

Environmental and Social Assessment of Urban Resilience Project

Project Area: Dhaka North City Corporation

September 2016

**Dhaka North City Corporation
64 Kamal Ataturk Avenue, Banani, Dhaka-1213**

Preface

Environmental Protection and Sustainable Development have been the cornerstones of the policies and procedures governing the industrial and other developmental activities. The Ministry of Environment and Forests has taken several policy initiatives and has enacted environmental (and pollution control) legislations to prevent indiscriminate exploitation of natural resources through Department of Environment (DoE). And also promote integration of environmental concerns in developmental projects. Environmental and Social Assessment (ESA) is a planning tool that is now generally accepted as an integral component of sound decision-making. The objective of ESA is to foresee and address potential environmental problems/ concerns at an early stage of project planning and design. ESA should assist planners and government authorities in the decision making process by identifying the key impacts/issues and formulating mitigation measures.

ESA of the **Urban Resilience Project-DNCC Part** is such kind of activity which points out the potentiality of the project in the local and national context. It also finds out the negatives impacts on the natural environment and on the surrounding people in addition to the positive impacts on the local society and the country. The project has appropriate preparation to protect from the deterioration of the environmental components and to minimize the impact on the inhabitants nearby to the factory. Moreover, an EMP is proposed for the project which will be very helpful to be friendly to the environment.

The proposed **Urban Resilience Project-DNCC Part** will be implemented in compliance with applicable environmental laws and regulations. Bangladesh has an environmental legal framework that is conducive to both environmental protection and natural resources conservation. This environmental legal framework applies to the proposed sub-project. In addition, a wide range of laws and regulations related to environmental issues are in place in Bangladesh. Many of these are cross-sectoral and partially related to environmental issues. This Section presents an overview of the major national environmental laws and regulations that are relevant and may apply to activities supported by the Urban Resilience Project-DNCC Part, institutional arrangement and national and sub-national level, and World Bank safeguard policies.

I am very much grateful to the *Project Director* of **Urban Resilience Project-DNCC Part** and *other officials* to support me in every step of doing the ESA. I am gratified to *the Environmental Experts* of World Bank for their guidance and suggestions to conduct the study. Finally, great appreciation from my side goes to my team members especially to Engr. Noman Al- Hafiz, Mr. Shahidur Rahman, Engr. Hasibul Hasan and Engr. Mehedi Hasan Mishuk for their all through support regarding the EA study.

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Bangladesh

LIST OF ABBREVIATIONS

ADB	Asian Development Bank
AEGL	Acute Exposure Guideline Level
AEZ	Agro-ecological Zone
ALOHA	Areal Location of Hazardous Atmosphere
AMSL	Above Mean Sea Level
ASME	American Society of Mechanical Engineers
BBS	Bangladesh Bureau of Statistics
BEZ	Bio-Ecological Zone
BIWTA	Bangladesh Inland Water Transport Authority
BLEVE	Boiling Liquid Expanding Vapor Explosion
BMD	Bangladesh Meteorological Department
BOD	Biochemical Oxygen Demand
BWDB	Bangladesh Water Development Board
CEGIS	Center for Environmental and Geographic Information Services
COD	Chemical Oxygen Demand
CSR	Corporate Social Responsibility
CW	Circulatory Water
DAE	Department of Agricultural Extension
DC	Deputy Commissioner
DG	Director General
DNCC	Dhaka North City Corporation
DoE	Department of Environment
DoF	Department of Fisheries
DoEx	Department of Explosives
DPHE	Department of Public Health Engineering
DSCC	Dhaka South City Corporation
DSM	Demand Side Management
ESA	Environmental and Social Assessment
EC	Electric Conductivity
ECA (zone)	Ecologically Critical Area
ECA	Environment Conservation Act
ECC	Environmental Clearance Certificate
ECR	Environment Conservation Rules
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EP	Equator Principle
EPA	Environmental Protection Agency
EPFI	Equator Principles Financial Institution
EPGL	Energypac Power Generation Limited

EPZ	Export Processing Zone
ETP	Effluent Treatment Plant
FD	Forest Department
FEED	Front End Engineering Design
FGD	Focus Group Discussion
FSCD	Fire Service and Civil Defence
GHG	Greenhouse Gas
GIS	Geographic Information System
GOB	Government of Bangladesh
GSB	Geological Survey of Bangladesh
HC	Hydrocarbon
HSD	Hi-speed Diesel
HSE	Health, Safety and Environmental
IEE	Initial Environmental Examination
IFC	International Finance Corporation
KII	Key Informants Interview
LPG	Liquefied Petroleum Gas
MEA	Multilateral Environmental Agreement
MoEF	Ministry of Environment and Forestry
MP	Muriate of Potash
MPA	Mongla Port Authority
MPFWB	Mongla Port Fairway Buoy
MSL	Mean Sea Level
NCA	Net Cultivable Area
NCS	National Conservation Strategy
NEMAP	National Environmental Management Action Plan
NEP	National Environment Policy
NGO	Non-Government Organization
NOAA	National Oceanic and Atmospheric Administration
NoC	No Objection Certificate
NWRD	National Water Resources Database
OD	Operational Directive
OM	Organic Matter
OP	Operational Policy
OP	Organic Phosphate
OUV	Outstanding Universal Value
PCM	Public Consultation Meetings
PGCB	Power Generation Company of Bangladesh
PPE	Personal Protective Equipment
PWD	Public Works Datum

RDC	Regional Distribution Center
RS	Remote Sensing
SLR	Sea Level Rise
SOP	Standard Operating Procedures
SPM	Suspended Particulate Matter
SPS	Safeguard Policy Statement
SRF	Sundarbans Reserve Forest
STW	Shallow Tube Well
TDS	Total Dissolved Solids
ToC	Table of Contents
ToR	Terms of Reference
TSP	Triple Super Phosphate
TSS	Total Suspended Solids
UEL	Upper Explosive Limit
UNCED	United Nations Conference on Environment and Development
URP	Urban Resilience Project
VOC	Volatile Organic Compound
WB	World Bank

WEIGHTS AND MEASURES

km	– Kilometer
kWh	– Kilo Watt Hour
l	– Liter
m	– Meter
m ³	– Cubic Meter
MW	– Mega Watt
MT	– Metric Ton

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Executive Summary

Urban Disaster Resilience has been defined as the capability to be prepared, respond to, and recover from multi-hazard threats with minimum damage to public safety and health, the economy, and security of a given area. The focus of the proposed project concerns natural disasters like flood, cyclone, tornado, earthquake etc. including accidents like fire, building collapse, landslide etc. that cause massive destruction and unrecoverable losses to the victims. All these incidents are frequent in the deliberate project areas of Dhaka North City Corporations (DNCC) specifically the floods and the earthquakes.

The Government of Bangladesh has therefore undertaken the Urban Resilience Project (URP) in DNCC with financing from the International Development Association (IDA) for the proposed Urban Resilience Project to support the emergency response and operation in disaster risk management. DNCC is implementing the project for DNCC, DSCC (Dhaka South City Corporation), Sylhet City Corporation (SCC) and Fire Service & Civil Defense (FSCD). Thirteen warehouses have been planned for construction; 11 in Dhaka and 2 in Sylhet and for FSCD, 5 for DNCC and 3 for DSCC for keeping the search and rescue equipments and subsequently use during emergency. The locations of the warehouses have already been finalized by the respective organizations, mostly in the existing premises.

DNCC is divided into 5 zones. The five sub-projects of DNCC, namely Uttara, Mirpur 2, Mohakhali, Mirpur 10 and Kawranbazar are fallen under Zone-1, 2, 3, 4 and 5 respectively. However, the proposed locations are not located within any environmentally sensitive area, and therefore, does not seem to create any adverse impact on the important environmental features. All the sites are belong to the concern agencies and mostly in their premises (except in Uttara, DNCC but no resettlement is required). In Uttara of DNCC at present some vehicles are occasionally parked while shopping. There are other places adjacent, where the vehicles could be parked. No significant impact is expected on the ecosystem and biodiversity, no agricultural land/ activities or fish farming will be disturbed, due to the construction of the sub project. Although, some earth excavation work will be involved, no agricultural land or garden has chances to demolish. In Uttara and Kawranbazar no three will be cut down whereas in Mohakhali site 8, Mirpur-2 site 3 and Mirpur-10 site only 1 tree will be cut down. Four trees will be planted against each cut down tree in addition to common gardening at each site.

Mitigation measures will be taken according to the EMP for minimizing the air, dust, noise, impact of construction materials storage areas and others such as health risk due to combustibility, compression and other mechanical malfunction. Drainage congestion and water logging problems are not found. Therefore, the Sub-project activities will not result any adverse impact in the environment surrounding the sub project. Moreover, it is a welcome and beneficial project for the local communities.

In conclusions of the Environmental and Social Assessment can be summarized, as the communities will receive large benefits in terms of quality of life, particularly with reduced disaster vulnerability, and improved health and education facilities, infrastructure, transportation & communication etc. The short-term negative impacts that may come in the way of air quality, noise, solid waste, occupational health & safety need to be minimized through the mitigation action plan. Moreover, post disaster health, safety and flood problems are common. These issues might be problematic if necessary mitigation measures, as suggested in EMP, would not take into consideration. The project will create employment for the workforce who live in the vicinity of the construction site and will provide them a short-term economic gain. The green belt development with large-growing trees at the periphery of the site will give the places a more natural and pleasing appearance. A comprehensive Environmental Management Plan (EMP) has been prepared to mitigate and reduce the adverse impacts that will come out from the Sub-project activities. The EMP mainly focuses on managing, mitigating and reducing the impacts exhibited from design, construction and operation phase.

BACKGROUND

Bangladesh is one of the most disaster-prone countries of the world because of its geographical location and the disaster risks are increasing due to climate change effects and other reasons. Besides natural disasters like cyclone, flood and tornado; man-made disasters like fire, drainage congestion, landslide and building collapse are increasing rapidly particularly in and around the major cities. The country has on the other hand achieved considerable capacity in disaster management particularly with respect to coastal cyclone, tidal surge and flood and to these the local communities, rural local government, NGOs, voluntary organizations like Red Crescent Society, and government organizations in the district and Upazila levels have been playing important role. But the city level emergency disaster management system remains weak as revealed from the various assessments and the City Corporations in particular have not been actively involved in disaster management except in some relief distribution during events like flood.

The National Plan for Disaster Management 2010-15 identified 12 major hazards. Of these, earthquake, fire, tornado and infrastructure collapse are highly relevant in both Dhaka and Sylhet while landslide too is highly relevant in Sylhet. In addition, drainage congestion is a serious concern in both cities. Earth quake is infrequent but Dhaka has been identified by Stanford University, as one of the 20 most earthquake vulnerable cities in the world. Besides earthquake, Dhaka has been identified as the second most flood prone metropolis, after Shanghai of China. Unplanned urbanization is consequently contributing to the threat.

Urban Disaster Resilience has been defined as the capability to be prepared, respond to, and recover from multi-hazard threats with minimum damage to public safety and health, the economy, and security of a given area. The focus of the proposed project concerns natural disasters like flood, cyclone, tornado, earthquake etc. including accidents like fire, building collapse, landslide etc. that cause massive destruction and unrecoverable losses to the victims. All these incidents are frequent in the deliberate project areas of Dhaka and Sylhet City Corporations.

Dhaka the capital city of Bangladesh is highly densely populated with habitation of 7 million people in the jurisdictional boundaries of Dhaka City Corporations, and 15 million in the wider Dhaka metropolitan area, the greater Dhaka area is particularly at risk of both natural and man-made disasters. Recent events serve as grim indicators of the extreme vulnerability of the built environment in Dhaka. The collapse of the Rana Plaza building in Savar on April 24, 2013 resulted in the death of 1,127 people and was the latest and most deadly in a series of structural failures in the city. A report commissioned by the Ministry of Home Affairs concluded that poor site location, sub-standard building materials, and illegal construction had contributed to the collapse. The lack of local capacity to conduct search and rescue, which required heavy lifting equipment and specialized training, also resulted in a slow response process. The event highlighted the deficiencies in the emergency management system, which relied more on ad-hoc decisions rather than a structured response operation. A separate study by the Bangladesh University of Engineering and Technology (BUET) assessed garment factories across the city and found that 60 percent were vulnerable to similar collapse.¹ The tragedy in Savar has prompted the GoB to consider how to reduce disaster risks in urban areas and simultaneously increase its capacity to respond more effectively to emergencies including disaster events.

Dhaka has also been identified as one of the 20 most vulnerable cities in the world to seismic risk². The nearest major fault line is believed to run less than 60 km from Dhaka, and although there is some uncertainty, research suggests that an earthquake of up to magnitude 7.5 is possible. This would have a dramatic, devastating impact on the city. Moreover, the city and its inhabitants are poorly prepared to respond to a crisis on this scale within the metropolitan area. A joint research project conducted by the University of Kansas and Dhaka University found that 83% of Dhaka's residents do not consider themselves prepared for an earthquake.³

Outside of Dhaka, the City of Sylhet - like many fast growing secondary cities in the region - suffers from a responsive rather than proactive approach to urban management and development. Sylhet is the third largest city in Bangladesh. Sylhet's own five-year development plan acknowledges that "the shortage of administrative, technical and professional capacity is exacerbated by lack of coordination,

¹ <http://www.guardian.co.uk/world/2013/jun/03/bangladesh-garment-factories-vulnerable-collapse>

² Earthquake Disaster Risk Index, Blume Earthquake Engineering Center, Stanford University (1997)

³ Disasters. 2010 Apr;34(2):337-59

an unwieldy bureaucracy and poor organization". In this context, the city's proximity to a fault line that crosses the country compounds vulnerability, and experts believe that Sylhet has the largest earthquake risk in the country.

PROJECT OBJECTIVES AND COMPONENTS

The Objective of the project is to increase the effectiveness of disaster preparedness and response, while addressing existing and emergent risks in Dhaka and Sylhet. The Project will enhance the capacity of municipal public organizations in Dhaka and Sylhet to effectively prepare for, respond to and recover from small and large emergency events. It will also identify an investment program to reduce critical vulnerabilities and will support an improvement in the quality of new building construction. Further, the project seeks to create an enabling environment for coordinated, locally managed disaster risks management.

The project has five components including (A) Reinforcing Bangladesh's Emergency Response Capacity; (B) Assessment of Vulnerability of Critical and Essential Facilities; (C) Improved construction, urban planning, and development; (D) Project Implementation, Monitoring, and Evaluation; and (E) Contingent Emergency Response. DNCC is implementing the Component A for improvement of the emergency response systems in the country covering (i) Creation of National Coordination Center and National Disaster Management Research and Training Institute; (ii) Enhancements to Fire Service and Civil Defense Capabilities; (iii) Building Emergency Management Capabilities of Dhaka City Corporations; and (iv) Enhancing Sylhet City Corporation's Emergency Management Capabilities.

PROJECT DESCRIPTION

The Government of Bangladesh has undertaken the Urban Resilience Project (URP) in two cities, Dhaka and Sylhet with financing from the International Development Association (IDA) for the proposed Urban Resilience Project to support the emergency response and operation in disaster risk management. Dhaka North City Corporation (DNCC) is implementing the project for DNCC, DSCC (Dhaka South City Corporation), Sylhet City Corporation (SCC) and Fire Service & Civil Defense (FSCD). Thirteen warehouses have been planned for construction; 11 in Dhaka and 2 in Sylhet and for FSCD, 5 for DNCC and 3 for DSCC for keeping the search and rescue equipments and subsequently use during emergency. The locations of the warehouses have already been finalized by the respective organizations, mostly in the existing premises.

The URP consists of four main components that focus on:

- i) Improving emergency response and preparedness capabilities,
- ii) Establishing an understanding of risk for critical facilities and essential facilities,
- iii) Supporting improvements in urban development and construction
- iv) Providing institutional arrangements for implementation, monitoring and evaluation to ensure efficiency, transparency, and accountability in the implementation of project activities.

Component A will support the following activities of the URP:

- Upgrade and refurbish a new facility that would house National Disaster Response Coordination Center (NDRCC) and the National Disaster Management Research and Training Institute (NDMRTI). The new facility will operationalize and sustain a program for well-coordinated emergency planning and response operations, and undertake training, educational and awareness activities. (Component A1)
- Enhance the emergency management planning and response capability of the Fire Services and Civil Defense (FSCD) with fixed and mobile control rooms. (Component A2)
- Build disaster risk management and emergency response capability of the Dhaka City Corporations including the establishment of a fully operating Emergency Operation Center (EOC). (Component A3)
- Build disaster risk management and emergency response capability of the Sylhet City Corporation including the establishment of a fully operating EOC for Sylhet City Corporation.

Sylhet City Corporation program will also the development of an Urban Resilience Unit (Sylhet URU) within the Corporation. (Component A4)

The objective of Component B is to develop the consensus-driven analytical foundation required for longer-term investments to reduce risk in the built environment of Dhaka and other cities in Bangladesh. It would concentrate on two activities:

- An assessment of the vulnerability of the built environment in greater Dhaka to earthquakes and other major hazards, focusing on essential and critical facilities and infrastructure. The assessment will establish the patterns of vulnerability of the city, understand the hotspots, and serve as a basis for a long term vulnerability reduction in greater Dhaka (Dhaka Metropolitan Development Plan Area);
- The development of risk-sensitive land use planning as a practice in Bangladesh informed by an understanding of the hazards, vulnerability and risk facing urban centers.

The over-all scheme for Component C covers three areas of investment, namely to:

- Create an organization within RAJUK, the Urban Resilience Unit (URU) to support DRR mainstreaming and improving Dhaka urban resilience;
- Put up the infrastructure and process to ensure an efficient and integral process for land use & zoning clearance; building code implementation and enforcement; permitting and approval of site & building plans; and
- Improved competency (through professional accreditation), trainings, continuous education, forums, piloting of projects for urban resilience, demonstrating results that address key urban development and management problems and issues.

Four organizations Dhaka North City Corporation (DNCC), Rajdhani Unnayan Koitripokkha (RAJUK), Department of Disaster Management (DDM) and Project Co-ordination and Management Unit (PCMU) under Programming Division of Planning Ministry are implementing the Urban Resilience Project under separate DPP. Three components: Component A, Component B and Component C of the Urban Resilience Project are being implemented. Dhaka North City Corporation is implementing the Component A of the project with the Dhaka South City Corporation (DSCC), Sylhet City Corporation (SCC) and Fire Service & Civil Defense (FSCD).

21 Numbers (5 for DNCC, 3 for DSCC and 13 for FSCD) of warehouses are planning to be constructed in Dhaka and Sylhet City. In the warehouses, the search and rescue equipments will be kept and during the disaster, the equipments will be mobilized for rescue operation. The lists of equipment to be kept in the warehouses are being finalized and going to be procured under international bidding process. In Dhaka North City Corporation, 5 sites are already been identified near to five zonal offices. In South City Corporation, 3 sites are provided for warehouse construction in the jurisdiction of 3 zone offices. As the 2 zonal offices are housed in the main corporation building, two rooms in the main corporation building are kept for storing the equipments. The warehouses in DNCC and DSCC will be two storied pre-fabricated steel structure. In the ground floor, ambulance and trailer will be parked and in the up-stair the light equipments will be shelved with a monitoring & control room. In FSCD, single storied pre-fabricated steel structure warehouses will be constructed in the premises of the existing fire stations.

The locations of the warehouses are:

Dhaka North City Corporation:

S/N	Warehouse Location	Type of Building
1.	Zone-1, Uttara	Type 1 (2400 sft), 2-storied Building
2.	Zone-2, Mirpur-2	Type 1 (3000 sft), 2-storied Building
3.	Zone-3, Mohakhali Wholesale Kitchen Market	Type 1 (2400 sft), 2-storied Building
4.	Zone-4, Mirpur-10	Type 1 (2400 sft), 2-storied Building
5.	Zone-5, Karwanbazar	Type 1 (2400 sft), 2-storied Building

Fire Service & Civil Defense:

S/N	Warehouse Location	Type of Building
1.	FSCD office Sadarghat	Type C (1000 sft)
2.	FSCD office Postagola	Type A (1350 sft)
3.	FSCD office Demra	Type A (1350 sft)
4.	FSCD office Khilgaon	Type B (1000 sft)
5.	FSCD office Fulbari	Type A (1350 sft)
6.	FSCD office Hajaribag	Type A (1350 sft)
7.	FSCD office Tejgaon	Type B (1000 sft)
8.	FSCD office Uttara	Type A (1350 sft)
9.	FSCD office Tongi	Type A (1350 sft)
10.	FSCD office Mirpur 10	Type B (1000 sft)
11.	FSCD office Taltola, Sylhet	Type A (1350 sft)
12.	FSCD office South Surma, Sylhet	Type A (1350 sft)
13.	FSCD Training Academy, Mirpur-10	Type D (18000 sft)

Dhaka South City Corporation:

S/N	Warehouse Location	Type of Building
1.	Zone-3, Azimpur	Type 1 (3000 sft), 2-storied Building
2.	Zone-2, Khilgaon	Type 2 (2400 sft), 2-storied Building
3.	Zone-5, Saidabad	Type 3 (2400 sft), 2-storied Building

The present Environmental Assessment particularly focuses on the environmental management of construction of warehouses for emergency management facilities in Component A of URP of Urban Resilience Project- Dhaka North City Corporation Part.

SCOPE OF ESA STUDY

This ESA for the industrial project of **Urban Resilience Project** identifies the potential environmental impact/issue due to the industrial project and also provides outline of suggestions of effective measures to mitigate the adverse impact and enhance the positive environmental potential.

Specific Scope of the ESA report covers to:

- Present a description of the project, the process and activities under the program and evaluate the practices from environment point of view
- Present a discussion of environmental Biological and social legal policy and institutional requirement and arrangement
- Describe and evaluate the project and adjacent area from environmental, biodiversity health and social point of view
- Delineate the significant environmental, biological, social and health issue believed to be involved due to the industrial project

- Assess the environmental, biological, social and health impacts of project implementation and operational stage and management practices
- Documents of public concerns and advices
- Suggestion recommended 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

The final output of the work is an environmental, biological, Health and social Impact Assessment in name of an ESA report.

METHODOLOGY

The study has conducted and the report is prepared based on the information provided by **Urban Resilience Project** all possible secondary information and data collected from all relevant sources, data collected from the field through observation, primary data collection, public consultation, surveys and certain degree of field validation.

During this process following step were followed:

- Collect information from project area related to study
- Detail understanding of scope of assignment, activities involved and the intervention areas and its surrounding environment
- Engage resource persons/ field staff for the assignment
- Collect all possible data on the environmental, social, health and natural resource components and parameters of necessity
- Collection and review of pertinent report and other references which particularly included DoE SEA guideline for industries, Environmental policies, Environment conservation Act, Rules
- Meet concerned agencies and gather information from various government and other agencies (Local Union councils, Upazila councils, SRDI, BMD, DoE, WDB, DoF)
- Develop and utilize different information gathering tools as necessary or deemed appropriate
- Undertake field visit and field surveys which would be representative of geographical, ecological and also potential environmental, biological and social problem areas
- Conduct representative survey a wide section of people of proposed plant area to acquire field level data on existing environment, biodiversity, health and socio-economic and apprehend impacts of project
- Critical analysis of proposed project documents and others information
- Identification of source of environmental and biodiversity degradation and disturbances of significance
- Look into the performance of certain similar company
- Sampling and analysis of different components of environment related to the proposed plant
- Identification of possible environmental impacts and evaluation of their significance and consequences
- Presentation of an outline of environmental management plan for future handle the environmental, biological, social and health related issues
- Prepare the draft ESA report
- Receive feedback and obtain quality check
- Prepare final ESA report

Environmental and Social Assessment of Urban Resilience Project

Project Area: Dhaka North City Corporation

Project Location: Uttara

1 INTRODUCTION

1.1 Background of the Sub-project

This is a Sub-project under Urban Resilience Project-DNCC Part. In the Sub-project area a new warehouse has been planned for construction for keeping the search and rescue equipments and subsequently use during emergency. The significant features of the Sub-project have been mentioned in Table 1.

Table 1: Significant features of the sub-project

Name of the Sub-project	Construction of warehouse in Uttara under Urban Resilience Project-DNCC Part
Warehouse Location	Zone-1, Uttara model town, Isakha Avenue, Uttara
Type of Building	Type 1 (2400 sft), 2-storied Building
Land available	0.055 acres
Land acquisition	Not required

1.1.1 Aim of Sub-project

The objective of the sub-project is to increase the effectiveness of disaster preparedness and response, while addressing existing and emergent risks in Dhaka. The Project will enhance the capacity of municipal public organizations in Dhaka to effectively prepare for, respond to and recover from small and large emergency events. It will also identify an investment program to reduce critical vulnerabilities and will support an improvement in the quality of new building construction. Further, the project seeks to create an enabling environment for coordinated, locally managed disaster risks management.

1.1.2 Location of Sub-Project

The Sub-project is located in the Zone-1, Uttara model town, Isakha Avenue, Uttara which is within the Dhaka North City Corporation. The location details of the Sub-project have been summarized in Table 2. The Layout Plan, Location Map, Base Map and Topographical Map have been shown in Figure 1, Figure 2, Figure 3 and Figure 4 respectively. Photographs showing present condition of the Sub-project area have been shown in Figure 5.

Table 2: Location Details of the sub-project

Division	Dhaka
District	Dhaka
Upazila	Uttara (East)
Word No.	1 (N)
Mouza	Azampur
GPS Position	23.87 ⁰ N and 90.40 ⁰ E
Nearby Major Road	Dhaka- Mymensingh highway
Nearby River/ Canal	Turag River which is about 2 km away from the site

1.2 Purpose of the Environmental and Social Assessment (ESA) Study

The purpose of the ESA process is to inform decision-makers and the public of the environmental consequences of implementing a proposed project. The ESA document itself is a technical tool that identifies, predicts, and analyzes impacts on the physical environment, as well as social, cultural, and health impacts. If the ESA process is successful, it identifies alternatives and mitigation measures to reduce the environmental impact of a proposed project. The ESA process also serves an important procedural role in the overall decision-making process by promoting transparency and public involvement.

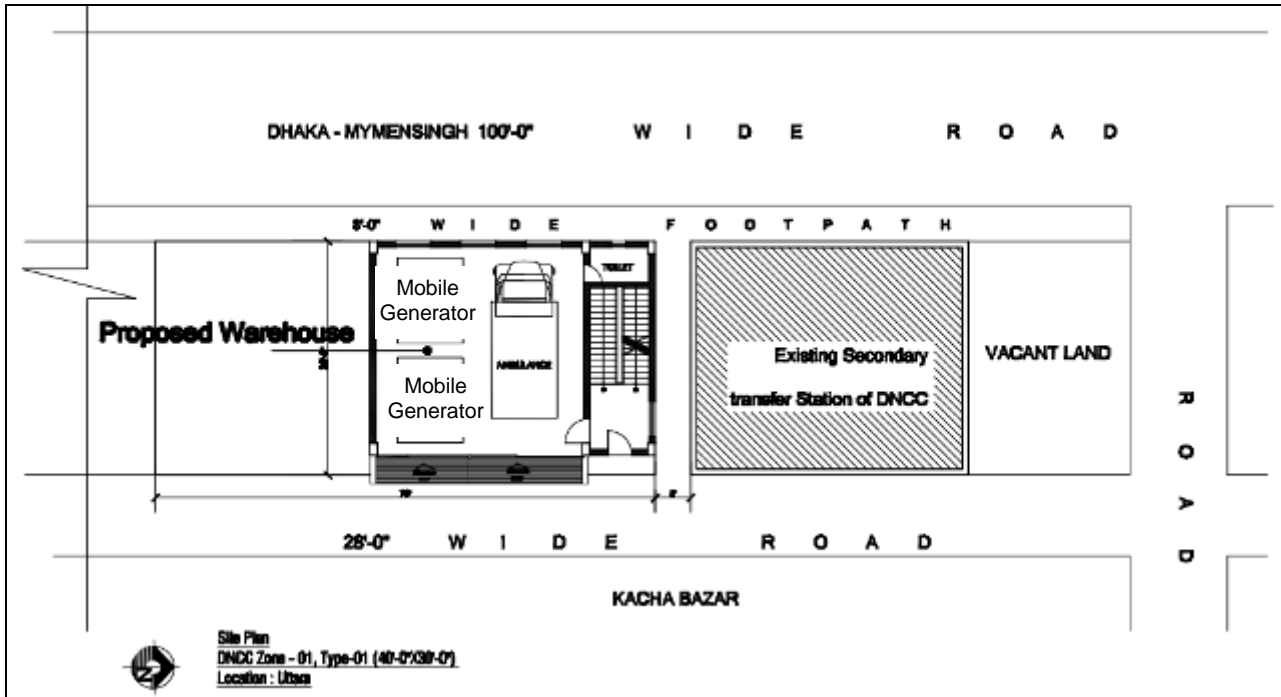


Figure 1: Layout Plan of the Proposed Sub-project

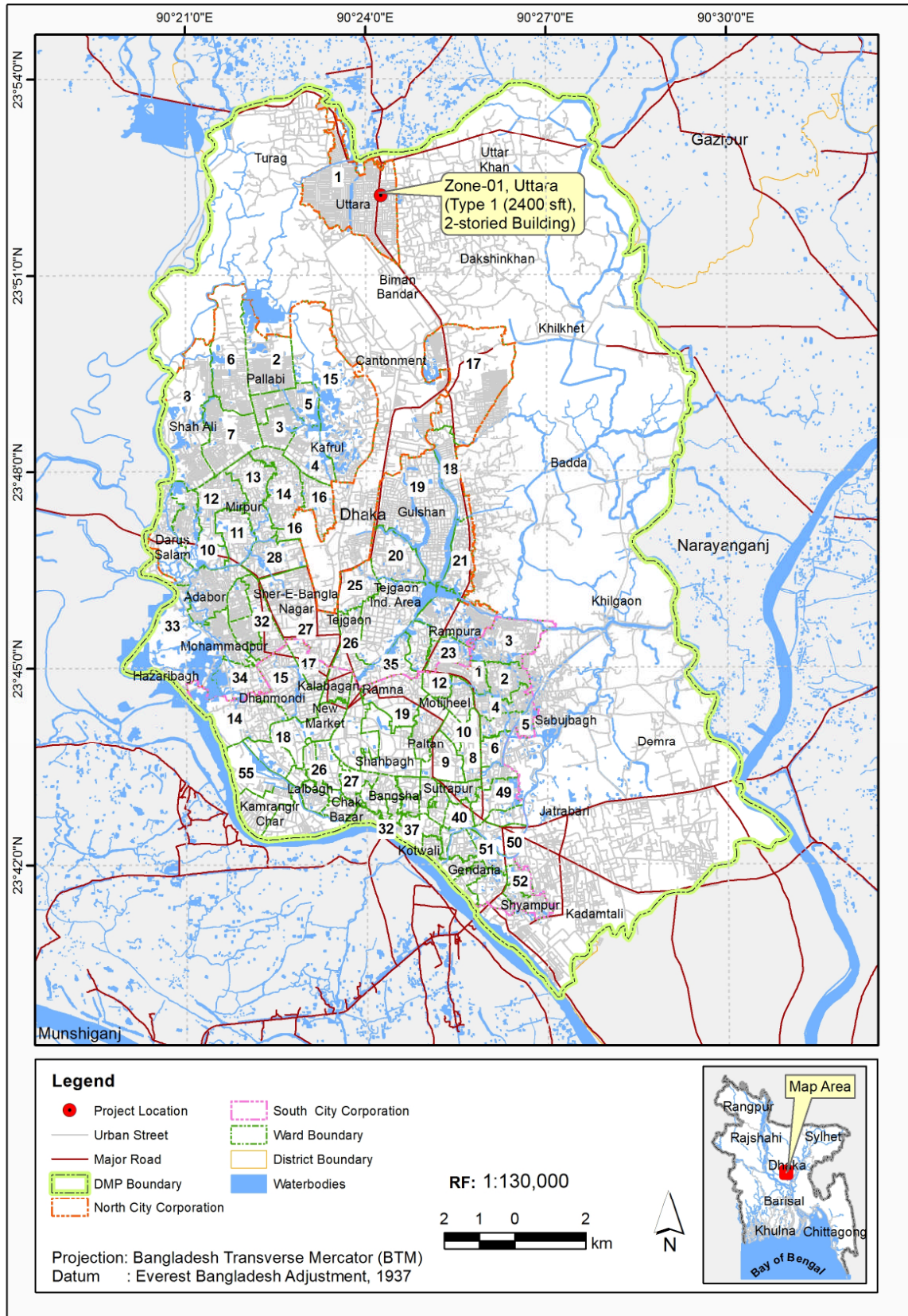


Figure 2: Location Map of Sub-project Site

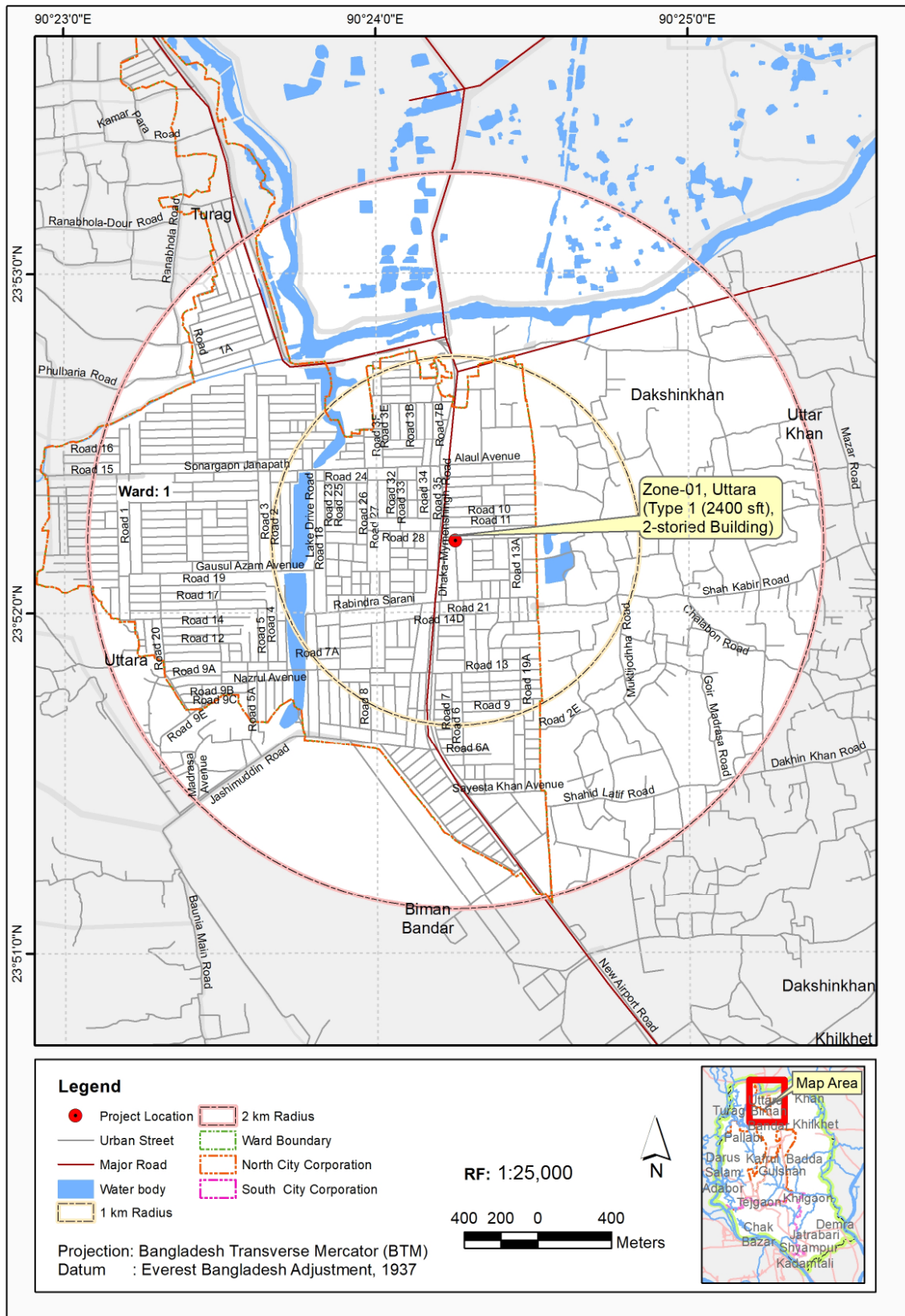


Figure 3: Base Map of Sub-project Site

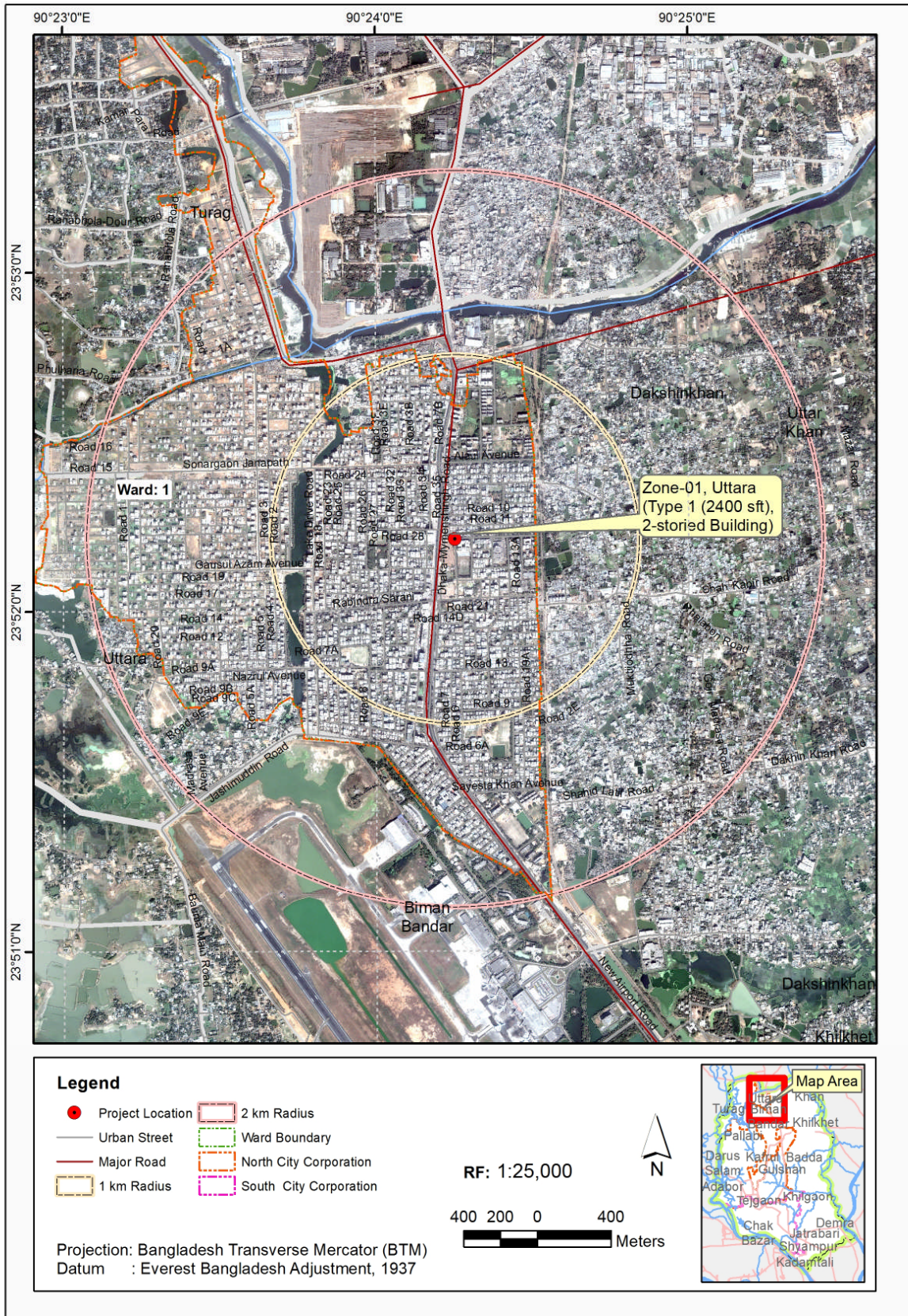


Figure 4: Topographical Map of Sub-project Site



Figure 5: Photograph showing the present condition the sub-project area

1.5 Brief Description of Sub-Project Site

The proposed Sub-project is located within the Zone-1, Uttara model town, Isakha Avenue, Uttara, beside Dhaka- Mymensingh highway. The important establishments around the Sub-project site have been summarized below.

North Boundary: Lab aid diagnostic Centre, I.C Hospital, Hotel La Meridian Restaurant, Mascot Plaza, Brac bank etc.



Figure 6: North side major features of the site

South Boundary: Nawab Habibullah Model High School and College, DPS STS School, Standard Chartered Bank Limited, Uttara Police Station, Bangladesh Krishi Bank, persona etc.



Figure 7: South side major features of the site

East Boundary: Rajuk Uttara Model College, Uttara University, Dhaka North City Corporation, American Super Hospital Limited.



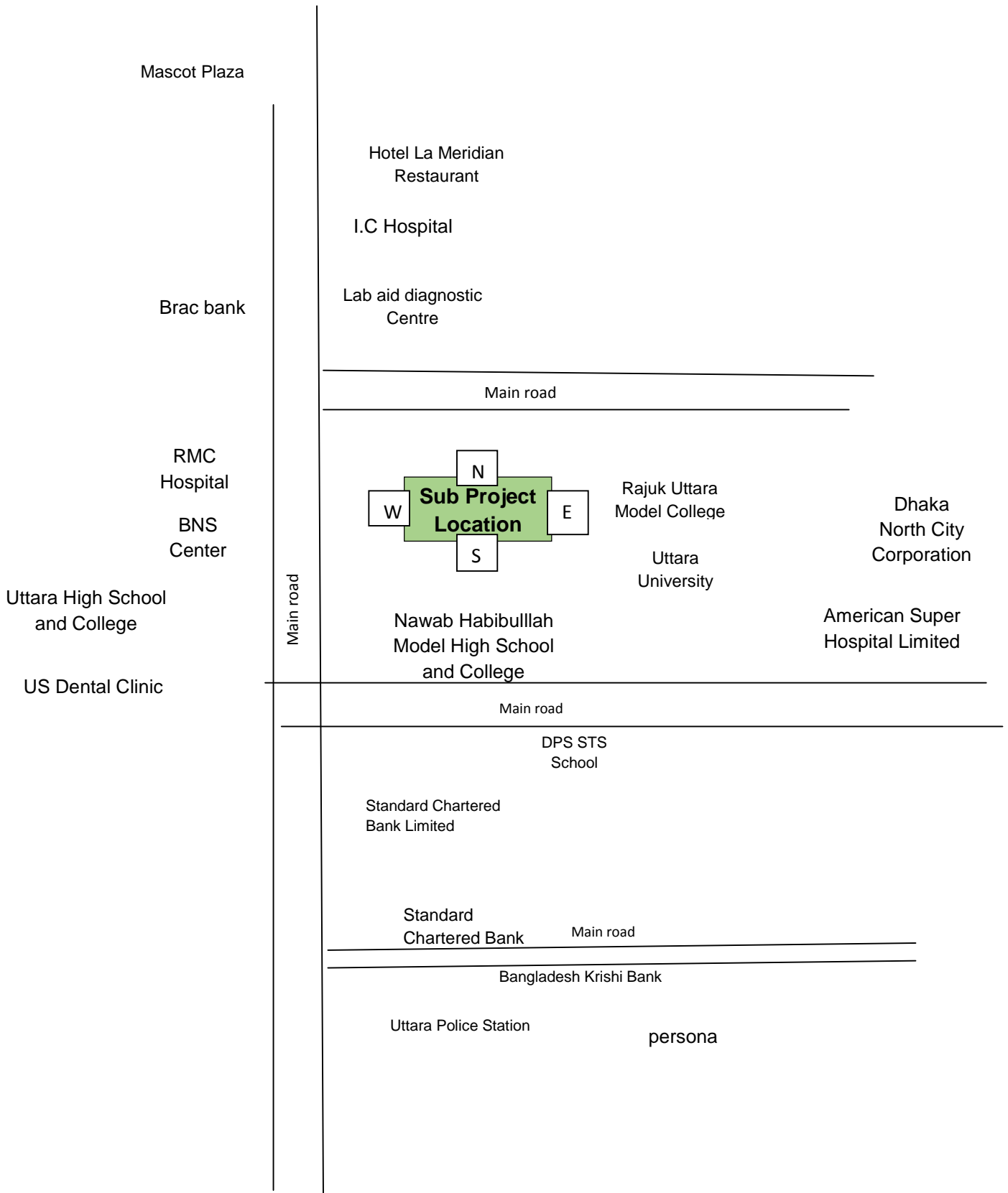
Figure 8: East side major features of the site

West Boundary: RMC Hospital, BNS Center, Uttara High School and College, US Dental Clinic etc.



Figure 9: West side major features of the site

Site Surrounding of Sub-Project in Hand Sketch Map



1.6 Sub-Project Components

The major components of the sub-project are a two storied building (2400 sft) and some rescue equipments (such as Trailer, Ambulance, Fire extinguisher and Life jacket etc) kept in this building which is used use during emergency. Also a 815 sft auxiliary monitoring and demonstration room is proposed in 1st floor of this building.

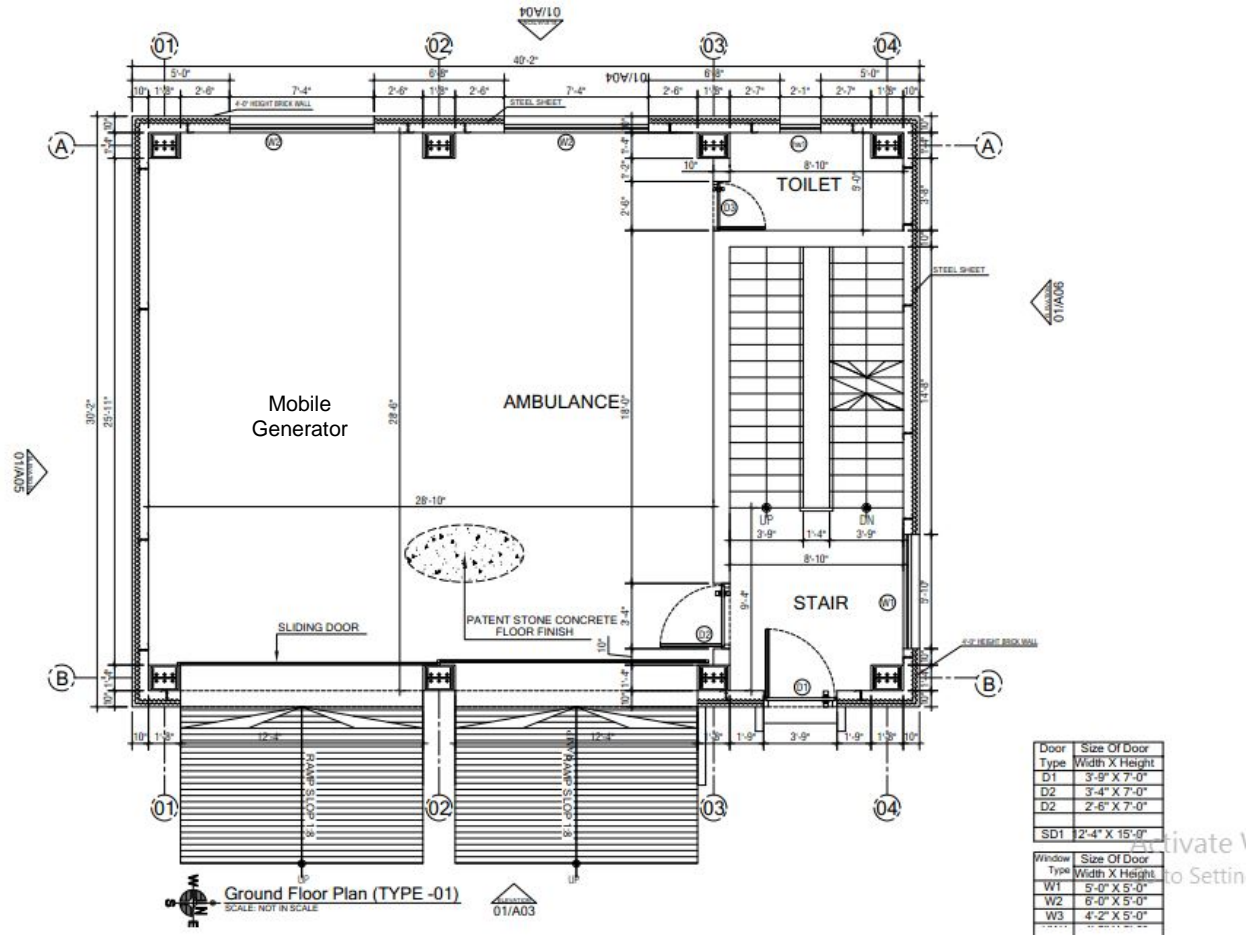


Figure 10: Plan layout of ground floor

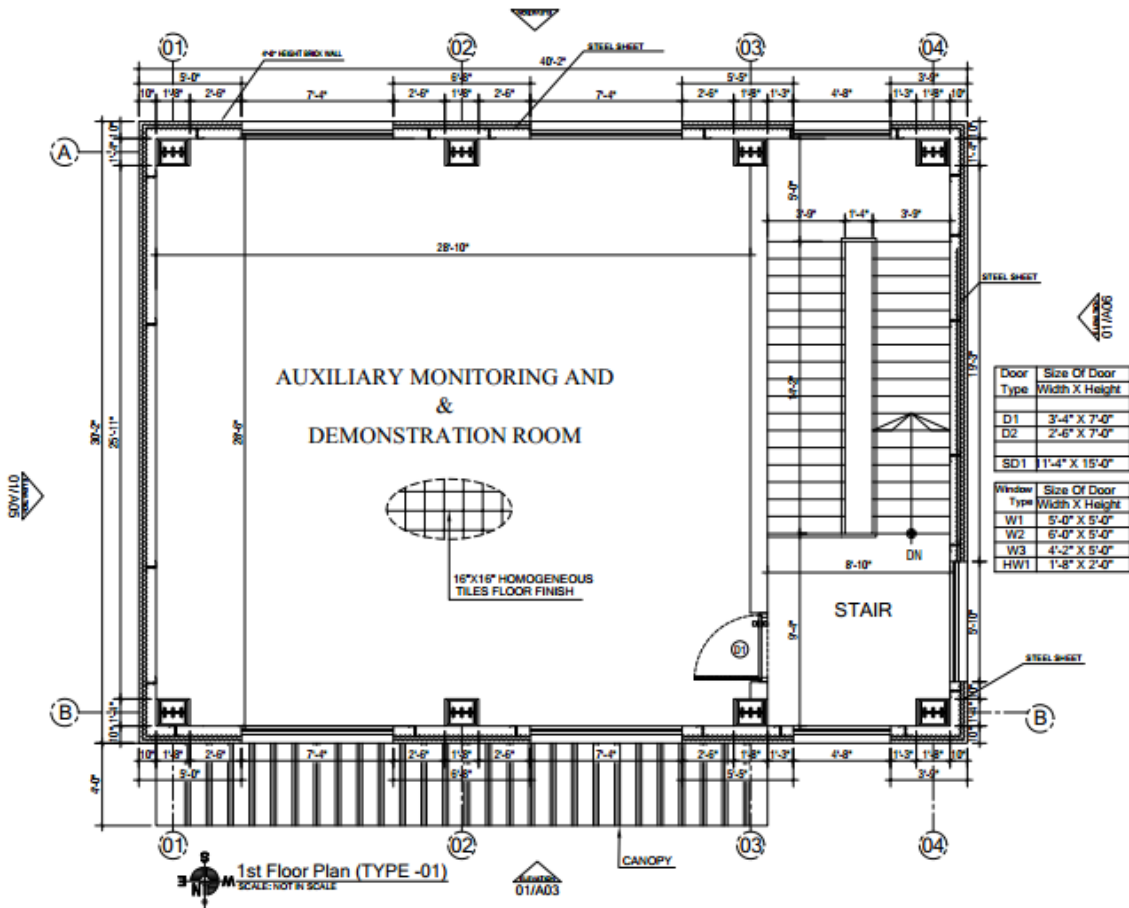


Figure 11: Plan layout of first floor



Figure 12: North elevation

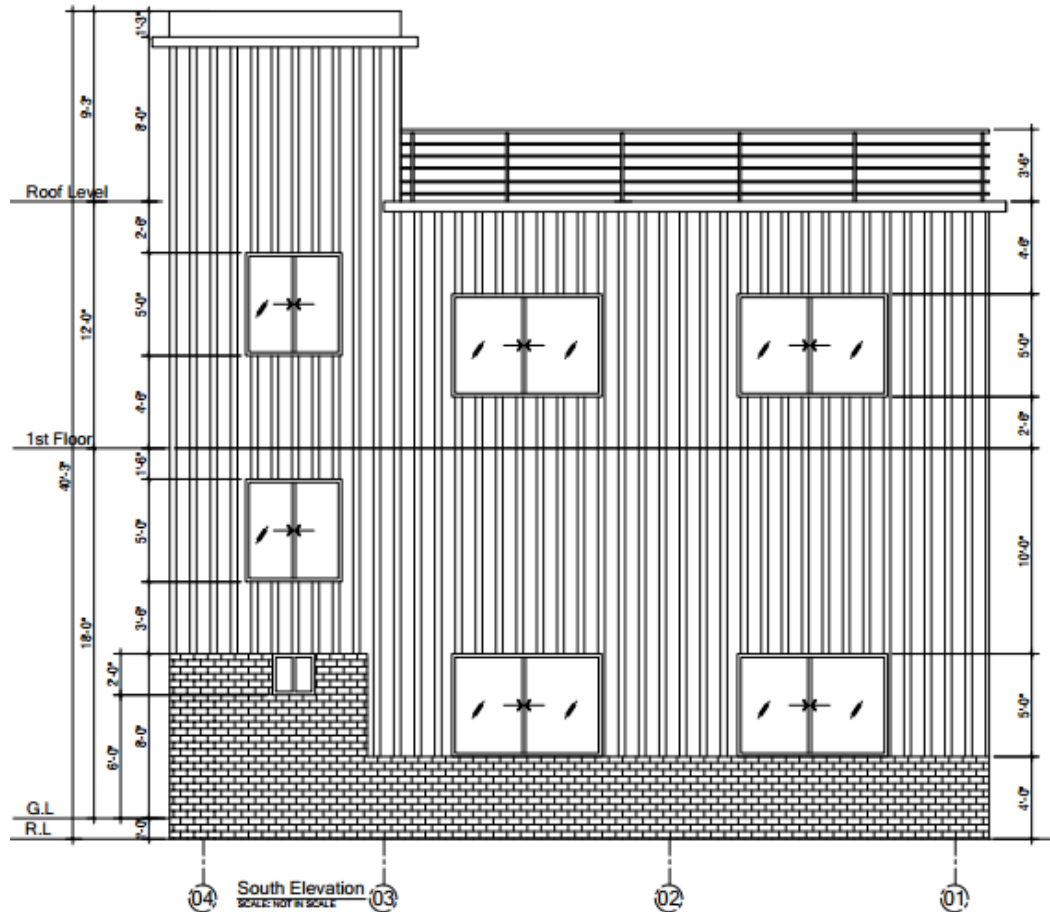


Figure 13: South elevation

1.7 Structural Design Analysis

In the structural design it is very important to keep sufficient air and light circulation in the floor plan. According to the BNBC minimum 25% ventilation should be maintained in any kind of infrastructure. From the above floor plan (Figure 11, 12, 13 and 14), it has been found that there is around 650 sq. ft. openings where as 25 % of 2400 sq. ft. is 600 sq. ft. So, there is sufficient ventilation option in the proposed structure.

Normally, according to the BNBC code 2014, the plinth or floor level of a building is 2 feet high from the existing ground or road level. In the design of warehouse, the plinth level is considered with respect to the surrounding infrastructure plinth level. The highest plinth level among surrounding buildings has been considered as the plinth level of the warehouse. In this area, the highest flood height is 5 feet, lowest is 1 feet and average is around 2 feet. And the frequency of highest height flooding is more or less 15 years. So the design seems safe regarding the flooding issue.

Moreover, for DSCC, in the ground floor Ambulance and Mortuary vans will be parked, in the first floor light search and Rescue equipment will be kept. Only 2/3 people will be stationed in the warehouse. And the stair will be enough for the Emergency Exit as per the BNBC rules (the rule is given at the end of the table). Moreover a steel ladder with a window will be kept for using as emergency exit. *The guidance of BNBC is given below for the Emergency Exit.*

Emergency Exit: *Provided single stair satisfies the BNBC Part 4 chapter 3 requirement as described below:*

3.14 *Number of Exits*

3.14.1 *The requirements of the number of exits specified in this subsection shall apply to buildings of all occupancy groups unless a more restrictive requirement for any occupancy is provided in Chapter 5, Part 4 or elsewhere in this Code.*

3.14.2 *Only one means of exit shall suffice for the buildings specified in Table 4.3.5 provided that*

they do not have more than one floor below the level of exit discharge.

3.14.3 For all other buildings the required number of exits shall depend on the occupant load as specified below:

Occupant load 500 or less	Minimum 2 exits
Occupant load 501 to 1000	Minimum 3 exits
Occupant load more than 1000	Minimum 4 exits

Table 4.3.5 Buildings Served by One Means of Exit

Occupancy	Maximum Number of Storeys	Other Restrictions
All	1	Maximum occupant load 100 and maximum travel distance 25 m
A1	2	Maximum occupant load 30
A2	6	Maximum 12 dwelling units
A3	4	Maximum 50 occupants per floor and maximum travel distance 25 m
A4	6	Maximum 50 occupants per floor and maximum travel distance 25 m
A5	2	Maximum occupant load 50
B, C	2	Maximum occupant load 200
D	2	Maximum occupant load 50
F, G, H	2	Maximum occupant load 100 and maximum travel distance 25 m

3.14.4 All buildings more than 6 storeys or 20 m in height and all buildings having a floor area larger than 500 m² on each floor, used as educational, institutional, assembly, industrial, storage or hazardous occupancy or a mixed occupancy involving any of these, shall have a minimum of two staircases. The staircases shall be of the enclosed type and shall lead directly to the exterior or the designated area of refuge.

1.8 Equipment and Storing Place

The larger and vehicular equipment will be stored at the ground floor like Mobile Light Unit and Generator (2000w), Generator, Concrete Cutter, Ambulance and the smaller equipment will be stored at the first floor like Air Compressor, Power Chain Saw, Megaphone, Breathing, Apparatus, Knee Pad & Eye Protector, Gloves, Multi-Purpose, Cutter, Ram Jack, High Pressure Air Bag, Rubble Removing Bag, Stretcher, Family tent, Relief tent, Dead Body Bag, Chemical Light Sticks, Fire Aid Box.

For the storing of the equipment, there is enough space according to the above drawing. And the equipment which will be stored at the ground floor will be lightly affected from any sudden flood due to their nature. And as per the layout there is enough space for emergency exit.

2 POLICY LEGAL AND ADMINISTRATIVE FRAMEWORKS

The proposed Urban Resilience Project-DNCC Part will be implemented in compliance with applicable environmental laws and regulations. Bangladesh has an environmental legal framework that is conducive to both environmental protection and natural resources conservation. This environmental legal framework applies to the proposed sub-project. In addition, a wide range of laws and regulations related to environmental issues are in place in Bangladesh. Many of these are cross-sectoral and partially related to environmental issues. This Section presents an overview of the major national environmental laws and regulations that are relevant and may apply to activities supported by the Urban Resilience Project-DNCC Part, institutional arrangement and national and sub-national level, and World Bank safeguard policies.

2.1 National Environmental Laws and Regulations

National Environmental Policy 1992

The concept of environmental protection through national efforts was first recognized and declared in Bangladesh with the adoption of the Environment Policy, 1992 and the Environment Action Plan, 1992. The major objectives of Environmental policy are to i) maintain ecological balance and overall development through protection and improvement of the environment; ii) protect country against natural disaster; iii) identify and regulate activities, which pollute and degrade the environment; iv) ensure environmentally sound development in all sectors; v) ensure sustainable, long term and environmentally sound base of natural resources; and vi) actively remain associate with all international environmental initiatives to the maximum possible extent.

Bangladesh Environmental Conservation Act (ECA), 1995 amended 2002

This umbrella Act includes laws for conservation of the environment, improvement of environmental standards, and control and mitigation of environmental pollution. It is currently the main legislative framework document relating to environmental protection in Bangladesh, which repealed the earlier Environment Pollution Control ordinance of 1977.

Environment Conservation Rules (ECR) 1997 amended 2003

These are the first set of rules, promulgated under the Environment Conservation Act 1995. Among other things, these rules set (i) the National Environmental Quality Standards for ambient air, various types of water, industrial effluent, emission, noise, vehicular exhaust etc., (ii) requirement for and procedures to obtain Environmental Clearance, and (iii) requirements for IEE/EIA according to categories of industrial and other development interventions.

Environment Court Act, 2000

The aim and objective of the Act is to materialize the Environmental Conservation Act, 1995 through judicial activities. This Act established Environmental Courts (one or more in every division), set the jurisdiction of the courts, and outlined the procedure of activities and power of the courts, right of entry for judicial inspection and for appeal as well as the constitution of Appeal Court.

Bangladesh National Building Code

The basic purpose of this code is to establish minimum standards for design, construction, quality of materials, use and occupancy, location and maintenance of all buildings within Bangladesh in order to safeguard, within achievable limits, life, limb, health, property and public welfare. The installation and use of certain equipment, services and appurtenances related, connected or attached to such buildings are also regulated herein to achieve the same purpose.

2.2 International Safeguard Policies (World Bank)

The objective of these policies is to prevent and mitigate undue harm to people and their environment in the development process. Safeguard policies provide a platform for the participation of stakeholders in project design, and act as an important instrument for building ownership among local populations. The effectiveness and development impact of projects and programs supported by the Bank has substantially increased as a result of attention to these policies. The World Bank has ten environmental, social, and legal safeguard policies. The relevant policies for environmental safeguard are the following:

- OP/BP 4.01 Environmental Assessment
- OP/BP 4.04 Natural Habitats

OP/BP 4.09 Pest Management
OP/BP 4.11 Physical Cultural Resources
OP/BP 4.36 Forests
OP/BP 4.37 Safety of Dams

Operational Policies (OP) are the statement of policy objectives and operational principles including the roles and obligations of the Borrower and the Bank, whereas Bank Procedures (BP) is the mandatory procedures to be followed by the Borrower and the Bank. Apart from these, the IFC guidelines for Environmental Health and safety have been adopted by the World Bank Group which is also relevant for environmental protection and monitoring. In addition to that the Policy on Access to Information of World Bank also relates to environmental safeguard.

2.3 Implications of Environmental Policies and Regulations on URP

The Environmental Conservation Rules (ECR) 1997 (DoE, 1997) classifies projects into four categories according to potential environmental impacts: **(1) Green; (2) Orange A; (3) Orange B; and (4) Red. Green category** projects are those with mostly positive environmental impacts or negligible negative impacts; **Orange A** category projects are those with minor and mostly temporary environmental impacts for which there are standard mitigation measures; **Orange B** category project are those with moderately significant environmental impacts; while **Red category** projects are those with significant adverse environmental impacts. As discussed in project description, the sub-projects to be implemented under Urban Resilience Project-DNCC Part would fall under **Orange A** category.

The BNBC, PPR 2008, Bangladesh Labor Act 2006 outlines guidelines for ensuring worker's health and safety during construction works which would have direct implications in project. It would be the responsibilities of the contractors (with supervision of DNCC) to make sure that these guidelines are followed in the workplace environment.

According to WB Operational Policy (OP 4.01), the nature of environmental assessment to be carried out for a particular sub-project would largely depend on the category of the sub-project. As mentioned earlier, The World Bank Operational Policy (OP) 4.01 classifies projects into three major categories (category A, B and C), depending on the type, location, sensitivity and scale of the project, and nature and magnitude of potential impacts.

The sub-projects to be implemented under the Urban Resilience Project-DNCC Part do not involve large-scale infrastructure development (e.g., construction of sanitary landfill, water or wastewater treatment plant, major highways). The sub-projects would involve no involuntary land acquisition. Thus, the sub-projects to be carried out do not appear to pose risk of significant adverse environmental impacts. In view of subprojects nature, the overall project is classified as a Category 'B' and the safeguard policy OP/BP 4.01 has been triggered for the proposed operation. The policy has been triggered to ensure that the sub project design and implementation will be focused on reducing adverse impacts and enhancing positive impacts.

It is highly unlikely that any natural habitat formed largely by native plant and animal species will be affected or modified by the subprojects activities to be implemented under Urban Resilience Project-DNCC Part because most of the infrastructure development works are small-scale and will take place in the built environments of municipalities adjacent to various other infrastructures. However, the EMF stipulated the code of practice on natural habitat as advance precautionary measures and Natural Habitats (OP/BP 4.04) has been triggered.

Also it is unlikely that any designated physical cultural resources will be affected by the subprojects. However, the impacts will be examined as part of the environmental screening/assessment of each sub-project. The EMF provided criteria for screening and assessment of physical cultural resources. In addition, 'Chance find' procedures conforming to local legislation on heritage would be evaluated that any physical or cultural resources will not be impacted. OP 4.11 (Physical Cultural Resources) has been triggered.

The activities of the project will not involve any pesticide application, include activities in forest areas or relate to protection of dams. Hence OP 4.09, 4.36 and OP 4.37 will not be relevant as well.

The IFC guidelines provides guidance on certain EHS issues which include standards for

environmental parameters (ambient air quality, water and wastewater quality, noise level, waste management), hazard and accident prevention, occupational and community health and safety (during commissioning and decommissioning works) etc. These guidelines will be directly applicable to the MGSP project. As a general rule, the IFC guidelines should complement the existing Bangladesh guidelines or standards. In case the Bangladesh guidelines or standards differ from the IFC guidelines, project is expected to follow the more stringent ones.

The World Bank access to information policy would be directly followed. The Urban Resilience Project-DNCC Part will make the environmental assessment and EMF documents available to the public by publishing it in their websites. In addition, subproject specific screening/assessment report will periodically be posted in the DNCC website before the bidding process. Hard copies of these documents in English (including a summary in Bengali) will be made available in the offices of the respective Pourashavas and city corporations for the local stakeholders.

3 DESCRIPTION OF THE ENVIRONMENT (BASELINE ENVIRONMENT)

3.1 Physical Environment

3.1.1 Geology, Topography and Soils

The part of Bangladesh to which the capital city of Dhaka belongs is dominated by the rivers Ganges, Jamuna and Meghna, which drain large quantities of water from the Himalayan Mountains into the Bay of Bengal, through a complex delta system of tidal tributaries and creeks, formed by sediment deposited by the rivers. Known as a composite of Brahmaputra-Jamuna Flood plain and Madhupur Sal Tract, this part – the central region – is composed of flat and low lying land, which floods extensively in the rainy season and red textured highlands.

Much of Bangladesh lies on the Gangetic-Bengal Plain, and is flat and low lying particularly around the delta, which floods extensively in the rainy season. The sub-project site situated in North of Dhaka, the land gradually begins to rise, towards the foothills of the Himalayas in the north. The influence of the rivers is evident in the soils, which are almost entirely alluvial and generally fertile in the central plains, with a predominantly loam and silt consistency.

The sub-project site is situated in Dhaka which is situated at the southern tip of a Pleistocene terrace, the Madhupur tract. Two characteristic geological units cover the city and surroundings, viz Madhupur Clay of the Pleistocene age and alluvial deposits of recent age. The Madhupur Clay is the oldest sediment exposed in and around the city area having characteristic topography and drainage. The major geomorphic units of the city are: the high land or the Dhaka terrace, the low lands or floodplains and depressions and abandoned channels. Low lying swamps and marshes located in and around the city are other major topographic features of the sub-project site.

3.1.2 Hydrology (Surface & Groundwater)

In the proposed site where warehouse will be constructed there is no water body but Turag River which is about 2 km away from the site.

Like other towns and cities of Bangladesh, the Dhaka city dwellers, too, use both surface and groundwater as a source of domestic water. Principal difference lies in use of supply water based on treatment with some application of chlorine in Dhaka and other population centers. Pollution of rivers is a major problem, because of the discharge of industrial wastewater and inadequate sewerage. The DoE has identified 450 polluting industrial units in Dhaka (196 tanneries, 129 textile producers, 38 engineering factories, and plants manufacturing pesticides, chemicals, fertilizers, pulp and paper), many of which discharge untreated wastewater to the rivers. The sewerage system covers only 20% of the city population, and 50% of people use septic tanks, 20% pit latrines and 10% use open latrines and other unsanitary methods.

There are three main aquifers in the central region of Bangladesh:

- (i) An upper (composite) aquifer, which can reach depths of 50 m and is covered with an upper silty clay layer of less than 20 m;
- (ii) A middle (main) aquifer of fine to heavy sands, which is generally 10-60 m thick and in most areas is hydraulically connected with the composite aquifer above; and
- (iii) A deep aquifer of medium, medium-to-fine or medium-to-coarse sand, which is generally found at depths below 100 m.

In Dhaka 80% of the domestic water supply is obtained from the middle aquifer, extracted by tube-wells throughout the city. Recent studies have shown that water levels have fallen dramatically (20 m over the past six years) and suggest that the aquifer may be changing from a confined to an unconfined condition, which could make it vulnerable to contamination. There is already evidence of pollution by leaking underground tanks at petrol stations and chemical plants, and seepage from sewers, septic tanks and pit latrines. DWASA is implementing a major project to improve the water supply service, which amongst other things will increase the usage of surface water and extend groundwater abstraction to the deeper aquifer, at a sustainable rate.

The water quality data of the month of June, 2016 of the lakes and rivers in and around Dhaka City is given in ANNEX A. The analysis is done by DoE, Dhaka.

3.1.3 Climate and Meteorology

The climate in the sub-project area is humid and sub-tropical, with a typical three season pattern. During the winter season (November-February), cool winds blow from the north-east. The weather is cool and dry. Rainfall, however, shows variations over the last decade (2001-2011) between 116 mm in November, 2002 and 0 mm in February, 2011. Average temperatures show, over the same period, variation between 23.4°C in November, 2005 and 17.3°C in January, 2011. Temperatures start to rise in March and reach the annual maximum of around 39.9°C in April-May, when daytime temperatures can reach up to 40°C. Rainfall also increases, and this period is characterized by unstable weather. The monsoon begins in May-June as hot air rises over the Indian subcontinent, creating low pressure areas into which rush the cooler moisture-laden winds from the Indian Ocean and the Bay of Bengal. Around 70-80% of the annual rain falls during this time. The rain is often accompanied by strong winds, sometimes exceeding 100 km/h. Temperature and rainfall both decline post-monsoon, returning rapidly to the winter lows.

Wind data from the Bangladesh Meteorological Department Climate Division suggests that wind directions vary month-to-month in Dhaka, though predominantly in the NW, S, and NE directions. As the STSs will be contained within tall walled structures and cleaned daily, windborne odor will get minimized.

3.1.4 Flooding, Water Logging and Drainage Pattern

The Sub-project area is mostly flood free and elevation is higher than normal local flood level. The area is not affected in normal floods. Most of the drains in the sub-project area are connected with Turag River bearing the waste water. Also Industrial wastewater is disposed in these open drains. **According to the environmental standard of Bangladesh (ECR, 1997), for the survival of the aquatic life the dissolved oxygen be between 4 mg and 8 mg per liter and accepted level of Biological Oxygen Demand (BOD) is 100 mg per liter. But the situation is far-off worse in study area.**

3.1.5 Air Quality and Dust

Being a residential area, the area produces a less amount of air pollutant and dust. The main atmospheric pollutants are those produced by vehicles and industries and in particular by the burning of fuels. These include particulate matter, hydrocarbons, carbon dioxide, carbon monoxide, sulfur dioxide, oxides of nitrogen, lead, ammonia and hydrogen sulfide. Many of these cause respiratory problems in humans, plus other diseases if substances accumulate in the tissues.

Table 3.1: National Ambient Air Quality Standards for Bangladesh and Field Data

S/N	Parameter	BD Standard	Averaging Time	AQMP, DOE (Darus-Salam, 23.78N 90.36E)		Field Survey
				July	August	August
1.	SO ₂	80 µg/m ³ (0.03 ppm)	Annual	-	-	-
		365 µg/m ³ (0.14 ppm)	24 hours (a)	-	0.71	3.0
2.	NO _x	100 µg/m ³ (0.053 ppm)	Annual	13.0	19.9	6.0
3.	PM10	50 µg/m ³	Annual (b)	-	-	-
		150 µg/m ³	24 hours (c)	44.3	70.2	96.7
4.	PM2.5	15 µg/m ³	Annual	-	-	-
		65 µg/m ³	24 hours	19.2	31.6	-

Source: AQMP, DOE and Field Survey, 2016.

The main causes of the poor air quality are:

- (i) Poor roads and traffic management leading to severe traffic congestion;
- (ii) Heavy industrialization, and use of cheaper high-sulfur fuels (coal, wood and tyres) by smaller industries like brick kilns; and

(iii) Poor solid waste management, so burning is the common method of treating garbage.

3.1.6 Noise level

The project is situated in a mixed zone. Noise level of the project area is within the accepted limit (75 dB).

- On site sources: Minimum 66 dB and maximum 75 dB during 1.00 P.M.
- Off site sources: Minimum 63 dB and maximum 74 dB during 1.10 P.M.

Present noise level in the project site and Bangladesh standards for sound level are shown in Table 3.2

Table 3.2: Bangladesh Standards for sound level (GoB, 2006)

Noise Level at Project Site				Bangladesh Standards		
Site	Time	Minimum	Maximum	Location	Noise Level (dBA) at Day	Noise Level (dBA) at Night
On Site	1 p.m.	66	75	Silent zone	50	40
	8:30 p.m.	45	60	Residential area	55	45
Off Site	1:10 p.m.	63	74	Mixed Zone	60	50
	8:10 p.m.	53	70	Commercial area	70	60
				Industrial area	75	70

3.2 Biological Environment

3.2.1 Flora

Total number of trees observed is 20 in which approximate four number of trees will be cut off from proposed location. The following list shows the total observation about trees and vegetation.

Table3.3: Types and number of Flora

S/N	Types of Flora and Name		Existing	To be Cut Off
1.	Large Trees	Mahogany (<i>Swietenia genus</i>)	08	02
2.		Banyan Tree (<i>Ficus benghalensis</i>)	02	0
3.	Medium Trees	Mahogany (<i>Swietenia genus</i>)	10	02
4.	Small Trees	No	0	0
5.	Grass Land		0	0
6.	Other Forest/ Agricultural/ Garden etc.		0	0
7.	Total Trees		20	04



Figure 14: Existing Large Trees (Mahogany, Banyan Tree)



Figure 15: Existing Medium Trees

3.2.2 Fauna

In the project site no rare endangered species, mammals, fish and others have been seen. Only some birds like Peacock (*Pavocristatus*), Crow (*Corvus corone*), Myna (*Acrida thestristis*), and Wagtail (*Motacilla*) have been seen. Moreover some animals like Dog (*Canis familiaris*), Cat (*Felis catus*) have been also seen.

3.3 Socio-Economical Environment

Table 3.3: Land covers classification of the study area

Land Use	For 1 km buffer	For 2 km buffer
	Area (sq.km)	Area (sq.km)
Commercial area	0.0	0.073
Industrial area	0.0	0.459
Institutional area	0.0	0.077
Open Space	0.0	0.0
Road	0.073	0.304
Urban Residential area	2.972	9.600
Waterbody	0.101	0.541
Others	0.0	1.578
Grand Total	3.146	12.632

3.3.1 Land Use

The proposed land for the sub-project is situated within the Uttara model town, Isakha Avenue and the site is mainly used for vehicle parking and movement place of people. Whereas the present land use surrounding the sub-project site is quite mixed in character. The lands in the Sub-project's catchment areas shown in Figure 15 are mainly distributed in Commercial, Residential, Institutional, Road and other infrastructures etc. The detail land coverage of 1 km and 2 km buffer of sub-project location is given in the Table 3.

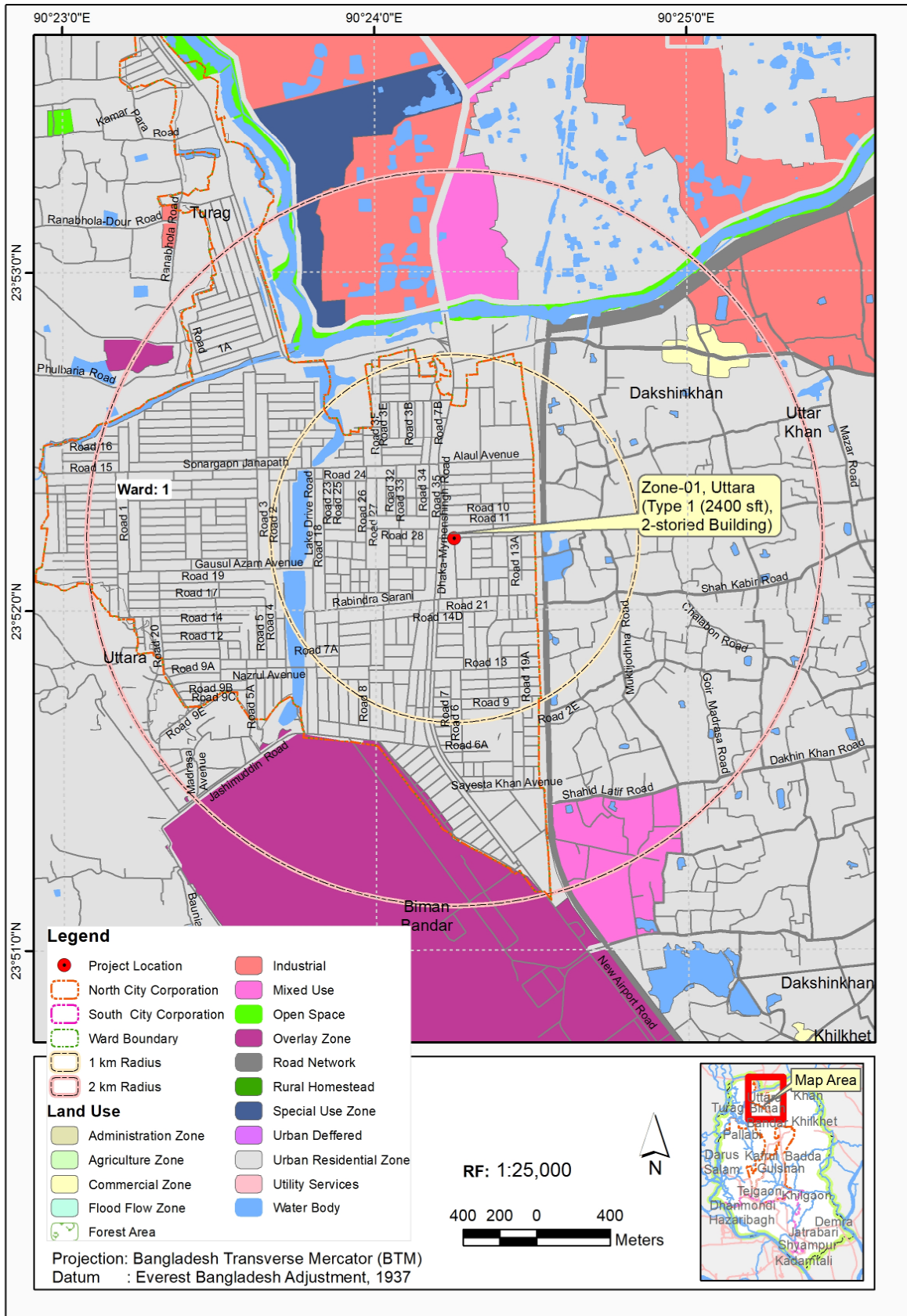


Figure 16: Land use and Land Cover Map of the Study Area

3.3.2 Beneficiary Population

The Sub-project activities will benefit the local people and people who comes in the Sub-project's catchment areas during disaster and non-disaster period. The Sub-project's catchment area will cover 8.95 sq.km. situated around it. Total numbers of population in catchment area of the Sub-project is 179907 among which 101349 are male and 78558 are female [BBS, 2011 - Population Census].

3.3.3 Education

In catchment area of the Sub-project, literacy rate among the population is 80.2%. Literacy rate of male is still higher than the female populations [BBS, 2011- Population Census]. There are many educational institute like Nawab Habibullah Model High School and College, DPS STS School, Rajuk Uttara Model College, Uttara high school and college, Small and Cottage Industries Training Institute etc.



Figure 17: Major educational facilities around the site

3.3.4 Access Road to the site and Traffic Load with Types

There is a 4 lane highway from Dhaka to Mymensingh division which is 100 ft. wide and in the west site there is 28 ft. wide road around the proposed site.



Figure 18: Access road for the warehouse

3.3.5 Public Services

There are many public services like Hospital, Fire service, Thana etc. Major public services are LABAID Diagnostic center, RMC Hospital, Uttara Thana, Uttara fire service station etc.



Figure 19: Major Public Services

3.3.6 Recreation and Aesthetics

There are various shopping malls like BNS Center, Rajuk Commercial Center, Smartex, etc. A park known as Uttara sector 7 park is located around the site.



Figure 20: Recreation facilities

3.3.7 Land Acquisition & Resettlement

Land acquisition and resettlement activities are not involved in the Sub-project Intervention.

3.3.8 Agriculture

No agricultural activities are taking place in the Sub-project area.

4 PUBLIC CONSULTATION

4.1 General

Presently the public consultation is done as a part of social assessment separately to ascertain the people's reaction. During the survey, public consultation has done to know the people's perceptions about the project and environmental problems. The purpose of the public consultation includes the following:

- To ascertain the public views on various environmental issues related to the project;
- To encourage and provide for people's participation in project implementation; and
- To obtain new insight and site specific information, and to appropriating possible mitigation measures based on local knowledge of the communities.
- To ensure the minimization of social conflicts regarding the project, if any

During consultation with the local people, they were little known about this type of project. This area is somewhat underdeveloped part of the area. The expansion of the industrial unites is very slow so they are very positive about this project. The proponent also commits to give privilege locality in every aspect.

4.2 Approach and Methodology

4.2.1 Approach

Participatory approach was followed for identifying the participants as well as conducting public consultation meeting. Initially, the study team consulted with the project proponent i.e. **City Corporation Authority** for understanding the project situation and the potential stakeholders. However, the meeting ensured the common and equal platform of the participants so that they can express their opinion in an enabling environment. The consultants unfold the issues and in return, the participants give feedback to the given issues and in some cases open two-ways discussions were held in the meeting.

The consultation process was intended to generate an enabling participatory environment between the project proponent and the potential stakeholders through the intermediaries of the consultant. The consultant, in this context, ensured a congenial participatory interaction by mixing two beneficiary groups i.e. **City Corporation Authority** that belongs to up stair and the stakeholders who belong to down stair.

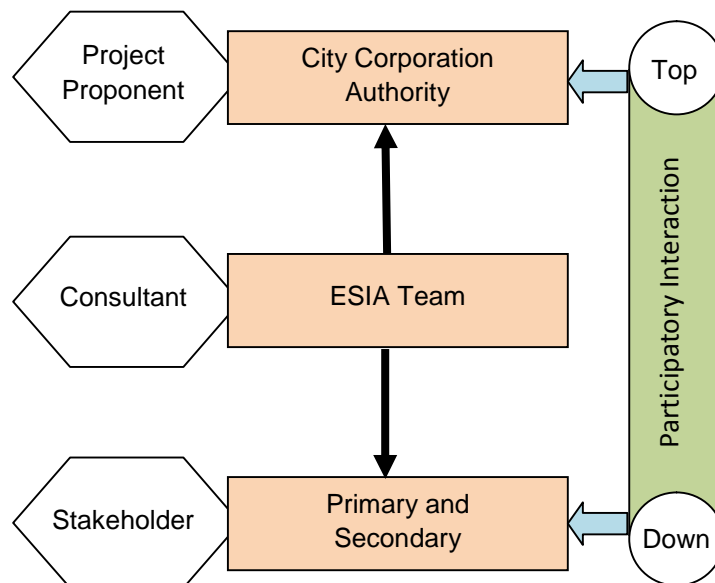


Figure 21: Overall Consultation Process

4.2.2 Methodology

4.2.2.1 Identification of Stakeholders

Stakeholders include all those who affect and are being affected by policies, decisions or actions within a particular system. Stakeholders can be groups of people, organizations, institutions and sometimes even individuals. Stakeholders can be divided into primary and secondary stakeholder categories.

Primary Stakeholders: Primary stakeholders are people who would be directly benefited or impacted by the proposed project. In this context, people who have/had land within the project boundary, and who are living at the vicinity of the proposed project were considered as the primary stakeholders.

Secondary Stakeholders: This category of stakeholders pertains to those who may not be directly affected but have interests that could contribute to the study, play a role in implementation at some stage, or affect decision making on Project aspects. In this project local elite persons, government departments and line agencies fall under this category.

4.2.2.2 Time, Date and Venue Selection

For formal consultation meeting venue, date and time of meeting was selected through the consultation with local people, the project proponent and the consultant. These three groups select an agreed venue considering the closeness to the proposed project, easy accessibility to the venue and which is likely to be neutral. Date and time was also finalized in this way considering availability of the participants, ensuring the maximum participation and compliance with the other arrangement.

For Key Informant Interviews (KIIs), potential secondary stakeholders preferably different government officials, private entrepreneur have been selected who are incumbent in the jurisdiction. Appointments were taken prior to visit them.

For Focus Group Discussion (FGDs), local occupational groups who are concerned and are likely to be impacted were identified and consulted at the spot.

4.2.2.3 Enlisting and Invitation

A comprehensive list of potential stakeholders was prepared through the consultation. This list was intended to cover all sorts of interest groups, occupational groups, socially acceptable and knowledgeable peoples.

A formal invitation was sent to them and also communicated over telephone for ensuring their presence in the meeting.

4.2.2.4 Consultation Instrument

Checklist: A comprehensive checklist covering all possible issues to be addressed was prepared through consultation with the multidisciplinary study team. This checklist was used in the meeting to unveil peoples' perception and opinion along with suggestions.

Attendance list: An inventory of the participants was maintained in attendance sheet containing contact number.

Camera: For visualizing the participants, photographs were taken using camera. These photos were presented in this chapter.

4.2.2.5 Consultation Process

The study team conducted the meeting. During consultation meeting, the following process was followed with sequences.

Greetings: At the outset, the team spelled greetings to all participants. Welcomed them for attending and stated the entire design of the meeting.

Introduction: The team members introduced themselves to the participants and gave detail description of the project, spelled out about the objectives and anticipated outcome of the meeting.

Respect to the participants: The study team showed respect to all participants. They respected not only to the individuals but also to their values, cultural practices and social structures.

Ensuring peoples’ voice: Generally, all participants cannot participate equally. In fact, a substantial number of participants tended to remain silent in any meeting. However, the study team encouraged all to participate willingly through explaining the ethics of the study.

Note taking: discussed issues and opinions were written in notebook carefully. All issues were given equal importance.

Recapitulation and closing the session: At the end the study team recapitulated the session and responded to the quarries. Finally, the facilitator closed the session thanking the participants.

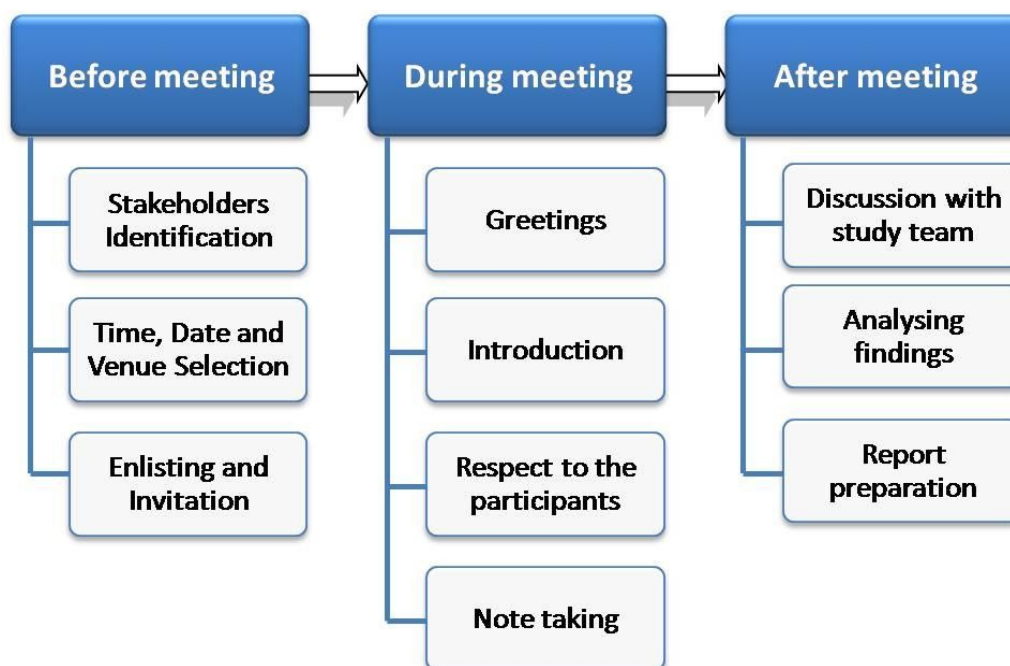


Figure 22: Steps of Consultation Process

4.2.2.6 Consultation Meeting

Venue, Date and Time

One Public Consultation Meeting (PCMs) was held at Uttara project site comprising different types of the stakeholders. Details are given below.

