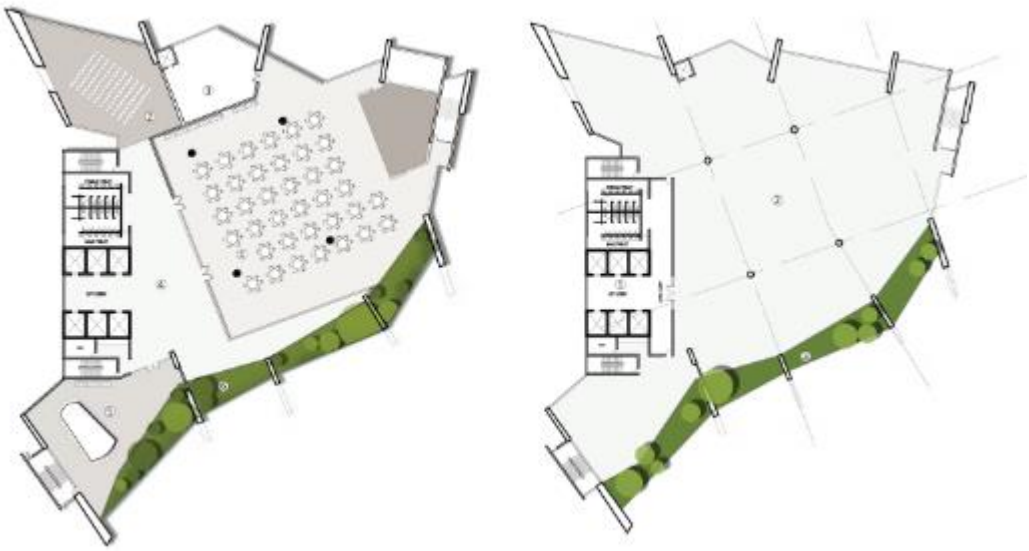
Initial Environmental Examination (IEE) Study for Construction of 4-Storied Engineer's Main Office (EMO) Building with 16-Storied Foundation and Three Basements

At

Fulbaria, Dhaka



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Executive Summary

Government of Bangladesh has now undertaken many development projects in the transport section. Railways are a major mode of transport in Bangladesh so priority is given to the railway industry. BR requires the Construction of a 4-story Engineer's Main Office (EMO) structure with a 16-story foundation and three basements to ensure smooth continuation of the railway project. According to the requirement, the Engineer's Main Office building will be constructed along Phoenix Road in Dhaka on available BR land near Rail Bhaban.

Modern amenities like as environmentally friendly solar panel systems, rainwater harvesting systems, better station facilities, and accessibility for those with physical disabilities will be included in the construction of EMO building.

Introduction

Project needs, objectives and scope of work, study methodology details are discussed in this chapter. The environmental and social baseline conditions of the proposed study area have been developed by collecting relevant data from primary and secondary sources. Available data on climate, geology, seismicity, water resources, land resources, soil quality, agriculture, fisheries, ecology and socio-economic components have been collected from both primary and secondary sources. The study team also made field visits in potential concern locations of the study area, as per the requirement for collecting primary data on environmental and social components using Rapid Appraisal and Informal and formal Group Discussion techniques. All qualitative and quantitative information have been gathered from different primary or secondary sources and used to the relevant field accordingly for developing potential environmental and socio-economic baseline of the study area.

Policy, Legal and Administrative Framework

This report was prepared by reviewing of several pieces of legislation and policies which have relevance to the Building construction activity in Bangladesh. All of these regulations are aimed at the conservation and protection of the environment and an overview of these legislations and policies is presented in this chapter. The major GoB, EIB and ADB environmental policies, rules, regulations and standards are as follows:

National Environmental Policy, National Environmental Management Action Plan, Environmental Conservation Act (ECA), Environmental Conservation Rules (ECR), Bangladesh National Building Code (BNBC), Building Construction Act, Building Construction Rules, Land Development Rules for Private Housing, Acquisition and Requisition of Immovable Property Act, Bangladesh Labor Act, Noise Pollution (Control) Rules, Disaster Management Act, ADB Safeguard Policy Statement, SPS 2009, EIB Environmental And Social Standards

Project Description

The proponent of the proposed Engineer's Main Office (EMO) building structure is the Government of Bangladesh. Funds provided by ADB and this building will be used as the head office of the Railway Engineer. The proposed project will be located at the heart of Dhaka city at Fulbaria, Dhaka. Total area is approximately 8200 sqm. The EMO building will be 4-story structure with a 16-story foundation and three basements.

Modern amenities like as environmentally friendly solar panel systems, rainwater harvesting systems, better station facilities, and accessibility for those with physical disabilities will be included in the construction of EMO building. A conceptual design for the EMO building has been developed for foundations, structural

systems, utility areas and mechanical/electrical services concepts and will be further developed by the Contractor.

Environmental Baseline

Baseline environment is concerned with existing physical, chemical and biological conditions of the area where the EMO building is going to be set up. The ambient air quality, noise level, surface and groundwater have been analysed to evaluate the primary baseline of the area.

Physical Environment

Climate: According to BMD, the climate of study area is divided into four distinct seasons where summer seasons shows high temperature and winter seasons shows moderate cold weather. In this area summer has long time record on the other hand rainy and winter season is short.

Rainfall: The highest annual rainfall recorded between 2015 and 2021 was in 2017 with peak of 2905 mm whereas the minimum annual rainfall was recorded 1365 mm in 2016. The seven-yearly (2015-2021) maximum rainfall recorded was 623 mm/month and minimum recorded is 0 mm/month. However, no rainfall was recorded during the months of November, December and January.

Temperature: The maximum and minimum temperature according to Table 7 shows that the hottest year of (2015-2021) series is 2021 which accounts for 27.7°C temperature. The hottest month of the seven-year series is 31°C in the month of April of 2016. Also, the minimum temperature is 18.1°C recorded in the year of 2018.

Relative Humidity: the maximum relative humidity for Dhaka is about 85% recorded in August of 2014. In project the area, relative humidity rises over 75% from May and continues to rise to 86% in October in a year. In 2014, the least humidity is recorded 52% in the month of March. The most humid year of this series is 2021 where highest annual average humidity (77.5%) is recorded.

Wind and Direction: The highest wind speed was 3.6 km/h and lowest 2.2 km/h was recorded in between March to May (monsoon period). Dry season accounts for moderate wind frequency so the highest wind frequency was recorded 3.3 km/h in the month of October, 2017 and the lowest wind frequency was 1.9 km/h in the month of October, 2015.

Earthquake and Seismicity: According to BNBC-2017, Bangladesh has been divided into four generalized seismic zones: Zone-I, Zone-II and Zone-III Zone-IV where Zone IV is the most vulnerable and Zone I is the least vulnerable to seismic risks. The Project area is located at Dhaka is located in Zone II which refers moderate risk zone and the risk coefficient for this zone is 0.20 illustrated. The project area is 6.5 km far from Madhupur fault and 13.5 km from Active faults and other faults are out of buffer area.

Cyclones and Storm Surges: Cyclones are most devastating storms affecting Bangladesh such storms (Nor'westers) cause a lot of destruction of lives and property but the project area falls at No Risk Zone.

Geology and soil: According to SRDI, 1997, the edge of Bangladesh is classified into five major groups and this major group is divided by sixteen geological units. The soil deposits mainly consist of the Alluvial Silt and Clay; Madhupur Clay Residuum and Marsh Clay and Peat of soil. The project area consists of Madhupur Clay Residuum

Environmental Quality

Air quality: Carbon monoxide concentration was measured 0.22 mg/m^3 and .24 mg/m^3. Measured concentrations for NO_2 were 57.3, 60.1 µg/m^3 and Sulphur dioxide (SO_2) were 7 µg/m^3 and 7.01 µg/m^3. Measured concentrations for Particulate matters PM_{10} and $PM_{2.5}$ were 172.4, 160.1 µg/m^3 and 95.8, 80.8 µg/m^3 respectively. According to Air Pollution Control Rules (APCR) 2022 the concentration of NO_2,

PM_{10} & $PM_{2.5}$ had exceeded the DoE Standard. The test results of CO & SO_2 were found within the acceptable limits.

Noise Level: Noise data were collected from two location. The existing general maximum, minimum and average noise level recorded as 68.5 dB, 44.3 dB, 58.2 dB in location one and 67.8 dB, 45.2 dB, 57.1 dB in location two. The standard of commercial zone (day time) both for DoE and WB 70 dB. The measured value is much below than the standard of commercial zone land use (DoE, 1997) and World Bank Standard.

Groundwater Quality: Ground water sample was taken once during the study period from one location. The ground water samples were collected on 26th January 2023. Temperature, As, Fe, Mn, pH, DO, TDS, Alkalinity, Chloride and E. Coli were tested and all parameter data were found within the standard limit.

Biological Environment

Bio-Ecological Zone: Bangladesh enjoys a diverse array of ecosystems having its relatively small geographic boundary. Each of the ecosystems has many sub-units with distinct characteristics as well. IUCN Bangladesh in 2002 classified the country into twenty-five Bio-Ecological Zones (BEZ). The project location falls within bio-ecological zones: Brahmaputra-Jamuna Floodplain (Zone 4c).

Ecological Critical Area and Protected Areas: There is no ECA and EPA area falls within the proposed EMO building project area. However, the nearest ECA area Buriganga and Balu River are 1.7 km and 9.5 km respectively far in an aerial distance from the project boundary. On the other hand, Mirpur Botanical Garden the EPA area is 11 km far in an aerial distance from the project boundary.

Terrestrial Flora: A total of 24 species of plants has been recorded during the field survey. The most common trees recorded in the study area area karoi (*Albizzia procera*), Lal bot (*Ficus benghalensis*), Pakur (*Ficus virens*), Mehogoni (*Swietenia mahagoni*), Akasmoni (*Acacia auriculiformis*), Coconut (*Cocos nucifera*), Boroi (*Ziziphus mauritiana*), etc. However, all these trees are scattered. Mango (*Mangifera indica*), betel nut (*Areca catechv*), jack fruit (*Artocarpus heterophyllus*), jaam (*Eugenia jambolanavav*), banana (*Musa sapientum*), litchi (*Litchi chinensis*), papaya (*Carica papaya*), jambura (*Citrus decumana*), etc. are among common fruits found in this study area.

Terrestrial Fauna: Many colorful and singing birds were found in the study area. Direct observation was followed to document the avifauna during the extensive field survey, and dominant species were noted as Brahminy Kite (*Haliastur indus*), Common Myna (*Acridotheres tristis*), Red-vented Bulbul (*Pycnonotus cafer*), Oriental Magpie Robin (*Copsychus saularis*), Spotted Dove (*Spilopelia chinensis*), House Sparrow (*Passer domesticus*), Jacobin Cuckoo (*Jacobin Cuckoo*), White-browed Wagtail (*Motacilla madaraspatensis*), White rumped Shama (*Copsychus malabaricus*), etc. within the study area. All these species were observed near the homestead and roadside plantation areas.

Aquatic Flora: The water bodies of the study area are ornamented by different aquatic plant species such as free floating, rooted floating, submerged, and marginal plants. Aquatic floral within the study area include aquatic vegetation species, *Alternanthera philoxeroides* (Helencha), *Cyperus iria* (Mutha), *Eichhornia crassipes* (Kachuripana), *Lemna minor* (Lemna), *Monochoria hastate* (Kochuripana), *Utricularia exoleta* (Jaji), etc.

Aquatic Flora: The faunal species present in the aquatic ecosystems are the common kingfisher (*Alcedo atthis*), Indian pond heron (*Ardeola grayii*), snipe (*Gallinago stenura*), water snake (*Enhydris enhydris*), common toad (*Bufo melanostictus*), and others.

Fish species: Some of the commonly available fishes are ruhi or salmon (*Labeo rohita*), mrigel (*Cirrhinus mrigala*), kalbous (*Labeuca*), katla or carp (*Catla catla*), etc. soal fish (*Chann striatus*), boal/sheat fish (*Wallago atttu*), tapsi (*Polynemus paradiseus*), dhain, chital (*Notopterus chitala*), pangas (*Pangasius pangasius*), bain (*Mastacembelus armatus*), chapila (*Gudusia chapra*), golhsa (*Mystas bleekeri*), tengra (*Mystus vittatus*), chanda (*Mene*

muculata), kachki (*Corica soborna*), baila (*Glossogobius giuris*), tatkeni (*Crosscheilus latius*), pabda (*Ompok pabda*), koi or climbing fish (*Anabas testudineus*), puti (*Barbus puntius*), sharputi (*Puntius sarana*), taki (*Channa punctatus*), shrimps, and prawn are found in the market.

Socio-economic Environment

Population: According to (Statistics, Population & Housing Census 2011), total population of Shahbag thana is 68140 and the study area has about 7.41% population. The male population (4085) is higher than female population (984).

Literacy Rate: According to (Statistics, Population & Housing Census 2011) community report, it's noticed that total literacy rate is 84.7% and 58% and male literacy rate is higher than female literacy rate in Shahbag thana and Fulbaria.

Drinking Water: According to (Statistics, Population & Housing Census 2011)- community report of study area, most of the people drinking here pure water. 35.85% general households get the facility of drinking water from tube-well, 31.9% from tap and the remaining average 32.3% household get water from other sources.

Sanitation Status: Sanitation of dwelling households of the study area shows three categories with sanitary latrine, non-sanitary latrine and no toilet facilities. According to (Statistics, Population & Housing Census 2011)- community report, Fulbaria has good sanitation system. Maximum household use sanitary toilet in this district (86%). Non-sanitary system was recorded as 13% and very insignificant percentage (1%) having no sanitary facility.

Identification of Potential Impacts

The possible impacts of the project's pre-construction and construction phase on physical and biological environment may include dust emissions caused by operation of machinery and running vehicles within the project site and along the access routes; gaseous emissions from construction vehicles, machinery, and generators; release of waste effluents and solid wastes from construction areas and camps causing soil and water contamination; and finally, occupational health and safety (OHS) hazards for the construction staff and other project site personnel. There would be no referable impacts on wildlife habitats as well as vegetation. For civil activities for construction of Building may cause habitat loss of existing rodents like mouse, mongoose etc.