Participants Criteria	Governmental and Non-governmental Officials
Date	16.07.2016
Place	Uttara
Starting time	2.30 PM
Ending time	3.00 PM

The Participants

There were total 4 participants in the PCM. Two of them are service holder and two of them are shopkeepers. No Local Government representative is found during the PCM.

4.3 Issues Discussed

The following issues are discussed:

- Disaster shelter is very urgent as they are very much vulnerable to disaster i.e. Earthquake, cyclone, flood etc.
- Man-made disasters like fire, drainage congestion, landslide and building collapse are increasing rapidly particularly in and around the major cities.
- City level emergency disaster management system remains weak.

- Earth quake is infrequent but Dhaka has been identified by Stanford University, as one of the 20 most earthquake vulnerable cities in the world.
- Government of Bangladesh has therefore undertaken the Urban Resilience Project (URP) in two cities, Dhaka and Sylhet.
- Objective of the project is to increase the effectiveness of disaster preparedness and response.
- It will also reduce critical vulnerabilities and will support an improvement in the quality of new building construction.

4.5 Feedback of the Stakeholders

4.5.1 Knowledge about the Project

At the outset, the study team gave a brief description about the project. However, the stated description by the study team makes them clearer about the objectives and process of the project.

4.5.2 Attitude to the project

The participants expressed conditional positive response to the project. They stated that if the proposed project does not hamper their business, it will be welcomed warmly. Otherwise they are not interested of this project.

4.5.3 Findings of the Consultation Meeting

Upswing of employment in community

Sequences of matters were emerged with FGD (Focus Group Discussion) participants looking at their experience of employment in the project from a different perspective including quality of occupation. The participants summarized their opinion about the possibility of better occupational probabilities.

Environmental apprehensions

Environment is the most prominent issue in our everyday life. We are bound to protect our environment for the betterment of our living. Most of the participants concern about environmental threats i.e. the disaster. Over all discussions, environmental apprehensions (water pollution, air pollution and soil pollution) was stated and was the most frequent measures of the environment.

Upsurge social mobility

There are too many topics were discussed by the participants of FGD. Social mobility is one of them. Very few people discussed about social mobility. Social mobility means the proportion of individuals in a particular social class who move up or down in the socio-economic hierarchy.

4.5.4 Suggestions and Recommendations of the Participants

The participants were presented a number of feedback, suggestions and recommendations which are as follows:

- Literate people are interested but illiterate people do not have any interest to the project
- Existing concrete pavement need to be repaired after construction of warehouse.
- The construction of new warehouse will increase employment opportunities but need to maintain at a regular basis.
- The warehouse will be an asset for emergency situation.
- There should be access facilities to the disaster affected areas such as connecting roads, available of resources so that people can get help during emergency cases.
- They also requested to have provision of additional facilities such as Radio, TV, Rain Coat, Torch light, Life jacket, Mike, Flag, Fire extinguisher, Gum boot etc.
- Most of the participants are expressed that the capacity of the proposed warehouse is satisfactory.

4.6 Researcher's Understanding Based on the Discussion

Each participant shares their opinions on the **Urban Resilience Project**. Some of the participants demand to establish the facility. They, who support the project, identified some major social and environmental factors that may have really functioned for the communal people of the locality. Despite some negative comments, all of the participants suggested to establish the facility.

5 INITIAL ENVIRONMENTAL AND SOCIAL SCREENING (IESS)

5.1 General

Initial Environmental and Social Screening (IESS) for the Sub-project has been conducted with the purpose of fulfilling the requirements of GoB and WB. IESS ensures that environmental issues are properly identified in terms of extent of impacts. Field visit for performing IESS has been carried out on July 2016 in the Sub-project site. The screening data and information for this Sub-project have been formulated and shown in Table 5.1. The social screening checklist is given in Annex C.

Table 5.1: Initial Environmental Screening Checklist

Screening Questions	Impact ⁴					Remarks
	Y	N	H	M	L	
A. Potential Environmental Impacts due to Sub-project location during Planning Phase						
Is the Sub-project area.....						
Adjacent to/or within any of the environmentally sensitive areas?						
Cultural heritage site	√					At a safe distance, no significant impact will happen
Protected area		√				
Wetland		√				
Mangrove		√				
Estuarine		√				
Buffer zone of protected areas		√				
Special area for protecting biodiversity		√				
Bay		√				
B. Potential Physical Environmental Impacts during Construction Phase						
Will the Sub-Project cause						
Loss of agricultural land/ crop?		√				
Impact of Air / Dust pollution?	√				√	Vehicles movement: bus, mini truck, motor cycle, auto rickshaw, taxi, tractor, lorry, private car, human howler and during construction period due to construction activities.
Impact of Noise pollution?	√				√	Vehicles movement: bus, mini truck, motor cycle, auto rickshaw, taxi, tractor, lorry, private car, human howler etc. and during construction period due to construction activities.

⁴Y = Yes, N = No, H=High, M=medium, L=Low

Screening Questions	Impact ⁴					Remarks
	Y	N	H	M	L	
Impact on soil, surface and ground waters Pollution? If yes, mentions source?		√				
Impacts on surrounding environment due to sanitation and wastes disposal during: construction phase?	√				√	Disposal area available? [√Yes/No] If yes, where: √On-site, Off-site
Impact from construction camp?		√				Camp area available? Yes / No [√]
Construction material storage area		√				
Impact on drainage or create water logging in the area?	√				√	Heavy rainfall cause the water stagnation in the sub-project area 1'-1.5' in June & July in every year.
Is there any flooding problem? Mention frequency & severity.	√				√	1988 - 4'-5', 5-6 Days 2007-1'-2', 1-2 Days 2008 - 3'-4', 2-3 Days
Is there any river erosion? Where & Severity?		√				
C. Potential Biological/ Ecological Environmental Impacts during Construction Phase Will the Sub-project cause.....						
Destruction of trees and vegetation?		√				
Impact on pond or fish?		√				
Negative effects on rare, vulnerable, threatened or endangered species of flora & fauna and/ or their habitat?		√				No rare species are found near by the sub-project area.
Negative effects on wildlife habitat, populations, Corridors or movement?		√				No wildlife habitat reported to exist nearby the sub-project area.
Negative effects on locally important or valued ecosystems or vegetation?		√				
D. Potential Socio-Economical Impacts during Construction Phase Will the Sub-project cause...						
Involve any land acquisition and involuntary resettlement?		√				
Traffic disturbances due to construction material transport and wastes?	√				√	There is a 4 lane highway from Dhaka to Mymensingh division which is 100 ft. wide and in the west site there is 28 ft. wide road around the proposed site.
Negative effects on neighborhood or community?		√				

Screening Questions	Impact ⁴					Remarks
	Y	N	H	M	L	
Are there any Impediments to movements of people and livestock?	√					
Disturbance to the student to take the lesson in the classroom? If yes, Specify.	√					
Direct or indirect hazards to student for walking in the school campus by construction activities?	√					
Risks and vulnerabilities related to occupational -health and safety due to hazards during construction and operation phase?	√				√	During construction period due to construction activities.
E. Potential Historical & Cultural Impacts during Construction Phase						
Will the sub project cause...						
Degradation or disturbance of historically culturally important site (mosque, graveyards, monuments etc.)? If Yes, Specify.	√					
F. Potential Impacts during Operation & Maintenance Phase						
Will the sub-project activities cause...						
Possible development of labor camp into permanent settlement.	√					Contractor will remove labor camp and will clear the places after completion of construction.
Nuisance at stockpiling areas of construction materials.	√					Contractor will clear the places after completion of construction.
Nuisance at sanitation and waste disposal areas?	√					
G. Existing Environmental & Social Condition around the sub-project						
Air Quality	√				√	Insignificant impact due to earth works, construction material processing, construction activities, vehicle movements etc. would generate fugitive dust particles and hence the level of SPM in the ambient air would increase
Noise Quality.						There is likely insignificant impact of noise pollution due to movement of local vehicles, running of heavy load traffic for construction materials transportation.
Mention sources of drinking water in dry and wet seasons?						Supply water from wasa and Tubewell 5%, tap 82% and others 3%
Are there any ponds, khals, beels, haors, baors, rivers, etc. in/around the site? Please specify numbers & names for each.						Nos.-Name-Distance-Direction
						Ponds: 0
						Khals: 0
						Beels: 0
						Haors: 0

Screening Questions	Impact ⁴					Remarks
	Y	N	H	M	L	
						Baors: 0 Rivers: 01, Turag River which is about 2 km away from the site Other: 0
Surface water (Pond, Khal, Beel, Haor, Baor, River etc.) quality.						Moderately treated
Groundwater Quality.						Fresh water is needed for construction purpose mainly in civil works that will put pressure on aquifer storage.
Soil Quality.						Soil is reasonable
Is there any disaster early warning system? If Yes, by Whom?						Available: UDMC, Micing, TV, TNO, TEO, Red crescent, CPP, Mobile phone SMS etc.

5.2 Assessment of Environmental Screening

The proposed Sub-project (Warehouse) is not located within any identified environmentally sensitive area, and therefore, does not seem to create any adverse impact on the important environmental features. No significant impact is expected on the ecosystem and biodiversity, no agricultural land/ activities or fish farming will be disturbed, due to the construction of the sub project. Although, some earth excavation work will be involved, no agricultural land or garden has chances to demolish. Moreover, mitigation measures will be taken according to the EMP for minimizing the air, dust, noise, impact of construction materials storage areas and others such as health risk due to combustibility, compression and other mechanical malfunction. Drainage congestion and water logging problems are not found but extreme floods in past years had created around 2-3 ft water stagnant in the Sub-project area. Plinth level of the Warehouse should be higher than the flood water level. Due to construction activities of this sub-project, no tree will be cut down out of eight existing trees. Therefore, the Sub-project activities will not result any adverse impact in the environment surrounding the sub project. Moreover, it is a welcome and beneficial project for the local communities.

5.3 Rehabilitation and Resettlement Plan

Resettlement Action Plan (RAP) is not mandatory for this project since the project authority has purchased/leased the lands or has taken permission to use the lands from actual owners/authority. The site is belong to the concern agencies and situated in their premises.

6 ENVIRONMENTAL IMPACTS IDENTIFICATION

6.1 General

This section identifies and predicts the probable impacts on different environmental parameters due to construction of a new 2-storied warehouse (2400 sft). After studying the existing baseline environmental scenario, monitoring environmental parameters, reviewing the process and related statutory norms, detailing the waste management measures, the major impacts can be identified during construction and operation phase. Relevant important aspects of environment are therefore selected which may have significant impacts due to project activities.

6.2 Identification of Impacts

The environmental implications of the predicted impacts may be beneficial or adverse, but the main objective of impact identification is to specify areas that are likely to be affected by the implementation of a sub-project. Environmental impact, by definition, implies an alternation of environmental conditions or creation of a new set of adverse or beneficial environmental consequences caused by the action under consideration. Impact identification starts at the early stage of scoping when data on both the project and surrounding environment are made available. The predicted impacts have been identified by rigorous scientific analysis and expert opinion. The consequences of impact on different resources have been accounted precisely. The following sections describe all the potential impacts (activity wise) on atmospheric environment, water resources, land resources, agricultural resources, fisheries resources, ecosystem resources and socio-economic environment of the surrounding.

6.2.1 Impact on Landform

There will be no noticeable impact in the landform as the proposed 0.055 acres of land for this sub-project is already in developed form.

6.2.2 Impact on Natural Resources

Impact on Water Resources

In construction stage of the warehouse, if runoff of the rain water is occurred from the project area to the surrounding water drains, it may cause deterioration of water quality. So it may be considered as the impact on water resources that is mentioned below.

Impact on Agricultural Resources

Construction has no impact on agricultural resources as there are no agricultural resources in the sub-project site.

6.2.3 Impact on Ecosystems

Flora

During construction phase it has less significant impact on existing trees and vegetation at the sub-project site. This is due to total number of trees observed is 20 in which approximate four number of trees will be cut off from proposed location.

Fauna

Construction has no impact on the faunal communities present at the sub-project site.

6.2.4 Impact on Ambient Air

Various activities during construction phase such as earth works, construction material processing, construction activities, vehicle movements etc. would generate fugitive dust particles and hence the level of SPM in the ambient air would increase. This increase in SPM level would be very local and short term and would be limited to the time of construction period only.

Carbon dioxide and nitrogen oxides may be emitted from combustion of the petroleum products in project related vehicles, machinery, and generators etc during the construction period. Their impact on air quality will not be significant as the pollutant emission activities (point and area sources) will be limited within the project boundary and the activities will be short term (only for construction period). However, this impact may further be minimized by adopting Environmental Management Plan.

6.2.5 Impact on Ambient Noise

It is expected that during construction of the warehouse, the level of noise will increase sharply in the project area. Operation of different machineries and equipments for construction activities, running of heavy load traffic for construction materials transportation, and regular traffic movement may generate noise during construction period. The produced noise may have impact on existing acoustic environment of urban category defined in ECR, 1997. Local inhabitants may feel disturbed due to noise from line sources (traffic movement).

High noise level during construction phase can cause high disturbance to the local community. This can also cause health impacts and increase stress level of the inhabitants of the locality and workers.

6.2.6 Impact on Soil

Generally, construction activities do not include any activities that cause soil pollution. However, Rainfall runoff from the construction site may cause soil pollution if the construction site is not properly managed. If the solid waste and other construction wastes are not properly managed, it may lead to soil pollution.

6.2.7 Impact on Workers Health, Sanitation and Safety

During construction time more security, construction workers and others about 50 people will move to the site. Most of them will come from outside the sub-project site. They have to stay at site. For them more living, washing, kitchen, storing etc. purpose temporary facilities have to construct. These will cause more hygienic/sanitation issues if are not properly managed. Due to more movement man and material accidental incidents may increase if safety issues are not strictly maintained. Movement of more river craft may also cause accident if strict rules for movement, loading and unloading man and materials are not carried out. During construction accident may cause if safety rules and regulation are not strictly maintained. Requirement of safe drinking water will increase at site. If smooth supply safe drinking water are not maintained the workers may suffer out of water borne disease. Due to wind and movement of vehicles may cause dust at the site. This may cause problem of the workers and neighboring resident. However it may attract some interested people to visit the site. It would be wise to avoid/discourage those tourists on safety ground.

6.2.8 Solid Waste Disposal

Generation of construction related waste would occur during the construction period of the warehouse. Wastes may be generated from earth works, site establishment, civil construction, stockpile of materials, and domestic household activities. The wastes might be metals, concrete, spoiled construction material, excavated spoils, spilled oil from machinery and vehicles, etc. Moreover, some domestic waste such as food waste, paper etc would be also generated. The waste generated during the construction period can have adverse environmental impacts if not disposed of properly.

If the waste generated during construction period is not disposed of properly, then it will have negative impacts on the ambient environment. Construction activities should be carried out following the environmental rules and regulation for avoiding significant impacts on the environment. Creation of odor would be one of the major problems of not disposing the domestic waste properly. Moreover, it will deteriorate water quality and have adverse impacts on aquatic ecosystem if they are thrown in water stream. Generation and scattered disposal of waste must be controlled for preventing the impacts on physical environmental resources i.e. water, land resources etc.

6.2.9 Social Impact due to Construction of warehouse

The proposed warehouse will be an asset for emergency situation by supplying search and rescue equipments during emergency, as the warehouse will be constructed in the area which is mainly residential and almost every building in this area is highrise, so occurrence of man-made disasters like fire hazard, drainage congestion and building collapse etc are increasing rapidly in this area. Moreover the warehouse will be used as Disaster shelter during natural disasters like Earthquake, cyclone, flood etc.

Also the construction activities of the proposed warehouse would offer employment opportunity. Most of the un-skilled labor would be hired. The noise and dust generated from the construction site might disturb the nearest community patches. However, once the boundary wall around the project area is completed, the dust would not reach to nearest community patches. The boundary wall would also attenuate the noise to be generated from construction activities.

6.2.10 Impact due to Transportation of Construction Related Materials

Construction materials will be transported through inland road transport. Moreover the sub-project site is situated within the Uttara model town, Isakha Avenue, Uttara and the surrounding area of the proposed site is a residential area, traffic load on the road surface adjacent to Sub-project site during day and night is very high. So, if proper time schedule of incoming and outgoing vehicles to the Sub-project site will not maintain, Traffic congestion and traffic problems will be created. For these reasons, DMP doesn't allow any vehicle containing construction material to enter into the Dhaka city before 10 p.m. and after 7 a.m. The other construction material will be collected from the local suppliers. During transportation of construction material, the following conditions will be followed strictly:

- Loading and unloading of transportation would not create any disturbance to nearby community and other dwellers, do it in such a way
- No stocking of construction material in public place that may cause disturbance to community
- Efficient equipment would be used in handling of construction materials
- No disposal of oil to the near water body
- No disposal of waste into nearest water body
- The transport to be used for transportation should be fuel efficient and in good maintenance
- No cleaning and maintenance of the vehicle will be carried out at project site
- Every material must be covered while carrying to the site through vehicles so that no dust or air pollution may happen
- In the project site, construction material should be kept in dry and clean places
- Cement and reinforcement must be kept under the shed and in dry and high places from ground level
- Other materials must be covered.
- Material transportation time schedule should be maintained strictly

Table 6.1: Environmental Impact Identification Matrix- Construction Phase

Parameter	Physical Environment					Ecological Environment			Human Environment				
	Topography	Hydrology	Water Quality	Air Quality	Noise	Vegetation	Fauna	Aquatic Environment	Displacement	Employment	Service	Health	Culture
Possession of Land													
Site development	P			T		P				T		T	
Civil and Structural Work			T	T	T					T		T	
Mechanical and Electrical Work				T	T					T			
Water Requirement			T										
Transport				T	T								
Immigration													
Employment			T							T	T		T

Here, P – Permanent and T – Temporary, **Immigration**: To come to a place to live there (Kind of migration), **Emigration**: to leave one's place of residence or country to live elsewhere (Kind of migration)

Table 6.2: Environmental Impact Identification Matrix- Operation Phase

Parameter	Physical Environment					Ecological Environment			Human Environment				
	Topography	Hydrology	Water Quality	Air Quality	Noise	Vegetation	Fauna	Aquatic Environment	Displacement	Employment	Service	Health	Culture
Water Requirement													
Liquid Effluent			X					X				X	
Gaseous effluent				X		X						X	
Solid Waste												X	
Hazardous Waste													
Transport				X	X							X	
Operational noise					X							X	
Immigration			X							X	X		X
Employment										X			

Here, **Immigration**: To come to a place to live there (Kind of migration), **Emigration**: to leave one's place of residence or country to live elsewhere (Kind of migration)

7 ENVIRONMENTAL MITIGATION AND MANAGEMENT PLAN (EMMP)

7.1 General Consideration

In the context of the sub-project, the Environmental Mitigation and Management Plan (EMMP) is concerning with the implementation of the measures necessary to minimize or offset adverse impact and to enhance beneficial impacts. The prime function cannot be achieved unless the mitigation and benefit enhancement measures are fully implemented. All measures are said to be successful when they comply with the Environmental Quality Standard (EQS) of Bangladesh. Thus the objectives of EMMP of studied sub-project would be:

- Mitigation measures to reduce and eliminate negative impacts
- Enhancement measures to maximize positive impacts
- Monitoring requirement and monitoring indicators

The main benefits of the environmental mitigation plan are

- Ensuring that environmental standards are met during design, construction, and operation of the project
- Providing offsets to negate project impacts especially ecological impacts, e.g., in the form of compensatory afforestation, greenbelt development and landscaping.

7.2 Water resources conservation plan

Water resources should be conserved and prevented from any pollution and hydrological alteration. The nearby drains should be kept away from any obstruction and waste dumping. If any drain flows through the project area that drains water from outside the project area should be free flowing without any obstruction. Proper guidelines should be developed for Operation & Maintenance of drains.

7.3 Good housekeeping of Construction Related Materials

The construction yard and the site should be managed in such a way that would ensure minimum environmental degradation or damage of the surrounding. The contractor must take responsibility for the construction site to confirm contractual aspects and applicable environmental standards. Unauthorized access from public in the site should be prevented for safety issue. Adequate numbers of bins, sanitary toilet, water supply system, run-on and run-off drains, fire safety and fighting system etc. should be provided in the site. All the construction materials and stockpiles should be maintained within the project area provided with rain and wind protection. Electrocution from general supply of electricity on site or overhead electrical lines contact with on-site cranes or mobile cranes or other trucks should be prevented. A housekeeping team should plan the safety measurements and visit the plant regularly for ensuring safety. An Environment Manager should be employed with responsibility of monitoring the activities which causes any environmental effects and ensuring enforcement of EMP during construction activities.

7.4 Worker's Health and Safety

To ensure a safe working place, the following measures should be ensured:

- Before operating a machine, ensure that the dangerous part of the machine has been installed with a guard
- Avoid going to any area with insufficient lighting as there may be some dangerous places which have not been provided with fencing.
- Keep vigilant all the time and watch out for moving cranes, hooks or other lifting equipment.
- Before using any electrical installation or tool, check the condition of its electric cables.
- Avoid dragging electric cables on the ground or allowing the cables to come into contact with water.
- Using electrical tools installed with an earth leakage circuit breaker.
- Using and handling chemicals with care and following the safety data sheet provided by the chemical suppliers.

- Using of Fall protection during working at height
- The internal roads, sidewalks and walking ways would be demarked properly
- Traffic safety measures should be available within the internal roads of the project sites.
- Regular checking, servicing and maintenance of vehicle should be ensured
- Proper training for the workers on safety
- Use of Personal Protective Equipments (PPE) should be mandatory for all (including the visitors). Applicable PPEs are mentioned in the following table:

Protection	Applicable PPE	Safeguarding for
Hand	i) Leather gloves ii) Electrical resistance gloves iii) Canvas gloves iv) Hand sleeves	Cuts due to handling Heat radiation Electrical Shock Contact with oil and grease etc Falling of hot slag
Leg	i) Leg guards ii) Steel toe & Leather safety boots	Welding sparks Striking by objects, fall of objects and stepping on sharp or hot objects Heat radiation, stepping hot or sharp objects and stepping on sharp or hot objects
Eye	i) Spectacle type goggles with plain shatter proof lens	Foreign bodies entering the eyes and reflected arc rays
Head	i) Fiber helmet	Fall off objects/hitting against objects during construction, maintenance etc
Ear	i) Ear plug or muffs	High noise level
Nose	i) Dust protection mask	Fine dust particles

7.5 Safety at site

Safety at site should be ensured at the construction site. The construction area should be protected by security fencing to prevent any safety threat to nearby community. All the piles should be placed within the boundary of the project with proper protection from wind and rain. All the passage should be keeping clear for all the time. The construction site should be properly lighted. All the lights should be directed to land within the project boundary. It is to be ensured that no light beam is to be directed towards nearby community. Light shed should be used. The Construction site should be equipped with firefighting equipments and firstaid.

7.6 Construction Waste Management

Construction waste should be managed properly. The rate of waste generation should be reduced adopting efficient technique and limiting waste generating activities. The measures for controlling construction waste may include limiting site clearance activities, planned stocking and gathering of construction materials and equipments, fencing around the construction yard, maintaining existing right of way to carry construction materials, banning of waste burning and quality housekeeping. A waste dumping place should be provided with efficient waste collection and disposal techniques. No waste should be dumped to the surrounding rivers. Appropriate measures provided with run-on and run-off system might be constructed from controlling run off from construction yard and liquid waste.

The management plan for construction waste during construction period should include the steps like fencing around the project site, limiting site clearance activities, planned stocking and gathering of construction materials and equipment, covering the stockpiles for protecting them from wind and weathering actions, avoiding waste burning, keeping provision of different colored waste bin, keeping onsite waste collection and disposal system, adopting proper sanitation system for the employees and the workers, quality housekeeping etc. No waste should be dumped/thrown to the river. Recycling and reuse of the waste should be done whenever possible. Hazardous materials, spillage and accidental release should be managed carefully according the hazardous material handling guideline. Moreover, training should be provided to the employees and the workers/laborers about proper waste management system for increasing their awareness.

7.7 EMP for Preventing Pollution from Construction Site

Dust Control

Construction activities of the plant would generate significant amount of suspended particulate matter. As the sub-project area is highly residential, an efficient dust control plan has to be adopted. The plan would include limiting SPM generating activities, adopting dust suppression system, minimizing base stripping and vegetation clearing activities, covering stockpiles, restricting vehicle speed, avoiding earthen roads for vehicle movement, spraying water regularly to suppress dust etc.

GHG emission control

The construction activities might generate significant amount of GHG also. The GHG emission control plan includes using efficient generator/machineries/equipment, regular maintenance of generators and other machineries, switching off/throttling down generators/ machines/ equipment/ vehicles which are not in use, avoiding the use of ozone depleting substances etc. Moreover, creating thick green belt around the plant is another major step for air quality management as it will help to sequester CO₂.

Controlling Noise

For preserving the acoustic environment and for protecting the nearby inhabitants from the negative impacts of noise pollution during the construction period a noise pollution management plan has to be adopted which would include steps like siting noisy equipments as far away as possible from the settlements, creating temporary barriers or enclosures with sound absorbing materials around the noisy equipment, maintaining the equipments properly.

Moreover, a significant part of construction work should be conducted during night time. The following specific measures should be adopted

- The noisy equipments should be sited as far away as possible from the nearby settlements
- Acoustic hoods/ silencers/ enclosures on all sources of noise generation should be used to decrease the intensity and degree of noise.
- Temporary barriers or enclosures with sound absorbing materials should be built around the noisy equipments
- A significant part of construction work should be conducted during night time
- Steps should be taken to create the boundary wall
- Steps should be taken to create a thick green belt
- The equipments used during the construction phase should be properly maintained as proper maintenance can decrease the level of sound significantly
- For protecting the workers from the adverse impacts of high noise level, personal protective equipments such as air plug/ear muffers should be provided to them and the use of this protective measure should be made mandatory to the workers who are susceptible to high noise

7.8 Green Belt Development

Development of Green belt along the plant site is essential for safeguarding the nearby community. Proper plantation will enhance scenic beauty of the plant also. Local suitable species is suggested for plantation. Following are the summary points that should be implemented:

- Green belt should be developed around the boundary wall, the open space within the sub-project.
- Different heights of local plant species should give preference for plantation.
- Additional plantation program may take outside the project boundary at road side.
- Seven plants like Mahogany, Fruit given trees etc. should be planted against four cut down trees. The green circles indicate the possible locations of the proposed green belt mentioned in the Hand sketch map shown in below.

Green Belt Development in a Hand Sketch Map

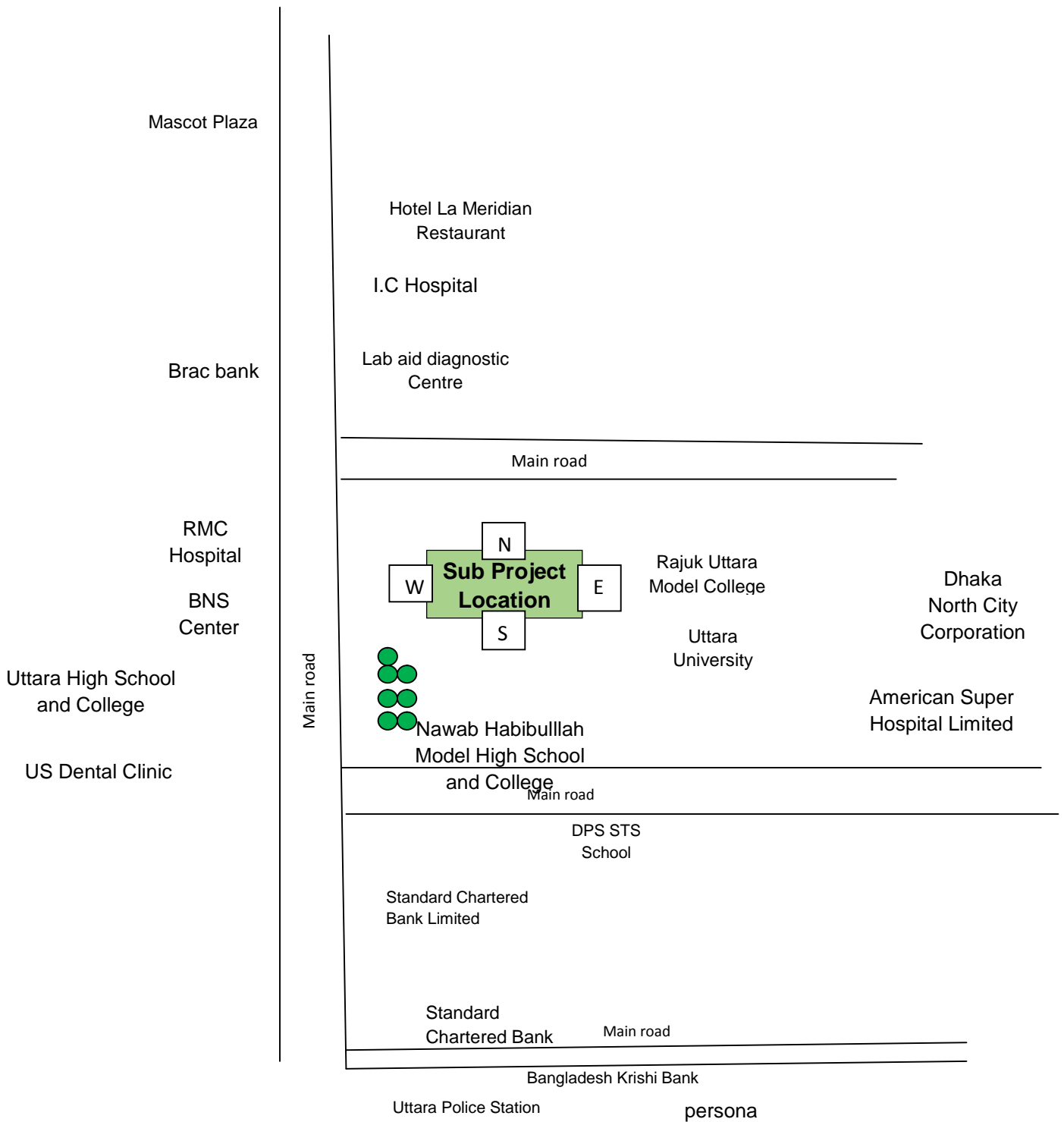


Table 7.2: Environmental Management Plan during Construction Phase

Environmental Component	Potential Impacts	Mitigation measures	Time frame	Location	Responsibility
Water					
Ground Water	Ground Water Contamination	Minimum Extraction of Ground water and Rain water harvesting system develop	Throughout Construction Phase	Project Site	Environmental Monitoring Team of the Project Proponent
Surface water sources	Surface Water Pollution	No disposal of any wastewater directly into outside water bodies. Refueling, washing and maintenance of plant and vehicles will be prohibited in the vicinity of the river and water bodies.	Throughout Construction Phase	Project Site	Environmental Monitoring Team of the Project Proponent
Drinking Water Requirement	Increase local demand	Arrange water without affecting local requirement	Throughout Construction Phase	Project Site	Environmental Monitoring Team of the Project Proponent
Wastewater from Workers' camp	Pollute the surface water	Ensure proper sanitation and drainage. No direct discharge of wastewater in the river. The construction workers at site will be provided with proper sanitation arrangement. The workers colony houses for foreign workers will have sanitary latrines to treat sanitary waste.	Throughout Construction Phase	Project Site	Design consultant and Project Proponent
Air and Noise					
Dust Generation	Increase dust in the air	Spraying of water wherever required. All stock pile materials which can blow to contribute to airborne dust will be covered with canvas or plastic sheets during windy season. The vehicle should be covered while transporting the materials.	Throughout Construction Phase	Project Site	Environmental Monitoring Team of the Project Proponent
Gaseous Emission from Construction work vehicles	Pollute the Air	Ensure checking of vehicular emission and obtaining Pollution Under Control Certificate	Throughout Construction Phase	Project Site and surroundings	Environmental Monitoring Team of the Project Proponent
Noise from machineries and construction	Increase Noise level	Ensure machineries meeting noise level standards. Noise levels of machineries used shall conform to relevant standards prescribed in Environment Conservation Rules, 1997. Silencers and mufflers of machineries will be regularly inspected to control	Throughout Construction Phase	Project Site	Environmental Monitoring Team of the Project Proponent

Environmental Component	Potential Impacts	Mitigation measures	Time frame	Location	Responsibility
		noise generation.			
Land					
Disruption of Earth Surface	Become a hazard	Earth work should be kept minimum and adequate drainage system should be developed	Throughout Construction Phase	Project Site	Environmental Monitoring Team of the Project Proponent and DOE
Solid Waste from construction work	Deteriorate the environment	Ensure dumping at preselected location	Throughout Construction Phase	Project Site	Project Proponent
Others					
Occupational Health & Safety	May create risk for the workers	All relevant rules for protection of health and safety of the workers will be rigorously followed. All contractors will be made aware of this responsibility. Proper restriction signs and other methods should be applied to prevent unwanted entry of people.	Throughout Construction Phase	Project Site	Design consultant and Environmental Monitoring Team of the Project Proponent
Labour Condition	Increase labour scope	Bangladesh has ratified key International Labour Organization (ILO) conventions to ensure the work conditions are reasonable and safe, and employees are free from any types of discrimination.	Throughout Construction Phase	Project Site	Project Proponent
Traffic	Increase traffic at the locality	There shall be a continuous vigil to see that the regular local traffic is not disturbed and the personnel to guide the construction vehicles to the site without causing any traffic jam	Throughout Construction Phase	Project Site and surroundings	Project Proponent
Socio-economic	Improve the condition	Various environment awareness programmes shall be organized by management committee on regular basis to bring forth the beneficial aspects of the project at local level. A management committee shall take keen interest in public participation and expectations of the local people for improving quality of life during planning of welfare activities under CSR plan. The committee shall identify eligible people for jobs in construction and lower level administrative jobs by noting their literacy level, extent of need, availability of means etc. Or the committee should confirm the employment of	Throughout Construction Phase	Project surroundings	Environmental Monitoring Team of the Project Proponent

Environmental Component	Potential Impacts	Mitigation measures	Time frame	Location	Responsibility
		local people by subcontractors.			
Influx of workers	Generation of sewage and solid waste	Construction of sanitary latrines and septic tank system Erecting “no litter” sign, provision of waste bins/cans, where appropriate Waste minimization, recycle and reuse (as required) Proper disposal of solid waste	Throughout Construction Phase	Project Site	Environmental Monitoring Team of the Project Proponent
	Possible spread of disease from workers	Clean bill of health a condition for employment Regular medical monitoring of workers			
Transportation of equipment, materials and personnel; storage of materials	Deterioration of air quality from increased vehicular movement, affecting people in the surrounding areas	Keeping vehicles under good condition, with regular checking of vehicle condition to ensure compliance with national standards and EHS guidelines (where applicable)	Throughout Construction Phase	Project Site	Environmental Monitoring Team of the Project Proponent
	Wind-blown dust from material (e.g. fine aggregate) storage areas	Spraying of water in the access road Sprinkling and covering stock piles Covering top of trucks carrying materials to the site.			
Site clearance	Topographic change by cutting existing trees, shrubs, herbs, and filling land	Adopt such type design as is required minimum cutting of trees, shrubs, herbs, and low-land filling Use waste shrubs, herbs as organic fertilizers Adopt required measures to prevent waste shrubs, herbs as fuel to cook or for any localized burning purpose.	Throughout Construction Phase	Project Site	Environmental Monitoring Team of the Project Proponent
Noise from construction equipment operations and maintenance	Noise could exceed the allowable limit and result in hearing loss.	Avoiding, as much as possible, construction equipment producing excessive noise Avoiding prolonged exposure to noise by workers Creating a buffer zone by introducing green belt around the project site Follow construction scheduling to avoid evening and night time disruption	Throughout Construction Phase	Project Site	Design consultant and Project Proponent

Dust and exhaust gases from construction machinery and vehicles	Increased SPM, PM 2.5, PM 10, NOx, SOx levels at construction sites, and surrounding areas.	Try to avoid using equipment such as stone crushers at site by purchasing ready-mix construction mixture (sand, cement and gravel) Immediate use of construction spoils as filling materials Immediate disposal/sale of excavated materials Continuous watering of bare areas	Throughout Construction Phase	Project Site	Environmental Monitoring Team of the Project Proponent
Fires, explosion and other accidents	Risk of human health and property damage	Use of personal protective equipment during construction and maintenance. Prepare and implement safety and emergency manual Regular inspection of lines for faults prone to accidents Provision of fire protection equipment. Provision of lightening arrestors	Throughout Construction Phase	Project Site and surroundings	Environmental Monitoring Team of the Project Proponent

Table 7.3: Environmental Management Plan during Operation Phase

Environmental Component	Potential impacts	Mitigation measures	Time frame	Location	Responsibility
Wastewater	Generation of steam, oily water, sludge containing water, cooling water, domestic and floor washing wastewater	No discharge of untreated wastewater outside the municipal drainage. Monitoring of wastewater quality before and after discharge.	Throughout Operation Phase	Project site and surrounding	Environmental Monitoring Team of the Project Proponent
Gaseous Pollution	NOx generation from the engine, which can negative	Dispersion through high stack, Use of Low NOx burner	Throughout Operation Phase	Project site	Environmental Monitoring Team of the Project Proponent
Air Quality	Suspended particulate matter (SPM) and PM2.5, PM10 generation from the engine, which can adversely affect health	Regular Monitoring according to the schedule	Throughout Operation Phase but maintaining 3 months interval	Ambient Air Quality	Environmental Monitoring Team of the Project Proponent and DoE
Emission Quality	CO and VOC, which can negatively affect health	Regular Stack emission monitoring according to the schedule	Throughout Operation Phase but maintaining 3 months interval	Project site	Environmental Monitoring Team of the Project Proponent and DoE
Noise	Generation of noise from generators and associated substations, which could exceed 70 dB(A) at site boundary.	All machineries shall follow relevant noise regulations. Boilers, generators and compressors shall be installed in buildings equipped with acoustic walls and enclosures. Regular noise monitoring according to the schedule.	Throughout Operation Phase but maintaining 3 months interval	Project site	Environmental Monitoring Team of the Project Proponent and DoE
Solid Waste	Generation of oily solid waste, plastic waste and other solid wastes.	Disposal at preselected site, Segregate wastes and dispose hazardous wastes to authorized contractors only.	Throughout Operation Phase	Project site	Environmental Monitoring Team of the Project Proponent
Occupational Health and Safety	Occupational health hazard due to different operation processes	Maintain all safety provisions related to plant operation and hazardous chemicals. Train all employees working in hazardous area for safety norms.	Throughout Operation Phase	Project site	Environmental Monitoring Team of the Project Proponent

		First aid kit to be made available. Medical aid to be available on the site. All subcontractors to follow the health and safety rules. They should be trained for that. Display of proper sign boards for health and safety in and around the plant complex.			
Fire Safety	Little possibility for firing due to welding activities produce lot of heat in welding arc	All employees to be trained for fire safety rules. Mock safety drills to be performed in regular intervals. Disaster Management Group to be made ready for all situations. Regular check for offsite helps.	Continuous Process	Project site	Project Proponent
Socio-economic	As there are no religious, cultural or historic places near the site, so the noise and air pollution from the operation of the project would not create any potential impact.	A management committee shall regularly monitor the implemented welfare activities and progress of Corporate Social Responsibilities (CSR) programme. The committee should confirm the employment of local people during operation and maintenance phase of the project activity and Keep local people informed about the demands for new jobs in the project	Throughout Operation Phase	Project surroundings	Project Proponent

7.9 Emergency Preparedness Plan

Emergency Preparedness Plan (EPP) is the process of preparing for, mitigating, responding to and recovering from an emergency. EPP is a dynamic process. Planning, though critical, is not the only component. Training, conducting drills, testing equipment and coordinating activities with the community are other important functions. The detail EPP is described as follows.

Key Persons and Their Roles during an Emergency Situation

Project Manager will

- Work as contact person and observe the situation.
- Keep in touch with local administration and head office.
- Deal with police, media and outside enquiries in consultation with Site Controller.
- Arrange for refreshments if required.
- Observe the traffic movement inside the project area and arrange for alternative transport if required.
- Monitor the record keeping of attendance of workers, staff, contractor's personnel, and visitors at the Gate which will act as Assembly Point.

Shift Supervisor will

- Act as Site controller for the time being.
- As soon as becomes aware of the emergency and its location, he will proceed to the site.
- Assess the scale of the incident and directs to stop operations within the affected areas.
- Contact and inform the Site Controller and Incident Controller immediately. Till their arrival he will continue to perform their duties.
- Contact the departmental head to act as incident controller and guide Safety Officer and Security Officers for containing the damage.
- Call the Medical Officer to the plant if necessary.

Site Controller will

- Ensure that all members of his/her team have been informed to assemble at Emergency Control centre. He/She will then proceed to Emergency Control Centre to take charge.
- Attend to telephone
- Keep in touch with incident controller
- Communicate with Assembly Points
- Meet outside emergency services
- Ensure proper flow of traffic and security
- Meet media/ other people coming at site from outside.
- Arrange for Medical Aid

Incident Controller will

- Direct all efforts to contain and control the incident.
- Keep non-essential persons away from the site.
- Guide outside emergency services at the site.
- Arrange to remove any casualties at the site.
- Keep in touch with Emergency Controller.

Security In-Charge will

- Actuate the Emergency Siren, if not done already.
- Send one guard to start the fire pump.
- Attend to incoming telephone.
- Await instructions from the Emergency Controller

Communication Officer

Public Relations Officer will act as Communication Officer. On hearing alarm, he will proceed to Emergency Control Centre.

- Maintains communication with Incident Controller and Deputy Incident Controller.
- Recruits suitable staff to act as messengers if telephone and other communications fail.
- Organizes all requirement of Emergency Control Centre.
- Arranges Food, Transport, and Nursing Home etc.

Safety Officer will

- Assist the Incident Controller with his special knowledge on the safety aspects in the factory. He will help to identify the hazardous chemicals, hazard zones and zone of probable impact in different accident scenarios.
- Select people with special training in safety matters to assist in the control activities.

Fire and Security Officer

- His main task is fire fighting and control.
- Announce through PAS about the incident zone and any other immediate information needed for the people nearby.
- Maintains liaison with the Fire Brigade team from outside.

Medical Officer will

- Immediately open a First Aid Centre at Control Centre or at Assembly Point.
- Take up the full responsibility of providing medical assistance during emergency.
- Arrange for outside medical help if required.

Telephone Operator

- On hearing the emergency alarm, he/she will immediately contact Site Controller.
- On the advice of Site controller/Incident Controller/Security Officer will ring Fire brigade, Police etc.
- Keep telephone board free for urgent communications.

General Employees

Who have not been specified a duty in case of emergency should proceed to/contact the Emergency Assembly Point in their area. Designated persons will carry out the actions detailed in the Individual Plant Emergency Procedure. The Roll Call leader will hold a Roll call. Personnel not at their normal work place must go to the emergency assembly point. Personnel will remain at these points and await instructions from the Site Controller.

Contractor's Employees

Contractor's employees will be instructed in the Emergency Procedures before commencing work on this site. They will report to the emergency assembly point on this site. Personnel Manager will guide them in case a major decision likes evacuation from the project site if required.

Visitors

Infrequent visitors are registered on each visit. They will be given a visitors pass which includes an emergency action statement. The responsibility for visitors in emergency situation rests with the person being visited.

Fire Design and Alarm Monitoring Measures for the Whole Plant

Fire design is based on approach of “prevention first, combined with fire measures”, firmly implementing related fire design standards and regulations according to specific situation of this project. Prevention measures shall be mainly taken into account by different professionals when selecting and arranging equipments and devices according to characteristic of different system flow, in order to prevent occur and spread of fire. Automation fire alarm monitoring device shall be applied for important buildings and equipments. Additionally, other measures such as separation and block shall be applied for fire-prone areas, in order to prevent fire spreading to nearby area.

Fire Water Supply System

In order to ensure a safe, reliable and manageable fire water supply system, a high-pressure fire water supply system with pressure regulators shall be applied for this project, preventing fire water being put to other use and making sure that fire water quantity and water pressure shall not be influenced due to leakage of other water consumption points when fire occurs.

Fire Drainage

Drainage of indoor fire hydrants and automatic sprinkler system shall be collected by indoor underground waste water system and then transferred to outdoor rain water system. Drainage of outdoor hydrants shall be collected by outdoor rain water system.

Fire Extinguishers

Selection and allocation of fire extinguishers for all kinds of buildings and structures shall be in accordance with the “Code for design of extinguisher distribution in buildings”. Main power building shall be equipped with portable CO₂ fire extinguishers, portable powder fire extinguishers, CO₂ trolley fire extinguishers and powder trolley fire extinguishers.

Risk Management Strategy

For the project risk management strategy is significant for minimizing risk. The following can be considered before formulating such strategy:

- The flammability of the process material
- Monitoring the state of reactions-particularly in enclosed vessels- to ensure that the remain within specified limits and do not become dangerous
- The amount of waste produced by the proces- how to minimize it - how to dispose and
- Measures to ensure that emissions remain within acceptable environmental limits.

After extensive literature review of natural gas based power plant the following best practices can be adopted for risk management on site:

- Safety measures are to be maintained at their expected level of performance and their good condition to be regularly ensured
- Strict ignition control shall be ensured
- Regular maintenance and inspection should be performed
- Ensure availability and effectiveness of Fire & Gas detecting system and the emergency alarm system and means of communication, which would enable early warning to all personnel in the event of accidental release and subsequently enable all personnel to take appropriate action.

Table 7.4: Safety Hazard Prevention-Control Mitigation Measures

Event	Prevention, Control and Mitigation Measures
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Event	Prevention, Control and Mitigation Measures
1. General Instruction of Workers	<ol style="list-style-type: none"> 1. Personal and continuous visual supervision of the worker who is not competent to perform the job. 2. Workers to be conversant on the codes and standards of safety 3. Workers must be confident that they have adequate training on handling or unsafe hazards material.
2. Maintenance of Equipment	<ol style="list-style-type: none"> 1. Employer shall ensure that all equipment used on a work site is maintained in a condition that will not compromise the health and safety of workers using or transporting the equipment. 2. Will perform the function for which it is intended or was designed 3. Is of adequate strength for that purpose. 4. Is free from potential defects.
3. Traffic Hazard	<ol style="list-style-type: none"> 1. Where there is a danger to workers from traffic, an employer shall take appropriate measures to ensure that the workers are protected from traffic hazards. 2. Ensure that workers who are on foot and who are exposed to traffic hazards on traveled rural roads wear reflective vests or alternative clothing that is clearly distinguished. 3. Where the operator of vehicle does not have a clear view of the path to be traveled on a work site, he shall not proceed until he receives a signal from a designated signaler who has a clear view of the path to be traveled.
4. Illumination	<ol style="list-style-type: none"> 1. Ensure that illumination at a work site is sufficient to enable work to be done safely. 2. Where failure of the normal lighting system would endanger workers, the employer shall ensure that emergency lighting is available that will generate sufficient dependable illumination to enable the workers to <ol style="list-style-type: none"> a) Leave the work site in safety b) Initiate emergency shutdown procedures c) Restore normal lighting
5. House keeping	<ol style="list-style-type: none"> 1. Ensure that each work site is clean and free from stepping and tripping hazards 2. Waste and other debris or material do not accumulate around equipment, endangering workers
6. Falling Hazards	<ol style="list-style-type: none"> 1. Ensure that where it is possible for a worker to fall a vertical distance greater than 3.5 meters the worker is protected from the falling by guard rail around the work area a safety net fall arresting device

Event	Prevention, Control and Mitigation Measures
7. Overhead power Lines	1. Ensure that no worker approaches and that no equipment is operated and no worker shall approach or operate equipment, within 7 meters of a overhead power line.
8. Sanitary facilities & drinking water	1. Ensure that an adequate supply of drinking fluids is available at the work site. 2. Ensure that work site is provided with toilet facilities in accordance with the requirement of general health protection guidelines.
9. Working proper clothing	1. Ensure that where is a possibility that a worker or worker's clothing might come in to contact with moving parts of machinery, the worker: <ul style="list-style-type: none"> . wears close-fitting clothing . confines or cuts short his head and facial hair . avoids wearing jewelry or other similar items
10. Head protection	1. Ensure that during the work process adequate alternative means of protecting the workers head is in place.
11. Eye protection	1. Where there is a danger of injury to or irritation of a worker's eyes, his employer shall ensure that the worker wears properly fitting eye protective equipment.
12. Foot protection	1. Where there is a danger of injury to a worker's feet, ensure that the worker wears safety footwear that is appropriate to the nature of the hazard associated with particular activities and conditions.
13. Respiratory protective equipment	1. Where the worker is exposed to hazards gases, gums, vapors, or particulates appropriate respiratory protective equipment to be supplied.
14. Testing & commissioning	<ol style="list-style-type: none"> 1. Mobilize test rigs at site 2. Ensure that the test equipment is in good condition 3. Ensure other equipment and facility conforms to the approved specification of test. 4. Public notice to be served before testing.

8 ENVIRONMENTAL MONITORING PLANS

Environmental monitoring is an essential tool in relation to environmental management as it provides the basic information for rational management decisions. The prime objectives of monitoring are

- To check on whether mitigation and benefit enhancement measures are actually being adopted and are providing effective in practice.
- To provide information on the actual nature and extent of key impacts and the effectiveness of the mitigation measures which, through a feedback mechanism, can be taken into account in the planning and execution of similar projects in future.

The sub-project authority should have provision of Environmental quality and safety department for monitoring the environmental management plan implementation during construction and operation phase of the project. The environmental monitoring officer should monitor the environmental management plan implementation and submit a quarterly report to the concerned department. Key components of environmental monitoring plan are described in the following subsections.

8.1 Ambient air monitoring

During the construction phase, ambient air quality will be monitored by active sampling and measurement for SPM, SO_x, NO_x, CO, toxic gases at the same locations used during the baseline study. During construction of the facility, air emissions may result from fuel or oil burning due to equipment failure. Leakages should be checked by visual inspection at the start of every shift. Monitoring plan for ambient air is presented in following table.

Area of Monitoring	Indicators	Monitoring Location	Monitoring Apparatus	Frequency
Monitoring Ambient Air Quality	SPM	Four edges of the project boundary, one sample from 1 km downwind from the project boundary	SSPM-100 sampler	On a monthly basis
	SO _x , NO _x , CO, toxic gases	Project site, 2km upwind and 2km down wind direction	Bacharach ECA 450 sensors and compact sample conditioner for SO _x , NO _x measurement, Fluke CO-220 Carbon Monoxide Meter for CO measurement	Quarterly

8.2 Meteorological Monitoring

During construction phase the collection of representative meteorological data (e.g., wind speed and direction, precipitation, temperature, humidity, and atmospheric pressure) is very useful to predict weather conditions of plant site. Meteorological data also useful to assess the possibility of natural calamities specially Cyclone, Storm surge etc so that precautions and measures in contingency plan will be taken within due time. Monitoring plan for meteorological parameters is presented in following table.

Area of Monitoring	Indicators	Monitoring Location	Monitoring Apparatus	Frequency
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Meteorological monitoring	Wind speed and direction, precipitation, temperature, humidity, and atmospheric pressure	Within the project boundary	Hygrometer for humidity, Anemometer for wind speed and direction, Temperature Sensor for temperature, Rain gauge for precipitation and Mercury barometer for atmospheric pressure measurement	Quarterly
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8.3 Ambient noise monitoring

Noise levels at the facility site during construction must comply with relevant national and international legislation. Site staff will monitor noise levels and take any remedial measures that prove necessary to reduce disturbance to nearby local residents. At locations where the possibility of noise level exceeds the standard limit such as ongoing pile-driving activities, excavation, cut and fill, erection of temporary stores etc. noise levels shall be checked at least weekly (using a Type II sound level meter). Monitoring plan for ambient noise is presented in following table.

Area of Monitoring	Indicators	Monitoring Location	Monitoring Apparatus	Frequency
Monitoring Ambient Noise	Noise level	four corner point inside the boundary, middle point of the project boundary	Digital Sound Level Meter- AR814	Monthly basis

8.4 Surface water monitoring

During the construction phase, monitoring will be conducted to the sub-project site surrounding surface drains. Parameters to be sampled every two months during this phase are Temperature, pH, EC, DO, BOD, COD, TSS, TDS, Salinity. Samples should be taken at the point of any discharge into the receiving water drain. Monitoring plan for surface water is presented in following table.

Area of Monitoring	Indicators	Monitoring Location	Monitoring Apparatus	Frequency
Monitoring Surface water quality	Temperature, pH, EC, DO, BOD, COD, TSS, TDS, Salinity	Different points on surface drains	Thermometer for Temperature, pH meter for pH, SMP350 EC meter for EC, DO meter for DO, Salinity meter for Salinity measurement. Also BOD, COD, TSS, TDS are measured by laboratory analysis	Every two months

8.5 Solid waste monitoring

During the construction phase, wastes may be generated from earth works, site establishment, civil construction, stockpile of materials, and domestic household activities. The wastes might be metals, concrete, spoiled construction material, excavated spoils, spilled oil from machinery and vehicles, etc. Moreover, some domestic waste such as food waste, paper etc would be also generated. Monitoring is required to ensure proper management of this waste. Solid and hazardous waste quantities and destination (final disposal) will be documented by the Contractor and the records handed over to authority after commissioning, to demonstrate compliant handling and disposal. Monitoring plan for solid waste is presented in following table.

Area of Monitoring	Indicators	Monitoring Location	Monitoring Apparatus	Frequency
Monitoring Solid waste	Construction and domestic wastes	Project area and labor shed	Visual observation and regular checks	Monthly basis

8.6 Workers health and safety monitoring

During construction and erecting plants and machineries may cause accident. Records of all health risk/workplace accidents will be documented and archived, in accordance with the Project health and safety Plan developed by the Contractor. This should include “near miss”, “incident” and “accident”. A baseline medical check-up for all employees (prior to commencing employment) will be conducted. Monitoring plan for Workers health and safety is presented in following table.

Area of Monitoring	Indicators	Monitoring Location	Monitoring Apparatus	Frequency
Workers health and safety monitoring	Health, Safety, awareness	Proposed industrial complex	Visual observation and regular checks	On a monthly basis

8.7 Community health monitoring

The local community may feel disturbed if the Health, safety and environmental (HSE) issues are not properly maintained during construction. On the other hand If HSE and corporate social responsibilities are maintained; there will be positive impact from the local community on the project. So continuous Community safety, health, CSR program, Security monitoring is very important. Monitoring plan for Community health is presented in following table.

Area of Monitoring	Indicators	Monitoring Location	Monitoring Apparatus	Frequency
Community health monitoring	Community safety, health, CSR program, Security, compliance to applicable social and environmental rules, etc.	Proposed industrial complex, nearest community	Visual observation and regular checks	On a monthly basis

8.8 Ecosystem monitoring

Five samples from homestead ecosystem (at least 2 at down wind direction) within 5 km radius area 5 Samples from Road side plantation including 2 at downwind direction within 5 km radius area should be collected during monitoring. Monitoring plan for ecosystem is presented in following table.

Area of Monitoring	Indicators	Monitoring Location	Monitoring Apparatus	Frequency
Ecosystem monitoring	Avifauna, Fish habitat status, Fish biodiversity, Fish production	Ramna Lake area of the project	Visual observation and regular checks	Quarterly
	Plant health and productivity of fruiting plants surrounding the project area	Selected sites within 10km radius area of the project	Visual observation and regular checks	Quarterly

8.9 Responsibility matrix

Area of Monitoring	Implementing Agency
Ambient air monitoring	DNCC
Ambient noise monitoring	DNCC
Surface water monitoring	DNCC
Solid waste monitoring	DNCC / Contractor
Workers health and safety monitoring	DNCC / Contractor
Community health monitoring	DNCC / Contractor
Ecosystem (Flora, Fauna) monitoring	DNCC

8.10 Estimated Budget for Monitoring Plan for one year and EPP

S/N	Issues	Unit cost (Lac BDT)	Monitoring time in a Year	Total cost (Lac BDT)
1.	Ambient air monitoring	0.25	1	0.25
2.	Meteorological monitoring (secondary source) i.e. Air Temperature, Humidity, Rain Fall, Wind Velocity etc	-	4	-
3.	Ambient noise monitoring	0.1	4	0.4
4.	Surface water monitoring	0.25	1	0.25
5.	Solid waste monitoring	-	12	-
6.	Workers health and safety monitoring	0.05	12	0.6
7.	Community health monitoring	0.1	1	0.1
8.	Ecosystem (Flora, Fauna) monitoring	0.05	4	0.2
Total monitoring cost				1.8

9 CONTRACTOR OBLIGATIONS

Construction project management (CPM) is the overall planning, coordination, and control of a project from beginning to completion. CPM is aimed at meeting a client's requirement in order to produce a functionally and financially viable project. A contractor is assigned to a construction project once the design has been completed by the person or is still in progress. This is done by going through a bidding process with different contractors. The contractor is selected by using one of three common selection methods: low-bid selection, best-value selection, or qualifications-based selection.

A construction manager should have the ability to handle public safety, time management, cost management, quality management, decision making, mathematics, working drawings, and human resources.

The functions of construction management typically include the following:

1. Specifying project objectives and plans including delineation of scope, budgeting, scheduling, setting performance requirements, and selecting project participants.
2. Maximizing the resource efficiency through procurement of labor, materials and equipment.
3. Implementing various operations through proper coordination and control of planning, design, estimating, contracting and construction in the entire process.
4. Developing effective communications and mechanisms for resolving conflicts.

The Construction Management Association of America (a US construction management certification and advocacy body) says the 120 most common responsibilities of a Construction Manager fall into the following 7 categories: Project Management Planning, Cost Management, Time Management, Quality Management, Contract Administration, Safety Management, and CM Professional Practice. CM professional practice includes specific activities, such as defining the responsibilities and management structure of the project management team, organizing and leading by implementing project controls, defining roles and responsibilities, developing communication protocols, and identifying elements of project design and construction likely to give rise to disputes and claims.

Contractor Obligation for Construction Activities for the Urban Resilience Project-DNCC Part (With Budget)

S/N	Environmental Issue	Objective	Suggestion for the Contractor	Proposed Budget (BDT)	Remarks
1.	Minimizing Erosion	To minimize the quantity of soil lost during construction due to land-clearing	<ul style="list-style-type: none"> • Schedule measures to avoid and reduce erosion by phasing the work program to minimize land disturbance in the planning and design stage. • Keep the areas of land cleared to a minimum, and the period of time areas remain cleared to a minimum • Base control measures to manage erosion on the vulnerability of cleared land to soil loss, paying particular attention to protecting slopes. • Mulch, roughen and seed cleared slopes and stockpiles where no works are planned for more than 28 days, with sterile grasses. • Keep vehicles to well-defined haul roads. • Rehabilitate cleared areas promptly 	0.00	No separate budget is assigned for any of the proposed sites as those are regular standard practice for the Contractors
2.	Storm water Management	To minimize the generation of contaminated storm water	<ul style="list-style-type: none"> • Minimize the quantity of uncontaminated storm water entering cleared areas • Establish cut-off or intercept drains to redirect storm water away from cleared areas and slopes to stable (vegetated) areas or effective treatment installation • Reduce water velocities, if needed 	0.00	No separate budget is assigned for any of the proposed sites as those are regular standard practice for the Contractors
3.	Sediment Controls	To minimize the impact of contaminated storm water on receiving waters	<ul style="list-style-type: none"> • Install erosion and sediment control measures, if possible before construction commences • Identify drainage lines and install control measures to handle predicted storm water and sediment loads generated in the minicatchment. • Establish an adequate inspection, maintenance and cleaning program for sediment run-off control structures. • Ensure that contingency plans are in place for unusual storm events. • Continually assess the effectiveness of sediment control measures and make necessary improvements. 	0.00	No separate budget is assigned for any of the proposed sites as those are regular standard practice for the Contractors
4.	De-Watering Work Sites	To ensure that de-watering operations	<ul style="list-style-type: none"> • Treat contaminated water pumped into the storm water system or a natural waterway to remove sediment if the turbidity exceeds 30 NTU. 	10,000.00	None of the proposed site is needed such type of

S/N	Environmental Issue	Objective	Suggestion for the Contractor	Proposed Budget (BDT)	Remarks
		do not result in turbid water entering natural waterways	<ul style="list-style-type: none"> • Ensure that the level of suspended solids in waters pumped into natural waterways never exceeds the regulatory water quality standard. • De-water by pumping water, wherever practical, on to vegetated area of sufficient width to remove suspended soil, or to sediment control devices. • Supervise all pumping and implement precautions to ensure that turbidity of pumped water is minimized. • Monitor every hour during a pumping operation the turbidity of water pumped directly to a natural waterway or a drainage system discharging to a natural waterway. 		management measures. However, if the situation demand for any site, the contractor can demand for BDT 10,000.00 for the management of the situation.
5.	Dust Control	To ensure there is no health risk or loss of amenity due to emission of dust to the environment	<ul style="list-style-type: none"> • Implement a dust prevention strategy, developed at the project planning stage • Take dust suppression measures, such as promptly watering exposed areas when visible dust is observed • Install wind fences wherever appropriate 	0.00	No separate budget is assigned for any of the proposed sites as those are regular standard practice for the Contractors
6.	Management of Stockpiles	To manage stockpiles so that dust and sediment in run-off are minimized	<ul style="list-style-type: none"> • Minimize the number of stockpiles, and the area and the time stockpiles are exposed • Keep topsoil and under burden stockpiles separate • Locate stockpiles away from drainage lines, at least 10 meters away from natural waterways and where they will be least susceptible to wind erosion • Ensure that stockpiles are designed with slopes no greater than 2:1 (horizontal/vertical) • Stabilize stockpiles that will remain bare for more than 28 days by covering with mulch or anchored fabrics or seeding with sterile grass • Establish sediment controls around unsterilized stockpiles • Suppress dust on stockpiles and batters, as circumstances demand 	0.00	No separate budget is assigned for any of the proposed sites as those are regular standard practice for the Contractors
7.	Working In Waterways	To minimize stress on aquatic communities	<ul style="list-style-type: none"> • Plan in-stream works so that the contact time is minimized • Establish special practices so that impacts on the waterway and 	0.00	None of the proposed site is needed such type of

S/N	Environmental Issue	Objective	Suggestion for the Contractor	Proposed Budget (BDT)	Remarks
	and Floodplains	when working in a waterway	disturbance of its banks are minimized <ul style="list-style-type: none"> • Stabilize banks and in stream structure so that they do not contribute to the sediment load • Maintain minimum flows to ensure the viability of aquatic communities and ensure that there are no barriers to the passage of fish up and downstream • Avoid times of the year when environmental damage is expected to be highest • Construct in-stream crossings during low flows, designed to be stable under expected vehicle loads and flow regimes that do not contribute to the sediment load in the stream • Design crossings so that drainage off the crossing does not contribute sediment load to the stream. • Prepare a contingency plan for high-rain events. • Prepare a reinstatement plan if work in a stream is planned or the structure of a waterway will be altered. 		management measures. However, no separate budget is assigned if the situation demand for any of the proposed sites as those are regular standard practice for the Contractors
8.	Noise and Vibration	To ensure nuisance from noise and vibration does not occur	<ul style="list-style-type: none"> • Fit and maintain appropriate mufflers on earth-moving and other vehicles on the site • Enclose noisy equipment • Provide noise attenuation screens, where appropriate • Where an activity is likely to cause a noise nuisance to nearby residents, restrict operating hours to between 7 am and 6 pm weekdays and 7 am to 12 pm Friday, except where, for practical reasons, the activity is unavoidable • Noise should not be above background levels inside any adjacent residence between 10 pm and 7 am • Advise local residents when unavoidable out-of-hours' work will occur. • Schedule deliveries to the site so that disruption to local amenity and traffic are minimized • Conduct a study on the impact of ground vibration from construction activities, where these operations occur within 50 meters of a building 	0.00	No separate budget is assigned for any of the proposed sites as those are regular standard practice for the Contractors

S/N	Environmental Issue	Objective	Suggestion for the Contractor	Proposed Budget (BDT)	Remarks
			and take appropriate action <ul style="list-style-type: none"> Minimize air vibrations 		
9.	Waste Minimization	To minimize the waste load discharged to the environment	<ul style="list-style-type: none"> Carry out a waste minimization assessment which examines opportunities for waste avoidance reduction, reuse and recycling. Reduce wastes by selecting, in order of preference, avoidance, reduction, reuse and recycling. Incorporate waste minimization targets and measures into the environmental management plan. 	0.00	No separate budget is assigned for any of the proposed sites as those are regular standard practice for the Contractors
10.	Contaminated Material and Wastes	To ensure that all contaminated material uncovered on a construction site are excavated and disposed of in an environmentally responsible manner	<ul style="list-style-type: none"> Assay material uncovered on-site prior to disposal. If the wastes include putrescible wastes, then also analyze leachate and landfill gases. Excavate material in a manner which avoids off-site environmental problems. Seal remaining contaminated material or wastes, where only part of the tip has been excavated, to ensure that there is no off-site effect now or in the future. Transport odorous wastes in covered vehicles. Dispose of contaminated material in a landfill licensed to take the type of contaminated material or wastes uncovered. 	0.00	No separate budget is assigned for any of the proposed sites as those are regular standard practice for the Contractors
11.	Air Quality	To ensure there is no health risk or loss of amenity due to emission of exhaust gases to the environment	<ul style="list-style-type: none"> Ensure that all vehicles and machinery are fitted with appropriate emission control equipment, maintained frequently and serviced to the manufacturers' specifications. Smoke from internal combustion engines should not be visible for more than ten seconds 	0.00	No separate budget is assigned for any of the proposed sites as those are regular standard practice for the Contractors
12.	Litter	To ensure that all litter is disposed of in a responsible manner, and is not released into the environment	<ul style="list-style-type: none"> Maintain a high quality of housekeeping and ensure that materials are not left where they can be washed or blown away to become litter. Provide bins for construction workers and staff at locations where they consume food Conduct ongoing awareness with staff of the need to avoid littering 	0.00	No separate budget is assigned for any of the proposed sites as those are regular standard practice for the Contractors
13.	Storing Fuels	To ensure that fuel	<ul style="list-style-type: none"> Minimize fuels and chemicals stored onsite. 	0.00	No separate budget is assigned

S/N	Environmental Issue	Objective	Suggestion for the Contractor	Proposed Budget (BDT)	Remarks
	and Chemicals	and chemical storage is safe, and that any materials that escape do not cause environmental damage	<ul style="list-style-type: none"> • Install bunds and take other precautions to reduce the risk of spills. • Implement a contingency plan to handle spills, so that environmental damage is avoided. 		for any of the proposed sites as those are regular standard practice for the Contractors
14.	Keeping Roads Clean	To ensure that roads are kept clean of soil	<ul style="list-style-type: none"> • Install wheel washes and rumble grids at all main road crossings. • Ensure that the roads are swept at least once a day on uncontrolled road crossings when construction vehicles are travelling off the site. • Install litter traps lined with filter cloth in all side-entry pits. • Cover all loads of soil being taken off site for disposal. 	0.00	No separate budget is assigned for any of the proposed sites as those are regular standard practice for the Contractors
15.	Supply of First Aid Box with standard contents	To ensure immediate treatment after a sudden accident	<ul style="list-style-type: none"> • Install a first aid box at an easy accessible place of the site for anyone 	2000.00	For the proposed site
16.	Health and Safety Warning Sign	To understand for the workers and visitor about the risky site or component of the construction activity	<ul style="list-style-type: none"> • Install health and safety warning signs where it is necessary 	2000.00	For the proposed site
17.	Safety Gear Package	To ensure the safety of the workers, field supervisors and the visitors	<ul style="list-style-type: none"> • Make available of the Safety Gear Package like gloves, helmets, eye protector, rubber shoes, light reflecting dress etc for each worker, field supervisors and the visitors 	0.00	No separate budget is assigned for any of the proposed sites as those are regular standard practice for the Contractors
18.	Tree Plantation	To develop a green belt around the project area	<ul style="list-style-type: none"> • Tree plantation around the shelter or road in a planned way and maintenance for all the construction time • Extra care should be given to the sites where trees will be cut down 	BDT 3000.00	BDT 3000.00 for Uttara (Type 1)
19.	Temporary Sanitary Latrine/	To ensure sanitary environment of the work area	<ul style="list-style-type: none"> • Temporary Sanitary Latrine/ Septic Tank/ Portable Toilet: 2 nos. (1 no of Toilet for women and 1 no of Toilet for men) 	0.00	No separate budget is assigned for any of the proposed sites as those are regular standard

S/N	Environmental Issue	Objective	Suggestion for the Contractor	Proposed Budget (BDT)	Remarks
	Septic Tank/ Portable Toilet				practice for the Contractors
20.	Drinking Water Sample Analysis and Drinking Water Filter	To ensure safe drinking water for the workers at site	<ul style="list-style-type: none"> • Take water sample from the surrounding tube-well or the new tube-well dug at the site to analyze important parameters for drinking water • 1-no of tube-well should be installed at the beginning of construction works, if there is no one at the vicinity, so that labour and other site staff can get drinking water. • Supplying of best quality drinking water filter including extra set of faucets ceramic and at least three sets of ceramic filter 	BDT 5000.00	For each site the budget will be given
Total BDT 22,000.00					

10 CONCLUSIONS AND RECOMMENDATIONS

This study aims to understand initial environmental impacts for the Sub-project as well as to formulate the relevant mitigation and monitoring plans. Based on the Environmental Assessment, all possible environmental aspects have been adequately assessed and necessary control measures have been formulated to meet with statutory requirements.

The overall conclusion is that if the mitigation, compensation and enhancement measures are implemented in full, there will be no significant negative environmental impacts as a result of location, design, construction, and/or operation of the proposed Sub-project. There will in fact be tremendous benefits from recommended mitigation and enhancement measures and major improvements in quality of life and individual, education, job and public health once the scheme is in operation.

The conclusions of the Environmental and Social Assessment can be summarized as follows:

- The communities will receive large benefits in terms of quality of life, particularly with reduced disaster vulnerability, and improved health and education facilities, infrastructure, transportation & communication etc.
- The short-term negative impacts that may come in the way of air quality, noise, solid waste, occupational health & safety need to be minimized through the mitigation action plan. Moreover, post disaster health, safety and flood problems are common. These issues might be problematic if necessary mitigation measures, as suggested in EMP, would not take into consideration.
- The project will create employment for the workforce who live in the vicinity of the construction site and will provide them a short-term economic gain.
- The green belt development with large-growing trees at the periphery of the site will give the places a more natural and pleasing appearance.
- A comprehensive Environmental Management Plan (EMP) has been prepared to mitigate and reduce the adverse impacts that will come out from the Sub-project activities. The EMP mainly focuses on managing, mitigating and reducing the impacts exhibited from design, construction and operation phase.
- The tentative cost has been estimated around **BDT 1.8 Lacs for yearly monitoring** and around **BDT 22 Thousands to implement the EMP during construction**. This budget can change due to change of market prices and if the project implementation period extends.

Two straight recommendations which are listed below need to be followed by the concern authority to ensure sound environmental and socio-economic condition:

- All mitigation, compensation and enhancement measures proposed in this report need to be followed.
- The Environmental Management and Monitoring Plan proposed in this report also need to be followed.

Environmental and Social Assessment of Urban Resilience Project

Project Area: Dhaka North City Corporation

Project Location: Mirpur 2

1 INTRODUCTION

1.1 Background of the Sub-project

This is a Sub-project under Urban Resilience Project-DNCC Part. In the Sub-project area a new warehouse has been planned for construction for keeping the search and rescue equipments and subsequently use during emergency. The significant features of the Sub-project have been mentioned in Table 1.

Table 1: Significant features of the sub-project

Name of the Sub-project	Construction of warehouse in Mirpur-2 under Urban Resilience Project-DNCC Part
Warehouse Location	Zone-2, Mirpur-2 area, Block- Fnear road no 5
Type of Building	Type 1 (3000 sft), 2-storied Building
Land available	0.069 acres
Land acquisition	Not required

1.1.1 Aim of Sub-project

The Objective of the sub-project is to increase the effectiveness of disaster preparedness and response, while addressing existing and emergent risks in Dhaka. The Project will enhance the capacity of municipal public organizations in Dhaka to effectively prepare for, respond to and recover from small and large emergency events. It will also identify an investment program to reduce critical vulnerabilities and will support an improvement in the quality of new building construction. Further, the project seeks to create an enabling environment for coordinated, locally managed disaster risks management.

1.1.2 Location of Sub-Project

The Sub-project is located in the Zone-2, Mirpur-2 area, Block- F, near road no 5 which is within the Dhaka North City Corporation. The location details of the Sub-project have been summarized in Table 2. The Layout Plan, Location Map, Base Map and Topographical Map have been shown in Figure 1, Figure 2, Figure 3 and Figure 4 respectively. Photographs showing present condition of the Sub-project area have been shown in Figure 5.

Table 2: Location Details of the sub-project

Division	Dhaka
District	Dhaka
Upazila	Mirpur (Darus Salam)
Word No.	7 (N)
Mouza	Senpara
GPS Position	23.80 ⁰ N and 90.36 ⁰ E
Nearby Major Road	Mirpur 1 to Mirpur 10 road

1.2 Purpose of the Environmental and Social Assessment (ESA) Study

The purpose of the ESA process is to inform decision-makers and the public of the environmental consequences of implementing a proposed project. The ESA document itself is a technical tool that identifies, predicts, and analyzes impacts on the physical environment, as well as social, cultural, and health impacts. If the ESA process is successful, it identifies alternatives and mitigation measures to reduce the environmental impact of a proposed project. The ESA process also serves an important procedural role in the overall decision-making process by promoting transparency and public involvement.

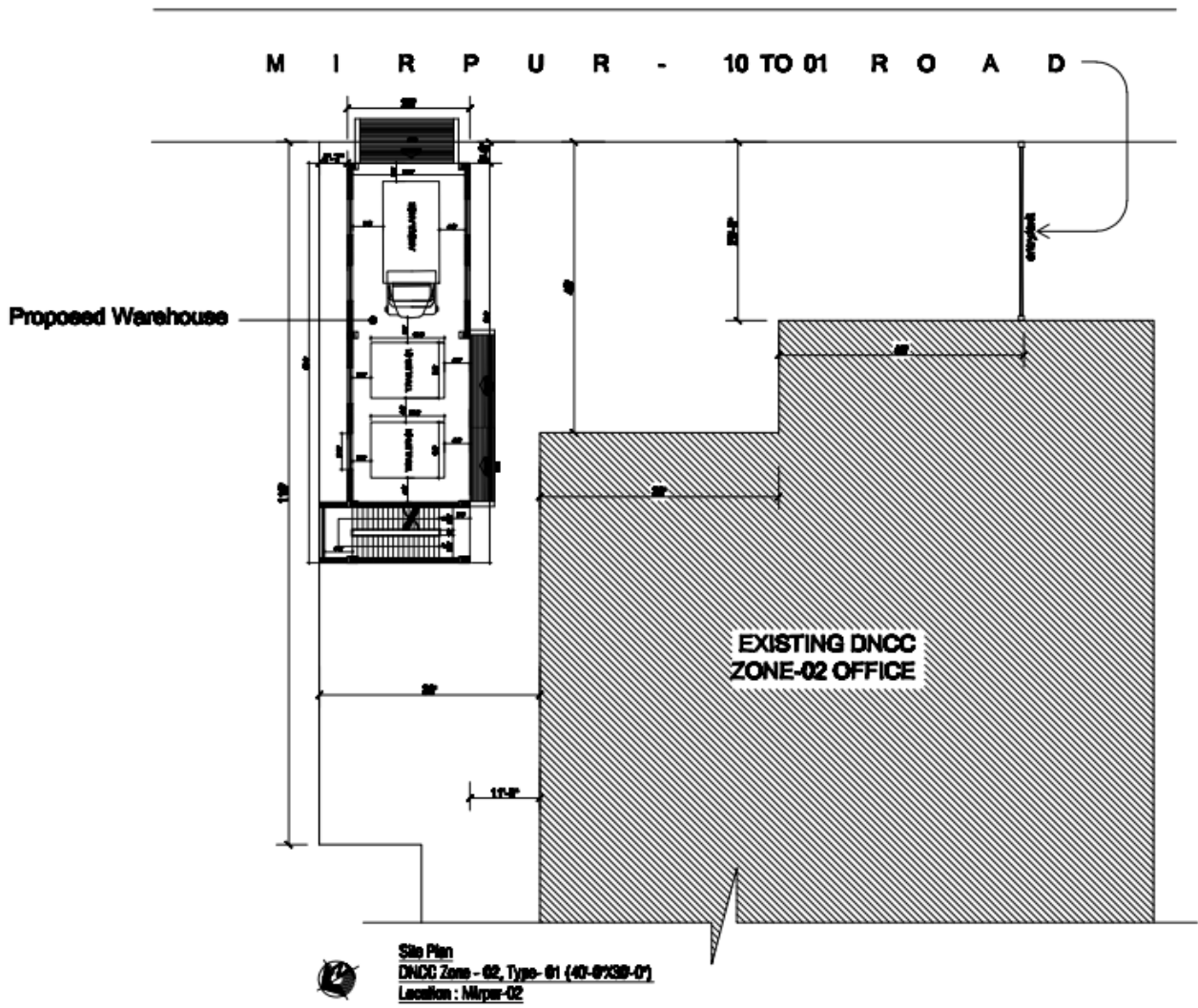


Figure 1: Layout Plan of the Proposed Sub-project

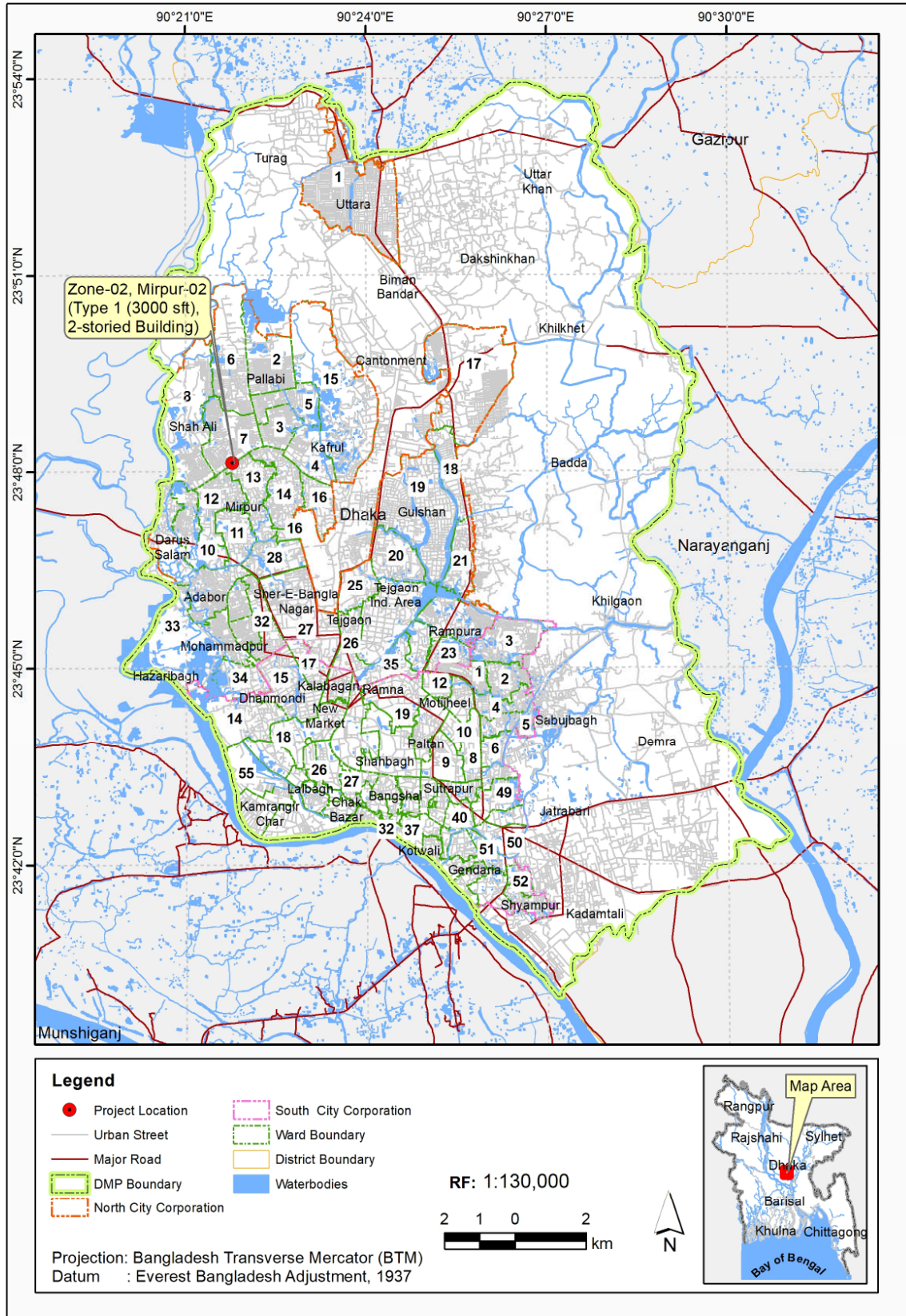


Figure 2: Location Map of Sub-project Site

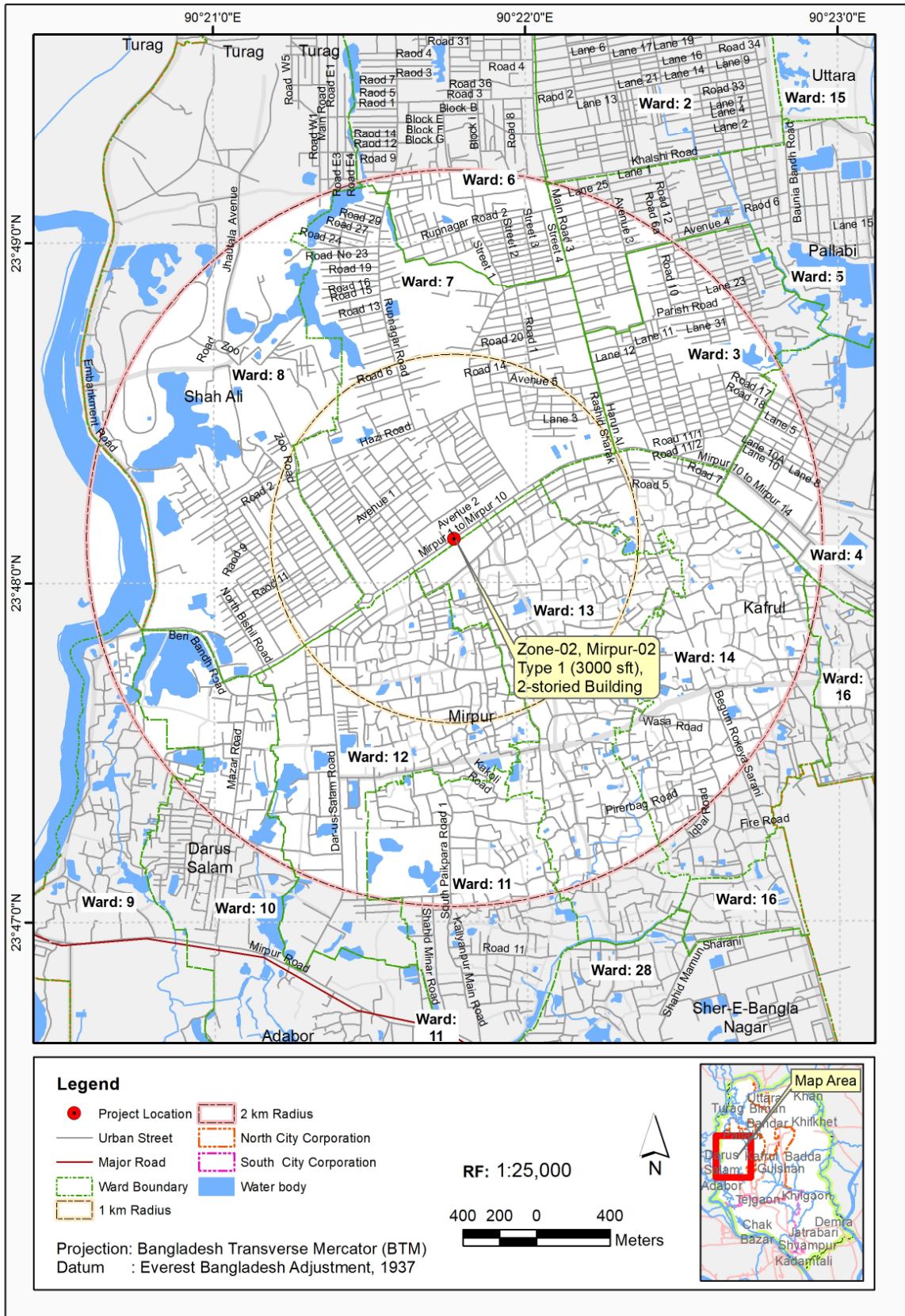


Figure 3: Base Map of Sub-project Site

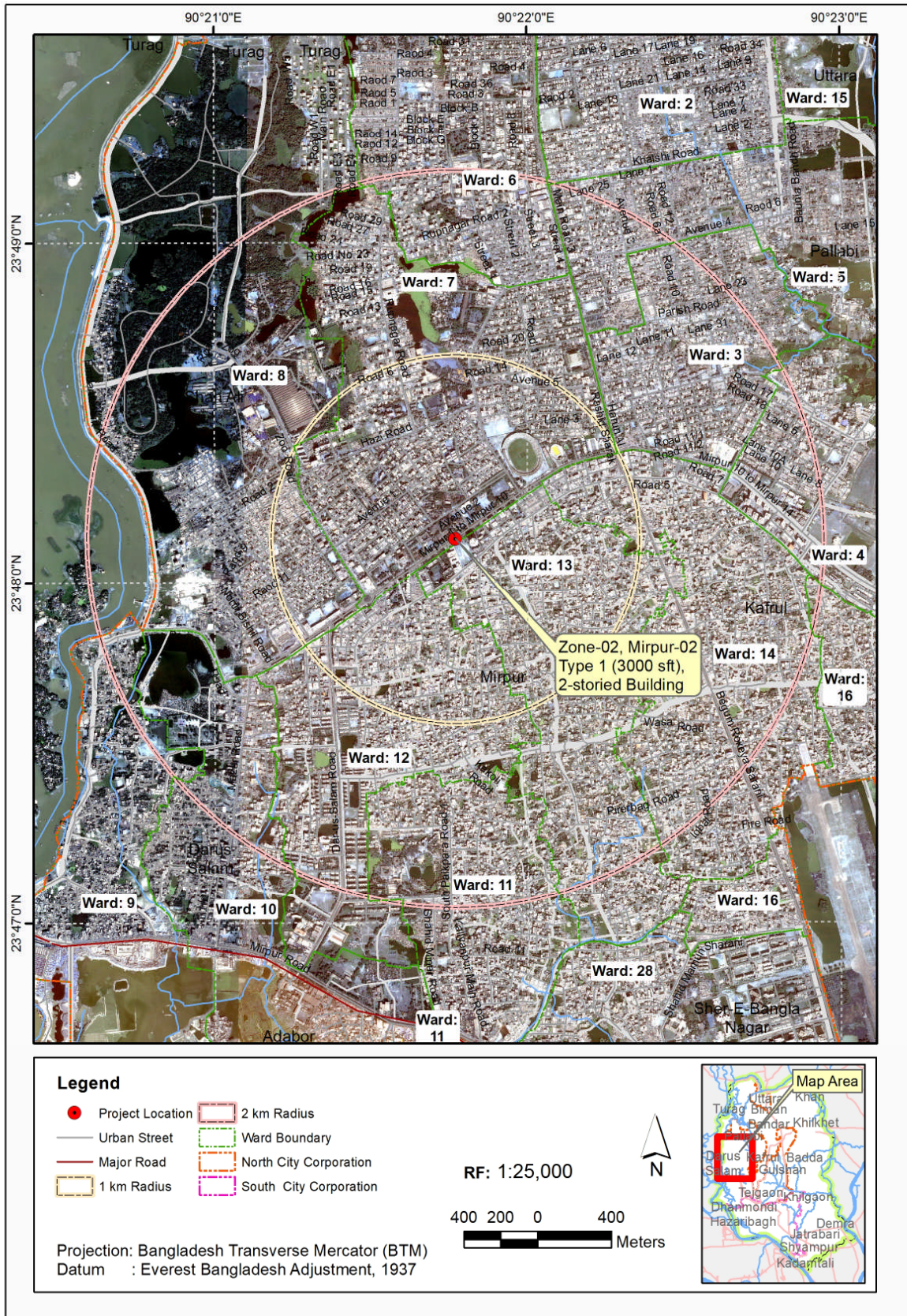


Figure 4: Topographical Map of Sub-project Site



Figure 5: Photograph showing the present condition the sub-project area

1.5 Brief Description of Sub-Project Site

The proposed Sub-project is located within the Mirpur-2 area, Block- Fnear road no 5, beside Mirpur 1 to Mirpur 10 road. The important establishments around the Sub-project site have been summarized below.

North Boundary: Mirpur Zoo, Botanical Garden, Sheikh Fazilatunnesa College, Mirpur Central Temple etc.



Figure 6: North side major features of the site

South Boundary: Grameen Bank, Kidney Foundation, Mirpur post office, Bangladesh Bank Training Academy etc.



Figure 7: South side major features of the site

East Boundary: Sher-e-Bangla National Cricket Stadium, Mirpur Shopping Center, BTRC, Mirpur 10 circle, Mirpur Girls Ideal Laboratory Institute etc.