Social impacts of the project's construction phase on the communities considered are the temporary blockage of local routes, loss of livelihood, project-related traffic on local roads, noise generation and disturbance to local population, safety hazards caused by construction activities and project-related vehicular traffic, social conflict or cultural issues caused by labor influx.

Mitigation Measures

The potential environmental impacts of the project were found to be mostly during pre-construction and construction phases. Appropriate mitigation measures have been included in this report. These include water sprinkling to suppress dust emissions particularly near the settlements, using properly tuned vehicles and machinery, strictly following the air pollution guideline and keep the soil moisture during any transportation for local as well as construction equipment to minimize exhaust emissions; in noise pollution area (heavy construction equipment area) noise plug should be used; it is needed to ensure that construction activity to be undertaken in the dry season. Ensuring that no untreated waste effluents are released to the environment and using appropriate treatment mechanism. The site preparation works need consider as much as possible 'no hunting, no trapping, no catching' policy for the wildlife.

Environmental Management and Monitoring Plan

An Environmental Management Plan (EMP) has been prepared as part of the present report in order to define the implementation mechanism for the above-described mitigation measures. The EMP includes description of institutional arrangements, a mitigation plan, and monitoring plan.

The environmental management of the project will be achieved through implementation of a number of plans: a) Construction Environmental Management Plan (CEMP), (b) Labor Management Plan, and (c) Biodiversity Management Plan (d) Mitigation Plan. The mitigation plan, prepared on the basis of impact assessment carried out during this report, provides project-specific mitigation measures and assigns implementation and supervision responsibilities for these measures. The CEMP will be prepared by the construction contractor based upon the EMP included in this report and will comprise a number of sub-plans including pollution prevention plan, waste management plan, traffic management plan, camp management plan, OHS plan, and others.

As one of the key elements of the EMP, a monitoring program has been proposed comprising compliance monitoring and effects monitoring. The main purpose of this monitoring program is to ensure that the various tasks detailed in the EMP particularly the mitigation measures are implemented in an effective manner, and also to evaluate project's impacts on the key environment and social parameters.

For implementing the present EMP about 30, 37000 BDT will be required.

Stakeholder Consultation

The aim of the consultation is to ensure that the people and the stakeholders living in the proposed project area are aware of the planned project activities. The FGD with different stakeholders was carried out in compliance with DoE guidelines.

FGD was undertaken during the field visits. The key objectives of these FGD included informing the stakeholders particularly the local communities about the proposed interventions and soliciting their views, concerns, and recommendation concerning project and its impacts.

A checklist was used to maintain uniformity and relevancy in discussion and in properly recording the opinions and views of the participants. During the FGD, the socioeconomic, hydrological, geological, fisheries, and ecological issues were discussed in detail, including potential impacts of the interventions on the environmental and social parameters. Institutional issues were also discussed regarding which the participants provided their opinions and suggestions freely.

Grievance Redress Mechanism

BR will ensure that local people will have the opportunity to express their legitimate grievances or file a complaint about the project by establishing a process to address the issues raised. A GRC at the local administrative (ward/city corporation) level will be set up by BR as soon as the project commences and will ensure equal representation of women as the members of GRC.

Conclusion

Construction of a 4-story Engineer's Main Office (EMO) structure with a 16-story foundation and three basements is required by BR in order to ensure the smooth continuation of the railway project. Modern amenities will be included in the construction of EMO buildings. Although development of this magnitude may have potential environmental and social implications, this study has provided appropriate mitigation measures for all potential impacts. The PMU of this project is committed to the implementation of proposed mitigation measures including full implementation of environmental management plan.

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Acronyms and Definitions

ADB	**Asian Development Bank**
ARIPA	Acquisition and Requisition of Immovable Property Act
As	Arsenic
BBS	Bangladesh Bureau of Statistics
BC	Building Construction
BD	Bangladesh
BEZ	Bio-Ecological Zones
BMD	Bangladesh Meteriological Department
BNBC	Bangladesh National Building Code
BOD	Biochemical Oxygen Demand
BR	Bangladesh Railway
BWDB	Bangladesh Water Development Board
CBDRM	Community-Based Disaster Risk Management
CCL	Compensation Under The Law
CEMP	Construction Environmental Management Plan
CO	Carbon Monoxide
COD	Chemical Oxygen Demand
CSWG	Community & Social Welfare Groups
DO	Dissolved Oxygen
DoE	Department of Environment
DOHS	Directorate of Occupational Health and Safety
DPHE	Department of Public Health Engineering
EARF	Environmental Assessment and Review Framework
ECA	Environmental Conservation Act
ECC	Environmental Clearance Certificate
ECR	Environmental Conservation Rules
ECS	environmental, climate and social
EHS	Environmental Health and Safety
EIA	Environmental Impact Assessment
EMO	Engineer's Main Office
EMP	Environmental Management Plan
ENRAC	Environment and Resources Analysis Center Ltd.
EPA	Environmental Protected Area
ESIA	Environmental and Social Impact Assessment
ESMF	Environmental and Social Management Framework
ETP	Effluent Treatment Plan
FGD	Focus Group Discussion
GEF	Global Environmental Facility
GIS	Geographic Information System
GoB	Government of Bangladesh
GPS	Geographic Positioning Systems
GRM	Grievance Redress Mechanism
GW	Groundwater
IEE	Initial Environmental Examination
IFC	International Finance Corporation
ISO	International Organization for Standardization

IUCN	International Union for Conservation of Nature and Natural Resources
KII	Key Informant Interview
Leq	Average Sound Level
MOEF	Ministry of Environment and Forest
MoL	Ministry of Land
NAP	Bangladesh National Action Plan
NEMAP	National Environmental Management Action Plan
NEMP	National Environmental Management Plan
NEP	National Energy Policy
NGO	Non-governmental Organization
NO	Nitric Oxide
NO_2	Nitrogen di-oxide
NOC	No Objection Certificates
NPP	National Pollution Policy
O_3	Ozone
PCRs	Physical Cultural Resources
PM_{10}	Particulate Matter (less than or equal to 10 microns)
$PM_{2.5}$	Particulate Matter (less than or equal to 2.5 microns)
PMP	Pest Management Plan
RAJUK	Rajdhani Unnayan Kartripakkha
RHD	Roads and Highways Department
SO_2	Sulphur di-oxide
TDS	Total Dissolved Solids
ToR	Terms of References
TSS	Total Suspended Solid
UNDP	United Nations Development Programmee
UNFCC	United Nations Framework Convention on Climate Change
WARPO	Water Resources Planning Organization
WB	World Bank

Glossary

Adverse impact: An impact that is considered undesirable.

Ambient air: Surrounding air.

Aquatic: Growing or living in or near water.

Bangla: Bengali language.

Baseline (or existing) conditions: The 'baseline' essentially comprises the factual understanding and interpretation of existing environmental, social and health conditions of where the project activity is proposed. Understanding the baseline shall also include those trends present within it, and especially how changes could occur regardless of the presence of the project, i.e. the 'No-development Option'.

Bazar: Market.

Beneficial impacts: Impacts, which are considered to be desirable and useful.

Biological diversity: The variety of life forms, the different plants, animals and microorganisms, genes they contain and the ecosystems they form. It is usually considered at three levels: genetic diversity, species diversity and ecological diversity.

Ecosystem: A dynamic complex of plant, animal, fungal and microorganism communities and associated non-living environment interacting as an ecological unit.

Emission: The total amount of solid, liquid or gaseous pollutant emitted into the atmosphere from a given source within a given time, as indicated, for e.g., in grams per cubic meter of gas or by a relative measure, upon discharge from the source.

Endangered species: Species in danger of extinction and whose survival is unlikely if the existing conditions continue to operate. Included among those are species whose numbers have been reduced to a critical level or whose habitats have been so drastically reduced that they are deemed to suffer from immediate danger of extinction.

Environmental effects: The measurable changes, in the natural system of productivity and environmental quality, resulting from a development activity.

Environmental Impact: An estimate or judgment of the significance and value of environmental effects for natural, socio-economic and human receptors.

Environmental impact assessment (EIA)/Environmental assessment: The systematic, reproducible and interdisciplinary identification, prediction and evaluation, mitigation and management of impacts from a proposed development and its reasonable alternatives, sometimes known as environmental assessment.

Initial environmental examination: describe the environmental condition of a project, including potential impact, formulation of mitigation measures, and preparation of institutional requirements and environmental monitoring.

Environment Management Plan (EMP): A Plan to undertake an array of follow-up activities which provide for the sound environmental management of a project/ intervention so that adverse environmental impacts are minimized and mitigated; beneficial environmental effects are maximized; and sustainable development is ensured.

Evaluation: The process of looking back at what has been really done or accomplished.

Fauna: A collective term denoting the animals occurring in a particular region or period.

Flora: All of the plants found in a given area.

Project corridor: The Bio-Ecological zoning area covering 1 km radius from the project location is called Project Corridor.

Land use: Types include agriculture, horticulture, settlement, pisciculture and industries.

Mauza: A Bangla word for the smallest government administrative area corresponding to village revenue unit.

Mitigation: An action, which may prevent or minimize adverse impacts and enhance beneficial impacts.

Negative Impact: Negative change from the existing situation due to the project.

Public involvement / Public consultation: A range of techniques that can be used to inform, consult or interact with stakeholders affected / to be affected by a proposal.

Stakeholders: Those who may be potentially affected by a proposal, e.g. Local people, the proponent, government agencies, NGOs, donors and others, all parties who may be affected by the project or to take an interest in it.

Taka: Unit of Bangladeshi currency.

Terrestrial: Living on land.

Thana: Sub-district level of government administration, comprising several unions under district.

Union: Smallest unit of local self-government comprising several villages.

Upazilla: Sub-district name. Upazilla introduced in 1982.

Zilla: Bengali word of district.

1 Introduction

1 This report addresses the social and environmental concerns surrounding the proposed development of a multi-storey building in Fulbaria, Dhaka. The development of a 4-story structure with a 16-story foundation and three basement buildings has some environmental impacts that require Environmental Assessment report under Bangladesh regulations. The primary objective of the report for buildings is to minimize structural damage to neighboring structures due to piling or excavation for foundations.

2 This report will identify the potential impacts of the proposed project and will recommend mitigation measures to minimize such impacts during and after the proposed works. The report will also look at the justifications for taking up the proposed project in terms of location, design and environmental considerations. Impact mitigation measures and a monitoring program before, during and after work will also be included.

The findings of this report are based on rapid assessments undertaken during a site visit made to the project site as well as professional judgment. The development concept prepared by the project architect and engineering protocols developed by the project engineer has been utilized in order to understand and present the project. The impact assessment methodology has been restricted to field data collected, professional judgment and experience of similar projects.

1.1 Background of the Project

3 The Bangladeshi government is making significant advancements in logistics for transportation. These improvements should bring significant economic benefits to the countries of the region in general, and to Bangladesh in particular. The railway industry is given priority because it is thought to be the best mode of land transportation for the nation. Construction of a 4-story Engineer's Main Office (EMO) structure with a 16-story foundation and three basements is required by BR in order to ensure the smooth continuation of the railway project.

4 Modern amenities like as environmentally friendly solar panel systems, rainwater harvesting systems, better station facilities, and accessibility for those with physical disabilities will be included in the construction of EMO buildings. The new EMO building will be constructed along Phoenix Road in Dhaka on available BR land near Rail Bhaban. A conceptual design for the EMO building has been developed for foundations, structural systems, utility areas and mechanical/electrical services concepts and will be further developed by the Contractor.

5 According to the Department of Environment (DoE) Bangladesh, every multi storied building is required Environmental Assessment study. In order to comply the DoE rules, the proponent has entrusted Environment and Resources Analysis Center Limited (ENRAC) as a third-party independent consulting firm under a contact signed on 14th December 2022 for conducting an Environmental study.

1.2 Need of the Project

6 Government of Bangladesh has now undertaken many development projects in the transport section. Railways are a major mode of transport in Bangladesh so priority is given to the railway industry. BR requires the Construction of a 4-story Engineer's Main Office (EMO) structure with a 16-story foundation and three basements to ensure smooth continuation of the railway project. Additionally, inspection of the construction work, checking the waste disposal site, and monitoring the project work progress etc. is important to monitor regularly for which, it is important to build a engineers main building.

1.3 Objectives and Scope of Work

7 The overall objective of the consultancy is to collect all necessary information from the project site to properly conduct the report of the EMO buildings.

1.3.1 Objective and Scope of The Study

1.3.1.1 Objectives

8 The Construction of the EMO building could have impacts on the surrounding environment, depending on environmental sensitivities and the design of responsive mitigation measures. Environmental impacts include physical, ecological and socio-economic impacts. Environmental Assessment is required to address the anticipated impacts and to suggest appropriate mitigation measures in the Environmental Management Plan (EMP). The overall objective of the study is to conduct Environmental Assessment Study of the Project for obtaining 'Site Clearance Certificate' from the DoE.

9 The specific objectives of the Study are:

- To delineate baseline condition based on primary and secondary data;
- To assess preliminary impact of the interventions on the surrounding environment;
- To identify suitable and effective mitigation measures to address the impacts;
- To prepare a preliminary environmental management and monitoring plan (EMP and EMoP); and
- To prescribe proper recommendation.

1.3.1.2 Scope of Work

10 The scope of work for the Study includes the following:

- To conduct field visits to collect data relevant to the study area and also collect secondary data for establishment of the baseline environmental status of the study area;
- To assess the impacts on environmental attributes due to the location, design, construction and operation of the proposed project;
- To identify critical environmental parameters required to be monitored subsequent to the implementation of the proposed project;
- Conducting public consultation to obtain peoples' perception about the Project and potential impacts;
- Preparing an Environmental Management Plan (EMP); and an Environmental Monitoring Plan (EMoP), including cost estimates for BR to comply with during the project implementation;
- To prepare an IEE/EIA report in accordance with the ADB, EIB and the national regulations of the government; and
- Assisting in obtaining a 'Site Clearance Certificate' from the DoE.

1.4 Study Methodology

11 The report is prepared on the basis of the information of the project activities supplied by the project proponent (BR). The interaction between the project activity and the significant environmental components was made based on a checklist. This checklist was prepared following the DoE (DoE, 1997), ADB, EIB Guidelines and the consultants' experience on similar projects.

12 At the initial stage socio-economic data and environmental data were collected from both primary

and secondary source. Environmental and socio-economic data from different sources (BBS, DoE, BMD, BWDB and other reports) of the proposed project area were collected to prepare baseline environmental and socio-economic profile of the area. The Consultant's multi-disciplinary team of experts, made a reconnaissance visit to visualize the condition of project sites

13 The environmental baseline, project components, possible environmental impacts, mitigation measures and environmental monitoring plan are presented in this report following the DoE guidelines. The Methodology of the study is guided by the guidelines of the Department of Environment (DoE). The required data for conducting the study has been collected from the primary and secondary sources. Data collection through field investigation falls under primary data and secondary data sources include scientific publications, data provided by government agencies and academic institutions and information from ENRAC's own database. The dataset was then used to predict the likely impacts and when the construction and operations take place, it will be applied to monitor change (usually negative) using the dataset as a baseline.

14 Key elements which were assessed are as follow:

- aspects of the physical environment such as climate, global warming, temperature, rainfall and underlying geology;
- aspects of the biological environment such as species presence

1.4.1 Preliminary Discussion with Project Proponent

15 Discussion held with BR to understand the proposed project, current status of agreement (i.e., implementation, land, water, power etc.), project milestones, legal requirements and scopes; and collection of relevant project documents.

1.4.2 Screening and Scoping Exercise

16 Desk based review of the relevant documents and available imagery of the project site and its surroundings. Reconnaissance survey of the project sites, surrounding areas and preliminary discussion with local stakeholders, Meeting and discussion with Department of Environment (DoE) of Bangladesh to understand regulatory requirements associated with the project.

17 The outcome of the screening was then used to identify the study area, key data to be collected and categorize of the project. A preliminary stakeholder mapping exercise was also undertaken to identify key stakeholders from the Government, relevant Government agencies. NGOs as well as the community at the local, regional and national level. This information was then used for consultation during different stages of the project.

1.4.3 Baseline Data Collection

1.4.3.1 Environmental Data Collection and Analysis

18 In order to establish the baseline physical conditions within the study area, relevant secondary and primary data was collected and reviewed, a comprehensive field visit was undertaken, and a number of specialist studies were carried out. This process also included consultation with various relevant agencies including Government department, BR, locally-active NGOs, and members of the local community.

19 The data generated allowed the Project team to better understand the complex interplay between the various biotic and abiotic factors within the study area and to establish the baseline conditions. Once this baseline was established it was used as a reference point to identify potential changes to the environment that may occur as a result of the proposed Project activities, as well as to allow development of measures to prevent, mitigate or manage these potential impacts.

20 To comprehensively evaluate the existing Project area baseline conditions, a detailed field visit and

data collection program was developed and implemented. This survey aimed to identify important environmental components and environmental issues within the study area. It included investigation and observation of the local landforms, habitat types, drainage patterns, species abundance and distribution, soil types, water quality (surface water and groundwater), air quality, noise quality.

21 The study area and surrounds were surveyed by foot and by vehicle. Important environmental features were identified and logged. Hand-held geographic positioning systems (GPS) were used to identify specific features for mapping and further analysis in office. Direct field observations were also made for significant portions of the study area. The observations were cross-referenced with primary, secondary and anecdotal information provided by government representative and the local community about key issues such as flood levels, groundwater quality and presence of significant fauna.

1.4.3.2 Terrestrial and Aquatic Ecological Data Collection and Analysis

22 A terrestrial and aquatic ecological survey was conducted in the Project area to determine the extent, species composition and the condition of existing vegetation, wildlife, threatened and protected flora and fauna, and important habitat for local migratory species. Pre-prepared detailed questionnaires and checklists were used during the survey to collect both observed and anecdotal data on terrestrial and aquatic biodiversity. Local elderly stakeholders and forest officials were interviewed for collecting primary data and secondary data as well. The following activities were undertaken during the terrestrial and aquatic field surveys:

- **Direct Observation**

23 Direct observation on the occurrence and abundance of flora and fauna was made while travelling road edges. Appropriate field guides and data preforms were used for this activity so that information was accurately recorded. Some plant species which could not be identified in the field were pressed.

- **Interviews with Local Residents**

24 Interviews with local people are a very useful method for collecting information on local biodiversity. This data is anecdotal and as such should not form the core of any assessment; however, it does nonetheless provide useful supplementary information. During the field survey period, extensive interviews with local people were conducted to collect information.

1.4.3.3 Environmental Quality Data

25 Environmental Quality Data such as air quality, noise level, surface water & ground water quality was collected on January and February 2023. The sampling stations were defined and data were collected, allowing a set of baseline or/ existing conditions to be recorded. This dataset was then used to predict the likely impacts and when the construction and operations take place, it will be applied to monitor change (usually negative) using the dataset as a baseline. The sampling was conducted primarily within the project corridor at locations reflecting representative land use conditions and population densities.

1.4.4 Stakeholder Consultation

26 Stakeholder consultation is the process of sharing relevant project information and impacts with local stakeholders, and addressing their concerns. FGDs were held to obtain opinions and feedback from both direct and indirect stakeholders.

1.4.5 Socio-economic Environment

27 Socio-economic environment is an important instrument in evaluating socio-economic scenario and potential project impacts. The aim is to assess the existing demographic profile and ethnic composition, settlement and housing, traffic and transport, public utilities, fisheries, economy and employment, poverty, inequality, access to recourses as well as social analysis along the influenced area of

the proposed project implementation. Primary as well as secondary data were collected for this study. Secondary data was collected from various published and unpublished sources. Field survey along with FGDs, KIIs were conducted for information gathering. From field survey along with socio-economic data, information about the Project Affected People including Small Ethnic Community and issues raised due to operation/construction of the project were collected. Secondary data were collected through various sources including ENRAC's documents that are related to the Project. Besides, publications of Bangladesh Bureau of Statistics (BBS), Ministries of Government of Bangladesh and relevant organizations were used to prepare the report as well ensure authenticity of the field level data and quality of the report.

1.4.6 GIS Mapping

28 Geographical Information Systems (GIS) was used as a specialised analysis and presentation tool. Prior to field investigations, spatial analysis of satellite imagery was used to identify administrative areas and other boundaries and constraints to be considered for both the environmental and social assessments. For example, the administrative boundaries of local government areas were defined, and alignment, settlement areas, and drainage networks were identified. These tools also supported detailed on-ground surveys, and particularly spatial features that may be directly or indirectly influenced by project activities.

29 Detailed on-ground validation of spatial information - particularly land use - was conducted using a hand-held, non-differential GPS. The spatial data acquisition team took detailed transect walks through the Project area to identify various land use types, and to confirm the findings of the satellite imagery analysis. The extensive exercise both validated the land use mapping, and identified additional sensitive areas to include for sampling in the environmental fieldwork. The collected information is demonstrated in the numerous GIS mapping figures throughout this report.

1.5 Study Team

30 Study team consists of following experienced, expert and qualified multidisciplinary professionals performed and prepared the report under the guidance of the Environmental Expert/Team Leader of ENRAC. The multidisciplinary team of the environmental study is presented **Table 1.**

Table 1: Multidisciplinary team of the Environmental Study

Sl. No.	Name	Designation
1	Md. Mehedi Hasan Emon	Team Leader Cum Environmental Expert
2	Rubaiyat Ashrafee	Environmental Specialist
3	Irin Afrin Lopa	Ecologist
4	Md. Muhibullah	Social Development Specialist
5	Mohammad Shariful Islam	GIS Specialist
6	Md. Nur Absar	Civil Engineer
7	Md. Giash Uddin	Environmental officer
8	Tasnim Hossain	Jr. Environmental officer

2 Policy, Legal and Administrative Framework

2.1 Regulatory Requirements for the Project

31 Bangladesh is a developing country that is particularly vulnerable to environmental change. Poverty, growth and environmental sustainability are bound together in Bangladesh. Half of the population depends on an overexploited and degrading natural resource base. Industrial urban growth is contributing to economic livelihoods, but already there are serious threats to environmental and human health because of inadequate attention to the environment and sustainable development.

32 The Regulatory requirements toward protection and conservation of environment and various environmental resources and also toward protection of social environment from adverse impact of projects and activities are associated with them have been enunciated by the GOB as well as the ADB Pertinent requirements.

33 The national environmental policies and laws and legal framework applicable to the proposed project have been identified. An overview of a few of the major national environmental laws and regulations that are relevant and may apply to the activities supported by the proposed project, and Asian Development Bank (ADB) safeguard policies are given below.

2.2 GoB Environmental Policy, Regulations, and Guidelines

2.2.1 National Environmental Policy 2018

34 It is essential that proper environmental management and appropriate use of different components of environment is practiced in every region of the country and in every development project. Therefore, the National Environmental Policy 2018 has been developed addressing the sector-wise environmental policy among 24 sectors/fields.

2.2.2 National Environmental Policy, 1992

35 The Bangladesh has adopted a National Environmental Policy (NEP) in 1992 aimed at sustainable development. The NEP sets out the basic framework for environmental action together with a set of broad sectorial guidelines for action. Major elements of the policy are as follows:

- Maintaining ecological balance and ensuring sustainable development of the country through protection and conservation of the environment;
- Protection of the country against natural disasters;
- Identifying and controlling activities which are polluting and destroying the environment;
- Ensuring environment-friendly development in all sectors;
- Ensuring sustainable and environmentally sound management of the natural resources; and
- Maintaining active collaboration with international initiatives related to the environment.

36 With regard to the transport sector, the environmental policy aims at prevention of pollution and degradation of resources caused by roads and inland waterways transport. The policy mentions that Environmental Impact Assessments (IEE) should be conducted before projects are undertaken.

2.2.3 National Environmental Management Action Plan, 1995

37 The National Environmental Management Action Plan (NEMAP) builds on the NEP and was developed to address specific issues and management requirements during the period 1995-2005. The plan

includes a framework within which the recommendations of a National Conservation Strategy (NCS) are to be implemented. The NEMAP was developed with the following objectives:

a) to identify key environmental issues affecting Bangladesh;
b) to identify actions to halt or reduce the rate of environmental degradation;
c) to improve management of the natural environment;
d) to conserve and protect habitats and bio-diversity;
e) to promote sustainable development; and
f) To improve the quality of life.

2.2.4 Environmental Conservation Act (ECA), 1995

38 The ECA is currently the main legislation relating to environment protection in Bangladesh. This Act is promulgated for environment conservation, environmental standards development and environment pollution control and abatement.

39 The main objectives of ECA are:

- Conservation and improvement of the environment; and
- Control and mitigation of pollution of the environment.

40 The main focuses of the Act can be summarized as:

- Declaration of ecologically critical areas and restriction on the operations and processes, which can or cannot be carried out/ initiated in the ecologically critical areas (ECA);
- Regulations in respect of vehicles emitting smoke harmful for the environment;
- Environmental clearance;
- Regulation of industries and other development activities' discharge permits;
- Promulgation of standards for quality of air, water, noise and soil for different areas for different purposes;
- Promulgation of a standard limit for discharging and emitting waste; and
- Formulation and declaration of environmental guidelines

41 Before any new project can go ahead, as stipulated under the ECA, the project promoter must obtain Environmental Clearance from the Director General (DG), DOE. An appeal procedure does exist for those promoters who fail to obtain clearance. Failure to comply with any part of this Act may result in punishment to a maximum of 5 years' imprisonment or a maximum fine of Tk.100, 000 or both. The DOE executes the Act under the leadership of the DG. The Project will be undertaken in line with the aims and objectives of the Act by conserving the environment and controlling and mitigating potential impacts throughout the drilling program.

2.2.5 Environmental Conservation Act (Amendment 2000)

42 The Bangladesh Environment Conservation Act Amendment 2000 focuses on ascertaining responsibility for compensation in cases of damage to ecosystems, increased provision of punitive measures both for fines and imprisonment and the authority to take cognizance of offences.

2.2.6 Environmental Conservation Act (Amendment 2002)

43 The 2002 Amendment of the ECA elaborates on the following parts of the Act:

- Restrictions on polluting automobiles;

- Restrictions on the sale, production of environmentally harmful items like polythene bags;
- Assistance from law enforcement agencies for environmental actions;
- Break up of punitive measures; and
- Authority to try environmental cases.

2.2.7 Environmental Conservation Act (Amendment 2010)

44 This amendment of the act introduces new rules & restriction on:

- No individual or institution (Gov. or Semi Gov./ Non Gov. / Self Governing) cannot cut any Hill and Hillock. In case of national interest; it can be done after getting clearance from respective the department
- Owner of the ship breaking yard will be bound to ensure proper management of their hazardous wastes to prevent environmental pollution and Health Risk
- No remarked water body cannot be filled up/changed; in case of national interest; it can be done after getting clearance from the respective department; and
- Emitter of any activities/incident will be bound to control emission of environmental pollutants that exceeds the existing emission standards.

2.2.8 Environmental Conservation Rules, 2023

45 These are the first set of rules, promulgated under the Environment Conservation Act of 1995 (so far there have been multiple amendments to this set of rules, Recently gazetted ECR, 2023 supersedes all. The Environment Conservation Rules (ECR) has classified the projects into following four categories based on their site conditions and the impacts on the environment; (a) Green, (b) Yellow, (c) Orange and (d) Red. Various industries and projects falling under each category have been listed in Schedule 1 of ECR 2023.

46 According to the Rules, Environmental Clearance Certificate is issued to all existing and proposed industrial units and projects, falling in the Green Category without undergoing EIA. However, for category Yellow, Orange and for Red projects, require location clearance certificate and followed by issuing of Environmental Clearance upon the satisfactory submission of the required documents. Green listed industries are considered relatively pollution-free, and therefore do not require site clearance from the DoE. On the other hand, Red listed industries are those that can cause 'significant adverse' environmental impacts and are, therefore, required to submit an EIA report. These industrial projects may obtain an initial Site Clearance on the basis of an IEE based on the DoE's prescribed format, and subsequently submit an EIA report for obtaining Environmental Clearance.

2.2.9 Air pollution (Control) Rules 2022

47 The government has published a new rule based on section 20 of The Bangladesh Environment Conservation Act, 1995. aiming to protect environmental health. The main objectives of this rule are to prevent, control, and reduce air pollution. The government will appoint a Director General who will be responsible for managing and maintaining the environmental issue. The Air pollution (Control) Rules 2022 has specified several types of pollution such as pollution caused by factories, vehicles, construction, garbage, etc. According to the new rule, there will be a committee that will impose damages and punishment for such pollution. As stated by the rule, the government will give rewards to those who will protest against pollution and not cause any type of pollution.