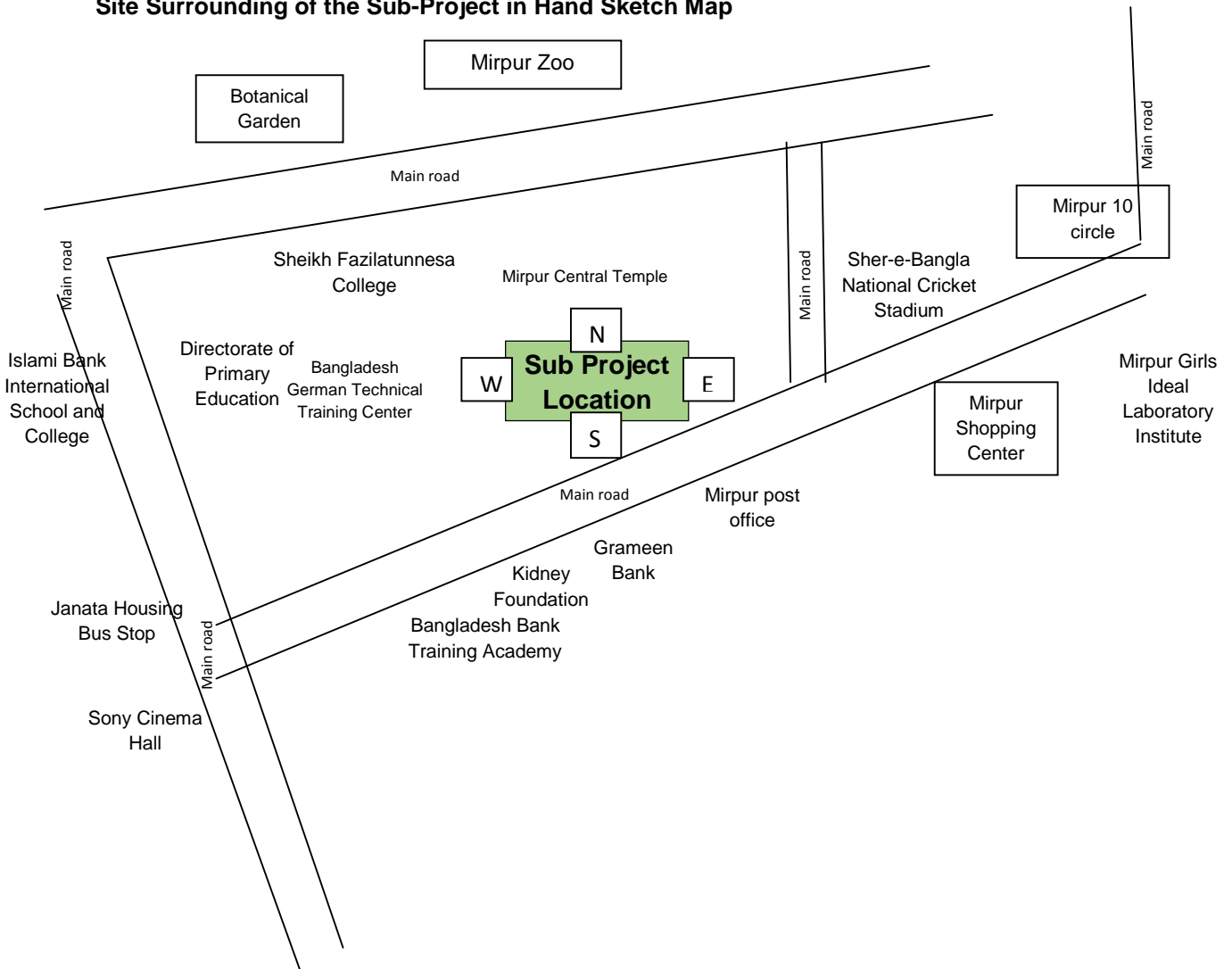
Figure 8: East side major features of the site

West Boundary: Bangladesh German Technical Training Center, Directorate of Primary Education, Janata Housing Bus Stop, Sony Cinema Hall, Mirpur 1 eidgah Math, Islami Bank International School and College etc.



Figure 9: West side major features of the site

Site Surrounding of the Sub-Project in Hand Sketch Map



1.6 Sub-Project Components

The major components of the sub-project are a two storied building (3000 sft) and some rescue equipments (such as Trailer, Ambulance, Fire extinguisher and Life jacket etc) kept in this building which is used use during emergency. Also a 1120 sft auxiliary monitoring and demonstration room is proposed in 1st floor of this building.

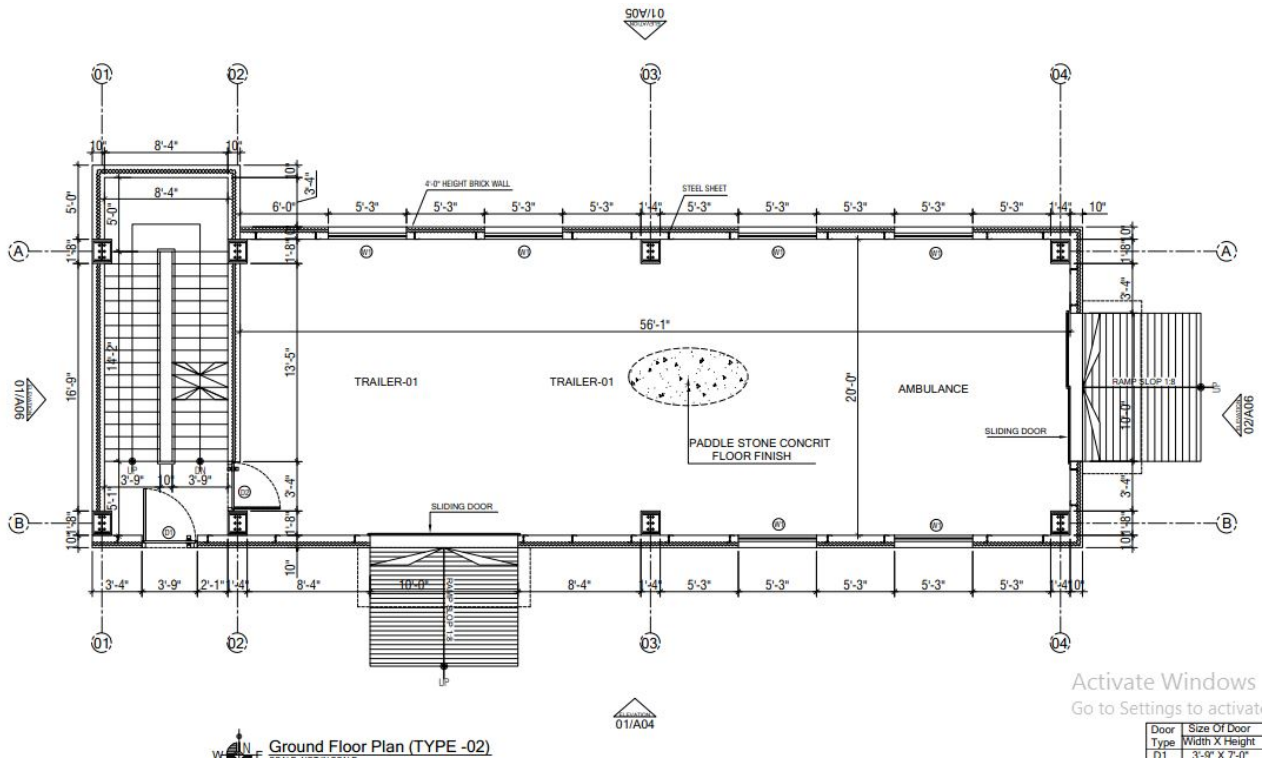


Figure 10: Plan layout of ground floor

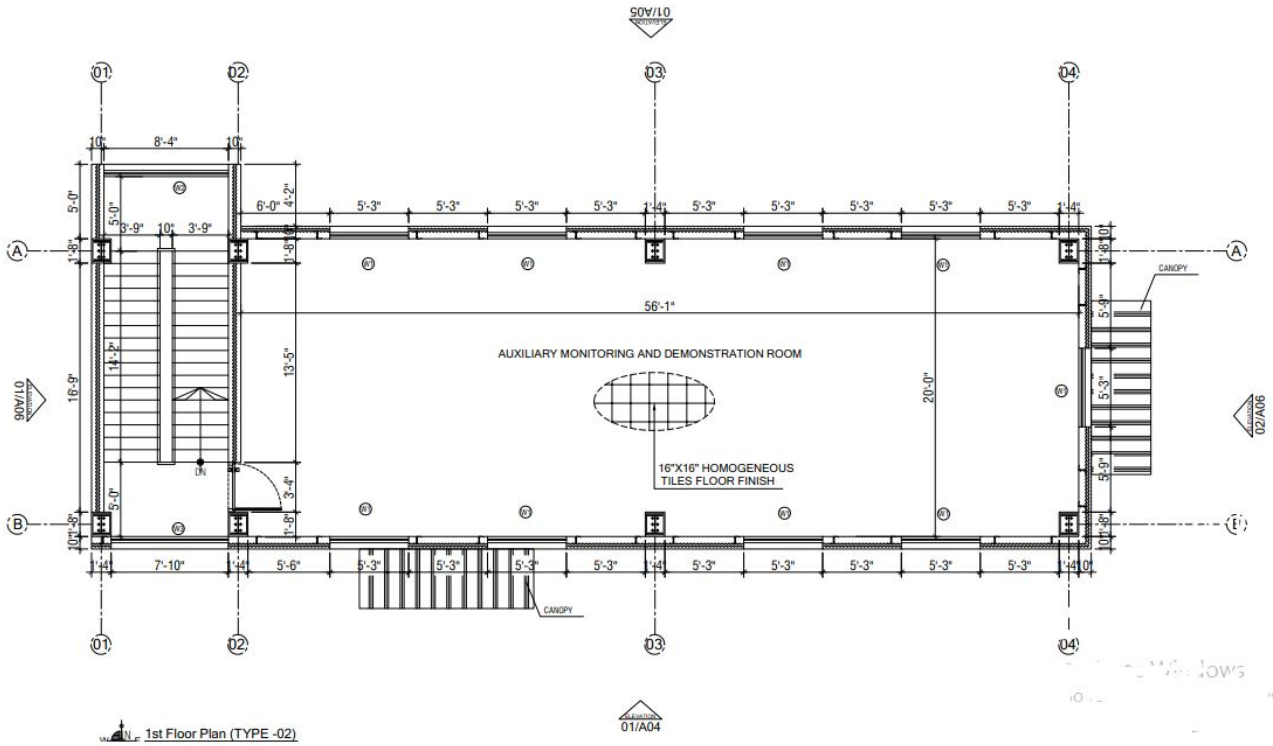


Figure 11: Plan layout of first floor

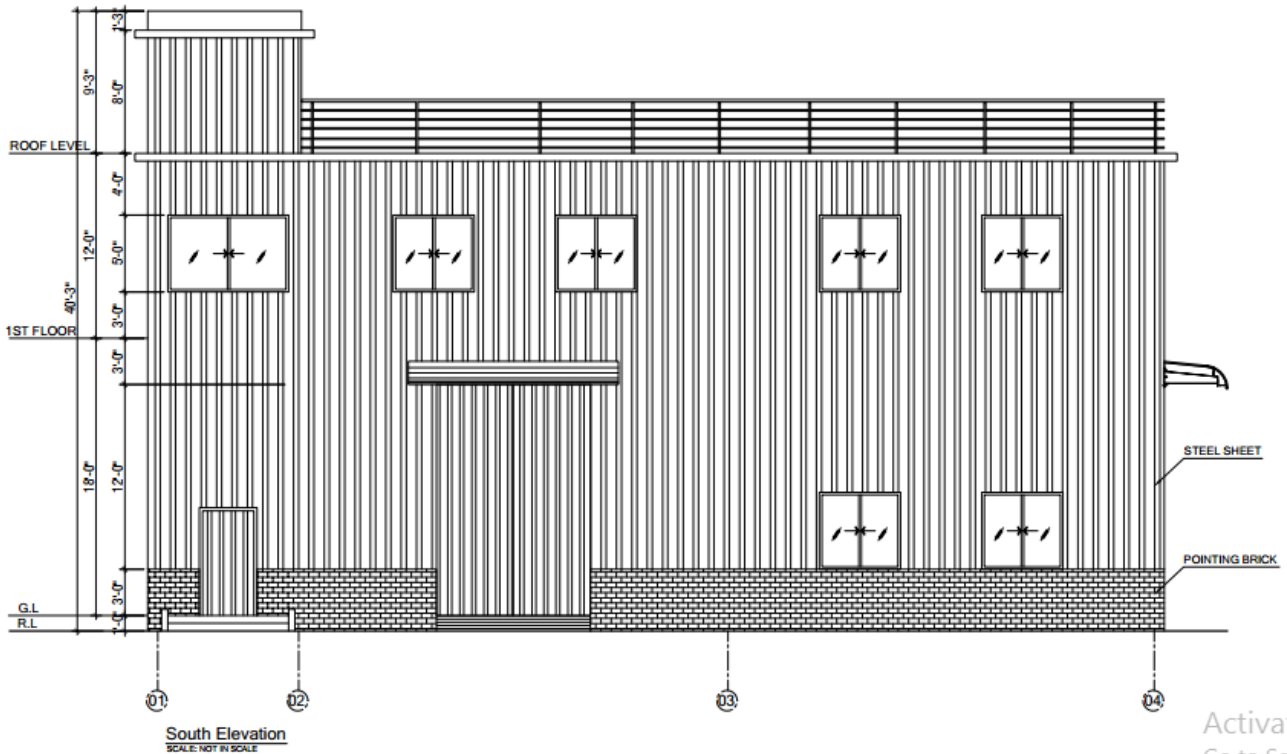


Figure 12: North elevation

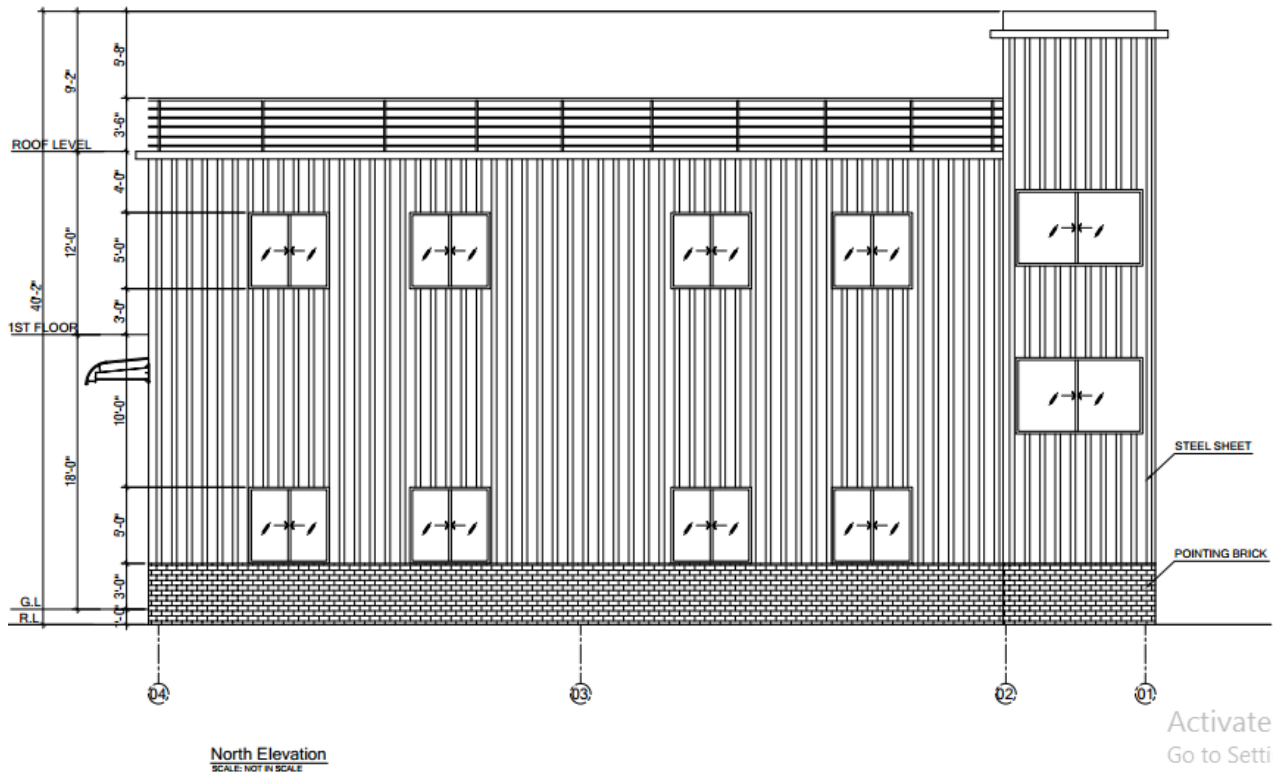


Figure 13: South elevation

1.7 Structural Design Analysis

In the structural design it is very important to keep sufficient air and light circulation in the floor plan. According to the BNBC minimum 25% ventilation should be maintained in any kind of infrastructure. From the above floor plan (Figure 10, 11, 12 and 13), it has been found that there is around 900 sq. ft. openings where as 25 % of 3000 sq. ft. is 750 sq. ft. So, there is sufficient ventilation option in the proposed structure.

Normally, according to the BNBC code 2014, the plinth or floor level of a building is 2 feet high from the existing ground or road level. In the design of warehouse, the plinth level is considered with respect to the surrounding infrastructure plinth level. The highest plinth level among surrounding buildings has been considered as the plinth level of the warehouse. In this area, the highest flood height is 5 feet, lowest is 1 feet and average is around 2 feet. And the frequency of highest height flooding is more or less 15 years. So the design seems safe regarding the flooding issue.

Moreover, for DSCC, in the ground floor Ambulance and Mortuary vans will be parked, in the first floor light search and Rescue equipment will be kept. Only 2/3 people will be stationed in the warehouse. And the stair will be enough for the Emergency Exit as per the BNBC rules (the rule is given at the end of the table). Moreover a steel ladder with a window will be kept for using as emergency exit. *The guidance of BNBC is given below for the Emergency Exit.*

Emergency Exit: *Provided single stair satisfies the BNBC Part 4 chapter 3 requirement as described below:*

3.14 Number of Exits

3.14.1 *The requirements of the number of exits specified in this subsection shall apply to buildings of all occupancy groups unless a more restrictive requirement for any occupancy is provided in Chapter 5, Part 4 or elsewhere in this Code.*

3.14.2 *Only one means of exit shall suffice for the buildings specified in Table 4.3.5 provided that they do not have more than one floor below the level of exit discharge.*

3.14.3 *For all other buildings the required number of exits shall depend on the occupant load as specified below:*

Occupant load 500 or less	Minimum 2 exits
Occupant load 501 to 1000	Minimum 3 exits
Occupant load more than 1000	Minimum 4 exits

Table 4.3.5 Buildings Served by One Means of Exit

Occupancy	Maximum Number of Storeys	Other Restrictions
All	1	Maximum occupant load 100 and maximum travel distance 25 m
A1	2	Maximum occupant load 30
A2	6	Maximum 12 dwelling units
A3	4	Maximum 50 occupants per floor and maximum travel distance 25 m
A4	6	Maximum 50 occupants per floor and maximum travel distance 25 m
A5	2	Maximum occupant load 50
B, C	2	Maximum occupant load 200
D	2	Maximum occupant load 50
F, G, H	2	Maximum occupant load 100 and maximum travel distance 25 m

3.14.4 All buildings more than 6 storeys or 20 m in height and all buildings having a floor area larger than 500 m² on each floor, used as educational, institutional, assembly, industrial, storage or hazardous occupancy or a mixed occupancy involving any of these, shall have a minimum of two staircases. The staircases shall be of the enclosed type and shall lead directly to the exterior or the designated area of refuge.

1.8 Equipment and Storing Place

The larger and vehicular equipment will be stored at the ground floor like Mobile Light Unit and Generator (2000w), Generator, Concrete Cutter, Ambulance and the smaller equipment will be stored at the first floor like Air Compressor, Power Chain Saw, Megaphone, Breathing, Apparatus, Knee Pad & Eye Protector, Gloves, Multi-Purpose, Cutter, Ram Jack, High Pressure Air Bag, Rubble Removing Bag, Stretcher, Family tent, Relief tent, Dead Body Bag, Chemical Light Sticks, Fire Aid Box.

For the storing of the equipment, there is enough space according to the above drawing. And the equipment which will be stored at the ground floor will be lightly affected from any sudden flood due to their nature. And as per the layout there is enough space for emergency exit.

2 POLICY LEGAL AND ADMINISTRATIVE FRAMEWORKS

The proposed Urban Resilience Project-DNCC Part will be implemented in compliance with applicable environmental laws and regulations. Bangladesh has an environmental legal framework that is conducive to both environmental protection and natural resources conservation. This environmental legal framework applies to the proposed sub-project. In addition, a wide range of laws and regulations related to environmental issues are in place in Bangladesh. Many of these are cross-sectoral and partially related to environmental issues. This Section presents an overview of the major national environmental laws and regulations that are relevant and may apply to activities supported by the Urban Resilience Project-DNCC Part, institutional arrangement and national and sub-national level, and World Bank safeguard policies.

2.1 National Environmental Laws and Regulations

National Environmental Policy 1992

The concept of environmental protection through national efforts was first recognized and declared in Bangladesh with the adoption of the Environment Policy, 1992 and the Environment Action Plan, 1992. The major objectives of Environmental policy are to i) maintain ecological balance and overall development through protection and improvement of the environment; ii) protect country against natural disaster; iii) identify and regulate activities, which pollute and degrade the environment; iv) ensure environmentally sound development in all sectors; v) ensure sustainable, long term and environmentally sound base of natural resources; and vi) actively remain associate with all international environmental initiatives to the maximum possible extent.

Bangladesh Environmental Conservation Act (ECA), 1995 amended 2002

This umbrella Act includes laws for conservation of the environment, improvement of environmental standards, and control and mitigation of environmental pollution. It is currently the main legislative framework document relating to environmental protection in Bangladesh, which repealed the earlier Environment Pollution Control ordinance of 1977.

Environment Conservation Rules (ECR) 1997 amended 2003

These are the first set of rules, promulgated under the Environment Conservation Act 1995. Among other things, these rules set (i) the National Environmental Quality Standards for ambient air, various types of water, industrial effluent, emission, noise, vehicular exhaust etc., (ii) requirement for and procedures to obtain Environmental Clearance, and (iii) requirements for IEE/EIA according to categories of industrial and other development interventions.

Environment Court Act, 2000

The aim and objective of the Act is to materialize the Environmental Conservation Act, 1995 through judicial activities. This Act established Environmental Courts (one or more in every division), set the jurisdiction of the courts, and outlined the procedure of activities and power of the courts, right of entry for judicial inspection and for appeal as well as the constitution of Appeal Court.

Bangladesh National Building Code

The basic purpose of this code is to establish minimum standards for design, construction, quality of materials, use and occupancy, location and maintenance of all buildings within Bangladesh in order to safeguard, within achievable limits, life, limb, health, property and public welfare. The installation and use of certain equipment, services and appurtenances related, connected or attached to such buildings are also regulated herein to achieve the same purpose.

2.2 International Safeguard Policies (World Bank)

The objective of these policies is to prevent and mitigate undue harm to people and their environment in the development process. Safeguard policies provide a platform for the participation of stakeholders in project design, and act as an important instrument for building ownership among local populations. The effectiveness and development impact of projects and programs supported by the

Bank has substantially increased as a result of attention to these policies. The World Bank has ten environmental, social, and legal safeguard policies. The relevant policies for environmental safeguard are the following:

- OP/BP 4.01 Environmental Assessment
- OP/BP 4.04 Natural Habitats
- OP/BP 4.09 Pest Management
- OP/BP 4.11 Physical Cultural Resources
- OP/BP 4.36 Forests
- OP/BP 4.37 Safety of Dams

Operational Policies (OP) are the statement of policy objectives and operational principles including the roles and obligations of the Borrower and the Bank, whereas Bank Procedures (BP) is the mandatory procedures to be followed by the Borrower and the Bank. Apart from these, the IFC guidelines for Environmental Health and safety have been adopted by the World Bank Group which is also relevant for environmental protection and monitoring. In addition to that the Policy on Access to Information of World Bank also relates to environmental safeguard.

2.3 Implications of Environmental Policies and Regulations on URP

The Environmental Conservation Rules (ECR) 1997 (DoE, 1997) classifies projects into four categories according to potential environmental impacts: **(1) Green; (2) Orange A; (3) Orange B; and (4) Red.** **Green category** projects are those with mostly positive environmental impacts or negligible negative impacts; **Orange A** category projects are those with minor and mostly temporary environmental impacts for which there are standard mitigation measures; **Orange B** category project are those with moderately significant environmental impacts; while **Red category** projects are those with significant adverse environmental impacts. As discussed in project description, the sub-projects to be implemented under Urban Resilience Project-DNCC Part would fall under **Orange A** category.

The BNBC, PPR 2008, Bangladesh Labor Act 2006 outlines guidelines for ensuring worker's health and safety during construction works which would have direct implications in project. It would be the responsibilities of the contractors (with supervision of DNCC) to make sure that these guidelines are followed in the workplace environment.

According to WB Operational Policy (OP 4.01), the nature of environmental assessment to be carried out for a particular sub-project would largely depend on the category of the sub-project. As mentioned earlier, The World Bank Operational Policy (OP) 4.01 classifies projects into three major categories (category A, B and C), depending on the type, location, sensitivity and scale of the project, and nature and magnitude of potential impacts.

The sub-projects to be implemented under the Urban Resilience Project-DNCC Part do not involve large-scale infrastructure development (e.g., construction of sanitary landfill, water or wastewater treatment plant, major highways). The sub-projects would involve no involuntary land acquisition. Thus, the sub-projects to be carried out do not appear to pose risk of significant adverse environmental impacts. In view of subprojects nature, the overall project is classified as a Category 'B' and the safeguard policy OP/BP 4.01 has been triggered for the proposed operation. The policy has been triggered to ensure that the sub project design and implementation will be focused on reducing adverse impacts and enhancing positive impacts.

It is highly unlikely that any natural habitant formed largely by native plant and animal species will be affected or modified by the subprojects activities to be implemented under Urban Resilience Project-DNCC Part because most of the infrastructure development works are small-scale and will take place in the built environments of municipalities adjacent to various other infrastructures. However, the EMF stipulated the code of practice on natural habitat as advance precautionary measures and Natural Habitats (OP/BP 4.04) has been triggered.

Also it is unlikely that any designated physical cultural resources will be affected by the subprojects. However, the impacts will be examined as part of the environmental screening/assessment of each sub-project. The EMF provided criteria for screening and assessment of physical cultural resources. In addition, 'Chance find' procedures conforming to local legislation on heritage would be evaluated that any physical or cultural resources will not be impacted. OP 4.11 (Physical Cultural Resources)

has been triggered.

The activities of the project will not involve any pesticide application, include activities in forest areas or relate to protection of dams. Hence OP 4.09, 4.36 and OP 4.37 will not be relevant as well.

The IFC guidelines provides guidance on certain EHS issues which include standards for environmental parameters (ambient air quality, water and wastewater quality, noise level, waste management), hazard and accident prevention, occupational and community health and safety (during commissioning and decommissioning works) etc. These guidelines will be directly applicable to the MGSP project. As a general rule, the IFC guidelines should complement the existing Bangladesh guidelines or standards. In case the Bangladesh guidelines or standards differ from the IFC guidelines, project is expected to follow the more stringent ones.

The World Bank access to information policy would be directly followed. The Urban Resilience Project-DNCC Part will make the environmental assessment and EMF documents available to the public by publishing it in their websites. In addition, subproject specific screening/assessment report will periodically be posted in the DNCC website before the bidding process. Hard copies of these documents in English (including a summary in Bengali) will be made available in the offices of the respective Pourashavas and city corporations for the local stakeholders.

3 DESCRIPTION OF THE ENVIRONMENT (BASELINE ENVIRONMENT)

3.1 Physical Environment

3.1.1 Geology, Topography and Soils

The part of Bangladesh to which the capital city of Dhaka belongs is dominated by the rivers Ganges, Jamuna and Meghna, which drain large quantities of water from the Himalayan Mountains into the Bay of Bengal, through a complex delta system of tidal tributaries and creeks, formed by sediment deposited by the rivers. Known as a composite of Brahmaputra-Jamuna Flood plain and Madhupur Sal Tract, this part – the central region – is composed of flat and low lying land, which floods extensively in the rainy season and red textured highlands.

Much of Bangladesh lies on the Gangetic-Bengal Plain, and is flat and low lying particularly around the delta, which floods extensively in the rainy season. The sub-project site situated in North of Dhaka, the land gradually begins to rise, towards the foothills of the Himalayas in the north. The influence of the rivers is evident in the soils, which are almost entirely alluvial and generally fertile in the central plains, with a predominantly loam and silt consistency.

The sub-project site is situated in Dhaka which is situated at the southern tip of a Pleistocene terrace, the Madhupur tract. Two characteristic geological units cover the city and surroundings, viz Madhupur Clay of the Pleistocene age and alluvial deposits of recent age. The Madhupur Clay is the oldest sediment exposed in and around the city area having characteristic topography and drainage. The major geomorphic units of the city are: the high land or the Dhaka terrace, the low lands or floodplains and depressions and abandoned channels. Low lying swamps and marshes located in and around the city are other major topographic features of the sub-project site.

3.1.2 Hydrology (Surface & Groundwater)

In the proposed site where warehouse will be constructed there is no water body.

Like other towns and cities of Bangladesh, the Dhaka city dwellers, too, use both surface and groundwater as a source of domestic water. Principal difference lies in use of supply water based on treatment with some application of chlorine in Dhaka and other population centers. Pollution of rivers is a major problem, because of the discharge of industrial wastewater and inadequate sewerage. The DoE has identified 450 polluting industrial units in Dhaka (196 tanneries, 129 textile producers, 38 engineering factories, and plants manufacturing pesticides, chemicals, fertilizers, pulp and paper), many of which discharge untreated wastewater to the rivers. The sewerage system covers only 20% of the city population, and 50% of people use septic tanks, 20% pit latrines and 10% use open latrines and other unsanitary methods.

There are three main aquifers in the central region of Bangladesh:

- (iv) An upper (composite) aquifer, which can reach depths of 50 m and is covered with an upper silty clay layer of less than 20 m;
- (v) A middle (main) aquifer of fine to heavy sands, which is generally 10-60 m thick and in most areas is hydraulically connected with the composite aquifer above; and
- (vi) A deep aquifer of medium, medium-to-fine or medium-to-coarse sand, which is generally found at depths below 100 m.

In Dhaka 80% of the domestic water supply is obtained from the middle aquifer, extracted by tube-wells throughout the city. Recent studies have shown that water levels have fallen dramatically (20 m over the past six years) and suggest that the aquifer may be changing from a confined to an unconfined condition, which could make it vulnerable to contamination. There is already evidence of pollution by leaking underground tanks at petrol stations and chemical plants, and seepage from sewers, septic tanks and pit latrines. DWASA is implementing a major project to improve the water supply service, which amongst other things will increase the usage of surface water and extend groundwater abstraction to the deeper aquifer, at a sustainable rate.

The water quality data of the month of June, 2016 of the lakes and rivers in and around Dhaka City is given in Annex A. The analysis is done by DoE, Dhaka.

3.1.3 Climate and Meteorology

The climate in the sub-project area is humid and sub-tropical, with a typical three season pattern. During the winter season (November-February), cool winds blow from the north-east. The weather is cool and dry. Rainfall, however, shows variations over the last decade (2001-2011) between 116 mm in November, 2002 and 0 mm in February, 2011. Average temperatures show, over the same period, variation between 23.4°C in November, 2005 and 17.3°C in January, 2011. Temperatures start to rise in March and reach the annual maximum of around 39.9°C in April-May, when daytime temperatures can reach up to 40°C. Rainfall also increases, and this period is characterized by unstable weather. The monsoon begins in May-June as hot air rises over the Indian subcontinent, creating low pressure areas into which rush the cooler moisture-laden winds from the Indian Ocean and the Bay of Bengal. Around 70-80% of the annual rain falls during this time. The rain is often accompanied by strong winds, sometimes exceeding 100 km/h. Temperature and rainfall both decline post-monsoon, returning rapidly to the winter lows.

Wind data from the Bangladesh Meteorological Department Climate Division suggests that wind directions vary month-to-month in Dhaka, though predominantly in the NW, S, and NE directions. As the STSs will be contained within tall walled structures and cleaned daily, windborne odor will get minimized.

3.1.4 Flooding, Water Logging and Drainage Pattern

The Sub-project area is mostly flood free and elevation is higher than normal local flood level. The area is not affected in normal floods. Most of the drains in the sub-project area are connected with Sewerage Lines and Turag River bearing the waste water. Also Industrial wastewater is disposed in this open drains. According to the environmental standard of Bangladesh (ECR, 1997), for the survival of the aquatic life the dissolved oxygen be between 4 mg and 8 mg per liter and accepted level of Biological Oxygen Demand (BOD) is 100 mg per liter. But the situation is far-off worse in study area.

3.1.5 Air Quality and Dust

Being a commercial area, the area produces a large amount of air pollutant and dust. The main atmospheric pollutants are those produced by vehicles and industries and in particular by the burning of fuels. These include particulate matter, hydrocarbons, carbon dioxide, carbon monoxide, sulfur dioxide, oxides of nitrogen, lead, ammonia and hydrogen sulfide. Many of these cause respiratory problems in humans, plus other diseases if substances accumulate in the tissues.

Table 3.1: National Ambient Air Quality Standards for Bangladesh and Field Data

S/N	Parameter	BD Standard	Averaging Time	AQMP, DOE (Darus-Salam, 23.78N 90.36E)		Field Survey
				July	August	August
5.	SO ₂	80 µg/m ³ (0.03 ppm)	Annual	-	-	-
		365 µg/m ³ (0.14 ppm)	24 hours (a)	-	0.71	9.0
6.	NO _x	100 µg/m ³ (0.053 ppm)	Annual	13.0	19.9	14.0
7.	PM10	50 µg/m ³	Annual (b)	-	-	-
		150 µg/m ³	24 hours (c)	44.3	70.2	105.0
8.	PM2.5	15 µg/m ³	Annual	-	-	-
		65 µg/m ³	24 hours	19.2	31.6	-

Source: AQMP, DOE and Field Survey, 2016.

The main causes of the poor air quality are:

- (iv) Poor roads and traffic management leading to severe traffic congestion;
- (v) Heavy industrialization, and use of cheaper high-sulfur fuels (coal, wood and tyres) by smaller industries like brick kilns; and
- (vi) Poor solid waste management, so burning is the common method of treating garbage.

3.1.6 Noise level

The project is in a mixed zone. Noise level of the project area is within the accepted limit (75 dB).

- On site sources: Minimum 55 dB and maximum 66 dB during 9.30 A.M from various sources.
- Off site sources: Minimum 63 dB and maximum 77 dB during 9.30 A.M from various sources.

Present noise level in the project site and Bangladesh standards for sound level are shown in Table 3.2

Table 3.2: Bangladesh Standards for sound level (GoB, 2006)

Noise Level at Project Site				Bangladesh Standards		
Site	Time	Minimum	Maximum	Location	Noise Level (dBA) at Day	Noise Level (dBA) at Night
On Site	9:30 a.m.	55	66	Silent zone	50	40
	9:30 p.m.	40	50	Residential area	55	45
Off Site	9:30 a.m.	63	77	Mixed Zone	60	50
				Commercial area	70	60
	9:10 p.m.	50	65	Industrial area	75	70

3.2 Biological Environment

3.2.1 Flora

The area is covered with various types of trees and plenty of grass land exist there. There are 36 number of trees existed on the site from which approximately 3 no's will be cut off due to acquisition of land and for construction purpose. Moreover existing grass land is approximate is 150 m² and nothing will be hampered so as for garden area.

Table3.3: Types and number of Flora

S/N	Types of Flora and Name	Existing	To be Cut Off	
1.	(Mahogany, <i>Swietenia genus</i>)	01	01	
	Neem (<i>Azadirachta indica</i>)	03	01	
	Mango (<i>Mangifera indica</i>)	01	01	
	Drumstick tree (<i>Moringa oleifera</i>)	01	0	
	Coconut (<i>Cocos nucifera</i>)	01	0	
	Tamarind (<i>Tamarindus indica</i>)	02	0	
	Breadfruit (<i>Artocarpus heterophyllus</i>)	02	0	
	Date plam (<i>Phonix dactylifera</i>)	02	0	
	Fir (<i>Polyalthia longifolia</i>)	05	0	
2.	Breadfruit (<i>Artocarpus heterophyllus</i>)	03	0	
	Neem (<i>Azadirachta indica</i>)	01	0	
	Green Coconut (<i>Cocos nucifera</i>)	01	0	
	Mango (<i>Magnifera indica</i>)	02	0	
	Krisnochura (<i>Caesalpinia pulcherrima</i>)	01	0	
3.	Small Tress	Papaya (<i>Carica papaya</i>)	10	0
4.	Grassland		150 m ²	0

5.	Other Forest/ Agricultural/ Garden etc	0	0
6.	Total Trees	36	03



Figure 14: Existing Large Trees
(Mahogany)



Existing Medium Trees
(Breadfruit, Neem etc.)



Existing grass land

3.2.2 Fauna

In the project site no rare endangered species, mammals, fish and others have been observed. Only some indigenous like Squirrels (Sciuridae), Cat (*Felis catus*), Dog (*Canis lupus familiaris*) have been seen. Moreover various birds like Crow (*Corvus corone*), Myna (*Acridotheres tristis*), and Sparrow (*Passer domesticus*) have been seen.

3.3 Socio-Economical Environment

3.3.1 Land Use

The proposed land for the sub-project is situated within the existing DNCC zone-02 office, so the site is mainly used for vehicle parking and movement place of people who comes in the office. Whereas the present land use surrounding the sub-project site is quite mixed in character. The lands in the Sub-project's catchment areas shown in Figure 15 are mainly distributed in Commercial, Residential, Institutional, Road and other infrastructures etc. The detail land coverage of 1 km and 2 km buffer of sub-project location is given in the Table 3.

Table 3: Land covers classification of the study area

Land Use	For 1 km buffer	For 2 km buffer
	Area (acres)	Area (acres)
Commercial area	103.63	190.2
Industrial area	0.0	0.0
Institutional area	36.64	82.28
Open Space	16.50	137.13
Road	91.83	305.60
Urban Residential area	521.0	2280.79
Water body	8.57	195.44
Others	42.33	143.78
Grand Total	820.5	3335.22

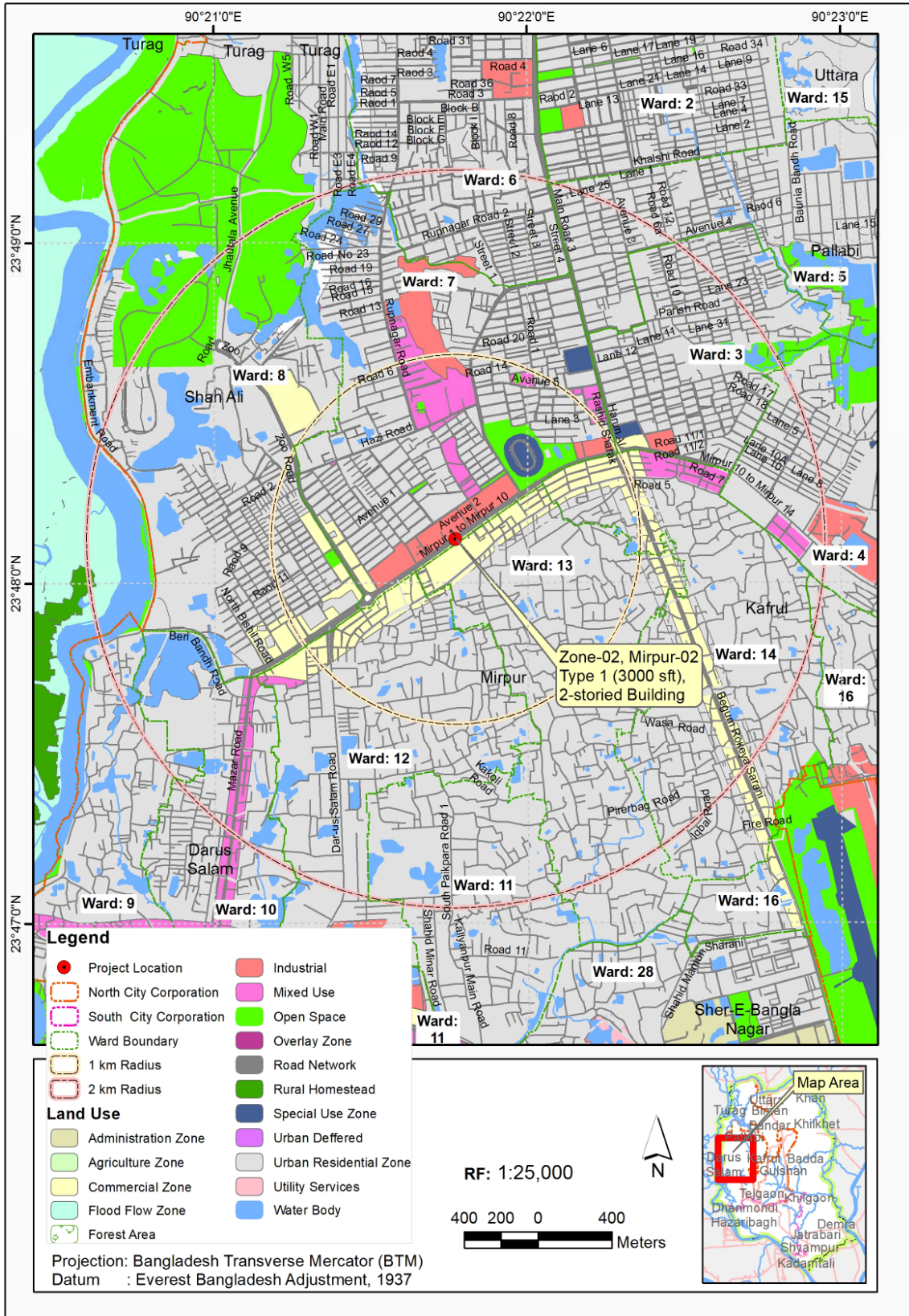


Figure 15: Land use and Land Cover Map of the Study Area

3.3.2 Beneficiary Population

The Sub-project activities will benefit the local people and people who comes in the Sub-project's catchment areas during disaster and non-disaster period. The Sub-project's catchment area will cover 1.88 sq.km. situated around it. Total numbers of population in catchment area of the Sub-project is 113750 among which 60408 are male and 53342 are female [BBS, 2011 - Population Census].

3.3.3 Education

In catchment area of the Sub-project, literacy rate among the population is higher than the national average (70.7%). Literacy rate of male is still higher than the female populations [BBS, 2011-Population Census]. There are many school, colleges and university around the project site like Mirpur University College, SAIC Institute of Medical Technology, Mirpur Girls Ideal Laboratory Institute, Adarsha High School, Mirpur Bangla High School and College, Hazrat Shah Ali Mohila Degree College etc.



Figure 16: Major educational facilities around the site

3.3.4 Access Road to the site and Traffic Load with Types

There is a 4 lane access road in front of the project site. The road is main vehicle route from Mirpur 10 to Mirpur 1 and vice versa.



Figure 17: Access road for the warehouse

3.3.5 Public Services

There are many public services like Hospital, Fire service, Thana etc. Major public services are Health Foundation, Kidney Foundation, Mirpur 10 no Fire Brigade Office and Mirpur 2 no Thana.



Figure 18: Major Public Services

3.3.6 Recreation and Aesthetics

There is a park named Mirpur zoo and another garden named botanical garden is near the project site. Moreover Sher-e-Bangla National Cricket Stadium and Mirpur shopping complex is near the proposed warehouse.



Figure 19: Recreation facilities

3.3.7 Land Acquisition & Resettlement

Land acquisition and resettlement activities are not involved in the Sub-project Intervention.

3.3.8 Agriculture

No agricultural activities are taking place in the Sub-project area.

4 PUBLIC CONSULTATION

4.1 General

Presently the public consultation is done as a part of social assessment separately to ascertain the people's reaction. During the survey, public consultation has done to know the people's perceptions about the project and environmental problems. The purpose of the public consultation includes the following:

- To ascertain the public views on various environmental issues related to the project;
- To encourage and provide for people's participation in project implementation; and
- To obtain new insight and site specific information, and to appropriating possible mitigation measures based on local knowledge of the communities.
- To ensure the minimization of social conflicts regarding the project, if any

During consultation with the local people, they were little known about this type of project. This area is somewhat underdeveloped part of the area. The expansion of the industrial unites is very slow so they are very positive about this project. The proponent also commits to give privilege locality in every aspect.

4.2 Approach and Methodology

4.2.1 Approach

Participatory approach was followed for identifying the participants as well as conducting public consultation meeting. Initially, the study team consulted with the project proponent i.e. **City Corporation Authority** for understanding the project situation and the potential stakeholders. However, the meeting ensured the common and equal platform of the participants so that they can express their opinion in an enabling environment. The consultants unfold the issues and in return, the participants give feedback to the given issues and in some cases open two-ways discussions were held in the meeting.

The consultation process was intended to generate an enabling participatory environment between the project proponent and the potential stakeholders through the intermediaries of the consultant. The consultant, in this context, ensured a congenial participatory interaction by mixing two beneficiary groups i.e. **City Corporation Authority** that belongs to up stair and the stakeholders who belong to down stair.

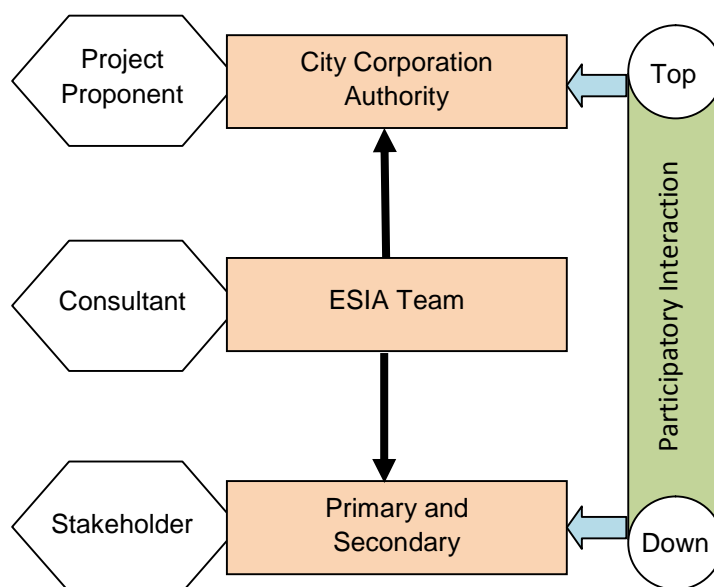


Figure 20: Overall Consultation Process

4.2.2 Methodology

4.2.2.1 Identification of Stakeholders

Stakeholders include all those who affect and are being affected by policies, decisions or actions within a particular system. Stakeholders can be groups of people, organizations, institutions and sometimes even individuals. Stakeholders can be divided into primary and secondary stakeholder categories.

Primary Stakeholders: Primary stakeholders are people who would be directly benefited or impacted by the proposed project. In this context, people who have/had land within the project boundary, and who are living at the vicinity of the proposed project were considered as the primary stakeholders.

Secondary Stakeholders: This category of stakeholders pertains to those who may not be directly affected but have interests that could contribute to the study, play a role in implementation at some stage, or affect decision making on Project aspects. In this project local elite persons, government departments and line agencies fall under this category.

4.2.2.2 Time, Date and Venue Selection

For formal consultation meeting venue, date and time of meeting was selected through the consultation with local people, the project proponent and the consultant. These three groups select an agreed venue considering the closeness to the proposed project, easy accessibility to the venue and which is likely to be neutral. Date and time was also finalized in this way considering availability of the participants, ensuring the maximum participation and compliance with the other arrangement.

For Key Informant Interviews (KIIs), potential secondary stakeholders preferably different government officials, private entrepreneur have been selected who are incumbent in the jurisdiction. Appointments were taken prior to visit them.

For Focus Group Discussion (FGDs), local occupational groups who are concerned and are likely to be impacted were identified and consulted at the spot.

4.2.2.3 Enlisting and Invitation

A comprehensive list of potential stakeholders was prepared through the consultation. This list was intended to cover all sorts of interest groups, occupational groups, socially acceptable and knowledgeable peoples.

A formal invitation was sent to them and also communicated over telephone for ensuring their presence in the meeting.

4.2.2.4 Consultation Instrument

Checklist: A comprehensive checklist covering all possible issues to be addressed was prepared through consultation with the multidisciplinary study team. This checklist was used in the meeting to unveil peoples' perception and opinion along with suggestions.

Attendance list: An inventory of the participants was maintained in attendance sheet containing contact number.

Camera: For visualizing the participants, photographs were taken using camera. These photos were presented in this chapter. Photos of the meeting participants are presented at the end of this chapter.

4.2.2.5 Consultation Process

The study team conducted the meeting. During consultation meeting, the following process was followed with sequences.

Greetings: At the outset, the team spelled greetings to all participants. Welcomed them for attending and stated the entire design of the meeting.

Introduction: The team members introduced themselves to the participants and gave detail description of the project, spelled out about the objectives and anticipated outcome of the meeting.

Respect to the participants: The study team showed respect to all participants. They respected not only to the individuals but also to their values, cultural practices and social structures.

Ensuring peoples’ voice: Generally, all participants cannot participate equally. In fact, a substantial number of participants tended to remain silent in any meeting. However, the study team encouraged all to participate willingly through explaining the ethics of the study.

Note taking: discussed issues and opinions were written in notebook carefully. All issues were given equal importance.

Recapitulation and closing the session: At the end the study team recapitulated the session and responded to the quarries. Finally, the facilitator closed the session thanking the participants.

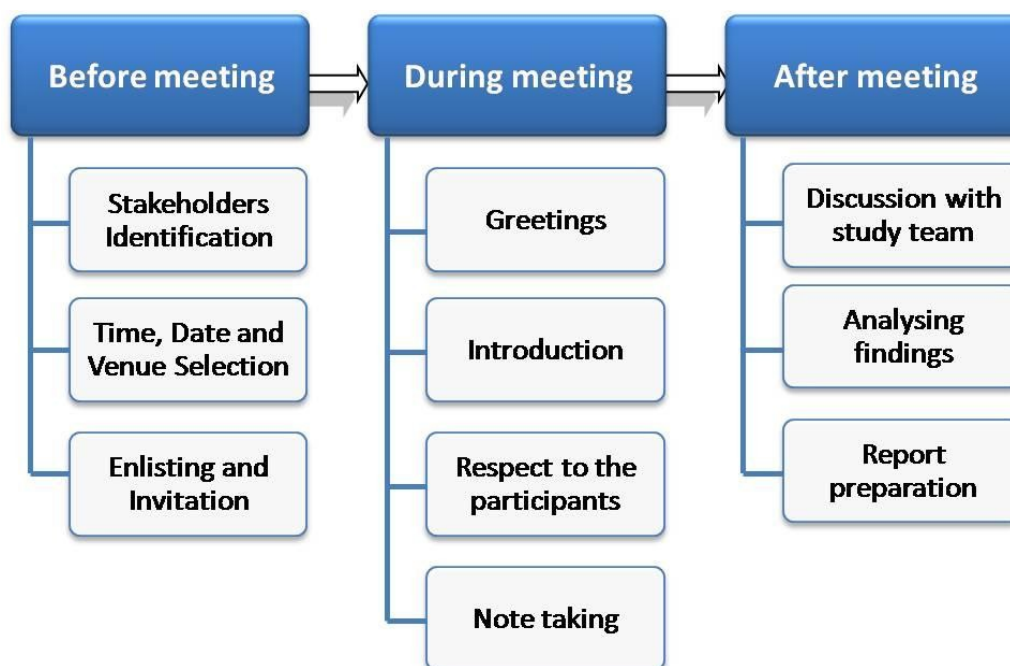


Figure 21: Steps of Consultation Process

4.2.2.6 Consultation Meeting

Venue, Date and Time

One Public Consultation Meeting (PCMs) was held at Mirpur-2 project site comprising different types of the stakeholders. Details are given below.

Participants Criteria	Governmental and Non-governmental Officials
Date	26.06.2016
Place	Mirpur 2
Starting time	9.30 AM
Ending time	10.30 AM

The Participants

There were total 8 participants in the PCM. Most of them are small businessman or shopkeepers and some are service holder. No Local Government representative is found during the PCM.

4.3 Issues Discussed

The following issues are discussed:

- Disaster shelter is very urgent as they are very much vulnerable to disaster i.e. Earthquake, cyclone, flood etc.
- Man-made disasters like fire, drainage congestion, landslide and building collapse are increasing rapidly particularly in and around the major cities.
- City level emergency disaster management system remains weak.

- Earth quake is infrequent but Dhaka has been identified by Stanford University, as one of the 20 most earthquake vulnerable cities in the world.
- Government of Bangladesh has therefore undertaken the Urban Resilience Project (URP) in two cities, Dhaka and Sylhet.
- Objective of the project is to increase the effectiveness of disaster preparedness and response.
- It will also reduce critical vulnerabilities and will support an improvement in the quality of new building construction.

4.5 Feedback of the Stakeholders

4.5.1 Knowledge about the Project

At the outset, the study team gave a brief description about the project. However, the stated description by the study team makes them clearer about the objectives and process of the project.

4.5.2 Attitude to the project

The participants expressed conditional positive response to the project. They stated that if the proposed project does not hamper their business, it will be welcomed warmly. Otherwise they are not interested of this project.

4.5.3 Findings of the Consultation Meeting

Upswing of employment in community

Sequences of matters were emerged with FGD (Focus Group Discussion) participants looking at their experience of employment in the project from a different perspective including quality of occupation. The participants summarized their opinion about the possibility of better occupational probabilities.

Environmental apprehensions

Environment is the most prominent issue in our everyday life. We are bound to protect our environment for the betterment of our living. Most of the participants concern about environmental threats i.e. the disaster. Over all discussions, environmental apprehensions (water pollution, air pollution and soil pollution) was stated and was the most frequent measures of the environment.

Upsurge social mobility

There are too many topics were discussed by the participants of FGD. Social mobility is one of them. Very few people discussed about social mobility. Social mobility means the proportion of individuals in a particular social class who move up or down in the socio-economic hierarchy.

4.5.4 Suggestions and Recommendations of the Participants

The participants were presented a number of feedback, suggestions and recommendations which are as follows:

- Existing concrete pavement need to be repaired after construction of warehouse.
- Local people have no interest in conversation because they think that, it won't be helpful to them.
- City Corporation peoples did not give any idea of information about this project.
- The construction of new warehouse will increase employment opportunities but need to maintain at a regular basis.
- The warehouse will be an asset for emergency situation.
- There should be access facilities to the disaster affected areas such as connecting roads, available of resources so that people can get help during emergency cases.
- They also requested to have provision of additional facilities such as Radio, TV, Rain Coat, Torch light, Life jacket, Mike, Flag, Fire extinguisher, Gum boot etc.
- Most of the participants are expressed that the capacity of the proposed warehouse is satisfactory.

4.6 Researcher's Understanding Based on the Discussion

Each participant shares their opinions on the **Urban Resilience Project**. Some of the participants demand to establish the facility. They, who support the project identified some major social and environmental factors that may have really functioned for the communal people of the locality. Despite some negative comments, all of the participants suggested to establish the facility.

5 INITIAL ENVIRONMENTAL AND SOCIAL SCREENING (IESS)

5.1 General

Initial Environmental and Social Screening (IESS) for the Sub-project has been conducted with the purpose of fulfilling the requirements of GoB and WB. IESS ensures that environmental issues are properly identified in terms of extent of impacts. Field visit for performing IESS has been carried out on July 2016 in the Sub-project site. The screening data and information for this Sub-project have been formulated and shown in Table 5.1. The social screening checklist is given in Annex C.

Table 5.1: Initial Environmental Screening Checklist

Screening Questions	Impact ⁵					Remarks
	Y	N	H	M	L	
A. Potential Environmental Impacts due to Sub-project location during Planning Phase						
Is the Sub-project area.....						
Adjacent to/or within any of the environmentally sensitive areas?						
Cultural heritage site	√					At safe distance, No potential threat is found
Protected area		√				
Wetland		√				
Mangrove		√				
Estuarine		√				
Buffer zone of protected areas		√				
Special area for protecting biodiversity		√				
Bay		√				
B. Potential Physical Environmental Impacts during Construction Phase						
Will the Sub-Project cause...						
Loss of agricultural land/ crop?		√				
Impact of Air / Dust pollution?	√				√	Vehicles movement: bus, mini truck, motor cycle, auto rickshaw, taxi, tractor, lorry, private car, human howler and during construction period due to construction activities.
Impact of Noise pollution?	√				√	Vehicles movement: bus, mini truck, motor cycle, auto rickshaw, taxi, tractor, lorry, private car, human howler etc. and during construction period due to construction activities.

⁵Y = Yes, N = No, H=High, M=medium, L=Low

Screening Questions	Impact ⁵					Remarks
	Y	N	H	M	L	
Impact on soil, surface and ground waters Pollution? If yes, mentions source?		√				
Impacts on surrounding environment due to sanitation and wastes disposal during: construction phase?	√				√	Disposal area available? [√Yes/No] If yes, where: √On-site, Off-site
Impact from construction camp?		√				Camp area available? Yes / No [√]
Construction material storage area		√				
Impact on drainage or create water logging in the area?	√				√	Heavy rainfall cause the water stagnation in the sub-project area 1'-1.5' in June & July in every year.
Is there any flooding problem? Mention frequency & severity.	√				√	1988 - 4'-5', 5-6 Days 2007-1'-2', 1-2 Days 2008 - 3'-4', 2-3 Days
Is there any river erosion? Where & Severity?		√				
C. Potential Biological/ Ecological Environmental Impacts during Construction Phase						
Will the Sub-project cause.....						
Destruction of trees and vegetation?		√				
Impact on pond or fish?		√				
Negative effects on rare, vulnerable, threatened or endangered species of flora & fauna and/ or their habitat?		√				No rare species are found near by the sub-project area.
Negative effects on wildlife habitat, populations, Corridors or movement?		√				No wildlife habitat reported to exist nearby the sub-project area.
Negative effects on locally important or valued ecosystems or vegetation?		√				
D. Potential Socio-Economical Impacts during Construction Phase						
Will the Sub-project cause...						
Involve any land acquisition and involuntary resettlement?		√				
Traffic disturbances due to construction material transport and wastes?	√				√	There is a 4 lane access road in front of the project site. The road is main vehicle route from Mirpur 10 to Mirpur 1 and vice versa.
Negative effects on neighborhood or community?		√				
Are there any Impediments to movements of people and livestock?		√				

Screening Questions	Impact ⁵					Remarks
	Y	N	H	M	L	
Disturbance to the student to take the lesson in the classroom? If yes, Specify.	√					
Direct or indirect hazards to student for walking in the school campus by construction activities?	√					
Risks and vulnerabilities related to occupational -health and safety due to hazards during construction and operation phase?	√				√	During construction period due to construction activities.
E. Potential Historical & Cultural Impacts during Construction Phase						
Will the sub project cause...						
Degradation or disturbance of historically culturally important site (mosque, graveyards, monuments etc.)? If Yes, Specify.	√					
F. Potential impacts during Operation & Maintenance Phase						
Will the sub-project activities cause...						
Possible development of labor camp into permanent settlement.	√					Contractor will remove labor camp and will clear the places after completion of construction.
Nuisance at stockpiling areas of construction materials.	√					Contractor will clear the places after completion of construction.
Nuisance at sanitation and waste disposal areas?	√					
G. Existing Environmental & Social Condition around the sub-project						
Air Quality	√				√	Insignificant impact due to earth works, construction material processing, construction activities, vehicle movements etc. would generate fugitive dust particles and hence the level of SPM in the ambient air would increase
Noise Quality.						There is likely insignificant impact of noise pollution due to movement of local vehicles, running of heavy load traffic for construction materials transportation.
Mention sources of drinking water in dry and wet seasons?						Supply water from wasa and Tubewell 15.01%, pond 0.11%, tap 82.08% and others 2.80%
Are there any ponds, khals, beels, haors, baors, rivers, etc. in/around the site? Please specify numbers & names for each.						Nos.-Name-Distance-Direction
						Ponds: 0
						Khals: 0
						Beels: 0
						Haors: 0
					Baors: 0	

Screening Questions	Impact ⁵					Remarks
	Y	N	H	M	L	
						Rivers: 0 Other:
Surface water (Pond, Khal, Beel, Haor, Baor, River etc.) quality.						Moderately treated
Groundwater Quality.						Fresh water is needed for construction purpose mainly in civil works that will put pressure on aquifer storage.
Soil Quality						Soil is reasonable
Is there any disaster early warning system? If Yes, by Whom?						Available: UDMC, Micing, TV, TNO, TEO, Red crescent, CPP, Mobile phone SMS etc.

5.2 Assessment of Environmental Screening

The proposed Sub-project (new Warehouse) is not located within any identified environmentally sensitive area, and therefore, does not seem to create any adverse impact on the important environmental features. No significant impact is expected on the ecosystem and biodiversity, no agricultural land/ activities or fish farming will be disturbed, due to the construction of the sub project. Although, some earth excavation work will be involved, no agricultural land or garden has chances to demolish. Moreover, mitigation measures will be taken according to the EMP for minimizing the air, dust, noise, impact of construction materials storage areas and others such as health risk due to combustibility, compression and other mechanical malfunction. Drainage congestion and water logging problems are not found but according to recent information of Banglapedia about Dhaka District extreme floods in past years (1987, 1988, and 1998) extreme floods in past years had created around 2-3 ft water stagnant in the Sub-project area. Plinth level of the Warehouse should be higher than the flood water level. Due to construction activities of this sub-project, 3 trees will be cut down from total 36 trees. Therefore, the Sub-project activities will result minor adverse impact in the environment surrounding the sub project. Moreover, it is a welcome and beneficial project for the local communities.

5.3 Rehabilitation and Resettlement Plan

Resettlement Action Plan (RAP) is not mandatory for this project since the project authority has purchased/leased the lands or has taken permission to use the lands from actual owners/authority. The site is belong to the concern agencies and situated in their premises.

6 ENVIRONMENTAL IMPACTS

6.1 General

This section identifies and predicts the probable impacts on different environmental parameters due to construction of a new 2-storied warehouse (3000 sft). After studying the existing baseline environmental scenario, monitoring environmental parameters, reviewing the process and related statutory norms, detailing the waste management measures, the major impacts can be identified during construction and operation phase. Relevant important aspects of environment are therefore selected which may have significant impacts due to project activities.

6.2 Identification of Impacts

The environmental implications of the predicted impacts may be beneficial or adverse, but the main objective of impact identification is to specify areas that are likely to be affected by the implementation of a sub-project. Environmental impact, by definition, implies an alternation of environmental conditions or creation of a new set of adverse or beneficial environmental consequences caused by the action under consideration. Impact identification starts at the early stage of scoping when data on both the project and surrounding environment are made available. The predicted impacts have been identified by rigorous scientific analysis and expert opinion. The consequences of impact on different resources have been accounted precisely. The following sections describe all the potential impacts (activity wise) on atmospheric environment, water resources, land resources, agricultural resources, fisheries resources, ecosystem resources and socio-economic environment of the surrounding.

6.2.1 Impact on Landform

There will be no noticeable impact in the landform as the proposed 0.069 acres of land for this sub-project is already in developed form.

6.2.2 Impact on Natural Resources

Impact on Water Resources

In construction stage of the warehouse, if runoff of the rain water is occurred from the project area to the surrounding water drains, it may cause deterioration of water quality. So it may be considered as the impact on water resources that is mentioned below.

Impact on Agricultural Resources

Construction has no impact on agricultural resources as there are no agricultural resources in the sub-project site.

6.2.3 Impact on Ecosystems

Flora

During construction phase it has less significant impact on existing trees and vegetation at the sub-project site. This is due to 36 number of trees existed on the site from which approximately 3 no's will be cut off due to acquisition of land and for construction purpose. Moreover existing grass land is approximate is 150 m² and nothing will be hampered so as for garden area.

Fauna

Construction has no impact on the faunal communities present at the sub-project site.

6.2.4 Impact on Ambient Air

Various activities during construction phase such as earth works, construction material processing, construction activities, vehicle movements etc. would generate fugitive dust particles and hence the level of SPM in the ambient air would increase. This increase in SPM level would be very local and short term and would be limited to the time of construction period only.

Carbon dioxide and nitrogen oxides may be emitted from combustion of the petroleum products in project related vehicles, machinery, and generators etc during the construction period. Their impact on air quality will not be significant as the pollutant emission activities (point and area sources) will be limited within the project boundary and the activities will be short term (only for construction period). However, this impact may further be minimized by adopting Environmental Management Plan.

6.2.5 Impact on Ambient Noise

It is expected that during construction of the warehouse, the level of noise will increase sharply in the project area. Operation of different machineries and equipments for construction activities, running of heavy load traffic for construction materials transportation, and regular traffic movement may generate noise during construction period. The produced noise may have impact on existing acoustic environment of urban category defined in ECR, 1997. Local inhabitants may feel disturbed due to noise from line sources (traffic movement).

High noise level during construction phase can cause high disturbance to the local community. This can also cause health impacts and increase stress level of the inhabitants of the locality and workers.

6.2.6 Impact on Soil

Generally, construction activities do not include any activities that cause soil pollution. However, Rainfall runoff from the construction site may cause soil pollution if the construction site is not properly managed. If the solid waste and other construction wastes are not properly managed, it may lead to soil pollution.

6.2.7 Impact on Workers Health, Sanitation and Safety

During construction time more security, construction workers and others about 50 people will move to the site. Most of them will come from outside the sub-project site. They have to stay at site. For them more living, washing, kitchen, storing etc purpose temporary facilities have to construct. These will cause more hygienic/sanitation issues if are not properly managed. Due to more movement man and material accidental incidents may increase if safety issues are not strictly maintained. Movement of more river craft may also cause accident if strict rules for movement, loading and unloading man and materials are not carried out. During construction accident may cause if safety rules and regulation are not strictly maintained. Requirement of safe drinking water will increase at site. If smooth supply safe drinking water are not maintained the workers may suffer out of water borne disease. Due to wind and movement of vehicles may cause dust at the site. This may cause problem of the workers and neighboring resident. However it may attract some interested people to visit the site. It would be wise to avoid/discourage those tourists on safety ground.

6.2.8 Solid Waste Disposal

Generation of construction related waste would occur during the construction period of the warehouse. Wastes may be generated from earth works, site establishment, civil construction, stockpile of materials, and domestic household activities. The wastes might be metals, concrete, spoiled construction material, excavated spoils, spilled oil from machinery and vehicles, etc. Moreover, some domestic waste such as food waste, paper etc would be also generated. The waste generated during the construction period can have adverse environmental impacts if not disposed of properly.

If the waste generated during construction period is not disposed of properly, then it will have negative impacts on the ambient environment. Construction activities should be carried out following the environmental rules and regulation for avoiding significant impacts on the environment. Creation of odor would be one of the major problems of not disposing the domestic waste properly. Moreover, it will deteriorate water quality and have adverse impacts on aquatic ecosystem if they are thrown in water stream. Generation and scattered disposal of waste must be controlled for preventing the impacts on physical environmental resources i.e. water, land resources etc.

6.2.9 Social Impact due to Construction of warehouse

The proposed warehouse will be an asset for emergency situation by supplying search and rescue equipments during emergency, as the warehouse will be constructed in the area which is highly commercial and almost every building in this area is highrise, so occurrence of man-made disasters like fire hazard, drainage congestion and building collapse etc are increasing rapidly in this area. Moreover the warehouse will be used as Disaster shelter during natural disasters like Earthquake, cyclone, flood etc.

Also the construction activities of the proposed warehouse would offer employment opportunity. Most of the un-skilled labor would be hired. The noise and dust generated from the construction site might disturb the nearest community patches. However, once the boundary wall around the project area is completed, the dust would not reach to nearest community patches. The boundary wall would also attenuate the noise to be generated from construction activities.

6.2.10 Impact due to Transportation of Construction Releted Materials

Construction materials will be transported through inland road transport. Moreover the traffic load on the road surface adjacent to Sub-project site during day and night is very high. So, if proper time schedule of incoming and outgoing vehicles to the Sub-project site will not maintain, Traffic congestion and traffic problems will be created. For these reasons, DMP doesn't allow any vehicle containing construction material to enter into the Dhaka city before 10 p.m. and after 7 a.m. The other construction material will be collected from the local suppliers. During transportation of construction material, the following conditions will be followed strictly:

- Loading and unloading of transportation would not create any disturbance to nearby community and other dwellers, do it in such a way
- No stocking of construction material in public place that may cause disturbance to community
- Efficient equipment would be used in handling of construction materials
- No disposal of oil to the near water body
- No disposal of waste into nearest water body
- The transport to be used for transportation should be fuel efficient and in good maintenance
- No cleaning and maintenance of the vehicle will be carried out at project site
- Every material must be covered while carrying to the site through vehicles so that no dust or air pollution may happen
- In the project site, construction material should be kept in dry and clean places
- Cement and reinforcement must be kept under the shed and in dry and high places from ground level
- Other materials must be covered.
- Material transportation time schedule should be maintained strictly

Table 6.1: Environmental Impact Identification Matrix- Construction Phase

Parameter	Physical Environment	Ecological Environment	Human Environment
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	Topography	Hydrology	Water Quality	Air Quality	Noise	Vegetation	Fauna	Aquatic Environment	Displacement	Employment	Service	Health	Culture
Possession of Land													
Site development	P			T		P				T		T	
Civil and Structural Work			T	T	T					T		T	
Mechanical and Electrical Work				T	T					T			
Water Requirement			T										
Transport				T	T								
Immigration													
Employment			T							T	T		T

Here, **P** – Permanent and **T** – Temporary, **Immigration**: To come to a place to live there (Kind of migration), **Emigration**: to leave one's place of residence or country to live elsewhere (Kind of migration)

Table 6.2: Environmental Impact Identification Matrix- Operation Phase

Parameter	Physical Environment					Ecological Environment			Human Environment				
	Topography	Hydrology	Water Quality	Air Quality	Noise	Vegetation	Fauna	Aquatic Environment	Displacement	Employment	Service	Health	Culture
Water Requirement													
Liquid Effluent			X					X				X	
Gaseous effluent				X		X						X	
Solid Waste												X	
Hazardous Waste													
Transport				X	X							X	
Operational noise					X							X	
Immigration			X							X	X		X
Employment										X			

Here, **Immigration**: To come to a place to live there (Kind of migration), **Emigration**: to leave one's place of residence or country to live elsewhere (Kind of migration)

7 ENVIRONMENTAL MITIGATION AND MANAGEMENT PLAN (EMMP)

7.1 General Consideration

In the context of the sub-project, the Environmental Mitigation and Management Plan (EMMP) is concerning with the implementation of the measures necessary to minimize or offset adverse impact and to enhance beneficial impacts. The prime function cannot be achieved unless the mitigation and benefit enhancement measures are fully implemented. All measures are said to be successful when they comply with the Environmental Quality Standard (EQS) of Bangladesh. Thus the objectives of EMMP of studied sub-project would be:

- Mitigation measures to reduce and eliminate negative impacts
- Enhancement measures to maximize positive impacts
- Monitoring requirement and monitoring indicators

The main benefits of the environmental mitigation plan are

- Ensuring that environmental standards are met during design, construction, and operation of the project
- Providing offsets to negate project impacts especially ecological impacts, e.g., in the form of compensatory afforestation, greenbelt development and landscaping.

7.2 Water resources conservation plan

Water resources should be conserved and prevented from any pollution and hydrological alteration. The nearby drains should be kept away from any obstruction and waste dumping. If any drain flows through the project area that drains water from outside the project area should be free flowing without any obstruction. Proper guidelines should be developed for Operation & Maintenance of drains.

7.3 Good housekeeping of Construction Related Materials

The construction yard and the site should be managed in such a way that would ensure minimum environmental degradation or damage of the surrounding. The contractor must take responsibility for the construction site to confirm contractual aspects and applicable environmental standards. Unauthorized access from public in the site should be prevented for safety issue. Adequate numbers of bins, sanitary toilet, water supply system, run-on and run-off drains, fire safety and fighting system etc. should be provided in the site. All the construction materials and stockpiles should be maintained within the project area provided with rain and wind protection. Electrocutation from general supply of electricity on site or overhead electrical lines contact with on-site cranes or mobile cranes or other trucks should be prevented. A housekeeping team should plan the safety measurements and visit the plant regularly for ensuring safety. An Environment Manager should be employed with responsibility of monitoring the activities which causes any environmental effects and ensuring enforcement of EMP during construction activities.

7.4 Worker's Health and Safety

To ensure a safe working place, the following measures should be ensured:

- Before operating a machine, ensure that the dangerous part of the machine has been installed with a guard
- Avoid going to any area with insufficient lighting as there may be some dangerous places which have not been provided with fencing.
- Keep vigilant all the time and watch out for moving cranes, hooks or other lifting equipment.
- Before using any electrical installation or tool, check the condition of its electric cables.
- Avoid dragging electric cables on the ground or allowing the cables to come into contact with water.
- Using electrical tools installed with an earth leakage circuit breaker.
- Using and handling chemicals with care and following the safety data sheet provided by the chemical suppliers.

- Using of Fall protection during working at height
- The internal roads, sidewalks and walking ways would be demarked properly
- Traffic safety measures should be available within the internal roads of the project sites.
- Regular checking, servicing and maintenance of vehicle should be ensured
- Proper training for the workers on safety
- Use of Personal Protective Equipments (PPE) should be mandatory for all (including the visitors). Applicable PPEs are mentioned in the following table:

Protection	Applicable PPE	Safeguarding for
Hand	v) Leather gloves vi) Electrical resistance gloves vii) Canvas gloves viii) Hand sleeves	Cuts due to handling Heat radiation Electrical Shock Contact with oil and grease etc Falling of hot slag
Leg	iii) Leg guards iv) Steel toe & Leather safety boots	Welding sparks Striking by objects, fall of objects and stepping on sharp or hot objects Heat radiation, stepping hot or sharp objects and stepping on sharp or hot objects
Eye	ii) Spectacle type goggles with plain shatter proof lens	Foreign bodies reflected arc rays entering the eyes
Head	i) Fiber helmet	Fall off objects/hitting against objects during construction, maintenance etc
Ear	i) Ear plug or muffs	High noise level
Nose	i) Dust protection mask	Fine dust particles

7.5 Safety at Site

Safety at site should be ensured at the construction site. The construction area should be protected by security fencing to prevent any safety threat to nearby community. All the piles should be placed within the boundary of the project with proper protection from wind and rain. All the passage should be keeping clear for all the time. The construction site should be properly lighted. All the lights should be directed to land within the project boundary. It is to be ensured that no light beam is to be directed towards nearby community. Light shed should be used. The Construction site should be equipped with firefighting equipments and first aid.

7.6 Construction Waste Management

Construction waste should be managed properly. The rate of waste generation should be reduced adopting efficient technique and limiting waste generating activities. The measures for controlling construction waste may include limiting site clearance activities, planned stocking and gathering of construction materials and equipments, fencing around the construction yard, maintaining existing right of way to carry construction materials, banning of waste burning and quality housekeeping. A waste dumping place should be provided with efficient waste collection and disposal techniques. No waste should be dumped to the surrounding rivers. Appropriate measures provided with run-on and run-off system might be constructed from controlling run off from construction yard and liquid waste.

The management plan for construction waste during construction period should include the steps like fencing around the project site, limiting site clearance activities, planned stocking and gathering of construction materials and equipment, covering the stockpiles for protecting them from wind and weathering actions, avoiding waste burning, keeping provision of different colored waste bin, keeping onsite waste collection and disposal system, adopting proper sanitation system for the employees and the workers, quality housekeeping etc. No waste should be dumped/thrown to the river. Recycling and reuse of the waste should be done whenever possible. Hazardous materials, spillage and accidental release should be managed carefully according the hazardous material handling guideline. Moreover, training should be provided to the employees and the workers/laborers about proper waste management system for increasing their awareness.

7.7 EMP for Preventing Pollution from Construction Site

Dust Control

Construction activities of the plant would generate significant amount of suspended particulate matter. As the sub-project area is highly commercial, an efficient dust control plan has to be adopted. The plan would include limiting SPM generating activities, adopting dust suppression system, minimizing base stripping and vegetation clearing activities, covering stockpiles, restricting vehicle speed, avoiding earthen roads for vehicle movement, spraying water regularly to suppress dust etc.

GHG emission control

The construction activities might generate significant amount of GHG also. The GHG emission control plan includes using efficient generator/machineries/equipment, regular maintenance of generators and other machineries, switching off/throttling down generators/ machines/ equipment/ vehicles which are not in use, avoiding the use of ozone depleting substances etc. Moreover, creating thick green belt around the plant is another major step for air quality management as it will help to sequester CO₂.

Controlling Noise

For preserving the acoustic environment and for protecting the nearby inhabitants from the negative impacts of noise pollution during the construction period a noise pollution management plan has to be adopted which would include steps like siting noisy equipments as far away as possible from the settlements, creating temporary barriers or enclosures with sound absorbing materials around the noisy equipment, maintaining the equipments properly.

Moreover, a significant part of construction work should be conducted during night time. The following specific measures should be adopted

- The noisy equipments should be sited as far away as possible from the nearby settlements
- Acoustic hoods/ silencers/ enclosures on all sources of noise generation should be used to decrease the intensity and degree of noise.
- Temporary barriers or enclosures with sound absorbing materials should be built around the noisy equipments
- A significant part of construction work should be conducted during night time
- Steps should be taken to create the boundary wall
- Steps should be taken to create a thick green belt
- The equipments used during the construction phase should be properly maintained as proper maintenance can decrease the level of sound significantly
- For protecting the workers from the adverse impacts of high noise level, personal protective equipments such as air plug/ear muffers should be provided to them and the use of this protective measure should be made mandatory to the workers who are susceptible to high noise

7.8 Green Belt Development

Development of Green belt along the plant site is essential for safeguarding the nearby community. Proper plantation will enhance scenic beauty of the plant also. Local suitable species is suggested for plantation. Following are the summary points that should be implemented:

- Green belt should be developed around the boundary wall, the open space within the sub-project.
- Different heights of local plant species should give preference for plantation.
- Additional plantation program may take outside the project boundary at road side.
- Five plants like Mahogany, Neem, Mango etc. Should be planted against two cut down trees which has shown in a hand sketch with green circle in below.

Green Belt of the Sub-Project in Hand Sketch Map

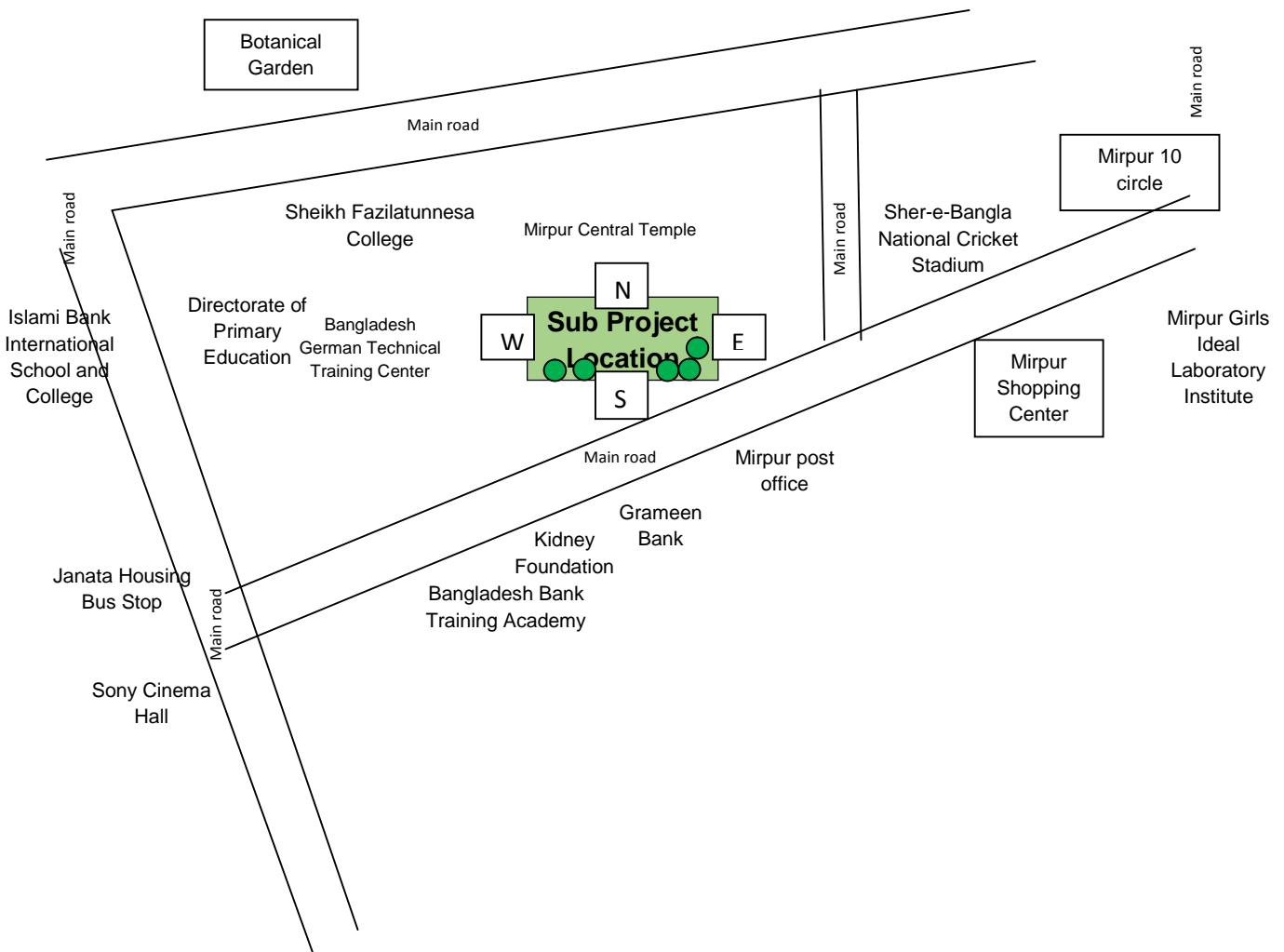


Table 7.2: Environmental Management Plan during Construction Phase

Environmental Component	Potential Impacts	Mitigation measures	Time frame	Location	Responsibility
Water					
Ground Water	Ground Water Contamination	Minimum Extraction of Ground water and Rain water harvesting system develop	Throughout Construction Phase	Project Site	Environmental Monitoring Team of the Project Proponent
Surface water sources	Surface Water Pollution	No disposal of any wastewater directly into outside water bodies. Refueling, washing and maintenance of plant and vehicles will be prohibited in the vicinity of the river and water bodies.	Throughout Construction Phase	Project Site	Environmental Monitoring Team of the Project Proponent
Drinking Water Requirement	Increase local demand	Arrange water without affecting local requirement	Throughout Construction Phase	Project Site	Environmental Monitoring Team of the Project Proponent
Wastewater from Workers' camp	Pollute the surface water	Ensure proper sanitation and drainage. No direct discharge of wastewater in the river. The construction workers at site will be provided with proper sanitation arrangement. The workers colony houses for foreign workers will have sanitary latrines to treat sanitary waste.	Throughout Construction Phase	Project Site	Design consultant and Project Proponent
Air and Noise					
Dust Generation	Increase dust in the air	Spraying of water wherever required. All stock pile materials which can blow to contribute to airborne dust will be covered with canvas or plastic sheets during windy season. The vehicle should be covered while transporting the materials.	Throughout Construction Phase	Project Site	Environmental Monitoring Team of the Project Proponent
Gaseous Emission from Construction work vehicles	Pollute the Air	Ensure checking of vehicular emission and obtaining Pollution Under Control Certificate	Throughout Construction Phase	Project Site and surroundings	Environmental Monitoring Team of the Project Proponent
Noise from machineries and construction	Increase Noise level	Ensure machineries meeting noise level standards. Noise levels of machineries used shall conform to relevant standards prescribed in Environment Conservation Rules, 1997. Silencers and mufflers of machineries will be regularly inspected to control	Throughout Construction Phase	Project Site	Environmental Monitoring Team of the Project Proponent

Environmental Component	Potential Impacts	Mitigation measures	Time frame	Location	Responsibility
		noise generation.			
Land					
Disruption of Earth Surface	Become a hazard	Earth work should be kept minimum and adequate drainage system should be developed	Throughout Construction Phase	Project Site	Environmental Monitoring Team of the Project Proponent and DOE
Solid Waste from construction work	Deteriorate the environment	Ensure dumping at preselected location	Throughout Construction Phase	Project Site	Project Proponent
Others					
Occupational Health & Safety	May create risk for the workers	All relevant rules for protection of health and safety of the workers will be rigorously followed. All contractors will be made aware of this responsibility. Proper restriction signs and other methods should be applied to prevent unwanted entry of people.	Throughout Construction Phase	Project Site	Design consultant and Environmental Monitoring Team of the Project Proponent
Labour Condition	Increase labour scope	Bangladesh has ratified key International Labour Organization (ILO) conventions to ensure the work conditions are reasonable and safe, and employees are free from any types of discrimination.	Throughout Construction Phase	Project Site	Project Proponent
Traffic	Increase traffic at the locality	There shall be a continuous vigil to see that the regular local traffic is not disturbed and the personnel to guide the construction vehicles to the site without causing any traffic jam	Throughout Construction Phase	Project Site and surroundings	Project Proponent
Socio-economic	Improve the condition	Various environment awareness programmes shall be organized by management committee on regular basis to bring forth the beneficial aspects of the project at local level. A management committee shall take keen interest in public participation and expectations of the local people for improving quality of life during planning of welfare activities under CSR plan. The committee shall identify eligible people for jobs in construction and lower level administrative jobs by noting their literacy level, extent of need, availability of means etc. Or the committee should confirm the employment of	Throughout Construction Phase	Project surroundings	Environmental Monitoring Team of the Project Proponent

Environmental Component	Potential Impacts	Mitigation measures	Time frame	Location	Responsibility
		local people by subcontractors.			
Influx of workers	Generation of sewage and solid waste	Construction of sanitary latrines and septic tank system Erecting “no litter” sign, provision of waste bins/cans, where appropriate Waste minimization, recycle and reuse (as required) Proper disposal of solid waste	Throughout Construction Phase	Project Site	Environmental Monitoring Team of the Project Proponent
	Possible spread of disease from workers	Clean bill of health a condition for employment Regular medical monitoring of workers			
Transportation of equipment, materials and personnel; storage of materials	Deterioration of air quality from increased vehicular movement, affecting people in the surrounding areas	Keeping vehicles under good condition, with regular checking of vehicle condition to ensure compliance with national standards and EHS guidelines (where applicable)	Throughout Construction Phase	Project Site	Environmental Monitoring Team of the Project Proponent
	Wind-blown dust from material (e.g. fine aggregate) storage areas	Spraying of water in the access road Sprinkling and covering stock piles Covering top of trucks carrying materials to the site.			
Site clearance	Topographic change by cutting existing trees, shrubs, herbs, and filling land	Adopt such type design as is required minimum cutting of trees, shrubs, herbs, and low-land filling Use waste shrubs, herbs as organic fertilizers Adopt required measures to prevent waste shrubs, herbs as fuel to cook or for any localized burning purpose.	Throughout Construction Phase	Project Site	Environmental Monitoring Team of the Project Proponent
Noise from construction equipment operations and maintenance	Noise could exceed the allowable limit and result in hearing loss.	Avoiding, as much as possible, construction equipment producing excessive noise Avoiding prolonged exposure to noise by workers Creating a buffer zone by introducing green belt around the project site Follow construction scheduling to avoid evening and night time disruption	Throughout Construction Phase	Project Site	Design consultant and Project Proponent
Dust and exhaust	Increased SPM,	Try to avoid using equipment such as stone	Throughout	Project Site	Environmental

gases from construction machinery and vehicles	PM 2.5, PM 10, NOx, SOx levels at construction sites, and surrounding areas.	crushers at site by purchasing ready-mix construction mixture (sand, cement and gravel) Immediate use of construction spoils as filling materials Immediate disposal/sale of excavated materials Continuous watering of bare areas	Construction Phase		Monitoring Team of the Project Proponent
Fires, explosion and other accidents	Risk of human health and property damage	Use of personal protective equipment during construction and maintenance. Prepare and implement safety and emergency manual Regular inspection of lines for faults prone to accidents Provision of fire protection equipment. Provision of lightening arrestors	Throughout Construction Phase	Project Site and surroundings	Environmental Monitoring Team of the Project Proponent

Table 7.3: Environmental Management Plan during Operation Phase

Environmental Component	Potential impacts	Mitigation measures	Time frame	Location	Responsibility
Wastewater	Generation of steam, oily water, sludge containing water, cooling water, domestic and floor washing wastewater	No discharge of untreated wastewater outside the municipal drainage. Monitoring of wastewater quality before and after discharge.	Throughout Operation Phase	Project site and surrounding	Environmental Monitoring Team of the Project Proponent
Gaseous Pollution	NOx generation from the engine, which can negative	Dispersion through high stack, Use of Low NOx burner	Throughout Operation Phase	Project site	Environmental Monitoring Team of the Project Proponent
Air Quality	Suspended particulate matter (SPM) and PM2.5, PM10 generation from the engine, which can adversely affect health	Regular Monitoring according to the schedule	Throughout Operation Phase but maintaining 3 months interval	Ambient Air Quality	Environmental Monitoring Team of the Project Proponent and DoE
Emission Quality	CO and VOC, which can negatively affect health	Regular Stack emission monitoring according to the schedule	Throughout Operation Phase but maintaining 3 months interval	Project site	Environmental Monitoring Team of the Project Proponent and DoE
Noise	Generation of noise from generators and associated substations, which could exceed 70 dB(A) at site boundary.	All machineries shall follow relevant noise regulations. Boilers, generators and compressors shall be installed in buildings equipped with acoustic walls and enclosures. Regular noise monitoring according to the schedule.	Throughout Operation Phase but maintaining 3 months interval	Project site	Environmental Monitoring Team of the Project Proponent and DoE
Solid Waste	Generation of oily solid waste, plastic waste and other solid wastes.	Disposal at preselected site, Segregate wastes and dispose hazardous wastes to authorized contractors only.	Throughout Operation Phase	Project site	Environmental Monitoring Team of the Project Proponent
Occupational Health and Safety	Occupational health hazard due to different operation processes	Maintain all safety provisions related to plant operation and hazardous chemicals. Train all employees working in hazardous area for safety norms.	Throughout Operation Phase	Project site	Environmental Monitoring Team of the Project Proponent

		First aid kit to be made available. Medical aid to be available on the site. All subcontractors to follow the health and safety rules. They should be trained for that. Display of proper sign boards for health and safety in and around the plant complex.			
Fire Safety	Little possibility for firing due to welding activities produce lot of heat in welding arc	All employees to be trained for fire safety rules. Mock safety drills to be performed in regular intervals. Disaster Management Group to be made ready for all situations. Regular check for offsite helps.	Continuous Process	Project site	Project Proponent
Socio-economic	As there are no religious, cultural or historic places near the site, so the noise and air pollution from the operation of the project would not create any potential impact.	A management committee shall regularly monitor the implemented welfare activities and progress of Corporate Social Responsibilities (CSR) programme. The committee should confirm the employment of local people during operation and maintenance phase of the project activity and Keep local people informed about the demands for new jobs in the project	Throughout Operation Phase	Project surroundings	Project Proponent

7.9 Emergency Preparedness Plan

Emergency Preparedness Plan (EPP) is the process of preparing for, mitigating, responding to and recovering from an emergency. EPP is a dynamic process. Planning, though critical, is not the only component. Training, conducting drills, testing equipment and coordinating activities with the community are other important functions. The detail EPP is described as follows.