2.2.10 Noise Pollution (Control) Rules, 2006

48 According to the Environment Protection Act 1995, the government formulated the noise pollution Rules & Regulation in 2006. This regulation recommends to keep the sound level: at50 dB in quieter areas from 6am until 9pm and at night 40 dB; similarly, in residential areas in the day at 55 dB and at night 45 dB;in mixed areas, 60 dB in the day time and at night 50 dB;in commercial areasin the day,70 dB and at night 60 dB; and, in industrial areas in the day, 75 dB and at night 70 dB.

2.2.11 EIA Guideline for the Industry 2021

49 The EIA Guidelines for Industry, 2021, introduced by the Department of Environment, Bangladesh, is the only guideline for conducting an Environmental Impact Assessment in Bangladesh and addresses the IEE and EIA for several industrial sectors, project and activities. It is not only for industries but also for all types of development works. It includes EIA procedures, methodology, guidelines for impact identification, forecasting, and evaluation, plans for mitigation measures, and monitoring programs. According to the EIA Guidelines for Industries (2021) each Project Proponent shall have to conduct an EIA, and is expected to consult and follow the DoE guidelines.

2.2.12 Bangladesh National Building Code (BNBC), 2017

50 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. For example, Part-7, Chapter-3 of the BNBC has clarified the issue of safety of workmen during construction and with relation to this, set out the details about the different safety tools of specified standard. In relation with the health hazards of the workers during construction, this chapter describes the nature of the different health hazards that normally occur in the sites during construction and at the same time specifies the specific measures to be taken to prevent such health hazards. Part 8, Chapter 5 provides details of the water supply, sanitation and drainage considerations for commercial buildings in urban area. Estimates of total water supply requirements for buildings shall be based on the estimation of total present and predicted future population and per capita water requirement.

2.2.13 Building Construction Act, 1952

51 The Act provided regulations regarding setbacks, building heights etc. in urban areas. The act also provided for prevention of haphazard construction of buildings and excavation of tanks which are likely to interfere with the planning of certain areas in Bangladesh and enables government through Section 16 to make any substantial rules for carrying out the purposes of this Act.

2.2.14 Building Construction Rules 2008

52 These rules superseded the previous Building Construction (BC) rules of 1984. These rules seek to control development plot-by-plot and case-by-case. It controls development by imposing conditions on setbacks, site coverage, construction of garages, access to plot, provision of lift, land use of that particular plot and height of building. Restricting the height of a building in BC Rules 1996 helps to control the density of an area and manage the growth of the city in some way.

53 The Dhaka Metropolitan Building Construction Rules 2008 superseded the earlier set of rules issued in 1996 for the Dhaka Metropolitan Area and provided more authority to RAJUK in the following way;

- Clear-cut responsibility to monitor the development of the city,
- Spread out the responsibilities to various actors,

- Spelled out responsibilities of building designers, structural engineers, site supervisors and their penalties etc.

54 One of the most significant improvements is the introduction of Floor Area Ratio (FAR). To manage the growth of the city it provides rules of building coverage area, allowable floor space and relation among building height - road width and plot size. Effectiveness of the new BCR rules will depend on how successfully implementation of these rules can be effected by RAJUK in a transparent way and keeping themselves away from corruption.

2.2.15 The Town Improvement Act (TI), 1953

55 It is the first statute which recognized the need for planning approach and created a special agency7 for development such as preparation of master plans, improvement schemes, and their implementations. The objective of the TI act, 1953 is to;

- Develop, improve and expand city of Dhaka by opening up congested areas
- Laying out of altering streets
- Providing open spaces for the purpose of ventilation or recreation
- Demolition or construction buildings
- Acquiring land for the said purpose and for
- Re-housing of persons displaced by the exclusion of improvement schemes.

2.2.16 Land Development Rules for Private Housing, 2004

56 This is a legal instrument for controlling land development in private sector housing. It provides procedures and guidelines for land development protecting the environment. It also spells out the percentages of land that must be kept for community facilities, amount of land to be sold out, school sites, road hierarchy and importantly planning standards, for example, allocation of land per 1000 population.

2.2.17 East Bengal State Acquisition and Tenancy Act, 1950

57 A law relating to tenancies to be held under the state and other matters connected therewith. Prior to its enactment, agrarian law of Bengal mainly consisted of the Bengal permanent settlement regulations of 1793 and the bengal tenancy act 1885. The Permanent Settlement regulations made zamindars owners of their land subject to payment of a fixed amount of their land revenue to the government and they were entitled to collect rent from their subordinate tenants, who were again entitled to create subordinate interests. Permanent Settlement regulations 1793 created a landed aristocracy, which was supposed to be loyal to the British regime. Bengal Tenancy Act of 1885 defined the rights and liabilities of the tenants in relation to their superior landlords.

58 Under the scheme of the Act, the government became the only landlord to acquire all rent receiving interest by phases. By operation of section 3 of the Act, all holders of land became directly tenants under the government and they are described as malik (owner), but all interest in subsoil right to minerals, hats, bazaars, forests, fisheries and ferries are vested in the government. The said law authorises the government to own and manage hats, bazaars, ferries, fisheries, etc.

59 In consequence of introduction of the State Acquisition Act, there exits no intermediary interest between the government and tenant, the government has become the only landlord and the cultivators were relieved of the baneful effect of subinfeudation and intermediate class. The service tenures in vogue in Bengal, more particularly in the district of sylhet, were done away with. Acquisition of rent receiving interest has been done under a scheme of payment of compensation to zamindars and intermediary interest holders.

60 Under State Acquisition of Tenancy Act, khatiyan is prepared in the names of respective tenants directly under the government and the Act provides for a process of updating khatiyan in the names of the persons by transfer, inheritance, and settlement from government. That Act provides a process of pre-emption of land by a co-sharer of contiguous tenant if the transfer is made to any stranger. The Act also provides a scheme of precedence of any co-sharer by inheritance against any co-sharer by purchase. This provision of pre-emption was first introduced as a part of general law incorporated in Bengal Tenancy Act of 1885 relating to agricultural tenancy. However, pre-emption for non-agricultural tenancy is governed by the provision of non-agricultural tenancy act.

61 The statute also provides for periodical field survey of land and updating the record of right through such periodical settlement operations. It may be mentioned that this law has no application for Chittagong hill tracts, which constitute almost one tenth of Bangladesh and is governed by Chittagong Hill Tracts Regulation 1900 and subsequent amending laws. Areas of Chittagong Hill Tracts are excluded from the operation of State Acquisition and Tenancy Act by gazette notification dated 30 November 1955. The gazette notification also stipulated restriction on transfer by the tribal people of different areas of the country. A member of a tribe can transfer his property to another one of the same or a different tribe at his will but he cannot do so to a non-tribal person without the permission of the revenue authority.

2.2.18 Acquisition and Requisition of Immovable Property Act, 2017 (ARIPA, 2017)

62 The principal legal instrument governing land acquisition in Bangladesh is the Acquisition and Requisition of Immovable Property Act, 2017 and subsequent amendments during 1993 - 1994. The 2017 Act requires that compensation be paid for: (i) land and assets permanently acquired (including standing crops, trees, and houses); and, (ii) any other damages caused by such acquisition. The Act provides certain safeguards for the owners and has provision for payment of "fair value" for the property acquired.

63 Deputy Commissioners (DC) will pay compensation for the land to be acquired based on Land Acquisition Proposals to be submitted by the requiring body. DCs, in all cases, determine market value of acquired assets on the date of notice of acquisition (notice under section 3 of the Ordinance). The DC then adds a 50% premium on the assessed value for cash compensation under the law (CCL) of all acquired assets except standing crops due to compulsory acquisition. The CCL paid for land is generally less than the "current market price" as owners customarily report undervalued land transaction prices in order to pay lower stamp duty and registration fees. If the land acquired has standing crops cultivated by a tenant under a legally constituted agreement, the law requires that part of the compensation money be paid in cash to the tenants as per the agreement. Places of worship, graveyards, and cremation grounds are not to be acquired for any purpose. The law requires that the salvaged materials upon payment of compensation will be auctioned out by the government. Under the 1982 Ordinance, the Government is obliged to pay compensation only for the assets acquired.

64 However, the provisions under this law are not adequate to cope with the adverse effects related to land acquisition and involuntary resettlement, nor do they fully match the requirements of ADB's safeguards requirements or international standards. Such gaps in the existing land acquisition law of the country are:

- Existing GoB laws recognize title owners only; informal settlers are not covered.
- Consultation with an affected community is not legally required.
- No support or program for income and livelihood restoration.

65 In light of addressing these shortcomings, the Government of Bangladesh is working on preparation of a national policy on involuntary resettlement, which is consistent with the general policy of the Government that the rights of those displaced by development projects shall be fully respected, and persons being displaced shall be treated with dignity and assisted in such a way that safeguards their welfare and livelihoods, irrespective of title, gender, and ethnicity. The Government will undertake further work

towards legislative changes to safeguard resettlement rights by law once the draft policy is approved in the Cabinet.

2.2.19 The Solid Waste Management Rules 2021

66 The Solid Waste Management Rules 2021 were published in Bangladesh on December 23, 2021, under the Bangladesh Environmental Protection Act, 1995. The Regulations define the responsibilities of businesses involved in solid waste management and impose collection, recycling, and disposal obligations according to Extended Producer Responsibility (EPR) on manufacturers of non-biodegradable products such as glass, plastic, and bottles. The Regulations also include provisions for the treatment of solid waste such as composting and energy recovery.

67 The main provisions of the Regulations are as follows.

- When recovering resources from waste, the principles of management that consider the waste hierarchy, such as the 3Rs, segregation, and reduction, must be followed at all stages from waste generation to final disposal.
- Responsibilities of waste generators, consumers, and users:
- Dispose of waste in accordance with the regulations of authorities including local government.
- Dispose of waste separately.
- Do not dump, store, or burn waste outdoors.
- Responsibilities of manufacturers (*not defined) and importers of products
- Collect non-biodegradable products such as glass, plastic, polyethylene, multi-layered packaging, bottles, and cans from consumers and recycle or dispose of them if appropriate.
- Determine work plans and implementation procedures for recycling and disposal.
- Ensure that EPR is properly implemented.
- Submit an annual report to the Department of Environment (DOE) on the amount of plastic recycled.
- Raise public awareness of proper waste management.

Any violation of the above provisions shall be subject to imprisonment for not more than two years or a fine not exceeding 200,000 taka (approximately 270,000 yen), or both. The Regulations also include provisions for the treatment of solid waste such as composting and energy recovery.

2.2.20 National 3R (Reduce, Reuse and Recycle) Strategy 2010

68 Department of Environment (DoE) with support from UNCRD and Ministry of Environment of the Government of Japan developed a National 3R (reduce, reuse and recycle) strategy for waste management. The main features for promoting 3R are,

- Prioritizing waste avoidance/reduction over recycling,
- Reusing non-avoidable waste as far as possible;
- Guaranteeing an environmentally sound residual waste treatment and disposal

69 Specific strategies to manage domestic wastes are discussed below

- The DoE with City Corporations will develop a program for source separation of domestic wastes. Segregation of waste at the point of origin will be a non-negotiable and critical element of the strategy.
- City Corporations/ will direct the households, and institutions not to mix recyclable waste with biodegradable waste and will encourage them to keep the bio degradable and non- biodegradable,

recyclable and non-recyclable waste in separate containers or bags for collection by the informal sector recyclers or by the approved DoE.

- All kinds of recycling activities can contribute towards greenhouse gas mitigation; as such linking recycling projects with Clean Development Mechanisms (CDM) will be encouraged.
- Domestic waste which cannot be recycled will be used for sanitary land filling. The site for land filling will be selected after EIA (Environmental Impact Assessment) and public consultation.

2.2.21 Fire Prevention and Fire Fighting Act, 2003

70 According to Fire Prevention and Fire Fighting Act, 2003 every owner of the building to take precautions and other measures necessary for public safety. It clearly depicts, notwithstanding anything contained in any other law, without approval of the Directorate General of Fire Service and Civil Defense regarding fire prevention or extinction, no structural design or layout of multi-storied commercial building shall be approved or amended. For fire extinguish, water shall be collected from nearby any water bodies where the owner of these water bodies or any other person shall not give any objection to use.

2.2.22 Bangladesh Fire Safety Rules 2003

71 The "Bangladesh Fire Safety Rules 2003" is a set of regulations established in Bangladesh to ensure fire safety in various types of buildings and establishments. These rules were formulated to prevent and control fire hazards, protect lives, and minimize property damage caused by fire incidents. Some key aspects covered in the Bangladesh Fire Safety Rules 2003 are as below:

- The rules outline requirements for fire prevention, including provisions for proper building design, construction materials, and fire-resistant structures.
- The rules lay down guidelines for fire safety management, including the appointment of responsible personnel and fire safety officers in establishments.
- The rules provide specific fire safety requirements for different types of buildings, such as high-rise buildings, industrial premises, educational institutions, hospitals, shopping complexes, and residential buildings.
- The rules specify guidelines for electrical safety, including proper wiring, grounding, and the use of fire-resistant electrical equipment, as well as safe storage and handling of flammable materials and the maintenance of fire exits and access routes.
- The rules stipulate that buildings and establishments must obtain a fire safety certificate from the Fire Service and Civil Defense Authority to ensure compliance with the fire safety regulations.

2.2.23 Disaster Management Act (2012)

72 The Disaster Management Act 2012 aims to make the activities about disaster management coordinated, object-oriented and strengthened, and to formulate rules to build up infrastructure for effective disaster management to fight all types of disasters. Disaster means any such incidents created by nature or humans.

73 Disaster (to a certain degree) may occur in the present project, if any harmful situation occurs during the normal work or construction activity. Therefore, an appropriate management plan should be developed by the project proponent to prevent any unwanted disaster.

74 This Act is particularly relevant to avoid accidental hazard both in construction and the operation and maintenance phase. The relevance of this act for this proposed project arises as follows:

- To make a disaster management plan for rehabilitation to bring back any infrastructure, life, livelihood and working environment damaged by a disaster to the previous condition or better

condition.

- To create effective disaster management infrastructure to fight disasters and to make the public concerned and strengthened to face the disasters.
- To ensure that no obstacle is created interfering with fire brigade and rescue vehicles in the event of a fire breaking out, earthquake, building collapse, or other disaster.

2.2.24 Bangladesh Labor Act, 2006 and Rules, 2015

75 The Bangladesh Labour Act was promulgated in 2006. The legislation pertains to the occupational rights and safety of factory workers and the provision of a comfortable work environment and reasonable working conditions. The amendment in 2013 introduced a good number of important items like workers' welfare, rights and safety and industrial safety and expansion of the industry (particularly relevant for this project).

76 This Act applies to the proposed project as it will involve construction and erection of structures. The occupational health and safety of the workers is covered under this Act. It is mandatory for every factory to keep its workers abreast of work risk(s) through providing all workers with personal protection equipment.

77 In 2015, the Bangladesh government introduced the Bangladesh Labour Rules. Some of the relevant points of these Rules are health and fire safety. The Bangladesh Labour Act 2006 consolidated and repealed 25 previous labour-related laws including the Dock Labourers Act, 1934, the Factories Act, 1965, among others.

2.2.25 Occupational Health and Safety Related Laws

78 During construction, the project will conform to the labor laws and occupational and health related rules as outlined in **Figure 2**

Table 2: Relevant Occupational Health and Safety Laws and Rules

Title	Overview
Bangladesh Labor Act, 2006	Provides for safety of work force during construction period. The act provides guidance of employer's extent of responsibility and the workman's right to compensation in case of injury caused by accident while working.
Labor Relations under Labor Laws, 1996	General concerns during the project implementation state that the project manager must recognize labor unions.
Public Health (Emergency Provisions) Ordinance, 1994	Calls for special provisions with regard to public health. In case of emergency, it is necessary to make special provisions for preventing the spread of disease, safeguarding the public health, and providing adequate medical service, and other services essential to the health of respective communities and workers during construction-related work.
The Employees State Insurance Act, 1948	Health, injury and sickness benefit should be paid.
The Employer's Liability Act, 1938	Covers accidents, risks, and damages with respect to employment injuries
Maternity Benefit Act, 1950	Framed rules for female employees, who are entitled to various benefits for maternity
Bangladesh Factory Act, 1979	Workplaces provisions: these Act and Labor Laws require medical facilities, first aid, accident and emergency arrangements, and childcare services to be provided to the workers at workplace.

2.2.26 Relevant other Regulatory Requirements for the Project

79 The Government of Bangladesh has framed various laws and regulation for protection and conservation of natural environment. The legislation with applicability to this project is summarized below in Table 3.

Table 3: Application of key Environmental & Social Legislation

No	Act/Rule/Law/Ordinance	Responsible Agency-Ministry/Authority	Key Features-Potential Applicability
1	Environment Court Act, 2000 and subsequent amendments in 2002	Ministry of Environment and Forest	GOB has given highest priority to environment pollution and passed Environment Court Act, 2000 for completing environment related legal proceedings effectively
2	Bangladesh Wildlife Preservation Order 1973 and Revision 2008 (Draft)	Ministry of Environment and Forests	Restricts people from damaging or destroying vegetation in wildlife sanctuaries and hunting and capturing of wild animals
3	National Land Use Policy, 2001	Ministry of Land	The plan deals with land uses for several purposes including agriculture (crop production, fishery and livestock), housing, forestry, industrialization, railways and roads, tea and rubber. The plan basically identifies land use constraints in all these sectors.
4	Bangladesh Labor (Amendment Act # 30, 2013)	Ministry of Labor	Amends and clarifies appropriate working conditions in all sectors and the rights of workers regarding safe working conditions.
5	Municipal Act (1982)	City corporation	Drainage, sewerage, water supply and sanitation
6	The Brick Burning (Control) Act, 1989 The Brick Burning (Control) Amendment Act, 1992 and 2001	Ministry of Environment and Forest (MOEF)	Control of brick burning Requires a license from the MoEF for operation; Restricts brick burning with fuel wood
7	Water Pollution Control Ordinance 1970	Ministry of Water Resources	Prevents water pollution
8	The Forest Act 1927, Amendment 2000 (Protected, village Forests and Social Forestry)	Forest Department, MOEF	• Declare any forests land or wasteland as protected forests. • May stop public or private way or watercourse in the interest of preservation of the forest • Declare a reserved forest area as Village Forests • Declare an area as Social forests or launch a social forestry • Programme in Govt. land or private land with permission
9	National Forest Policy and Forest Sector Review (1994, 2005)	Forest Department, MOEF	• Afforestation of 20% land. • Bio-diversity of the existing degraded forests

No	Act/Rule/Law/Ordinance	Responsible Agency-Ministry/Authority	Key Features-Potential Applicability
			• Strengthening of agricultural sector • Control of global warming, desertification, control of trade in wild birds and animals • Prevention illegal occupation of the forestlands, tree felling and hunting of wild animals.
10	National Biodiversity Strategy and Action Plan(2004)	MOEF	• Conserve, and restore the biodiversity of the country; • Maintain and improve environmental stability of ecosystems; • Ensure preservation of the unique biological heritage of the nation for the benefit of the present and future generations; • Guarantee safe passage and conservation of globally endangered migratory species, especially birds and mammals in the country; • Stop introduction of invasive alien species, genetically modified organisms and living modified organisms.
11	Vehicle Act 1927 and Motor vehicle ordinance 1983	BRTA	Road/traffic safety Vehicular air and noise pollutions Fitness of vehicles and registration
12	The ground Water Management Ordinance1985	Ministry of Water Resources	Focuses on management of Ground Water Resources. Disallows digging of tube wells without permission from the Upazila Parishad

2.3 ADB Safeguard Policy Statement, SPS 2009

80 ADB's environmental and social safeguards form the cornerstone of its support to inclusive economic growth and environmental sustainability in Asia and the Pacific. In July 2009, ADB's Board of Directors approved the new Safeguard Policy Statement (SPS) governing the environmental and social safeguards of ADB's operations. The objectives of the SPS are to avoid, or when avoidance is not possible, to minimize and mitigate adverse project impacts on the environment and affected people. Objectives also include helping borrowers strengthen their safeguard systems and develop the capacity to manage environmental and social risks.

81 ADB's environmental safeguards emphasize development and implementation of a comprehensive EMP. Key elements of EMP are mitigation measures, monitoring programs, budgets, and institutional arrangements for implementation. In addition, the environmental assessment process emphasizes public consultation, information disclosure, and consideration of alternatives.

82 The key safeguard areas which must be addressed are

i. environmental;

ii. involuntary resettlement; and

iii. Indigenous peoples.

83 ADB's environmental safeguards emphasize development and implementation of a comprehensive EMP. Key elements of EMP are mitigation measures, monitoring programs, budgets, and institutional arrangements for implementation. In addition, the environmental assessment process emphasizes public consultation, information disclosure, and consideration of alternatives.

84 Further, ADB adopts a set of specific safeguard requirements that borrowers or clients are required to meet in addressing environmental and social impacts and risks associated with a specific project. ADB will not finance projects that do not comply with its safeguard policy statement, nor will it finance projects that do not comply with the host country's social and environmental laws and regulations. The safeguard policy statement applies to all ADB-financed and/or ADB-administered sovereign and non-sovereign projects, and their components, regardless of the source of financing.

2.3.1 ADB's Environmental Safeguard Requirements - Policy Principles

85 Environmental assessment incorporates the following policy principles:

- Projects are screened and assigned to one of the following categories described in **Figure 4** as soon as possible.
- Conduct an environmental assessment for each proposed project. Assess potential trans-boundary and global impacts, including climate change.
- Examine alternatives to the project's location, design, technology, and components. Avoid, minimize, mitigate, and/or offset adverse impacts.
- Prepare an EMP.
- Carry out meaningful consultation with affected people and facilitate their informed participation.
- Disclose a draft environmental assessment (including the EMP) in a timely manner, before project appraisal, in an accessible place and in a form and language(s) understandable to affected people and other stakeholders. Disclose the final environmental assessment, and its updates if any, to affected people and other stakeholders.
- Implement the EMP and monitor its effectiveness. Document and disclose monitoring results.
- Do not implement project activities in areas of critical habitat, unless
    i. there are no measurable adverse impacts on the critical habitat that could impair its ability to function,
    ii. there is no reduction in the population of any recognized endangered or critically endangered species, and
    iii. Any lesser impacts are mitigated. If a project is located within a legally protected area, implement additional programs to promote and enhance the conservation aims of the protected area.
- Apply pollution prevention and control technologies and practices consistent with international good practices such as the World Bank Group's Environmental, Health and Safety Guidelines.
- Provide workers with safe and healthy working conditions and prevent accidents, injuries, and disease.
- Conserve physical cultural resources (PCRs) and avoid destroying or damaging them by using field-based surveys.

86 The project categorization system and the assessment required are described **Figure 4** Most of the environmental impacts of the project are temporary and reversible. This project is categorized as an Environmental Category Orange project. The project will also address the ADB SPS guidelines as they apply to Initial Environmental Examination (IEE) Study for Construction of 4-Storied Engineer's Main Office (EMO) Building with 16- Storied Foundation and Three Basements.

Table 4: ADB's Environmental Safeguards Categorization and Requirements

Category	Definition	Assessment Requirement
A	Likely to have significant adverse environmental impacts that are irreversible, diverse, or unprecedented, and may affect an area larger than the sites or facilities subject to physical works.	Environmental Impact Assessment (EIA)
B	Likely to have adverse environmental impacts that are less adverse than those of Category A. Impacts are site-specific, few if any of them irreversible, and in most cases mitigation measures can be designed more readily than Category A.	Initial Environmental Examination (IEE)
C	Likely to have minimal or no adverse environmental impacts.	No environmental assessment is required but the environmental implications of the project will be reviewed
FI	Project involves investment of ADB funds to or through a financial intermediary (FI).	FIs will be required to establish an environmental and social management system (ESMS) commensurate with the nature and risks of the FI's likely future portfolio to be maintained as part of the FI's overall management system.

Source: (ADB, 2009)

2.3.2 Comparison of Environmental Safeguard Principles between ADB and Bangladesh

87 The following Table presents a summary comparing the environmental safeguard principles of ADB and the government.

SPS 2009			Government	Gaps (if any)
No.	Principles	Delivery Process		
1	Use of screening process to determine the appropriate environmental assessment	Uses sector-specific rapid environmental assessment checklist for screening and assigns categories based on potential impacts: A - EIA required (irreversible, diverse or unprecedented adverse environmental impacts) B - IEE required C - no environmental assessment required but a review of environmental implications FI - ESMS required	ECA 1995 and ECR 2023 set screening criteria to classify industries/projects based on potential environmental impacts as follows: Green (pollution-free), Yellow, Orange and Red (causes significant environmental impacts). The screening criteria are based on project or industry type and do not consider the scale and location. The category determines the level of environmental assessment.	No major gaps
2	Conduct an environmental assessment	EIA and IEE - Identify potential impacts on physical, biological, PCRs, and socioeconomic aspects in the context of project's area of influence (i.e., primary project site and facilities, and associated facilities) ESMS for FIs	Industry/project category Green- no environmental assessment required Yellow - no IEE or EIA required but must provide relevant documents such as process flow, lay-out showing effluent treatment plant, etc. Orange - IEE required Red - both IEE and EIA are required	No major gaps
3	Examine alternatives	Analyze alternatives to the project's location, design, and technology Document rationale for selecting the project location, design, and technology Consider "no project" alternative	Regulations (i.e., ECA 1995 and ECR 1997 amended in 2017) do not require specifically the identification and analysis of alternatives	Not required by law but the TOR for EIA to be approved by the DOE now includes a discussion on analysis of alternatives.
4	Prepare an EMP	EMP to include monitoring, budget and implementation arrangements	EMP and procedures for monitoring included in the IEE and EIA (i.e., Orange and Red category projects)	No major gaps

SPS 2009			Government	Gaps (if any)
No.	Principles	Delivery Process		
5	Carry out meaningful consultation	Starts early and continues during implementation Undertaken in an atmosphere free of intimidation Gender inclusive and responsive Tailored to the needs of vulnerable groups Allows for the incorporation of all relevant views of stakeholders Establish a grievance redress mechanism	Public consultation and participation are not mandatory based on ECA 1995 and ECR 1997 (amended in 2017) Grievance redress mechanism is not mentioned in ECA 1995 and ECR 1997 (amended in 2017) EIA format required by DOE includes stakeholders' consultation	Approval of the TOR of EIA by DOE now includes consultation with stakeholders.
6	Timely disclosure of draft environmental assessment (including the EMP)	Draft EIA report posted on ADB website at least 120 days prior to Board consideration (for Category A) Draft IEE/EARF prior to appraisal Final or updated EIA/IEE upon receipt Environmental monitoring report submitted by borrowers upon receipt	No requirement for public disclosure of environmental reports but DOE posts the Minutes of the Meeting on the application for environmental clearance certificate to its website, http://www.doe-bd.org/minutes.php	Still no requirement for public disclosure of environmental assessment, but the project will be posted to the DoE website and will be available in summary form at the project site.
7	Implement EMP and monitor effectiveness	Prepare monitoring reports on the progress of EMP Retain qualified and experienced external experts or NGOs to verify monitoring information for Category A projects Prepare and implement corrective action plan if non-compliance is identified Requires submission of quarterly, semi-annual, and annual reports to ADB for review	Environmental clearance is subject to annual renewal based on compliance of the conditions set by DOE	No major gaps

SPS 2009			Government	Gaps (if any)
No.	Principles	Delivery Process		
8	Avoid areas of critical habitats (use of precautionary approach to the use, development and management of renewable natural resources)	Provides guidance on critical habitats	ECA 1995 and ECR 1997 (amended in 2017) identifies ecologically critical areas and the rules to protect them	No major gaps
9	Use pollution prevention and control technologies and practices consistent with international good practices	Refers to World Bank's Environmental Health and Safety (EHS) General Guidelines 2007 (or any update) If national regulations differ, more stringent will be followed If less stringent levels are appropriate in view of specific project circumstances, provide full and detailed justification	Effluent standards, ambient and emission standards included in ECA 1995 and ECR 1997 (amended in 2017) Ambient noise levels included in Noise Pollution Control Rules 2006	No major gaps
10	Provide workers with safe and healthy working conditions and avoid risks to community health and safety	Refers to WB EHS General Guidelines 2007 (or any update)	Occupational health and safety standards included in the Factories Act 1965, the Bangladesh Labor Law 2006, and the Bangladesh Labor Act 2013.	No major gaps; WB/IFC EHS guidelines will still apply, as per the ADB SPS, and enforcement requirements will be noted.
11	Conserve physical cultural resources (PCRs) and avoid destroying or damaging them	Use of field-based surveys and experts in the assessment Consult affected communities on PCRs findings Use chance find procedures for guidance	Preservation and protection of cultural resources are within the Antiquities Act 1968.	No major gaps
12	Grievance Redress Mechanism	Establish a grievance redress mechanism	Grievance redress mechanism is not mentioned in ECA 1995	Not required by regulation in Bangladesh

2.4 EIB Environmental And Social Standards

88 Raising & Promoting sustainable and inclusive development is at the heart of the EIB's objectives and its lending strategy. In particular, the preservation of environmental and social capital that exists today for future generations-underpins the EIB's lending strategy and objectives. The EIB Group Environmental and Social Policy provides the overarching framework for the Group's commitments and a vision for the critical decade up to 2030, placing sustainable finance at the centre of everything the EIB does. To honour its sustainability commitments, the EIB has adopted a set of 11 environmental and social standards that establish the requirements the promoter and the project must meet throughout the EIB project life cycle. The following brief overview of the standards outlines the promoters' responsibilities in their application to EIB projects.