Key Persons and Their Roles during an Emergency Situation

Project Manager will

- Work as contact person and observe the situation.
- Keep in touch with local administration and head office.
- Deal with police, media and outside enquiries in consultation with Site Controller.
- Arrange for refreshments if required.
- Observe the traffic movement inside the project area and arrange for alternative transport if required.
- Monitor the record keeping of attendance of workers, staff, contractor's personnel, and visitors at the Gate which will act as Assembly Point.

Shift Supervisor will

- Act as Site controller for the time being.
- As soon as becomes aware of the emergency and its location, he will proceed to the site.
- Assess the scale of the incident and directs to stop operations within the affected areas.
- Contact and inform the Site Controller and Incident Controller immediately. Till their arrival he will continue to perform their duties.
- Contact the departmental head to act as incident controller and guide Safety Officer and Security Officers for containing the damage.
- Call the Medical Officer to the plant if necessary.

Site Controller will

- Ensure that all members of his/her team have been informed to assemble at Emergency Control centre. He/She will then proceed to Emergency Control Centre to take charge.
- Attend to telephone
- Keep in touch with incident controller
- Communicate with Assembly Points
- Meet outside emergency services
- Ensure proper flow of traffic and security
- Meet media/ other people coming at site from outside.
- Arrange for Medical Aid

Incident Controller will

- Direct all efforts to contain and control the incident.
- Keep non-essential persons away from the site.
- Guide outside emergency services at the site.
- Arrange to remove any casualties at the site.
- Keep in touch with Emergency Controller.

Security In-Charge will

- Actuate the Emergency Siren, if not done already.
- Send one guard to start the fire pump.
- Attend to incoming telephone.
- Await instructions from the Emergency Controller

Communication Officer

Public Relations Officer will act as Communication Officer. On hearing alarm, he will proceed to Emergency Control Centre.

- Maintains communication with Incident Controller and Deputy Incident Controller.
- Recruits suitable staff to act as messengers if telephone and other communications fail.
- Organizes all requirement of Emergency Control Centre.
- Arranges Food, Transport, and Nursing Home etc.

Safety Officer will

- Assist the Incident Controller with his special knowledge on the safety aspects in the factory. He will help to identify the hazardous chemicals, hazard zones and zone of probable impact in different accident scenarios.
- Select people with special training in safety matters to assist in the control activities.

Fire and Security Officer

- His main task is fire fighting and control.
- Announce through PAS about the incident zone and any other immediate information needed for the people nearby.
- Maintains liaison with the Fire Brigade team from outside.

Medical Officer will

- Immediately open a First Aid Centre at Control Centre or at Assembly Point.
- Take up the full responsibility of providing medical assistance during emergency.
- Arrange for outside medical help if required.

Telephone Operator

- On hearing the emergency alarm, he/she will immediately contact Site Controller.
- On the advice of Site controller/Incident Controller/Security Officer will ring Fire brigade, Police etc.
- Keep telephone board free for urgent communications.

General Employees

Who have not been specified a duty in case of emergency should proceed to/contact the Emergency Assembly Point in their area. Designated persons will carry out the actions detailed in the Individual Plant Emergency Procedure. The Roll Call leader will hold a Roll call. Personnel not at their normal work place must go to the emergency assembly point. Personnel will remain at these points and await instructions from the Site Controller.

Contractor's Employees

Contractor's employees will be instructed in the Emergency Procedures before commencing work on this site. They will report to the emergency assembly point on this site. Personnel Manager will guide them in case a major decision likes evacuation from the project site if required.

Visitors

Infrequent visitors are registered on each visit. They will be given a visitors pass which includes an emergency action statement. The responsibility for visitors in emergency situation rests with the person being visited.

Fire Design and Alarm Monitoring Measures for the Whole Plant

Fire design is based on approach of “prevention first, combined with fire measures”, firmly implementing related fire design standards and regulations according to specific situation of this project. Prevention measures shall be mainly taken into account by different professionals when selecting and arranging equipments and devices according to characteristic of different system flow, in order to prevent occur and spread of fire. Automation fire alarm monitoring device shall be applied for important buildings and equipments. Additionally, other measures such as separation and block shall be applied for fire-prone areas, in order to prevent fire spreading to nearby area.

Fire Water Supply System

In order to ensure a safe, reliable and manageable fire water supply system, a high-pressure fire water supply system with pressure regulators shall be applied for this project, preventing fire water being put to other use and making sure that fire water quantity and water pressure shall not be influenced due to leakage of other water consumption points when fire occurs.

Fire Drainage

Drainage of indoor fire hydrants and automatic sprinkler system shall be collected by indoor underground waste water system and then transferred to outdoor rain water system. Drainage of outdoor hydrants shall be collected by outdoor rain water system.

Fire Extinguishers

Selection and allocation of fire extinguishers for all kinds of buildings and structures shall be in accordance with the “Code for design of extinguisher distribution in buildings”. Main power building shall be equipped with portable CO₂ fire extinguishers, portable powder fire extinguishers, CO₂ trolley fire extinguishers and powder trolley fire extinguishers.

Risk Management Strategy

For the project risk management strategy is significant for minimizing risk. The following can be considered before formulating such strategy:

- The flammability of the process material
- Monitoring the state of reactions-particularly in enclosed vessels- to ensure that the remain within specified limits and do not become dangerous
- The amount of waste produced by the proces- how to minimize it - how to dispose and
- Measures to ensure that emissions remain within acceptable environmental limits.

After extensive literature review of natural gas based power plant the following best practices can be adopted for risk management on site:

- Safety measures are to be maintained at their expected level of performance and their good condition to be regularly ensured
- Strict ignition control shall be ensured
- Regular maintenance and inspection should be performed
- Ensure availability and effectiveness of Fire & Gas detecting system and the emergency alarm system and means of communication, which would enable early warning to all personnel in the event of accidental release and subsequently enable all personnel to take appropriate action.

Table 7.4: Safety Hazard Prevention-Control Mitigation Measures

Event	Prevention, Control and Mitigation Measures
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Event	Prevention, Control and Mitigation Measures
1. General Instruction of Workers	<p>1. Personal and continuous visual supervision of the worker who is not competent to perform the job.</p> <p>2. Workers to be conversant on the codes and standards of safety</p> <p>3. Workers must be confident that they have adequate training on handling or unsafe hazards material.</p>
2. Maintenance of Equipment	<p>1. Employer shall ensure that all equipment used on a work site is maintained in a condition that will not compromise the health and safety of workers using or transporting the equipment.</p> <p>2. Will perform the function for which it is intended or was designed</p> <p>3. Is of adequate strength for that purpose.</p> <p>4. Is free from potential defects.</p>
3. Traffic Hazard	<p>1. Where there is a danger to workers from traffic, an employer shall take appropriate measures to ensure that the workers are protected from traffic hazards.</p> <p>2. Ensure that workers who are on foot and who are exposed to traffic hazards on traveled rural roads wear reflective vests or alternative clothing that is clearly distinguished.</p> <p>3. Where the operator of vehicle does not have a clear view of the path to be traveled on a work site, he shall not proceed until he receives a signal from a designated signaler who has a clear view of the path to be traveled.</p>
4. Illumination	<p>1. Ensure that illumination at a work site is sufficient to enable work to be done safely.</p> <p>2. Where failure of the normal lighting system would endanger workers, the employer shall ensure that emergency lighting is available that will generate sufficient dependable illumination to enable the workers to</p> <ul style="list-style-type: none"> a) Leave the work site in safety b) Initiate emergency shutdown procedures c) Restore normal lighting
5. House keeping	<p>1. Ensure that each work site is clean and free from stepping and tripping hazards</p> <p>2. Waste and other debris or material do not accumulate around equipment, endangering workers</p>
6. Falling Hazards	<p>1. Ensure that where it is possible for a worker to fall a vertical distance greater than 3.5 meters the worker is protected from the falling by guard rail around the work area a safety net fall arresting device</p>

Event	Prevention, Control and Mitigation Measures
7. Overhead power Lines	1. Ensure that no worker approaches and that no equipment is operated and no worker shall approach or operate equipment, within 7 meters of a overhead power line.
8. Sanitary facilities & drinking water	1. Ensure that an adequate supply of drinking fluids is available at the work site. 2. Ensure that work site is provided with toilet facilities in accordance with the requirement of general health protection guidelines.
9. Working proper clothing	2. Ensure that where is a possibility that a worker or worker's clothing might come in to contact with moving parts of machinery, the worker: <ul style="list-style-type: none"> . wears close-fitting clothing . confines or cuts short his head and facial hair . avoids wearing jewelry or other similar items
10. Head protection	1. Ensure that during the work process adequate alternative means of protecting the workers head is in place.
11. Eye protection	1. Where there is a danger of injury to or irritation of a worker's eyes, his employer shall ensure that the worker wears properly fitting eye protective equipment.
12. Foot protection	1. Where there is a danger of injury to a worker's feet, ensure that the worker wears safety footwear that is appropriate to the nature of the hazard associated with particular activities and conditions.
13. Respiratory protective equipment	1. Where the worker is exposed to hazards gases, gums, vapors, or particulates appropriate respiratory protective equipment to be supplied.
14. Testing & commissioning	5. Mobilize test rigs at site 6. Ensure that the test equipment is in good condition 7. Ensure other equipment and facility conforms to the approved specification of test. 8. Public notice to be served before testing.

8 ENVIRONMENTAL MONITORING PLANS

Environmental monitoring is an essential tool in relation to environmental management as it provides the basic information for rational management decisions. The prime objectives of monitoring are-

- To check on whether mitigation and benefit enhancement measures are actually being adopted and are providing effective in practice.
- To provide information on the actual nature and extent of key impacts and the effectiveness of the mitigation measures which, through a feedback mechanism, can be taken into account in the planning and execution of similar projects in future.

The sub-project authority should have provision of Environmental quality and safety department for monitoring the environmental management plan implementation during construction and operation phase of the project. The environmental monitoring officer should monitor the environmental management plan implementation and submit a quarterly report to the concerned department. Key components of environmental monitoring plan are described in the following subsections.

8.1 Ambient air monitoring

During the construction phase, ambient air quality will be monitored by active sampling and measurement for SPM, SO_x, NO_x, CO, toxic gases at the same locations used during the baseline study. During construction of the facility, air emissions may result from fuel or oil burning due to equipment failure. Leakages should be checked by visual inspection at the start of every shift. Monitoring plan for ambient air is presented in following table.

Area of Monitoring	Indicators	Monitoring Location	Monitoring Apparatus	Frequency
Monitoring Ambient Air Quality	SPM	Four edges of the project boundary, one sample from 1 km downwind from the project boundary	SSPM-100 sampler	On a monthly basis
	SO _x , NO _x , CO, toxic gases	Project site, 2km upwind and 2km down wind direction	Bacharach ECA 450 sensors and compact sample conditioner for SO _x , NO _x measurement, Fluke C0-220 Carbon Monoxide Meter for CO measurement	Quarterly

8.2 Meteorological monitoring

During construction phase the collection of representative meteorological data (e.g., wind speed and direction, precipitation, temperature, humidity, and atmospheric pressure) is very useful to predict weather conditions of plant site. Meteorological data also useful to assess the possibility of natural calamities specially Cyclone, Storm surge etc. so that precautions and measures in contingency plan will be taken within due time. Monitoring plan for meteorological parameters is presented in following table.

Area of Monitoring	Indicators	Monitoring Location	Monitoring Apparatus	Frequency
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Meteorological monitoring	Wind speed and direction, precipitation, temperature, humidity, and atmospheric pressure	Within the project boundary	Hygrometer for humidity, Anemometer for wind speed and direction, Temperature Sensor for temperature, Rain gauge for precipitation and Mercury barometer for atmospheric pressure measurement	Quarterly
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8.3 Ambient noise monitoring

Noise levels at the facility site during construction must comply with relevant national and international legislation. Site staff will monitor noise levels and take any remedial measures that prove necessary to reduce disturbance to nearby local residents. At locations where the possibility of noise level exceeds the standard limit such as ongoing pile-driving activities, excavation, cut and fill, erection of temporary stores etc. noise levels shall be checked at least weekly (using a Type II sound level meter). Monitoring plan for ambient noise is presented in following table.

Area of Monitoring	Indicators	Monitoring Location	Monitoring Apparatus	Frequency
Monitoring Ambient Noise	Noise level	four corner point inside the boundary, middle point of the project boundary	Digital Sound Level Meter- AR814	Monthly basis

8.4 Surface water monitoring

During the construction phase, monitoring will be conducted to the sub-project site surrounding surface drains. Parameters to be sampled every two months during this phase are Temperature, pH, EC, DO, BOD, COD, TSS, TDS, Salinity. Samples should be taken at the point of any discharge into the receiving water drain. Monitoring plan for surface water is presented in following table.

Area of Monitoring	Indicators	Monitoring Location	Monitoring Apparatus	Frequency
Monitoring Surface water quality	Temperature, pH, EC, DO, BOD, COD, TSS, TDS, Salinity	Different points on surface drains	Thermometer for Temperature, pH meter for pH, SMP350 EC meter for EC, DO meter for DO, Salinity meter for Salinity measurement. Also BOD, COD, TSS, TDS are measured by laboratory analysis	Every two months

8.5 Solid waste monitoring

During the construction phase, wastes may be generated from earth works, site establishment, civil construction, stockpile of materials, and domestic household activities. The wastes might be metals, concrete, spoiled construction material, excavated spoils, spilled oil from machinery and vehicles, etc. Moreover, some domestic waste such as food waste, paper etc would be also generated. Monitoring is required to ensure proper management of this waste. Solid and hazardous waste quantities and destination (final disposal) will be documented by the Contractor and the records handed over to authority after commissioning, to demonstrate compliant handling and disposal. Monitoring plan for solid waste is presented in following table.

Area of Monitoring	Indicators	Monitoring Location	Monitoring Apparatus	Frequency
Monitoring Solid waste	Construction and domestic wastes	Project area and labor shed	Visual observation and regular checks	Monthly basis

8.6 Workers health and safety monitoring

During construction and erecting plants and machineries may cause accident. Records of all health risk/workplace accidents will be documented and archived, in accordance with the Project health and safety Plan developed by the Contractor. This should include “near miss”, “incident” and “accident”. A baseline medical check-up for all employees (prior to commencing employment) will be conducted. Monitoring plan for Workers health and safety is presented in following table.

Area of Monitoring	Indicators	Monitoring Location	Monitoring Apparatus	Frequency
Workers health and safety monitoring	Health, Safety, awareness	Proposed industrial complex	Visual observation and regular checks	On a monthly basis

8.7 Community health monitoring

The local community may feel disturbed if the Health, safety and environmental (HSE) issues are not properly maintained during construction. On the other hand If HSE and corporate social responsibilities are maintained; there will be positive impact from the local community on the project. So continuous Community safety, health, CSR program, Security monitoring is very important. Monitoring plan for Community health is presented in following table.

Area of Monitoring	Indicators	Monitoring Location	Monitoring Apparatus	Frequency
Community health monitoring	Community safety, health, CSR program, Security, compliance to applicable social and environmental rules, etc.	Proposed industrial complex, nearest community	Visual observation and regular checks	On a monthly basis

8.8 Ecosystem monitoring

Five samples from homestead ecosystem (at least 2 at down wind direction) within 5 km radius area 5 Samples from Road side plantation including 2 at downwind direction within 5 km radius area should be collected during monitoring. Monitoring plan for ecosystem is presented in following table.

Area of Monitoring	Indicators	Monitoring Location	Monitoring Apparatus	Frequency
Ecosystem monitoring	Avifauna, Fish habitat status, Fish biodiversity, Fish production	Ramna Lake area of the project	Visual observation and regular checks	Quarterly
	Plant health and productivity of fruiting plants surrounding the project area	Selected sites within 10km radius area of the project	Visual observation and regular checks	Quarterly

8.9 Responsibility Matrix

Area of Monitoring	Implementing Agency
Ambient air monitoring	DNCC
Ambient noise monitoring	DNCC
Surface water monitoring	DNCC
Solid waste monitoring	DNCC / Contractor
Workers health and safety monitoring	DNCC / Contractor
Community health monitoring	DNCC / Contractor
Ecosystem (Flora, Fauna) monitoring	DNCC

8.10 Estimated Budget for Monitoring Plan for One Year

S/N	Issues	Unit cost (Lac BDT)	Monitoring time in a Year	Total cost (Lac BDT)
9.	Ambient air monitoring	0.25	1	0.25
10.	Meteorological monitoring (secondary source) i.e. Air Temperature, Humidity, Rain Fall, Wind Velocity etc	-	4	-
11.	Ambient noise monitoring	0.1	2	0.2
12.	Surface water monitoring	0.25	1	0.25
13.	Solid waste monitoring	-	12	-
14.	Workers health and safety monitoring	0.05	6	0.3
15.	Community health monitoring	0.1	1	0.1
16.	Ecosystem (Flora, Fauna) monitoring	0.05	2	0.1
Total monitoring cost				1.2

9 CONTRACTOR OBLIGATIONS

Construction project management (CPM) is the overall planning, coordination, and control of a project from beginning to completion. CPM is aimed at meeting a client's requirement in order to produce a functionally and financially viable project. A contractor is assigned to a construction project once the design has been completed by the person or is still in progress. This is done by going through a bidding process with different contractors. The contractor is selected by using one of three common selection methods: low-bid selection, best-value selection, or qualifications-based selection.

A construction manager should have the ability to handle public safety, time management, cost management, quality management, decision making, mathematics, working drawings, and human resources.

The functions of construction management typically include the following:

5. Specifying project objectives and plans including delineation of scope, budgeting, scheduling, setting performance requirements, and selecting project participants.
6. Maximizing the resource efficiency through procurement of labor, materials and equipment.
7. Implementing various operations through proper coordination and control of planning, design, estimating, contracting and construction in the entire process.
8. Developing effective communications and mechanisms for resolving conflicts.

The Construction Management Association of America (a US construction management certification and advocacy body) says the 120 most common responsibilities of a Construction Manager fall into the following 7 categories: Project Management Planning, Cost Management, Time Management, Quality Management, Contract Administration, Safety Management, and CM Professional Practice. CM professional practice includes specific activities, such as defining the responsibilities and management structure of the project management team, organizing and leading by implementing project controls, defining roles and responsibilities, developing communication protocols, and identifying elements of project design and construction likely to give rise to disputes and claims

Contractor Obligation for Construction Activities for the Urban Resilience Project-DNCC Part (With Budget)

S/N	Environmenta l Issue	Objective	Suggestion for the Contractor	Proposed Budget (BDT)	Remarks
21.	Minimizing Erosion	To minimize the quantity of soil lost during construction due to land-clearing	<ul style="list-style-type: none"> • Schedule measures to avoid and reduce erosion by phasing the work program to minimize land disturbance in the planning and design stage. • Keep the areas of land cleared to a minimum, and the period of time areas remain cleared to a minimum • Base control measures to manage erosion on the vulnerability of cleared land to soil loss, paying particular attention to protecting slopes. • Mulch, roughen and seed cleared slopes and stockpiles where no works are planned for more than 28 days, with sterile grasses. • Keep vehicles to well-defined haul roads. • Rehabilitate cleared areas promptly 	0.00	No separate budget is assigned for any of the proposed sites as those are regular standard practice for the Contractors
22.	Storm water Management	To minimize the generation of contaminated storm water	<ul style="list-style-type: none"> • Minimize the quantity of uncontaminated storm water entering cleared areas • Establish cut-off or intercept drains to redirect storm water away from cleared areas and slopes to stable (vegetated) areas or effective treatment installation • Reduce water velocities, if needed 	0.00	No separate budget is assigned for any of the proposed sites as those are regular standard practice for the Contractors
23.	Sediment Controls	To minimize the impact of contaminated storm water on receiving waters	<ul style="list-style-type: none"> • Install erosion and sediment control measures, if possible before construction commences • Identify drainage lines and install control measures to handle predicted storm water and sediment loads generated in the minicatchment. • Establish an adequate inspection, maintenance and cleaning program for sediment run-off control structures. • Ensure that contingency plans are in place for unusual storm events. • Continually assess the effectiveness of sediment control measures and make necessary improvements. 	0.00	No separate budget is assigned for any of the proposed sites as those are regular standard practice for the Contractors

S/N	Environmental Issue	Objective	Suggestion for the Contractor	Proposed Budget (BDT)	Remarks
24.	De-Watering Work Sites	To ensure that de-watering operations do not result in turbid water entering natural waterways	<ul style="list-style-type: none"> • Treat contaminated water pumped into the storm water system or a natural waterway to remove sediment if the turbidity exceeds 30 NTU. • Ensure that the level of suspended solids in waters pumped into natural waterways never exceeds the regulatory water quality standard. • De-water by pumping water, wherever practical, on to vegetated area of sufficient width to remove suspended soil, or to sediment control devices. • Supervise all pumping and implement precautions to ensure that turbidity of pumped water is minimized. • Monitor every hour during a pumping operation the turbidity of water pumped directly to a natural waterway or a drainage system discharging to a natural waterway. 	10,000.00	None of the proposed site is needed such type of management measures. However, if the situation demand for any site, the contractor can demand for BDT 10,000.00 for the management of the situation.
25.	Dust Control	To ensure there is no health risk or loss of amenity due to emission of dust to the environment	<ul style="list-style-type: none"> • Implement a dust prevention strategy, developed at the project planning stage • Take dust suppression measures, such as promptly watering exposed areas when visible dust is observed • Install wind fences wherever appropriate 	0.00	No separate budget is assigned for any of the proposed sites as those are regular standard practice for the Contractors
26.	Management of Stockpiles	To manage stockpiles so that dust and sediment in run-off are minimized	<ul style="list-style-type: none"> • Minimize the number of stockpiles, and the area and the time stockpiles are exposed • Keep topsoil and under burden stockpiles separate • Locate stockpiles away from drainage lines, at least 10 meters away from natural waterways and where they will be least susceptible to wind erosion • Ensure that stockpiles are designed with slopes no greater than 2:1 (horizontal/vertical) • Stabilize stockpiles that will remain bare for more than 28 days by covering with mulch or anchored fabrics or seeding with sterile grass 	0.00	No separate budget is assigned for any of the proposed sites as those are regular standard practice for the Contractors

S/N	Environmental Issue	Objective	Suggestion for the Contractor	Proposed Budget (BDT)	Remarks
			<ul style="list-style-type: none"> Establish sediment controls around unsterilized stockpiles Suppress dust on stockpiles and batters, as circumstances demand 		
27.	Working In Waterways and Floodplains	To minimize stress on aquatic communities when working in a waterway	<ul style="list-style-type: none"> Plan in-stream works so that the contact time is minimized Establish special practices so that impacts on the waterway and disturbance of its banks are minimized Stabilize banks and in stream structure so that they do not contribute to the sediment load Maintain minimum flows to ensure the viability of aquatic communities and ensure that there are no barriers to the passage of fish up and downstream Avoid times of the year when environmental damage is expected to be highest Construct in-stream crossings during low flows, designed to be stable under expected vehicle loads and flow regimes that do not contribute to the sediment load in the stream Design crossings so that drainage off the crossing does not contribute sediment load to the stream. Prepare a contingency plan for high-rain events. Prepare a reinstatement plan if work in a stream is planned or the structure of a waterway will be altered. 	0.00	None of the proposed site is needed such type of management measures. However, no separate budget is assigned if the situation demand for any of the proposed sites as those are regular standard practice for the Contractors
28.	Noise and Vibration	To ensure nuisance from noise and vibration does not occur	<ul style="list-style-type: none"> Fit and maintain appropriate mufflers on earth-moving and other vehicles on the site Enclose noisy equipment Provide noise attenuation screens, where appropriate Where an activity is likely to cause a noise nuisance to nearby residents, restrict operating hours to between 7 am and 6 pm weekdays and 7 am to 12 pm Friday, except where, for practical reasons, the activity is unavoidable Noise should not be above background levels inside any adjacent residence between 10 pm and 7 am Advise local residents when unavoidable out-of-hours work will 	0.00	No separate budget is assigned for any of the proposed sites as those are regular standard practice for the Contractors

S/N	Environmental Issue	Objective	Suggestion for the Contractor	Proposed Budget (BDT)	Remarks
			occur. <ul style="list-style-type: none"> • Schedule deliveries to the site so that disruption to local amenity and traffic are minimized • Conduct a study on the impact of ground vibration from construction activities, where these operations occur within 50 meters of a building and take appropriate action • Minimize air vibrations 		
29.	Waste Minimization	To minimize the waste load discharged to the environment	<ul style="list-style-type: none"> • Carry out a waste minimization assessment which examines opportunities for waste avoidance reduction, reuse and recycling. • Reduce wastes by selecting, in order of preference, avoidance, reduction, reuse and recycling. • Incorporate waste minimization targets and measures into the environmental management plan. 	0.00	No separate budget is assigned for any of the proposed sites as those are regular standard practice for the Contractors
30.	Contaminated Material and Wastes	To ensure that all contaminated material uncovered on a construction site are excavated and disposed of in an environmentally responsible manner	<ul style="list-style-type: none"> • Assay material uncovered on-site prior to disposal. If the wastes include putrescible wastes, then also analyze leachate and landfill gases. • Excavate material in a manner which avoids off-site environmental problems. • Seal remaining contaminated material or wastes, where only part of the tip has been excavated, to ensure that there is no off-site effect now or in the future. • Transport odorous wastes in covered vehicles. • Dispose of contaminated material in a landfill licensed to take the type of contaminated material or wastes uncovered. 	0.00	No separate budget is assigned for any of the proposed sites as those are regular standard practice for the Contractors
31.	Air Quality	To ensure there is no health risk or loss of amenity due to emission of exhaust gases to the environment	<ul style="list-style-type: none"> • Ensure that all vehicles and machinery are fitted with appropriate emission control equipment, maintained frequently and serviced to the manufacturers' specifications. • Smoke from internal combustion engines should not be visible for more than ten seconds 	0.00	No separate budget is assigned for any of the proposed sites as those are regular standard practice for the Contractors

S/N	Environmental Issue	Objective	Suggestion for the Contractor	Proposed Budget (BDT)	Remarks
32.	Litter	To ensure that all litter is disposed of in a responsible manner, and is not released into the environment	<ul style="list-style-type: none"> • Maintain a high quality of housekeeping and ensure that materials are not left where they can be washed or blown away to become litter. • Provide bins for construction workers and staff at locations where they consume food • Conduct ongoing awareness with staff of the need to avoid littering 	0.00	No separate budget is assigned for any of the proposed sites as those are regular standard practice for the Contractors
33.	Storing Fuels and Chemicals	To ensure that fuel and chemical storage is safe, and that any materials that escape do not cause environmental damage	<ul style="list-style-type: none"> • Minimize fuels and chemicals stored onsite. • Install bunds and take other precautions to reduce the risk of spills. • Implement a contingency plan to handle spills, so that environmental damage is avoided. 	0.00	No separate budget is assigned for any of the proposed sites as those are regular standard practice for the Contractors
34.	Keeping Roads Clean	To ensure that roads are kept clean of soil	<ul style="list-style-type: none"> • Install wheel washes and rumble grids at all main road crossings. • Ensure that the roads are swept at least once a day on uncontrolled road crossings when construction vehicles are travelling off the site. • Install litter traps lined with filter cloth in all side-entry pits. • Cover all loads of soil being taken off site for disposal. 	0.00	No separate budget is assigned for any of the proposed sites as those are regular standard practice for the Contractors
35.	Supply of First Aid Box with standard contents	To ensure immediate treatment after a sudden accident	<ul style="list-style-type: none"> • Install a first aid box at an easy accessible place of the site for anyone 	2000.00	For the proposed site
36.	Health and Safety Warning Sign	To understand for the workers and visitor about the risky site or component of the construction activity	<ul style="list-style-type: none"> • Install health and safety warning signs where it is necessary 	2000.00	For the proposed site
37.	Safety Gear Package	To ensure the safety of the workers, field	<ul style="list-style-type: none"> • Make available of the Safety Gear Package like gloves, helmets, eye protector, rubber shoes, light reflecting dress etc for each 	0.00	No separate budget is assigned for any of the proposed sites as

S/N	Environmental Issue	Objective	Suggestion for the Contractor	Proposed Budget (BDT)	Remarks
		supervisors and the visitors	worker, field supervisors and the visitors		those are regular standard practice for the Contractors
38.	Tree Plantation	To develop a green belt around the project area	<ul style="list-style-type: none"> • Tree plantation around the shelter or road in a planned way and maintenance for all the construction time • Extra care should be given to the sites where trees will be cut down 	BDT 2000.00	BDT 2000.00 for althel other site
39.	Temporary Sanitary Latrine/ Septic Tank/ Portable Toilet	To ensure sanitary environment of the work area	<ul style="list-style-type: none"> • Temporary Sanitary Latrine/ Septic Tank/ Portable Toilet: 2 nos. (1 no of Toilet for women and 1 no of Toilet for men) 	0.00	No separate budget is assigned for any of the proposed sites as those are regular standard practice for the Contractors
40.	Drinking Water Sample Analysis and Drinking Water Filter	To ensure safe drinking water for the workers at site	<ul style="list-style-type: none"> • Take water sample from the surrounding tube-well or the new tube-well dug at the site to analyze important parameters for drinking water • 1-no of tube-well should be installed at the beginning of construction works, if there is no one at the vicinity, so that labour and other site staff can get drinking water. • Supplying of best quality drinking water filter including extra set of faucets ceramic and at least three sets of ceramic filter 	BDT 5000.00	For each site the budget will be given
Total BDT 21,000.00					

10 CONCLUSIONS AND RECOMMENDATIONS

This study aims to understand initial environmental impacts for the Sub-project as well as to formulate the relevant mitigation and monitoring plans. Based on the Environmental Assessment, all possible environmental aspects have been adequately assessed and necessary control measures have been formulated to meet with statutory requirements.

The overall conclusion is that if the mitigation, compensation and enhancement measures are implemented in full, there will be no significant negative environmental impacts as a result of location, design, construction, and/or operation of the proposed Sub-project. There will in fact be tremendous benefits from recommended mitigation and enhancement measures and major improvements in quality of life and individual, education, job and public health once the scheme is in operation.

The conclusions of the Environmental Assessment can be summarized as follows:

- The communities will receive large benefits in terms of quality of life, particularly with reduced disaster vulnerability, and improved health and education facilities, infrastructure, transportation & communication etc.
- The short-term negative impacts that may come in the way of air quality, noise, solid waste, occupational health & safety need to be minimized through the mitigation action plan. Moreover, post disaster health, safety and flood problems are common. These issues might be problematic if necessary mitigation measures, as suggested in EMP, would not take into consideration.
- The project will create employment for the workforce who live in the vicinity of the construction site and will provide them a short-term economic gain.
- The green belt development with large-growing trees at the periphery of the site will give the places a more natural and pleasing appearance.
- A comprehensive Environmental Management Plan (EMP) has been prepared to mitigate and reduce the adverse impacts that will come out from the Sub-project activities. The EMP mainly focuses on managing, mitigating and reducing the impacts exhibited from design, construction and operation phase.
- **The tentative cost has been estimated around BDT 1.2 Lacs for yearly monitoring and around BDT 21 Thousands to implement the EMP.** This budget can change due to change of market prices and if the project implementation period extends.

Two straight recommendations which are listed below need to be followed by the concern authority to ensure sound environmental and socio-economic condition:

- All mitigation, compensation and enhancement measures proposed in this report need to be followed.
- The Environmental Management and Monitoring Plan proposed in this report also need to be followed.

Environmental and Social Assessment of Urban Resilience Project

Project Area: Dhaka North City Corporation

Project Location: Mohakhali

1 INTRODUCTION

1.1 Background of the Sub-project

This is a Sub-project under Urban Resilience Project-DNCC Part. In the Sub-project area a new warehouse has been planned for construction for keeping the search and rescue equipments and subsequently use during emergency. The significant features of the Sub-project have been mentioned in Table 1.

Table 1: Significant features of the sub-project

Name of the Sub-project	Construction of warehouse in Mohakhali under Urban Resilience Project-DNCC Part
Warehouse Location	Zone-3, Mohakhali Wholesale Kitchen Market, Shaheed Tajuddin Ahmed Avenue ,Dhaka
Type of Building	Type 1 (2400 sft), 2-storied Building
Land available	0.055 acres
Land acquisition	Not required

1.1.1 Aim of Sub-project

The Objective of the sub-project is to increase the effectiveness of disaster preparedness and response, while addressing existing and emergent risks in Dhaka. The Project will enhance the capacity of municipal public organizations in Dhaka to effectively prepare for, respond to and recover from small and large emergency events. It will also identify an investment program to reduce critical vulnerabilities and will support an improvement in the quality of new building construction. Further, the project seeks to create an enabling environment for coordinated, locally managed disaster risks management.

1.1.2 Location of Sub-Project

The Sub-project is located in the Zone-3, Mohakhali wholesale kitchen market, which is within the Dhaka North City Corporation. The location details of the Sub-project have been summarized in Table 2. The Layout Plan, Location Map, Base Map and Topographical Map have been shown in Figure 1, Figure 2, Figure 3 and Figure 4 respectively. Photographs showing present condition of the Sub-project area have been shown in Figure 5.

Table 2: Location Details of the sub-project

Division	Dhaka
District	Dhaka
Upazila	Gulshan
Word No.	20 (N)
Mouza	Mohakhali
GPS Position	23° 46' 29"N and 90° 24' 4" E
Nearby Major Road	Shaheed Tajuddin Ahmed Avenue
Nearby River/ Canal	Hatirjheel lake is about 1.5 km away in east direction

1.2 Purpose of the Environmental and Social Assessment (ESA) Study

The purpose of the ESA process is to inform decision-makers and the public of the environmental consequences of implementing a proposed project. The EA document itself is a technical tool that identifies, predicts, and analyzes impacts on the physical environment, as well as social, cultural, and health impacts. If the ESA process is successful, it identifies alternatives and mitigation measures to reduce the environmental impact of a proposed project. The ESA process also serves an important procedural role in the overall decision-making process by promoting transparency and public involvement.

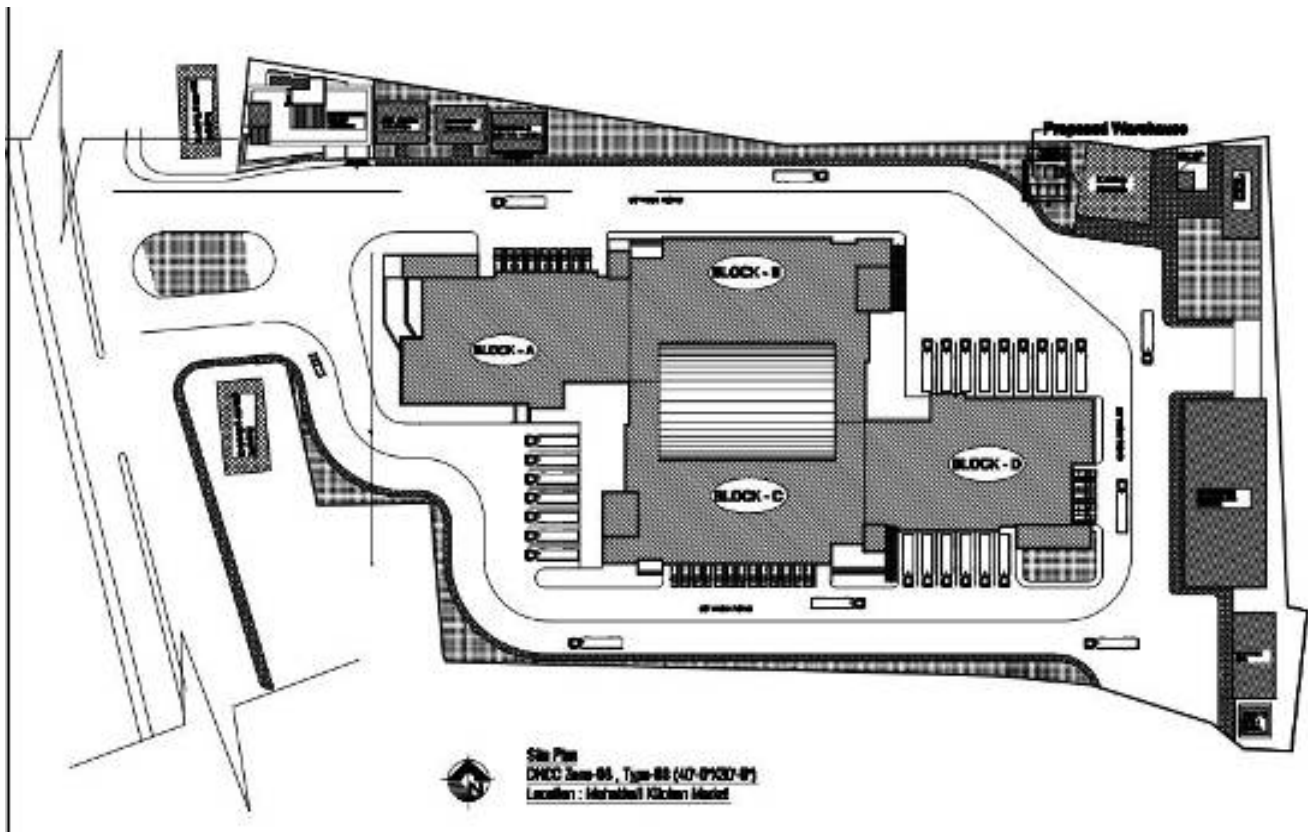


Figure 1: Layout Plan of the Proposed Sub-project at Mohakhali

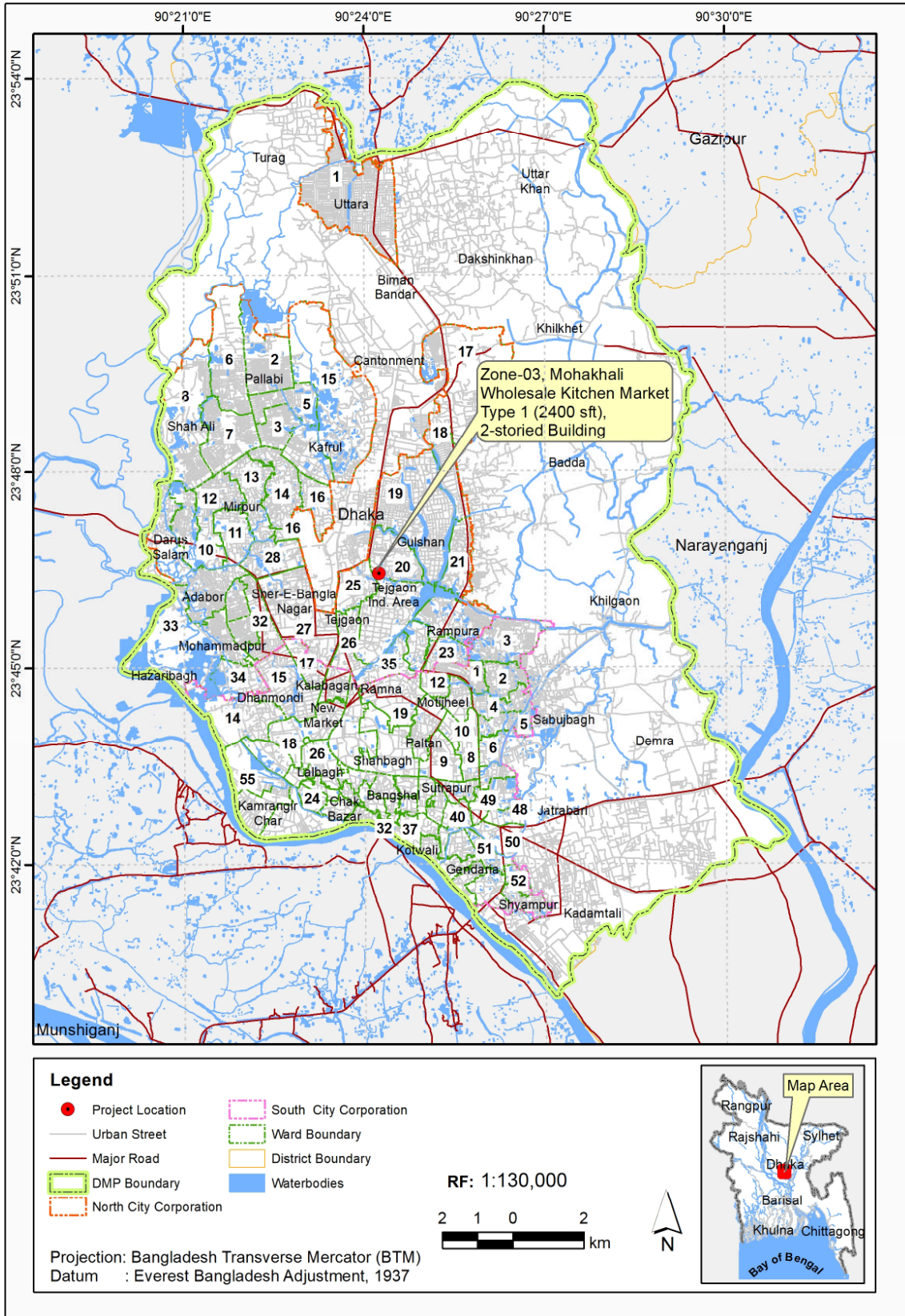


Figure 2: Location Map of Sub-project Site

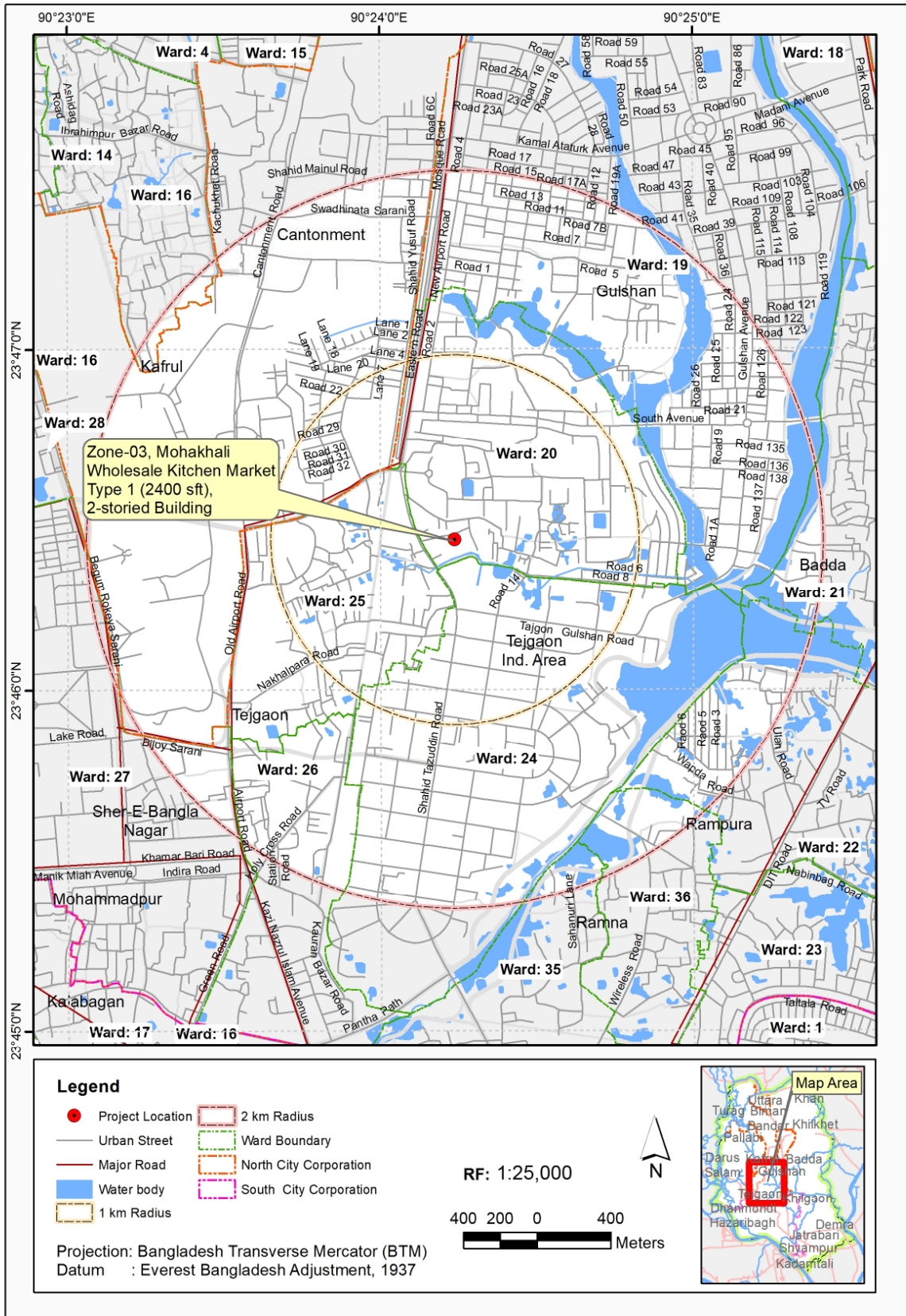


Figure 3: Base Map of Sub-project Site



Figure 4: Topographical Map of Sub-project Site



Figure 5: Photograph showing the present condition the sub-project area

1.5 Brief Description of Sub-Project Site

The proposed Sub-project is located within the Zone-3, Mohakhali Wholesale Kitchen Market Mohakali area, beside Shaheed Tajuddin Ahmed Avenue. The important establishments around the Sub-project site have been summarized below.

North Boundary: James P. Grant School, MCET Engineering College, Bangladesh College of Physicians and Surgeons, Institute of Health and Technology etc.

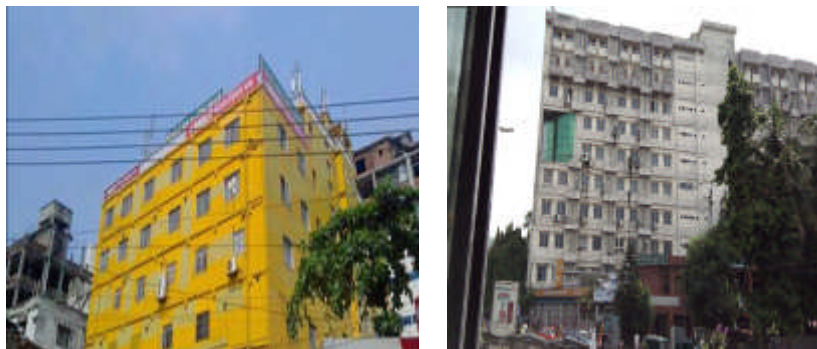


Figure 6: North side major features of the site

South Boundary: Mohakhali Bus Terminal, Shaheed bir uttam road, Impres Newtex Composite Textiles Ltd.



Figure 7: South side major features of the site

East Boundary: Northern Rubber Manufacturing Company, Paper Studio Bangladesh, Niketon Bazar etc.



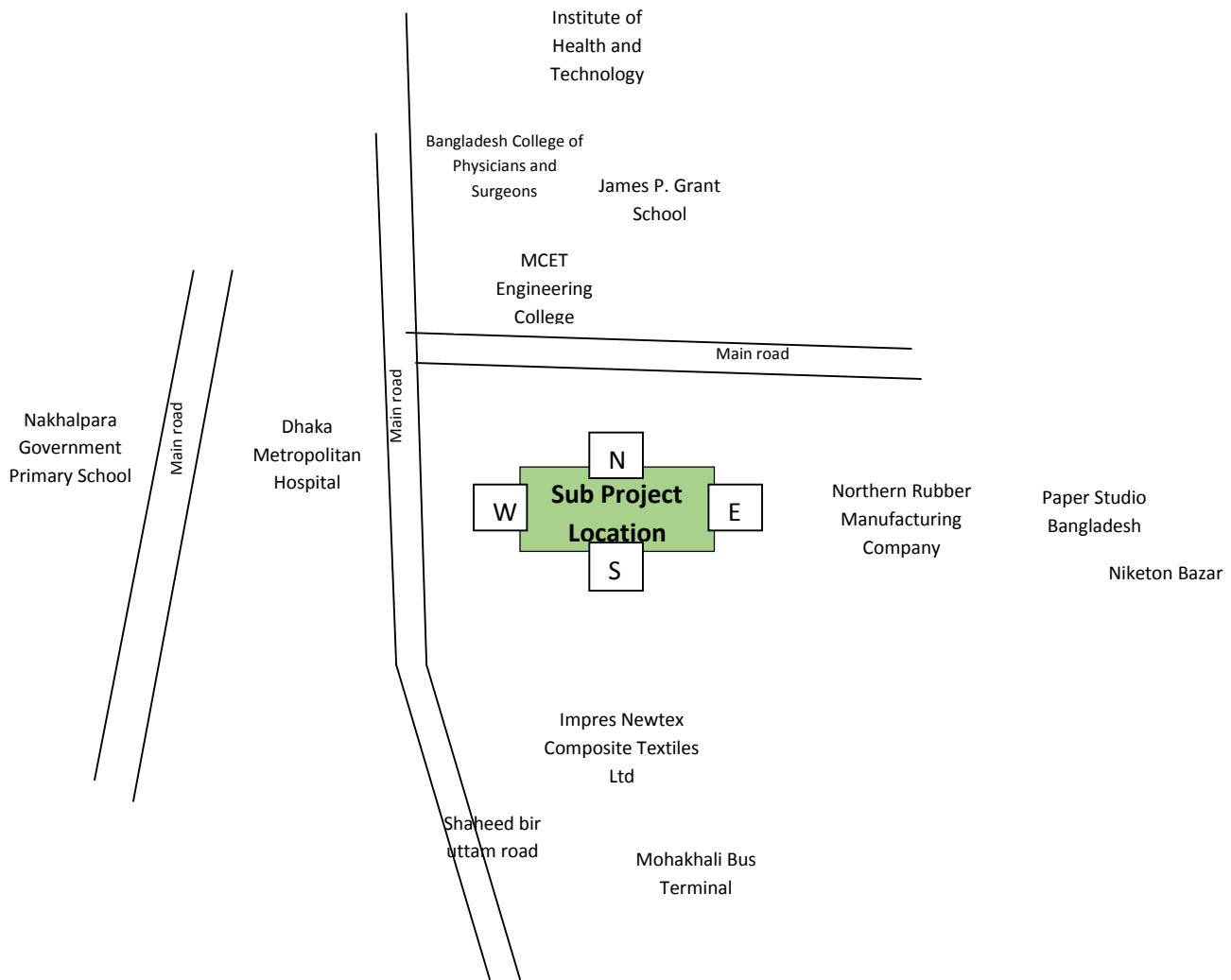
Figure 8: East side major features of the site

West Boundary: Dhaka Metropolitan Hospital, Nakhalpara Government Primary School etc.



Figure 9: West side major features of the site

Site Surrounding of the Sub-Project in Hand Sketch Map



1.6 Sub-Project Components

The major components of the sub-project are a two storied building (2400 sft) and some rescue equipments (such as Trailer, Ambulance, Fire extinguisher and Life jacket etc) kept in this building which is used use during emergency. Also a 815 sft auxiliary monitoring and demonstration room is proposed in 1st floor of this building.

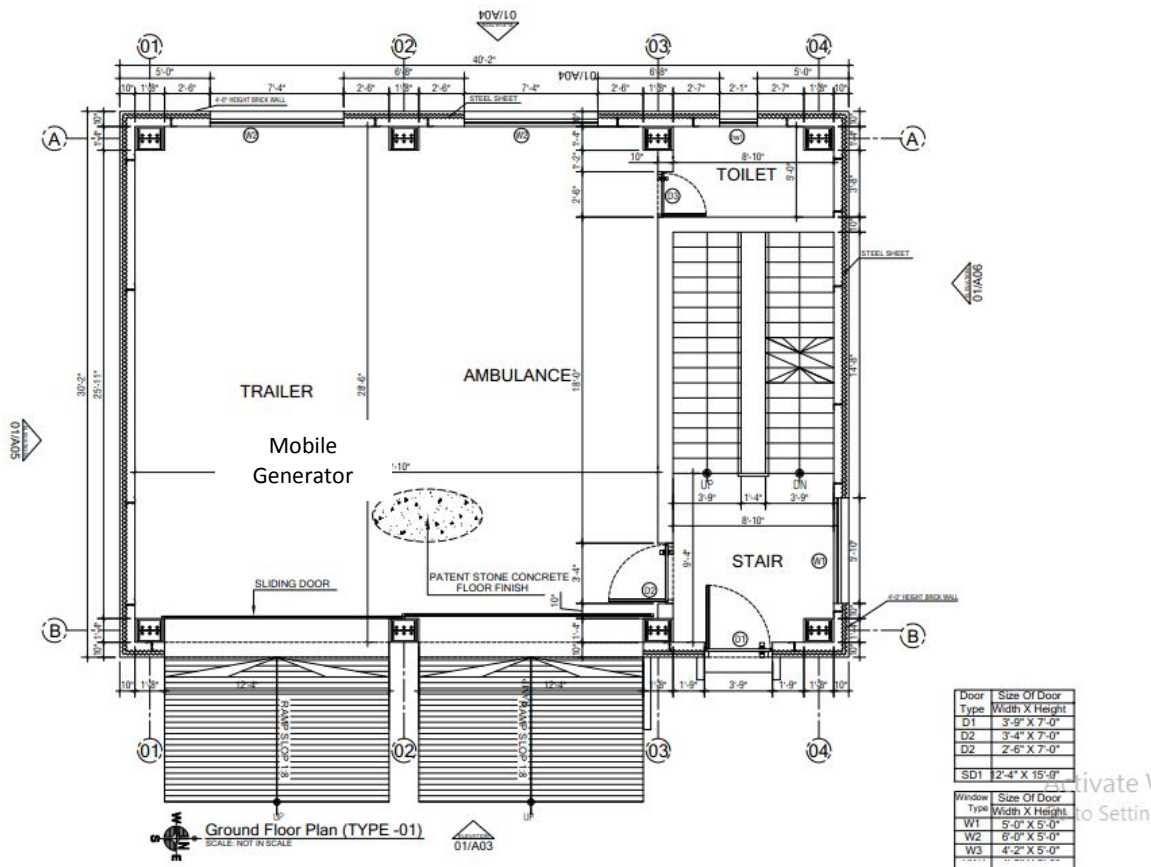


Figure 10: Plan layout of ground floor

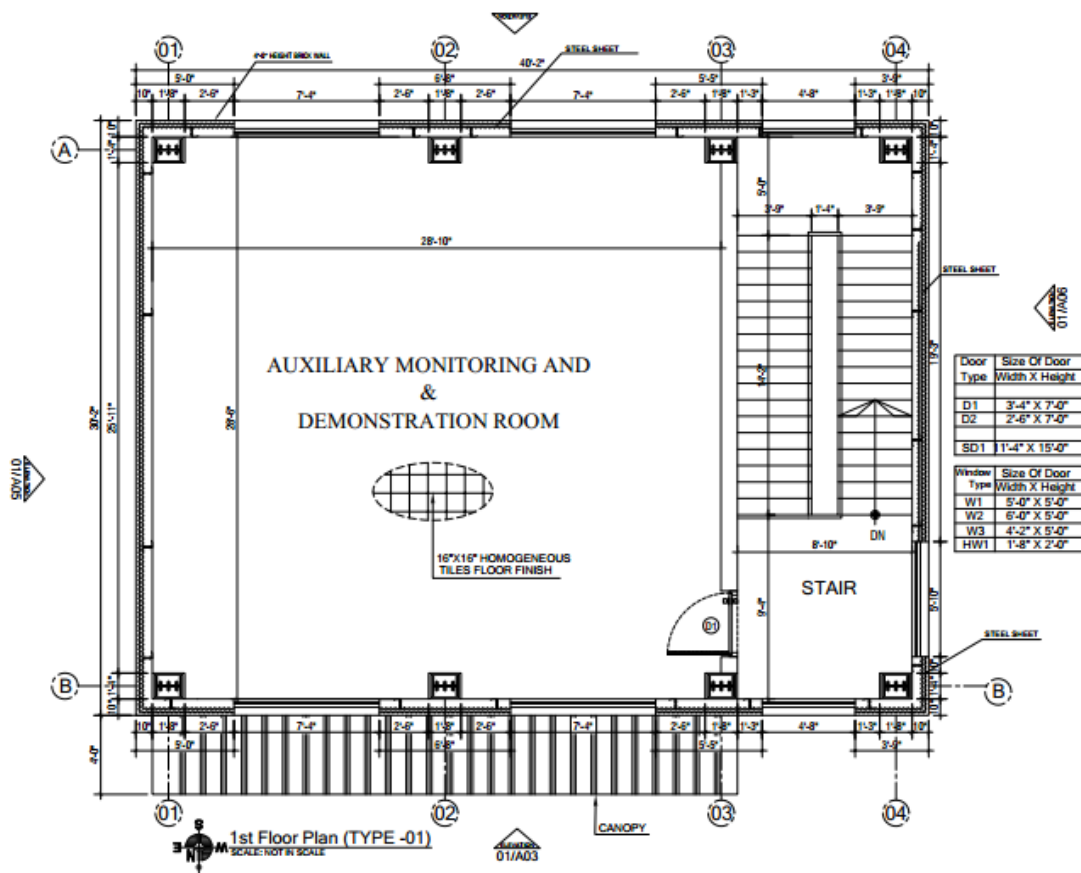


Figure 11: Plan layout of first floor

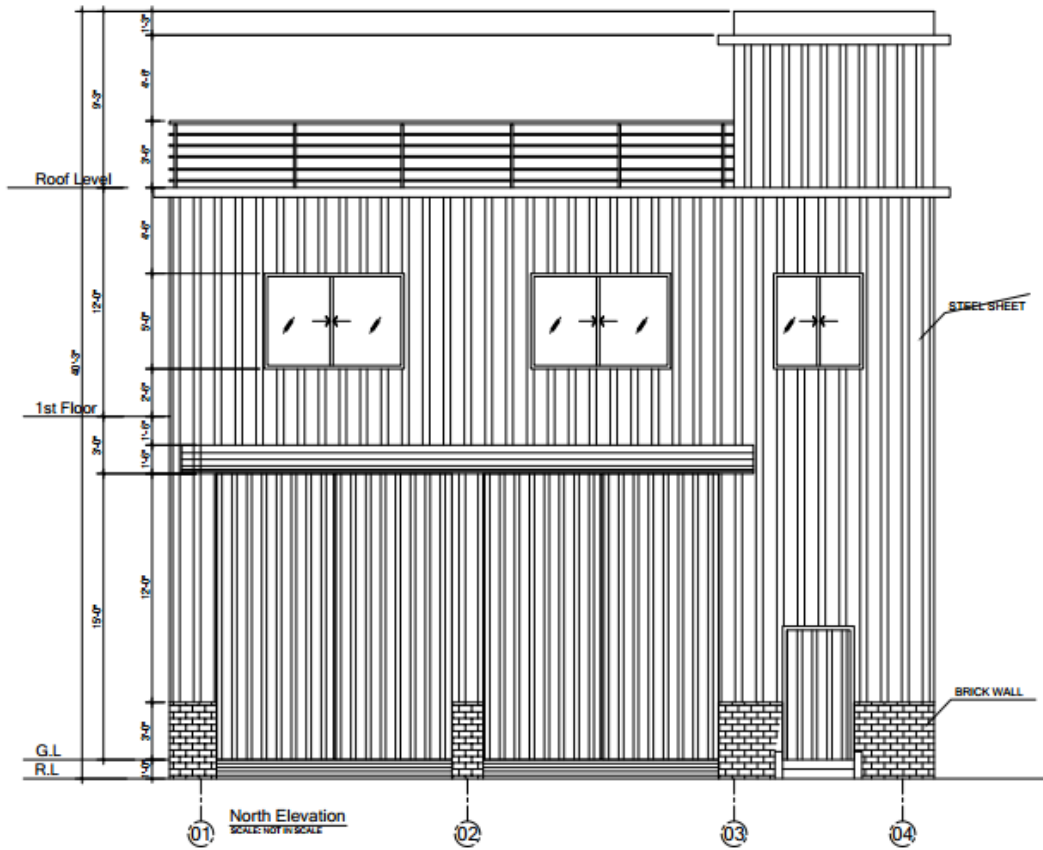


Figure 12: North elevation

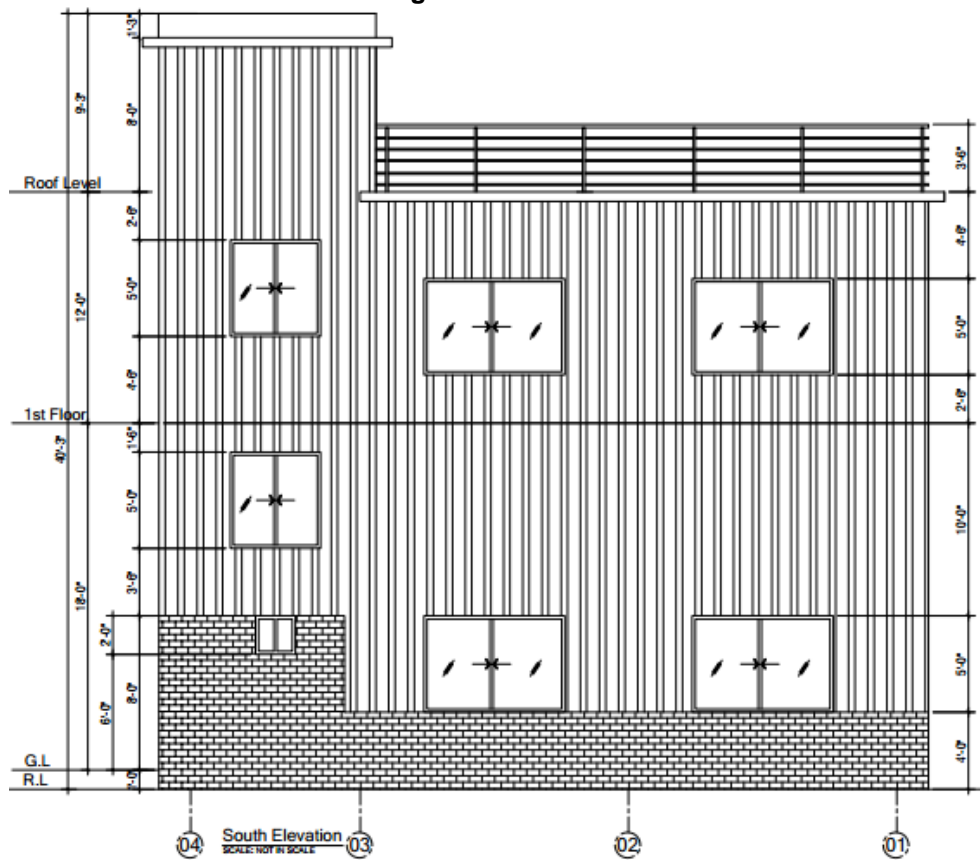


Figure 13: South elevation

1.7 Structural Design Analysis

In the structural design it is very important to keep sufficient air and light circulation in the floor plan. According to the BNBC minimum 25% ventilation should be maintained in any kind of infrastructure. From the above floor plan (Figure 10, 11, 12 and 13), it has been found that there is around 650 sq. ft. openings where as 25 % of 2400 sq. ft. is 600 sq. ft. So, there is sufficient ventilation option in the proposed structure.

Normally, according to the BNBC code 2014, the plinth or floor level of a building is 2 feet high from the existing ground or road level. In the design of warehouse, the plinth level is considered with respect to the surrounding infrastructure plinth level. The highest plinth level among surrounding buildings has been considered as the plinth level of the warehouse. In this area, the highest flood height is 5 feet, lowest is 1 feet and average is around 2 feet. And the frequency of highest height flooding is more or less 15 years. So the design seems safe regarding the flooding issue.

Moreover, for DSCC, in the ground floor Ambulance and Mortuary vans will be parked, in the first floor light search and Rescue equipment will be kept. Only 2/3 people will be stationed in the warehouse. And the stair will be enough for the Emergency Exit as per the BNBC rules (the rule is given at the end of the table). Moreover a steel ladder with a window will be kept for using as emergency exit. *The guidance of BNBC is given below for the Emergency Exit.*

Emergency Exit: *Provided single stair satisfies the BNBC Part 4 chapter 3 requirement as described below:*

3.14 Number of Exits

3.14.1 *The requirements of the number of exits specified in this subsection shall apply to buildings of all occupancy groups unless a more restrictive requirement for any occupancy is provided in Chapter 5, Part 4 or elsewhere in this Code.*

3.14.2 *Only one means of exit shall suffice for the buildings specified in Table 4.3.5 provided that they do not have more than one floor below the level of exit discharge.*

3.14.3 *For all other buildings the required number of exits shall depend on the occupant load as specified below:*

<i>Occupant load 500 or less</i>	<i>Minimum 2 exits</i>
<i>Occupant load 501 to 1000</i>	<i>Minimum 3 exits</i>
<i>Occupant load more than 1000</i>	<i>Minimum 4 exits</i>

Table 4.3.5 Buildings Served by One Means of Exit

Occupancy	Maximum Number of Storeys	Other Restrictions
All	1	Maximum occupant load 100 and maximum travel distance 25 m
A1	2	Maximum occupant load 30
A2	6	Maximum 12 dwelling units
A3	4	Maximum 50 occupants per floor and maximum travel distance 25 m
A4	6	Maximum 50 occupants per floor and maximum travel distance 25 m
A5	2	Maximum occupant load 50
B, C	2	Maximum occupant load 200
D	2	Maximum occupant load 50
F, G, H	2	Maximum occupant load 100 and maximum travel distance 25 m

3.14.4 *All buildings more than 6 storeys or 20 m in height and all buildings having a floor area larger than 500 m² on each floor, used as educational, institutional, assembly, industrial, storage or hazardous occupancy or a mixed occupancy involving any of these, shall have a minimum of two staircases. The staircases shall be of the enclosed type and shall lead directly to the exterior or the designated area of refuge.*

1.8 Equipment and Storing Place

The larger and vehicular equipment will be stored at the ground floor like Mobile Light Unit and Generator (2000w), Generator, Concrete Cutter, Ambulance and the smaller equipment will be stored at the first floor like Air Compressor, Power Chain Saw, Megaphone, Breathing Apparatus, Knee Pad & Eye Protector, Gloves, Multi-Purpose Cutter, Ram Jack, High Pressure Air Bag, Rubble Removing Bag, Stretcher, Family tent, Relief tent, Dead Body Bag, Chemical Light Sticks, Fire Aid Box.

For the storing of the equipment, there is enough space according to the above drawing. And the equipment which will be stored at the ground floor will be lightly affected from any sudden flood due to their nature. And as per the layout there is enough space for emergency exit.

2 POLICY LEGAL AND ADMINISTRATIVE FRAMEWORKS

The proposed Urban Resilience Project-DNCC Part will be implemented in compliance with applicable environmental laws and regulations. Bangladesh has an environmental legal framework that is conducive to both environmental protection and natural resources conservation. This environmental legal framework applies to the proposed sub-project. In addition, a wide range of laws and regulations related to environmental issues are in place in Bangladesh. Many of these are cross-sectoral and partially related to environmental issues. This Section presents an overview of the major national environmental laws and regulations that are relevant and may apply to activities supported by the Urban Resilience Project-DNCC Part, institutional arrangement and national and sub-national level, and World Bank safeguard policies.

2.1 National Environmental Laws and Regulations

National Environmental Policy 1992

The concept of environmental protection through national efforts was first recognized and declared in Bangladesh with the adoption of the Environment Policy, 1992 and the Environment Action Plan, 1992. The major objectives of Environmental policy are to i) maintain ecological balance and overall development through protection and improvement of the environment; ii) protect country against natural disaster; iii) identify and regulate activities, which pollute and degrade the environment; iv) ensure environmentally sound development in all sectors; v) ensure sustainable, long term and environmentally sound base of natural resources; and vi) actively remain associate with all international environmental initiatives to the maximum possible extent.

Bangladesh Environmental Conservation Act (ECA), 1995 amended 2002

This umbrella Act includes laws for conservation of the environment, improvement of environmental standards, and control and mitigation of environmental pollution. It is currently the main legislative framework document relating to environmental protection in Bangladesh, which repealed the earlier Environment Pollution Control ordinance of 1977.

Environment Conservation Rules (ECR) 1997 amended 2003

These are the first set of rules, promulgated under the Environment Conservation Act 1995. Among other things, these rules set (i) the National Environmental Quality Standards for ambient air, various types of water, industrial effluent, emission, noise, vehicular exhaust etc., (ii) requirement for and procedures to obtain Environmental Clearance, and (iii) requirements for IEE/EIA according to categories of industrial and other development interventions.

Environment Court Act, 2000

The aim and objective of the Act is to materialize the Environmental Conservation Act, 1995 through judicial activities. This Act established Environmental Courts (one or more in every division), set the jurisdiction of the courts, and outlined the procedure of activities and power of the courts, right of entry for judicial inspection and for appeal as well as the constitution of Appeal Court.

Bangladesh National Building Code

The basic purpose of this code is to establish minimum standards for design, construction, quality of materials, use and occupancy, location and maintenance of all buildings within Bangladesh in order to safeguard, within achievable limits, life, limb, health, property and public welfare. The installation and use of certain equipment, services and appurtenances related, connected or attached to such buildings are also regulated herein to achieve the same purpose.

2.2 International Safeguard Policies (World Bank)

The objective of these policies is to prevent and mitigate undue harm to people and their environment in the development process. Safeguard policies provide a platform for the participation of stakeholders in project design, and act as an important instrument for building ownership among local populations. The effectiveness and development impact of projects and programs supported by the Bank has substantially increased as a result of attention to these policies. The World Bank has ten

environmental, social, and legal safeguard policies. The relevant policies for environmental safeguard are the following:

- OP/BP 4.01 Environmental Assessment
- OP/BP 4.04 Natural Habitats
- OP/BP 4.09 Pest Management
- OP/BP 4.11 Physical Cultural Resources
- OP/BP 4.36 Forests
- OP/BP 4.37 Safety of Dams

Operational Policies (OP) are the statement of policy objectives and operational principles including the roles and obligations of the Borrower and the Bank, whereas Bank Procedures (BP) is the mandatory procedures to be followed by the Borrower and the Bank. Apart from these, the IFC guidelines for Environmental Health and safety have been adopted by the World Bank Group which is also relevant for environmental protection and monitoring. In addition to that the Policy on Access to Information of World Bank also relates to environmental safeguard.

2.3 Implications of Environmental Policies and Regulations on URP

The Environmental Conservation Rules (ECR) 1997 (DoE, 1997) classifies projects into four categories according to potential environmental impacts: **(1) Green; (2) Orange A; (3) Orange B; and (4) Red. Green category** projects are those with mostly positive environmental impacts or negligible negative impacts; **Orange A** category projects are those with minor and mostly temporary environmental impacts for which there are standard mitigation measures; **Orange B** category project are those with moderately significant environmental impacts; while **Red category** projects are those with significant adverse environmental impacts. As discussed in project description, the sub-projects to be implemented under Urban Resilience Project-DNCC Part would fall under **Orange A** category.

The BNBC, PPR 2008, Bangladesh Labor Act 2006 outlines guidelines for ensuring worker's health and safety during construction works which would have direct implications in project. It would be the responsibilities of the contractors (with supervision of DNCC) to make sure that these guidelines are followed in the workplace environment.

According to WB Operational Policy (OP 4.01), the nature of environmental assessment to be carried out for a particular sub-project would largely depend on the category of the sub-project. As mentioned earlier, The World Bank Operational Policy (OP) 4.01 classifies projects into three major categories (category A, B and C), depending on the type, location, sensitivity and scale of the project, and nature and magnitude of potential impacts.

The sub-projects to be implemented under the Urban Resilience Project-DNCC Part do not involve large-scale infrastructure development (e.g., construction of sanitary landfill, water or wastewater treatment plant, major highways). The sub-projects would involve no involuntary land acquisition. Thus, the sub-projects to be carried out do not appear to pose risk of significant adverse environmental impacts. In view of subprojects nature, the overall project is classified as a Category 'B' and the safeguard policy OP/BP 4.01 has been triggered for the proposed operation. The policy has been triggered to ensure that the sub project design and implementation will be focused on reducing adverse impacts and enhancing positive impacts.

It is highly unlikely that any natural habitant formed largely by native plant and animal species will be affected or modified by the subprojects activities to be implemented under Urban Resilience Project-DNCC Part because most of the infrastructure development works are small-scale and will take place in the built environments of municipalities adjacent to various other infrastructures. However, the EMF stipulated the code of practice on natural habitat as advance precautionary measures and Natural Habitats (OP/BP 4.04) has been triggered.

Also it is unlikely that any designated physical cultural resources will be affected by the subprojects. However, the impacts will be examined as part of the environmental screening/assessment of each sub-project. The EMF provided criteria for screening and assessment of physical cultural resources. In addition, 'Chance find' procedures conforming to local legislation on heritage would be evaluated that any physical or cultural resources will not be impacted. OP 4.11 (Physical Cultural Resources) has been triggered.

The activities of the project will not involve any pesticide application, include activities in forest areas or relate to protection of dams. Hence OP 4.09, 4.36 and OP 4.37 will not be relevant as well.

The IFC guidelines provides guidance on certain EHS issues which include standards for environmental parameters (ambient air quality, water and wastewater quality, noise level, waste management), hazard and accident prevention, occupational and community health and safety (during commissioning and decommissioning works) etc. These guidelines will be directly applicable to the MGSP project. As a general rule, the IFC guidelines should complement the existing Bangladesh guidelines or standards. In case the Bangladesh guidelines or standards differ from the IFC guidelines, project is expected to follow the more stringent ones.

The World Bank access to information policy would be directly followed. The Urban Resilience Project-DNCC Part will make the environmental assessment and EMF documents available to the public by publishing it in their websites. In addition, subproject specific screening/assessment report will periodically be posted in the DNCC website before the bidding process. Hard copies of these documents in English (including a summary in Bengali) will be made available in the offices of the respective Pourashavas and city corporations for the local stakeholders.

3 DESCRIPTION OF THE ENVIRONMENT (BASELINE ENVIRONMENT)

3.1 Physical Environment

3.1.1 Geology, Topography and Soils

The part of Bangladesh to which the capital city of Dhaka belongs is dominated by the rivers Ganges, Jamuna and Meghna, which drain large quantities of water from the Himalayan Mountains into the Bay of Bengal, through a complex delta system of tidal tributaries and creeks, formed by sediment deposited by the rivers. Known as a composite of Brahmaputra-Jamuna Flood plain and Madhupur Sal Tract, this part – the central region – is composed of flat and low lying land, which floods extensively in the rainy season and red textured highlands.

Much of Bangladesh lies on the Gangetic-Bengal Plain, and is flat and low lying particularly around the delta, which floods extensively in the rainy season. The sub-project site situated in North of Dhaka, the land gradually begins to rise, towards the foothills of the Himalayas in the north. The influence of the rivers is evident in the soils, which are almost entirely alluvial and generally fertile in the central plains, with a predominantly loam and silt consistency.

The sub-project site is situated in Dhaka which is situated at the southern tip of a Pleistocene terrace, the Madhupur tract. Two characteristic geological units cover the city and surroundings, viz Madhupur Clay of the Pleistocene age and alluvial deposits of recent age. The Madhupur Clay is the oldest sediment exposed in and around the city area having characteristic topography and drainage. The major geomorphic units of the city are: the high land or the Dhaka terrace, the low lands or floodplains and depressions and abandoned channels. Low lying swamps and marshes located in and around the city are other major topographic features of the sub-project site.

3.1.2 Hydrology (Surface & Groundwater)

In the proposed site where warehouse will be constructed there is no water body but Hatirjheel lake is 1.5 km away in east direction from the site.

Like other towns and cities of Bangladesh, the Dhaka city dwellers, too, use both surface and groundwater as a source of domestic water. Principal difference lies in use of supply water based on treatment with some application of chlorine in Dhaka and other population centers. Pollution of rivers is a major problem, because of the discharge of industrial wastewater and inadequate sewerage. The DoE has identified 450 polluting industrial units in Dhaka (196 tanneries, 129 textile producers, 38 engineering factories, and plants manufacturing pesticides, chemicals, fertilizers, pulp and paper), many of which discharge untreated wastewater to the rivers. The sewerage system covers only 20% of the city population, and 50% of people use septic tanks, 20% pit latrines and 10% use open latrines and other unsanitary methods.

There are three main aquifers in the central region of Bangladesh:

- (vii) An upper (composite) aquifer, which can reach depths of 50 m and is covered with an upper silty clay layer of less than 20 m;
- (viii) A middle (main) aquifer of fine to heavy sands, which is generally 10-60 m thick and in most areas is hydraulically connected with the composite aquifer above; and
- (ix) A deep aquifer of medium, medium-to-fine or medium-to-coarse sand, which is generally found at depths below 100 m.

In Dhaka 80% of the domestic water supply is obtained from the middle aquifer, extracted by tube-wells throughout the city. Recent studies have shown that water levels have fallen dramatically (20 m over the past six years) and suggest that the aquifer may be changing from a confined to an unconfined condition, which could make it vulnerable to contamination. There is already evidence of pollution by leaking underground tanks at petrol stations and chemical plants, and seepage from sewers, septic tanks and pit latrines. DWASA is implementing a major project to improve the water supply service, which amongst other things will increase the usage of surface water and extend groundwater abstraction to the deeper aquifer, at a sustainable rate.

The water quality data of the month of June, 2016 of the lakes and rivers in and around Dhaka City is given in Annex A. The analysis is done by DoE, Dhaka.

3.1.3 Climate and Meteorology

The climate in the sub-project area is humid and sub-tropical, with a typical three season pattern. During the winter season (November-February), cool winds blow from the north-east. The weather is cool and dry. Rainfall, however, shows variations over the last decade (2001-2011) between 116 mm in November, 2002 and 0 mm in February, 2011. Average temperatures show, over the same period, variation between 23.4°C in November, 2005 and 17.3°C in January, 2011. Temperatures start to rise in March and reach the annual maximum of around 39.9°C in April-May, when daytime temperatures can reach up to 40°C. Rainfall also increases, and this period is characterized by unstable weather. The monsoon begins in May-June as hot air rises over the Indian subcontinent, creating low pressure areas into which rush the cooler moisture-laden winds from the Indian Ocean and the Bay of Bengal. Around 70-80% of the annual rain falls during this time. The rain is often accompanied by strong winds, sometimes exceeding 100 km/h. Temperature and rainfall both decline post-monsoon, returning rapidly to the winter lows.

Wind data from the Bangladesh Meteorological Department Climate Division suggests that wind directions vary month-to-month in Dhaka, though predominantly in the NW, S, and NE directions. As the STSs will be contained within tall walled structures and cleaned daily, windborne odor will get minimized.

3.1.4 Flooding, Water Logging and Drainage Pattern

The Sub-project area is mostly flood free and elevation is higher than normal local flood level. The area is not affected in normal floods. Most of the drains in the sub-project area are connected with drains or sewerage networks bearing the waste water. Also Industrial wastewater is disposed in this open drain. According to the environmental standard of Bangladesh (ECR, 1997), for the survival of the aquatic life the dissolved oxygen be between 4 mg and 8 mg per liter and accepted level of Biological Oxygen Demand (BOD) is 100 mg per liter. But the situation is far-off worse in study area.

3.1.5 Air Quality and Dust

Being a public place, the area produces a large amount of air pollutant and dust. The main atmospheric pollutants are those produced by vehicles and industries and in particular by the burning of fuels. These include particulate matter, hydrocarbons, carbon dioxide, carbon monoxide, sulfur dioxide, oxides of nitrogen, lead, ammonia and hydrogen sulfide. Many of these cause respiratory problems in humans, plus other diseases if substances accumulate in the tissues.

Table 3.1: National Ambient Air Quality Standards for Bangladesh and Field Data

S/N	Parameter	BD Standard	Averaging Time	AQMP, DOE (Darus-Salam, 23.78N 90.36E)		Field Survey
				July	August	August
9.	SO ₂	80 µg/m ³ (0.03 ppm)	Annual	-	-	-
		365 µg/m ³ (0.14 ppm)	24 hours (a)	-	0.71	29.0
10.	NO _x	100 µg/m ³ (0.053 ppm)	Annual	13.0	19.9	13.0
11.	PM10	50 µg/m ³	Annual (b)	-	-	-
		150 µg/m ³	24 hours (c)	44.3	70.2	119.0
12.	PM2.5	15 µg/m ³	Annual	-	-	-
		65 µg/m ³	24 hours	19.2	31.6	-

Source: AQMP, DOE and Field Survey, 2016.

The main causes of the poor air quality are:

- (vii) Poor roads and traffic management leading to severe traffic congestion;
- (viii) Heavy industrialization, and use of cheaper high-sulfur fuels (coal, wood and tyres) by smaller industries like brick kilns; and
- (ix) Poor solid waste management, so burning is the common method of treating garbage.

3.1.6 Noise Level

The site is in a mixed area. Noise level of the project area is within the accepted limit (75 dB)

- On site sources: Minimum 40 dB and maximum 53 dB during 1.15 P.M from various sources.
- Off site sources: Minimum 52 dB and maximum 67 dB during 1.20 P.M from various sources.

Present noise level in the project site and Bangladesh standards for sound level are shown in Table 3.2

Table 3.2: Bangladesh Standards for sound level (GoB, 2006)

Noise Level at Project Site				Bangladesh Standards		
Site	Time	Minimum	Maximum	Location	Noise Level (dBA) at Day	Noise Level (dBA) at Night
On Site	1:15 a.m.	40	53	Silent zone	50	40
	8:30 p.m.	30	40	Residential area	55	45
Off Site	1:20 a.m.	52	67	Mixed Zone	60	50
	8:10 p.m.	43	60	Commercial area	70	60
				Industrial area	75	70

3.2 Biological Environment

3.2.1 Flora

The area is situated in a private place of Zone-3, Mohakhali Wholesale Kitchen Market, Mohakhali. There is only one tree at the entrance of the location. The tree will be cut off due to construction purpose. From observation total no of trees are 30 in which 8 trees will be cut off.

Table 3.3: Types and number of trees at the proposed location

S/N	Types of Flora and Name		Existing	To be Cut Off
1.	Large Trees	Mango (<i>Magnifera indica</i>)	09	Large Trees
		Mahogany (<i>Swietenia genus</i>)	08	
		Arcea (<i>Areca catechu</i>)	02	
		Coconut (<i>Cocos nucifera</i>)	03	
2.	Medium Trees	Mango (<i>Magnifera indica</i>)	01	Medium Trees
		Jambul (<i>Syzygium Cumini</i>)	02	
		Jujube (<i>Ziziphus zizyphus</i>)	01	
		Guava (<i>Sidium guajava</i>)	02	
3.	Small Trees	Mahogany (<i>Swietenia genus</i>)	02	Small Trees
4.	Grass Land		0	0
5.	Other Forest/ Agricultural/ Garden etc.		0	0
6.	Total Trees	30	08	Total Trees



Figure 13: Existing Medium Trees (Mahogany and Mango)

3.2.2 Fauna

In the project site no rare endangered species, indigenous, mammals, fish and others have been observed. Only various birds like Crow (*Corvus corone*), Myna (*Acridotheres tristis*), and Sparrow (*Passer domesticus*) have been seen.

3.3 Socio-Economical Environment

3.3.1 Land Use

The proposed land for the sub-project is situated within Zone-3, Mohakhali Wholesale Kitchen Market, Mohakhali. Whereas the present land use surrounding the sub-project site is quite mixed in character. The lands in the Sub-project's catchment areas shown in Figure 14 are mainly distributed in Commercial, Residential, Institutional, Road and other infrastructures etc. The detail land coverage of 1 km and 2 km buffer of sub-project location is given in the Table 3.

Table 3.4: Land covers classification of the study area

Land Use	For 1 km buffer	For 2 km buffer
	Area (acres)	Area (acres)
Commercial area	0.053	0.113
Industrial area	0.560	1.633
Institutional area	0.009	0.171
Open Space	0.004	1.122
Road	0.326	0.846
Urban Residential area	0.987	3.824
Water body	0.056	1.567
Others	1.154	4.002
Grand Total	3.149	13.278

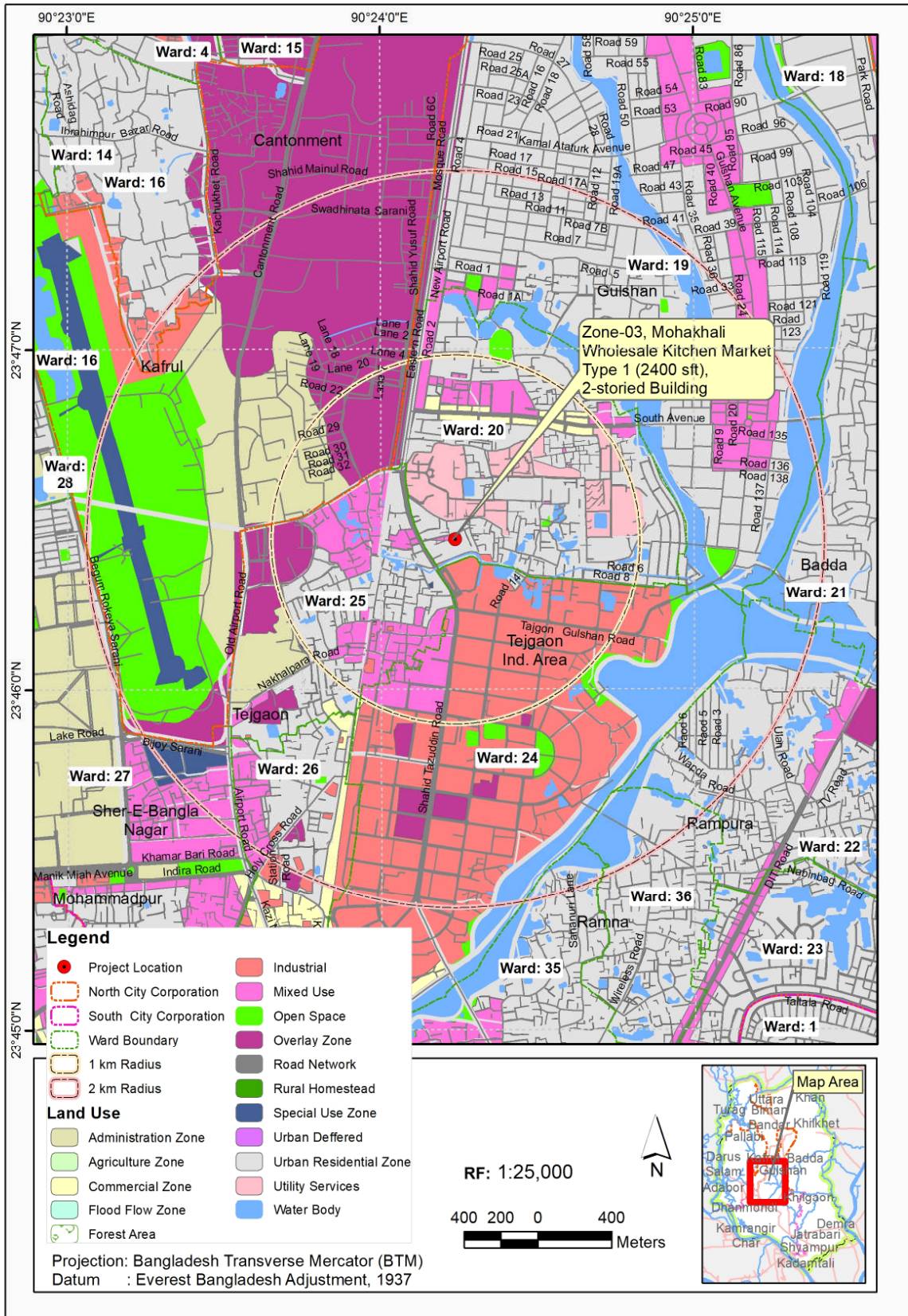


Figure 14: Land use and Land Cover Map of the Study Area

3.3.2 Beneficiary Population

The Sub-project activities will benefit the local people and people who comes in the Sub-project's catchment areas during disaster and non- disaster period. The Sub-project's catchment area will cover 1.73 sq.km. situated around it. Total numbers of population in catchment area of the Sub-project is 93143 among which 51401 are male and 41742 are female [BBS, 2011 - Population Census].