2.4.1 Standard 1 — Environmental And Social Impacts And Risks

89 Standard 1 promotes an integrated approach to impact and risk assessment and management by ensuring that environmental, climate, social and human rights considerations are taken into account and addressed at every step of the project. The standard sets out the promoter's responsibilities for assessing, managing, monitoring and reporting on the potential environmental, climate and social impacts and risks associated with the project and for maximising positive outcomes throughout the project. This is essential to achieve the environmental, climate and social outcomes in line with the EIB Group Environmental and Social Policy and the EIB Environmental and Social Standards.

2.4.2 Standard 2 — Stakeholder Engagement

90 Standard 2 promotes an inclusive and systematic approach to engaging constructively with stakeholders. It acknowledges stakeholder engagement as essential for the effective assessment, management and monitoring of environmental, climate and social impacts and risks, and to ensure projects are sustainable and deliver better outcomes. This standard outlines the promoter's responsibilities for implementing continuous and transparent engagement with project stakeholders. As a public institution, the EIB actively promotes the right to access to information, as well as public consultation and participation. Standard requires promoters to uphold an open, transparent and accountable dialogue with all project- affected communities and relevant stakeholders in an effective and appropriate manner. The value of public participation in the decision-making process is stressed throughout the preparation, implementation and monitoring phases of a project. The right to access to remedy, including through grievance resolution, is actively required.

2.4.3 Standard 3 — Resource Efficiency And Pollution Prevention

91 Standard 3 recognises the importance of resource efficiency to relieve pressure on the environment and curb climate change. It encourages the identification, design and use of technologies, processes and services best suited to achieve environmental quality objectives. The standard also strengthens the approach and requirements for projects involving existing activities, facilities, modifications and/or extensions. The objective of this standard is to avoid and minimise pollution from EIB-supported operations. It outlines a project-level approach to resource efficiency and pollution prevention and control in line with best available techniques and internationally disseminated practices.

2.4.4 Standard 4 — Biodiversity And Ecosystems

92 Standard 4 emphasises that the protection and conservation of biodiversity and ecosystems, and maintaining their ecological functions and processes, are fundamental to environmental and social sustainability. This standard sets out the requirements and measures that the promoter has to adopt throughout the different stages of a project supported by the Bank to achieve a "no loss" of biodiversity

and where required a net positive impact. Standard 4 also addresses the sustainable management and use of living natural resources, such as plants, trees and forests, and recognises the need to consider the livelihood of project-affected people whose access to, or use of living natural resources may be affected by the project. The standard also emphasises the need to engage with traditional and indigenous communities as key stakeholders in protecting and managing biodiversity and natural resources, while respecting their rights to their land, culture and spirituality.

93 The EIB also acknowledges the intrinsic value of biodiversity and that its operations may have a potential impact on biodiversity and ecosystems. This standard outlines the approach and measures the promoter has to take to protect and conserve all levels of biodiversity. It focuses on major threats and supports the sustainable use of renewable natural resources and the equitable sharing of benefits from the project's use of natural resources.

2.4.5 Standard 5 — Climate Change

94 In line with the EIB's enhanced climate action and environmental sustainability ambitions and its 2021-2025 Climate Bank Roadmap, this standard promotes the alignment of projects supported by the EIB with the goals and principles of the Paris Agreement and the EU Sustainable Finance Action Plan. It does so by stipulating that promoters must explicitly address and incorporate climate change mitigation and adaptation considerations into the decision making process for EIB-supported projects throughout the project cycle, by assessing and minimising greenhouse gas emissions and physical climate risk.

95 EIB financing as a whole is aligned with EU climate policies, which should be taken into account at all stages of the project cycle, in particular regarding the assessment of the economic cost of greenhouse gas emissions and the climate vulnerability context. Specifically, project promoters must ensure that all projects comply with appropriate national and, where applicable, EU legal requirements, including multilateral agreements, related to climate change policy.

2.4.6 Standard 6 — Involuntary Resettlement

96 EIB projects sometimes involve land acquisition and/or restrictions on land use, which can result in the temporary or permanent displacement of people from their original places of residence or their economic activities or subsistence practices. A situation when affected individuals or communities do not have the right to refuse such displacement is referred to as involuntary resettlement. Standard 6 seeks to avoid involuntary resettlement in the first instance, and minimise and define the appropriate mitigation measures that should be in place to counter the adverse impacts of involuntary resettlement. It also aims to assist all affected persons so they can improve or at least restore their socioeconomic and cultural conditions.

97 The standard 6 is rooted in the respect and protection of the rights to property and to adequate housing, and of the standard of living of all affected people and communities. It seeks to mitigate any adverse impacts arising from their loss of assets or restrictions on land use. It also aims to assist all affected persons to improve or at least restore their former livelihoods and living standards and adequately compensate for incurred losses.

2.4.7 Standard 7 — Vulnerable Groups, Indigenous Peoples And Gender

98 The objective of this standard is to address inequalities and other factors contributing to vulnerability, marginalisation and/or discrimination in an EIB project. The standard also promotes gender equality as a basic human right crucial for sustainable development. It outlines the promoter's responsibilities for assessing, managing and monitoring project impacts, risks and opportunities related to Indigenous Peoples and vulnerable persons/groups.

99 The EIB seeks to protect all vulnerable project-affected individuals and groups, while seeking that

these populations duly benefit from EIB operations. The standard requires that there is full respect for the dignity, human rights, aspiration, cultures and customary livelihoods of vulnerable groups including indigenous peoples. It requires the free, prior and informed consent of affected indigenous groups.

2.4.8 Standard 8 — Labour Rights

100 Good labour practices and the use of appropriate codes of conduct are important to ensure that workers' fundamental rights are respected and that working conditions are fair and decent. This standard aims to ensure that promoters of EIB projects comply with the core labour standards of the International Labour Organization and with national labour and employment laws. It sets the need for a workers' grievance mechanism. It further defines standards to protect migrant workers and workers affected by collective dismissals. The standard also requires the establishment, maintenance and improvement of worker management relationships and terms and conditions of employment. The standard defines the assessment requirements that are needed for the promoter's own workforce, third-party workers and supply chain workers. The standard also requires the establishment, maintenance and improvement of worker-management relationships.

2.4.9 Standard 9 — Health, Safety And Security

101 Standard 9 outlines the promoters' and workers' responsibilities to safeguard the health, safety and security of workers and affected people and communities. It establishes the importance of putting in place a well-defined health and safety management system, endowed with appropriate resources and expertise. The standard further reinforces requirements to prevent gender-based violence and introduces impact and risk assessment requirements for new areas such as traffic and road safety, natural hazards (including those triggering technological disasters) and pandemics and epidemics.

102 The EIB expects promoters to protect and secure public and occupational health, safety and security and promote the dignity of the affected community in relation to project-related activities, with particular attention to vulnerable groups. The standard also requires promoters to adhere to the international norms and relevant human rights principles when using security services.

2.4.10 Standard 10 — Cultural Heritage

103 The EIB recognises the central role of cultural heritage as a source of valuable historical and scientific information, an asset for economic and social development and an integral part of people's cultural rights, identity and practices. Consistent with the applicable international conventions and declarations, this standard aims to identify and assess project risks and potential impacts affecting tangible and intangible cultural heritage, and covers the management and monitoring of related mitigation measures. It emphasizes the need for a chance find procedure outlining the actions to be taken if previously unknown cultural heritage is encountered.

2.4.11 Standard 11 — Intermediated Finance

104 This standard 11 sets out how the environmental, climate and social (ECS) impacts and risks arising from sub-projects shall be identified, assessed for their significance, managed and monitored, in line with applicable requirements and commensurate with the sub-project's size, nature, socioeconomic context, location and sector sensitivity to ECS impacts and risks.

105 The standard also set out the requirements and processes that financial intermediaries must have in place to assess, manage, monitor and report on the environmental, climate and social impacts and risks associated with the sub-projects it finances, as appropriate to the nature of intermediated financing.

2.4.12 Comparison between ADB and EIB

106 The EIB has an environmental assessment process very similar to ADB's with the following four assessment categories: the first three matching ADB's A to C categorization (Table 5).

Table 5: Comparison of ADB and EIB Deliverables

EIB Category	EIB EA Document	Description	ADB Category	ADB EA Document
A	Screening	Minimal or no adverse impacts – Low risk	C	Rapid Environmental Assessment (Screening)
B	Basic EIA	Environmental and social impacts can be readily identified and mitigation and/or remedial measures well known -medium risk	B	IEE
C	ESIA	Highly significant, adverse and/or long-term environmental and social impacts, - high risk	A	EIA
D	Decision Statement	Not meeting EIB core terms and therefore not eligible	-	Decision Statement

107 When the EIB is co-financing in partnership with other IFIs that have developed, and apply their own Environment and Social policies, such as with ADB, adequate implementation of those policies may prove enough to meet the EIB standards, pursuant to EIB's own assessment. This does not relinquish the EIB's own environmental and social due diligence duty and any gaps between that and other lenders shall be duly accounted for.

2.5 Administrative Procedure for Obtaining Location/ Environmental Clearance

2.5.1 Requirement for Initial Environment Examination (IEE) Report

108 All proposed projects in Orange category have to conduct IEE which helps in understanding the potential extant of environment changes, and in finding ways to mitigate by considering the available information, of past experience or standard operating practices. The steps for conducting IEE are:

- Collection of baseline information in respect of the project and the environmental setting of the project and its site.
- Setting of boundaries of an IEE by identifying the -significant issues.
- Impact assessment suggesting mitigation measures, Environmental Management Plan (EMP) or alternative sites or other project modifications.
- In the event IEE of the project or industry reveals that further investigation is to be carried out then the sponsors will have to carry out a detailed EIA.

109 After completion of IEE Report the project proponent should apply to the DOE in the prescribed format for site/ environmental clearance. The application for environmental clearance for the project classified in the Orange Category should be accompanied by the following documents:

- Feasibility Study Report of the project
- IEE report
- An NOC (No Objection Certificate) from the local authorities concerned

- Pollution minimization plan including emergency plan for mitigation of adverse environmental impacts
- Outline of relocation plans (where applicable)
- Other information as deemed necessary

110 The project in concern will take place in Dhaka district and this IEE report along with other required documents should be submitted in the DoE Dhaka office.

111 DoE prefers the proponent to do public consultation during the assessment and puts condition for it while providing site clearance or during the approval of the EIA TORs. Steps to be followed for obtaining Environmental Clearance Certificate (ECC) in connection under Orange Category from DoE are outlined in **Figure 1**. The **Figure 1** shows the process of obtaining the environmental clearance for 'Orange' category projects (such as this Project) as per the changes made by the DoE in December 2017.

112 It is also mentioned in the Environment Conservation Rules that the Director General of the Department of Environment can issue environmental clearance directly without issuing any site clearance to any industry or project if he (the Director General) finds appropriate reason for doing so. As the proposed EMO building construction project falls under Orange category, all necessary requirement mentioned above will be adopted for the project.

113 For Green and Yellow Category Projects the gestation period for granting Environmental Clearance has been fixed at within 15 days; For Orange and Red Category Projects at first Location Clearance and thereafter Environmental Clearance will be granted.