3.3.3 Education

In catchment area of the Sub-project, literacy rate among the population is 76.2%. Literacy rate of male is still higher than the female Populations [BBS, 2011- Population Census]. There are many schools, colleges and university around the project site like James P. Grant School, Institute of Health and Technology, MCET Engineering College, Universal Medical College and Hospital etc.

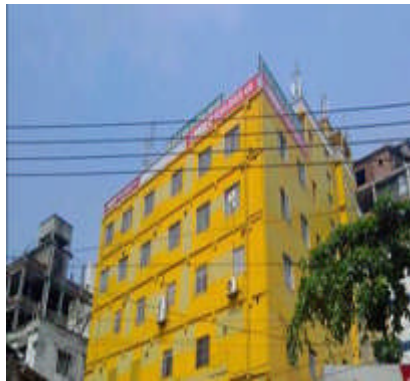


Figure 15: Major educational facilities around the site

3.3.4 Access Road to the site and Traffic Load with Types

There is a road named Shaheed Tajuddin Ahmed Avenue ahead of the proposed warehouse. This is the main transport route for all types of vehicles.



Figure 16: Access road for the warehouse

3.3.5 Public Services

There are many public services like Hospital, Fire service, Thana etc. Major public services are Gulshan Thana, Institute of Public Health etc.



Figure 17: Major Public Services

3.3.6 Recreation and Aesthetics

There is a park named Hatirjheel Park and Dr. Fazle Rabbi Park etc.



Figure 18: Recreation facilities

3.3.7 Land Acquisition & Resettlement

Land acquisition and resettlement activities are not involved in the Sub-project Intervention.

3.3.8 Agriculture

No agricultural activities are taking place in the Sub-project area.

4 PUBLIC CONSULTATION

4.1 General

Presently the public consultation is done as a part of social assessment separately to ascertain the people's reaction. During the survey, public consultation has done to know the people's perceptions about the project and environmental problems. The purpose of the public consultation includes the following:

- To ascertain the public views on various environmental issues related to the project;
- To encourage and provide for people's participation in project implementation; and
- To obtain new insight and site specific information, and to appropriating possible mitigation measures based on local knowledge of the communities.
- To ensure the minimization of social conflicts regarding the project, if any

During consultation with the local people, they were little known about this type of project. This area is somewhat underdeveloped part of the area. The expansion of the industrial unites is very slow so they are very positive about this project. The proponent also commits to give privilege locality in every aspect.

4.2 Approach and Methodology

4.2.1 Approach

Participatory approach was followed for identifying the participants as well as conducting public consultation meeting. Initially, the study team consulted with the project proponent i.e. **City Corporation Authority** for understanding the project situation and the potential stakeholders. However, the meeting ensured the common and equal platform of the participants so that they can express their opinion in an enabling environment. The consultants unfold the issues and in return, the participants give feedback to the given issues and in some cases open two-ways discussions were held in the meeting.

The consultation process was intended to generate an enabling participatory environment between the project proponent and the potential stakeholders through the intermediaries of the consultant. The consultant, in this context, ensured a congenial participatory interaction by mixing two beneficiary groups i.e. **City Corporation Authority** that belongs to up stair and the stakeholders who belong to down stair.

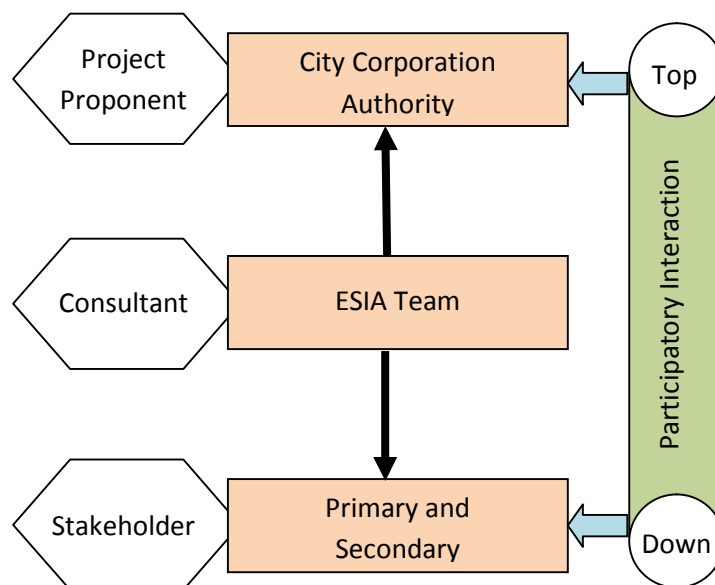


Figure 20: Overall Consultation Process

4.2.2 Methodology

4.2.2.1 Identification of Stakeholders

Stakeholders include all those who affect and are being affected by policies, decisions or actions within a particular system. Stakeholders can be groups of people, organizations, institutions and sometimes even individuals. Stakeholders can be divided into primary and secondary stakeholder categories.

Primary Stakeholders: Primary stakeholders are people who would be directly benefited or impacted by the proposed project. In this context, people who have/had land within the project boundary, and who are living at the vicinity of the proposed project were considered as the primary stakeholders.

Secondary Stakeholders: This category of stakeholders pertains to those who may not be directly affected but have interests that could contribute to the study, play a role in implementation at some stage, or affect decision making on Project aspects. In this project local elite persons, government departments and line agencies fall under this category.

4.2.2.2 Time, Date and Venue Selection

For formal consultation meeting venue, date and time of meeting was selected through the consultation with local people, the project proponent and the consultant. These three groups select an agreed venue considering the closeness to the proposed project, easy accessibility to the venue and which is likely to be neutral. Date and time was also finalized in this way considering availability of the participants, ensuring the maximum participation and compliance with the other arrangement.

For Key Informant Interviews (KIIs), potential secondary stakeholders preferably different government officials, private entrepreneur have been selected who are incumbent in the jurisdiction. Appointments were taken prior to visit them.

For Focus Group Discussion (FGDs), local occupational groups who are concerned and are likely to be impacted were identified and consulted at the spot.

4.2.2.3 Enlisting and Invitation

A comprehensive list of potential stakeholders was prepared through the consultation. This list was intended to cover all sorts of interest groups, occupational groups, socially acceptable and knowledgeable peoples.

A formal invitation was sent to them and also communicated over telephone for ensuring their presence in the meeting.

4.2.2.4 Consultation Instrument

Checklist: A comprehensive checklist covering all possible issues to be addressed was prepared through consultation with the multidisciplinary study team. This checklist was used in the meeting to unveil peoples' perception and opinion along with suggestions.

Attendance list: An inventory of the participants was maintained in attendance sheet containing contact number.

Camera: For visualizing the participants, photographs were taken using camera. These photos were presented in this chapter. Photos of the meeting participants are presented at the end of this chapter.

4.2.2.5 Consultation Process

The study team conducted the meeting. During consultation meeting, the following process was followed with sequences.

Greetings: At the outset, the team spelled greetings to all participants. Welcomed them for attending and stated the entire design of the meeting.

Introduction: The team members introduced themselves to the participants and gave detail description of the project, spelled out about the objectives and anticipated outcome of the meeting.

Respect to the participants: The study team showed respect to all participants. They respected not only to the individuals but also to their values, cultural practices and social structures.

Ensuring peoples’ voice: Generally, all participants cannot participate equally. In fact, a substantial number of participants tended to remain silent in any meeting. However, the study team encouraged all to participate willingly through explaining the ethics of the study.

Note taking: discussed issues and opinions were written in notebook carefully. All issues were given equal importance.

Recapitulation and closing the session: At the end the study team recapitulated the session and responded to the quarries. Finally, the facilitator closed the session thanking the participants.

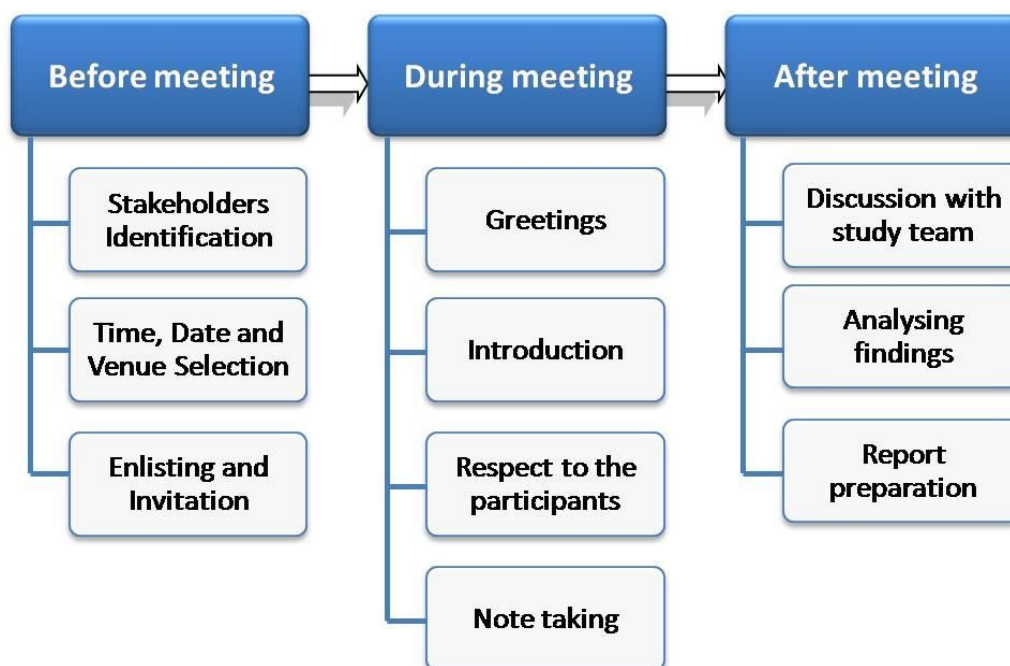


Figure 21: Steps of Consultation Process

4.2.2.6 Consultation Meeting

Venue, Date and Time

One Public Consultation Meeting (PCMs) was held at Mohakhali project site comprising different types of the stakeholders. Details are given below.

Participants Criteria	Governmental and Non-governmental Officials
Date	27.06.2016
Place	Mohakhali
Starting time	10.00 AM
Ending time	10.45 AM

The Participants

There were total 6 participants in the PCM. Most of them are small businessman or shopkeepers. No Government representative is found during the PCM.

4.3 Issues Discussed

The following issues are discussed:

- Disaster shelter is very urgent as they are very much vulnerable to disaster i.e. Earthquake, cyclone, flood etc.
- Man-made disasters like fire, drainage congestion, landslide and building collapse are increasing rapidly particularly in and around the major cities.
- City level emergency disaster management system remains weak.

- Earth quake is infrequent but Dhaka has been identified by Stanford University, as one of the 20 most earthquake vulnerable cities in the world.
- Government of Bangladesh has therefore undertaken the Urban Resilience Project (URP) in two cities, Dhaka and Sylhet.
- Objective of the project is to increase the effectiveness of disaster preparedness and response.
- It will also reduce critical vulnerabilities and will support an improvement in the quality of new building construction.



Figure 19: Meet with local people and consultation

4.5 Feedback of the Stakeholders

4.5.1 Knowledge about the Project

At the outset, the study team gave a brief description about the project. However, the stated description by the study team makes them clearer about the objectives and process of the project.

4.5.2 Attitude to the project

The participants expressed conditional positive response to the project. They stated that if the proposed project does not hamper their business, it will be welcomed warmly. Otherwise they are not interested of this project.

4.5.3 Findings of the Consultation Meeting

Upswing of employment in community

Sequences of matters were emerged with FGD (Focus Group Discussion) participants looking at their experience of employment in the project from a different perspective including quality of occupation. The participants summarized their opinion about the possibility of better occupational probabilities.

Environmental apprehensions

Environment is the most prominent issue in our everyday life. We are bound to protect our environment for the betterment of our living. Most of the participants concern about environmental threats i.e. the disaster. Over all discussions, environmental apprehensions (water pollution, air pollution and soil pollution) was stated and was the most frequent measures of the environment.

Upsurge social mobility

There are too many topics were discussed by the participants of FGD. Social mobility is one of them. Very few people discussed about social mobility. Social mobility means the proportion of individuals in a particular social class who move up or down in the socio-economic hierarchy.

4.5.4 Suggestions and Recommendations of the Participants

The participants were presented a number of feedback, suggestions and recommendations which are as follows:

- Local people were not interested about talking and neglected during taking pictures.

- People have no interest about this project because they don't know exactly whether it will help them or not.
- The warehouse will be an asset for emergency situation.
- There should be access facilities to the disaster affected areas such as connecting roads, available of resources so that people can get help during emergency cases.
- They also requested to have provision of additional facilities such as Radio, TV, Rain Coat, Torch light, Life jacket, Mike, Flag, Fire extinguisher, Gum boot etc.
- Most of the participants are expressed that the capacity of the proposed warehouse is satisfactory.

4.6 Researcher's Understanding Based on the Discussion

Each participant shares their opinions on the **Urban Resilience Project**. Some of the participants demand to establish the facility. They, who support the project identified some major social and environmental factors that may have really functioned for the communal people of the locality. Despite some negative comments, all of the participants suggested to establish the facility.

5 INITIAL ENVIRONMENTAL AND SOCIAL SCREENING (IESS)

5.1 General

Initial Environmental and Social Screening (IESS) for the Sub-project has been conducted with the purpose of fulfilling the requirements of GoB and WB. IESS ensures that environmental issues are properly identified in terms of extent of impacts. Field visit for performing IESS has been carried out on July 2016 in the Sub-project site. The screening data and information for this Sub-project have been formulated and shown in Table 5.1. The social screening checklist is given in Annex C.

Table 5.1: Initial Environmental Screening Checklist

Screening Questions	Impact ⁶					Remarks
	Y	N	H	M	L	
A. Potential Environmental Impacts due to Sub-project location during Planning Phase						
Is the Sub-project area.....						
Adjacent to/or within any of the environmentally sensitive areas?						
Cultural heritage site		√				
Protected area		√				
Wetland		√				
Mangrove		√				
Estuarine		√				
Buffer zone of protected areas		√				
Special area for protecting biodiversity		√				
Bay		√				
B. Potential Physical Environmental Impacts during Construction Phase						
Will the Sub-Project cause...						
Loss of agricultural land/ crop?		√				
Impact of Air / Dust pollution?	√				√	Vehicles movement: bus, mini truck, motor cycle, auto rickshaw, taxi, tractor, lorry, private car, human howler and during construction period due to construction activities.
Impact of Noise pollution?	√				√	Vehicles movement: bus, mini truck, motor cycle, auto rickshaw, taxi, tractor, lorry, private car, human howler etc. and during construction period due to construction activities.

⁶Y = Yes, N = No, H=High, M=medium, L=Low

Screening Questions	Impact ⁶					Remarks
	Y	N	H	M	L	
Impact on soil, surface and ground waters Pollution? If yes, mentions source?		√				
Impacts on surrounding environment due to sanitation and wastes disposal during: construction phase?	√				√	Disposal area available? [√Yes/No] If yes, where: √On-site, Off-site
Impact from construction camp?		√				Camp area available? Yes / No [√]
Construction material storage area		√				
Impact on drainage or create water logging in the area?	√				√	Heavy rainfall cause the water stagnation in the sub-project area 1'-1.5' in June & July in every year.
Is there any flooding problem? Mention frequency & severity.	√				√	1988 - 4'-5', 5-6 Days 2007-1'-2', 1-2 Days 2008 - 3'-4', 2-3 Days
Is there any river erosion? Where & Severity?		√				
C. Potential Biological/ Ecological Environmental Impacts during Construction Phase						
Will the Sub-project cause.....						
Destruction of trees and vegetation?		√				
Impact on pond or fish?		√				
Negative effects on rare, vulnerable, threatened or endangered species of flora & fauna and/ or their habitat?		√				No rare species are found near by the sub-project area.
Negative effects on wildlife habitat, populations, Corridors or movement?		√				No wildlife habitat reported to exist nearby the sub-project area.
Negative effects on locally important or valued ecosystems or vegetation?		√				
D. Potential Socio-Economical Impacts during Construction Phase						
Will the Sub-project cause...						
Involve any land acquisition and involuntary resettlement?		√				
Traffic disturbances due to construction material transport and wastes?	√				√	There is a road named Shaheed Tajuddin Ahmed Ave ahead of the proposed warehouse. This is the main transport route for all types of vehicles
Negative effects on neighborhood or community?		√				

Screening Questions	Impact ⁶					Remarks
	Y	N	H	M	L	
Are there any Impediments to movements of people and livestock?	√					
Disturbance to the student to take the lesson in the classroom? If yes, Specify.	√					
Direct or indirect hazards to student for walking in the school campus by construction activities?	√					
Risks and vulnerabilities related to occupational -health and safety due to hazards during construction and operation phase?	√				√	During construction period due to construction activities.
E. Potential Historical & Cultural impacts during Construction Phase						
Will the sub project cause...						
Degradation or disturbance of historically culturally important site (mosque, graveyards, monuments etc.)? If Yes, Specify.	√					
F. Potential Impacts during Operation & Maintenance Phase						
Will the sub-project activities cause...						
Possible development of labor camp into permanent settlement.	√					Contractor will remove labor camp and will clear the places after completion of construction.
Nuisance at stockpiling areas of construction materials.	√					Contractor will clear the places after completion of construction.
Nuisance at sanitation and waste disposal areas?	√					
G. Existing Environmental & Social Condition around the sub-project						
Air Quality	√				√	Insignificant impact due to earth works, construction material processing, construction activities, vehicle movements etc. would generate fugitive dust particles and hence the level of SPM in the ambient air would increase
Noise Quality.						There is likely insignificant impact of noise pollution due to movement of local vehicles, running of heavy load traffic for construction materials transportation.
Mention sources of drinking water in dry and wet seasons?						Supply water from wasa and Tubewell 15.01%, pond 0.11%, tap 82.08% and others 2.80%
Are there any ponds, khals, beels, haors, baors, rivers, etc. in/around the site? Please						Nos.-Name-Distance-Direction Ponds: 0

Screening Questions	Impact ⁶					Remarks
	Y	N	H	M	L	
specify numbers & names for each.						Khals: 0 Beels: 0 Haors: 0 Baors: 0 Rivers: 0 Other: Hatirjheel lake is about 1.5 km away in east direction
Surface water (Pond, Khal, Beel, Haor, Baor, River etc.) quality.						Moderately treated
Groundwater Quality.						Fresh water is needed for construction purpose mainly in civil works that will put pressure on aquifer storage.
Soil Quality						Soil is reasonable
Is there any disaster early warning system? If Yes, by Whom?						Available: UDMC, Micing, TV, TNO, TEO, Red crescent, CPP, Mobile phone SMS etc.

5.2 Assessment of Environmental Screening

The proposed Sub-project (new Warehouse) is not located within any identified environmentally sensitive area, and therefore, does not seem to create any adverse impact on the important environmental features. No significant impact is expected on the ecosystem and biodiversity, no agricultural land/ activities or fish farming will be disturbed, due to the construction of the sub project. Although, some earth excavation work will be involved, no agricultural land or garden has chances to demolish. Moreover, mitigation measures will be taken according to the EMP for minimizing the air, dust, noise, impact of construction materials storage areas and others such as health risk due to combustibility, compression and other mechanical malfunction. Drainage congestion and water logging problems are not found but according to recent information of Banglapedia about Dhaka District extreme floods in past years (1987, 1988, and 1998) extreme floods in past years had created around 2-3 ft water stagnant in the Sub-project area. Plinth level of the Warehouse should be higher than the flood water level. Due to construction activities of this sub-project, 8 trees will be cut down from total 30 trees. Therefore, the Sub-project activities will result medium adverse impact in the environment surrounding the sub project. Moreover, it is a welcome and beneficial project for the local communities.

5.3 Rehabilitation and Resettlement Plan

Resettlement Action Plan (RAP) is not mandatory for this project since the project authority has purchased/leased the lands or has taken permission to use the lands from actual owners/authority. The site is belong to the concern agencies and situated in their premises.

6 ENVIRONMENTAL IMPACTS

6.1 General

This section identifies and predicts the probable impacts on different environmental parameters due to construction of a new Type 1 (2400 sft), 2-storied Building. After studying the existing baseline environmental scenario, monitoring environmental parameters, reviewing the process and related statutory norms, detailing the waste management measures, the major impacts can be identified during construction and operation phase. Relevant important aspects of environment are therefore selected which may have significant impacts due to project activities.

6.2 Identification of Impacts

The environmental implications of the predicted impacts may be beneficial or adverse, but the main objective of impact identification is to specify areas that are likely to be affected by the implementation of a sub-project. Environmental impact, by definition, implies an alternation of environmental conditions or creation of a new set of adverse or beneficial environmental consequences caused by the action under consideration. Impact identification starts at the early stage of scoping when data on both the project and surrounding environment are made available. The predicted impacts have been identified by rigorous scientific analysis and expert opinion. The consequences of impact on different resources have been accounted precisely. The following sections describe all the potential impacts (activity wise) on atmospheric environment, water resources, land resources, agricultural resources, fisheries resources, ecosystem resources and socio-economic environment of the surrounding.

6.2.1 Impact on Landform

There will be no noticeable impact in the landform as the proposed 0.055 acres of land for this sub-project is already in developed form.

6.2.2 Impact on Natural Resources

Impact on Water Resources

In construction stage of the warehouse, if runoff of the rain water is occurred from the project area to the surrounding water drains, it may cause deterioration of water quality. So it may be considered as the impact on water resources that is mentioned below.

Impact on Agricultural Resources

Construction has no impact on agricultural resources as there are no agricultural resources in the sub-project site.

6.2.3 Impact on Ecosystems

Flora

During construction phase it has minor significant impact on existing trees and vegetation at the sub-project site. This is due to the area is covered with various types of trees. From our observation there are total 30 trees on which approximate 8 no's will be cut off in the proposed site due to acquisition of land and for construction purpose.

Fauna

Construction has no impact on the faunal comonities present at the sub-project site.

6.2.4 Impact on Ambient Air

Various activities during construction phase such as earth works, construction material processing, construction activities, vehicle movements etc. would generate fugitive dust particles and hence the level of SPM in the ambient air would increase. This increase in SPM level would be very local and short term and would be limited to the time of construction period only.

Carbon dioxide and nitrogen oxides may be emitted from combustion of the petroleum products in project related vehicles, machinery, and generators etc during the construction period. Their impact on air quality will not be significant as the pollutant emission activities (point and area sources) will be limited within the project boundary and the activities will be short term (only for construction period). However, this impact may further be minimized by adopting Environmental Management Plan.

6.2.5 Impact on Ambient Noise

It is expected that during construction of the warehouse, the level of noise will increase sharply in the project area. Operation of different machineries and equipments for construction activities, running of heavy load traffic for construction materials transportation, and regular traffic movement may generate noise during construction period. The produced noise may have impact on existing acoustic environment of urban category defined in ECR, 1997. Local inhabitants may feel disturbed due to noise from line sources (traffic movement).

High noise level during construction phase can cause high disturbance to the local community. This can also cause health impacts and increase stress level of the inhabitants of the locality and workers.

6.2.6 Impact on Soil

Generally, construction activities do not include any activities that cause soil pollution. However, Rainfall runoff from the construction site may cause soil pollution if the construction site is not properly managed. If the solid waste and other construction wastes are not properly managed, it may lead to soil pollution.

6.2.7 Impact on Workers Health, Sanitation and Safety

During construction time more security, construction workers and others about 50 people will move to the site. Most of them will come from outside the sub-project site. They have to stay at site. For them more living, washing, kitchen, storing etc purpose temporary facilities have to construct. These will cause more hygienic/sanitation issues if are not properly managed. Due to more movement man and material accidental incidents may increase if safety issues are not strictly maintained. Movement of more river craft may also cause accident if strict rules for movement, loading and unloading man and materials are not carried out. During construction accident may cause if safety rules and regulation are not strictly maintained. Requirement of safe drinking water will increase at site. If smooth supply safe drinking water are not maintained the workers may suffer out of water borne disease. Due to wind and movement of vehicles may cause dust at the site. This may cause problem of the workers and neighboring resident. However it may attract some interested people to visit the site. It would be wise to avoid/discourage those tourists on safety ground.

6.2.8 Solid Waste Disposal

Generation of construction related waste would occur during the construction period of the warehouse. Wastes may be generated from earth works, site establishment, civil construction, stockpile of materials, and domestic household activities. The wastes might be metals, concrete, spoiled construction material, excavated spoils, spilled oil from machinery and vehicles, etc. Moreover, some domestic waste such as food waste, paper etc would be also generated. The waste generated during the construction period can have adverse environmental impacts if not disposed of properly.

If the waste generated during construction period is not disposed of properly, then it will have negative impacts on the ambient environment. Construction activities should be carried out following the environmental rules and regulation for avoiding significant impacts on the environment. Creation of odor would be one of the major problems of not disposing the domestic waste properly. Moreover, it will deteriorate water quality and have adverse impacts on aquatic ecosystem if they are thrown in water stream. Generation and scattered disposal of waste must be controlled for preventing the impacts on physical environmental resources i.e. water, land resources etc.

6.2.9 Social Impact due to Construction of warehouse

The proposed warehouse will be an asset for emergency situation by supplying search and rescue equipments during emergency, as the warehouse will be constructed in the area which is highly public place, where a large number of people comes everyday and almost every building in this area is highrise, so occurrence of man-made disasters like fire hazard, drainage congestion and building collapse etc are increasing rapidly in this area. Moreover the warehouse will be used as Disaster shelter during natural disasters like Earthquake, cyclone, flood etc.

Also the construction activities of the proposed warehouse would offer employment opportunity. Most of the un-skilled labor would be hired. The noise and dust generated from the construction site might disturb the nearest community patches. However, once the boundary wall around the project area is completed, the dust would not reach to nearest community patches. The boundary wall would also attenuate the noise to be generated from construction activities.

6.2.10 Impact due to Transportation of Construction Related Materials

Construction materials will be transported through inland road transport. Moreover the traffic load on the road surface adjacent to Sub-project site during day and night is very high. So, if proper time schedule of incoming and outgoing vehicles to the Sub-project site will not maintain, Traffic congestion and traffic problems will be created. For these reasons, DMP doesn't allow any vehicle containing construction material to enter into the Dhaka city before 10 p.m. and after 7 a.m. The other construction material will be collected from the local suppliers. During transportation of construction material, the following conditions will be followed strictly:

- Loading and unloading of transportation would not create any disturbance to nearby community and other dwellers, do it in such a way
- No stocking of construction material in public place that may cause disturbance to community
- Efficient equipment would be used in handling of construction materials
- No disposal of oil to the near water body
- No disposal of waste into nearest water body
- The transport to be used for transportation should be fuel efficient and in good maintenance
- No cleaning and maintenance of the vehicle will be carried out at project site
- Every material must be covered while carrying to the site through vehicles so that no dust or air pollution may happen
- In the project site, construction material should be kept in dry and clean places
- Cement and reinforcement must be kept under the shed and in dry and high places from ground level
- Other materials must be covered.
- Material transportation time schedule should be maintained strictly

Table 6.1: Environmental Impact Identification Matrix- Construction Phase

Parameter	Physical Environment					Ecological Environment			Human Environment				
	Topography	Hydrology	Water Quality	Air Quality	Noise	Vegetation	Fauna	Aquatic Environment	Displacement	Employment	Service	Health	Culture
Possession of Land													
Site development	P			T		P				T		T	
Civil and Structural Work			T	T	T					T		T	
Mechanical and Electrical Work				T	T					T			
Water Requirement			T										
Transport				T	T								
Immigration													
Employment			T							T	T		T

Here, **P** – Permanent and **T** – Temporary, **Immigration**: To come to a place to live there (Kind of migration), **Emigration**: to leave one's place of residence or country to live elsewhere (Kind of migration)

Table 6.2: Environmental Impact Identification Matrix- Operation Phase

Parameter	Physical Environment					Ecological Environment			Human Environment				
	Topography	Hydrology	Water Quality	Air Quality	Noise	Vegetation	Fauna	Aquatic Environment	Displacement	Employment	Service	Health	Culture
Water Requirement													
Liquid Effluent			X					X				X	
Gaseous effluent				X		X						X	
Solid Waste												X	
Hazardous Waste													
Transport				X	X							X	
Operational noise					X							X	
Immigration			X							X	X		X
Employment										X			

Here, **Immigration**: To come to a place to live there (Kind of migration), **Emigration**: to leave one's place of residence or country to live elsewhere (Kind of migration)

7 ENVIRONMENTAL MITIGATION AND MANAGEMENT PLAN (EMMP)

7.1 General Consideration

In the context of the sub-project, the Environmental Mitigation and Management Plan (EMMP) is concerning with the implementation of the measures necessary to minimize or offset adverse impact and to enhance beneficial impacts. The prime function cannot be achieved unless the mitigation and benefit enhancement measures are fully implemented. All measures are said to be successful when they comply with the Environmental Quality Standard (EQS) of Bangladesh. Thus the objectives of EMMP of studied sub-project would be:

- Mitigation measures to reduce and eliminate negative impacts
- Enhancement measures to maximize positive impacts
- Monitoring requirement and monitoring indicators

The main benefits of the environmental mitigation plan are

- Ensuring that environmental standards are met during design, construction, and operation of the project
- Providing offsets to negate project impacts especially ecological impacts, e.g., in the form of compensatory afforestation, greenbelt development and landscaping.

7.2 Water resources conservation plan

Water resources should be conserved and prevented from any pollution and hydrological alteration. The nearby drains should be kept away from any obstruction and waste dumping. If any drain flows through the project area that drains water from outside the project area should be free flowing without any obstruction. Proper guidelines should be developed for Operation & Maintenance of drains.

7.3 Good housekeeping of Construction Related Materials

The construction yard and the site should be managed in such a way that would ensure minimum environmental degradation or damage of the surrounding. The contractor must take responsibility for the construction site to confirm contractual aspects and applicable environmental standards. Unauthorized access from public in the site should be prevented for safety issue. Adequate numbers of bins, sanitary toilet, water supply system, run-on and run-off drains, fire safety and fighting system etc. should be provided in the site. All the construction materials and stockpiles should be maintained within the project area provided with rain and wind protection. Electrocution from general supply of electricity on site or overhead electrical lines contact with on-site cranes or mobile cranes or other trucks should be prevented. A housekeeping team should plan the safety measurements and visit the plant regularly for ensuring safety. An Environment Manager should be employed with responsibility of monitoring the activities which causes any environmental effects and ensuring enforcement of EMP during construction activities.

7.4 Worker's Health and Safety

To ensure a safe working place, the following measures should be ensured:

- Before operating a machine, ensure that the dangerous part of the machine has been installed with a guard
- Avoid going to any area with insufficient lighting as there may be some dangerous places which have not been provided with fencing.
- Keep vigilant all the time and watch out for moving cranes, hooks or other lifting equipment.
- Before using any electrical installation or tool, check the condition of its electric cables.
- Avoid dragging electric cables on the ground or allowing the cables to come into contact with water.

- Using electrical tools installed with an earth leakage circuit breaker.
- Using and handling chemicals with care and following the safety data sheet provided by the chemical suppliers.
- Using of Fall protection during working at height
- The internal roads, sidewalks and walking ways would be demarked properly
- Traffic safety measures should be available within the internal roads of the project sites.
- Regular checking, servicing and maintenance of vehicle should be ensured
- Proper training for the workers on safety
- Use of Personal Protective Equipments (PPE) should be mandatory for all (including the visitors). Applicable PPEs are mentioned in the following table:

Protection	Applicable PPE	Safeguarding for
Hand	ix) Leather gloves x) Electrical resistance gloves xi) Canvas gloves	Cuts due to handling Heat radiation Electrical Shock Contact with oil and grease etc Falling of hot slag
Leg	v) Leg guards vi) Steel toe & Leather safety boots	Welding sparks Striking by objects, fall of objects and stepping on sharp or hot objects Heat radiation, stepping hot or sharp objects and stepping on sharp or hot objects
Eye	iii) Spectacle type goggles with plain shatter proof	Foreign bodies reflected entering the eyes and arc rays
Head	i) Fiber helmet	Fall off objects/hitting against objects during construction, maintenance etc
Ear	i) Ear plug or muffs	High noise level
Nose	i) Dust protection	Fine dust particles

7.5 Safety at Site

Safety at site should be ensured at the construction site. The construction area should be protected by security fencing to prevent any safety threat to nearby community. All the piles should be placed within the boundary of the project with proper protection from wind and rain. All the passage should be keeping clear for all the time. The construction site should be properly lighted. All the lights should be directed to land within the project boundary. It is to be ensured that no light beam is to be directed towards nearby community. Light shed should be used. The Construction site should be equipped with firefighting equipments and first aid.

7.6 Construction Waste Management

Construction waste should be managed properly. The rate of waste generation should be reduced adopting efficient technique and limiting waste generating activities. The measures for controlling construction waste may include limiting site clearance activities, planned stocking and gathering of construction materials and equipments, fencing around the construction yard, maintaining existing right of way to carry construction materials, banning of waste burning and quality housekeeping. A waste dumping place should be provided with efficient waste collection and disposal techniques. No waste should be dumped to the surrounding rivers. Appropriate measures provided with run-on and run-off system might be constructed from controlling run off from construction yard and liquid waste.

The management plan for construction waste during construction period should include the steps like fencing around the project site, limiting site clearance activities, planned stocking and gathering of construction materials and equipment, covering the stockpiles for protecting them from wind and weathering actions, avoiding waste burning, keeping provision of different colored waste bin, keeping onsite waste collection and disposal system, adopting proper sanitation system for the employees and the workers, quality housekeeping etc. No waste should be dumped/thrown to the

river. Recycling and reuse of the waste should be done whenever possible. Hazardous materials, spillage and accidental release should be managed carefully according to the hazardous material handling guideline. Moreover, training should be provided to the employees and the workers/laborers about proper waste management system for increasing their awareness.

7.7 EMP for Preventing Pollution from Construction Site

Dust Control

Construction activities of the plant would generate significant amount of suspended particulate matter. As the sub-project area is highly commercial and also a market place, an efficient dust control plan has to be adopted. The plan would include limiting SPM generating activities, adopting dust suppression system, minimizing base stripping and vegetation clearing activities, covering stockpiles, restricting vehicle speed, avoiding earthen roads for vehicle movement, spraying water regularly to suppress dust etc.

GHG emission control

The construction activities might generate significant amount of GHG also. The GHG emission control plan includes using efficient generator/machineries/equipment, regular maintenance of generators and other machineries, switching off/throttling down generators/ machines/ equipment/ vehicles which are not in use, avoiding the use of ozone depleting substances etc. Moreover, creating thick green belt around the plant is another major step for air quality management as it will help to sequester CO₂.

Controlling Noise

For preserving the acoustic environment and for protecting the nearby inhabitants from the negative impacts of noise pollution during the construction period a noise pollution management plan has to be adopted which would include steps like siting noisy equipments as far away as possible from the settlements, creating temporary barriers or enclosures with sound absorbing materials around the noisy equipment, maintaining the equipments properly.

Moreover, a significant part of construction work should be conducted during night time. The following specific measures should be adopted

- The noisy equipments should be sited as far away as possible from the nearby settlements
- Acoustic hoods/ silencers/ enclosures on all sources of noise generation should be used to decrease the intensity and degree of noise.
- Temporary barriers or enclosures with sound absorbing materials should be built around the noisy equipments
- A significant part of construction work should be conducted during night time
- Steps should be taken to create the boundary wall
- Steps should be taken to create a thick green belt
- The equipments used during the construction phase should be properly maintained as proper maintenance can decrease the level of sound significantly
- For protecting the workers from the adverse impacts of high noise level, personal protective equipments such as air plug/ear mufflers should be provided to them and the use of this protective measure should be made mandatory to the workers who are susceptible to high noise

7.8 Green Belt Development

Development of Green belt along the plant site is essential for safeguarding the nearby community. Proper plantation will enhance scenic beauty of the plant also. Local suitable species is suggested for plantation. Following are the summary points that should be implemented:

- Green belt should be developed around the boundary wall, the open space within the sub-

project.

- Different heights of local plant species should give preference for plantation.
- Additional plantation program may take outside the project boundary at road side.
- Four plants like Neem, Jack fruit etc. should be planted against eight cut down trees. Possible locations of trees are shown in below in hand sketch map.

Green Belt in a Hand Sketch Map

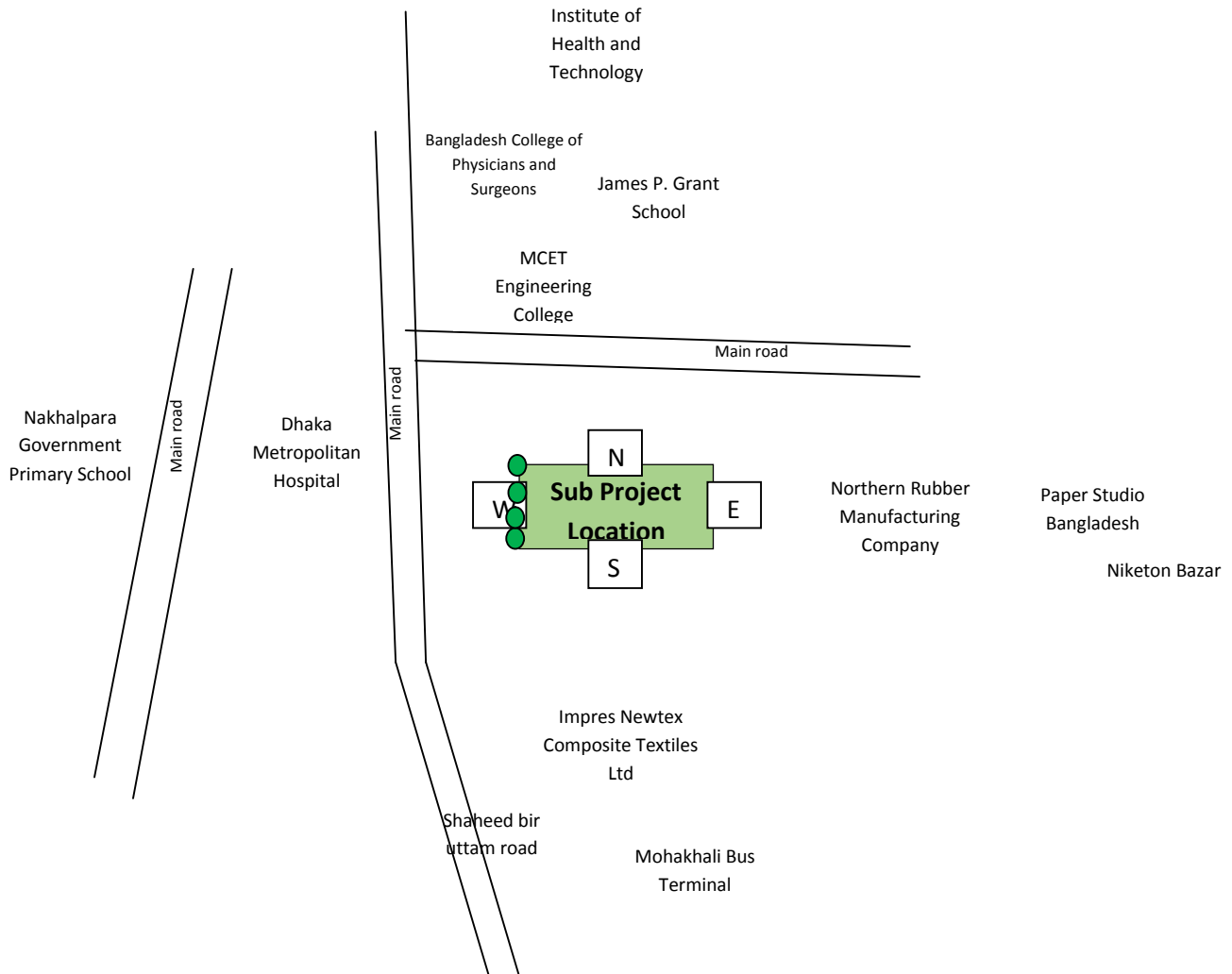


Table 7.2: Environmental Management Plan during Construction Phase

Environmental Component	Potential Impacts	Mitigation measures	Time frame	Location	Responsibility
Water					
Ground Water	Ground Water Contamination	Minimum Extraction of Ground water and Rain water harvesting system develop	Throughout Construction Phase	Project Site	Environmental Monitoring Team of the Project Proponent
Surface water sources	Surface Water Pollution	No disposal of any wastewater directly into outside water bodies. Refueling, washing and maintenance of plant and vehicles will be prohibited in the vicinity of the river and water bodies.	Throughout Construction Phase	Project Site	Environmental Monitoring Team of the Project Proponent
Drinking Water Requirement	Increase local demand	Arrange water without affecting local requirement	Throughout Construction Phase	Project Site	Environmental Monitoring Team of the Project Proponent
Wastewater from Workers' camp	Pollute the surface water	Ensure proper sanitation and drainage. No direct discharge of wastewater in the river. The construction workers at site will be provided with proper sanitation arrangement. The workers colony houses for foreign workers will have sanitary latrines to treat sanitary waste.	Throughout Construction Phase	Project Site	Design consultant and Project Proponent
Air and Noise					
Dust Generation	Increase dust in the air	Spraying of water wherever required. All stock pile materials which can blow to contribute to airborne dust will be covered with canvas or plastic sheets during windy season. The vehicle should be covered while transporting the materials.	Throughout Construction Phase	Project Site	Environmental Monitoring Team of the Project Proponent
Gaseous Emission from Construction work vehicles	Pollute the Air	Ensure checking of vehicular emission and obtaining Pollution Under Control Certificate	Throughout Construction Phase	Project Site and surroundings	Environmental Monitoring Team of the Project Proponent
Noise from machineries and construction	Increase Noise level	Ensure machineries meeting noise level standards. Noise levels of machineries used shall conform to relevant standards prescribed in Environment Conservation Rules, 1997. Silencers and mufflers of machineries will be regularly inspected to control	Throughout Construction Phase	Project Site	Environmental Monitoring Team of the Project Proponent

Environmental Component	Potential Impacts	Mitigation measures	Time frame	Location	Responsibility
		noise generation.			
Land					
Disruption of Earth Surface	Become a hazard	Earth work should be kept minimum and adequate drainage system should be developed	Throughout Construction Phase	Project Site	Environmental Monitoring Team of the Project Proponent and DOE
Solid Waste from construction work	Deteriorate the environment	Ensure dumping at preselected location	Throughout Construction Phase	Project Site	Project Proponent
Others					
Occupational Health & Safety	May create risk for the workers	All relevant rules for protection of health and safety of the workers will be rigorously followed. All contractors will be made aware of this responsibility. Proper restriction signs and other methods should be applied to prevent unwanted entry of people.	Throughout Construction Phase	Project Site	Design consultant and Environmental Monitoring Team of the Project Proponent
Labour Condition	Increase labour scope	Bangladesh has ratified key International Labour Organization (ILO) conventions to ensure the work conditions are reasonable and safe, and employees are free from any types of discrimination.	Throughout Construction Phase	Project Site	Project Proponent
Traffic	Increase traffic at the locality	There shall be a continuous vigil to see that the regular local traffic is not disturbed and the personnel to guide the construction vehicles to the site without causing any traffic jam	Throughout Construction Phase	Project Site and surroundings	Project Proponent
Socio-economic	Improve the condition	Various environment awareness programmes shall be organized by management committee on regular basis to bring forth the beneficial aspects of the project at local level. A management committee shall take keen interest in public participation and expectations of the local people for improving quality of life during planning of welfare activities under CSR plan. The committee shall identify eligible people for jobs in construction and lower level administrative jobs by noting their literacy level, extent of need, availability of means etc. Or the committee should confirm the employment of	Throughout Construction Phase	Project surroundings	Environmental Monitoring Team of the Project Proponent

Environmental Component	Potential Impacts	Mitigation measures	Time frame	Location	Responsibility
		local people by subcontractors.			
Influx of workers	Generation of sewage and solid waste	Construction of sanitary latrines and septic tank system Erecting “no litter” sign, provision of waste bins/cans, where appropriate Waste minimization, recycle and reuse (as required) Proper disposal of solid waste	Throughout Construction Phase	Project Site	Environmental Monitoring Team of the Project Proponent
	Possible spread of disease from workers	Clean bill of health a condition for employment Regular medical monitoring of workers			
Transportation of equipment, materials and personnel; storage of materials	Deterioration of air quality from increased vehicular movement, affecting people in the surrounding areas	Keeping vehicles under good condition, with regular checking of vehicle condition to ensure compliance with national standards and EHS guidelines (where applicable)	Throughout Construction Phase	Project Site	Environmental Monitoring Team of the Project Proponent
	Wind-blown dust from material (e.g. fine aggregate) storage areas	Spraying of water in the access road Sprinkling and covering stock piles Covering top of trucks carrying materials to the site.			
Site clearance	Topographic change by cutting existing trees, shrubs, herbs, and filling land	Adopt such type design as is required minimum cutting of trees, shrubs, herbs, and low-land filling Use waste shrubs, herbs as organic fertilizers Adopt required measures to prevent waste shrubs, herbs as fuel to cook or for any localized burning purpose.	Throughout Construction Phase	Project Site	Environmental Monitoring Team of the Project Proponent
Noise from construction equipment operations and maintenance	Noise could exceed the allowable limit and result in hearing loss.	Avoiding, as much as possible, construction equipment producing excessive noise Avoiding prolonged exposure to noise by workers Creating a buffer zone by introducing green belt around the project site Follow construction scheduling to avoid evening and night time disruption	Throughout Construction Phase	Project Site	Design consultant and Project Proponent

Dust and exhaust gases from construction machinery and vehicles	Increased SPM, PM 2.5, PM 10, NOx, SOx levels at construction sites, and surrounding areas.	Try to avoid using equipment such as stone crushers at site by purchasing ready-mix construction mixture (sand, cement and gravel) Immediate use of construction spoils as filling materials Immediate disposal/sale of excavated materials Continuous watering of bare areas	Throughout Construction Phase	Project Site	Environmental Monitoring Team of the Project Proponent
Fires, explosion and other accidents	Risk of human health and property damage	Use of personal protective equipment during construction and maintenance. Prepare and implement safety and emergency manual Regular inspection of lines for faults prone to accidents Provision of fire protection equipment. Provision of lightening arrestors	Throughout Construction Phase	Project Site and surroundings	Environmental Monitoring Team of the Project Proponent

Table 7.3: Environmental Management Plan during Operation Phase

Environmental Component	Potential impacts	Mitigation measures	Time frame	Location	Responsibility
Wastewater	Generation of steam, oily water, sludge containing water, cooling water, domestic and floor washing wastewater	No discharge of untreated wastewater outside the municipal drainage. Monitoring of wastewater quality before and after discharge.	Throughout Operation Phase	Project site and surrounding	Environmental Monitoring Team of the Project Proponent
Gaseous Pollution	NO _x generation from the engine, which can negative	Dispersion through high stack, Use of Low NO _x burner	Throughout Operation Phase	Project site	Environmental Monitoring Team of the Project Proponent
Air Quality	Suspended particulate matter (SPM) and PM _{2.5} , PM ₁₀ generation from the engine, which can adversely affect health	Regular Monitoring according to the schedule	Throughout Operation Phase but maintaining 3 months interval	Ambient Air Quality	Environmental Monitoring Team of the Project Proponent and DoE
Emission Quality	CO and VOC, which can negatively affect health	Regular Stack emission monitoring according to the schedule	Throughout Operation Phase but maintaining 3 months interval	Project site	Environmental Monitoring Team of the Project Proponent and DoE
Noise	Generation of noise from generators and associated substations, which could exceed 70 dB(A) at site boundary.	All machineries shall follow relevant noise regulations. Boilers, generators and compressors shall be installed in buildings equipped with acoustic walls and enclosures. Regular noise monitoring according to the schedule.	Throughout Operation Phase but maintaining 3 months interval	Project site	Environmental Monitoring Team of the Project Proponent and DoE
Solid Waste	Generation of oily solid waste, plastic waste and other solid wastes.	Disposal at preselected site, Segregate wastes and dispose hazardous wastes to authorized contractors only.	Throughout Operation Phase	Project site	Environmental Monitoring Team of the Project Proponent
Occupational Health and Safety	Occupational health hazard due to different operation processes	Maintain all safety provisions related to plant operation and hazardous chemicals. Train all employees working in hazardous area for safety norms.	Throughout Operation Phase	Project site	Environmental Monitoring Team of the Project Proponent

		First aid kit to be made available. Medical aid to be available on the site. All subcontractors to follow the health and safety rules. They should be trained for that. Display of proper sign boards for health and safety in and around the plant complex.			
Fire Safety	Little possibility for firing due to welding activities produce lot of heat in welding arc	All employees to be trained for fire safety rules. Mock safety drills to be performed in regular intervals. Disaster Management Group to be made ready for all situations. Regular check for offsite helps.	Continuous Process	Project site	Project Proponent
Socio-economic	As there are no religious, cultural or historic places near the site, so the noise and air pollution from the operation of the project would not create any potential impact.	A management committee shall regularly monitor the implemented welfare activities and progress of Corporate Social Responsibilities (CSR) programme. The committee should confirm the employment of local people during operation and maintenance phase of the project activity and Keep local people informed about the demands for new jobs in the project	Throughout Operation Phase	Project surroundings	Project Proponent

7.9 Emergency Preparedness Plan

Emergency Preparedness Plan (EPP) is the process of preparing for, mitigating, responding to and recovering from an emergency. EPP is a dynamic process. Planning, though critical, is not the only component. Training, conducting drills, testing equipment and coordinating activities with the community are other important functions. The detail EPP is described as follows.

Key Persons and Their Roles during an Emergency Situation

Project Manager will

- Work as contact person and observe the situation.
- Keep in touch with local administration and head office.
- Deal with police, media and outside enquiries in consultation with Site Controller.
- Arrange for refreshments if required.
- Observe the traffic movement inside the project area and arrange for alternative transport if required.
- Monitor the record keeping of attendance of workers, staff, contractor's personnel, and visitors at the Gate which will act as Assembly Point.

Shift Supervisor will

- Act as Site controller for the time being.
- As soon as becomes aware of the emergency and its location, he will proceed to the site.
- Assess the scale of the incident and directs to stop operations within the affected areas.
- Contact and inform the Site Controller and Incident Controller immediately. Till their arrival he will continue to perform their duties.
- Contact the departmental head to act as incident controller and guide Safety Officer and Security Officers for containing the damage.
- Call the Medical Officer to the plant if necessary.

Site Controller will

- Ensure that all members of his/her team have been informed to assemble at Emergency Control centre. He/She will then proceed to Emergency Control Centre to take charge.
- Attend to telephone
- Keep in touch with incident controller
- Communicate with Assembly Points
- Meet outside emergency services
- Ensure proper flow of traffic and security
- Meet media/ other people coming at site from outside.
- Arrange for Medical Aid

Incident Controller will

- Direct all efforts to contain and control the incident.
- Keep non-essential persons away from the site.
- Guide outside emergency services at the site.
- Arrange to remove any casualties at the site.
- Keep in touch with Emergency Controller.

Security In-Charge will

- Actuate the Emergency Siren, if not done already.
- Send one guard to start the fire pump.
- Attend to incoming telephone.
- Await instructions from the Emergency Controller

Communication Officer

Public Relations Officer will act as Communication Officer. On hearing alarm, he will proceed to Emergency Control Centre.

- Maintains communication with Incident Controller and Deputy Incident Controller.
- Recruits suitable staff to act as messengers if telephone and other communications fail.
- Organizes all requirement of Emergency Control Centre.
- Arranges Food, Transport, and Nursing Home etc.

Safety Officer will

- Assist the Incident Controller with his special knowledge on the safety aspects in the factory. He will help to identify the hazardous chemicals, hazard zones and zone of probable impact in different accident scenarios.
- Select people with special training in safety matters to assist in the control activities.

Fire and Security Officer

- His main task is fire fighting and control.
- Announce through PAS about the incident zone and any other immediate information needed for the people nearby.
- Maintains liaison with the Fire Brigade team from outside.

Medical Officer will

- Immediately open a First Aid Centre at Control Centre or at Assembly Point.
- Take up the full responsibility of providing medical assistance during emergency.
- Arrange for outside medical help if required.

Telephone Operator

- On hearing the emergency alarm, he/she will immediately contact Site Controller.
- On the advice of Site controller/Incident Controller/Security Officer will ring Fire brigade, Police etc.
- Keep telephone board free for urgent communications.

General Employees

Who have not been specified a duty in case of emergency should proceed to/contact the Emergency Assembly Point in their area. Designated persons will carry out the actions detailed in the Individual Plant Emergency Procedure. The Roll Call leader will hold a Roll call. Personnel not at their normal work place must go to the emergency assembly point. Personnel will remain at these points and await instructions from the Site Controller.

Contractor's Employees

Contractor's employees will be instructed in the Emergency Procedures before commencing work on this site. They will report to the emergency assembly point on this site. Personnel Manager will guide them in case a major decision likes evacuation from the project site if required.

Visitors

Infrequent visitors are registered on each visit. They will be given a visitors pass which includes an emergency action statement. The responsibility for visitors in emergency situation rests with the person being visited.

Fire Design and Alarm Monitoring Measures for the Whole Plant

Fire design is based on approach of “prevention first, combined with fire measures”, firmly implementing related fire design standards and regulations according to specific situation of this project. Prevention measures shall be mainly taken into account by different professionals when selecting and arranging equipments and devices according to characteristic of different system flow, in order to prevent occur and spread of fire. Automation fire alarm monitoring device shall be applied for important buildings and equipments. Additionally, other measures such as separation and block shall be applied for fire-prone areas, in order to prevent fire spreading to nearby area.

Fire Water Supply System

In order to ensure a safe, reliable and manageable fire water supply system, a high-pressure fire water supply system with pressure regulators shall be applied for this project, preventing fire water being put to other use and making sure that fire water quantity and water pressure shall not be influenced due to leakage of other water consumption points when fire occurs.

Fire Drainage

Drainage of indoor fire hydrants and automatic sprinkler system shall be collected by indoor underground waste water system and then transferred to outdoor rain water system. Drainage of outdoor hydrants shall be collected by outdoor rain water system.

Fire Extinguishers

Selection and allocation of fire extinguishers for all kinds of buildings and structures shall be in accordance with the “Code for design of extinguisher distribution in buildings”. Main power building shall be equipped with portable CO₂ fire extinguishers, portable powder fire extinguishers, CO₂ trolley fire extinguishers and powder trolley fire extinguishers.

Risk Management Strategy

For the project risk management strategy is significant for minimizing risk. The following can be considered before formulating such strategy:

- The flammability of the process material
- Monitoring the state of reactions-particularly in enclosed vessels- to ensure that the remain within specified limits and do not become dangerous
- The amount of waste produced by the process- how to minimize it - how to dispose and
- Measures to ensure that emissions remain within acceptable environmental limits.

After extensive literature review of natural gas based power plant the following best practices can be adopted for risk management on site:

- Safety measures are to be maintained at their expected level of performance and their good condition to be regularly ensured
- Strict ignition control shall be ensured
- Regular maintenance and inspection should be performed
- Ensure availability and effectiveness of Fire & Gas detecting system and the emergency alarm system and means of communication, which would enable early warning to all personnel in the event of accidental release and subsequently enable all personnel to take appropriate action.

Table 7.4: Safety Hazard Prevention-Control Mitigation Measures

Event	Prevention, Control and Mitigation Measures
1. General Instruction of Workers	<ol style="list-style-type: none"> 1. Personal and continuous visual supervision of the worker who is not competent to perform the job. 2. Workers to be conversant on the codes and standards of safety 3. Workers must be confident that they have adequate training on handling or unsafe hazards material.
2. Maintenance of Equipment	<ol style="list-style-type: none"> 1. Employer shall ensure that all equipment used on a work site is maintained in a condition that will not compromise the health and safety of workers using or transporting the equipment. 2. Will perform the function for which it is intended or was designed 3. Is of adequate strength for that purpose. 4. Is free from potential defects.
3. Traffic Hazard	<ol style="list-style-type: none"> 1. Where there is a danger to workers from traffic, an employer shall take appropriate measures to ensure that the workers are protected from traffic hazards. 2. Ensure that workers who are on foot and who are exposed to traffic hazards on traveled rural roads wear reflective vests or alternative clothing that is clearly distinguished. 3. Where the operator of vehicle does not have a clear view of the path to be traveled on a work site, he shall not proceed until he receives a signal from a designated signaler who has a clear view of the path to be traveled.
4. Illumination	<ol style="list-style-type: none"> 1. Ensure that illumination at a work site is sufficient to enable work to be done safely. 2. Where failure of the normal lighting system would endanger workers, the employer shall ensure that emergency lighting is available that will generate sufficient dependable illumination to enable the workers to <ol style="list-style-type: none"> a) Leave the work site in safety b) Initiate emergency shutdown procedures c) Restore normal lighting
5. House keeping	<ol style="list-style-type: none"> 1. Ensure that each work site is clean and free from stepping and tripping hazards 2. Waste and other debris or material do not accumulate around equipment, endangering workers
6. Falling Hazards	<ol style="list-style-type: none"> 1. Ensure that where it is possible for a worker to fall a vertical distance greater than 3.5 meters the worker is protected from the falling by guard rail around the work area a safety net fall arresting

Event	Prevention, Control and Mitigation Measures
	device
7. Overhead power Lines	1. Ensure that no worker approaches and that no equipment is operated and no worker shall approach or operate equipment, within 7 meters of a overhead power line.
8. Sanitary facilities & drinking water	1. Ensure that an adequate supply of drinking fluids is available at the work site. 2. Ensure that work site is provided with toilet facilities in accordance with the requirement of general health protection guidelines.
9. Working proper clothing	3. Ensure that where is a possibility that a worker or worker's clothing might come in to contact with moving parts of machinery, the worker: <ul style="list-style-type: none"> . wears close-fitting clothing . confines or cuts short his head and facial hair . avoids wearing jewelry or other similar items
10. Head protection	1. Ensure that during the work process adequate alternative means of protecting the workers head is in place.
11. Eye protection	1. Where there is a danger of injury to or irritation of a worker's eyes, his employer shall ensure that the worker wears properly fitting eye protective equipment.
12. Foot protection	1. Where there is a danger of injury to a worker's feet, ensure that the worker wears safety footwear that is appropriate to the nature of the hazard associated with particular activities and conditions.
13. Respiratory protective equipment	1. Where the worker is exposed to hazards gases, gums, vapors, or particulates appropriate respiratory protective equipment to be supplied.
14. Testing & commissioning	9. Mobilize test rigs at site 10. Ensure that the test equipment is in good condition 11. Ensure other equipment and facility conforms to the approved specification of test. 12. Public notice to be served before testing.

8 ENVIRONMENTAL MONITORING PLANS

Environmental monitoring is an essential tool in relation to environmental management as it provides the basic information for rational management decisions. The prime objectives of monitoring are-

- To check on whether mitigation and benefit enhancement measures are actually being adopted and are providing effective in practice.
- To provide information on the actual nature and extent of key impacts and the effectiveness of the mitigation measures which, through a feedback mechanism, can be taken into account in the planning and execution of similar projects in future.

The sub-project authority should have provision of Environmental quality and safety department for monitoring the environmental management plan implementation during construction and operation phase of the project. The environmental monitoring officer should monitor the environmental management plan implementation and submit a quarterly report to the concerned department. Key components of environmental monitoring plan are described in the following subsections.

8.1 Ambient Air Monitoring

During the construction phase, ambient air quality will be monitored by active sampling and measurement for SPM, SO_x, NO_x, CO, toxic gases at the same locations used during the baseline study. During construction of the facility, air emissions may result from fuel or oil burning due to equipment failure. Leakages should be checked by visual inspection at the start of every shift. Monitoring plan for ambient air is presented in following table.

Area of Monitoring	Indicators	Monitoring Location	Monitoring Apparatus	Frequency
Monitoring Ambient Air Quality	SPM	Four edges of the project boundary, one sample from 1 km downwind from the project boundary	SSPM-100 sampler	On a monthly basis
	SO _x , NO _x , CO, toxic gases	Project site, 2km upwind and 2km down wind direction	Bacharach ECA 450 sensors and compact sample conditioner for SO _x , NO _x measurement, Fluke CO-220 Carbon Monoxide Meter for CO measurement	Quarterly

8.2 Meteorological Monitoring

During construction phase the collection of representative meteorological data (e.g., wind speed and direction, precipitation, temperature, humidity, and atmospheric pressure) is very useful to predict weather conditions of plant site. Meteorological data also useful to assess the possibility of natural calamities specially Cyclone, Storm surge etc so that precautions and measures in contingency plan will be taken within due time. Monitoring plan for meteorological parameters is presented in following table.

Area of Monitoring	Indicators	Monitoring Location	Monitoring Apparatus	Frequency
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Meteorological monitoring	Wind speed and direction, precipitation, temperature, humidity, and atmospheric pressure	Within the project boundary	Hygrometer for humidity, Anemometer for wind speed and direction, Temperature Sensor for temperature, Rain gauge for precipitation and Mercury barometer for atmospheric pressure measurement	Quarterly
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8.3 Ambient Noise Monitoring

Noise levels at the facility site during construction must comply with relevant national and international legislation. Site staff will monitor noise levels and take any remedial measures that prove necessary to reduce disturbance to nearby local residents. At locations where the possibility of noise level exceeds the standard limit such as ongoing pile-driving activities, excavation, cut and fill, erection of temporary stores etc. noise levels shall be checked at least weekly (using a Type II sound level meter). Monitoring plan for ambient noise is presented in following table.

Area of Monitoring	Indicators	Monitoring Location	Monitoring Apparatus	Frequency
Monitoring Ambient Noise	Noise level	four corner point inside the boundary, middle point of the project boundary	Digital Sound Level Meter-AR814	Monthly basis

8.4 Surface water monitoring

During the construction phase, monitoring will be conducted to the sub-project site surrounding surface drains. Parameters to be sampled every two months during this phase are Temperature, pH, EC, DO, BOD, COD, TSS, TDS, Salinity. Samples should be taken at the point of any discharge into the receiving water drain. Monitoring plan for surface water is presented in following table.

Area of Monitoring	Indicators	Monitoring Location	Monitoring Apparatus	Frequency
Monitoring Surface water quality	Temperature, pH, EC, DO, BOD, COD, TSS, TDS, Salinity	Different points on surface drains	Thermometer for Temperature, pH meter for pH, SMP350 EC meter for EC, DO meter for DO, Salinity meter for Salinity measurement. Also BOD, COD, TSS, TDS are measured by laboratory analysis	Every two months

8.5 Solid Waste Monitoring

During the construction phase, wastes may be generated from earth works, site establishment, civil construction, stockpile of materials, and domestic household activities. The wastes might be metals, concrete, spoiled construction material, excavated spoils, spilled oil from machinery and vehicles, etc. Moreover, some domestic waste such as food waste, paper etc would be also generated. Monitoring is required to ensure proper management of this waste. Solid and hazardous waste quantities and destination (final disposal) will be documented by the Contractor and the records handed over to authority after commissioning, to demonstrate compliant handling and disposal. Monitoring plan for solid waste is presented in following table.

Area of Monitoring	Indicators	Monitoring Location	Monitoring Apparatus	Frequency
Monitoring Solid waste	Construction and domestic wastes	Project area and labor shed	Visual observation and regular checks	Monthly basis

8.6 Workers Health And Safety Monitoring

During construction and erecting plants and machineries may cause accident. Records of all health risk/workplace accidents will be documented and archived, in accordance with the Project health and safety Plan developed by the Contractor. This should include “near miss”, “incident” and “accident”. A baseline medical check-up for all employees (prior to commencing employment) will be conducted. Monitoring plan for Workers health and safety is presented in following table.

Area of Monitoring	Indicators	Monitoring Location	Monitoring Apparatus	Frequency
Workers health and safety monitoring	Health, Safety, awareness	Proposed industrial complex	Visual observation and regular checks	On a monthly basis

8.7 Community Health Monitoring

The local community may feel disturbed if the Health, safety and environmental (HSE) issues are not properly maintained during construction. On the other hand If HSE and corporate social responsibilities are maintained; there will be positive impact from the local community on the project. So continuous Community safety, health, CSR program, Security monitoring is very important. Monitoring plan for Community health is presented in following table.

Area of Monitoring	Indicators	Monitoring Location	Monitoring Apparatus	Frequency
Community health monitoring	Community safety, health, CSR program, Security, compliance to applicable social and environmental rules, etc.	Proposed industrial complex, nearest community	Visual observation and regular checks	On a monthly basis

8.8 Ecosystem Monitoring

Five samples from homestead ecosystem (at least 2 at down wind direction) within 5 km radius area 5 Samples from Road side plantation including 2 at downwind direction within 5 km radius area should be collected during monitoring. Monitoring plan for ecosystem is presented in following table.

Area of	Indicators	Monitoring	Monitoring	Frequency
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Monitoring		Location	Apparatus	
Ecosystem monitoring	Avifauna, Fish habitat status, Fish biodiversity, Fish production	Ramna Lake area of the project	Visual observation and regular checks	Quarterly
	Plant health and productivity of fruiting plants surrounding the project area	Selected sites within 10km radius area of the project	Visual observation and regular checks	Quarterly

8.9 Responsibility Matrix

Area of Monitoring	Implementing Agency
Ambient air monitoring	DNCC
Ambient noise monitoring	DNCC
Surface water monitoring	DNCC
Solid waste monitoring	DNCC / Contractor
Workers health and safety monitoring	DNCC / Contractor
Community health monitoring	DNCC / Contractor
Ecosystem (Flora, Fauna) monitoring	DNCC

8.10 Estimated Budget for Monitoring Plan for One Year

S/N	Issues	Unit cost (Lac BDT)	Monitoring time in a Year	Total cost (Lac BDT)
17.	Ambient air monitoring	0.25	1	0.25
18.	Meteorological monitoring (secondary source) i.e. Air Temperature, Humidity, Rain Fall, Wind Velocity etc	-	4	-
19.	Ambient noise monitoring	0.1	4	0.4
20.	Surface water monitoring	0.25	1	0.25
21.	Solid waste monitoring	-	12	-
22.	Workers health and safety monitoring	0.05	12	0.6
23.	Community health monitoring	0.1	1	0.1
24.	Ecosystem (Flora, Fauna) monitoring	0.05	4	0.2
Total monitoring cost				1.8

9 CONTRACTOR OBLIGATIONS

Construction project management (CPM) is the overall planning, coordination, and control of a project from beginning to completion. CPM is aimed at meeting a client's requirement in order to produce a functionally and financially viable project. A contractor is assigned to a construction project once the design has been completed by the person or is still in progress. This is done by going through a bidding process with different contractors. The contractor is selected by using one of three common selection methods: low-bid selection, best-value selection, or qualifications-based selection.

A construction manager should have the ability to handle public safety, time management, cost management, quality management, decision making, mathematics, working drawings, and human resources.

The functions of construction management typically include the following:

9. Specifying project objectives and plans including delineation of scope, budgeting, scheduling, setting performance requirements, and selecting project participants.
10. Maximizing the resource efficiency through procurement of labor, materials and equipment.
11. Implementing various operations through proper coordination and control of planning, design, estimating, contracting and construction in the entire process.
12. Developing effective communications and mechanisms for resolving conflicts.

The Construction Management Association of America (a US construction management certification and advocacy body) says the 120 most common responsibilities of a Construction Manager fall into the following 7 categories: Project Management Planning, Cost Management, Time Management, Quality Management, Contract Administration, Safety Management, and CM Professional Practice. CM professional practice includes specific activities, such as defining the responsibilities and management structure of the project management team, organizing and leading by implementing project controls, defining roles and responsibilities, developing communication protocols, and identifying elements of project design and construction likely to give rise to disputes and claims

Contractor Obligation for Construction Activities for the Urban Resilience Project-DNCC Part (With Budget)

S/N	Environmental Issue	Objective	Suggestion for the Contractor	Budget (BDT)	Remarks
41.	Minimizing Erosion	To minimize the quantity of soil lost during construction due to land-clearing	<ul style="list-style-type: none"> • Schedule measures to avoid and reduce erosion by phasing the work program to minimize land disturbance in the planning and design stage. • Keep the areas of land cleared to a minimum, and the period of time areas remain cleared to a minimum • Base control measures to manage erosion on the vulnerability of cleared land to soil loss, paying particular attention to protecting slopes. • Mulch, roughen and seed cleared slopes and stockpiles where no works are planned for more than 28 days, with sterile grasses. • Keep vehicles to well-defined haul roads. • Rehabilitate cleared areas promptly 	0.00	No separate budget is assigned for any of the proposed sites as those are regular standard practice for the Contractors
42.	Storm water Management	To minimize the generation of contaminated storm water	<ul style="list-style-type: none"> • Minimize the quantity of uncontaminated storm water entering cleared areas • Establish cut-off or intercept drains to redirect storm water away from cleared areas and slopes to stable (vegetated) areas or effective treatment installation • Reduce water velocities, if needed 	0.00	No separate budget is assigned for any of the proposed sites as those are regular standard practice for the Contractors
43.	Sediment Controls	To minimize the impact of contaminated storm water on receiving waters	<ul style="list-style-type: none"> • Install erosion and sediment control measures, if possible before construction commences • Identify drainage lines and install control measures to handle predicted storm water and sediment loads generated in the minicatchment. • Establish an adequate inspection, maintenance and cleaning program for sediment run-off control structures. • Ensure that contingency plans are in place for unusual storm events. • Continually assess the effectiveness of sediment control measures and make necessary improvements. 	0.00	No separate budget is assigned for any of the proposed sites as those are regular standard practice for the Contractors
44.	De-Watering	To ensure that de-watering operations	<ul style="list-style-type: none"> • Treat contaminated water pumped into the storm water system or a 	10,000.00	None of the proposed site is needed such type of

S/N	Environmental Issue	Objective	Suggestion for the Contractor	Budget (BDT)	Remarks
	Work Sites	do not result in turbid water entering natural waterways	natural waterway to remove sediment if the turbidity exceeds 30 NTU. <ul style="list-style-type: none"> • Ensure that the level of suspended solids in waters pumped into natural waterways never exceeds the regulatory water quality standard. • De-water by pumping water, wherever practical, on to vegetated area of sufficient width to remove suspended soil, or to sediment control devices. • Supervise all pumping and implement precautions to ensure that turbidity of pumped water is minimized. • Monitor every hour during a pumping operation the turbidity of water pumped directly to a natural waterway or a drainage system discharging to a natural waterway. 		management measures. However, if the situation demand for any site, the contractor can demand for BDT 10,000.00 for the management of the situation.
45.	Dust Control	To ensure there is no health risk or loss of amenity due to emission of dust to the environment	<ul style="list-style-type: none"> • Implement a dust prevention strategy, developed at the project planning stage • Take dust suppression measures, such as promptly watering exposed areas when visible dust is observed • Install wind fences wherever appropriate 	0.00	No separate budget is assigned for any of the proposed sites as those are regular standard practice for the Contractors
46.	Management of Stockpiles	To manage stockpiles so that dust and sediment in run-off are minimized	<ul style="list-style-type: none"> • Minimize the number of stockpiles, and the area and the time stockpiles are exposed • Keep topsoil and under burden stockpiles separate • Locate stockpiles away from drainage lines, at least 10 meters away from natural waterways and where they will be least susceptible to wind erosion • Ensure that stockpiles are designed with slopes no greater than 2:1 (horizontal/vertical) • Stabilize stockpiles that will remain bare for more than 28 days by covering with mulch or anchored fabrics or seeding with sterile grass • Establish sediment controls around unsterilized stockpiles • Suppress dust on stockpiles and batters, as circumstances demand 	0.00	No separate budget is assigned for any of the proposed sites as those are regular standard practice for the Contractors

S/N	Environmental Issue	Objective	Suggestion for the Contractor	Budget (BDT)	Remarks
47.	Working In Waterways and Floodplains	To minimize stress on aquatic communities when working in a waterway	<ul style="list-style-type: none"> • Plan in-stream works so that the contact time is minimized • Establish special practices so that impacts on the waterway and disturbance of its banks are minimized • Stabilize banks and in stream structure so that they do not contribute to the sediment load • Maintain minimum flows to ensure the viability of aquatic communities and ensure that there are no barriers to the passage of fish up and downstream • Avoid times of the year when environmental damage is expected to be highest • Construct in-stream crossings during low flows, designed to be stable under expected vehicle loads and flow regimes that do not contribute to the sediment load in the stream • Design crossings so that drainage off the crossing does not contribute sediment load to the stream. • Prepare a contingency plan for high-rain events. • Prepare a reinstatement plan if work in a stream is planned or the structure of a waterway will be altered. 	0.00	None of the proposed site is needed such type of management measures. However, no separate budget is assigned if the situation demand for any of the proposed sites as those are regular standard practice for the Contractors
48.	Noise and Vibration	To ensure nuisance from noise and vibration does not occur	<ul style="list-style-type: none"> • Fit and maintain appropriate mufflers on earth-moving and other vehicles on the site • Enclose noisy equipment • Provide noise attenuation screens, where appropriate • Where an activity is likely to cause a noise nuisance to nearby residents, restrict operating hours to between 7 am and 6 pm weekdays and 7 am to 12 pm Friday, except where, for practical reasons, the activity is unavoidable • Noise should not be above background levels inside any adjacent residence between 10 pm and 7 am • Advise local residents when unavoidable out-of-hours work will occur. • Schedule deliveries to the site so that disruption to local amenity and traffic are minimized 	0.00	No separate budget is assigned for any of the proposed sites as those are regular standard practice for the Contractors

S/N	Environmental Issue	Objective	Suggestion for the Contractor	Budget (BDT)	Remarks
			<ul style="list-style-type: none"> Conduct a study on the impact of ground vibration from construction activities, where these operations occur within 50 meters of a building and take appropriate action Minimize air vibrations 		
49.	Waste Minimization	To minimize the waste load discharged to the environment	<ul style="list-style-type: none"> Carry out a waste minimization assessment which examines opportunities for waste avoidance reduction, reuse and recycling. Reduce wastes by selecting, in order of preference, avoidance, reduction, reuse and recycling. Incorporate waste minimization targets and measures into the environmental management plan. 	0.00	No separate budget is assigned for any of the proposed sites as those are regular standard practice for the Contractors
50.	Contaminated Material and Wastes	To ensure that all contaminated material uncovered on a construction site are excavated and disposed of in an environmentally responsible manner	<ul style="list-style-type: none"> Assay material uncovered on-site prior to disposal. If the wastes include putrescible wastes, then also analyze leachate and landfill gases. Excavate material in a manner which avoids off-site environmental problems. Seal remaining contaminated material or wastes, where only part of the tip has been excavated, to ensure that there is no off-site effect now or in the future. Transport odorous wastes in covered vehicles. Dispose of contaminated material in a landfill licensed to take the type of contaminated material or wastes uncovered. 	0.00	No separate budget is assigned for any of the proposed sites as those are regular standard practice for the Contractors
51.	Air Quality	To ensure there is no health risk or loss of amenity due to emission of exhaust gases to the environment	<ul style="list-style-type: none"> Ensure that all vehicles and machinery are fitted with appropriate emission control equipment, maintained frequently and serviced to the manufacturers' specifications. Smoke from internal combustion engines should not be visible for more than ten seconds 	0.00	No separate budget is assigned for any of the proposed sites as those are regular standard practice for the Contractors
52.	Litter	To ensure that all litter is disposed of in a responsible manner, and is not released into the environment	<ul style="list-style-type: none"> Maintain a high quality of housekeeping and ensure that materials are not left where they can be washed or blown away to become litter. Provide bins for construction workers and staff at locations where they consume food 	0.00	No separate budget is assigned for any of the proposed sites as those are regular standard practice for the Contractors

S/N	Environmental Issue	Objective	Suggestion for the Contractor	Budget (BDT)	Remarks
			<ul style="list-style-type: none"> Conduct ongoing awareness with staff of the need to avoid littering 		
53.	Storing Fuels and Chemicals	To ensure that fuel and chemical storage is safe, and that any materials that escape do not cause environmental damage	<ul style="list-style-type: none"> Minimize fuels and chemicals stored onsite. Install bunds and take other precautions to reduce the risk of spills. Implement a contingency plan to handle spills, so that environmental damage is avoided. 	0.00	No separate budget is assigned for any of the proposed sites as those are regular standard practice for the Contractors
54.	Keeping Roads Clean	To ensure that roads are kept clean of soil	<ul style="list-style-type: none"> Install wheel washes and rumble grids at all main road crossings. Ensure that the roads are swept at least once a day on uncontrolled road crossings when construction vehicles are travelling off the site. Install litter traps lined with filter cloth in all side-entry pits. Cover all loads of soil being taken off site for disposal. 	0.00	No separate budget is assigned for any of the proposed sites as those are regular standard practice for the Contractors
55.	Supply of First Aid Box with standard contents	To ensure immediate treatment after a sudden accident	<ul style="list-style-type: none"> Install a first aid box at an easy accessible place of the site for anyone 	2000.00	For the proposed site
56.	Health and Safety Warning Sign	To understand for the workers and visitor about the risky site or component of the construction activity	<ul style="list-style-type: none"> Install health and safety warning signs where it is necessary 	2000.00	For the proposed site
57.	Safety Gear Package	To ensure the safety of the workers, field supervisors and the visitors	<ul style="list-style-type: none"> Make available of the Safety Gear Package like gloves, helmets, eye protector, rubber shoes, light reflecting dress etc for each worker, field supervisors and the visitors 	0.00	No separate budget is assigned for any of the proposed sites as those are regular standard practice for the Contractors
58.	Tree Plantation	To develop a green belt around the project area	<ul style="list-style-type: none"> Tree plantation around the shelter or road in a planned way and maintenance for all the construction time Extra care should be given to the sites where trees will be cut down 	BDT 2000.00	BDT 2000.00
59.	Temporary Sanitary Latrine/	To ensure sanitary environment of the work area	<ul style="list-style-type: none"> Temporary Sanitary Latrine/ Septic Tank/ Portable Toilet: 2 nos. (1 no of Toilet for women and 1 no of Toilet for men) 	0.00	No separate budget is assigned for any of the proposed sites as those are regular standard

S/N	Environmental Issue	Objective	Suggestion for the Contractor	Budget (BDT)	Remarks
	Septic Tank/ Portable Toilet				practice for the Contractors
60.	Drinking Water Sample Analysis and Drinking Water Filter	To ensure safe drinking water for the workers at site	<ul style="list-style-type: none"> • Take water sample from the surrounding tube-well or the new tube-well dug at the site to analyze important parameters for drinking water • 1-no of tube-well should be installed at the beginning of construction works, if there is no one at the vicinity, so that labour and other site staff can get drinking water. • Supplying of best quality drinking water filter including extra set of faucets ceramic and at least three sets of ceramic filter 	BDT 5000.00	For the site the budget will be given
Total BDT 21,000.00					

10 CONCLUSIONS AND RECOMMENDATIONS

This study aims to understand initial environmental impacts for the Sub-project as well as to formulate the relevant mitigation and monitoring plans. Based on the Environmental Assessment, all possible environmental aspects have been adequately assessed and necessary control measures have been formulated to meet with statutory requirements.

The overall conclusion is that if the mitigation, compensation and enhancement measures are implemented in full, there will be no significant negative environmental impacts as a result of location, design, construction, and/or operation of the proposed Sub-project. There will in fact be tremendous benefits from recommended mitigation and enhancement measures and major improvements in quality of life and individual, education, job and public health once the scheme is in operation.

The conclusions of the Environmental Assessment can be summarized as follows:

- The communities will receive large benefits in terms of quality of life, particularly with reduced disaster vulnerability, and improved health & education facilities, infrastructure, transportation & communication etc.
- The short-term negative impacts that may come in the way of air quality, noise, solid waste, occupational health & safety need to be minimized through the mitigation action plan. Moreover, post disaster health, safety and flood problems are common. These issues might be problematic if necessary mitigation measures, as suggested in EMP, would not take into consideration.
- The project will create employment for the workforce who live in the vicinity of the construction site and will provide them a short-term economic gain.
- The green belt development with large-growing trees at the periphery of the site will give the places a more natural and pleasing appearance.
- A comprehensive Environmental Management Plan (EMP) has been prepared to mitigate and reduce the adverse impacts that will come out from the Sub-project activities. The EMP mainly focuses on managing, mitigating and reducing the impacts exhibited from design, construction and operation phase.
- **The tentative cost has been estimated around 1.8 Lacs for yearly monitoring and 21 Thousands Bangladeshi Taka to implement the EMMP.** This budget can change due to change of market prices and if the project implementation period extends.

Two straight recommendations which are listed below need to be followed by the concern authority to ensure sound environmental and socio-economic condition:

- All mitigation, compensation and enhancement measures proposed in this report need to be followed.
- The Environmental Management and Monitoring Plan proposed in this report also need to be followed.

Environmental and Social Assessment of Urban Resilience Project

Project Area: Dhaka North City Corporation

Project Location: Mirpur 10

1 INTRODUCTION

1.1 Background of the Sub-project

This is a Sub-project under Urban Resilience Project-DNCC Part. In the Sub-project area a new warehouse has been planned for construction for keeping the search and rescue equipments and subsequently use during emergency. The significant features of the Sub-project have been mentioned in Table 1.

Table 1.1: Significant features of the sub-project

Name of the Sub-project	Construction of warehouse in Mirpur-10 under Urban Resilience Project-DNCC Part
Warehouse Location	Zone-4, Mirpur-10 area
Type of Building	Type 1 (2400 sft), 2-storied Building
Land available	0.055 acres
Land acquisition	Not required

1.1.1 Aim of Sub-project

The Objective of the sub-project is to increase the effectiveness of disaster preparedness and response, while addressing existing and emergent risks in Dhaka. The Project will enhance the capacity of municipal public organizations in Dhaka to effectively prepare for, respond to and recover from small and large emergency events. It will also identify an investment program to reduce critical vulnerabilities and will support an improvement in the quality of new building construction. Further, the project seeks to create an enabling environment for coordinated, locally managed disaster risks management.

1.1.2 Location of Sub-Project

The Sub-project is located in the Zone-4, Mirpur-10 area which is within the Dhaka North City Corporation. The location details of the Sub-project have been summarized in Table 2. The Layout Plan, Location Map, Base Map and Topographical Map have been shown in Figure 1, Figure 2, Figure 3 and Figure 4 respectively. Photographs showing present condition of the Sub-project area have been shown in Figure 5.

Table 1.2: Location Details of the sub-project

Division	Dhaka
District	Dhaka
Upazila	Pallabi
Word No.	3 (N)
Mouza	Senpara
GPS Position	23.81 ⁰ N and 90.37 ⁰ E
Nearby Major Road	Mirpur 1 to Mirpur 2 road

1.2 Purpose of the Environmental and Social Assessment (ESA) Study

The purpose of the ESA process is to inform decision-makers and the public of the environmental consequences of implementing a proposed project. The EA document itself is a technical tool that identifies, predicts, and analyzes impacts on the physical environment, as well as social, cultural, and health impacts. If the ESA process is successful, it identifies alternatives and mitigation measures to reduce the environmental impact of a proposed project. The ESA process also serves an important procedural role in the overall decision-making process by promoting transparency and public involvement.

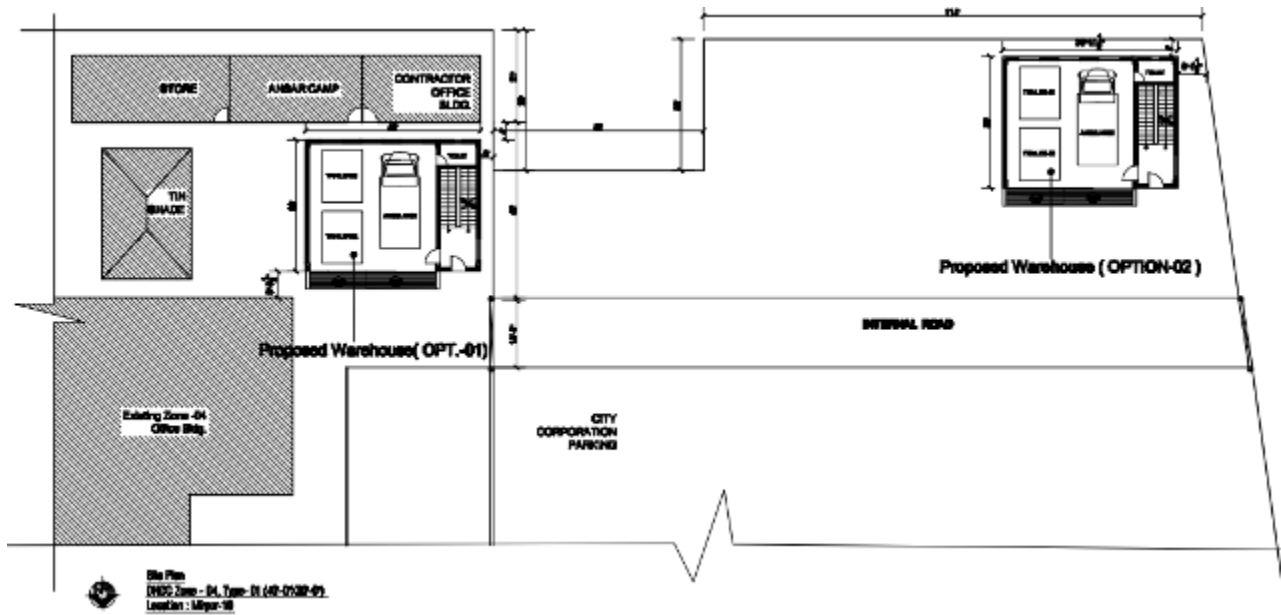


Figure 1: Layout Plan of the Proposed Sub-project

Option-2 is preferable for warehouse construction rather than option-1. If warehouse is constructed in option-2 then, no single tree will be cut down, time for emergency exit will be minimum and moreover it is near the main road of Mirpur. If warehouse is constructed in option-1 then, normal activity within the city corporation area will be disturbed and it will be more congested for movement of traffic, and service holders, people etc. So, it will be suitable and better decision to choose the option-2.

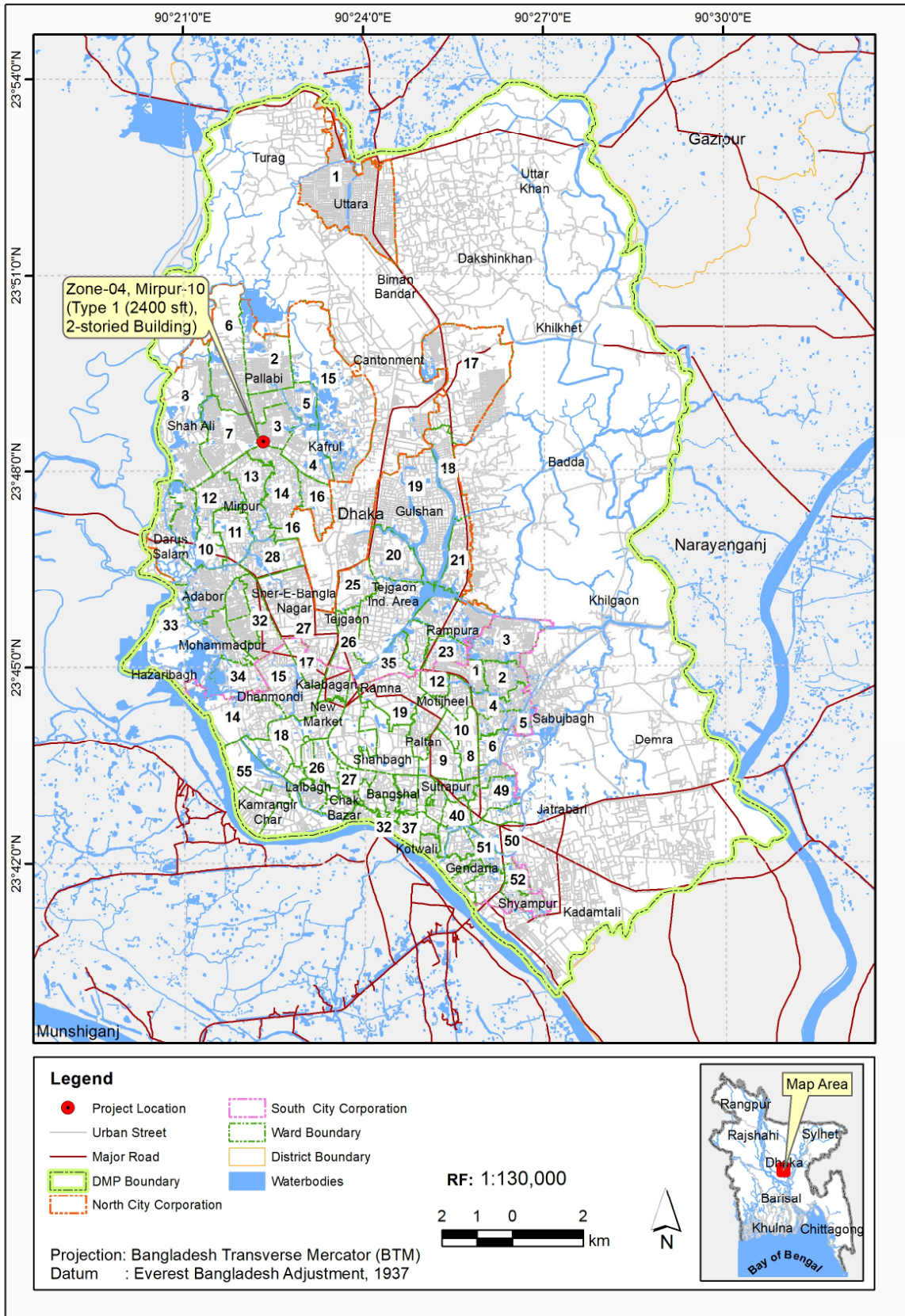


Figure 2: Location Map of Sub-project Site

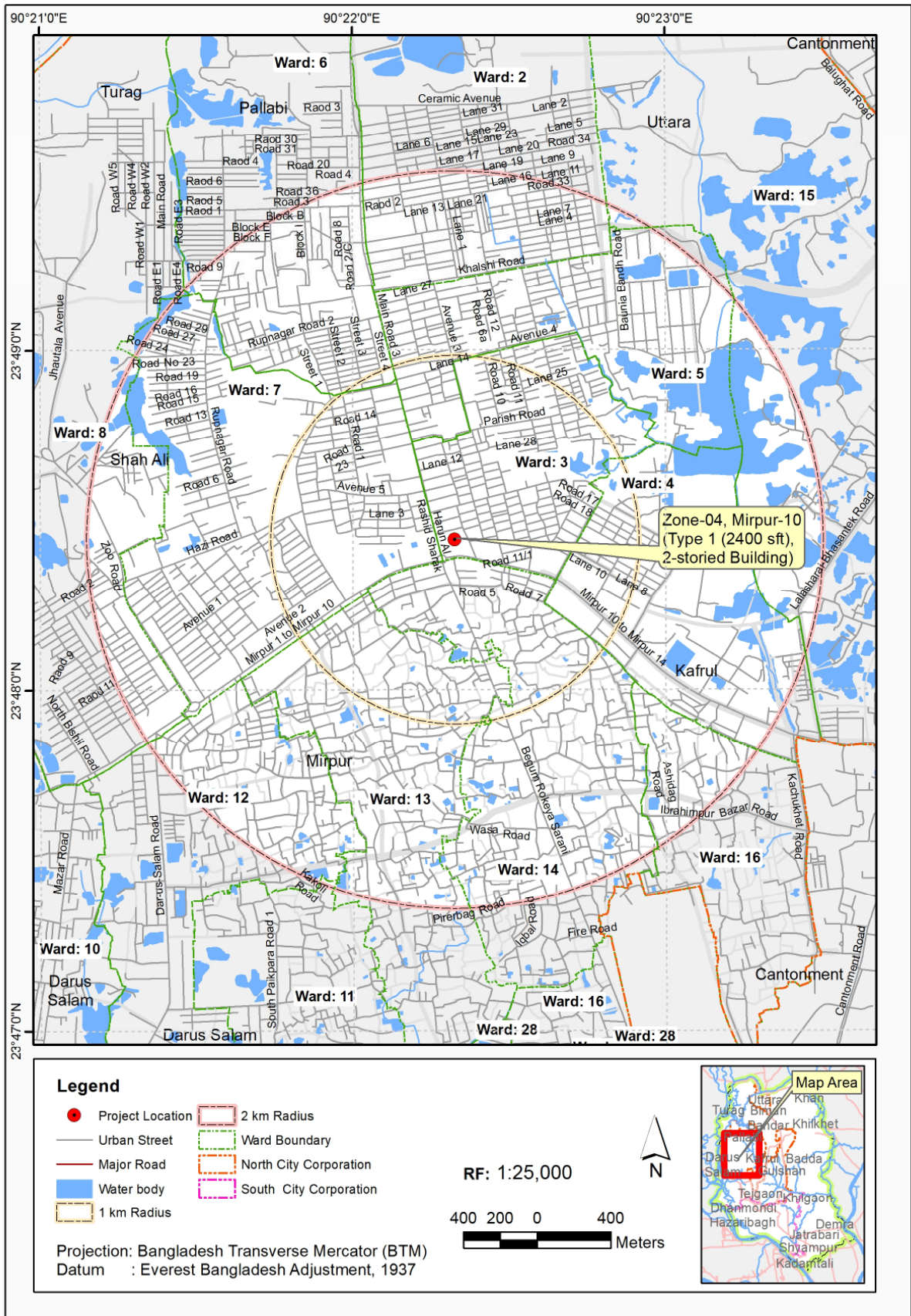


Figure 3: Base Map of Sub-project Site



Figure 4: Topographical Map of Sub-project Site



Figure 5: Photograph showing the present condition the sub-project area

1.5 Brief Description of Sub-Project Site

The proposed Sub-project is located within the Zone-4, Mirpur-10 area, beside Mirpur 1 to Mirpur 2 road. The important establishments around the Sub-project site have been summarized below.

North Boundary: Alok Dignostic Center, Benarosi Sari Market, Asha Shopping Mall, Mirpur Zoo.



Figure 6: North side major features of the site

South Boundary: Mirpur 10 no circle, Shah Ali Plaza, Mirpur addarsha Uccha biddalay, Monipur Uccha Biddalay.



Figure 7: South side major features of the site

East Boundary: Fokirbari Mazar, senpara porbota primary school, Ideal school and college, Wasa, BRTA etc.



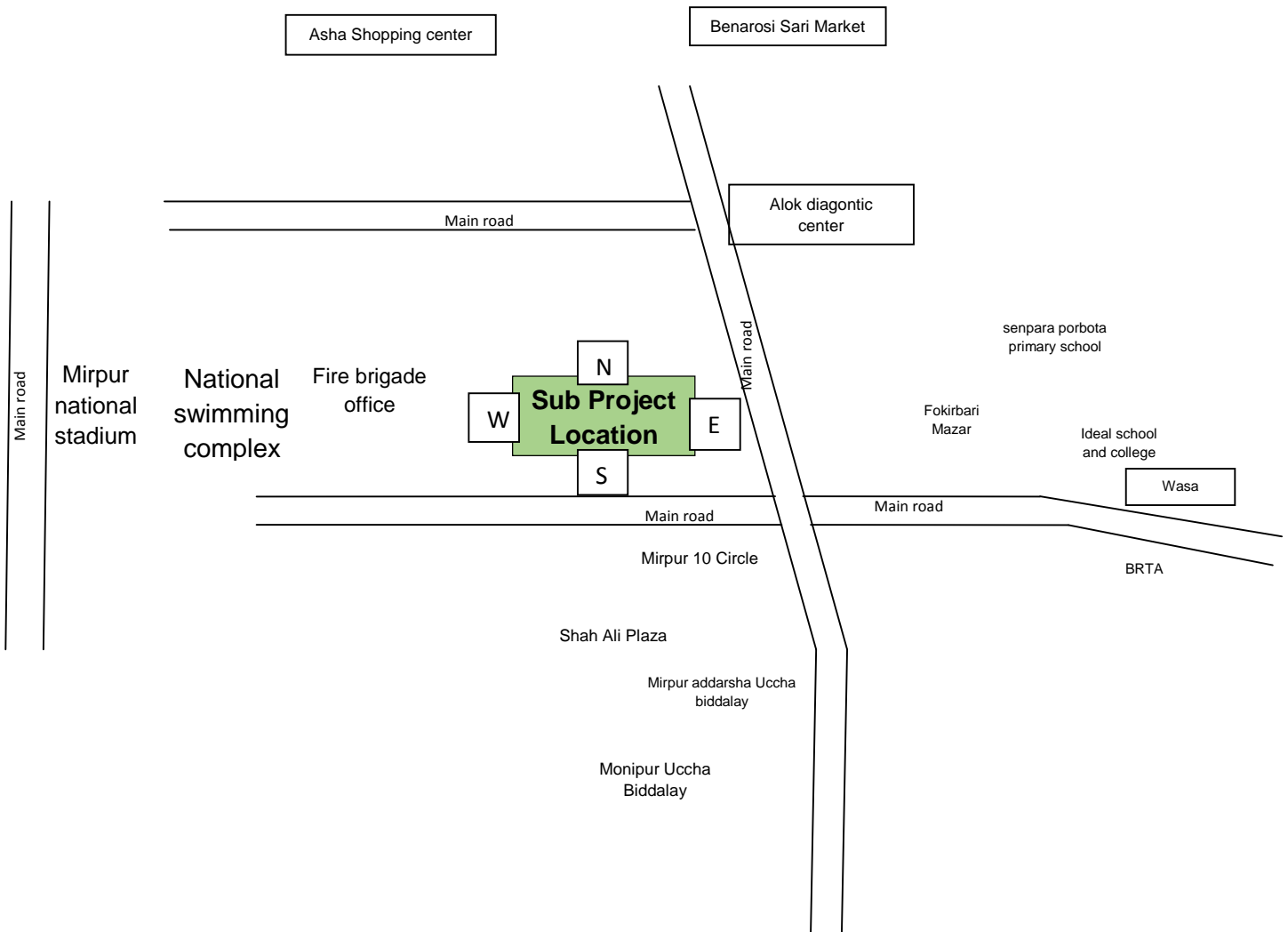
Figure 8: East side major features of the site

West Boundary: Fire brigade office, national swimming complex, Mirpur national stadium etc.



Figure 9: West side major features of the site

Site Surrounding of the Sub-Project in Hand Sketch Map



1.6 Sub-Project Components

The major components of the sub-project are a two storied building (2400 sft) and some rescue equipments (such as Trailer, Ambulance, Fire extinguisher and Life jacket etc) kept in this building which is used use during emergency. Also a 815 sft auxiliary monitoring and demonstration room is proposed in 1st floor of this building.

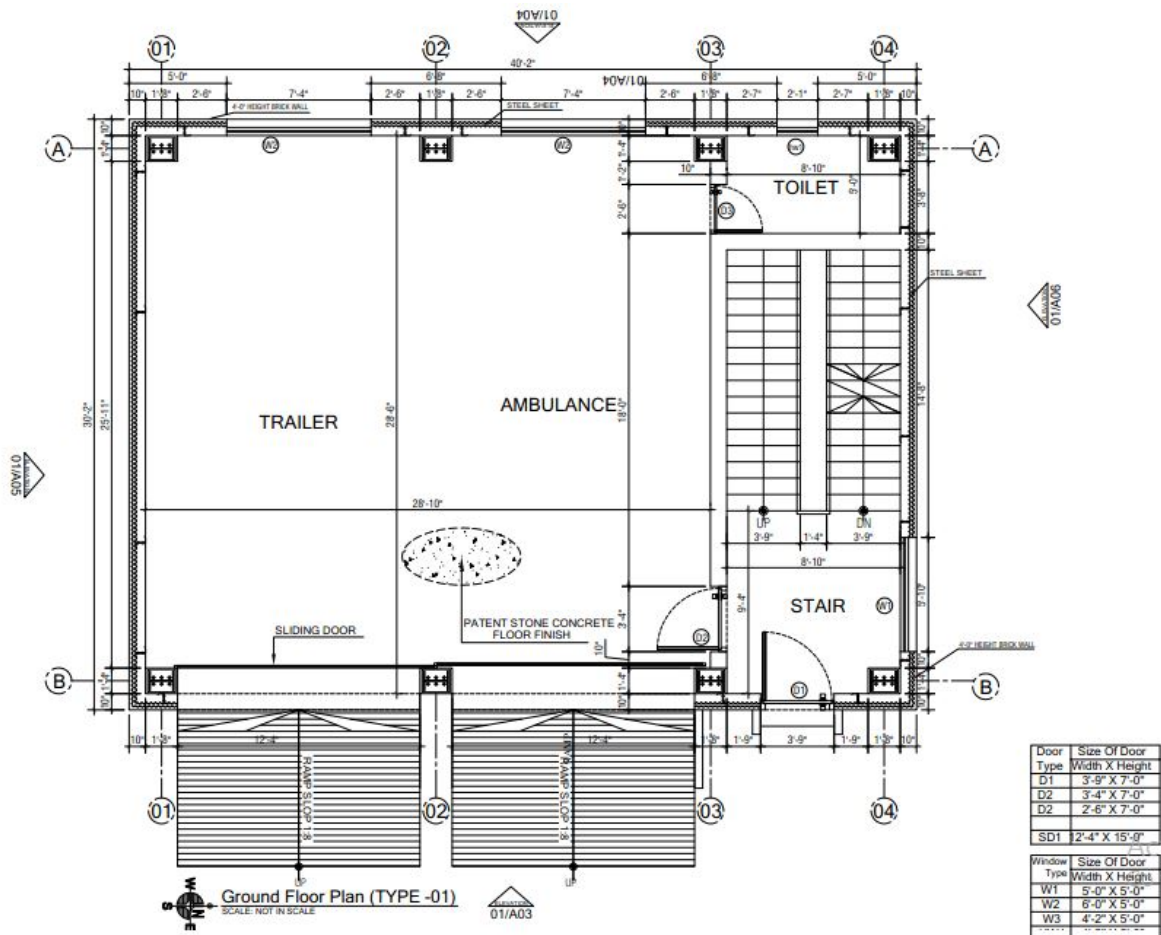


Figure 10: Plan layout of ground floor

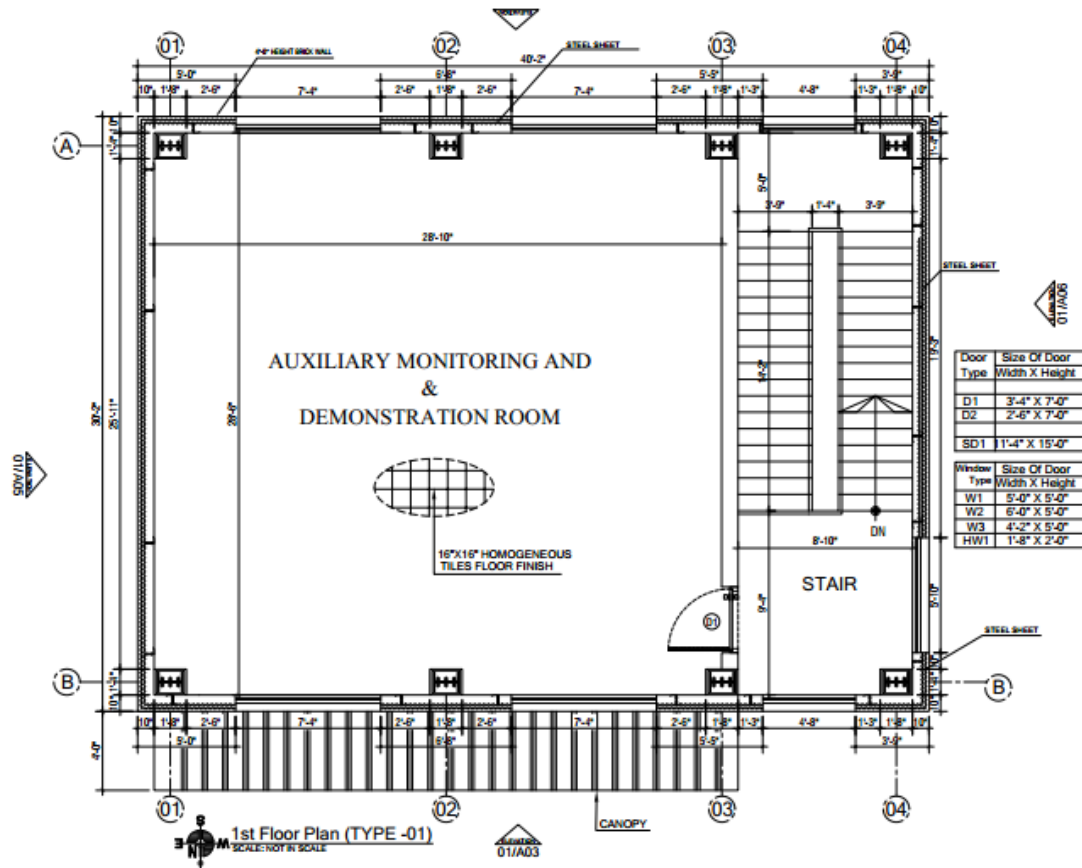


Figure 11: Plan layout of first floor



Figure 12: North elevation

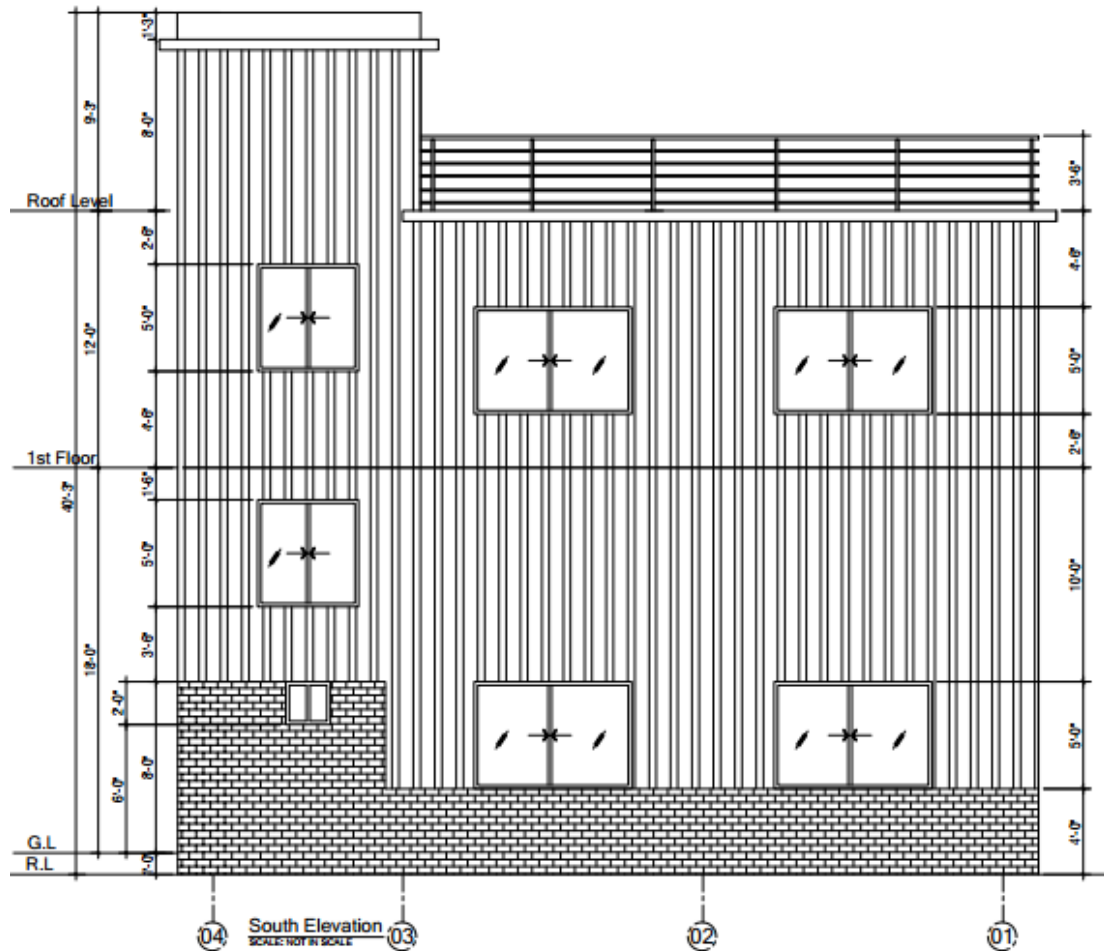


Figure 12: South elevation

1.7 Structural Design Analysis

In the structural design it is very important to keep sufficient air and light circulation in the floor plan. According to the BNBC minimum 25% ventilation should be maintained in any kind of infrastructure. From the above floor plan (Figure 10, 11, 12 and 13), it has been found that there is around 650 sq. ft. openings where as 25 % of 2400 sq. ft. is 600 sq. ft. So, there is sufficient ventilation option in the proposed structure.

Normally, according to the BNBC code 2014, the plinth or floor level of a building is 2 feet high from the existing ground or road level. In the design of warehouse, the plinth level is considered with respect to the surrounding infrastructure plinth level. The highest plinth level among surrounding buildings has been considered as the plinth level of the warehouse. In this area, the highest flood height is 5 feet, lowest is 1 feet and average is around 2 feet. And the frequency of highest height flooding is more or less 15 years. So the design seems safe regarding the flooding issue.

Moreover, for DSCC, in the ground floor Ambulance and Mortuary vans will be parked, in the first floor light search and Rescue equipment will be kept. Only 2/3 people will be stationed in the warehouse. And the stair will be enough for the Emergency Exit as per the BNBC rules (the rule is given at the end of the table). Moreover a steel ladder with a window will be kept for using as emergency exit. *The guidance of BNBC is given below for the Emergency Exit.*

Emergency Exit: *Provided single stair satisfies the BNBC Part 4 chapter 3 requirement as described below:*

3.14 *Number of Exits*

3.14.1 *The requirements of the number of exits specified in this subsection shall apply to buildings of all occupancy groups unless a more restrictive requirement for any occupancy is provided in Chapter 5, Part 4 or elsewhere in this Code.*

- 3.14.2 Only one means of exit shall suffice for the buildings specified in Table 4.3.5 provided that they do not have more than one floor below the level of exit discharge.
- 3.14.3 For all other buildings the required number of exits shall depend on the occupant load as specified below:
- | | |
|------------------------------|-----------------|
| Occupant load 500 or less | Minimum 2 exits |
| Occupant load 501 to 1000 | Minimum 3 exits |
| Occupant load more than 1000 | Minimum 4 exits |

Table 4.3.5 Buildings Served by One Means of Exit

Occupancy	Maximum Number of Storeys	Other Restrictions
All	1	Maximum occupant load 100 and maximum travel distance 25 m
A1	2	Maximum occupant load 30
A2	6	Maximum 12 dwelling units
A3	4	Maximum 50 occupants per floor and maximum travel distance 25 m
A4	6	Maximum 50 occupants per floor and maximum travel distance 25 m
A5	2	Maximum occupant load 50
B, C	2	Maximum occupant load 200
D	2	Maximum occupant load 50
F, G, H	2	Maximum occupant load 100 and maximum travel distance 25 m

- 3.14.4 All buildings more than 6 storeys or 20 m in height and all buildings having a floor area larger than 500 m² on each floor, used as educational, institutional, assembly, industrial, storage or hazardous occupancy or a mixed occupancy involving any of these, shall have a minimum of two staircases. The staircases shall be of the enclosed type and shall lead directly to the exterior or the designated area of refuge.

1.8 Equipment and Storing Place

The larger and vehicular equipment will be stored at the ground floor like Mobile Light Unit and Generator (2000w), Generator, Concrete Cutter, Ambulance and the smaller equipment will be stored at the first floor like Air Compressor, Power Chain Saw, Megaphone, Breathing Apparatus, Knee Pad & Eye Protector, Gloves, Multi-Purpose Cutter, Ram Jack, High Pressure Air Bag, Rubble Removing Bag, Stretcher, Family tent, Relief tent, Dead Body Bag, Chemical Light Sticks, Fire Aid Box.

For the storing of the equipment, there is enough space according to the above drawing. And the equipment which will be stored at the ground floor will be lightly affected from any sudden flood due to their nature. And as per the layout there is enough space for emergency exit.

2 POLICY LEGAL AND ADMINISTRATIVE FRAMEWORKS

The proposed Urban Resilience Project-DNCC Part will be implemented in compliance with applicable environmental laws and regulations. Bangladesh has an environmental legal framework that is conducive to both environmental protection and natural resources conservation. This environmental legal framework applies to the proposed sub-project. In addition, a wide range of laws and regulations related to environmental issues are in place in Bangladesh. Many of these are cross-sectoral and partially related to environmental issues. This Section presents an overview of the major national environmental laws and regulations that are relevant and may apply to activities supported by the Urban Resilience Project-DNCC Part, institutional arrangement and national and sub-national level, and World Bank safeguard policies.

2.1 National Environmental Laws and Regulations

National Environmental Policy 1992

The concept of environmental protection through national efforts was first recognized and declared in Bangladesh with the adoption of the Environment Policy, 1992 and the Environment Action Plan, 1992. The major objectives of Environmental policy are to i) maintain ecological balance and overall development through protection and improvement of the environment; ii) protect country against natural disaster; iii) identify and regulate activities, which pollute and degrade the environment; iv) ensure environmentally sound development in all sectors; v) ensure sustainable, long term and environmentally sound base of natural resources; and vi) actively remain associate with all international environmental initiatives to the maximum possible extent.

Bangladesh Environmental Conservation Act (ECA), 1995 amended 2002

This umbrella Act includes laws for conservation of the environment, improvement of environmental standards, and control and mitigation of environmental pollution. It is currently the main legislative framework document relating to environmental protection in Bangladesh, which repealed the earlier Environment Pollution Control ordinance of 1977.

Environment Conservation Rules (ECR) 1997 amended 2003

These are the first set of rules, promulgated under the Environment Conservation Act 1995. Among other things, these rules set (i) the National Environmental Quality Standards for ambient air, various types of water, industrial effluent, emission, noise, vehicular exhaust etc., (ii) requirement for and procedures to obtain Environmental Clearance, and (iii) requirements for IEE/EIA according to categories of industrial and other development interventions.

Environment Court Act, 2000

The aim and objective of the Act is to materialize the Environmental Conservation Act, 1995 through judicial activities. This Act established Environmental Courts (one or more in every division), set the jurisdiction of the courts, and outlined the procedure of activities and power of the courts, right of entry for judicial inspection and for appeal as well as the constitution of Appeal Court.

Bangladesh National Building Code

The basic purpose of this code is to establish minimum standards for design, construction, quality of materials, use and occupancy, location and maintenance of all buildings within Bangladesh in order to safeguard, within achievable limits, life, limb, health, property and public welfare. The installation and use of certain equipment, services and appurtenances related, connected or attached to such buildings are also regulated herein to achieve the same purpose.

2.2 International Safeguard Policies (World Bank)

The objective of these policies is to prevent and mitigate undue harm to people and their environment in the development process. Safeguard policies provide a platform for the participation of stakeholders in project design, and act as an important instrument for building ownership among local populations. The effectiveness and development impact of projects and programs supported by the

Bank has substantially increased as a result of attention to these policies. The World Bank has ten environmental, social, and legal safeguard policies. The relevant policies for environmental safeguard are the following:

- OP/BP 4.01 Environmental Assessment
- OP/BP 4.04 Natural Habitats
- OP/BP 4.09 Pest Management
- OP/BP 4.11 Physical Cultural Resources
- OP/BP 4.36 Forests
- OP/BP 4.37 Safety of Dams

Operational Policies (OP) are the statement of policy objectives and operational principles including the roles and obligations of the Borrower and the Bank, whereas Bank Procedures (BP) is the mandatory procedures to be followed by the Borrower and the Bank. Apart from these, the IFC guidelines for Environmental Health and safety have been adopted by the World Bank Group which is also relevant for environmental protection and monitoring. In addition to that the Policy on Access to Information of World Bank also relates to environmental safeguard.

2.3 Implications of Environmental Policies and Regulations on URP

The Environmental Conservation Rules (ECR) 1997 (DoE, 1997) classifies projects into four categories according to potential environmental impacts: **(1) Green; (2) Orange A; (3) Orange B; and (4) Red.** **Green category** projects are those with mostly positive environmental impacts or negligible negative impacts; **Orange A** category projects are those with minor and mostly temporary environmental impacts for which there are standard mitigation measures; **Orange B** category project are those with moderately significant environmental impacts; while **Red category** projects are those with significant adverse environmental impacts. As discussed in project description, the sub-projects to be implemented under Urban Resilience Project-DNCC Part would fall under **Orange A** category.

The BNBC, PPR 2008, Bangladesh Labor Act 2006 outlines guidelines for ensuring worker's health and safety during construction works which would have direct implications in project. It would be the responsibilities of the contractors (with supervision of DNCC) to make sure that these guidelines are followed in the workplace environment.

According to WB Operational Policy (OP 4.01), the nature of environmental assessment to be carried out for a particular sub-project would largely depend on the category of the sub-project. As mentioned earlier, The World Bank Operational Policy (OP) 4.01 classifies projects into three major categories (category A, B and C), depending on the type, location, sensitivity and scale of the project, and nature and magnitude of potential impacts.

The sub-projects to be implemented under the Urban Resilience Project-DNCC Part do not involve large-scale infrastructure development (e.g., construction of sanitary landfill, water or wastewater treatment plant, major highways). The sub-projects would involve no involuntary land acquisition. Thus, the sub-projects to be carried out do not appear to pose risk of significant adverse environmental impacts. In view of subprojects nature, the overall project is classified as a Category 'B' and the safeguard policy OP/BP 4.01 has been triggered for the proposed operation. The policy has been triggered to ensure that the sub project design and implementation will be focused on reducing adverse impacts and enhancing positive impacts.

It is highly unlikely that any natural habitant formed largely by native plant and animal species will be affected or modified by the subprojects activities to be implemented under Urban Resilience Project-DNCC Part because most of the infrastructure development works are small-scale and will take place in the built environments of municipalities adjacent to various other infrastructures. However, the EMF stipulated the code of practice on natural habitat as advance precautionary measures and Natural Habitats (OP/BP 4.04) has been triggered.

Also it is unlikely that any designated physical cultural resources will be affected by the subprojects. However, the impacts will be examined as part of the environmental screening/assessment of each sub-project. The EMF provided criteria for screening and assessment of physical cultural resources. In addition, 'Chance find' procedures conforming to local legislation on heritage would be evaluated that any physical or cultural resources will not be impacted. OP 4.11 (Physical Cultural Resources)

has been triggered.

The activities of the project will not involve any pesticide application, include activities in forest areas or relate to protection of dams. Hence OP 4.09, 4.36 and OP 4.37 will not be relevant as well.

The IFC guidelines provides guidance on certain EHS issues which include standards for environmental parameters (ambient air quality, water and wastewater quality, noise level, waste management), hazard and accident prevention, occupational and community health and safety (during commissioning and decommissioning works) etc. These guidelines will be directly applicable to the MGSP project. As a general rule, the IFC guidelines should complement the existing Bangladesh guidelines or standards. In case the Bangladesh guidelines or standards differ from the IFC guidelines, project is expected to follow the more stringent ones.

The World Bank access to information policy would be directly followed. The Urban Resilience Project-DNCC Part will make the environmental assessment and EMF documents available to the public by publishing it in their websites. In addition, subproject specific screening/assessment report will periodically be posted in the DNCC website before the bidding process. Hard copies of these documents in English (including a summary in Bengali) will be made available in the offices of the respective Pourashavas and city corporations for the local stakeholders.

3 DESCRIPTION OF THE ENVIRONMENT (BASELINE ENVIRONMENT)

3.1 Physical Environment

3.1.1 Geology, Topography and Soils

The part of Bangladesh to which the capital city of Dhaka belongs is dominated by the rivers Ganges, Jamuna and Meghna, which drain large quantities of water from the Himalayan Mountains into the Bay of Bengal, through a complex delta system of tidal tributaries and creeks, formed by sediment deposited by the rivers. Known as a composite of Brahmaputra-Jamuna Flood plain and Madhupur Sal Tract, this part – the central region – is composed of flat and low lying land, which floods extensively in the rainy season and red textured highlands.

Much of Bangladesh lies on the Gangetic-Bengal Plain, and is flat and low lying particularly around the delta, which floods extensively in the rainy season. The sub-project site situated in North of Dhaka, the land gradually begins to rise, towards the foothills of the Himalayas in the north. The influence of the rivers is evident in the soils, which are almost entirely alluvial and generally fertile in the central plains, with a predominantly loam and silt consistency.

The sub-project site is situated in Dhaka which is situated at the southern tip of a Pleistocene terrace, the Madhupur tract. Two characteristic geological units cover the city and surroundings, viz Madhupur Clay of the Pleistocene age and alluvial deposits of recent age. The Madhupur Clay is the oldest sediment exposed in and around the city area having characteristic topography and drainage. The major geomorphic units of the city are: the high land or the Dhaka terrace, the low lands or floodplains and depressions and abandoned channels. Low lying swamps and marshes located in and around the city are other major topographic features of the sub-project site.

3.1.2 Hydrology (Surface & Groundwater)

In the proposed site where warehouse will be constructed there is no water body.

Like other towns and cities of Bangladesh, the Dhaka city dwellers, too, use both surface and groundwater as a source of domestic water. Principal difference lies in use of supply water based on treatment with some application of chlorine in Dhaka and other population centers. Pollution of rivers is a major problem, because of the discharge of industrial wastewater and inadequate sewerage. The DoE has identified 450 polluting industrial units in Dhaka (196 tanneries, 129 textile producers, 38 engineering factories, and plants manufacturing pesticides, chemicals, fertilizers, pulp and paper), many of which discharge untreated wastewater to the rivers. The sewerage system covers only 20% of the city population, and 50% of people use septic tanks, 20% pit latrines and 10% use open latrines and other unsanitary methods.

There are three main aquifers in the central region of Bangladesh:

- (x) An upper (composite) aquifer, which can reach depths of 50 m and is covered with an upper silty clay layer of less than 20 m;
- (xi) A middle (main) aquifer of fine to heavy sands, which is generally 10-60 m thick and in most areas is hydraulically connected with the composite aquifer above; and
- (xii) A deep aquifer of medium, medium-to-fine or medium-to-coarse sand, which is generally found at depths below 100 m.

In Dhaka 80% of the domestic water supply is obtained from the middle aquifer, extracted by tube-wells throughout the city. Recent studies have shown that water levels have fallen dramatically (20 m over the past six years) and suggest that the aquifer may be changing from a confined to an unconfined condition, which could make it vulnerable to contamination. There is already evidence of pollution by leaking underground tanks at petrol stations and chemical plants, and seepage from sewers, septic tanks and pit latrines. DWASA is implementing a major project to improve the water supply service, which amongst other things will increase the usage of surface water and extend groundwater abstraction to the deeper aquifer, at a sustainable rate.

The water quality data of the month of June, 2016 of the lakes and rivers in and around Dhaka City is given in Annex A. The analysis is done by DoE, Dhaka.

3.1.3 Climate and Meteorology

The climate in the sub-project area is humid and sub-tropical, with a typical three season pattern. During the winter season (November-February), cool winds blow from the north-east. The weather is cool and dry. Rainfall, however, shows variations over the last decade (2001-2011) between 116 mm in November, 2002 and 0 mm in February, 2011. Average temperatures show, over the same period, variation between 23.4°C in November, 2005 and 17.3°C in January, 2011. Temperatures start to rise in March and reach the annual maximum of around 39.9°C in April-May, when daytime temperatures can reach up to 40°C. Rainfall also increases, and this period is characterized by unstable weather. The monsoon begins in May-June as hot air rises over the Indian subcontinent, creating low pressure areas into which rush the cooler moisture-laden winds from the Indian Ocean and the Bay of Bengal. Around 70-80% of the annual rain falls during this time. The rain is often accompanied by strong winds, sometimes exceeding 100 km/h. Temperature and rainfall both decline post-monsoon, returning rapidly to the winter lows.

Wind data from the Bangladesh Meteorological Department Climate Division suggests that wind directions vary month-to-month in Dhaka, though predominantly in the NW, S, and NE directions. As the STSs will be contained within tall walled structures and cleaned daily, windborne odor will get minimized.

3.1.4 Flooding, Water Logging and Drainage Pattern

The Sub-project area is mostly flood free and elevation is higher than normal local flood level. The area is not affected in normal floods. Most of the drains in the sub-project area are connected with Turag River and Sewerage networks bearing the waste water. Also Industrial wastewater is disposed in this open drains. According to the environmental standard of Bangladesh (ECR, 1997), for the survival of the aquatic life the dissolved oxygen be between 4 mg and 8 mg per liter and accepted level of Biological Oxygen Demand (BOD) is 100 mg per liter. But the situation is far-off worse in study area.

3.1.5 Air Quality and Dust

Being a commercial area, the area produces a large amount of air pollutant and dust. The main atmospheric pollutants are those produced by vehicles and industries and in particular by the burning of fuels. These include particulate matter, hydrocarbons, carbon dioxide, carbon monoxide, sulfur dioxide, oxides of nitrogen, lead, ammonia and hydrogen sulfide. Many of these cause respiratory problems in humans, plus other diseases if substances accumulate in the tissues.

Table 3.1: National Ambient Air Quality Standards for Bangladesh and Field Data

S/N	Parameter	BD Standard	Averaging Time	AQMP, DOE (Darus-Salam, 23.78N 90.36E)		Field Survey
				July	August	August
13.	SO ₂	80 µg/m ³ (0.03 ppm)	Annual	-	-	-
		365 µg/m ³ (0.14 ppm)	24 hours (a)	-	0.71	9.0
14.	NO _x	100 µg/m ³ (0.053 ppm)	Annual	13.0	19.9	11.0
15.	PM ₁₀	50 µg/m ³	Annual (b)	-	-	-
		150 µg/m ³	24 hours (c)	44.3	70.2	95.0
16.	PM _{2.5}	15 µg/m ³	Annual	-	-	-
		65 µg/m ³	24 hours	19.2	31.6	-

Source: AQMP, DOE and Field Survey, 2016.

The main causes of the poor air quality are:

- (x) Poor roads and traffic management leading to severe traffic congestion;
- (xi) Heavy industrialization, and use of cheaper high-sulfur fuels (coal, wood and tyres) by smaller industries like brick kilns; and
- (xii) Poor solid waste management, so burning is the common method of treating garbage.

3.1.6 Noise level

The project is situated in a mixed zone. Noise level of the project area is within the accepted limit (75 dB).

- On site sources: 50-55dB for warehouse (OPT-1) and 60-65 dB for warehouse (OPT-
- Off site sources: 75-80 dB in the main entrance and main road of Mirpur-10 but may vary during 12.00 P.M to 4.00 P.M.

Present noise level in the project site and Bangladesh standards for sound level are shown in Table 3.2

Table 3.2: Bangladesh Standards for sound level (GoB, 2006)

Noise Level at Project Site				Bangladesh Standards		
Site	Time	Minimum	Maximum	Location	Noise Level (dBA) at Day	Noise Level (dBA) at Night
On Site	12 p.m.	50	65	Silent zone	50	40
	8:30 p.m.	38	58	Residential area	55	45
Off Site	4 p.m.	75	80	Mixed Zone	60	50
	8:10 p.m.	53	70	Commercial area	70	60
				Industrial area	75	70

3.2 Biological Environment

3.2.1 Flora

Total number of trees observed is 15 in which only one tree will be cut off from proposed location (OPT-1). The following list shows the total observation about trees and vegetation.

Table 3.3: Types and number of trees at the proposed location

S/N	Types of Flora and Name		Existing	To be Cut Off
1.	Large Trees	Custard Apple (<i>Annona genus</i>)	01	0
		Neem (<i>Azadirachta indica</i>)	01	0
		Tropical Almond (<i>Prunus dulcis</i>)	01	01
		Breadfruit (<i>Artocarpus heterophyllus</i>)	05	0
		Mahogany (<i>Swietenia genus</i>)	01	0
		Arcea (<i>Arcea catecha</i>)	01	0
		Cocunut (<i>Cocos nucifera</i>)	01	0
2.	Medium Trees	Breadfruit (<i>Artocarpus heterophyllus</i>)	01	0
		Mahogany (<i>Swietenia genus</i>)	02	0
3.	Small Trees	Guava (<i>Sidium guajava</i>)	01	0
4.	Grass Land		0	0
5.	Other Forest/ Agricultural/ Garden etc.		100 sft.	0
6.	Total Trees		15	01



Figure 13: Existing Large Trees (Mahogany)



Existing Medium Trees (Breadfruit, Neem etc.)



Existing grass land

3.2.2 Fauna

In the project site no rare endangered species, mammals, fish and others have been observed. Only some indigenous like Squirrels (Sciuridae), Dog (Canis lupus familiaris) have been seen. Moreover various birds like Peacock (Pavo cristatus), Crow (Corvus corone), Myna (Acridotheres tristis), and Wagtail (Motacilla) have been seen.

3.3 Socio-Economical Environment

3.3.1 Land Use

The proposed land for the sub-project is situated within the existing DNCC zone-04 office, so the site is mainly used for vehicle parking and movement place of people who comes in the office. Whereas the present land use surrounding the sub-project site is quite mixed in character. The lands in the Sub-project's catchment areas shown in Figure 15 are mainly distributed in Commercial, Residential, Institutional, Road and other infrastructures etc. The detail land coverage of 1 km and 2 km buffer of sub-project location is given in the Table 3.

Table 3.4: Land covers classification of the study area

Land Use	For 1 km buffer	For 2 km buffer
	Area (acres)	Area (acres)
Commercial area	0.531	0.677
Industrial area	0.0	0.0
Institutional area	0.114	0.533
Open Space	0.100	0.494
Road	0.400	1.217
Urban Residential area	2.217	9.089
Water body	0.014	0.647
Others	0.262	0.401
Grand Total	3.638	13.058

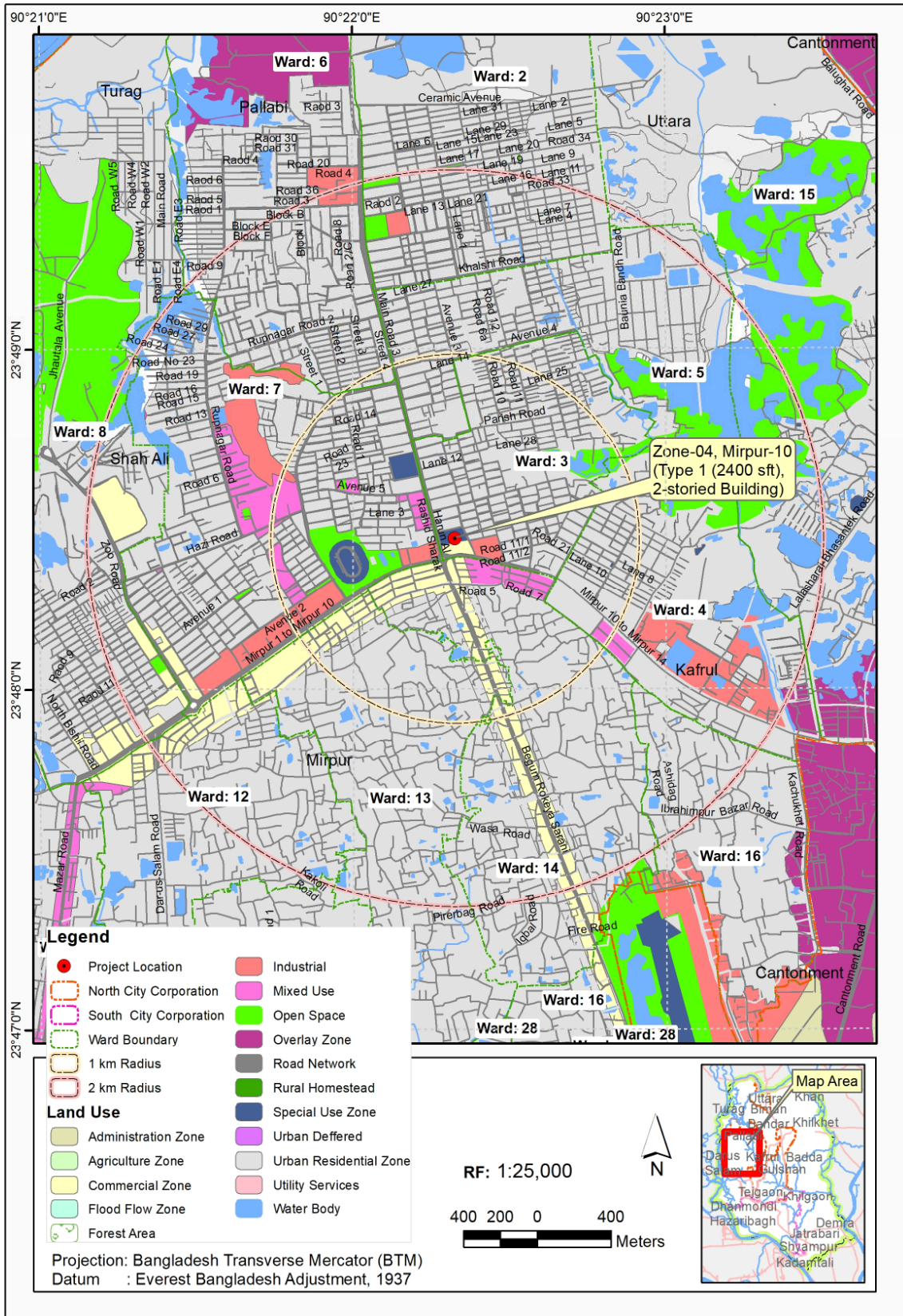


Figure 14: Land use and Land Cover Map of the Study Area

3.3.2 Beneficiary Population

The Sub-project activities will benefit the local people and people who comes in the Sub-project's catchment areas during disaster and non-disaster period. The Sub-project's catchment area will cover 1.10 sq.km. situated around it. Total numbers of population in catchment area of the Sub-project is 94664 among which 49093 are male and 45571 are female [BBS, 2011 - Population Census].

3.3.3 Education

In catchment area of the Sub-project, literacy rate among the population is 72.3%. Literacy rate of male is still higher than the female populations [BBS, 2011- Population Census]. There are many school, colleges and university around the project site like Greenfield school and college, mirpur addarsha uchhabiddalay, mirpur girl's laboratory institute, sos hermann Gmeiner College etc.



Figure 15: Major educational facilities around the site

3.3.4 Access Road to the site and Traffic Load with Types

There is a 4 lane Mirpur 10 main road and an approximate 152 ft. connecting road to warehouse (OPT-1). Moreover the width of the road is 15'3".

3.3.5 Public Services

There are many public services like Hospital, Fire service, Thana etc. Major public services are Galaxy Hospital, Pallabi Thana, and Mirpur Fire Station etc.



Figure 16: Major Public Services

3.3.6 Recreation and Aesthetics

There is a shopping mall (Shah Ali Plaza) near the proposed warehouse location and no lake or park is found.



Figure 17: Recreation facilities

3.3.7 Land Acquisition & Resettlement

Land acquisition and resettlement activities are not involved in the Sub-project Intervention.

3.3.8 Agriculture

No agricultural activities are taking place in the Sub-project area.

4 PUBLIC CONSULTATION

4.1 General

Presently the public consultation is done as a part of social assessment separately to ascertain the people's reaction. During the survey, public consultation has done to know the people's perceptions about the project and environmental problems. The purpose of the public consultation includes the following:

- To ascertain the public views on various environmental issues related to the project;
- To encourage and provide for people's participation in project implementation; and
- To obtain new insight and site specific information, and to appropriating possible mitigation measures based on local knowledge of the communities.
- To ensure the minimization of social conflicts regarding the project, if any

During consultation with the local people, they were little known about this type of project. This area is somewhat underdeveloped part of the area. The expansion of the industrial unites is very slow so they are very positive about this project. The proponent also commits to give privilege locality in every aspect.

4.2 Approach and Methodology

4.2.1 Approach

Participatory approach was followed for identifying the participants as well as conducting public consultation meeting. Initially, the study team consulted with the project proponent i.e. **City Corporation Authority** for understanding the project situation and the potential stakeholders. However, the meeting ensured the common and equal platform of the participants so that they can express their opinion in an enabling environment. The consultants unfold the issues and in return, the participants give feedback to the given issues and in some cases open two-ways discussions were held in the meeting.

The consultation process was intended to generate an enabling participatory environment between the project proponent and the potential stakeholders through the intermediaries of the consultant. The consultant, in this context, ensured a congenial participatory interaction by mixing two beneficiary groups i.e. **City Corporation Authority** that belongs to up stair and the stakeholders who belong to down stair.

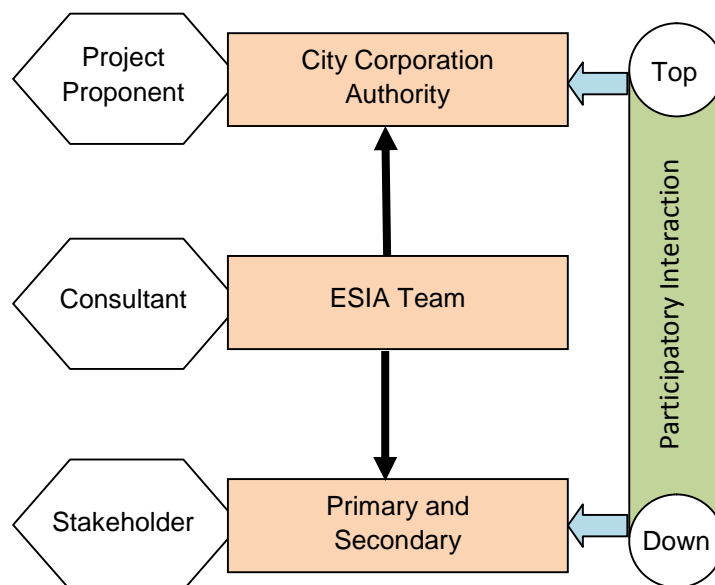


Figure 20: Overall Consultation Process

4.2.2 Methodology

4.2.2.1 Identification of Stakeholders

Stakeholders include all those who affect and are being affected by policies, decisions or actions within a particular system. Stakeholders can be groups of people, organizations, institutions and sometimes even individuals. Stakeholders can be divided into primary and secondary stakeholder categories.

Primary Stakeholders: Primary stakeholders are people who would be directly benefited or impacted by the proposed project. In this context, people who have/had land within the project boundary, and who are living at the vicinity of the proposed project were considered as the primary stakeholders.

Secondary Stakeholders: This category of stakeholders pertains to those who may not be directly affected but have interests that could contribute to the study, play a role in implementation at some stage, or affect decision making on Project aspects. In this project local elite persons, government departments and line agencies fall under this category.

4.2.2.2 Time, Date and Venue Selection

For formal consultation meeting venue, date and time of meeting was selected through the consultation with local people, the project proponent and the consultant. These three groups select an agreed venue considering the closeness to the proposed project, easy accessibility to the venue and which is likely to be neutral. Date and time was also finalized in this way considering availability of the participants, ensuring the maximum participation and compliance with the other arrangement.

For Key Informant Interviews (KIIs), potential secondary stakeholders preferably different government officials, private entrepreneur have been selected who are incumbent in the jurisdiction. Appointments were taken prior to visit them.

For Focus Group Discussion (FGDs), local occupational groups who are concerned and are likely to be impacted were identified and consulted at the spot.

4.2.2.3 Enlisting and Invitation

A comprehensive list of potential stakeholders was prepared through the consultation. This list was intended to cover all sorts of interest groups, occupational groups, socially acceptable and knowledgeable peoples.

A formal invitation was sent to them and also communicated over telephone for ensuring their presence in the meeting.

4.2.2.4 Consultation Instrument

Checklist: A comprehensive checklist covering all possible issues to be addressed was prepared through consultation with the multidisciplinary study team. This checklist was used in the meeting to unveil peoples' perception and opinion along with suggestions.

Attendance list: An inventory of the participants was maintained in attendance sheet containing contact number.

Camera: For visualizing the participants, photographs were taken using camera. These photos were presented in this chapter. Photos of the meeting participants are presented at the end of this chapter.

4.2.2.5 Consultation Process

The study team conducted the meeting. During consultation meeting, the following process was followed with sequences.

Greetings: At the outset, the team spelled greetings to all participants. Welcomed them for attending and stated the entire design of the meeting.

Introduction: The team members introduced themselves to the participants and gave detail description of the project, spelled out about the objectives and anticipated outcome of the meeting.

Respect to the participants: The study team showed respect to all participants. They respected not only to the individuals but also to their values, cultural practices and social structures.

Ensuring peoples' voice: Generally, all participants cannot participate equally. In fact, a substantial number of participants tended to remain silent in any meeting. However, the study team encouraged all to participate willingly through explaining the ethics of the study.

Note taking: discussed issues and opinions were written in notebook carefully. All issues were given equal importance.

Recapitulation and closing the session: At the end the study team recapitulated the session and responded to the quarries. Finally, the facilitator closed the session thanking the participants.

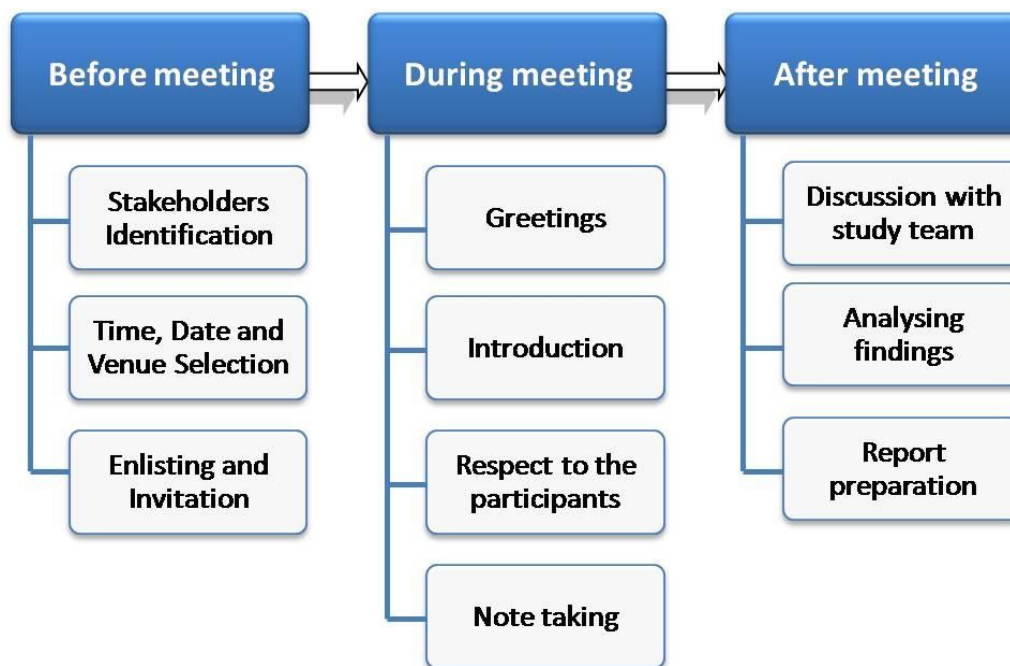


Figure 21: Steps of Consultation Process

4.2.2.6 Consultation Meeting

Venue, Date and Time

One Public Consultation Meeting (PCMs) was held at Mirpur 10 project site comprising different types of the stakeholders. Details are given below.

Participants Criteria	Governmental and Non-governmental Officials
Date	27.06.2016
Place	Mirpur 10
Starting time	12.00 PM
Ending time	12.45 PM

The Participants

There were total 5 participants in the PCM. Most of them are small businessman or shopkeepers. No Local Government representative is found during the PCM.

4.3 Issues Discussed

The following issues are discussed:

- Disaster shelter is very urgent as they are very much vulnerable to disaster i.e. Earthquake, cyclone, flood etc.
- Man-made disasters like fire, drainage congestion, landslide and building collapse are increasing rapidly particularly in and around the major cities.
- City level emergency disaster management system remains weak.

- Earth quake is infrequent but Dhaka has been identified by Stanford University, as one of the 20 most earthquake vulnerable cities in the world.
- Government of Bangladesh has therefore undertaken the Urban Resilience Project (URP) in two cities, Dhaka and Sylhet.
- Objective of the project is to increase the effectiveness of disaster preparedness and response.
- It will also reduce critical vulnerabilities and will support an improvement in the quality of new building construction.

4.5 Feedback of the Stakeholders

4.5.1 Knowledge about the Project

At the outset, the study team gave a brief description about the project. However, the stated description by the study team makes them clearer about the objectives and process of the project.

4.5.2 Attitude to the project

The participants expressed conditional positive response to the project. They stated that if the proposed project does not hamper their business, it will be welcomed warmly. Otherwise they are not interested of this project.

4.5.3 Findings of the Consultation Meeting

Upswing of employment in community

Sequences of matters were emerged with FGD (Focus Group Discussion) participants looking at their experience of employment in the project from a different perspective including quality of occupation. The participants summarized their opinion about the possibility of better occupational probabilities.

Environmental apprehensions

Environment is the most prominent issue in our everyday life. We are bound to protect our environment for the betterment of our living. Most of the participants concern about environmental threats i.e. the disaster. Over all discussions, environmental apprehensions (water pollution, air pollution and soil pollution) was stated and was the most frequent measures of the environment.

Upsurge social mobility

There are too many topics were discussed by the participants of FGD. Social mobility is one of them. Very few people discussed about social mobility. Social mobility means the proportion of individuals in a particular social class who move up or down in the socio-economic hierarchy.

4.5.4 Suggestions and Recommendations of the Participants

The participants were presented a number of feedback, suggestions and recommendations which are as follows:

- People are not aware of this project, since they thought it will not help them and it will be used for stubborn people.
- The construction of new warehouse will increase employment opportunities but need to maintain at a regular basis.
- The warehouse will be an asset for emergency situation.
- There should be access facilities to the disaster affected areas such as connecting roads, available of resources so that people can get help during emergency cases.
- They also requested to have provision of additional facilities such as Radio, TV, Rain Coat, Torch light, Life jacket, Mike, Flag, Fire extinguisher, Gum boot etc.
- Most of the participants are expressed that the capacity of the proposed warehouse is satisfactory.

4.6 Researcher's Understanding Based on the Discussion

Each participant shares their opinions on the **Urban Resilience Project**. Some of the participants demand to establish the facility. They, who support the project identified some major social and

environmental factors that may have really functioned for the communal people of the locality. Despite some negative comments, all of the participants suggested to establish the facility.

5 INITIAL ENVIRONMENTAL AND SOCIAL SCREENING (IESS)

5.1 General

Initial Environmental and Social Screening (IESS) for the Sub-project has been conducted with the purpose of fulfilling the requirements of GoB and WB. IESS ensures that environmental issues are properly identified in terms of extent of impacts. Field visit for performing IESS has been carried out on July 2016 in the Sub-project site. The screening data and information for this Sub-project have been formulated and shown in Table 5.1. The social screening checklist is given in Annex C.

Table 5.1: Initial Environmental Screening Checklist

Screening Questions	Impact ⁷					Remarks
	Y	N	H	M	L	
A. Potential Environmental Impacts due to Sub-project location during Planning Phase						
Is the Sub-project area.....						
Adjacent to/or within any of the environmentally sensitive areas?						
Cultural heritage site		√				
Protected area		√				
Wetland		√				
Mangrove		√				
Estuarine		√				
Buffer zone of protected areas		√				
Special area for protecting biodiversity		√				
Bay		√				
B. Potential Physical Environmental Impacts during Construction Phase						
Will the Sub-Project cause...						
Loss of agricultural land/ crop?		√				
Impact of Air / Dust pollution?	√				√	Vehicles movement: bus, mini truck, motor cycle, auto rickshaw, taxi, tractor, lorry, private car, human howler and during construction period due to construction activities.
Impact of Noise pollution?	√				√	Vehicles movement: bus, mini truck, motor cycle, auto rickshaw, taxi, tractor, lorry, private car, human howler etc. and during construction period due to construction activities.
Impact on soil, surface and ground waters Pollution? If yes, mentions source?						

⁷Y = Yes, N = No, H=High, M=medium, L=Low

Screening Questions	Impact ⁷					Remarks
	Y	N	H	M	L	
Impacts on surrounding environment due to sanitation and wastes disposal during: construction phase?	√				√	Disposal area available? [√Yes/No] If yes, where: √On-site, Off-site
Impact from construction camp?		√				Camp area available? Yes / No [√]
Construction material storage area		√				
Impact on drainage or create water logging in the area?	√				√	Heavy rainfall cause the water stagnation in the sub-project area 1'-1.5' in June & July in every year.
Is there any flooding problem? Mention frequency & severity.	√				√	1988 - 4'-5', 5-6 Days 2007-1'-2', 1-2 Days 2008 - 3'-4', 2-3 Days
Is there any river erosion? Where & Severity?		√				
C. Potential Biological/ Ecological Environmental Impacts during Construction Phase						
Will the Sub-project cause.....						
Destruction of trees and vegetation?		√				
Impact on pond or fish?		√				
Negative effects on rare, vulnerable, threatened or endangered species of flora & fauna and/ or their habitat?		√				No rare species are found near by the sub-project area.
Negative effects on wildlife habitat, populations, Corridors or movement?		√				No wildlife habitat reported to exist nearby the sub-project area.
Negative effects on locally important or valued ecosystems or vegetation?		√				
D. Potential Socio-Economical Impacts during Construction Phase						
Will the Sub-project cause...						
Involve any land acquisition and involuntary resettlement?		√				
Traffic disturbances due to construction material transport and wastes?	√				√	There is a 4 lane Mirpur 10 main road and an approximate 152 ft. connecting road to warehouse (OPT-1). Moreover the width of the road is 15'3".
Negative effects on neighborhood or community?		√				
Are there any Impediments to movements of people and livestock?		√				
Disturbance to the student to take the lesson in the classroom? If yes, Specify.		√				

Screening Questions	Impact ⁷					Remarks
	Y	N	H	M	L	
Direct or indirect hazards to student for walking in the school campus by construction activities?	√					
Risks and vulnerabilities related to occupational -health and safety due to hazards during construction and operation phase?	√				√	During construction period due to construction activities.
E. Potential Historical & Cultural Impacts during Construction Phase						
Will the sub project cause...						
Degradation or disturbance of historically culturally important site (mosque, graveyards, monuments etc.)? If Yes, Specify.	√					
F. Potential Impacts during Operation & Maintenance Phase						
Will the sub-project activities cause...						
Possible development of labor camp into permanent settlement.	√					Contractor will remove labor camp and will clear the places after completion of construction.
Nuisance at stockpiling areas of construction materials.	√					Contractor will clear the places after completion of construction.
Nuisance at sanitation and waste disposal areas?	√					
G. Existing Environmental & Social Condition around the sub-project						
Air Quality	√				√	Insignificant impact due to earth works, construction material processing, construction activities, vehicle movements etc. would generate fugitive dust particles and hence the level of SPM in the ambient air would increase
Noise Quality.						There is likely insignificant impact of noise pollution due to movement of local vehicles, running of heavy load traffic for construction materials transportation.
Mention sources of drinking water in dry and wet seasons?						Supply water from wasa and Tubewell 15.01%, pond 0.11%, tap 82.08% and others 2.80%
Are there any ponds, khals, beels, haors, baors, rivers, etc. in/around the site? Please specify numbers & names for each.						Nos.-Name-Distance-Direction Ponds: 0 Khals: 0 Beels: 0 Haors: 0 Baors: 0 Rivers: 0 Other:
Surface water (Pond, Khal, Beel, Haor, Baor, River etc.) quality.						Moderately treated

Screening Questions	Impact ⁷					Remarks
	Y	N	H	M	L	
Groundwater Quality.						Fresh water is needed for construction purpose mainly in civil works that will put pressure on aquifer storage.
Soil Quality.						Soil is reasonable
Is there any disaster early warning system? If Yes, by Whom?						Available: UDMC, Micing, TV, TNO, TEO, Red crescent, CPP, Mobile phone SMS etc.

5.2 Assessment of Environmental Screening

The proposed Sub-project (new Warehouse) is not located within any identified environmentally sensitive area, and therefore, does not seem to create any adverse impact on the important environmental features. No significant impact is expected on the ecosystem and biodiversity, no agricultural land/ activities or fish farming will be disturbed, due to the construction of the sub project. Although, some earth excavation work will be involved, no agricultural land or garden have chances to demolish. Moreover, mitigation measures will be taken according to the EMP for minimizing the air, dust, noise, impact of construction materials storage areas and others such as health risk due to combustibility, compression and other mechanical malfunction. Drainage congestion and water logging problems are not found but according to recent information of Banglapedia about Dhaka District extreme floods in past years (1987, 1988, and 1998) extreme floods in past years had created around 2-3 ft water stagnant in the Sub-project area. Plinth level of the Warehouse should be higher than the flood water level. Due to construction activities of this sub-project, one tree will be cut down from 15 no's of trees. Therefore, the Sub-project activities will result minor adverse impact in the environment surrounding the sub project. Moreover, it is a welcome and beneficial project for the local communities.

5.3 Rehabilitation and Resettlement Plan

Resettlement Action Plan (RAP) is not mandatory for this project since the project authority has purchased/leased the lands or has taken permission to use the lands from actual owners/authority. The site is belong to the concern agencies and situated in their premises.

6 ENVIRONMENTAL IMPACTS

6.1 General

This section identifies and predicts the probable impacts on different environmental parameters due to construction of a new 2-storied warehouse (2400 sft). After studying the existing baseline environmental scenario, monitoring environmental parameters, reviewing the process and related statutory norms, detailing the waste management measures, the major impacts can be identified during construction and operation phase. Relevant important aspects of environment are therefore selected which may have significant impacts due to project activities.

6.2 Identification of Impacts

The environmental implications of the predicted impacts may be beneficial or adverse, but the main objective of impact identification is to specify areas that are likely to be affected by the implementation of a sub-project. Environmental impact, by definition, implies an alternation of environmental conditions or creation of a new set of adverse or beneficial environmental consequences caused by the action under consideration. Impact identification starts at the early stage of scoping when data on both the project and surrounding environment are made available. The predicted impacts have been identified by rigorous scientific analysis and expert opinion. The consequences of impact on different resources have been accounted precisely. The following sections describe all the potential impacts (activity wise) on atmospheric environment, water resources, land resources, agricultural resources, fisheries resources, ecosystem resources and socio-economic environment of the surrounding.

6.2.1 Impact on Landform

There will be no noticeable impact in the landform as the proposed 0.055 acres of land for this sub-project is already in developed form.

6.2.2 Impact on Natural Resources

Impact on Water Resources

In construction stage of the warehouse, if runoff of the rain water is occurred from the project area to the surrounding water drains, it may cause deterioration of water quality. So it may be considered as the impact on water resources that is mentioned below.

Impact on Agricultural Resources

Construction has no impact on agricultural resources as there are no agricultural resources in the sub-project site.

6.2.3 Impact on Ecosystems

Flora

During construction phase it has no significant impact on existing trees and vegetation at the sub-project site. This is due to total number of trees observed is 15 in which only one tree will be cut off from proposed location (OPT-1).

Fauna

Construction has no impact on the faunal communities present at the sub-project site.

6.2.4 Impact on Ambient Air

Various activities during construction phase such as earth works, construction material processing, construction activities, vehicle movements etc. would generate fugitive dust particles and hence the level of SPM in the ambient air would increase. This increase in SPM level would be very local and short term and would be limited to the time of construction period only.

Carbon dioxide and nitrogen oxides may be emitted from combustion of the petroleum products in project related vehicles, machinery, and generators etc during the construction period. Their impact

on air quality will not be significant as the pollutant emission activities (point and area sources) will be limited within the project boundary and the activities will be short term (only for construction period). However, this impact may further be minimized by adopting Environmental Management Plan.

6.2.5 Impact on Ambient Noise

It is expected that during construction of the warehouse, the level of noise will increase sharply in the project area. Operation of different machineries and equipments for construction activities, running of heavy load traffic for construction materials transportation, and regular traffic movement may generate noise during construction period. The produced noise may have impact on existing acoustic environment of urban category defined in ECR, 1997. Local inhabitants may feel disturbed due to noise from line sources (traffic movement).

High noise level during construction phase can cause high disturbance to the local community. This can also cause health impacts and increase stress level of the inhabitants of the locality and workers.

6.2.6 Impact on Soil

Generally, construction activities do not include any activities that cause soil pollution. However, Rainfall runoff from the construction site may cause soil pollution if the construction site is not properly managed. If the solid waste and other construction wastes are not properly managed, it may lead to soil pollution.

6.2.7 Impact on Workers Health, Sanitation and Safety

During construction time more security, construction workers and others about 50 people will move to the site. Most of them will come from outside the sub-project site. They have to stay at site. For them more living, washing, kitchen, storing etc purpose temporary facilities have to construct. These will cause more hygienic/sanitation issues if are not properly managed. Due to more movement man and material accidental incidents may increase if safety issues are not strictly maintained. Movement of more river craft may also cause accident if strict rules for movement, loading and unloading man and materials are not carried out. During construction accident may cause if safety rules and regulation are not strictly maintained. Requirement of safe drinking water will increase at site. If smooth supply safe drinking water are not maintained the workers may suffer out of water borne disease. Due to wind and movement of vehicles may cause dust at the site. This may cause problem of the workers and neighboring resident. However it may attract some interested people to visit the site. It would be wise to avoid/discourage those tourists on safety ground.

6.2.8 Solid Waste Disposal

Generation of construction related waste would occur during the construction period of the warehouse. Wastes may be generated from earth works, site establishment, civil construction, stockpile of materials, and domestic household activities. The wastes might be metals, concrete, spoiled construction material, excavated spoils, spilled oil from machinery and vehicles, etc. Moreover, some domestic waste such as food waste, paper etc would be also generated. The waste generated during the construction period can have adverse environmental impacts if not disposed of properly.

If the waste generated during construction period is not disposed of properly, then it will have negative impacts on the ambient environment. Construction activities should be carried out following the environmental rules and regulation for avoiding significant impacts on the environment. Creation of odor would be one of the major problems of not disposing the domestic waste properly. Moreover, it will deteriorate water quality and have adverse impacts on aquatic ecosystem if they are thrown in water stream. Generation and scattered disposal of waste must be controlled for preventing the impacts on physical environmental resources i.e. water, land resources etc.

6.2.9 Social Impact due to Construction of warehouse

The proposed warehouse will be an asset for emergency situation by supplying search and rescue equipments during emergency, as the warehouse will be constructed in the area which is residential as well as highly commercial and almost every building in this area is high rise, so occurrence of man-made disasters like fire hazard, drainage congestion and building collapse etc are increasing rapidly in this area. Moreover the warehouse will be used as Disaster shelter during natural disasters like Earthquake, cyclone, flood etc.

Also the construction activities of the proposed warehouse would offer employment opportunity. Most of the un-skilled labor would be hired. The noise and dust generated from the construction site might disturb the nearest community patches. However, once the boundary wall around the project area is completed, the dust would not reach to nearest community patches. The boundary wall would also attenuate the noise to be generated from construction activities.

6.2.10 Impact due to Transportation of Construction Related Materials

Construction materials will be transported through inland road transport. Moreover the traffic load on the road surface adjacent to Sub-project site during day and night is very high. So, if proper time schedule of incoming and outgoing vehicles to the Sub-project site will not maintain, Traffic congestion and traffic problems will be created. For these reasons, DMP doesn't allow any vehicle containing construction material to enter into the Dhaka city before 10 p.m. and after 7 a.m. The other construction material will be collected from the local suppliers. During transportation of construction material, the following conditions will be followed strictly:

- Loading and unloading of transportation would not create any disturbance to nearby community and other dwellers, do it in such a way
- No stocking of construction material in public place that may cause disturbance to community
- Efficient equipment would be used in handling of construction materials
- No disposal of oil to the near water body
- No disposal of waste into nearest water body
- The transport to be used for transportation should be fuel efficient and in good maintenance
- No cleaning and maintenance of the vehicle will be carried out at project site
- Every material must be covered while carrying to the site through vehicles so that no dust or air pollution may happen
- In the project site, construction material should be kept in dry and clean places
- Cement and reinforcement must be kept under the shed and in dry and high places from ground level
- Other materials must be covered.
- Material transportation time schedule should be maintained strictly

Table 6.1: Environmental Impact Identification Matrix- Construction Phase

Parameter	Physical Environment					Ecological Environment			Human Environment				
	Topography	Hydrology	Water Quality	Air Quality	Noise	Vegetation	Fauna	Aquatic Environment	Displacement	Employment	Service	Health	Culture
Possession of Land													
Site development	P			T		P				T		T	
Civil and Structural Work			T	T	T					T		T	
Mechanical and Electrical Work				T	T					T			
Water Requirement			T										
Transport				T	T								
Immigration													
Employment			T							T	T		T

Here, P – Permanent and T – Temporary, **Immigration**: To come to a place to live there (Kind of migration), **Emigration**: to leave one's place of residence or country to live elsewhere (Kind of migration)

Table 6.2: Environmental Impact Identification Matrix- Operation Phase

Parameter	Physical Environment					Ecological Environment			Human Environment				
	Topography	Hydrology	Water Quality	Air Quality	Noise	Vegetation	Fauna	Aquatic Environment	Displacement	Employment	Service	Health	Culture
Water Requirement													
Liquid Effluent			X					X				X	
Gaseous effluent				X		X						X	
Solid Waste												X	
Hazardous Waste													
Transport				X	X							X	
Operational noise					X							X	
Immigration			X							X	X		X
Employment										X			

Here, **Immigration**: To come to a place to live there (Kind of migration), **Emigration**: to leave one's place of residence or country to live elsewhere (Kind of migration)

7 ENVIRONMENTAL MITIGATION AND MANAGEMENT PLAN (EMMP)

7.1 General Consideration

In the context of the sub-project, the Environmental Mitigation and Management Plan (EMMP) is concerning with the implementation of the measures necessary to minimize or offset adverse impact and to enhance beneficial impacts. The prime function cannot be achieved unless the mitigation and benefit enhancement measures are fully implemented. All measures are said to be successful when they comply with the Environmental Quality Standard (EQS) of Bangladesh. Thus the objectives of EMMP of studied sub-project would be:

- Mitigation measures to reduce and eliminate negative impacts
- Enhancement measures to maximize positive impacts
- Monitoring requirement and monitoring indicators

The main benefits of the environmental mitigation plan are

- Ensuring that environmental standards are met during design, construction, and operation of the project
- Providing offsets to negate project impacts especially ecological impacts, e.g., in the form of compensatory afforestation, greenbelt development and landscaping.

7.2 Water resources conservation plan

Water resources should be conserved and prevented from any pollution and hydrological alteration. The nearby drains should be kept away from any obstruction and waste dumping. If any drain flows through the project area that drains water from outside the project area should be free flowing without any obstruction. Proper guidelines should be developed for Operation & Maintenance of drains.

7.3 Good housekeeping of Construction Related Materials

The construction yard and the site should be managed in such a way that would ensure minimum environmental degradation or damage of the surrounding. The contractor must take responsibility for the construction site to confirm contractual aspects and applicable environmental standards. Unauthorized access from public in the site should be prevented for safety issue. Adequate numbers of bins, sanitary toilet, water supply system, run-on and run-off drains, fire safety and fighting system etc. should be provided in the site. All the construction materials and stockpiles should be maintained within the project area provided with rain and wind protection. Electrocution from general supply of electricity on site or overhead electrical lines contact with on-site cranes or mobile cranes or other trucks should be prevented. A housekeeping team should plan the safety measurements and visit the plant regularly for ensuring safety. An Environment Manager should be employed with responsibility of monitoring the activities which causes any environmental effects and ensuring enforcement of EMP during construction activities.

7.4 Worker's Health and Safety

To ensure a safe working place, the following measures should be ensured:

- Before operating a machine, ensure that the dangerous part of the machine has been installed with a guard
- Avoid going to any area with insufficient lighting as there may be some dangerous places which have not been provided with fencing.
- Keep vigilant all the time and watch out for moving cranes, hooks or other lifting equipment.
- Before using any electrical installation or tool, check the condition of its electric cables.
- Avoid dragging electric cables on the ground or allowing the cables to come into contact with water.
- Using electrical tools installed with an earth leakage circuit breaker.

- Using and handling chemicals with care and following the safety data sheet provided by the chemical suppliers.
- Using of Fall protection during working at height
- The internal roads, sidewalks and walking ways would be demarked properly
- Traffic safety measures should be available within the internal roads of the project sites.
- Regular checking, servicing and maintenance of vehicle should be ensured
- Proper training for the workers on safety
- Use of Personal Protective Equipments (PPE) should be mandatory for all (including the visitors). Applicable PPEs are mentioned in the following table:

Protection	Applicable PPE	Safeguarding for
Hand	xiii) Leather gloves xiv) Electrical resistance gloves xv) Canvas gloves xvi) Hand sleeves	Cuts due to handling Heat radiation Electrical Shock Contact with oil and grease etc Falling of hot slag
Leg	vii) Leg guards viii) Steel toe & Leather safety boots	Welding sparks Striking by objects, fall of objects and stepping on sharp or hot objects Heat radiation, stepping hot or sharp objects and stepping on sharp or hot objects
Eye	iv) Spectacle type goggles with plain shatter proof lens	Foreign bodies entering the eyes and reflected arc rays
Head	i) Fiber helmet	Fall off objects/hitting against objects during construction, maintenance etc
Ear	i) Ear plug or muffs	High noise level
Nose	i) Dust protection mask	Fine dust particles

7.5 Safety at site

Safety at site should be ensured at the construction site. The construction area should be protected by security fencing to prevent any safety threat to nearby community. All the piles should be placed within the boundary of the project with proper protection from wind and rain. All the passage should be keeping clear for all the time. The construction site should be properly lighted. All the lights should be directed to land within the project boundary. It is to be ensured that no light beam is to be directed towards nearby community. Light shed should be used. The Construction site should be equipped with firefighting equipments and firstaid.

7.6 Construction Waste Management

Construction waste should be managed properly. The rate of waste generation should be reduced adopting efficient technique and limiting waste generating activities. The measures for controlling construction waste may include limiting site clearance activities, planned stocking and gathering of construction materials and equipments, fencing around the construction yard, maintaining existing right of way to carry construction materials, banning of waste burning and quality housekeeping. A waste dumping place should be provided with efficient waste collection and disposal techniques. No waste should be dumped to the surrounding rivers. Appropriate measures provided with run-on and run-off system might be constructed from controlling run off from construction yard and liquid waste.

The management plan for construction waste during construction period should include the steps like fencing around the project site, limiting site clearance activities, planned stocking and gathering of construction materials and equipment, covering the stockpiles for protecting them from wind and weathering actions, avoiding waste burning, keeping provision of different colored waste bin, keeping onsite waste collection and disposal system, adopting proper sanitation system for the employees and the workers, quality housekeeping etc. No waste should be dumped/thrown to the river. Recycling and reuse of the waste should be done whenever possible. Hazardous materials, spillage and accidental release should be managed carefully according the hazardous material handling guideline. Moreover,

training should be provided to the employees and the workers/laborers about proper waste management system for increasing their awareness.

7.7 EMP for Preventing Pollution from Construction Site

Dust Control

Construction activities of the plant would generate significant amount of suspended particulate matter. As the sub-project area is residential as well as highly commercial, an efficient dust control plan has to be adopted. The plan would include limiting SPM generating activities, adopting dust suppression system, minimizing base stripping and vegetation clearing activities, covering stockpiles, restricting vehicle speed, avoiding earthen roads for vehicle movement, spraying water regularly to suppress dust etc.

GHG emission control

The construction activities might generate significant amount of GHG also. The GHG emission control plan includes using efficient generator/machineries/equipment, regular maintenance of generators and other machineries, switching off/throttling down generators/ machines/ equipment/ vehicles which are not in use, avoiding the use of ozone depleting substances etc. Moreover, creating thick green belt around the plant is another major step for air quality management as it will help to sequester CO₂.

Controlling Noise

For preserving the acoustic environment and for protecting the nearby inhabitants from the negative impacts of noise pollution during the construction period a noise pollution management plan has to be adopted which would include steps like siting noisy equipments as far away as possible from the settlements, creating temporary barriers or enclosures with sound absorbing materials around the noisy equipment, maintaining the equipments properly.

Moreover, a significant part of construction work should be conducted during night time. The following specific measures should be adopted

- The noisy equipments should be sited as far away as possible from the nearby settlements
- Acoustic hoods/ silencers/ enclosures on all sources of noise generation should be used to decrease the intensity and degree of noise.
- Temporary barriers or enclosures with sound absorbing materials should be built around the noisy equipments
- A significant part of construction work should be conducted during night time
- Steps should be taken to create the boundary wall
- Steps should be taken to create a thick green belt
- The equipments used during the construction phase should be properly maintained as proper maintenance can decrease the level of sound significantly
- For protecting the workers from the adverse impacts of high noise level, personal protective equipments such as air plug/ear mufflers should be provided to them and the use of this protective measure should be made mandatory to the workers who are susceptible to high noise

7.8 Green Belt Development

Development of Green belt along the plant site is essential for safeguarding the nearby community. Proper plantation will enhance scenic beauty of the plant also. Local suitable species is suggested for plantation. Following are the summary points that should be implemented:

- Green belt should be developed around the boundary wall, the open space within the sub-project.
- Different heights of local plant species should give preference for plantation.
- Additional plantation program may take outside the project boundary at road side.
- Four plants Mahogany and other fruit trees should be planted against one cut down trees which has shown in a hand sketch with green circle in below.

Possible locations of Green Belt in Hand Sketch Map

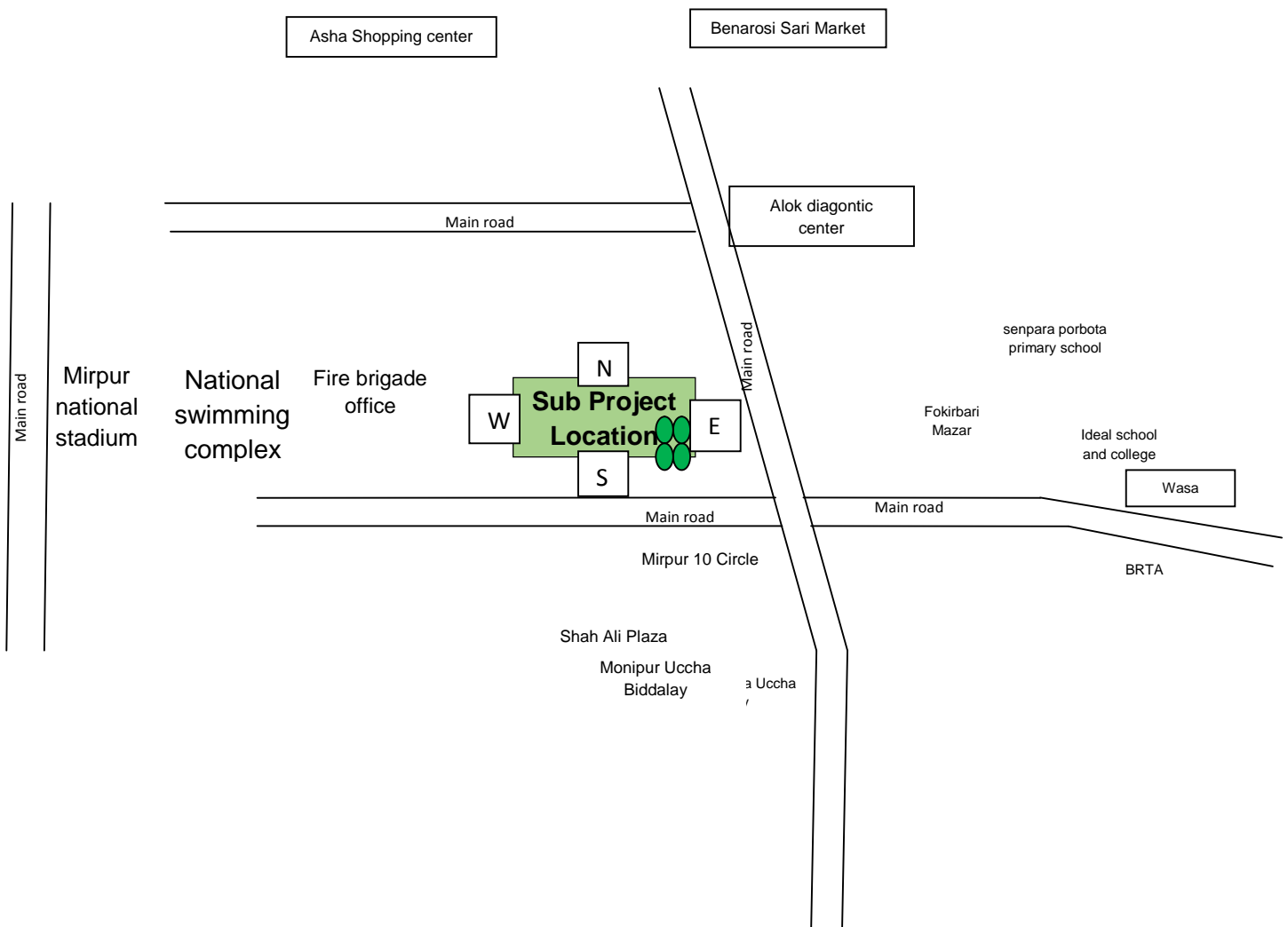


Table 7.2: Environmental Management Plan during Construction Phase

Environmental Component	Potential Impacts	Mitigation measures	Time frame	Location	Responsibility
Water					
Ground Water	Ground Water Contamination	Minimum Extraction of Ground water and Rain water harvesting system develop	Throughout Construction Phase	Project Site	Environmental Monitoring Team of the Project Proponent
Surface water sources	Surface Water Pollution	No disposal of any wastewater directly into outside water bodies. Refueling, washing and maintenance of plant and vehicles will be prohibited in the vicinity of the river and water bodies.	Throughout Construction Phase	Project Site	Environmental Monitoring Team of the Project Proponent
Drinking Water Requirement	Increase local demand	Arrange water without affecting local requirement	Throughout Construction Phase	Project Site	Environmental Monitoring Team of the Project Proponent
Wastewater from Workers' camp	Pollute the surface water	Ensure proper sanitation and drainage. No direct discharge of wastewater in the river. The construction workers at site will be provided with proper sanitation arrangement. The workers colony houses for foreign workers will have sanitary latrines to treat sanitary waste.	Throughout Construction Phase	Project Site	Design consultant and Project Proponent
Air and Noise					
Dust Generation	Increase dust in the air	Spraying of water wherever required. All stock pile materials which can blow to contribute to airborne dust will be covered with canvas or plastic sheets during windy season. The vehicle should be covered while transporting the materials.	Throughout Construction Phase	Project Site	Environmental Monitoring Team of the Project Proponent
Gaseous Emission from Construction work vehicles	Pollute the Air	Ensure checking of vehicular emission and obtaining Pollution Under Control Certificate	Throughout Construction Phase	Project Site and surroundings	Environmental Monitoring Team of the Project Proponent
Noise from machineries and construction	Increase Noise level	Ensure machineries meeting noise level standards. Noise levels of machineries used shall conform to relevant standards prescribed in Environment Conservation Rules, 1997. Silencers and mufflers of machineries will be regularly inspected to control	Throughout Construction Phase	Project Site	Environmental Monitoring Team of the Project Proponent

Environmental Component	Potential Impacts	Mitigation measures	Time frame	Location	Responsibility
		noise generation.			
Land					
Disruption of Earth Surface	Become a hazard	Earth work should be kept minimum and adequate drainage system should be developed	Throughout Construction Phase	Project Site	Environmental Monitoring Team of the Project Proponent and DOE
Solid Waste from construction work	Deteriorate the environment	Ensure dumping at preselected location	Throughout Construction Phase	Project Site	Project Proponent
Others					
Occupational Health & Safety	May create risk for the workers	All relevant rules for protection of health and safety of the workers will be rigorously followed. All contractors will be made aware of this responsibility. Proper restriction signs and other methods should be applied to prevent unwanted entry of people.	Throughout Construction Phase	Project Site	Design consultant and Environmental Monitoring Team of the Project Proponent
Labour Condition	Increase labour scope	Bangladesh has ratified key International Labour Organization (ILO) conventions to ensure the work conditions are reasonable and safe, and employees are free from any types of discrimination.	Throughout Construction Phase	Project Site	Project Proponent
Traffic	Increase traffic at the locality	There shall be a continuous vigil to see that the regular local traffic is not disturbed and the personnel to guide the construction vehicles to the site without causing any traffic jam	Throughout Construction Phase	Project Site and surroundings	Project Proponent
Socio-economic	Improve the condition	Various environment awareness programmes shall be organized by management committee on regular basis to bring forth the beneficial aspects of the project at local level. A management committee shall take keen interest in public participation and expectations of the local people for improving quality of life during planning of welfare activities under CSR plan. The committee shall identify eligible people for jobs in construction and lower level administrative jobs by noting their literacy level, extent of need, availability of means etc. Or the committee should confirm the employment of	Throughout Construction Phase	Project surroundings	Environmental Monitoring Team of the Project Proponent

Environmental Component	Potential Impacts	Mitigation measures	Time frame	Location	Responsibility
		local people by subcontractors.			
Influx of workers	Generation of sewage and solid waste	Construction of sanitary latrines and septic tank system Erecting “no litter” sign, provision of waste bins/cans, where appropriate Waste minimization, recycle and reuse (as required) Proper disposal of solid waste	Throughout Construction Phase	Project Site	Environmental Monitoring Team of the Project Proponent
	Possible spread of disease from workers	Clean bill of health a condition for employment Regular medical monitoring of workers			
Transportation of equipment, materials and personnel; storage of materials	Deterioration of air quality from increased vehicular movement, affecting people in the surrounding areas	Keeping vehicles under good condition, with regular checking of vehicle condition to ensure compliance with national standards and EHS guidelines (where applicable)	Throughout Construction Phase	Project Site	Environmental Monitoring Team of the Project Proponent
	Wind-blown dust from material (e.g. fine aggregate) storage areas	Spraying of water in the access road Sprinkling and covering stock piles Covering top of trucks carrying materials to the site.			
Site clearance	Topographic change by cutting existing trees, shrubs, herbs, and filling land	Adopt such type design as is required minimum cutting of trees, shrubs, herbs, and low-land filling Use waste shrubs, herbs as organic fertilizers Adopt required measures to prevent waste shrubs, herbs as fuel to cook or for any localized burning purpose.	Throughout Construction Phase	Project Site	Environmental Monitoring Team of the Project Proponent
Noise from construction equipment operations and maintenance	Noise could exceed the allowable limit and result in hearing loss.	Avoiding, as much as possible, construction equipment producing excessive noise Avoiding prolonged exposure to noise by workers Creating a buffer zone by introducing green belt around the project site Follow construction scheduling to avoid evening and night time disruption	Throughout Construction Phase	Project Site	Design consultant and Project Proponent

Dust and exhaust gases from construction machinery and vehicles	Increased SPM, PM 2.5, PM 10, NOx, SOx levels at construction sites, and surrounding areas.	Try to avoid using equipment such as stone crushers at site by purchasing ready-mix construction mixture (sand, cement and gravel) Immediate use of construction spoils as filling materials Immediate disposal/sale of excavated materials Continuous watering of bare areas	Throughout Construction Phase	Project Site	Environmental Monitoring Team of the Project Proponent
Fires, explosion and other accidents	Risk of human health and property damage	Use of personal protective equipment during construction and maintenance. Prepare and implement safety and emergency manual Regular inspection of lines for faults prone to accidents Provision of fire protection equipment. Provision of lightening arrestors	Throughout Construction Phase	Project Site and surroundings	Environmental Monitoring Team of the Project Proponent

Table 7.3: Environmental Management Plan during Operation Phase

Environmental Component	Potential impacts	Mitigation measures	Time frame	Location	Responsibility
Wastewater	Generation of steam, oily water, sludge containing water, cooling water, domestic and floor washing wastewater	No discharge of untreated wastewater outside the municipal drainage. Monitoring of wastewater quality before and after discharge.	Throughout Operation Phase	Project site and surrounding	Environmental Monitoring Team of the Project Proponent
Gaseous Pollution	NOx generation from the engine, which can negative	Dispersion through high stack, Use of Low NOx burner	Throughout Operation Phase	Project site	Environmental Monitoring Team of the Project Proponent
Air Quality	Suspended particulate matter (SPM) and PM2.5, PM1 0 generation from the engine, which can adversely affect health	Regular Monitoring according to the schedule	Throughout Operation Phase but maintaining 3 months interval	Ambient Air Quality	Environmental Monitoring Team of the Project Proponent and DoE
Emission Quality	CO and VOC, which can negatively affect health	Regular Stack emission monitoring according to the schedule	Throughout Operation Phase but maintaining 3 months interval	Project site	Environmental Monitoring Team of the Project Proponent and DoE
Noise	Generation of noise from generators and associated substations, which could exceed 70 dB(A) at site boundary.	All machineries shall follow relevant noise regulations. Boilers, generators and compressors shall be installed in buildings equipped with acoustic walls and enclosures. Regular noise monitoring according to the schedule.	Throughout Operation Phase but maintaining 3 months interval	Project site	Environmental Monitoring Team of the Project Proponent and DoE
Solid Waste	Generation of oily solid waste, plastic waste and other solid wastes.	Disposal at preselected site, Segregate wastes and dispose hazardous wastes to authorized contractors only.	Throughout Operation Phase	Project site	Environmental Monitoring Team of the Project Proponent
Occupational Health and Safety	Occupational health hazard due to different operation processes	Maintain all safety provisions related to plant operation and hazardous chemicals. Train all employees working in hazardous area for safety norms.	Throughout Operation Phase	Project site	Environmental Monitoring Team of the Project Proponent

		First aid kit to be made available. Medical aid to be available on the site. All subcontractors to follow the health and safety rules. They should be trained for that. Display of proper sign boards for health and safety in and around the plant complex.			
Fire Safety	Little possibility for firing due to welding activities produce lot of heat in welding arc	All employees to be trained for fire safety rules. Mock safety drills to be performed in regular intervals. Disaster Management Group to be made ready for all situations. Regular check for offsite helps.	Continuous Process	Project site	Project Proponent
Socio-economic	As there are no religious, cultural or historic places near the site, so the noise and air pollution from the operation of the project would not create any potential impact.	A management committee shall regularly monitor the implemented welfare activities and progress of Corporate Social Responsibilities (CSR) programme. The committee should confirm the employment of local people during operation and maintenance phase of the project activity and Keep local people informed about the demands for new jobs in the project	Throughout Operation Phase	Project surroundings	Project Proponent

7.9 Emergency Preparedness Plan

Emergency Preparedness Plan (EPP) is the process of preparing for, mitigating, responding to and recovering from an emergency. EPP is a dynamic process. Planning, though critical, is not the only component. Training, conducting drills, testing equipment and coordinating activities with the community are other important functions. The detail EPP is described as follows.