114 Under the Environmental Conservation Act (1995) and Rules (2023), the project will be required to obtain a site clearance as well as an environmental clearance. The procedure for obtaining environmental clearance is given in the following **Figure 1** and **Figure 2**

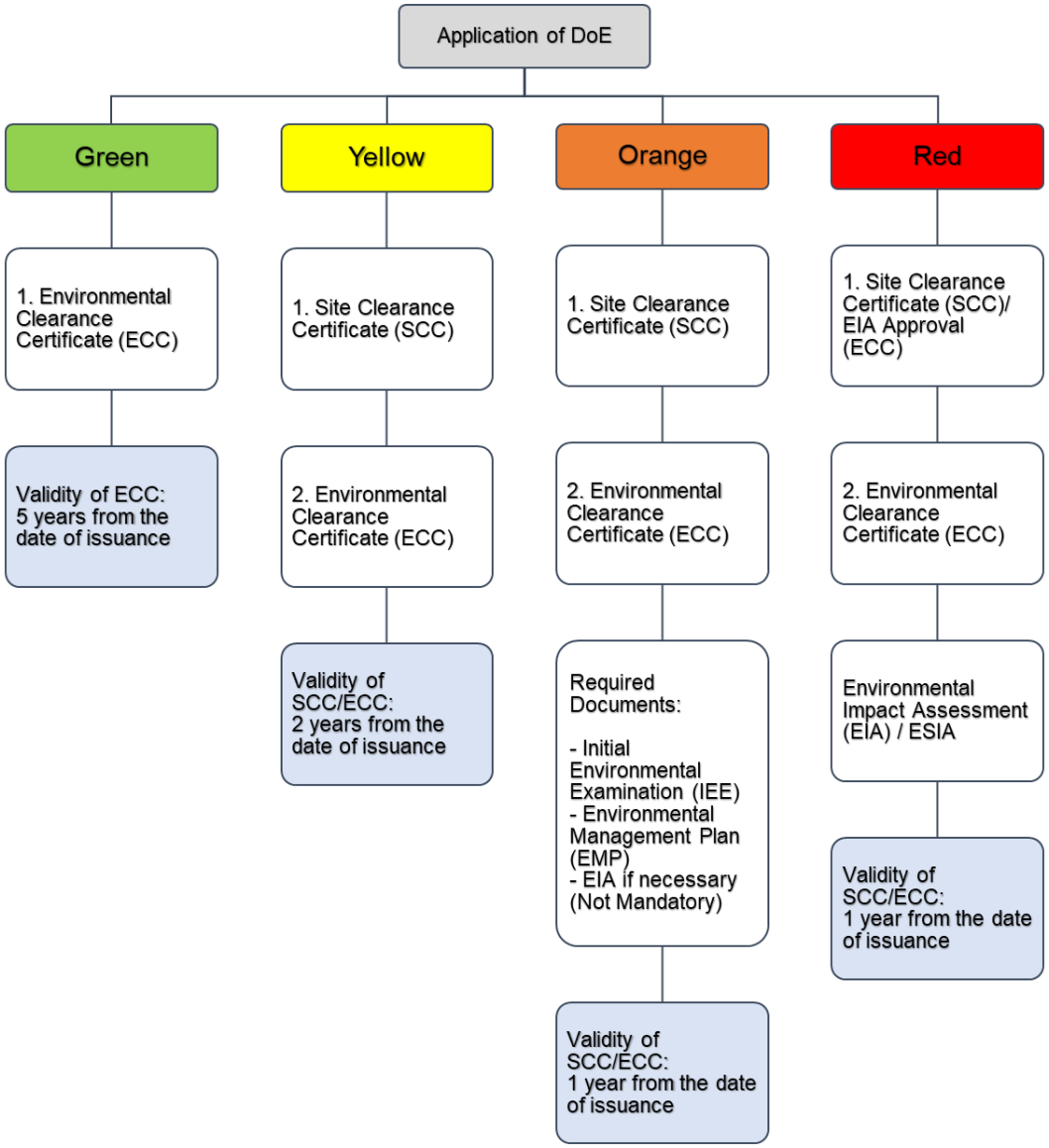


Figure 1: Steps Involved in Environmental Clearance following DoE Guideline

NOC = No Objection Certificate, usually obtained from local government.
Note: These requirements vary from those of the DoE (1997) in requiring EMPs for proposed, as well as current projects.

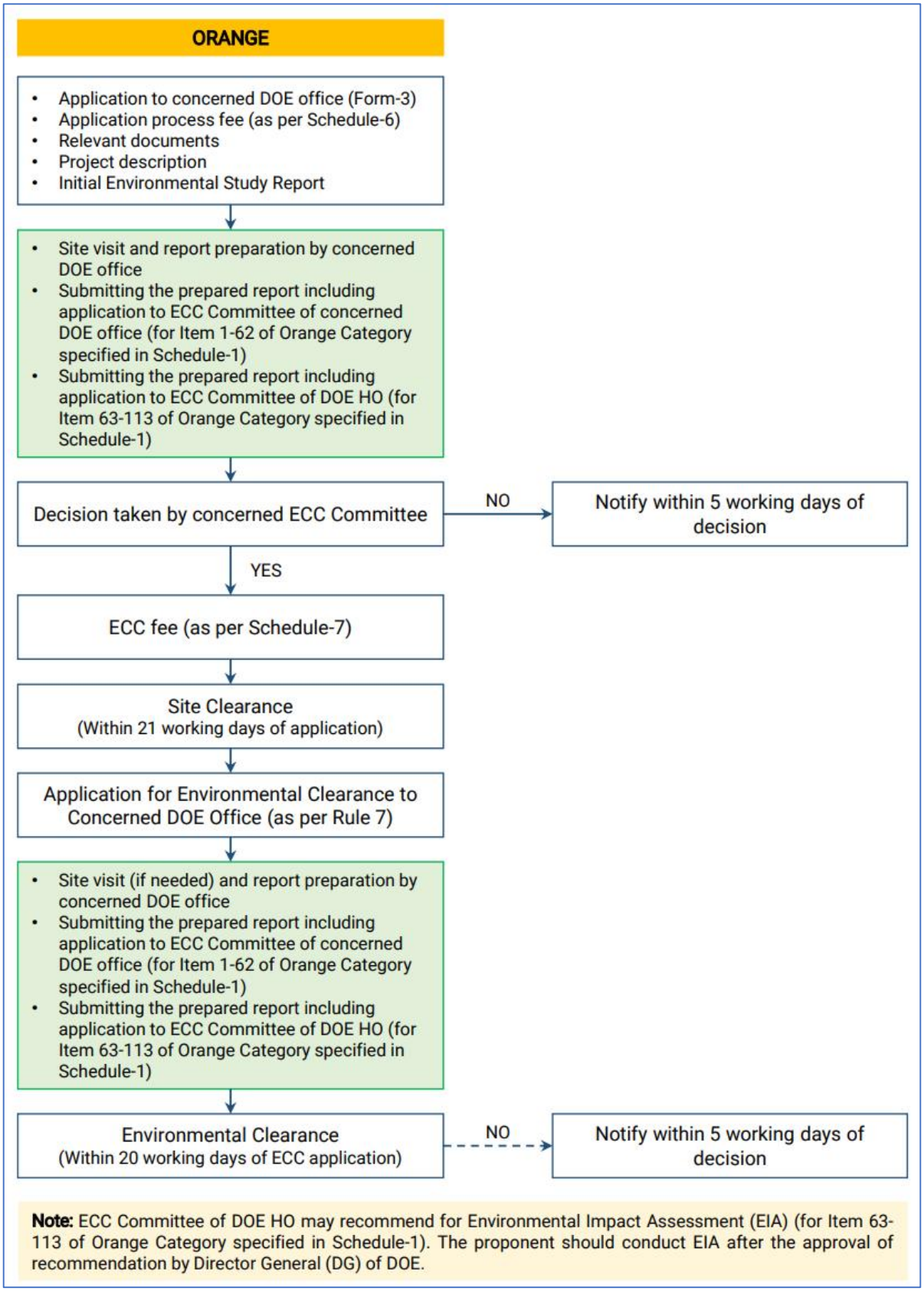


Figure 2: Process of Obtaining Environmental Clearance for Orange Category

2.5.2 Process of Receiving the NOC

115 The No Objection Certificate (NOC) is a mandatory requirement to obtain environmental

clearance from the Department of Environment. Usually, DoE indicates the name of the agency/ies from where NOC would be required. DoE requires that proponent obtain NOCs from affected agencies or local/ regional administrations, which essentially sign off on the project. It is only after these NOCs are provided that DoE gives the Environmental Clearance certificate, or green light to proceed to construction.

116 Since obtaining these certificates can take more than a month from few agencies, speeding up the DoE notification by securing NOCs in advance of DoE's request can speed up the process especially since, based on past experience. The process to obtain these can begin as soon as the draft environmental assessment has been completed.

117 A NOC letter basically contains description of the project including location, justification to obtain NOC from that agency, and proposed measures under the project. In this Project, BR will submit the NOC letter to the respective agencies. This is a labour and time intensive process and can take more than a month, and is largely contingent on regular and persistent follow up. Therefore, the NOC steps are:

118 The steps are:

- BR will sends letters to head of the agency;
- The requesting agency then evaluate the NOC request that sometime require field investigation for verification;
- BR will pursue this and generally requires constant follow up to get a result; and
- Once the NOCs are received-signed, they are forwarded by BR to DOE.

3 Project Description

3.1 Background

119 Government of Bangladesh has now undertaken many development projects in the transport section. Railways are a major mode of transport in Bangladesh so priority is given to the railway industry. BR requires the Construction of a 4-story Engineer's Main Office (EMO) structure with a 16-story foundation and three basements to ensure smooth continuation of the railway project. According to the requirement, the Engineer's Main Office building will be constructed along Phoenix Road in Dhaka on available BR land near Rail Bhaban.

120 Modern amenities like as environmentally friendly solar panel systems, rainwater harvesting systems, better station facilities, and accessibility for those with physical disabilities will be included in the construction of EMO building. A conceptual design for the EMO building has been developed for foundations, structural systems, utility areas and mechanical/electrical services concepts and will be further developed by the Contractor.

3.2 Project Proponent

121 The proponent of the proposed structure is the Government of Bangladesh. Funds provided by ADB and this building will be used as the head office of the Railway Engineer.

3.3 Description of the Project

122 Engineer's Main Office building will be constructed along Phoenix Road in Dhaka on available BR land near Rail Bhaban. The Contractor shall do all things necessary to design and construct this building including foundations, with basement ground floor parking, and offices on the other floors. The design will incorporate current design thinking in office design including using design concepts that support environmentally sustainable design.

123 The construction activities of the EMO are briefly described below that contractor will follow.

i. Demolish all the existing structures, and dispose of the materials arising in an approved disposal area;
ii. Undertake all necessary investigations to design and construct the building, including, but not limited to, the following:
    a. Subsoil geotechnical investigations;
    b. Topographic survey of the building site;
    c. Water quality;
    d. Environmental safeguards compliance; and
    e. Identify, locate and isolate all existing over ground and underground utilities.
iii. Prepare foundation design;
iv. Prepare structural design, allocating the basement and ground floor for covered parking;
v. Prepare utility plans for all necessary utilities,
vi. Prepare office layouts complete with all necessary utility infrastructure;
vii. Obtain all necessary permits;
viii. Obtain permits for and arrange connections to all necessary utilities;
ix. Construct the basement, ground floor, first, second, and third floors with adequate provision for

future construction of remaining floors; and

x. Fully furnish the third floor offices according to the architectural plan approved by the Engineer.

124 To make the necessary step into an environmental sustainable future, BR want to have the building designed to be sensitive to environmentally sensitive design principles. BR is committed to protecting the environment throughout the construction of the Project. When carrying out construction the contractor must minimise the impact on the environment. The building design will include as a minimum the following environmentally sustainability features:

- LED energy efficient lighting Low energy light fittings;
- Solar: Solar for the use of hot water and supplementary electric power;
- rain water harvesting and re-use;
- use of sustainable materials, including recycled materials;
- High performance external glasing;
- Orientation;
- High quality Insulation;
- Use of natural light;
- Natural ventilation; and
- Low water flow fittings.

3.3.1 Project Location

125 The proposed project will be located at the heart of Dhaka city at Fulbaria, Dhaka. Total area is approximately 8200 sqm. The EMO building will be 4-story structure with a 16-story foundation and three basements. The **Figure 3** shows the location of the proposed project.

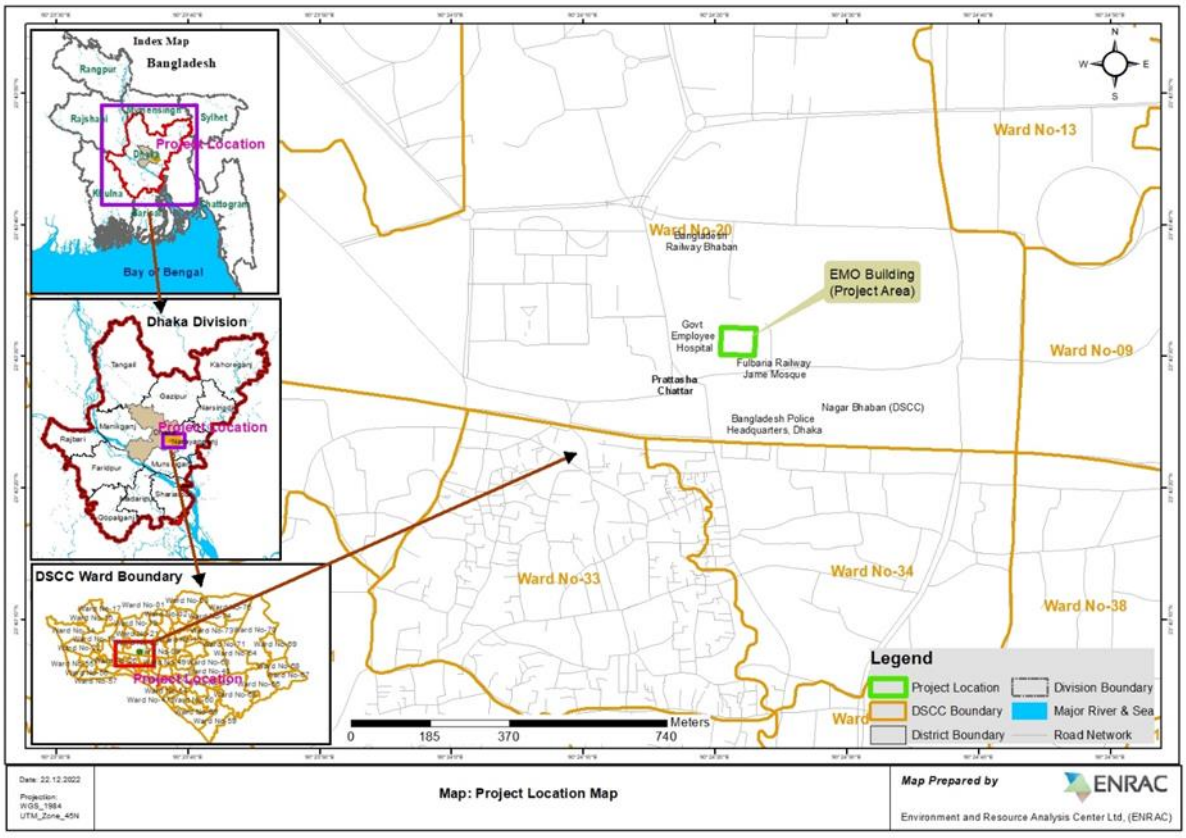


Figure 3: Location of the proposed project

3.3.2 Proposed Works

126 The following is a list of significant works that will be carried under this project;

- Excavation to achieve required depth
- De-watering during the foundation works
- Mixing and application of concrete
- Storage and handling of cement and other raw materials
- Use of heavy machinery and equipment for construction
- Plumbing
- Plastering, painting and finishing

3.3.3 Details Activities and Operational Layout Plan

127 Rainwater harvesting: Rainwater harvesting will around 55,000 Liter which will be use for Gardening & Car Wash.

128 Underground floor construction: Shore piles with bracing will be used as per structure design to protect underground floor construction

129 Waste management plan: Proper waste management plan will be followed. During the construction and operation stage for sewage septic tank will be constructed. A building sewerage line will be constructed to connect the septic tank. Where the solid waste is settled. Then the overflow water will go to the soak well. Where water is soaked. The rest of the water after socked will discharge to the nearest WASA Sewerage drain. Separate dustbin for separate types of waste will be used.