Key Persons and Their Roles during an Emergency Situation

Project Manager will

- Work as contact person and observe the situation.
- Keep in touch with local administration and head office.
- Deal with police, media and outside enquiries in consultation with Site Controller.
- Arrange for refreshments if required.
- Observe the traffic movement inside the project area and arrange for alternative transport if required.
- Monitor the record keeping of attendance of workers, staff, contractor's personnel, and visitors at the Gate which will act as Assembly Point.

Shift Supervisor will

- Act as Site controller for the time being.
- As soon as becomes aware of the emergency and its location, he will proceed to the site.
- Assess the scale of the incident and directs to stop operations within the affected areas.
- Contact and inform the Site Controller and Incident Controller immediately. Till their arrival he will continue to perform their duties.
- Contact the departmental head to act as incident controller and guide Safety Officer and Security Officers for containing the damage.
- Call the Medical Officer to the plant if necessary.

Site Controller will

- Ensure that all members of his/her team have been informed to assemble at Emergency Control centre. He/She will then proceed to Emergency Control Centre to take charge.
- Attend to telephone
- Keep in touch with incident controller
- Communicate with Assembly Points
- Meet outside emergency services
- Ensure proper flow of traffic and security
- Meet media/ other people coming at site from outside.
- Arrange for Medical Aid

Incident Controller will

- Direct all efforts to contain and control the incident.
- Keep non-essential persons away from the site.
- Guide outside emergency services at the site.
- Arrange to remove any casualties at the site.
- Keep in touch with Emergency Controller.

Security In-Charge will

- Actuate the Emergency Siren, if not done already.
- Send one guard to start the fire pump.
- Attend to incoming telephone.
- Await instructions from the Emergency Controller

Communication Officer

Public Relations Officer will act as Communication Officer. On hearing alarm, he will proceed to Emergency Control Centre.

- Maintains communication with Incident Controller and Deputy Incident Controller.
- Recruits suitable staff to act as messengers if telephone and other communications fail.
- Organizes all requirement of Emergency Control Centre.
- Arranges Food, Transport, and Nursing Home etc.

Safety Officer will

- Assist the Incident Controller with his special knowledge on the safety aspects in the factory. He will help to identify the hazardous chemicals, hazard zones and zone of probable impact in different accident scenarios.
- Select people with special training in safety matters to assist in the control activities.

Fire and Security Officer

- His main task is fire fighting and control.
- Announce through PAS about the incident zone and any other immediate information needed for the people nearby.
- Maintains liaison with the Fire Brigade team from outside.

Medical Officer will

- Immediately open a First Aid Centre at Control Centre or at Assembly Point.
- Take up the full responsibility of providing medical assistance during emergency.
- Arrange for outside medical help if required.

Telephone Operator

- On hearing the emergency alarm, he/she will immediately contact Site Controller.
- On the advice of Site controller/Incident Controller/Security Officer will ring Fire brigade, Police etc.
- Keep telephone board free for urgent communications.

General Employees

Who have not been specified a duty in case of emergency should proceed to/contact the Emergency Assembly Point in their area. Designated persons will carry out the actions detailed in the Individual Plant Emergency Procedure. The Roll Call leader will hold a Roll call. Personnel not at their normal work place must go to the emergency assembly point. Personnel will remain at these points and await instructions from the Site Controller.

Contractor's Employees

Contractor's employees will be instructed in the Emergency Procedures before commencing work on this site. They will report to the emergency assembly point on this site. Personnel Manager will guide them in case a major decision likes evacuation from the project site if required.

Visitors

Infrequent visitors are registered on each visit. They will be given a visitors pass which includes an emergency action statement. The responsibility for visitors in emergency situation rests with the person being visited.

Fire Design and Alarm Monitoring Measures for the Whole Plant

Fire design is based on approach of “prevention first, combined with fire measures”, firmly implementing related fire design standards and regulations according to specific situation of this project. Prevention measures shall be mainly taken into account by different professionals when selecting and arranging equipments and devices according to characteristic of different system flow, in order to prevent occur and spread of fire. Automation fire alarm monitoring device shall be applied for important buildings and equipments. Additionally, other measures such as separation and block shall be applied for fire-prone areas, in order to prevent fire spreading to nearby area.

Fire Water Supply System

In order to ensure a safe, reliable and manageable fire water supply system, a high-pressure fire water supply system with pressure regulators shall be applied for this project, preventing fire water being put to other use and making sure that fire water quantity and water pressure shall not be influenced due to leakage of other water consumption points when fire occurs.

Fire Drainage

Drainage of indoor fire hydrants and automatic sprinkler system shall be collected by indoor underground waste water system and then transferred to outdoor rain water system. Drainage of outdoor hydrants shall be collected by outdoor rain water system.

Fire Extinguishers

Selection and allocation of fire extinguishers for all kinds of buildings and structures shall be in accordance with the “Code for design of extinguisher distribution in buildings”. Main power building shall be equipped with portable CO₂ fire extinguishers, portable powder fire extinguishers, CO₂ trolley fire extinguishers and powder trolley fire extinguishers.

Risk Management Strategy

For the project risk management strategy is significant for minimizing risk. The following can be considered before formulating such strategy:

- The flammability of the process material
- Monitoring the state of reactions-particularly in enclosed vessels- to ensure that the remain within specified limits and do not become dangerous
- The amount of waste produced by the process- how to minimize it - how to dispose and
- Measures to ensure that emissions remain within acceptable environmental limits.

After extensive literature review of natural gas based power plant the following best practices can be adopted for risk management on site:

- Safety measures are to be maintained at their expected level of performance and their good condition to be regularly ensured
- Strict ignition control shall be ensured
- Regular maintenance and inspection should be performed
- Ensure availability and effectiveness of Fire & Gas detecting system and the emergency alarm system and means of communication, which would enable early warning to all personnel in the event of accidental release and subsequently enable all personnel to take appropriate action.

Table 7.4: Safety Hazard Prevention-Control Mitigation Measures

Event	Prevention, Control and Mitigation Measures
1. General Instruction of Workers	1. Personal and continuous visual supervision of the worker who is not competent to perform the job. 2. Workers to be conversant on the codes and standards of safety

Event	Prevention, Control and Mitigation Measures
	3. Workers must be confident that they have adequate training on handling or unsafe hazards material.
2. Maintenance of Equipment	<p>1. Employer shall ensure that all equipment used on a work site is maintained in a condition that will not compromise the health and safety of workers using or transporting the equipment.</p> <p>2. Will perform the function for which it is intended or was designed</p> <p>3. Is of adequate strength for that purpose.</p> <p>4. Is free from potential defects.</p>
3. Traffic Hazard	<p>1. Where there is a danger to workers from traffic, an employer shall take appropriate measures to ensure that the workers are protected from traffic hazards.</p> <p>2. Ensure that workers who are on foot and who are exposed to traffic hazards on traveled rural roads wear reflective vests or alternative clothing that is clearly distinguished.</p> <p>3. Where the operator of vehicle does not have a clear view of the path to be traveled on a work site, he shall not proceed until he receives a signal from a designated signaler who has a clear view of the path to be traveled.</p>
4. Illumination	<p>1. Ensure that illumination at a work site is sufficient to enable work to be done safely.</p> <p>2. Where failure of the normal lighting system would endanger workers, the employer shall ensure that emergency lighting is available that will generate sufficient dependable illumination to enable the workers to</p> <ul style="list-style-type: none"> a) Leave the work site in safety b) Initiate emergency shutdown procedures c) Restore normal lighting
5. House keeping	<p>1. Ensure that each work site is clean and free from stepping and tripping hazards</p> <p>2. Waste and other debris or material do not accumulate around equipment, endangering workers</p>
6. Falling Hazards	1. Ensure that where it is possible for a worker to fall a vertical distance greater than 3.5 meters the worker is protected from the falling by guard rail around the work area a safety net fall arresting device
7. Overhead power Lines	1. Ensure that no worker approaches and that no equipment is operated and no worker shall approach or operate equipment, within 7 meters of a overhead power line.
8. Sanitary facilities & drinking water	<p>1. Ensure that an adequate supply of drinking fluids is available at the work site.</p> <p>2. Ensure that work site is provided with toilet facilities in accordance</p>

Event	Prevention, Control and Mitigation Measures
	with the requirement of general health protection guidelines.
9. Working proper clothing	4. Ensure that where is a possibility that a worker or worker's clothing might come in to contact with moving parts of machinery, the worker: <ul style="list-style-type: none"> . wears close-fitting clothing . confines or cuts short his head and facial hair . avoids wearing jewelry or other similar items
10. Head protection	1. Ensure that during the work process adequate alternative means of protecting the workers head is in place.
11. Eye protection	1. Where there is a danger of injury to or irritation of a worker's eyes, his employer shall ensure that the worker wears properly fitting eye protective equipment.
12. Foot protection	1. Where there is a danger of injury to a worker's feet, ensure that the worker wears safety footwear that is appropriate to the nature of the hazard associated with particular activities and conditions.
13. Respiratory protective equipment	1. Where the worker is exposed to hazards gases, gums, vapors, or particulates appropriate respiratory protective equipment to be supplied.
14. Testing & commissioning	13. Mobilize test rigs at site 14. Ensure that the test equipment is in good condition 15. Ensure other equipment and facility conforms to the approved specification of test. 16. Public notice to be served before testing.

8 ENVIRONMENTAL MONITORING PLANS

Environmental monitoring is an essential tool in relation to environmental management as it provides the basic information for rational management decisions. The prime objectives of monitoring are-

- To check on whether mitigation and benefit enhancement measures are actually being adopted and are providing effective in practice.
- To provide information on the actual nature and extent of key impacts and the effectiveness of the mitigation measures which, through a feedback mechanism, can be taken into account in the planning and execution of similar projects in future.

The sub-project authority should have provision of Environmental quality and safety department for monitoring the environmental management plan implementation during construction and operation phase of the project. The environmental monitoring officer should monitor the environmental management plan implementation and submit a quarterly report to the concerned department. Key components of environmental monitoring plan are described in the following subsections.

8.1 Ambient air monitoring

During the construction phase, ambient air quality will be monitored by active sampling and measurement for SPM, SO_x, NO_x, CO, toxic gases at the same locations used during the baseline study. During construction of the facility, air emissions may result from fuel or oil burning due to equipment failure. Leakages should be checked by visual inspection at the start of every shift. Monitoring plan for ambient air is presented in following table.

Area of Monitoring	Indicators	Monitoring Location	Monitoring Apparatus	Frequency
Monitoring Ambient Air Quality	SPM	Four edges of the project boundary, one sample from 1 km downwind from the project boundary	SSPM-100 sampler	On a monthly basis
	SO _x , NO _x , CO, toxic gases	Project site, 2km upwind and 2km down wind direction	Bacharach ECA 450 sensors and compact sample conditioner for SO _x , NO _x measurement, Fluke CO-220 Carbon Monoxide Meter for CO measurement	Quarterly

8.2 Meteorological monitoring

During construction phase the collection of representative meteorological data (e.g., wind speed and direction, precipitation, temperature, humidity, and atmospheric pressure) is very useful to predict weather conditions of plant site. Meteorological data also useful to assess the possibility of natural calamities specially Cyclone, Storm surge etc so that precautions and measures in contingency plan will be taken within due time. Monitoring plan for meteorological parameters is presented in following table.

Area of Monitoring	Indicators	Monitoring Location	Monitoring Apparatus	Frequency
Meteorological monitoring	Wind speed and direction, precipitation, temperature, humidity, and atmospheric pressure	Within the project boundary	Hygrometer for humidity, Anemometer for wind speed and direction, Temperature Sensor for temperature, Rain gauge for precipitation and Mercury barometer for atmospheric pressure measurement	Quarterly

8.3 Ambient noise monitoring

Noise levels at the facility site during construction must comply with relevant national and international legislation. Site staff will monitor noise levels and take any remedial measures that prove necessary to reduce disturbance to nearby local residents. At locations where the possibility of noise level exceeds the standard limit such as ongoing pile-driving activities, excavation, cut and fill, erection of temporary stores etc. noise levels shall be checked at least weekly (using a Type II sound level meter). Monitoring plan for ambient noise is presented in following table.

Area of Monitoring	Indicators	Monitoring Location	Monitoring Apparatus	Frequency
Monitoring Ambient Noise	Noise level	four corner point inside the boundary, middle point of the project boundary	Digital Sound Level Meter- AR814	Monthly basis

8.4 Surface water monitoring

During the construction phase, monitoring will be conducted to the sub-project site surrounding surface drains. Parameters to be sampled every two months during this phase are Temperature, pH, EC, DO, BOD, COD, TSS, TDS, Salinity. Samples should be taken at the point of any discharge into the receiving water drain. Monitoring plan for surface water is presented in following table.

Area of Monitoring	Indicators	Monitoring Location	Monitoring Apparatus	Frequency
Monitoring Surface water quality	Temperature, pH, EC, DO, BOD, COD, TSS, TDS, Salinity	Different points on surface drains	Thermometer for Temperature, pH meter for pH, SMP350 EC meter for EC, DO meter for DO, Salinity meter for Salinity measurement. Also BOD, COD, TSS, TDS are measured by laboratory analysis	Every two months

8.5 Solid waste monitoring

During the construction phase, wastes may be generated from earth works, site establishment, civil construction, stockpile of materials, and domestic household activities. The wastes might be metals, concrete, spoiled construction material, excavated spoils, spilled oil from machinery and vehicles, etc. Moreover, some domestic waste such as food waste, paper etc would be also generated. Monitoring is required to ensure proper management of this waste. Solid and hazardous waste quantities and destination (final disposal) will be documented by the Contractor and the records handed over to authority after commissioning, to demonstrate compliant handling and disposal. Monitoring plan for solid waste is presented in following table.

Area of Monitoring	Indicators	Monitoring Location	Monitoring Apparatus	Frequency
Monitoring Solid waste	Construction and domestic wastes	Project area and labor shed	Visual observation and regular checks	Monthly basis

8.6 Workers health and safety monitoring

During construction and erecting plants and machineries may cause accident. Records of all health risk/workplace accidents will be documented and archived, in accordance with the Project health and safety Plan developed by the Contractor. This should include “near miss”, “incident” and “accident”. A baseline medical check-up for all employees (prior to commencing employment) will be conducted. Monitoring plan for Workers health and safety is presented in following table.

Area of Monitoring	Indicators	Monitoring Location	Monitoring Apparatus	Frequency
Workers health and safety monitoring	Health, Safety, awareness	Proposed industrial complex	Visual observation and regular checks	On a monthly basis

8.7 Community health monitoring

The local community may feel disturbed if the Health, safety and environmental (HSE) issues are not properly maintained during construction. On the other hand If HSE and corporate social responsibilities are maintained; there will be positive impact from the local community on the project. So continuous Community safety, health, CSR program, Security monitoring is very important. Monitoring plan for Community health is presented in following table.

Area of Monitoring	Indicators	Monitoring Location	Monitoring Apparatus	Frequency
Community health monitoring	Community safety, health, CSR program, Security, compliance to applicable social and environmental rules, etc.	Proposed industrial complex, nearest community	Visual observation and regular checks	On a monthly basis

8.8 Ecosystem Monitoring

Five samples from homestead ecosystem (at least 2 at down wind direction) within 5 km radius area 5 Samples from Road side plantation including 2 at downwind direction within 5 km radius area should be collected during monitoring. Monitoring plan for ecosystem is presented in following table.

Area of Monitoring	Indicators	Monitoring Location	Monitoring Apparatus	Frequency
Ecosystem monitoring	Avifauna, Fish habitat status, Fish biodiversity, Fish production	Ramna Lake area of the project	Visual observation and regular checks	Quarterly
	Plant health and productivity of fruiting plants surrounding the project area	Selected sites within 10km radius area of the project	Visual observation and regular checks	Quarterly

8.9 Responsibility Matrix

Area of Monitoring	Implementing Agency
Ambient air monitoring	DNCC
Ambient noise monitoring	DNCC
Surface water monitoring	DNCC
Solid waste monitoring	DNCC / Contractor
Workers health and safety monitoring	DNCC / Contractor
Community health monitoring	DNCC / Contractor
Ecosystem (Flora, Fauna) monitoring	DNCC

8.10 Estimated Budget for Monitoring Plan for One Year

S/N	Issues	Unit cost (Lac BDT)	Monitoring time in a Year	Total cost (Lac BDT)
25.	Ambient air monitoring	0.25	1	0.25
26.	Meteorological monitoring (secondary source) i.e. Air Temperature, Humidity, Rain Fall, Wind Velocity etc	-	4	-
27.	Ambient noise monitoring	0.1	2	0.2
28.	Surface water monitoring	0.25	1	0.25
29.	Solid waste monitoring	-	12	-
30.	Workers health and safety monitoring	0.05	6	0.3
31.	Community health monitoring	0.1	1	0.1
32.	Ecosystem (Flora, Fauna) monitoring	0.05	2	0.1
Total Monitoring Cost				1.2

9 CONTRACTOR OBLIGATIONS

Construction project management (CPM) is the overall planning, coordination, and control of a project from beginning to completion. CPM is aimed at meeting a client's requirement in order to produce a functionally and financially viable project. A contractor is assigned to a construction project once the design has been completed by the person or is still in progress. This is done by going through a bidding process with different contractors. The contractor is selected by using one of three common selection methods: low-bid selection, best-value selection, or qualifications-based selection.

A construction manager should have the ability to handle public safety, time management, cost management, quality management, decision making, mathematics, working drawings, and human resources.

The functions of construction management typically include the following:

13. Specifying project objectives and plans including delineation of scope, budgeting, scheduling, setting performance requirements, and selecting project participants.

14. Maximizing the resource efficiency through procurement of labor, materials and equipment.
15. Implementing various operations through proper coordination and control of planning, design, estimating, contracting and construction in the entire process.
16. Developing effective communications and mechanisms for resolving conflicts.

The Construction Management Association of America (a US construction management certification and advocacy body) says the 120 most common responsibilities of a Construction Manager fall into the following 7 categories: Project Management Planning, Cost Management, Time Management, Quality Management, Contract Administration, Safety Management, and CM Professional Practice. CM professional practice includes specific activities, such as defining the responsibilities and management structure of the project management team, organizing and leading by implementing project controls, defining roles and responsibilities, developing communication protocols, and identifying elements of project design and construction likely to give rise to disputes and claims.

Contractor Obligation for Construction Activities for the Urban Resilience Project-DNCC Part (With Budget)

S/N	Environmenta l Issue	Objective	Suggestion for the Contractor	Proposed Budget (BDT)	Remarks
61.	Minimizing Erosion	To minimize the quantity of soil lost during construction due to land-clearing	<ul style="list-style-type: none"> • Schedule measures to avoid and reduce erosion by phasing the work program to minimize land disturbance in the planning and design stage. • Keep the areas of land cleared to a minimum, and the period of time areas remain cleared to a minimum • Base control measures to manage erosion on the vulnerability of cleared land to soil loss, paying particular attention to protecting slopes. • Mulch, roughen and seed cleared slopes and stockpiles where no works are planned for more than 28 days, with sterile grasses. • Keep vehicles to well-defined haul roads. • Rehabilitate cleared areas promptly 	0.00	No separate budget is assigned for any of the proposed sites as those are regular standard practice for the Contractors
62.	Storm water Management	To minimize the generation of contaminated storm water	<ul style="list-style-type: none"> • Minimize the quantity of uncontaminated storm water entering cleared areas • Establish cut-off or intercept drains to redirect storm water away from cleared areas and slopes to stable (vegetated) areas or effective treatment installation • Reduce water velocities, if needed 	0.00	No separate budget is assigned for any of the proposed sites as those are regular standard practice for the Contractors
63.	Sediment Controls	To minimize the impact of contaminated storm water on receiving waters	<ul style="list-style-type: none"> • Install erosion and sediment control measures, if possible before construction commences • Identify drainage lines and install control measures to handle predicted storm water and sediment loads generated in the mini catchment. • Establish an adequate inspection, maintenance and cleaning program for sediment run-off control structures. • Ensure that contingency plans are in place for unusual storm events. • Continually assess the effectiveness of sediment control measures and make necessary improvements. 	0.00	No separate budget is assigned for any of the proposed sites as those are regular standard practice for the Contractors

S/N	Environmental Issue	Objective	Suggestion for the Contractor	Proposed Budget (BDT)	Remarks
64.	De-Watering Work Sites	To ensure that de-watering operations do not result in turbid water entering natural waterways	<ul style="list-style-type: none"> • Treat contaminated water pumped into the storm water system or a natural waterway to remove sediment if the turbidity exceeds 30 NTU. • Ensure that the level of suspended solids in waters pumped into natural waterways never exceeds the regulatory water quality standard. • De-water by pumping water, wherever practical, on to vegetated area of sufficient width to remove suspended soil, or to sediment control devices. • Supervise all pumping and implement precautions to ensure that turbidity of pumped water is minimized. • Monitor every hour during a pumping operation the turbidity of water pumped directly to a natural waterway or a drainage system discharging to a natural waterway. 	10,000.00	None of the proposed site is needed such type of management measures. However, if the situation demand for any site, the contractor can demand for BDT 10,000.00 for the management of the situation.
65.	Dust Control	To ensure there is no health risk or loss of amenity due to emission of dust to the environment	<ul style="list-style-type: none"> • Implement a dust prevention strategy, developed at the project planning stage • Take dust suppression measures, such as promptly watering exposed areas when visible dust is observed • Install wind fences wherever appropriate 	0.00	No separate budget is assigned for any of the proposed sites as those are regular standard practice for the Contractors
66.	Management of Stockpiles	To manage stockpiles so that dust and sediment in run-off are minimized	<ul style="list-style-type: none"> • Minimize the number of stockpiles, and the area and the time stockpiles are exposed • Keep topsoil and under burden stockpiles separate • Locate stockpiles away from drainage lines, at least 10 meters away from natural waterways and where they will be least susceptible to wind erosion • Ensure that stockpiles are designed with slopes no greater than 2:1 (horizontal/vertical) • Stabilize stockpiles that will remain bare for more than 28 days by covering with mulch or anchored fabrics or seeding with sterile grass 	0.00	No separate budget is assigned for any of the proposed sites as those are regular standard practice for the Contractors

S/N	Environmental Issue	Objective	Suggestion for the Contractor	Proposed Budget (BDT)	Remarks
			<ul style="list-style-type: none"> Establish sediment controls around unsterilized stockpiles Suppress dust on stockpiles and batters, as circumstances demand 		
67.	Working In Waterways and Floodplains	To minimize stress on aquatic communities when working in a waterway	<ul style="list-style-type: none"> Plan in-stream works so that the contact time is minimized Establish special practices so that impacts on the waterway and disturbance of its banks are minimized Stabilize banks and in stream structure so that they do not contribute to the sediment load Maintain minimum flows to ensure the viability of aquatic communities and ensure that there are no barriers to the passage of fish up and downstream Avoid times of the year when environmental damage is expected to be highest Construct in-stream crossings during low flows, designed to be stable under expected vehicle loads and flow regimes that do not contribute to the sediment load in the stream Design crossings so that drainage off the crossing does not contribute sediment load to the stream. Prepare a contingency plan for high-rain events. Prepare a reinstatement plan if work in a stream is planned or the structure of a waterway will be altered. 	0.00	None of the proposed site is needed such type of management measures. However, no separate budget is assigned if the situation demand for any of the proposed sites as those are regular standard practice for the Contractors
68.	Noise and Vibration	To ensure nuisance from noise and vibration does not occur	<ul style="list-style-type: none"> Fit and maintain appropriate mufflers on earth-moving and other vehicles on the site Enclose noisy equipment Provide noise attenuation screens, where appropriate Where an activity is likely to cause a noise nuisance to nearby residents, restrict operating hours to between 7 am and 6 pm weekdays and 7 am to 12 pm Friday, except where, for practical reasons, the activity is unavoidable Noise should not be above background levels inside any adjacent residence between 10 pm and 7 am Advise local residents when unavoidable out-of-hours work will 	0.00	No separate budget is assigned for any of the proposed sites as those are regular standard practice for the Contractors

S/N	Environmental Issue	Objective	Suggestion for the Contractor	Proposed Budget (BDT)	Remarks
			<p>occur.</p> <ul style="list-style-type: none"> • Schedule deliveries to the site so that disruption to local amenity and traffic are minimized • Conduct a study on the impact of ground vibration from construction activities, where these operations occur within 50 meters of a building and take appropriate action • Minimize air vibrations 		
69.	Waste Minimization	To minimize the waste load discharged to the environment	<ul style="list-style-type: none"> • Carry out a waste minimization assessment which examines opportunities for waste avoidance reduction, reuse and recycling. • Reduce wastes by selecting, in order of preference, avoidance, reduction, reuse and recycling. • Incorporate waste minimization targets and measures into the environmental management plan. 	0.00	No separate budget is assigned for any of the proposed sites as those are regular standard practice for the Contractors
70.	Contaminated Material and Wastes	To ensure that all contaminated material uncovered on a construction site are excavated and disposed of in an environmentally responsible manner	<ul style="list-style-type: none"> • Assay material uncovered on-site prior to disposal. If the wastes include putrescible wastes, then also analyze leachate and landfill gases. • Excavate material in a manner which avoids off-site environmental problems. • Seal remaining contaminated material or wastes, where only part of the tip has been excavated, to ensure that there is no off-site effect now or in the future. • Transport odorous wastes in covered vehicles. • Dispose of contaminated material in a landfill licensed to take the type of contaminated material or wastes uncovered. 	0.00	No separate budget is assigned for any of the proposed sites as those are regular standard practice for the Contractors
71.	Air Quality	To ensure there is no health risk or loss of amenity due to emission of exhaust gases to the environment	<ul style="list-style-type: none"> • Ensure that all vehicles and machinery are fitted with appropriate emission control equipment, maintained frequently and serviced to the manufacturers' specifications. • Smoke from internal combustion engines should not be visible for more than ten seconds 	0.00	No separate budget is assigned for any of the proposed sites as those are regular standard practice for the Contractors

S/N	Environmental Issue	Objective	Suggestion for the Contractor	Proposed Budget (BDT)	Remarks
72.	Litter	To ensure that all litter is disposed of in a responsible manner, and is not released into the environment	<ul style="list-style-type: none"> • Maintain a high quality of housekeeping and ensure that materials are not left where they can be washed or blown away to become litter. • Provide bins for construction workers and staff at locations where they consume food • Conduct ongoing awareness with staff of the need to avoid littering 	0.00	No separate budget is assigned for any of the proposed sites as those are regular standard practice for the Contractors
73.	Storing Fuels and Chemicals	To ensure that fuel and chemical storage is safe, and that any materials that escape do not cause environmental damage	<ul style="list-style-type: none"> • Minimize fuels and chemicals stored onsite. • Install bunds and take other precautions to reduce the risk of spills. • Implement a contingency plan to handle spills, so that environmental damage is avoided. 	0.00	No separate budget is assigned for any of the proposed sites as those are regular standard practice for the Contractors
74.	Keeping Roads Clean	To ensure that roads are kept clean of soil	<ul style="list-style-type: none"> • Install wheel washes and rumble grids at all main road crossings. • Ensure that the roads are swept at least once a day on uncontrolled road crossings when construction vehicles are travelling off the site. • Install litter traps lined with filter cloth in all side-entry pits. • Cover all loads of soil being taken off site for disposal. 	0.00	No separate budget is assigned for any of the proposed sites as those are regular standard practice for the Contractors
75.	Supply of First Aid Box with standard contents	To ensure immediate treatment after a sudden accident	<ul style="list-style-type: none"> • Install a first aid box at an easy accessible place of the site for anyone 	2000.00	For each proposed site
76.	Health and Safety Warning Sign	To understand for the workers and visitor about the risky site or component of the construction activity	<ul style="list-style-type: none"> • Install health and safety warning signs where it is necessary 	2000.00	For each proposed site
77.	Safety Gear Package	To ensure the safety of the workers, field	<ul style="list-style-type: none"> • Make available of the Safety Gear Package like gloves, helmets, eye protector, rubber shoes, light reflecting dress etc for each 	0.00	No separate budget is assigned for any of the proposed sites as

S/N	Environmental Issue	Objective	Suggestion for the Contractor	Proposed Budget (BDT)	Remarks
		supervisors and the visitors	worker, field supervisors and the visitors		those are regular standard practice for the Contractors
78.	Tree Plantation	To develop a green belt around the project area	<ul style="list-style-type: none"> Tree plantation around the shelter or road in a planned way and maintenance for all the construction time Extra care should be given to the sites where trees will be cut down 	BDT 3000.00	BDT 3000.00 for FSCD office Mirpur 10.
79.	Temporary Sanitary Latrine/ Septic Tank/ Portable Toilet	To ensure sanitary environment of the work area	<ul style="list-style-type: none"> Temporary Sanitary Latrine/ Septic Tank/ Portable Toilet: 2 nos. (1 no of Toilet for women and 1 no of Toilet for men) 	0.00	No separate budget is assigned for any of the proposed sites as those are regular standard practice for the Contractors
80.	Drinking Water Sample Analysis and Drinking Water Filter	To ensure safe drinking water for the workers at site	<ul style="list-style-type: none"> Take water sample from the surrounding tube-well or the new tube-well dug at the site to analyze important parameters for drinking water 1-no of tube-well should be installed at the beginning of construction works, if there is no one at the vicinity, so that labour and other site staff can get drinking water. Supplying of best quality drinking water filter including extra set of faucets ceramic and at least three sets of ceramic filter 	BDT 5000.00	For each site the budget will be given
Total BDT 22,000.00					

10 CONCLUSIONS AND RECOMMENDATIONS

This study aims to understand initial environmental impacts for the Sub-project as well as to formulate the relevant mitigation and monitoring plans. Based on the Environmental Assessment, all possible environmental aspects have been adequately assessed and necessary control measures have been formulated to meet with statutory requirements.

The overall conclusion is that if the mitigation, compensation and enhancement measures are implemented in full, there will be no significant negative environmental impacts as a result of location, design, construction, and/or operation of the proposed Sub-project. There will in fact be tremendous benefits from recommended mitigation and enhancement measures and major improvements in quality of life and individual, education, job and public health once the scheme is in operation.

The conclusions of the Environmental Assessment can be summarized as follows:

- The communities will receive large benefits in terms of quality of life, particularly with reduced disaster vulnerability, and improved health and education facilities, infrastructure, transportation & communication etc.
- The short-term negative impacts that may come in the way of air quality, noise, solid waste, occupational health & safety need to be minimized through the mitigation action plan. Moreover, post disaster health, safety and flood problems are common. These issues might be problematic if necessary mitigation measures, as suggested in EMP, would not take into consideration.
- The project will create employment for the workforce who live in the vicinity of the construction site and will provide them a short-term economic gain.
- The green belt development with large-growing trees at the periphery of the site will give the places a more natural and pleasing appearance.
- A comprehensive Environmental Management Plan (EMP) has been prepared to mitigate and reduce the adverse impacts that will come out from the Sub-project activities. The EMP mainly focuses on managing, mitigating and reducing the impacts exhibited from design, construction and operation phase.
- **The tentative cost has been estimated around BDT 1.2 Lacs for yearly monitoring and around BDT 22 Thousands to implement the EMP.** This budget can change due to change of market prices and if the project implementation period extends.

Two straight recommendations which are listed below need to be followed by the concern authority to ensure sound environmental and socio-economic condition:

- All mitigation, compensation and enhancement measures proposed in this report need to be followed.
- The Environmental Management and Monitoring Plan proposed in this report also need to be followed.

Environmental and Social Assessment of Urban Resilience Project

Project Area: Dhaka North City Corporation

Project Location: Karwanbazaar

1 INTRODUCTION

1.1 Background of the Sub-project

This is a Sub-project under Urban Resilience Project-DNCC Part. In the Sub-project area a new warehouse has been planned for construction for keeping the search and rescue equipments and subsequently use during emergency. The significant features of the Sub-project have been mentioned in Table 1.1.

Table 1.1: Significant features of the sub-project

Name of the Project	Construction of warehouse in Karwanbazar under Urban Resilience Project-DNCC Part
Warehouse Location	Zone-5, Karwanbazar
Type of Building	Type 1 (2400 sft), 2-storied Building
Land available	0.055 acres
Land acquisition	Not required

1.1.1 Aim of Sub-project

The objective of the sub-project is to increase the effectiveness of disaster preparedness and response, while addressing existing and emergent risks in Dhaka. The Project will enhance the capacity of municipal public organizations in Dhaka to effectively prepare for, respond to and recover from small and large emergency events. It will also identify an investment program to reduce critical vulnerabilities and will support an improvement in the quality of new building construction. Further, the project seeks to create an enabling environment for coordinated, locally managed disaster risks management.

1.1.2 Location of Sub-Project

The Sub-project is located in the Zone-5, Karwanbazar which is within the Dhaka North City Corporation. The location details of the Sub-project have been summarized in Table 1.2. The Layout Plan, Location Map, Base Map and Topographical Map have been shown in Figure 1, Figure 2, Figure 3 and Figure 4 respectively. Photographs showing present condition of the Sub-project area have been shown in Figure 5.

Table 1.2: Location Details of the sub-project

Division	Dhaka
District	Dhaka
Upazila	Tejgaon
Word No.	26 (N)
Mouza	Tejgaon
GPS Position	23.750 N 90.390 E
Nearby Major Road	4 lane Kazi Nazrul Islam Avenue
Nearby River/ Canal	Hatirjheel Lake is about 400 m away

1.2 Purpose of the Environmental and Social Assessment (ESA) Study

The purpose of the ESA process is to inform decision-makers and the public of the environmental consequences of implementing a proposed project. The EA document itself is a technical tool that identifies, predicts, and analyzes impacts on the physical environment, as well as social, cultural, and health impacts. If the ESA process is successful, it identifies alternatives and mitigation measures to reduce the environmental impact of a proposed project. The ESA process also serves an important procedural role in the overall decision-making process by promoting transparency and public involvement.

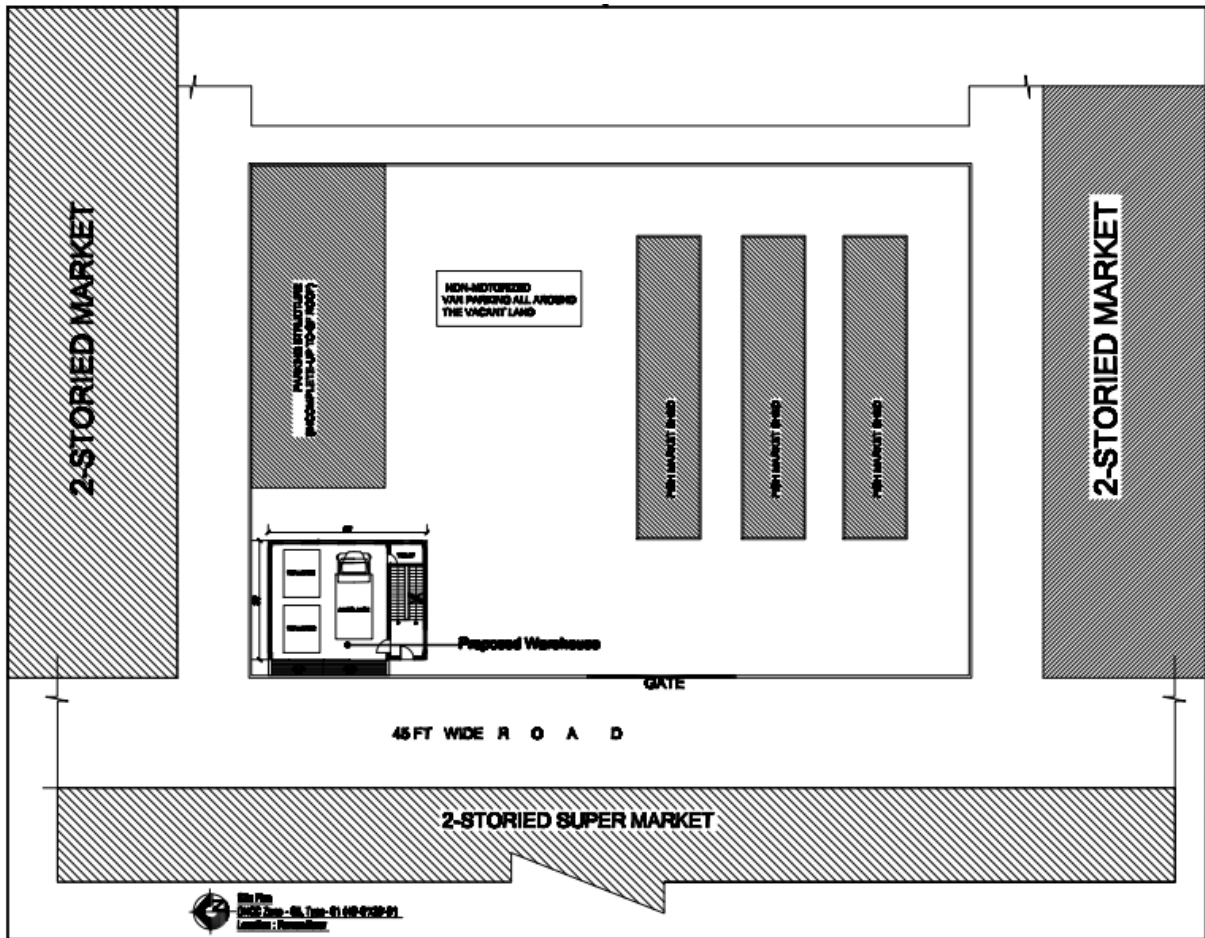


Figure 1: Layout Plan of the Proposed Sub-project

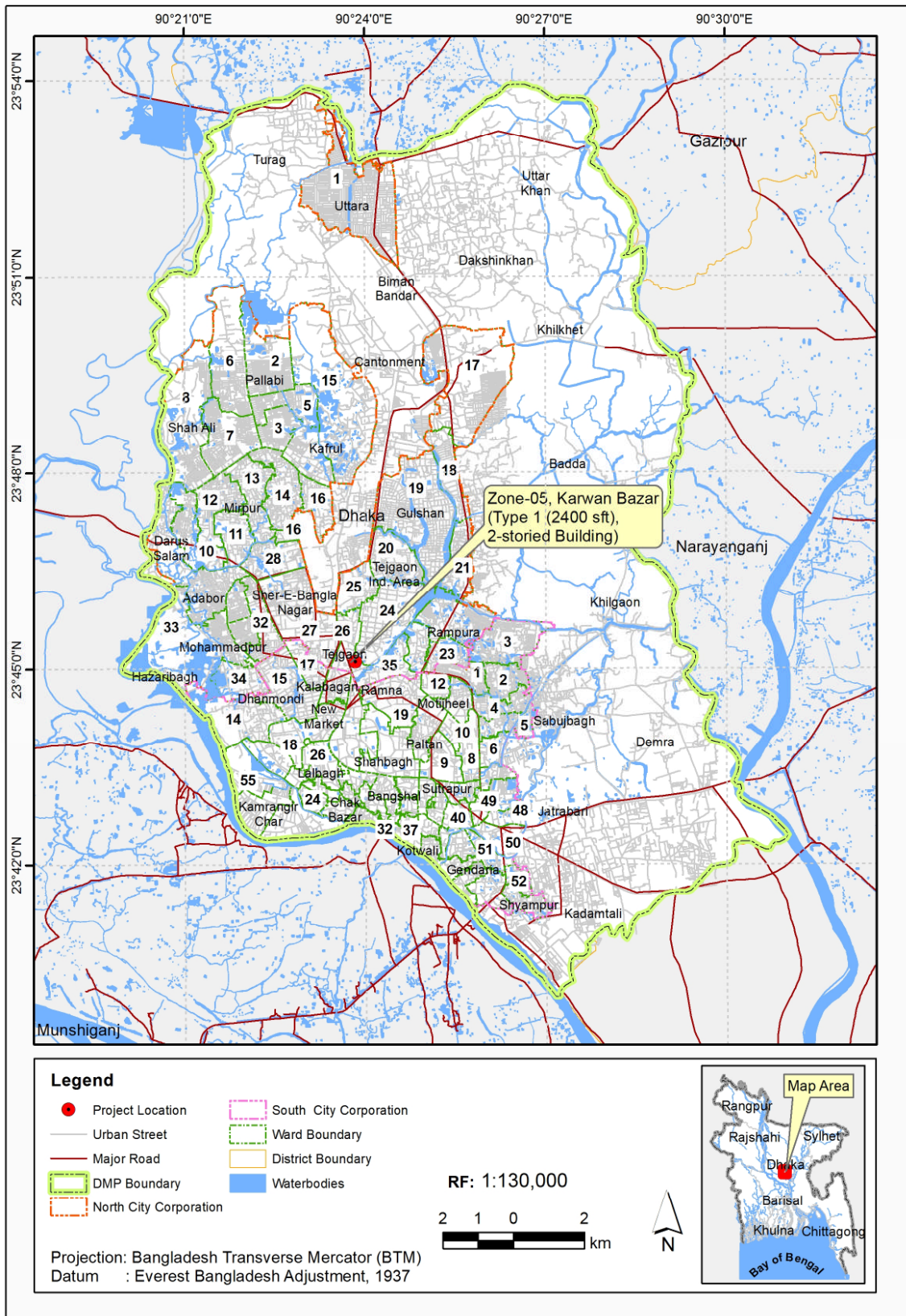


Figure 2: Location Map of Sub-project Site

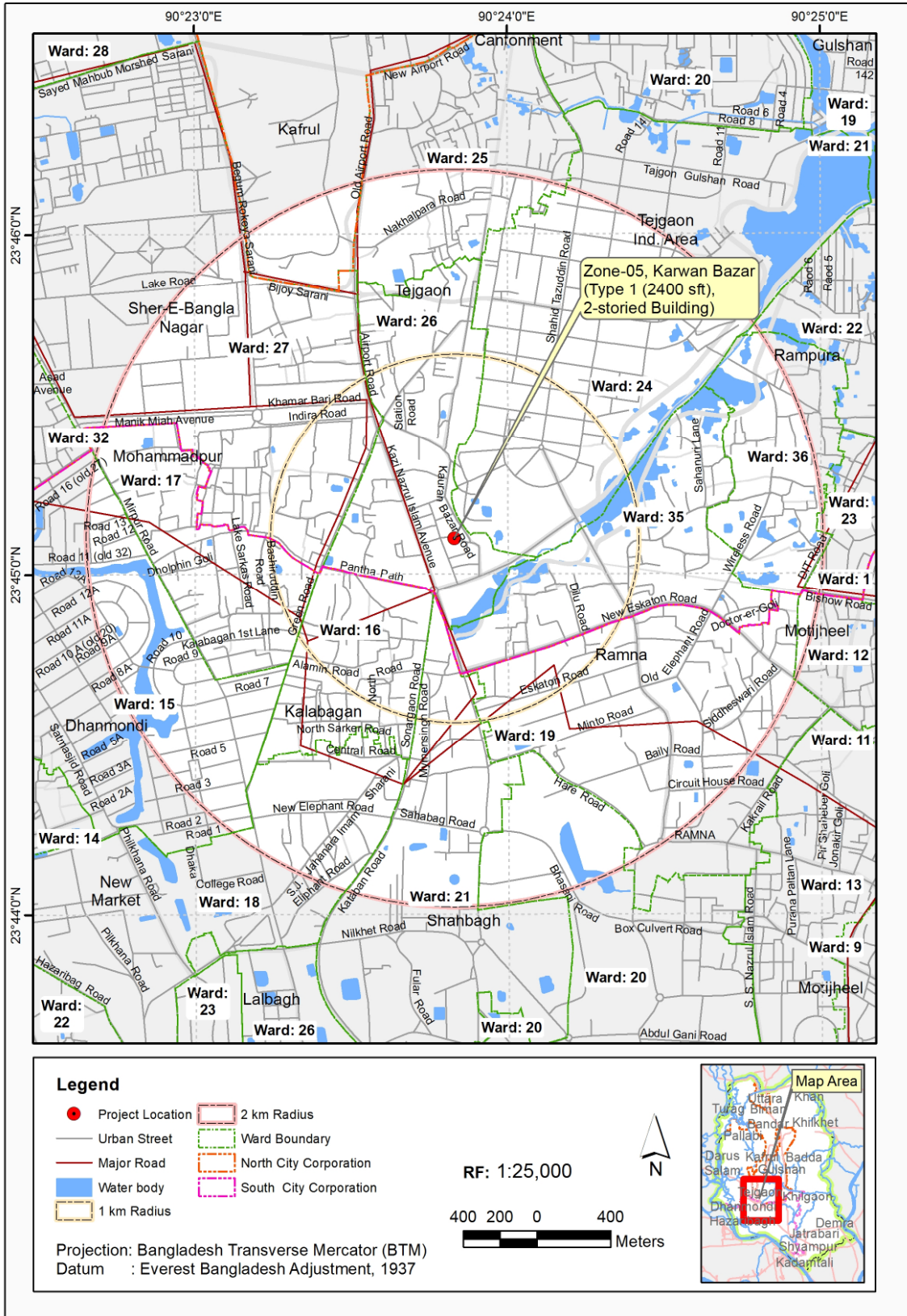


Figure 3: Base Map of Sub-project Site

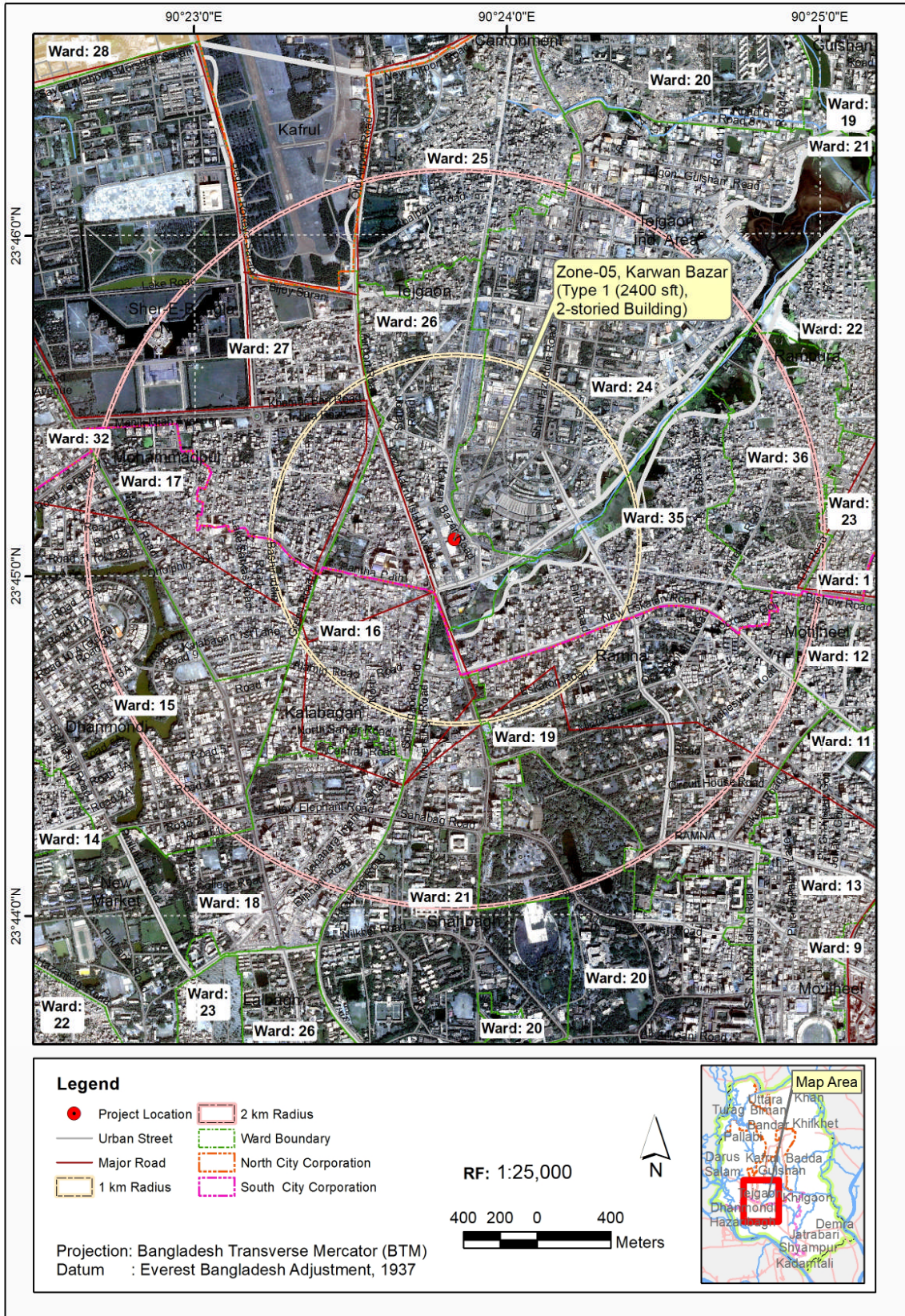


Figure 4: Topographical Map of Sub-project Site



Figure 5: Photograph showing the present condition the sub-project area

1.5 Brief Description of Sub-Project Site

The proposed Sub-project is located within the Karwan Bazar area, plot no 5 beside Karwan Bazar road. The important establishments around the Sub-project site have been summarized below.

North Boundary: Tejturi Bazar, Railway Market, Truck Terminal, Amber Shah Jame Mosque, ATN Bangla Bhaban, Dhaka Water and Swerage Authority, Holy Rosary Church etc.



Figure 6: North side major features of the site

South Boundary: Kabbokash Super Market, Shah Ali Tower, National Institute of Fashion and Technology, Bangladesh Petroleum Exploration & Production Company Limited, Pan Pacific Sonargaon Hotel, Karwan Bazar Jame Masjid, Bangla Motor Bus Stop etc.



Figure 7: South side major features of the site

East Boundary: Bangladesh Film Development Corporation, Bangladesh Red Crescent Society, Hatirjheel Link Road, Bangladesh Garment Manufacturers and Exporters Association, Moghbazar Bus Stop etc.



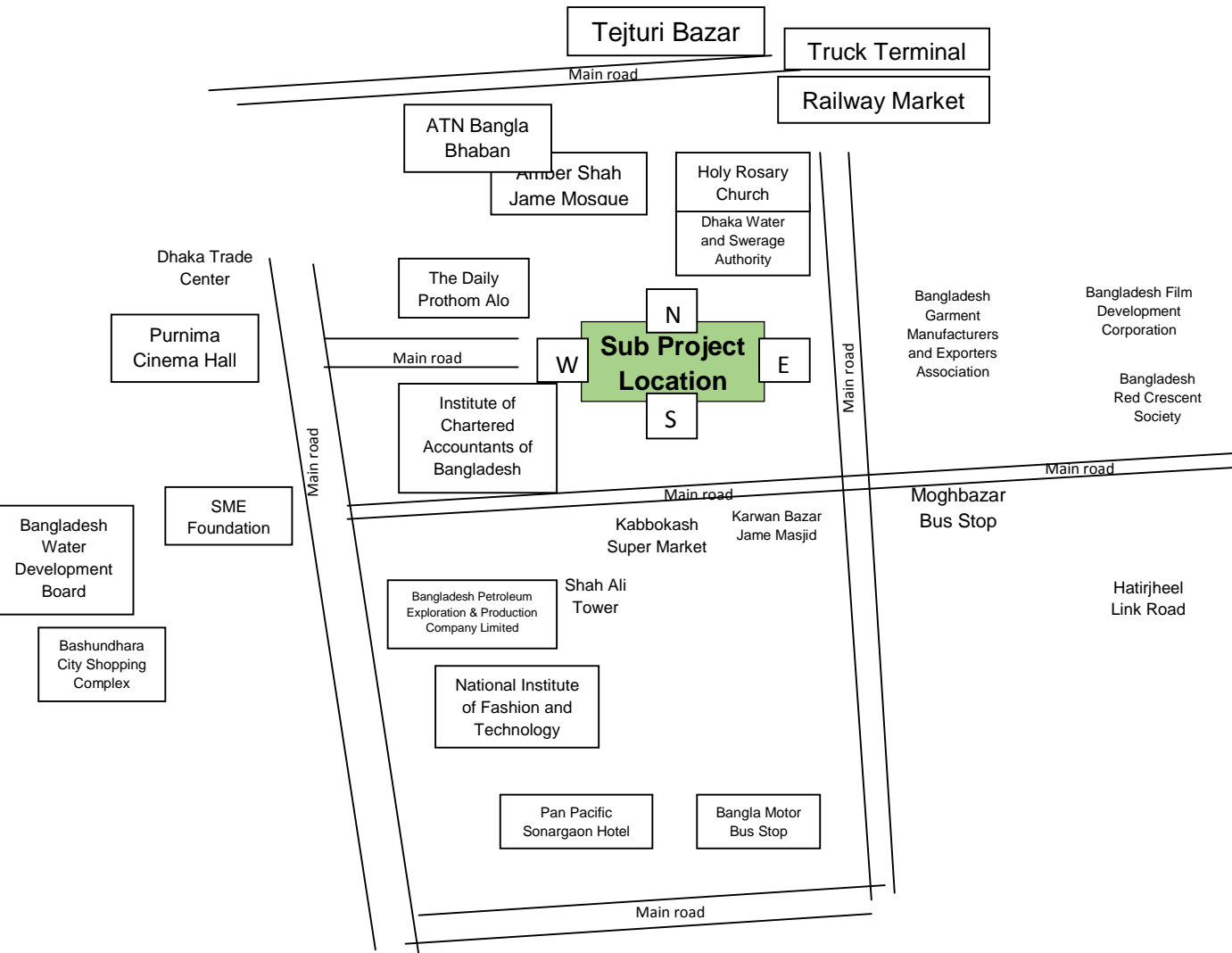
Figure 8: East side major features of the site

West Boundary: The Daily ProthomAlo, Institute of Chartered Accountants of Bangladesh, Dhaka Trade Center, Bangladesh Water Development Board, Bashundhara City Shopping Complex, Purnima Cinema Hall, SME Foundation etc.



Figure 9: West side major features of the site

Site Surrounding of the Sub-Project in Hand Sketch Map



1.6 Sub-Project Components

The major components of the sub-project are a two storied building (2400 sft) and some rescue equipments (such as Trailer, Ambulance, Fire extinguisher and Life jacket etc) kept in this building which is used use during emergency. Also a 815 sft auxiliary monitoring and demonstration room is proposed in 1st floor of this building.

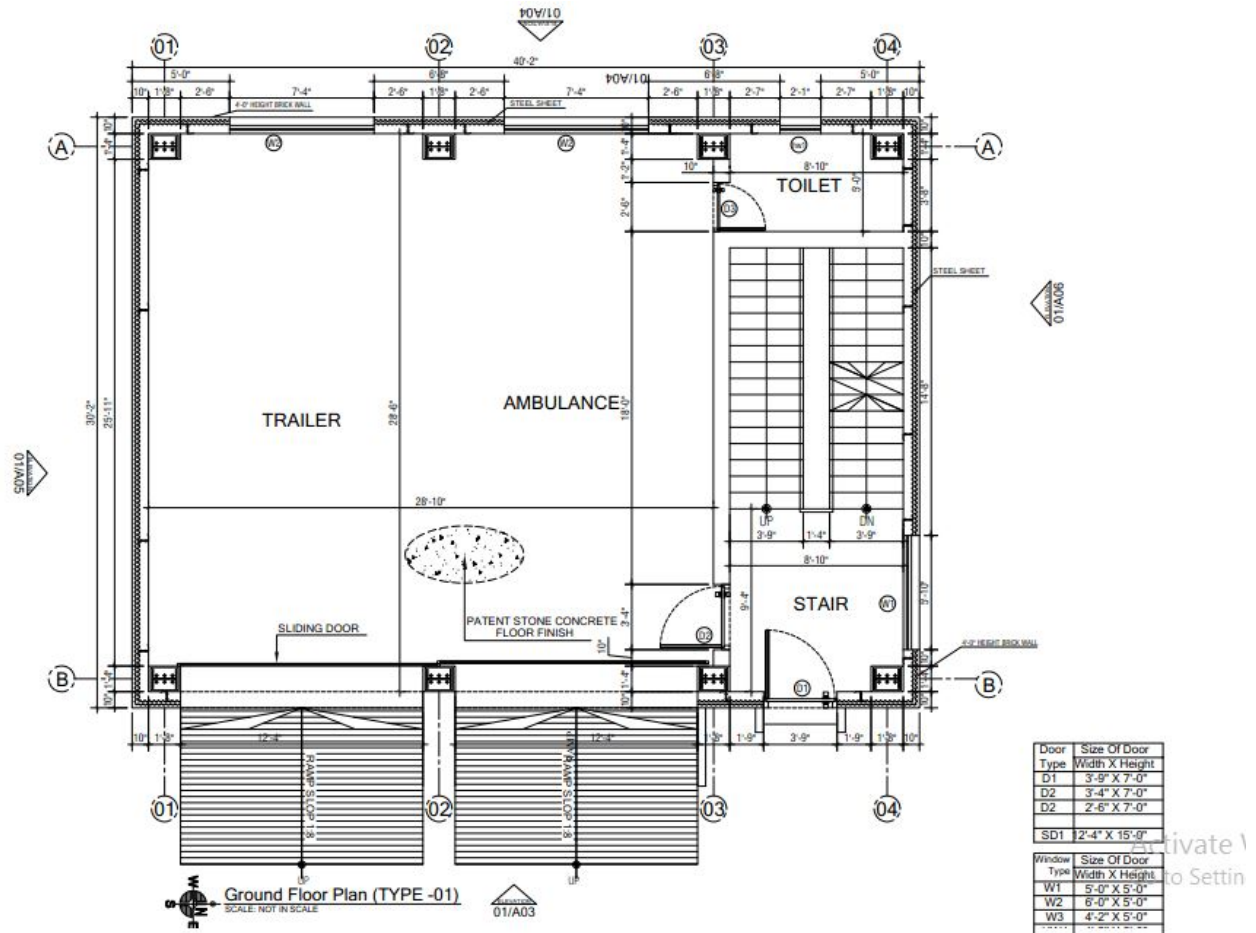


Figure 10: Plan layout of ground floor

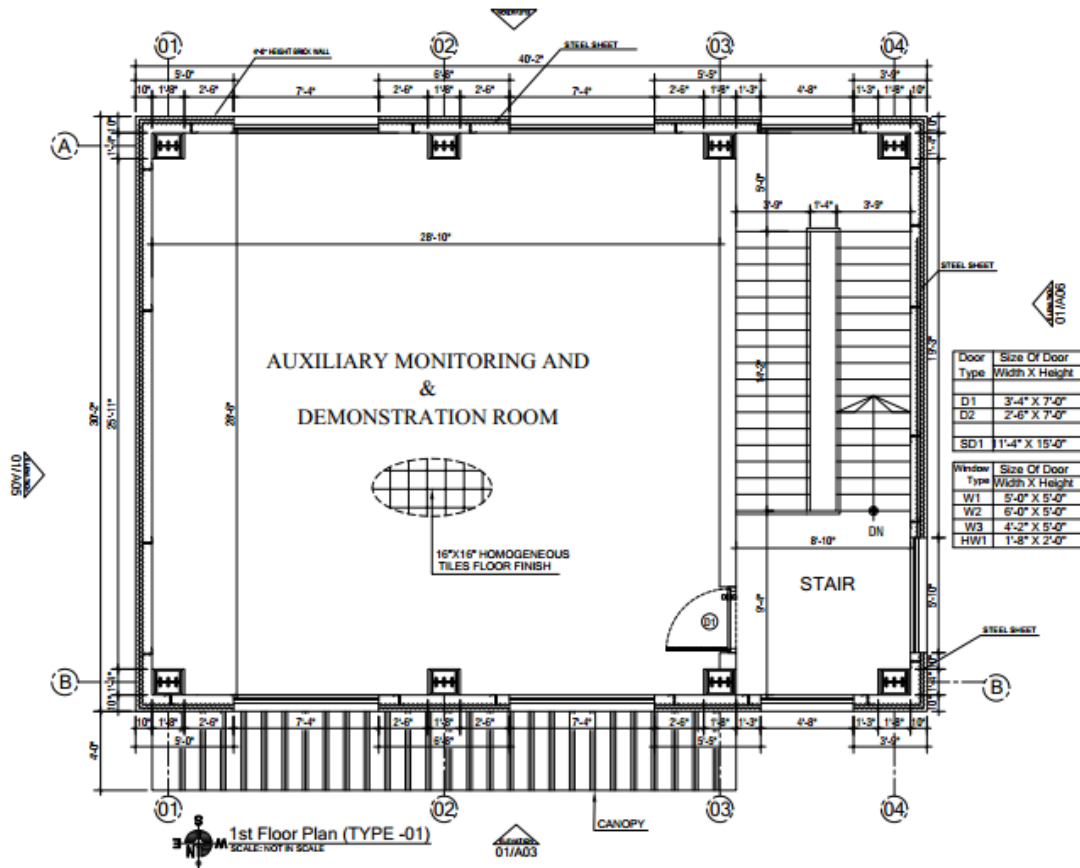


Figure 11: Plan layout of first floor

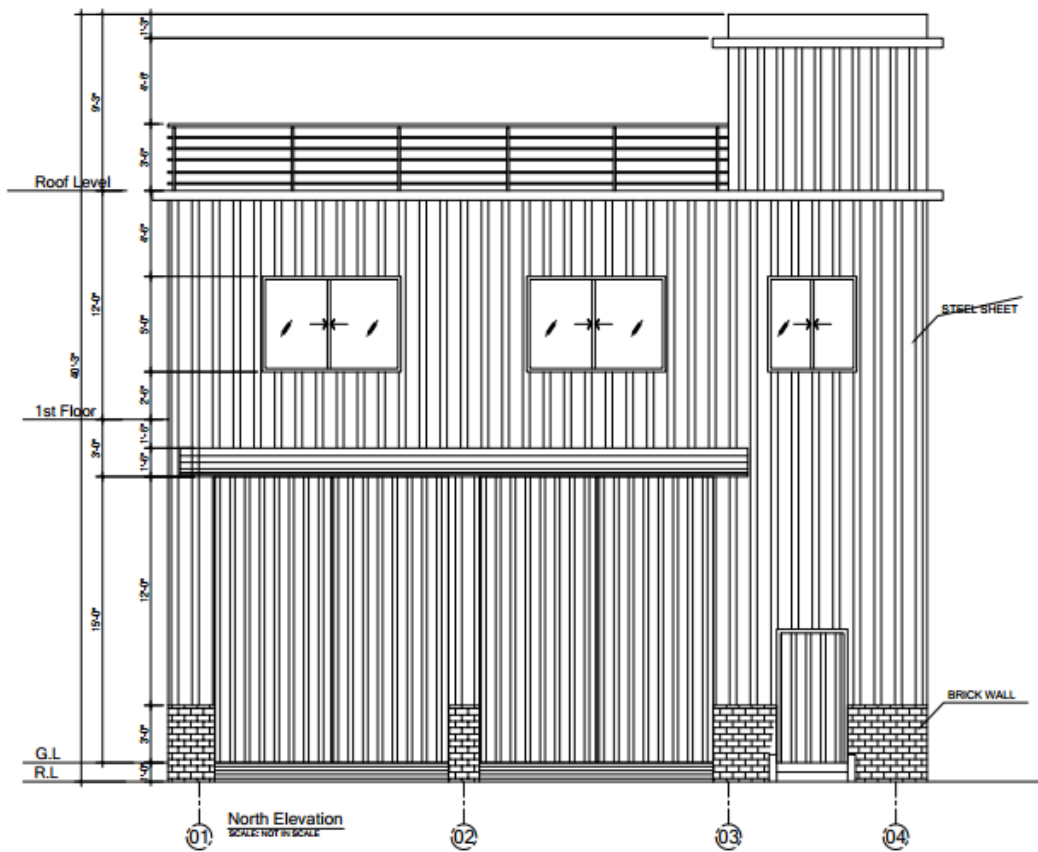


Figure 12: North elevation

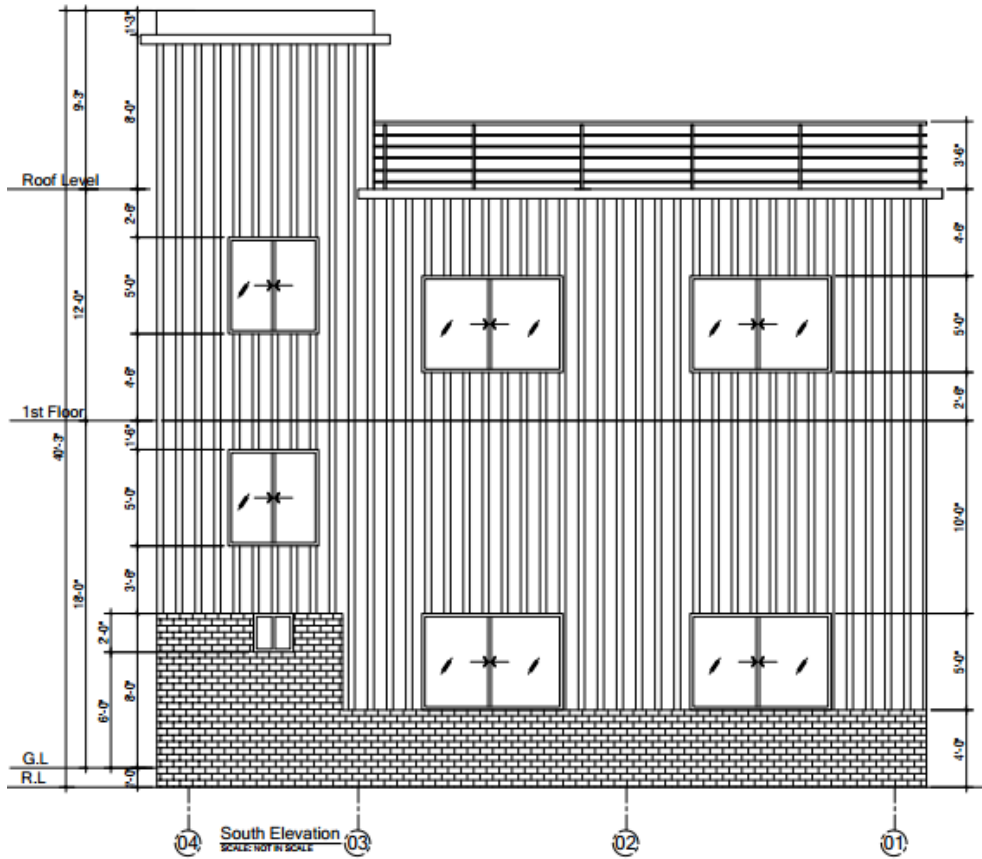


Figure 13: South elevation

1.7 Structural Design Analysis

In the structural design it is very important to keep sufficient air and light circulation in the floor plan. According to the BNBC minimum 25% ventilation should be maintained in any kind of infrastructure. From the above floor plan (Figure 10, 11, 12 and 13), it has been found that there is around 650 sq. ft. openings where as 25 % of 2400 sq. ft. is 600 sq. ft. So, there is sufficient ventilation option in the proposed structure.

Normally, according to the BNBC code 2014, the plinth or floor level of a building is 2 feet high from the existing ground or road level. In the design of warehouse, the plinth level is considered with respect to the surrounding infrastructure plinth level. The highest plinth level among surrounding buildings has been considered as the plinth level of the warehouse. In this area, the highest flood height is 5 feet, lowest is 1 feet and average is around 2 feet. And the frequency of highest height flooding is more or less 15 years. So the design seems safe regarding the flooding issue.

Moreover, for DSCC, in the ground floor Ambulance and Mortuary vans will be parked, in the first floor light search and Rescue equipment will be kept. Only 2/3 people will be stationed in the warehouse. And the stair will be enough for the Emergency Exit as per the BNBC rules (the rule is given at the end of the table). Moreover a steel ladder with a window will be kept for using as emergency exit. The guidance of BNBC is given below for the Emergency Exit.

Emergency Exit: Provided single stair satisfies the BNBC Part 4 chapter 3 requirement as described below:

3.14 Number of Exits

3.14.1 The requirements of the number of exits specified in this subsection shall apply to buildings of all occupancy groups unless a more restrictive requirement for any occupancy is provided in Chapter 5, Part 4 or elsewhere in this Code.

3.14.2 Only one means of exit shall suffice for the buildings specified in Table 4.3.5 provided that they do not have more than one floor below the level of exit discharge.

3.14.3 For all other buildings the required number of exits shall depend on the occupant load as specified below:

Occupant load 500 or less	Minimum 2 exits
Occupant load 501 to 1000	Minimum 3 exits
Occupant load more than 1000	Minimum 4 exits

Table 4.3.5 Buildings Served by One Means of Exit

Occupancy	Maximum Number of Storeys	Other Restrictions
All	1	Maximum occupant load 100 and maximum travel distance 25 m
A1	2	Maximum occupant load 30
A2	6	Maximum 12 dwelling units
A3	4	Maximum 50 occupants per floor and maximum travel distance 25 m
A4	6	Maximum 50 occupants per floor and maximum travel distance 25 m
A5	2	Maximum occupant load 50
B, C	2	Maximum occupant load 200
D	2	Maximum occupant load 50
F, G, H	2	Maximum occupant load 100 and maximum travel distance 25 m

3.14.4 All buildings more than 6 storeys or 20 m in height and all buildings having a floor area larger than 500 m² on each floor, used as educational, institutional, assembly, industrial, storage or hazardous occupancy or a mixed occupancy involving any of these, shall have a minimum of two staircases. The staircases shall be of the enclosed type and shall lead directly to the exterior or the designated area of refuge.

1.8 Equipment and Storing Place

The larger and vehicular equipment will be stored at the ground floor like Mobile Light Unit and Generator (2000w), Generator, Concrete Cutter, Ambulance and the smaller equipment will be stored at the first floor like Air Compressor, Power Chain Saw, Megaphone, Breathing, Apparatus, Knee Pad & Eye Protector, Gloves, Multi-Purpose, Cutter, Ram Jack, High Pressure Air Bag, Rubble Removing Bag, Stretcher, Family tent, Relief tent, Dead Body Bag, Chemical Light Sticks, Fire Aid Box.

For the storing of the equipment, there is enough space according to the above drawing. And the equipment which will be stored at the ground floor will be lightly affected from any sudden flood due to their nature. And as per the layout there is enough space for emergency exit.

2 POLICY LEGAL AND ADMINISTRATIVE FRAMEWORKS

The proposed Urban Resilience Project-DNCC Part will be implemented in compliance with applicable environmental laws and regulations. Bangladesh has an environmental legal framework that is conducive to both environmental protection and natural resources conservation. This environmental legal framework applies to the proposed sub-project. In addition, a wide range of laws and regulations related to environmental issues are in place in Bangladesh. Many of these are cross-sectoral and partially related to environmental issues. This Section presents an overview of the major national environmental laws and regulations that are relevant and may apply to activities supported by the Urban Resilience Project-DNCC Part, institutional arrangement and national and sub-national level, and World Bank safeguard policies.

2.1 National Environmental Laws and Regulations

National Environmental Policy 1992

The concept of environmental protection through national efforts was first recognized and declared in Bangladesh with the adoption of the Environment Policy, 1992 and the Environment Action Plan, 1992. The major objectives of Environmental policy are to i) maintain ecological balance and overall development through protection and improvement of the environment; ii) protect country against natural disaster; iii) identify and regulate activities, which pollute and degrade the environment; iv) ensure environmentally sound development in all sectors; v) ensure sustainable, long term and environmentally sound base of natural resources; and vi) actively remain associate with all international environmental initiatives to the maximum possible extent.

Bangladesh Environmental Conservation Act (ECA), 1995 amended 2002

This umbrella Act includes laws for conservation of the environment, improvement of environmental standards, and control and mitigation of environmental pollution. It is currently the main legislative framework document relating to environmental protection in Bangladesh, which repealed the earlier Environment Pollution Control ordinance of 1977.

Environment Conservation Rules (ECR) 1997 amended 2003

These are the first set of rules, promulgated under the Environment Conservation Act 1995. Among other things, these rules set (i) the National Environmental Quality Standards for ambient air, various types of water, industrial effluent, emission, noise, vehicular exhaust etc., (ii) requirement for and procedures to obtain Environmental Clearance, and (iii) requirements for IEE/EIA according to categories of industrial and other development interventions.

Environment Court Act, 2000

The aim and objective of the Act is to materialize the Environmental Conservation Act, 1995 through judicial activities. This Act established Environmental Courts (one or more in every division), set the jurisdiction of the courts, and outlined the procedure of activities and power of the courts, right of entry for judicial inspection and for appeal as well as the constitution of Appeal Court.

Bangladesh National Building Code

The basic purpose of this code is to establish minimum standards for design, construction, quality of materials, use and occupancy, location and maintenance of all buildings within Bangladesh in order to safeguard, within achievable limits, life, limb, health, property and public welfare. The installation and use of certain equipment, services and appurtenances related, connected or attached to such buildings are also regulated herein to achieve the same purpose.

2.2 International Safeguard Policies (World Bank)

The objective of these policies is to prevent and mitigate undue harm to people and their environment in the development process. Safeguard policies provide a platform for the participation of stakeholders in project design, and act as an important instrument for building ownership among local populations. The effectiveness and development impact of projects and programs supported by the Bank has substantially increased as a result of attention to these policies. The World Bank has ten

environmental, social, and legal safeguard policies. The relevant policies for environmental safeguard are the following:

- OP/BP 4.01 Environmental Assessment
- OP/BP 4.04 Natural Habitats
- OP/BP 4.09 Pest Management
- OP/BP 4.11 Physical Cultural Resources
- OP/BP 4.36 Forests
- OP/BP 4.37 Safety of Dams

Operational Policies (OP) are the statement of policy objectives and operational principles including the roles and obligations of the Borrower and the Bank, whereas Bank Procedures (BP) is the mandatory procedures to be followed by the Borrower and the Bank. Apart from these, the IFC guidelines for Environmental Health and safety have been adopted by the World Bank Group which is also relevant for environmental protection and monitoring. In addition to that the Policy on Access to Information of World Bank also relates to environmental safeguard.

2.3 Implications of Environmental Policies and Regulations on URP

The Environmental Conservation Rules (ECR) 1997 (DoE, 1997) classifies projects into four categories according to potential environmental impacts: **(1) Green; (2) Orange A; (3) Orange B; and (4) Red. Green category** projects are those with mostly positive environmental impacts or negligible negative impacts; **Orange A** category projects are those with minor and mostly temporary environmental impacts for which there are standard mitigation measures; **Orange B** category project are those with moderately significant environmental impacts; while **Red category** projects are those with significant adverse environmental impacts. As discussed in project description, the sub-projects to be implemented under Urban Resilience Project-DNCC Part would fall under **Orange A** category.

The BNBC, PPR 2008, Bangladesh Labor Act 2006 outlines guidelines for ensuring worker's health and safety during construction works which would have direct implications in project. It would be the responsibilities of the contractors (with supervision of DNCC) to make sure that these guidelines are followed in the workplace environment.

According to WB Operational Policy (OP 4.01), the nature of environmental assessment to be carried out for a particular sub-project would largely depend on the category of the sub-project. As mentioned earlier, The World Bank Operational Policy (OP) 4.01 classifies projects into three major categories (category A, B and C), depending on the type, location, sensitivity and scale of the project, and nature and magnitude of potential impacts.

The sub-projects to be implemented under the Urban Resilience Project-DNCC Part do not involve large-scale infrastructure development (e.g., construction of sanitary landfill, water or wastewater treatment plant, major highways). The sub-projects would involve no involuntary land acquisition. Thus, the sub-projects to be carried out do not appear to pose risk of significant adverse environmental impacts. In view of subprojects nature, the overall project is classified as a Category 'B' and the safeguard policy OP/BP 4.01 has been triggered for the proposed operation. The policy has been triggered to ensure that the sub project design and implementation will be focused on reducing adverse impacts and enhancing positive impacts.

It is highly unlikely that any natural habitant formed largely by native plant and animal species will be affected or modified by the subprojects activities to be implemented under Urban Resilience Project-DNCC Part because most of the infrastructure development works are small-scale and will take place in the built environments of municipalities adjacent to various other infrastructures. However, the EMF stipulated the code of practice on natural habitat as advance precautionary measures and Natural Habitats (OP/BP 4.04) has been triggered.

Also it is unlikely that any designated physical cultural resources will be affected by the subprojects. However, the impacts will be examined as part of the environmental screening/assessment of each sub-project. The EMF provided criteria for screening and assessment of physical cultural resources. In addition, 'Chance find' procedures conforming to local legislation on heritage would be evaluated that any physical or cultural resources will not be impacted. OP 4.11 (Physical Cultural Resources) has been triggered.

The activities of the project will not involve any pesticide application, include activities in forest areas or relate to protection of dams. Hence OP 4.09, 4.36 and OP 4.37 will not be relevant as well.

The IFC guidelines provides guidance on certain EHS issues which include standards for environmental parameters (ambient air quality, water and wastewater quality, noise level, waste management), hazard and accident prevention, occupational and community health and safety (during commissioning and decommissioning works) etc. These guidelines will be directly applicable to the MGSP project. As a general rule, the IFC guidelines should complement the existing Bangladesh guidelines or standards. In case the Bangladesh guidelines or standards differ from the IFC guidelines, project is expected to follow the more stringent ones.

The World Bank access to information policy would be directly followed. The Urban Resilience Project-DNCC Part will make the environmental assessment and EMF documents available to the public by publishing it in their websites. In addition, subproject specific screening/assessment report will periodically be posted in the DNCC website before the bidding process. Hard copies of these documents in English (including a summary in Bengali) will be made available in the offices of the respective Pourashavas and city corporations for the local stakeholders.

3 DESCRIPTION OF THE ENVIRONMENT (BASELINE ENVIRONMENT)

3.1 Physical Environment

3.1.1 Geology, Topography and Soils

The part of Bangladesh to which the capital city of Dhaka belongs is dominated by the rivers Ganges, Jamuna and Meghna, which drain large quantities of water from the Himalayan Mountains into the Bay of Bengal, through a complex delta system of tidal tributaries and creeks, formed by sediment deposited by the rivers. Known as a composite of Brahmaputra-Jamuna Flood plain and Madhupur Sal Tract, this part – the central region – is composed of flat and low lying land, which floods extensively in the rainy season and red textured highlands.

Much of Bangladesh lies on the Gangetic-Bengal Plain, and is flat and low lying particularly around the delta, which floods extensively in the rainy season. The sub-project site situated in North of Dhaka, the land gradually begins to rise, towards the foothills of the Himalayas in the north. The influence of the rivers is evident in the soils, which are almost entirely alluvial and generally fertile in the central plains, with a predominantly loam and silt consistency.

The sub-project site is situated in Dhaka which is situated at the southern tip of a Pleistocene terrace, the Madhupur tract. Two characteristic geological units cover the city and surroundings, viz Madhupur Clay of the Pleistocene age and alluvial deposits of recent age. The Madhupur Clay is the oldest sediment exposed in and around the city area having characteristic topography and drainage. The major geomorphic units of the city are: the high land or the Dhaka terrace, the low lands or floodplains and depressions and abandoned channels. Low lying swamps and marshes located in and around the city are other major topographic features of the sub-project site.

3.1.2 Hydrology (Surface & Groundwater)

In the proposed site where warehouse will be constructed there is no water body but Hatirjheel Lake is about 400 m away from the site.

Like other towns and cities of Bangladesh, the Dhaka city dwellers, too, use both surface and groundwater as a source of domestic water. Principal difference lies in use of supply water based on treatment with some application of chlorine in Dhaka and other population centers. Pollution of rivers is a major problem, because of the discharge of industrial wastewater and inadequate sewerage. The DoE has identified 450 polluting industrial units in Dhaka (196 tanneries, 129 textile producers, 38 engineering factories, and plants manufacturing pesticides, chemicals, fertilizers, pulp and paper), many of which discharge untreated wastewater to the rivers. The sewerage system covers only 20% of the city population, and 50% of people use septic tanks, 20% pit latrines and 10% use open latrines and other unsanitary methods.

There are three main aquifers in the central region of Bangladesh:

- (xiii) An upper (composite) aquifer, which can reach depths of 50 m and is covered with an upper silty clay layer of less than 20 m;
- (xiv) A middle (main) aquifer of fine to heavy sands, which is generally 10-60 m thick and in most areas is hydraulically connected with the composite aquifer above; and
- (xv) A deep aquifer of medium, medium-to-fine or medium-to-coarse sand, which is generally found at depths below 100 m.

In Dhaka 80% of the domestic water supply is obtained from the middle aquifer, extracted by tube-wells throughout the city. Recent studies have shown that water levels have fallen dramatically (20 m over the past six years) and suggest that the aquifer may be changing from a confined to an unconfined condition, which could make it vulnerable to contamination. There is already evidence of pollution by leaking underground tanks at petrol stations and chemical plants, and seepage from sewers, septic tanks and pit latrines. DWASA is implementing a major project to improve the water supply service, which amongst other things will increase the usage of surface water and extend groundwater abstraction to the deeper aquifer, at a sustainable rate.

The water quality data of the month of June, 2016 of the lakes and rivers in and around Dhaka City is given in Annex A. The analysis is done by DoE, Dhaka.

3.1.3 Climate and Meteorology

The climate in the sub-project area is humid and sub-tropical, with a typical three season pattern. During the winter season (November-February), cool winds blow from the north-east. The weather is cool and dry. Rainfall, however, shows variations over the last decade (2001-2011) between 116 mm in November, 2002 and 0 mm in February, 2011. Average temperatures show, over the same period, variation between 23.4°C in November, 2005 and 17.3°C in January, 2011. Temperatures start to rise in March and reach the annual maximum of around 39.9°C in April-May, when daytime temperatures can reach up to 40°C. Rainfall also increases, and this period is characterized by unstable weather. The monsoon begins in May-June as hot air rises over the Indian subcontinent, creating low pressure areas into which rush the cooler moisture-laden winds from the Indian Ocean and the Bay of Bengal. Around 70-80% of the annual rain falls during this time. The rain is often accompanied by strong winds, sometimes exceeding 100 km/h. Temperature and rainfall both decline post-monsoon, returning rapidly to the winter lows.

Wind data from the Bangladesh Meteorological Department Climate Division suggests that wind directions vary month-to-month in Dhaka, though predominantly in the NW, S, and NE directions. As the STSs will be contained within tall walled structures and cleaned daily, windborne odor will get minimized.

3.1.4 Flooding, Water Logging and Drainage Pattern

The Sub-project area is mostly flood free and elevation is higher than normal local flood level. The area is not affected in normal floods. Most of the drains in the sub-project area are connected with sewerage networks and Hatirjheel Lake bearing the waste water. Also Industrial wastewater is disposed in this open drains. According to the environmental standard of Bangladesh (ECR, 1997), for the survival of the aquatic life the dissolved oxygen be between 4 mg and 8 mg per liter and accepted level of Biological Oxygen Demand (BOD) is 100 mg per liter. But the situation is far-off worse in Tejgaon area.

3.1.5 Air Quality and Dust

Being a market place, the area produces a large amount of air pollutant and dust. The main atmospheric pollutants are those produced by vehicles and industries and in particular by the burning of fuels. These include particulate matter, hydrocarbons, carbon dioxide, carbon monoxide, sulfur dioxide, oxides of nitrogen, lead, ammonia and hydrogen sulfide. Many of these cause respiratory problems in humans, plus other diseases if substances accumulate in the tissues.

Table 3.1: National Ambient Air Quality Standards for Bangladesh and Field Data

S/N	Parameter	BD Standard	Averaging Time	AQMP, DOE (Darus-Salam, 23.78N 90.36E)		Field Survey
				July	August	August
17.	SO ₂	80 µg/m ³ (0.03 ppm)	Annual	-	-	-
		365 µg/m ³ (0.14 ppm)	24 hours (a)	-	0.71	21.0
18.	NO _x	100 µg/m ³ (0.053 ppm)	Annual	13.0	19.9	31.0
19.	PM ₁₀	50 µg/m ³	Annual (b)	-	-	-
		150 µg/m ³	24 hours (c)	44.3	70.2	115.0
20.	PM _{2.5}	15 µg/m ³	Annual	-	-	-
		65 µg/m ³	24 hours	19.2	31.6	-

Source: AQMP, DOE and Field Survey, 2016.

The main causes of the poor air quality are:

- (xiii) Poor roads and traffic management leading to severe traffic congestion;
- (xiv) Heavy industrialization, and use of cheaper high-sulfur fuels (coal, wood and tyres) by smaller industries like brick kilns; and
- (xv) Poor solid waste management, so burning is the common method of treating garbage.

3.1.6 Noise level

The project is situated in a mixed zone. Noise level of the project area is higher than the accepted limit.

- On site sources: Minimum 60 dB and maximum 68 dB during 9.00 A.M from various sources.
- Off site sources: Minimum 68 dB and maximum 78 dB during 9.00 A.M from various sources.

Present noise level in the project site and Bangladesh standards for sound level are shown in Table 3.2

Table 3.2: Bangladesh Standards for sound level (GoB, 2006)

Noise Level at Project Site				Bangladesh Standards		
Site	Time	Minimum	Maximum	Location	Noise Level (dBA) at Day	Noise Level (dBA) at Night
On Site	9 a.m.	60	68	Silent zone	50	40
	9:15 p.m.	49	60	Residential area	55	45
Off Site	9 a.m.	68	78	Mixed Zone	60	50
				Commercial area	70	60
	9:10 p.m.	53	70	Industrial area	75	70

3.2 Biological Environment

3.2.1 Flora

The area is a market place which is always crowded with people. Due to gathering of people in such place amount of tree is very minor. Total no of trees from observation is counted 2 in which no tree will be cut off. No grass land or garden or any other vegetation is not seen in the project site.

Table 3.3: Types and number of trees at the proposed location

S/N	Types of Flora and Name	Existing	To be Cut Off
1.	Large Trees (Mahogany, <i>Swietenia genus</i>)	01	0
2.	Medium Trees (Banyan Tree) (<i>Ficus benghalensis</i>)	01	0
3.	Small Trees	0	0
4.	Grass Land	0	0
5.	Other Forest/ Agricultural/ Garden etc	0	0
6.	Total Trees	02	0



Figure 13: Existing Large Trees (Mahogany)



Figure 14: Existing Medium Trees (Breadfruit, Mahogany etc.)

3.2.2 Fauna

In the project site no rare endangered species, mammals, fish and others have been observed. Only some indigenous like Cat (*Felis catus*), Dog (*Canis lupus familiaris*) have been seen. Moreover various birds like Crow (*Corvus corone*), Myna (*Acrida thestristis*) have been seen sometimes.

3.3 Socio-Economical Environment

3.3.1 Land Use

The proposed land for the sub-project is situated in a market area, so the site is mainly used for vehicle parking, keeping baskets with or without goods etc. Also the sub-project site is used as movement place of people who comes in the market. Whereas the present land use surrounding the sub-project site is quite mixed in character. The lands in the Sub-project's catchment areas shown in Figure 15 are mainly distributed in Commercial, Residential, Institutional, Road and other infrastructures etc. The detail land coverage of 1 km and 2 km buffer of sub-project location is given in the Table 3.

Table 3.4: Land covers classification of the study area

Land Use	For 1 km buffer	For 2 km buffer
	Area (acres)	Area (acres)
Commercial area	131.3	197.0
Industrial area	122.0	321.5
Institutional area	12.31	111.8
Open Space	26.1	190.0
Road	96.7	358.3
Urban Residential area	121.2	1017.0
Water body	50.0	143.0
Others	235.6	851.0
Grand Total	795.21	3189.6

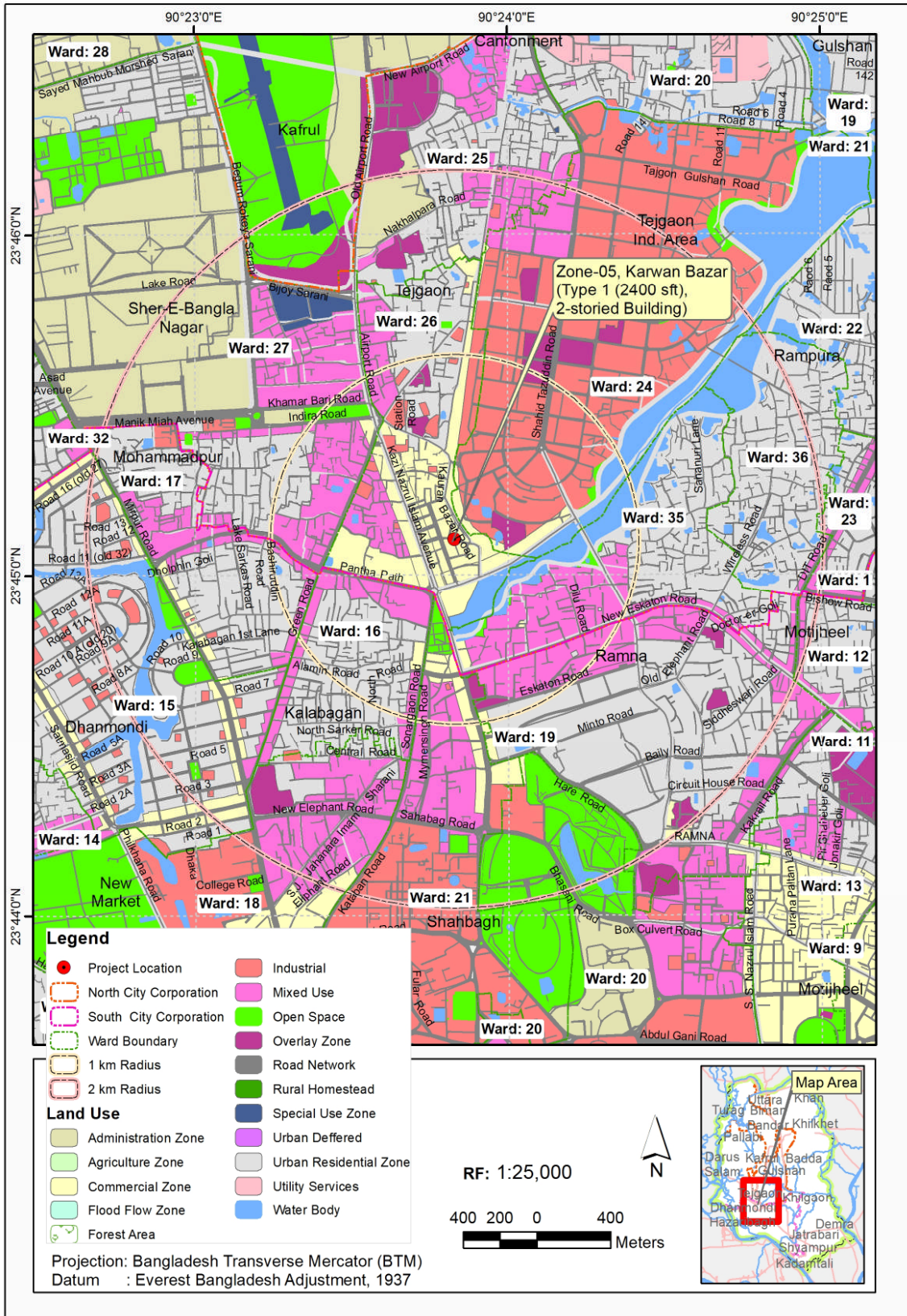


Figure 15: Land use and Land Cover Map of the Study Area

3.3.2 Beneficiary Population

The Sub-project activities will benefit the local people and people who comes in the Sub-project's catchment areas during disaster and non- disaster period. The Sub-project's catchment area will cover 1.11 sq.km. situated around it. Total numbers of population in catchment area of the Sub-project is 67876 among which 40739 are male and 27137 are female [BBS, 2011 - Population Census].

3.3.3 Education

In catchment area of the Sub-project, literacy rate among the population is higher -.7an the national average (72.2%). Literacy rate of male is still higher than the female Populations [BBS, 2011- Population Census]. There are many school, colleges and university around the project site like Government Science College, Holy Cross School and College, Tejgaon Government Girls High School, Tejgaon Mohila College, Sonargaon University, National Institute of Fashion Technology etc.



Figure 16: Major educational facilities around the site

3.3.4 Access Road to the site and Traffic Load with Types

There is a 45 ft. wide access road just between two storied super market and the proposed warehouse. Moreover existing 4 lane Kazi Nazrul Islam Avenue will be the main approach road to the proposed site location.



Figure 17: Access road for the warehouse

3.3.5 Public Services

There are many public services like Hospital, Fire service, Thana etc. Major public services are Tejgaon Police Station, Kazi Nazrul Islam Avenue, Tejgaon Fire Station, BIRDEM hospital, Samorita Hospital, Islamia Eye Hospital etc.



Figure 18: Major Public Services

3.3.6 Recreation and Aesthetics

There are shopping malls named Bashundhara City Shopping Complex, Kabbokash Super Market, Techshop Bangladesh etc. Few parks are also situated near the warehouse named Hatirjheel Park, Farmgate Park, Shahid Zia Shishu Park, and National Museum etc.



Figure 19: Recreation facilities

3.3.7 Land Acquisition & Resettlement

Land acquisition and resettlement activities are not involved in the Sub-project Intervention.

3.3.8 Agriculture

No agricultural activities are taking place in the Sub-project area.

4 PUBLIC CONSULTATION

4.1 General

Presently the public consultation is done as a part of social assessment separately to ascertain the people's reaction. During the survey, public consultation has done to know the people's perceptions about the project and environmental problems. The purpose of the public consultation includes the following:

- To ascertain the public views on various environmental issues related to the project;
- To encourage and provide for people's participation in project implementation; and
- To obtain new insight and site specific information, and to appropriating possible mitigation measures based on local knowledge of the communities.
- To ensure the minimization of social conflicts regarding the project, if any

During consultation with the local people, they were little known about this type of project. This area is somewhat underdeveloped part of the area. The expansion of the industrial unites is very slow so they are very positive about this project. The proponent also commits to give privilege locality in every aspect.

4.2 Approach and Methodology

4.2.1 Approach

Participatory approach was followed for identifying the participants as well as conducting public consultation meeting. Initially, the study team consulted with the project proponent i.e. **City Corporation Authority** for understanding the project situation and the potential stakeholders. However, the meeting ensured the common and equal platform of the participants so that they can express their opinion in an enabling environment. The consultants unfold the issues and in return, the participants give feedback to the given issues and in some cases open two-ways discussions were held in the meeting.

The consultation process was intended to generate an enabling participatory environment between the project proponent and the potential stakeholders through the intermediaries of the consultant. The consultant, in this context, ensured a congenial participatory interaction by mixing two beneficiary groups i.e. **City Corporation Authority** that belongs to up stair and the stakeholders who belong to down stair.

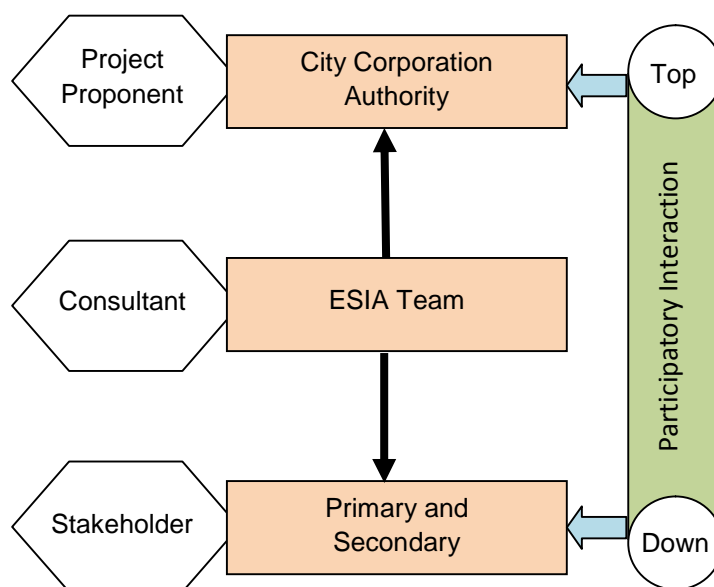


Figure 20: Overall Consultation Process

4.2.2 Methodology

4.2.2.1 Identification of Stakeholders

Stakeholders include all those who affect and are being affected by policies, decisions or actions within a particular system. Stakeholders can be groups of people, organizations, institutions and sometimes even individuals. Stakeholders can be divided into primary and secondary stakeholder categories.

Primary Stakeholders: Primary stakeholders are people who would be directly benefited or impacted by the proposed project. In this context, people who have/had land within the project boundary, and who are living at the vicinity of the proposed project were considered as the primary stakeholders.

Secondary Stakeholders: This category of stakeholders pertains to those who may not be directly affected but have interests that could contribute to the study, play a role in implementation at some stage, or affect decision making on Project aspects. In this project local elite persons, government departments and line agencies fall under this category.

4.2.2.2 Time, Date and Venue Selection

For formal consultation meeting venue, date and time of meeting was selected through the consultation with local people, the project proponent and the consultant. These three groups select an agreed venue considering the closeness to the proposed project, easy accessibility to the venue and which is likely to be neutral. Date and time was also finalized in this way considering availability of the participants, ensuring the maximum participation and compliance with the other arrangement.

For Key Informant Interviews (KIIs), potential secondary stakeholders preferably different government officials, private entrepreneur have been selected who are incumbent in the jurisdiction. Appointments were taken prior to visit them.

For Focus Group Discussion (FGDs), local occupational groups who are concerned and are likely to be impacted were identified and consulted at the spot.

4.2.2.3 Enlisting and Invitation

A comprehensive list of potential stakeholders was prepared through the consultation. This list was intended to cover all sorts of interest groups, occupational groups, socially acceptable and knowledgeable peoples.

A formal invitation was sent to them and also communicated over telephone for ensuring their presence in the meeting.

4.2.2.4 Consultation Instrument

Checklist: A comprehensive checklist covering all possible issues to be addressed was prepared through consultation with the multidisciplinary study team. This checklist was used in the meeting to unveil peoples' perception and opinion along with suggestions.

Attendance list: An inventory of the participants was maintained in attendance sheet containing contact number.

Camera: For visualizing the participants, photographs were taken using camera. These photos were presented in this chapter. Photos of the meeting participants are presented at the end of this chapter.

4.2.2.5 Consultation Process

The study team conducted the meeting. During consultation meeting, the following process was followed with sequences.

Greetings: At the outset, the team spelled greetings to all participants. Welcomed them for attending and stated the entire design of the meeting.

Introduction: The team members introduced themselves to the participants and gave detail description of the project, spelled out about the objectives and anticipated outcome of the meeting.

Respect to the participants: The study team showed respect to all participants. They respected not only to the individuals but also to their values, cultural practices and social structures.

Ensuring peoples’ voice: Generally, all participants cannot participate equally. In fact, a substantial number of participants tended to remain silent in any meeting. However, the study team encouraged all to participate willingly through explaining the ethics of the study.

Note taking: discussed issues and opinions were written in notebook carefully. All issues were given equal importance.

Recapitulation and closing the session: At the end the study team recapitulated the session and responded to the quarries. Finally, the facilitator closed the session thanking the participants.

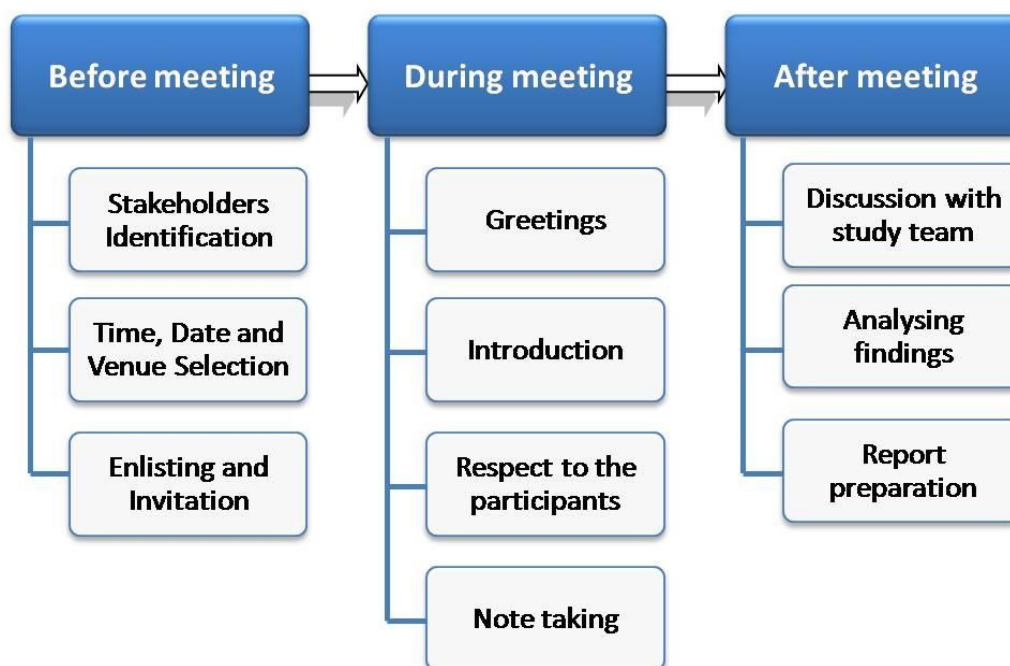


Figure 21: Steps of Consultation Process

4.2.2.6 Consultation Meeting

Venue, Date and Time

One Public Consultation Meeting (PCMs) was held at Kawranbazar project site comprising different types of the stakeholders. Details are given below.

Participants Criteria	Governmental and Non-governmental Officials
Date	27.06.2016
Place	Kawranbazar
Starting time	10.00 AM
Ending time	10.45 AM

The Participants

There were total 7 participants in the PCM. Most of them are small businessman or shopkeepers. No Local Government representative is found during the PCM.

4.3 Issues Discussed

The following issues are discussed:

- Disaster shelter is very urgent as they are very much vulnerable to disaster i.e. Earthquake, cyclone, flood etc.
- Man-made disasters like fire, drainage congestion, landslide and building collapse are increasing rapidly particularly in and around the major cities.
- City level emergency disaster management system remains weak.

- Earth quake is infrequent but Dhaka has been identified by Stanford University, as one of the 20 most earthquake vulnerable cities in the world.
- Government of Bangladesh has therefore undertaken the Urban Resilience Project (URP) in two cities, Dhaka and Sylhet.
- Objective of the project is to increase the effectiveness of disaster preparedness and response.
- It will also reduce critical vulnerabilities and will support an improvement in the quality of new building construction.



Figure 22: Public Consultation

4.5 Feedback of the Stakeholders

4.5.1 Knowledge about the Project

At the outset, the study team gave a brief description about the project. However, the stated description by the study team makes them clearer about the objectives and process of the project.

4.5.2 Attitude to the project

The participants expressed conditional positive response to the project. They stated that if the proposed project does not hamper their business, it will be welcomed warmly. Otherwise they are not interested of this project.

4.5.3 Findings of the Consultation Meeting

Upswing of employment in community

Sequences of matters were emerged with FGD (Focus Group Discussion) participants looking at their experience of employment in the project from a different perspective including quality of occupation. The participants summarized their opinion about the possibility of better occupational probabilities.

Environmental apprehensions

Environment is the most prominent issue in our everyday life. We are bound to protect our environment for the betterment of our living. Most of the participants concern about environmental threats i.e. the disaster. Over all discussions, environmental apprehensions (water pollution, air pollution and soil pollution) was stated and was the most frequent measures of the environment.

Upsurge social mobility

There are too many topics were discussed by the participants of FGD. Social mobility is one of them. Very few people discussed about social mobility. Social mobility means the proportion of individuals in a particular social class who move up or down in the socio-economic hierarchy.

4.5.4 Suggestions and Recommendations of the Participants

The participants were presented a number of feedback, suggestions and recommendations which are as follows:

- The local people are not so interested to the proposed project as they thought they will be hampered financially by the project
- The local people are even not interested to talk about it and attend the photography
- Some of them think that the warehouse will be an asset for emergency situation.
- There should be access facilities to the disaster affected areas such as connecting roads, available of resources so that people can get help during emergency cases.
- They also requested to have provision of additional facilities such as Radio, TV, Rain Coat, Torch light, Life jacket, Mike, Flag, Fire extinguisher, Gum boot etc.
- Most of the participants are expressed that the capacity of the proposed warehouse is satisfactory.

4.6 Researcher's Understanding Based on the Discussion

Each participant shares their opinions on the **Urban Resilience Project**. Some of the participants demand to establish the facility. They, who support the project identified some major social and environmental factors that may have really functioned for the communal people of the locality. Despite some negative comments, all of the participants suggested to establish the facility.

5 INITIAL ENVIRONMENTAL AND SOCIAL SCREENING (IESS)

5.1 General

Initial Environmental Screening (IES) for the Sub-project has been conducted with the purpose of fulfilling the requirements of GoB and WB. IESS ensures that environmental issues are properly identified in terms of extent of impacts. Field visit for performing IESS has been carried out on July 2016 in the Sub-project site. The screening data and information for this Sub-project have been formulated and shown in Table 5.1. The social screening checklist is given in Annex C.

Table 5.1: Initial Environmental Screening Checklist

Screening Questions	Impact ⁸					Remarks
	Y	N	H	M	L	
A. Potential Environmental Impacts due to Sub-project location during Planning Phase						
Is the Sub-project area.....						
Adjacent to/or within any of the environmentally sensitive areas?						
Cultural heritage site		√				
Protected area		√				
Wetland		√				
Mangrove		√				
Estuarine		√				
Buffer zone of protected areas		√				
Special area for protecting biodiversity		√				
Bay		√				
B. Potential Physical Environmental Impacts during Construction Phase						
Will the Sub-Project cause...						
Loss of agricultural land/ crop?		√				
Impact of Air / Dust pollution?	√				√	Vehicles movement: bus, mini truck, motor cycle, auto rickshaw, taxi, tractor, lorry, private car, human howler and during construction period due to construction activities.
Impact of Noise pollution?	√				√	Vehicles movement: bus, mini truck, motor cycle, auto rickshaw, taxi, tractor, lorry, private car, human howler etc. and during construction period due to construction activities.

⁸Y = Yes, N = No, H=High, M=medium, L=Low

Screening Questions	Impact ⁸					Remarks
	Y	N	H	M	L	
Impact on soil, surface and ground waters Pollution? If yes, mentions source?		√				
Impacts on surrounding environment due to sanitation and wastes disposal during: construction phase?	√				√	Disposal area available? [√Yes/No] If yes, where: √On-site, Off-site
Impact from construction camp?		√				Camp area available? Yes / No [√]
Construction material storage area		√				
Impact on drainage or create water logging in the area?	√				√	Heavy rainfall causes the water stagnation in the sub-project area 1'-1.5' in June & July in every year.
Is there any flooding problem? Mention frequency & severity.	√				√	1988 - 4'-5', 5-6 Days 2007-1'-2', 1-2 Days 2008 - 3'-4', 2-3 Days
Is there any river erosion? Where & Severity?		√				
C. Potential Biological/ Ecological Environmental Impacts during Construction Phase						
Will the Sub-project cause.....						
Destruction of trees and vegetation?		√				
Impact on pond or fish?		√				
Negative effects on rare, vulnerable, threatened or endangered species of flora & fauna and/ or their habitat?		√				No rare species are found near by the sub-project area.
Negative effects on wildlife habitat, populations, Corridors or movement?		√				No wildlife habitat reported to exist nearby the sub-project area.
Negative effects on locally important or valued ecosystems or vegetation?		√				
D. Potential Socio-Economical Impacts during Construction Phase						
Will the Sub-project cause...						
Involve any land acquisition and involuntary resettlement?		√				
Traffic disturbances due to construction material transport and wastes?	√				√	There is a 45 ft. wide access road just between two storied super market and the proposed warehouse. Moreover existing 4 lanes Kazi Nazrul Islam Avenue will be the main approach road to the proposed site location.
Negative effects on neighborhood or community?		√				

Screening Questions	Impact ⁸					Remarks
	Y	N	H	M	L	
Are there any Impediments to movements of people and livestock?	√					
Disturbance to the student to take the lesson in the classroom? If yes, Specify.	√					
Direct or indirect hazards to student for walking in the school campus by construction activities?	√					
Risks and vulnerabilities related to occupational -health and safety due to hazards during construction and operation phase?	√				√	During construction period due to construction activities.
E. Potential Historical & Cultural Impacts during Construction Phase						
Will the sub project cause...						
Degradation or disturbance of historically culturally important site (mosque, graveyards, monuments etc.)? If Yes, Specify.	√					
F. Potential Impacts during Operation & Maintenance Phase						
Will the sub-project activities cause...						
Possible development of labor camp into permanent settlement.	√					Contractor will remove labor camp and will clear the places after completion of construction.
Nuisance at stockpiling areas of construction materials.	√					Contractor will clear the places after completion of construction.
Nuisance at sanitation and waste disposal areas?	√					
G. Existing Environmental & Social Condition around the sub-project						
Air Quality	√				√	Insignificant impact due to earth works, construction material processing, construction activities, vehicle movements etc. would generate fugitive dust particles and hence the level of SPM in the ambient air would increase
Noise Quality	√					There is likely insignificant impact of noise pollution due to movement of local vehicles, running of heavy load traffic for construction materials transportation
Mention sources of drinking water in dry and wet seasons?						Supply water from wasa and Tubewell 15.01%, pond 0.11%, tap 82.08% and others 2.80%
Are there any ponds, khals, beels, haors, baors, rivers, etc. in/around the site? Please specify numbers & names for each						Nos.-Name-Distance-Direction Ponds: 0 Khals: 0 Beels: 0

Screening Questions	Impact ⁸					Remarks
	Y	N	H	M	L	
						Haors: 0
						Baors: 0
						Rivers: 0
						Other: Hatirjheel Lake is about 400 m away
Surface water (Pond, Khal, Beel, Haor, Baor, River etc.) quality						Moderately treated
Groundwater Quality						Fresh water is needed for construction purpose mainly in civil works that will put pressure on aquifer storage.
Soil Quality						Soil is reasonable
Is there any disaster early warning system? If Yes, by Whom?						Available: UDMC, Micing, TV, TNO, TEO, Red crescent, CPP, Mobile phone SMS etc.

5.2 Assessment of Environmental Screening

The proposed Sub-project (new Warehouse) is not located within any identified environmentally sensitive or ecologically critical area, and therefore, does not seem to create any adverse impact on the important environmental features. No significant impact is expected on the ecosystem and biodiversity, no agricultural land/ activities or fish farming will be disturbed, due to the construction of the sub project. Although, some earth excavation work will be involved, no agricultural land or gardens have chances to demolish. Moreover, mitigation measures will be taken according to the EMP for minimizing the air, dust, noise, impact of construction materials storage areas and others such as health risk due to combustibility, compression and other mechanical malfunction. Drainage congestion and water logging problems are not found. Plinth level of the Warehouse should be higher than the flood level (18-24 inches). Due to construction activities of this sub-project, no tree will be cut down out of 2 existing trees. Therefore, the Sub-project activities will not result any adverse impact in the environment surrounding the sub project. However, few shopkeepers of the footpath became worried about their business, whether they can do their business here or not, after commencing of the proposed project. There is enough space in the surrounding, where they can carry on their business. Despite of all the above points, it can be said that it is a welcome and beneficial project for the local communities.

5.3 Rehabilitation and Resettlement Plan

Resettlement Action Plan (RAP) is not mandatory for this project since the project authority has purchased/leased the lands or has taken permission to use the lands from actual owners/authority. The site is belong to the concern agencies and situated in their premises.

6 ENVIRONMENTAL IMPACTS IDENTIFICATION

6.1 General

This section identifies and predicts the probable impacts on different environmental parameters due to construction of a new 2-storied warehouse (2400 sft). After studying the existing baseline environmental scenario, monitoring environmental parameters, reviewing the process and related statutory norms, detailing the waste management measures, the major impacts can be identified during construction and operation phase. Relevant important aspects of environment are therefore selected which may have significant impacts due to project activities.

6.2 Identification of Impacts

The environmental implications of the predicted impacts may be beneficial or adverse, but the main objective of impact identification is to specify areas that are likely to be affected by the implementation of a sub-project. Environmental impact, by definition, implies an alternation of environmental conditions or creation of a new set of adverse or beneficial environmental consequences caused by the action under consideration. Impact identification starts at the early stage of scoping when data on both the project and surrounding environment are made available. The predicted impacts have been identified by rigorous scientific analysis and expert opinion. The consequences of impact on different resources have been accounted precisely. The following sections describe all the potential impacts (activity wise) on atmospheric environment, water resources, land resources, agricultural resources, fisheries resources, ecosystem resources and socio-economic environment of the surrounding.

6.2.1 Impact on Landform

There will be no noticeable impact in the landform as the proposed 0.055 acres of land for this sub-project is already in developed form.

6.2.2 Impact on Natural Resources

Impact on Water Resources

In construction stage of the warehouse, if runoff of the rain water is occurred from the project area to the surrounding water drains, it may cause deterioration of water quality. So it may be considered as the impact on water resources that is mentioned below.

Impact on Agricultural Resources

Construction has no impact on agricultural resources as there are no agricultural resources in the sub-project site.

6.2.3 Impact on Ecosystems

Flora

During construction phase it has no significant impact on existing trees and vegetation at the sub-project site. This is due to two numbers of Banyan Tree (*Ficus benghalensis*) and Mahogany tree (*Swietenia genus*) existed adjacent to the boundary, so it need not to require to cut down these two trees. Also the sub-project site is a market place which is always crowded with people, so there is vegetation at the site.

Fauna

Construction has no impact on the faunal communities present at the sub-project site.

6.2.4 Impact on Ambient Air

Various activities during construction phase such as earth works, construction material processing, construction activities, vehicle movements etc. would generate fugitive dust particles and hence the level of SPM in the ambient air would increase. This increase in SPM level would be very local and short term and would be limited to the time of construction period only.

Carbon dioxide and nitrogen oxides may be emitted from combustion of the petroleum products in project related vehicles, machinery, and generators etc during the construction period. Their impact on air quality will not be significant as the pollutant emission activities (point and area sources) will be limited within the project boundary and the activities will be short term (only for construction period). However, this impact may further be minimized by adopting Environmental Management Plan.

6.2.5 Impact on Ambient Noise

It is expected that during construction of the warehouse, the level of noise will increase sharply in the project area. Operation of different machineries and equipments for construction activities, running of heavy load traffic for construction materials transportation, and regular traffic movement may generate noise during construction period. The produced noise may have impact on existing acoustic environment of urban category defined in ECR, 1997. Local inhabitants may feel disturbed due to noise from line sources (traffic movement).

High noise level during construction phase can cause high disturbance to the local community. This can also cause health impacts and increase stress level of the inhabitants of the locality and workers.

6.2.6 Impact on Soil

Generally, construction activities do not include any activities that cause soil pollution. However, Rainfall runoff from the construction site may cause soil pollution if the construction site is not properly managed. If the solid waste and other construction wastes are not properly managed, it may lead to soil pollution.

6.2.7 Impact on Workers Health, Sanitation and Safety

During construction time more security, construction workers and others about 50 people will move to the site. Most of them will come from outside the sub-project site. They have to stay at site. For them more living, washing, kitchen, storing etc purpose temporary facilities have to construct. These will cause more hygienic/sanitation issues if are not properly managed. Due to more movement man and material accidental incidents may increase if safety issues are not strictly maintained. Movement of more river craft may also cause accident if strict rules for movement, loading and unloading man and materials are not carried out. During construction accident may cause if safety rules and regulation are not strictly maintained. Requirement of safe drinking water will increase at site. If smooth supply safe drinking water are not maintained the workers may suffer out of water borne disease. Due to wind and movement of vehicles may cause dust at the site. This may cause problem of the workers and neighboring resident. However it may attract some interested people to visit the site. It would be wise to avoid/discourage those tourists on safety ground.

6.2.8 Solid Waste Disposal

Generation of construction related waste would occur during the construction period of the warehouse. Wastes may be generated from earth works, site establishment, civil construction, stockpile of materials, and domestic household activities. The wastes might be metals, concrete, spoiled construction material, excavated spoils, spilled oil from machinery and vehicles, etc. Moreover, some domestic waste such as food waste, paper etc would be also generated. The waste generated during the construction period can have adverse environmental impacts if not disposed of properly.

If the waste generated during construction period is not disposed of properly, then it will have negative impacts on the ambient environment. Construction activities should be carried out following the environmental rules and regulation for avoiding significant impacts on the environment. Creation of odor would be one of the major problems of not disposing the domestic waste properly. Moreover, it will deteriorate water quality and have adverse impacts on aquatic ecosystem if they are thrown in water stream. Generation and scattered disposal of waste must be controlled for preventing the impacts on physical environmental resources i.e. water, land resources etc.

6.2.9 Social Impact due to Construction of Warehouse

The proposed warehouse will be an asset for emergency situation by supplying search and rescue equipments during emergency, as the warehouse will be constructed in the area which is highly commercial and also a market place, where a large number of people comes everyday and almost every building in this area is high rise, so occurrence of man-made disasters like fire hazard, drainage congestion and building collapse etc are increasing rapidly in this area. Moreover the warehouse will be used as Disaster shelter during natural disasters like Earthquake, cyclone, flood etc.

Also the construction activities of the proposed warehouse would offer employment opportunity. Most of the un-skilled labor would be hired. The noise and dust generated from the construction site might disturb the nearest community patches. However, once the boundary wall around the project area is completed, the dust would not reach to nearest community patches. The boundary wall would also attenuate the noise to be generated from construction activities.

6.2.10 Impact due to Transportation of Construction Related Materials

Construction materials will be transported through inland road transport. Moreover the traffic load on the road surface adjacent to Sub-project site during day and night is very high. So, if proper time schedule of incoming and outgoing vehicles to the Sub-project site will not maintain, Traffic congestion and traffic problems will be created. For these reasons, DMP doesn't allow any vehicle containing construction material to enter into the Dhaka city before 10 p.m. and after 7 a.m. The other construction material will be collected from the local suppliers. During transportation of construction material, the following conditions will be followed strictly:

- Loading and unloading of transportation would not create any disturbance to nearby community and other dwellers, do it in such a way
- No stocking of construction material in public place that may cause disturbance to community
- Efficient equipment would be used in handling of construction materials
- No disposal of oil to the near water body
- No disposal of waste into nearest water body
- The transport to be used for transportation should be fuel efficient and in good maintenance
- No cleaning and maintenance of the vehicle will be carried out at project site
- Every material must be covered while carrying to the site through vehicles so that no dust or air pollution may happen
- In the project site, construction material should be kept in dry and clean places
- Cement and reinforcement must be kept under the shed and in dry and high places from ground level
- Other materials must be covered.
- Material transportation time schedule should be maintained strictly

Table 6.1: Environmental Impact Identification Matrix- Construction Phase

Parameter	Physical Environment					Ecological Environment			Human Environment				
	Topography	Hydrology	Water Quality	Air Quality	Noise	Vegetation	Fauna	Aquatic Environment	Displacement	Employment	Service	Health	Culture
Possession of Land													
Site development	P			T		P				T		T	
Civil and Structural Work			T	T	T					T		T	
Mechanical and Electrical Work				T	T					T			
Water Requirement			T										
Transport				T	T								
Immigration													
Employment			T							T	T		T

Here, P – Permanent and T – Temporary, **Immigration**: To come to a place to live there (Kind of migration), **Emigration**: to leave one's place of residence or country to live elsewhere (Kind of migration)

Table 6.2: Environmental Impact Identification Matrix- Operation Phase

Parameter	Physical Environment					Ecological Environment			Human Environment				
	Topography	Hydrology	Water Quality	Air Quality	Noise	Vegetation	Fauna	Aquatic Environment	Displacement	Employment	Service	Health	Culture
Water Requirement													
Liquid Effluent			X					X				X	
Gaseous effluent				X		X						X	
Solid Waste												X	
Hazardous Waste													
Transport				X	X							X	
Operational noise					X							X	
Immigration			X							X	X		X
Employment										X			

Here, **Immigration**: To come to a place to live there (Kind of migration), **Emigration**: to leave one's place of residence or country to live elsewhere (Kind of migration)

7 ENVIRONMENTAL MITIGATION AND MANAGEMENT PLAN (EMMP)

7.1 General Consideration

In the context of the sub-project, the Environmental Mitigation and Management Plan (EMMP) is concerning with the implementation of the measures necessary to minimize or offset adverse impact and to enhance beneficial impacts. The prime function cannot be achieved unless the mitigation and benefit enhancement measures are fully implemented. All measures are said to be successful when they comply with the Environmental Quality Standard (EQS) of Bangladesh. Thus the objectives of EMMP of studied sub-project would be:

- Mitigation measures to reduce and eliminate negative impacts
- Enhancement measures to maximize positive impacts
- Monitoring requirement and monitoring indicators

The main benefits of the environmental mitigation plan are

- Ensuring that environmental standards are met during design, construction, and operation of the project
- Providing offsets to negate project impacts especially ecological impacts, e.g., in the form of compensatory afforestation, greenbelt development and landscaping.

7.2 Water resources conservation plan

Water resources should be conserved and prevented from any pollution and hydrological alteration. The nearby drains should be kept away from any obstruction and waste dumping. If any drain flows through the project area that drains water from outside the project area should be free flowing without any obstruction. Proper guidelines should be developed for Operation & Maintenance of drains.

7.3 Good housekeeping of Construction Related Materials

The construction yard and the site should be managed in such a way that would ensure minimum environmental degradation or damage of the surrounding. The contractor must take responsibility for the construction site to confirm contractual aspects and applicable environmental standards. Unauthorized access from public in the site should be prevented for safety issue. Adequate numbers of bins, sanitary toilet, water supply system, run-on and run-off drains, fire safety and fighting system etc. should be provided in the site. All the construction materials and stockpiles should be maintained within the project area provided with rain and wind protection. Electrocutation from general supply of electricity on site or overhead electrical lines contact with on-site cranes or mobile cranes or other trucks should be prevented. A housekeeping team should plan the safety measurements and visit the plant regularly for ensuring safety. An Environment Manager should be employed with responsibility of monitoring the activities which causes any environmental effects and ensuring enforcement of EMP during construction activities.

7.4 Worker's Health and Safety

To ensure a safe working place, the following measures should be ensured:

- Before operating a machine, ensure that the dangerous part of the machine has been installed with a guard
- Avoid going to any area with insufficient lighting as there may be some dangerous places which have not been provided with fencing.
- Keep vigilant all the time and watch out for moving cranes, hooks or other lifting equipment.
- Before using any electrical installation or tool, check the condition of its electric cables.
- Avoid dragging electric cables on the ground or allowing the cables to come into contact with water.
- Using electrical tools installed with an earth leakage circuit breaker.
- Using and handling chemicals with care and following the safety data sheet provided by the

chemical suppliers.

- Using of Fall protection during working at height
- The internal roads, sidewalks and walking ways would be demarked properly
- Traffic safety measures should be available within the internal roads of the project sites.
- Regular checking, servicing and maintenance of vehicle should be ensured
- Proper training for the workers on safety

Table 7.1: Use of Personal Protective Equipments (PPE) should be mandatory for all (including the visitors) Applicable PPEs are mentioned in the following table:

Protection	Applicable PPE	Safeguarding for
Hand	xvii) Leather gloves xviii) Electrical resistance gloves xix) Canvas gloves	Cuts due to handling Heat radiation Electrical Shock Contact with oil and grease etc Falling of hot slag
Leg	ix) Leg guards x) Steel toe & Leather safety boots	Welding sparks Striking by objects, fall of objects and stepping on sharp or hot objects Heat radiation, stepping hot or sharp objects and stepping on sharp or hot objects
Eye	v)Spectacle type goggles with plain shatter proof lens	Foreign bodies reflected arc rays entering the eyes
Head	i) Fiber helmet	Fall off objects/hitting against objects during construction, maintenance etc
Ear	i) Ear plug or muffs	High noise level
Nose	i) Dust protection mask	Fine dust particles

7.5 Safety at site

Safety at site should be ensured at the construction site. The construction area should be protected by security fencing to prevent any safety threat to nearby community. All the piles should be placed within the boundary of the project with proper protection from wind and rain. All the passage should be keeping clear for all the time. The construction site should be properly lighted. All the lights should be directed to land within the project boundary. It is to be ensured that no light beam is to be directed towards nearby community. Light shed should be used. The Construction site should be equipped with firefighting equipments and firstaid.

7.6 Construction Waste Management

Construction waste should be managed properly. The rate of waste generation should be reduced adopting efficient technique and limiting waste generating activities. The measures for controlling construction waste may include limiting site clearance activities, planned stocking and gathering of construction materials and equipments, fencing around the construction yard, maintaining existing right of way to carry construction materials, banning of waste burning and quality housekeeping. A waste dumping place should be provided with efficient waste collection and disposal techniques. No waste should be dumped to the surrounding rivers. Appropriate measures provided with run-on and run-off system might be constructed from controlling run off from construction yard and liquid waste.

The management plan for construction waste during construction period should include the steps like fencing around the project site, limiting site clearance activities, planned stocking and gathering of construction materials and equipment, covering the stockpiles for protecting them from wind and weathering actions, avoiding waste burning, keeping provision of different colored waste bin, keeping onsite waste collection and disposal system, adopting proper sanitation system for the employees and the workers, quality housekeeping etc. No waste should be dumped/thrown to the river. Recycling and reuse of the waste should be done whenever possible. Hazardous materials, spillage and accidental release should be managed carefully according the hazardous material handling guideline. Moreover, training should be provided to the employees and the workers/laborers about proper waste management system for increasing their awareness.

7.7 EMP for Preventing Pollution from Construction Site

Dust Control

Construction activities of the plant would generate significant amount of suspended particulate matter. As the sub-project area is highly commercial and also a market place, an efficient dust control plan has to be adopted. The plan would include limiting SPM generating activities, adopting dust suppression system, minimizing base stripping and vegetation clearing activities, covering stockpiles, restricting vehicle speed, avoiding earthen roads for vehicle movement, spraying water regularly to suppress dust etc.

GHG emission control

The construction activities might generate significant amount of GHG also. The GHG emission control plan includes using efficient generator/machineries/equipment, regular maintenance of generators and other machineries, switching off/throttling down generators/ machines/ equipment/ vehicles which are not in use, avoiding the use of ozone depleting substances etc. Moreover, creating thick green belt around the plant is another major step for air quality management as it will help to sequester CO₂.

Controlling Noise

For preserving the acoustic environment and for protecting the nearby inhabitants from the negative impacts of noise pollution during the construction period a noise pollution management plan has to be adopted which would include steps like setting noisy equipments as far away as possible from the settlements, creating temporary barriers or enclosures with sound absorbing materials around the noisy equipment, maintaining the equipments properly.

Moreover, a significant part of construction work should be conducted during night time. The following specific measures should be adopted

- The noisy equipments should be sited as far away as possible from the nearby settlements
- Acoustic hoods/ silencers/ enclosures on all sources of noise generation should be used to decrease the intensity and degree of noise.
- Temporary barriers or enclosures with sound absorbing materials should be built around the noisy equipments
- A significant part of construction work should be conducted during night time
- Steps should be taken to create the boundary wall
- Steps should be taken to create a thick green belt
- The equipments used during the construction phase should be properly maintained as proper maintenance can decrease the level of sound significantly
- For protecting the workers from the adverse impacts of high noise level, personal protective equipments such as air plug/ear muffers should be provided to them and the use of this protective measure should be made mandatory to the workers who are susceptible to high noise

7.8 Green Belt Development

Development of Green belt along the plant site is essential for safeguarding the nearby community. Proper plantation will enhance scenic beauty of the plant also. Local suitable species is suggested for plantation. Following are the summary points that should be implemented:

- Green belt should be developed around the boundary wall, the open space within the sub-project.
- Different heights of local plant species should give preference for plantation.
- Additional plantation program may take outside the project boundary at road side.
- Five plants like Mahogany, Neem, etc. should be planted against no cut down tree which has shown in a hand sketch with green circle in below.

Green Belt of the Sub-Project in Hand Sketch Map

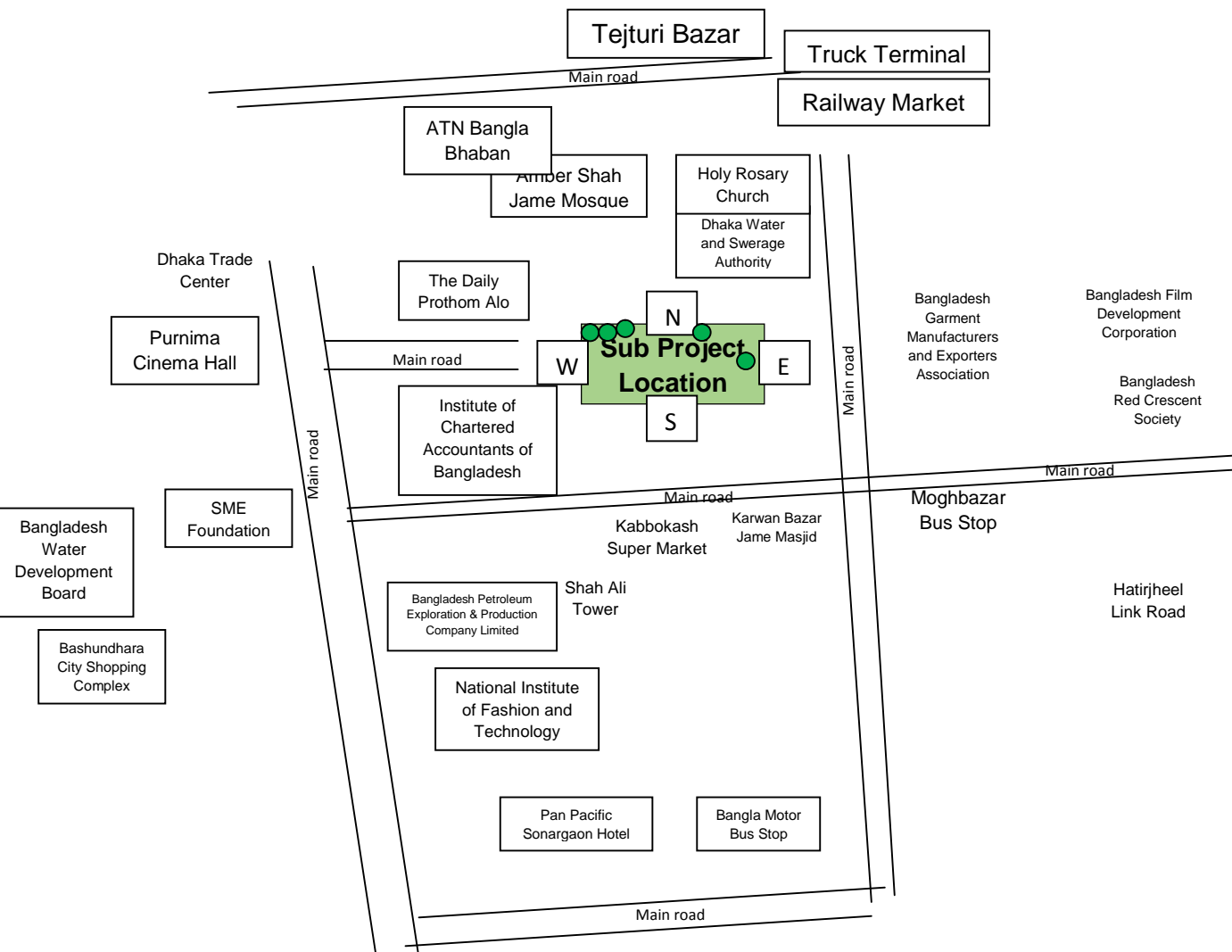


Table 7.2: Environmental Management Plan during Construction Phase

Environmental Component	Potential Impacts	Mitigation measures	Time frame	Location	Responsibility
Water					
Ground Water	Ground Water Contamination	Minimum Extraction of Ground water and Rain water harvesting system develop	Throughout Construction Phase	Project Site	Environmental Monitoring Team of the Project Proponent
Surface water sources	Surface Water Pollution	No disposal of any wastewater directly into outside water bodies. Refueling, washing and maintenance of plant and vehicles will be prohibited in the vicinity of the river and water bodies.	Throughout Construction Phase	Project Site	Environmental Monitoring Team of the Project Proponent
Drinking Water Requirement	Increase local demand	Arrange water without affecting local requirement	Throughout Construction Phase	Project Site	Environmental Monitoring Team of the Project Proponent
Wastewater from Workers' camp	Pollute the surface water	Ensure proper sanitation and drainage. No direct discharge of wastewater in the river. The construction workers at site will be provided with proper sanitation arrangement. The workers colony houses for foreign workers will have sanitary latrines to treat sanitary waste.	Throughout Construction Phase	Project Site	Design consultant and Project Proponent
Air and Noise					
Dust Generation	Increase dust in the air	Spraying of water wherever required. All stock pile materials which can blow to contribute to airborne dust will be covered with canvas or plastic sheets during windy season. The vehicle should be covered while transporting the materials.	Throughout Construction Phase	Project Site	Environmental Monitoring Team of the Project Proponent
Gaseous Emission from Construction work vehicles	Pollute the Air	Ensure checking of vehicular emission and obtaining Pollution Under Control Certificate	Throughout Construction Phase	Project Site and surroundings	Environmental Monitoring Team of the Project Proponent
Noise from machineries and construction	Increase Noise level	Ensure machineries meeting noise level standards. Noise levels of machineries used shall conform to relevant standards prescribed in Environment Conservation Rules, 1997. Silencers and mufflers of machineries will be regularly inspected to control noise generation.	Throughout Construction Phase	Project Site	Environmental Monitoring Team of the Project Proponent

Environmental Component	Potential Impacts	Mitigation measures	Time frame	Location	Responsibility
Land					
Disruption of Earth Surface	Become a hazard	Earth work should be kept minimum and adequate drainage system should be developed	Throughout Construction Phase	Project Site	Environmental Monitoring Team of the Project Proponent and DOE
Solid Waste from construction work	Deteriorate the environment	Ensure dumping at preselected location	Throughout Construction Phase	Project Site	Project Proponent
Others					
Occupational Health & Safety	May create risk for the workers	All relevant rules for protection of health and safety of the workers will be rigorously followed. All contractors will be made aware of this responsibility. Proper restriction signs and other methods should be applied to prevent unwanted entry of people.	Throughout Construction Phase	Project Site	Design consultant and Environmental Monitoring Team of the Project Proponent
Labour Condition	Increase labour scope	Bangladesh has ratified key International Labour Organization (ILO) conventions to ensure the work conditions are reasonable and safe, and employees are free from any types of discrimination.	Throughout Construction Phase	Project Site	Project Proponent
Traffic	Increase traffic at the locality	There shall be a continuous vigil to see that the regular local traffic is not disturbed and the personnel to guide the construction vehicles to the site without causing any traffic jam	Throughout Construction Phase	Project Site and surroundings	Project Proponent
Socio-economic	Improve the condition	Various environment awareness programmes shall be organized by management committee on regular basis to bring forth the beneficial aspects of the project at local level. A management committee shall take keen interest in public participation and expectations of the local people for improving quality of life during planning of welfare activities under CSR plan. The committee shall identify eligible people for jobs in construction and lower level administrative jobs by noting their literacy level, extent of need, availability of means etc. Or the committee should confirm the employment of local people by subcontractors.	Throughout Construction Phase	Project surroundings	Environmental Monitoring Team of the Project Proponent

Influx of workers	Generation of sewage and solid waste	Construction of sanitary latrines and septic tank system Erecting “no litter” sign, provision of waste bins/cans, where appropriate Waste minimization, recycle and reuse (as required) Proper disposal of solid waste	Throughout Construction Phase	Project Site	Environmental Monitoring Team of the Project Proponent
	Possible spread of disease from workers	Clean bill of health a condition for employment Regular medical monitoring of workers			
Transportation of equipment, materials and personnel; storage of materials	Deterioration of air quality from increased vehicular movement, affecting people in the surrounding areas	Keeping vehicles under good condition, with regular checking of vehicle condition to ensure compliance with national standards and EHS guidelines (where applicable)	Throughout Construction Phase	Project Site	Environmental Monitoring Team of the Project Proponent
	Wind-blown dust from material (e.g. fine aggregate) storage areas	Spraying of water in the access road Sprinkling and covering stock piles Covering top of trucks carrying materials to the site.			
Site clearance	Topographic change by cutting existing trees, shrubs, herbs, and filling land	Adopt such type design as is required minimum cutting of trees, shrubs, herbs, and low-land filling Use waste shrubs, herbs as organic fertilizers Adopt required measures to prevent waste shrubs, herbs as fuel to cook or for any localized burning purpose.	Throughout Construction Phase	Project Site	Environmental Monitoring Team of the Project Proponent
Noise from construction equipment operations and maintenance	Noise could exceed the allowable limit and result in hearing loss.	Avoiding, as much as possible, construction equipment producing excessive noise Avoiding prolonged exposure to noise by workers Creating a buffer zone by introducing green belt around the project site Follow construction scheduling to avoid evening and night time disruption	Throughout Construction Phase	Project Site	Design consultant and Project Proponent
Dust and exhaust gases from construction machinery and	Increased SPM, PM 2.5, PM 10, NOx, SOx levels at construction	Try to avoid using equipment such as stone crushers at site by purchasing ready-mix construction mixture (sand, cement and gravel) Immediate use of construction spoils as filling	Throughout Construction Phase	Project Site	Environmental Monitoring Team of the Project Proponent

vehicles	sites, and surrounding areas.	materials Immediate disposal/sale of excavated materials Continuous watering of bare areas			
Fires, explosion and other accidents	Risk of human health and property damage	Use of personal protective equipment during construction and maintenance. Prepare and implement safety and emergency manual Regular inspection of lines for faults prone to accidents Provision of fire protection equipment. Provision of lightening arrestors	Throughout Construction Phase	Project Site and surroundings	Environmental Monitoring Team of the Project Proponent

Table 7.3: Environmental Management Plan during Operation Phase

Environmental Component	Potential impacts	Mitigation measures	Time frame	Location	Responsibility
Wastewater	Generation of steam, oily water, sludge containing water, cooling water, domestic and floor washing wastewater	No discharge of untreated wastewater outside the municipal drainage. Monitoring of wastewater quality before and after discharge.	Throughout Operation Phase	Project site and surrounding	Environmental Monitoring Team of the Project Proponent
Gaseous Pollution	NOx generation from the engine, which can negative	Dispersion through high stack, Use of Low NOx burner	Throughout Operation Phase	Project site	Environmental Monitoring Team of the Project Proponent
Air Quality	Suspended particulate matter (SPM) and PM2.5, PM10 generation from the engine, which can adversely affect health	Regular Monitoring according to the schedule	Throughout Operation Phase but maintaining 3 months interval	Ambient Air Quality	Environmental Monitoring Team of the Project Proponent and DoE
Emission Quality	CO and VOC, which can negatively affect health	Regular Stack emission monitoring according to the schedule	Throughout Operation Phase but maintaining 3 months interval	Project site	Environmental Monitoring Team of the Project Proponent and DoE
Noise	Generation of noise from generators and associated substations, which could exceed 70 dB(A) at site boundary.	All machineries shall follow relevant noise regulations. Boilers, generators and compressors shall be installed in buildings equipped with acoustic walls and enclosures. Regular noise monitoring according to the schedule.	Throughout Operation Phase but maintaining 3 months interval	Project site	Environmental Monitoring Team of the Project Proponent and DoE
Solid Waste	Generation of oily solid waste, plastic waste and other solid wastes.	Disposal at preselected site, Segregate wastes and dispose hazardous wastes to authorized contractors only.	Throughout Operation Phase	Project site	Environmental Monitoring Team of the Project Proponent
Occupational Health and Safety	Occupational health hazard due to different operation processes	Maintain all safety provisions related to plant operation and hazardous chemicals. Train all employees working in hazardous area for safety norms. First aid kit to be made available.	Throughout Operation Phase	Project site	Environmental Monitoring Team of the Project Proponent

		Medical aid to be available on the site. All subcontractors to follow the health and safety rules. They should be trained for that. Display of proper sign boards for health and safety in and around the plant complex.			
Fire Safety	Little possibility for firing due to welding activities produce lot of heat in welding arc	All employees to be trained for fire safety rules. Mock safety drills to be performed in regular intervals. Disaster Management Group to be made ready for all situations. Regular check for offsite helps.	Continuous Process	Project site	Project Proponent
Socio-economic	As there are no religious, cultural or historic places near the site, so the noise and air pollution from the operation of the project would not create any potential impact.	A management committee shall regularly monitor the implemented welfare activities and progress of Corporate Social Responsibilities (CSR) programme. The committee should confirm the employment of local people during operation and maintenance phase of the project activity and Keep local people informed about the demands for new jobs in the project	Throughout Operation Phase	Project surroundings	Project Proponent

7.9 Emergency Preparedness Plan

Emergency Preparedness Plan (EPP) is the process of preparing for, mitigating, responding to and recovering from an emergency. EPP is a dynamic process. Planning, though critical, is not the only component. Training, conducting drills, testing equipment and coordinating activities with the community are other important functions. The detail EPP is described as follows.

Key Persons and Their Roles during an Emergency Situation

Project Manager will

- Work as contact person and observe the situation.
- Keep in touch with local administration and head office.
- Deal with police, media and outside enquiries in consultation with Site Controller.
- Arrange for refreshments if required.
- Observe the traffic movement inside the project area and arrange for alternative transport if required.
- Monitor the record keeping of attendance of workers, staff, contractor's personnel, and visitors at the Gate which will act as Assembly Point.

Shift Supervisor will

- Act as Site controller for the time being.
- As soon as becomes aware of the emergency and its location, he will proceed to the site.
- Assess the scale of the incident and directs to stop operations within the affected areas.
- Contact and inform the Site Controller and Incident Controller immediately. Till their arrival he will continue to perform their duties.
- Contact the departmental head to act as incident controller and guide Safety Officer and Security Officers for containing the damage.
- Call the Medical Officer to the plant if necessary.

Site Controller will

- Ensure that all members of his/her team have been informed to assemble at Emergency Control centre. He/She will then proceed to Emergency Control Centre to take charge.
- Attend to telephone
- Keep in touch with incident controller
- Communicate with Assembly Points
- Meet outside emergency services
- Ensure proper flow of traffic and security
- Meet media/ other people coming at site from outside.
- Arrange for Medical Aid

Incident Controller will

- Direct all efforts to contain and control the incident.
- Keep non-essential persons away from the site.
- Guide outside emergency services at the site.
- Arrange to remove any casualties at the site.
- Keep in touch with Emergency Controller.

Security In-Charge will

- Actuate the Emergency Siren, if not done already.
- Send one guard to start the fire pump.
- Attend to incoming telephone.
- Await instructions from the Emergency Controller

Communication Officer

Public Relations Officer will act as Communication Officer. On hearing alarm, he will proceed to Emergency Control Centre.

- Maintains communication with Incident Controller and Deputy Incident Controller.
- Recruits suitable staff to act as messengers if telephone and other communications fail.
- Organizes all requirement of Emergency Control Centre.
- Arranges Food, Transport, and Nursing Home etc.

Safety Officer will

- Assist the Incident Controller with his special knowledge on the safety aspects in the factory. He will help to identify the hazardous chemicals, hazard zones and zone of probable impact in different accident scenarios.
- Select people with special training in safety matters to assist in the control activities.

Fire and Security Officer

- His main task is fire fighting and control.
- Announce through PAS about the incident zone and any other immediate information needed for the people nearby.
- Maintains liaison with the Fire Brigade team from outside.

Medical Officer will

- Immediately open a First Aid Centre at Control Centre or at Assembly Point.
- Take up the full responsibility of providing medical assistance during emergency.
- Arrange for outside medical help if required.

Telephone Operator

- On hearing the emergency alarm, he/she will immediately contact Site Controller.
- On the advice of Site controller/Incident Controller/Security Officer will ring Fire brigade, Police etc.
- Keep telephone board free for urgent communications.

General Employees

Who have not been specified a duty in case of emergency should proceed to/contact the Emergency Assembly Point in their area. Designated persons will carry out the actions detailed in the Individual Plant Emergency Procedure. The Roll Call leader will hold a Roll call. Personnel not at their normal work place must go to the emergency assembly point. Personnel will remain at these points and await instructions from the Site Controller.

Contractor's Employees

Contractor's employees will be instructed in the Emergency Procedures before commencing work on this site. They will report to the emergency assembly point on this site. Personnel Manager will guide them in case a major decision likes evacuation from the project site if required.

Visitors

Infrequent visitors are registered on each visit. They will be given a visitors pass which includes an emergency action statement. The responsibility for visitors in emergency situation rests with the person being visited.

Fire Design and Alarm Monitoring Measures for the Whole Plant

Fire design is based on approach of “prevention first, combined with fire measures”, firmly implementing related fire design standards and regulations according to specific situation of this project. Prevention measures shall be mainly taken into account by different professionals when selecting and arranging equipments and devices according to characteristic of different system flow, in order to prevent occur and spread of fire. Automation fire alarm monitoring device shall be applied for important buildings and equipments. Additionally, other measures such as separation and block shall be applied for fire-prone areas, in order to prevent fire spreading to nearby area.

Fire Water Supply System

In order to ensure a safe, reliable and manageable fire water supply system, a high-pressure fire water supply system with pressure regulators shall be applied for this project, preventing fire water being put to other use and making sure that fire water quantity and water pressure shall not be influenced due to leakage of other water consumption points when fire occurs.

Fire Drainage

Drainage of indoor fire hydrants and automatic sprinkler system shall be collected by indoor underground waste water system and then transferred to outdoor rain water system. Drainage of outdoor hydrants shall be collected by outdoor rain water system.

Fire Extinguishers

Selection and allocation of fire extinguishers for all kinds of buildings and structures shall be in accordance with the “Code for design of extinguisher distribution in buildings”. Main power building shall be equipped with portable CO₂ fire extinguishers, portable powder fire extinguishers, CO₂ trolley fire extinguishers and powder trolley fire extinguishers.

Risk Management Strategy

For the project risk management strategy is significant for minimizing risk. The following can be considered before formulating such strategy:

- The flammability of the process material
- Monitoring the state of reactions-particularly in enclosed vessels- to ensure that the remain within specified limits and do not become dangerous
- The amount of waste produced by the proces- how to minimize it - how to dispose and
- Measures to ensure that emissions remain within acceptable environmental limits.

After extensive literature review of natural gas based power plant the following best practices can be adopted for risk management on site:

- Safety measures are to be maintained at their expected level of performance and their good condition to be regularly ensured
- Strict ignition control shall be ensured
- Regular maintenance and inspection should be performed
- Ensure availability and effectiveness of Fire & Gas detecting system and the emergency alarm system and means of communication, which would enable early warning to all personnel in the event of accidental release and subsequently enable all personnel to take appropriate action.

Table 7.4: Safety Hazard Prevention-Control Mitigation Measures

Event	Prevention, Control and Mitigation Measures
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Event	Prevention, Control and Mitigation Measures
1. General Instruction of Workers	<ol style="list-style-type: none"> 1. Personal and continuous visual supervision of the worker who is not competent to perform the job. 2. Workers to be conversant on the codes and standards of safety 3. Workers must be confident that they have adequate training on handling or unsafe hazards material.
2. Maintenance of Equipment	<ol style="list-style-type: none"> 1. Employer shall ensure that all equipment used on a work site is maintained in a condition that will not compromise the health and safety of workers using or transporting the equipment. 2. Will perform the function for which it is intended or was designed 3. Is of adequate strength for that purpose. 4. Is free from potential defects.
3. Traffic Hazard	<ol style="list-style-type: none"> 1. Where there is a danger to workers from traffic, an employer shall take appropriate measures to ensure that the workers are protected from traffic hazards. 2. Ensure that workers who are on foot and who are exposed to traffic hazards on traveled rural roads wear reflective vests or alternative clothing that is clearly distinguished. 3. Where the operator of vehicle does not have a clear view of the path to be traveled on a work site, he shall not proceed until he receives a signal from a designated signaler who has a clear view of the path to be traveled.
4. Illumination	<ol style="list-style-type: none"> 1. Ensure that illumination at a work site is sufficient to enable work to be done safely. 2. Where failure of the normal lighting system would endanger workers, the employer shall ensure that emergency lighting is available that will generate sufficient dependable illumination to enable the workers to <ol style="list-style-type: none"> a) Leave the work site in safety b) Initiate emergency shutdown procedures c) Restore normal lighting
5. House keeping	<ol style="list-style-type: none"> 1. Ensure that each work site is clean and free from stepping and tripping hazards 2. Waste and other debris or material do not accumulate around equipment, endangering workers
6. Falling Hazards	<ol style="list-style-type: none"> 1. Ensure that where it is possible for a worker to fall a vertical distance greater than 3.5 meters the worker is protected from the falling by guard rail around the work area a safety net fall arresting device
7. Overhead power Lines	<ol style="list-style-type: none"> 1. Ensure that no worker approaches and that no equipment is operated and no worker shall approach or operate equipment, within 7 meters of a overhead power line.

Event	Prevention, Control and Mitigation Measures
8. Sanitary facilities & drinking water	<p>1. Ensure that an adequate supply of drinking fluids is available at the work site.</p> <p>2. Ensure that work site is provided with toilet facilities in accordance with the requirement of general health protection guidelines.</p>
9. Working proper clothing	<p>5. Ensure that where is a possibility that a worker or worker's clothing might come in to contact with moving parts of machinery, the worker:</p> <ul style="list-style-type: none"> . wears close-fitting clothing . confines or cuts short his head and facial hair . avoids wearing jewelry or other similar items
10. Head protection	<p>1. Ensure that during the work process adequate alternative means of protecting the workers head is in place.</p>
11. Eye protection	<p>1. Where there is a danger of injury to or irritation of a worker's eyes, his employer shall ensure that the worker wears properly fitting eye protective equipment.</p>
12. Foot protection	<p>1. Where there is a danger of injury to a worker's feet, ensure that the worker wears safety footwear that is appropriate to the nature of the hazard associated with particular activities and conditions.</p>
13. Respiratory protective equipment	<p>1. Where the worker is exposed to hazards gases, gums, vapors, or particulates appropriate respiratory protective equipment to be supplied.</p>
14. Testing & commissioning	<p>17. Mobilize test rigs at site</p> <p>18. Ensure that the test equipment is in good condition</p> <p>19. Ensure other equipment and facility conforms to the approved specification of test.</p> <p>20. Public notice to be served before testing.</p>

8 ENVIRONMENTAL MONITORING PLANS

Environmental monitoring is an essential tool in relation to environmental management as it provides the basic information for rational management decisions. The prime objectives of monitoring are-

- To check on whether mitigation and benefit enhancement measures are actually being adopted and are providing effective in practice.
- To provide information on the actual nature and extent of key impacts and the effectiveness of the mitigation measures which, through a feedback mechanism, can be taken into account in the planning and execution of similar projects in future.

The sub-project authority should have provision of Environmental quality and safety department for monitoring the environmental management plan implementation during construction and operation phase of the project. The environmental monitoring officer should monitor the environmental management plan implementation and submit a quarterly report to the concerned department. Key components of environmental monitoring plan are described in the following subsections.

8.1 Ambient Air Monitoring

During the construction phase, ambient air quality will be monitored by active sampling and measurement for SPM, SO_x, NO_x, CO, toxic gases at the same locations used during the baseline study. During construction of the facility, air emissions may result from fuel or oil burning due to equipment failure. Leakages should be checked by visual inspection at the start of every shift. Monitoring plan for ambient air is presented in following table.

Area of Monitoring	Indicators	Monitoring Location	Monitoring Apparatus	Frequency
Monitoring Ambient Air Quality	SPM	One sample from the project boundary, one sample from 1 km downwind from the project boundary	SSPM-100 sampler	Yearly
	SO _x , NO _x , CO, toxic gases	Project site, 2km upwind and 2km down wind direction	Bacharach ECA 450 sensors and compact sample conditioner for SO _x , NO _x measurement, Fluke CO-220 Carbon Monoxide Meter for CO measurement	Yearly

8.2 Meteorological Monitoring

During construction phase the collection of representative meteorological data (e.g., wind speed and direction, precipitation, temperature, humidity, and atmospheric pressure) is very useful to predict weather conditions of plant site. Meteorological data also useful to assess the possibility of natural calamities specially Cyclone, Storm surge etc so that precautions and measures in contingency plan will be taken within due time. Monitoring plan for meteorological parameters is presented in following table.

Area of Monitoring	Indicators	Monitoring Location	Monitoring Apparatus	Frequency
Meteorological monitoring	Wind speed and direction, precipitation, temperature, humidity,	Within the project boundary	Hygrometer for humidity, Anemometer for wind speed and direction, Temperature Sensor for temperature, Rain gauge for precipitation and Mercury barometer for	Quarterly

	and atmospheric pressure		atmospheric pressure measurement	
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8.3 Ambient Noise Monitoring

Noise levels at the facility site during construction must comply with relevant national and international legislation. Site staff will monitor noise levels and take any remedial measures that prove necessary to reduce disturbance to nearby local residents. At locations where the possibility of noise level exceeds the standard limit such as ongoing pile-driving activities, excavation, cut and fill, erection of temporary stores etc. noise levels shall be checked at least weekly (using a Type II sound level meter). Monitoring plan for ambient noise is presented in following table.

Area of Monitoring	Indicators	Monitoring Location	Monitoring Apparatus	Frequency
Monitoring Ambient Noise	Noise level	four corner point inside the boundary, middle point of the project boundary	Digital Sound Level Meter-AR814	Quarterly

8.4 Surface Water Monitoring

During the construction phase, monitoring will be conducted to the sub-project site surrounding surface drains. Parameters to be sampled every two months during this phase are Temperature, pH, EC, DO, BOD, COD, TSS, TDS, Salinity. Samples should be taken at the point of any discharge into the receiving water drain. Monitoring plan for surface water is presented in following table.

Area of Monitoring	Indicators	Monitoring Location	Monitoring Apparatus	Frequency
Monitoring Surface water quality	Temperature, pH, EC, DO, BOD, COD, TSS, TDS, Salinity	Different points on surface drains	Thermometer for Temperature, pH meter for pH, SMP350 EC meter for EC, DO meter for DO, Salinity meter for Salinity measurement. Also BOD, COD, TSS, TDS are measured by laboratory analysis	Yearly

8.5 Solid Waste Monitoring

During the construction phase, wastes may be generated from earth works, site establishment, civil construction, stockpile of materials, and domestic household activities. The wastes might be metals, concrete, spoiled construction material, excavated spoils, spilled oil from machinery and vehicles, etc. Moreover, some domestic waste such as food waste, paper etc would be also generated. Monitoring is required to ensure proper management of this waste. Solid and hazardous waste quantities and destination (final disposal) will be documented by the Contractor and the records handed over to authority after commissioning, to demonstrate compliant handling and disposal. Monitoring plan for solid waste is presented in following table.

Area of Monitoring	Indicators	Monitoring Location	Monitoring Apparatus	Frequency
Monitoring Solid waste	Construction and domestic wastes	Project area and labor shed	Visual observation and regular checks	Monthly basis

8.6 Workers Health and Safety Monitoring

During construction and erecting plants and machineries may cause accident. Records of all health risk/workplace accidents will be documented and archived, in accordance with the Project health and safety Plan developed by the Contractor. This should include “near miss”, “incident” and “accident”. A baseline medical check-up for all employees (prior to commencing employment) will be conducted. Monitoring plan for Workers health and safety is presented in following table.

Area of Monitoring	Indicators	Monitoring Location	Monitoring Apparatus	Frequency
Workers health and safety monitoring	Health, Safety, awareness	Proposed industrial complex	Visual observation and regular checks	Monthly basis

8.7 Community Health Monitoring

The local community may feel disturbed if the Health, safety and environmental (HSE) issues are not properly maintained during construction. On the other hand If HSE and corporate social responsibilities are maintained; there will be positive impact from the local community on the project. So continuous Community safety, health, CSR program, Security monitoring is very important. Monitoring plan for Community health is presented in following table.

Area of Monitoring	Indicators	Monitoring Location	Monitoring Apparatus	Frequency
Community health monitoring	Community safety, health, CSR program, Security, compliance to applicable social and environmental rules, etc.	Proposed industrial complex, nearest community	Visual observation and regular checks	Yearly

8.8 Ecosystem monitoring

Five samples from homestead ecosystem (at least 2 at down wind direction) within 5 km radius area 5 Samples from Road side plantation including 2 at downwind direction within 5 km radius area should be collected during monitoring. Monitoring plan for ecosystem is presented in following table.

Area of Monitoring	Indicators	Monitoring Location	Monitoring Apparatus	Frequency
Ecosystem monitoring	Avifauna, Fish habitat status, Fish biodiversity, Fish production	Ramna Lake area of the project	Visual observation and regular checks	Quarterly
	Plant health and productivity of fruiting plants surrounding the project area	Selected sites within 10km radius area of the project	Visual observation and regular checks	Quarterly

8.9 Responsibility Matrix

Area of Monitoring	Implementing Agency
Ambient air monitoring	DNCC
Ambient noise monitoring	DNCC
Surface water monitoring	DNCC
Solid waste monitoring	DNCC / Contractor
Workers health and safety monitoring	DNCC / Contractor
Community health monitoring	DNCC / Contractor
Ecosystem (Flora, Fauna) monitoring	DNCC

8.10 Estimated Budget for Monitoring Plan for One Year

S/N	Issues	Unit cost (Lac BDT)	Monitoring time in a Year	Total cost (Lac BDT)
33.	Ambient air monitoring	0.25	1	0.25
34.	Meteorological monitoring (secondary source) i.e. Air Temperature, Humidity, Rain Fall, Wind Velocity etc	-	4	-
35.	Ambient noise monitoring	0.1	2	0.2
36.	Surface water monitoring	0.25	1	0.25
37.	Solid waste monitoring	-	12	-
38.	Workers health and safety monitoring	0.05	6	0.3
39.	Community health monitoring	0.1	1	0.1
40.	Ecosystem (Flora, Fauna) monitoring	0.05	2	0.1
Total Monitoring Cost				1.2

9 CONTRACTOR OBLIGATIONS

Construction Project Management (CPM) is the overall planning, coordination, and control of a project from beginning to completion. CPM is aimed at meeting a client's requirement in order to produce a functionally and financially viable project. A contractor is assigned to a construction project once the design has been completed by the person or is still in progress. This is done by going through a bidding process with different contractors. The contractor is selected by using one of three common selection methods: low-bid selection, best-value selection, or qualifications-based selection.

A construction manager should have the ability to handle public safety, time management, cost management, quality management, decision making, mathematics, working drawings, and human resources.

The functions of construction management typically include the following:

17. Specifying project objectives and plans including delineation of scope, budgeting, scheduling, setting performance requirements, and selecting project participants.
18. Maximizing the resource efficiency through procurement of labor, materials and equipment.
19. Implementing various operations through proper coordination and control of planning, design, estimating, contracting and construction in the entire process.
20. Developing effective communications and mechanisms for resolving conflicts.

The Construction Management Association of America (a US construction management certification and advocacy body) says the 120 most common responsibilities of a Construction Manager fall into the following 7 categories: Project Management Planning, Cost Management, Time Management, Quality Management, Contract Administration, Safety Management, and CM Professional Practice. CM professional practice includes specific activities, such as defining the responsibilities and management structure of the project management team, organizing and leading by implementing project controls, defining roles and responsibilities, developing communication protocols, and identifying elements of project design and construction likely to give rise to disputes and claims.

Contractor Obligation for Construction Activities for the Urban Resilience Project-DNCC Part (With Budget)

S/N	Environmental Issue	Objective	Suggestion for the Contractor	Proposed Budget (BDT)	Remarks
81.	Minimizing Erosion	To minimize the quantity of soil lost during construction due to land-clearing	<ul style="list-style-type: none"> • Schedule measures to avoid and reduce erosion by phasing the work program to minimize land disturbance in the planning and design stage. • Keep the areas of land cleared to a minimum, and the period of time areas remain cleared to a minimum • Base control measures to manage erosion on the vulnerability of cleared land to soil loss, paying particular attention to protecting slopes. • Mulch, roughen and seed cleared slopes and stockpiles where no works are planned for more than 28 days, with sterile grasses. • Keep vehicles to well-defined haul roads. • Rehabilitate cleared areas promptly 	0.00	No separate budget is assigned for any of the proposed sites as those are regular standard practice for the Contractors
82.	Storm water Management	To minimize the generation of contaminated storm water	<ul style="list-style-type: none"> • Minimize the quantity of uncontaminated storm water entering cleared areas • Establish cut-off or intercept drains to redirect storm water away from cleared areas and slopes to stable (vegetated) areas or effective treatment installation • Reduce water velocities, if needed 	0.00	No separate budget is assigned for any of the proposed sites as those are regular standard practice for the Contractors
83.	Sediment Controls	To minimize the impact of contaminated storm water on receiving waters	<ul style="list-style-type: none"> • Install erosion and sediment control measures, if possible before construction commences • Identify drainage lines and install control measures to handle predicted storm water and sediment loads generated in the micatchment. • Establish an adequate inspection, maintenance and cleaning program for sediment run-off control structures. • Ensure that contingency plans are in place for unusual storm events. • Continually assess the effectiveness of sediment control measures and make necessary improvements. 	0.00	No separate budget is assigned for any of the proposed sites as those are regular standard practice for the Contractors

S/N	Environmental Issue	Objective	Suggestion for the Contractor	Proposed Budget (BDT)	Remarks
84.	De-Watering Work Sites	To ensure that de-watering operations do not result in turbid water entering natural waterways	<ul style="list-style-type: none"> • Treat contaminated water pumped into the storm water system or a natural waterway to remove sediment if the turbidity exceeds 30 NTU. • Ensure that the level of suspended solids in waters pumped into natural waterways never exceeds the regulatory water quality standard. • De-water by pumping water, wherever practical, on to vegetated area of sufficient width to remove suspended soil, or to sediment control devices. • Supervise all pumping and implement precautions to ensure that turbidity of pumped water is minimized. • Monitor every hour during a pumping operation the turbidity of water pumped directly to a natural waterway or a drainage system discharging to a natural waterway. 	10,000.00	None of the proposed site is needed such type of management measures. However, if the situation demands for any site, the contractor can demand for BDT 10,000.00 for the management of the situation.
85.	Dust Control	To ensure there is no health risk or loss of amenity due to emission of dust to the environment	<ul style="list-style-type: none"> • Implement a dust prevention strategy, developed at the project planning stage • Take dust suppression measures, such as promptly watering exposed areas when visible dust is observed • Install wind fences wherever appropriate 	0.00	No separate budget is assigned for any of the proposed sites as those are regular standard practice for the Contractors
86.	Management of Stockpiles	To manage stockpiles so that dust and sediment in run-off are minimized	<ul style="list-style-type: none"> • Minimize the number of stockpiles, and the area and the time stockpiles are exposed • Keep topsoil and under burden stockpiles separate • Locate stockpiles away from drainage lines, at least 10 meters away from natural waterways and where they will be least susceptible to wind erosion • Ensure that stockpiles are designed with slopes no greater than 2:1 (horizontal/vertical) • Stabilize stockpiles that will remain bare for more than 28 days by covering with mulch or anchored fabrics or seeding with sterile grass • Establish sediment controls around unsterilized stockpiles 	0.00	No separate budget is assigned for any of the proposed sites as those are regular standard practice for the Contractors

S/N	Environmental Issue	Objective	Suggestion for the Contractor	Proposed Budget (BDT)	Remarks
			<ul style="list-style-type: none"> • Suppress dust on stockpiles and batters, as circumstances demand 		
87.	Working In Waterways and Floodplains	To minimize stress on aquatic communities when working in a waterway	<ul style="list-style-type: none"> • Plan in-stream works so that the contact time is minimized • Establish special practices so that impacts on the waterway and disturbance of its banks are minimized • Stabilize banks and in stream structure so that they do not contribute to the sediment load • Maintain minimum flows to ensure the viability of aquatic communities and ensure that there are no barriers to the passage of fish up and downstream • Avoid times of the year when environmental damage is expected to be highest • Construct in-stream crossings during low flows, designed to be stable under expected vehicle loads and flow regimes that do not contribute to the sediment load in the stream • Design crossings so that drainage off the crossing does not contribute sediment load to the stream. • Prepare a contingency plan for high-rain events. • Prepare a reinstatement plan if work in a stream is planned or the structure of a waterway will be altered. 	0.00	None of the proposed site is needed such type of management measures. However, no separate budget is assigned if the situation demand for any of the proposed sites as those are regular standard practice for the Contractors
88.	Noise and Vibration	To ensure nuisance from noise and vibration does not occur	<ul style="list-style-type: none"> • Fit and maintain appropriate mufflers on earth-moving and other vehicles on the site • Enclose noisy equipment • Provide noise attenuation screens, where appropriate • Where an activity is likely to cause a noise nuisance to nearby residents, restrict operating hours to between 7 am and 6 pm weekdays and 7 am to 12 pm Friday, except where, for practical reasons, the activity is unavoidable • Noise should not be above background levels inside any adjacent residence between 10 pm and 7 am • Advise local residents when unavoidable out-of-hours work will occur. 	0.00	No separate budget is assigned for any of the proposed sites as those are regular standard practice for the Contractors

S/N	Environmental Issue	Objective	Suggestion for the Contractor	Proposed Budget (BDT)	Remarks
			<ul style="list-style-type: none"> Schedule deliveries to the site so that disruption to local amenity and traffic are minimized Conduct a study on the impact of ground vibration from construction activities, where these operations occur within 50 meters of a building and take appropriate action Minimize air vibrations 		
89.	Waste Minimization	To minimize the waste load discharged to the environment	<ul style="list-style-type: none"> Carry out a waste minimization assessment which examines opportunities for waste avoidance reduction, reuse and recycling. Reduce wastes by selecting, in order of preference, avoidance, reduction, reuse and recycling. Incorporate waste minimization targets and measures into the environmental management plan. 	0.00	No separate budget is assigned for any of the proposed sites as those are regular standard practice for the Contractors
90.	Contaminated Material and Wastes	To ensure that all contaminated material uncovered on a construction site are excavated and disposed of in an environmentally responsible manner	<ul style="list-style-type: none"> Assay material uncovered on-site prior to disposal. If the wastes include putrescible wastes, then also analyze leachate and landfill gases. Excavate material in a manner which avoids off-site environmental problems. Seal remaining contaminated material or wastes, where only part of the tip has been excavated, to ensure that there is no off-site effect now or in the future. Transport odorous wastes in covered vehicles. Dispose of contaminated material in a landfill licensed to take the type of contaminated material or wastes uncovered. 	0.00	No separate budget is assigned for any of the proposed sites as those are regular standard practice for the Contractors
91.	Air Quality	To ensure there is no health risk or loss of amenity due to emission of exhaust gases to the environment	<ul style="list-style-type: none"> Ensure that all vehicles and machinery are fitted with appropriate emission control equipment, maintained frequently and serviced to the manufacturers' specifications. Smoke from internal combustion engines should not be visible for more than ten seconds 	0.00	No separate budget is assigned for any of the proposed sites as those are regular standard practice for the Contractors
92.	Litter	To ensure that all litter is disposed of in a responsible manner,	<ul style="list-style-type: none"> Maintain a high quality of housekeeping and ensure that materials are not left where they can be washed or blown away to become 	0.00	No separate budget is assigned for any of the proposed sites as those are regular standard

S/N	Environmental Issue	Objective	Suggestion for the Contractor	Proposed Budget (BDT)	Remarks
		and is not released into the environment	litter. <ul style="list-style-type: none"> • Provide bins for construction workers and staff at locations where they consume food • Conduct ongoing awareness with staff of the need to avoid littering 		practice for the Contractors
93.	Storing Fuels and Chemicals	To ensure that fuel and chemical storage is safe, and that any materials that escape do not cause environmental damage	<ul style="list-style-type: none"> • Minimize fuels and chemicals stored onsite. • Install bunds and take other precautions to reduce the risk of spills. • Implement a contingency plan to handle spills, so that environmental damage is avoided. 	0.00	No separate budget is assigned for any of the proposed sites as those are regular standard practice for the Contractors
94.	Keeping Roads Clean	To ensure that roads are kept clean of soil	<ul style="list-style-type: none"> • Install wheel washes and rumble grids at all main road crossings. • Ensure that the roads are swept at least once a day on uncontrolled road crossings when construction vehicles are travelling off the site. • Install litter traps lined with filter cloth in all side-entry pits. • Cover all loads of soil being taken off site for disposal. 	0.00	No separate budget is assigned for any of the proposed sites as those are regular standard practice for the Contractors
95.	Supply of First Aid Box with standard contents	To ensure immediate treatment after a sudden accident	<ul style="list-style-type: none"> • Install a first aid box at an easy accessible place of the site for anyone 	2000.00	For the proposed site
96.	Health and Safety Warning Sign	To understand for the workers and visitor about the risky site or component of the construction activity	<ul style="list-style-type: none"> • Install health and safety warning signs where it is necessary 	2000.00	For the proposed site
97.	Safety Gear Package	To ensure the safety of the workers, field supervisors and the visitors	<ul style="list-style-type: none"> • Make available of the Safety Gear Package like gloves, helmets, eye protector, rubber shoes, light reflecting dress etc for each worker, field supervisors and the visitors 	0.00	No separate budget is assigned for any of the proposed sites as those are regular standard practice for the Contractors
98.	Tree Plantation	To develop a green belt around the project area	<ul style="list-style-type: none"> • Tree plantation around the shelter or road in a planned way and maintenance for all the construction time 	BDT 2000.00	BDT 2000.00 for Kawranbazaar site

S/N	Environmental Issue	Objective	Suggestion for the Contractor	Proposed Budget (BDT)	Remarks
			<ul style="list-style-type: none"> Extra care should be given to the sites where trees will be cut down 		
99.	Temporary Sanitary Latrine/ Septic Tank/ Portable Toilet	To ensure sanitary environment of the work area	<ul style="list-style-type: none"> Temporary Sanitary Latrine/ Septic Tank/ Portable Toilet: 2 nos. (1 no of Toilet for women and 1 no of Toilet for men) 	0.00	No separate budget is assigned for any of the proposed sites as those are regular standard practice for the Contractors
100.	Drinking Water Sample Analysis and Drinking Water Filter	To ensure safe drinking water for the workers at site	<ul style="list-style-type: none"> Take water sample from the surrounding tube-well or the new tube-well dug at the site to analyze important parameters for drinking water 1-no of tube-well should be installed at the beginning of construction works, if there is no one at the vicinity, so that labour and other site staff can get drinking water. Supplying of best quality drinking water filter including extra set of faucets ceramic and at least three sets of ceramic filter 	BDT 5000.00	For each site the budget will be given
Total BDT 21,000.00					

10 CONCLUSIONS AND RECOMMENDATIONS

This study aims to understand initial environmental impacts for the Sub-project as well as to formulate the relevant mitigation and monitoring plans. Based on the Environmental Assessment, all possible environmental aspects have been adequately assessed and necessary control measures have been formulated to meet with statutory requirements.

The overall conclusion is that if the mitigation, compensation and enhancement measures are implemented in full, there will be no significant negative environmental impacts as a result of location, design, construction, and/or operation of the proposed Sub-project. There will in fact be tremendous benefits from recommended mitigation and enhancement measures and major improvements in quality of life and individual, education, job and public health once the scheme is in operation.

The conclusions of the Environmental Assessment can be summarized as follows:

- The communities will receive large benefits in terms of quality of life, particularly with reduced disaster vulnerability, and improved health and education facilities, infrastructure, transportation & communication etc.
- The short-term negative impacts that may come in the way of air quality, noise, solid waste, occupational health & safety need to be minimized through the mitigation action plan. Moreover, post disaster health, safety and flood problems are common. These issues might be problematic if necessary mitigation measures, as suggested in EMP, would not take into consideration.
- The project will create employment for the workforce who live in the vicinity of the construction site and will provide them a short-term economic gain.
- The green belt development with large-growing trees at the periphery of the site will give the places a more natural and pleasing appearance.
- A comprehensive Environmental Management Plan (EMP) has been prepared to mitigate and reduce the adverse impacts that will come out from the Sub-project activities. The EMP mainly focuses on managing, mitigating and reducing the impacts exhibited from design, construction and operation phase.
- The tentative cost has been estimated around **BDT 1.2 Lacs for yearly monitoring** and around **BDT 21 Thousands to implement the EMP for construction**. This budget can change due to change of market prices and if the project implementation period extends.

Two straight recommendations which are listed below need to be followed by the concern authority to ensure sound environmental and socio-economic condition:

- All mitigation, compensation and enhancement measures proposed in this report need to be followed.
- The Environmental Management and Monitoring Plan proposed in this report also need to be followed.

CONCLUSION

As Bangladesh is a disaster prone country naturally along with some man-made disasters in urban area, project like Urban Disaster Resilience is a perfect one to be implemented. The Environmental and Social Assessment study finds that, in any aspect like environmental or social, it is needed for the country. Especially, for the Capital of Bangladesh, Dhaka as well as for another prominent city of Bangladesh, Sylhet.

However, during the study a mild social unrest was going. To tackle it the law and enforcement teams are acting actively, arrest the suspected people and took into their account. Along with this, some fundamentalist groups were also active with their destructive activities. Some of the people did not back who were kidnapped by the said groups. So people were in a fear in such circumstances.

The study was affected to some extent for the situation, especially during the public consultation. The local people were confused about the interviewers as they are unknown to them and some of them thought they may come in disguise, practically they are from a law and enforcement team or etc. In some cases they may replied the questions but never agreed to take snaps and did not provide their name, cell number or address. It was one of the major difficulties for conducting the study.

11.1 Suggestions

Though most the opinions of the local people of different sites were found from the study, many of them were scattered. Some of the stakeholders, who are in service at Fire Service and Civil Defense, have agreed to take snaps which are presented into the report.

However, it will be very nice if there is central consultation meeting at the City Corporation office, where representatives from the stakeholders will be invited to provide their opinions and other expectation from the project. Along with this, a detailed and primary baseline study regarding the environmental components will be a plus point for the subsequent and upcoming new projects of the proposed area.

REFERENCES

- BADC, 2014 (Bangladesh Agricultural Development Corporation)
- BMD, 2014 (Bangladesh Meteorological Department) Report.
- ECA, 1995 (Environmental Conservation Acts 1995), Department of Environment, Ministry of Environment and Forest, Government of the People's Republic of Bangladesh.
- ECR 1997, (Environmental Conservation Rules 1997), Department of Environment, Ministry of Environment and Forest, Government of the People's Republic of Bangladesh.
- Ministry of Planning, 2010: Environmental Management Framework, Emergency 2007 Cyclone Sidr Recovery and Restoration Project (ECRRP), Dhaka, April 2010.
- NWRD, 2014 (National Water Resources Database) Bangladesh.
- Population and Housing Census, 2011 (Bangladesh Bureau of Statistics) Annual Report.
- UNDP, 2014 (United Nations Population Division).
- World Bank (1999a) Operational Policies, OP- 4.01: Environmental Assessment, The World Bank, Washington, D.C., USA, January 1999.
- World Bank (2001) Operational Policies, OP- 4.10: Indigenous Peoples, The World Bank, Washington, D.C., USA, December 2001.
- World Bank (2001) Operational Policies, OP- 4.12: Involuntary Resettlement, The World Bank, Washington, D.C., USA, December 2001.
- World Bank (2004a), Involuntary Resettlement Sourcebook, Planning and Implementation of Development Projects, Washington, D.C., USA.
- World Bank (2006) Operational Policies, OP- 4.11: Physical Cultural Resources, The World Bank, Washington, D.C., USA, July 2006.