130 Fire safety system of the building: For fire protection 1250 GPM fire pump will be used. Fire sprinkler system will be consider at basements 1, 2 & 3 and all 16 floors. 1250 GPM pump for 38 minutes (BNBC Chapter-4 Table 4.4.1) needs a 47500-us gallon capacity tank. A fire Hydrant system, Fire Detection System, and Passive Fire Protection system will be available in this building.

131 Amount of water per day: In the operation stage, the water requirement per day is 1, 44,000 liters. Total 300 people will work per floor. BNBC will be followed. As per BNBC Chpter-5 Table-8.5.1(d), Occupancy Group E1 offices for restricted facilities capacity water requirement 30L/day. So, total water requirement is (300X16X30) =1, 44,000 Liters.

132 The overall typical layout plan for the proposed EMO Building is as shown in Figure 4 to Figure 11.

3.3.3.1 Access Road

133 There is currently an access road in place that connects the main Fulbaria road to the EMO Building area. The road is 5 meters wide and spans a length of 60 meters. In order to improve its quality and durability, plans have been made to upgrade the road by implementing RCC (Reinforced Concrete Cement) works. This upgrade will involve the construction of a solid and sturdy road surface using reinforced concrete.

134 During the construction period, the road will be exclusively used by vehicles involved in the construction project, meaning that access will be restricted to authorized construction vehicles to facilitate the construction process and ensure the safety of workers and materials.

135 Once the construction work is completed, the upgraded road will continue to serve as the main access route to the EMO Building. The RCC works will enhance the road's structural integrity, making it capable of accommodating regular vehicular traffic and ensuring its longevity. The upgraded road will contribute to improved accessibility, smooth traffic flow, and enhanced convenience for all those utilizing the EMO Building facilities.

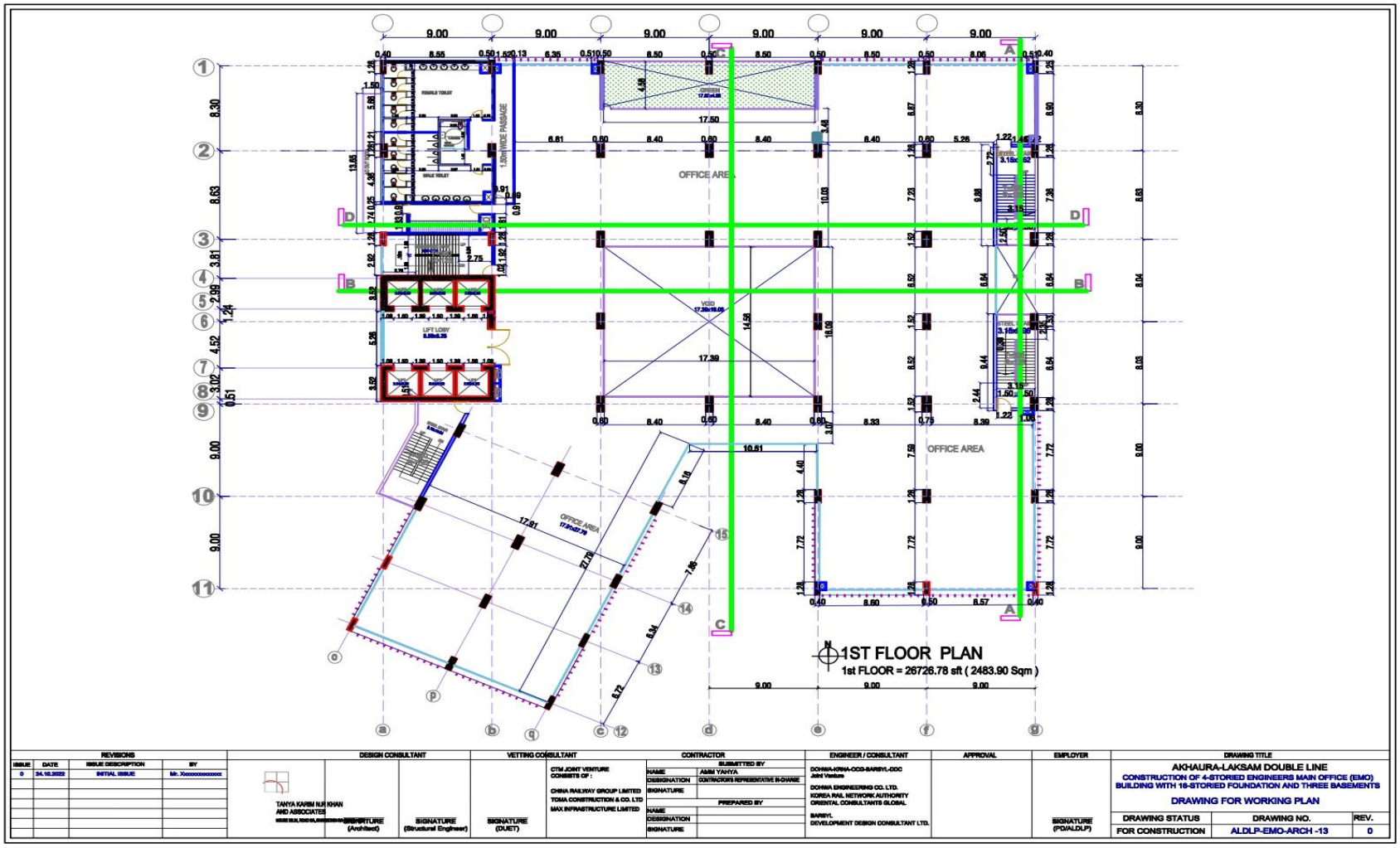


Figure 4: Layout Plan of Proposed EMO Building (1st Floor)

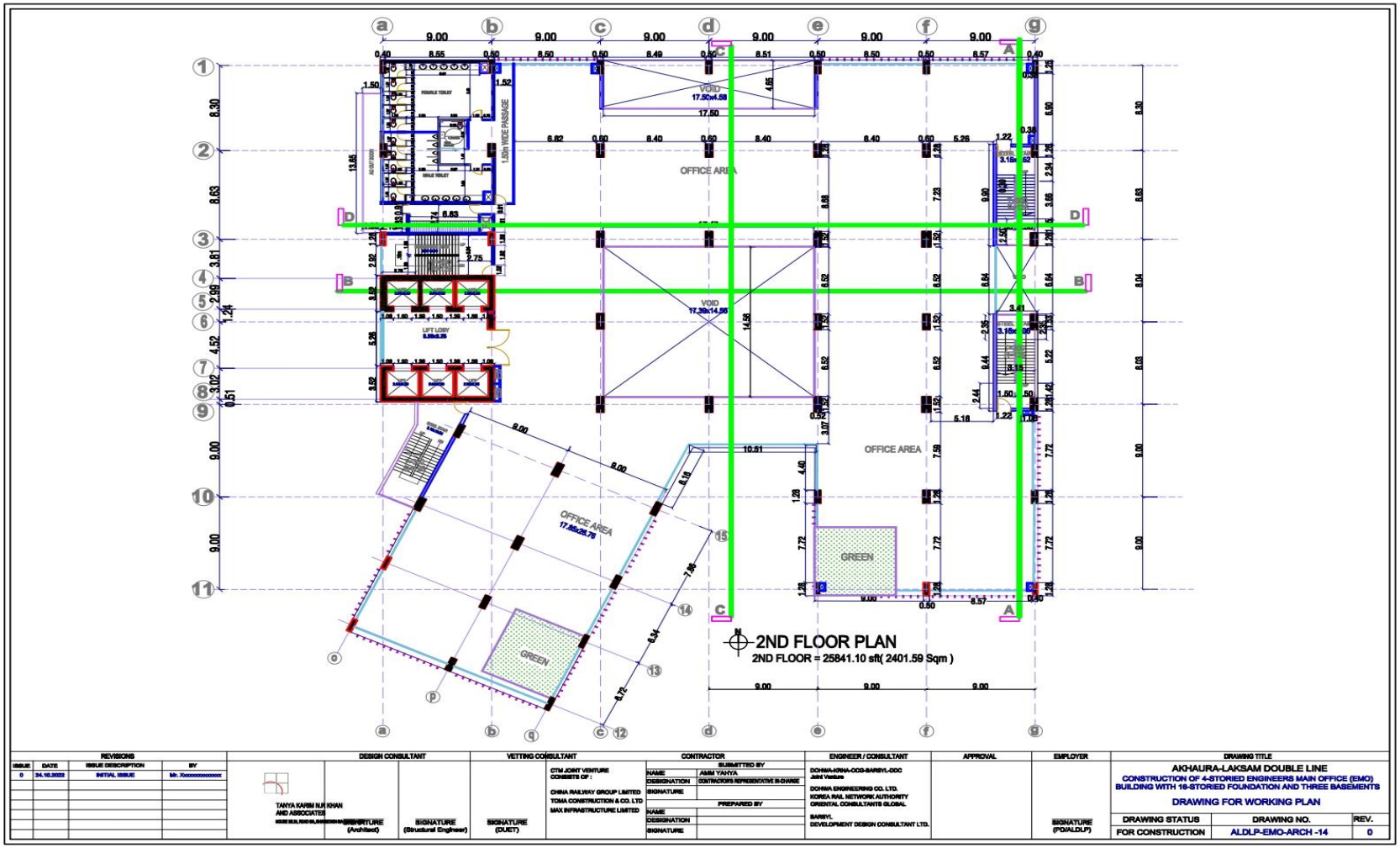


Figure 5: Layout Plan of Proposed EMO Building (2nd Floor)

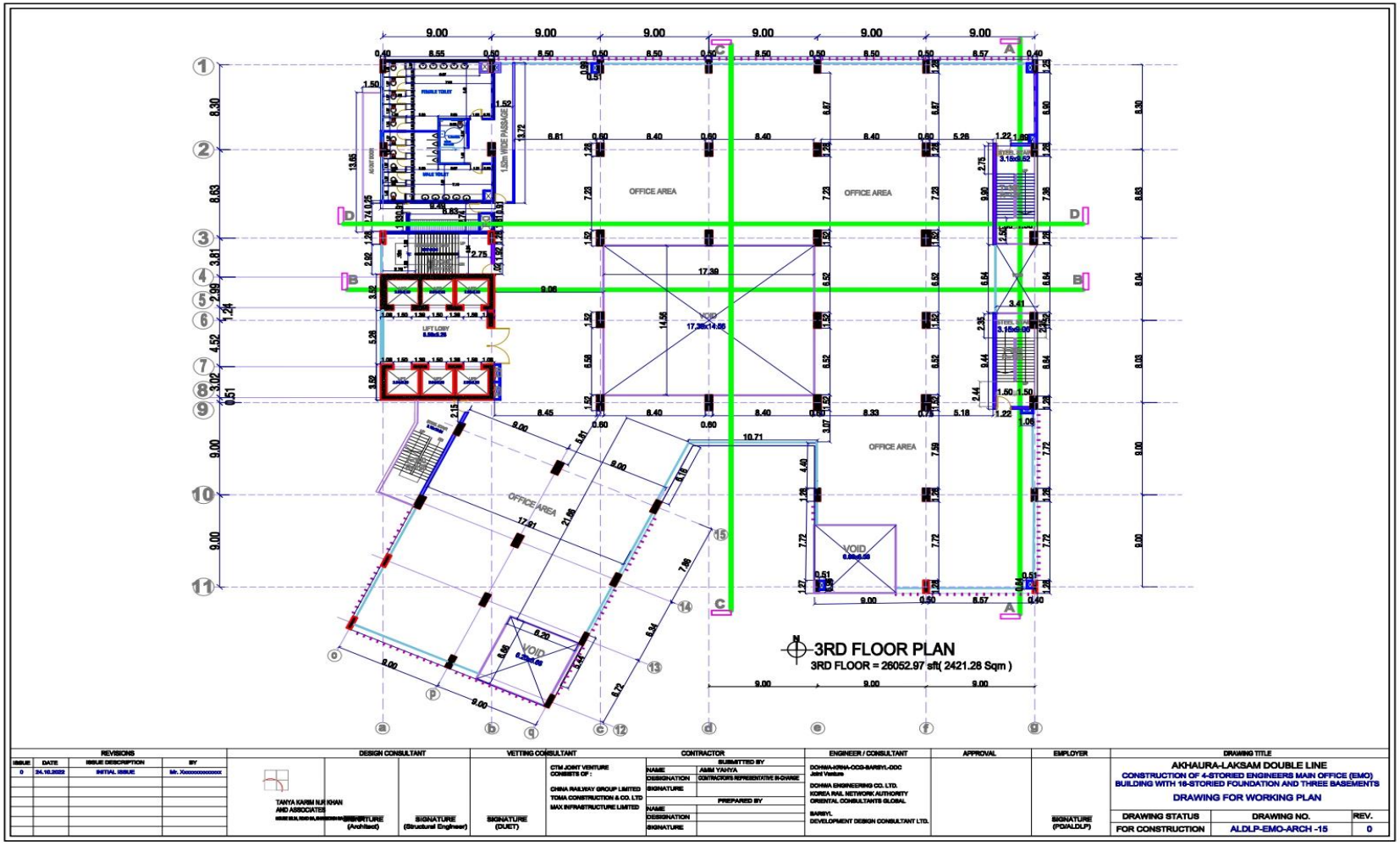


Figure 6: Layout Plan of Proposed EMO Building (3rd Floor)

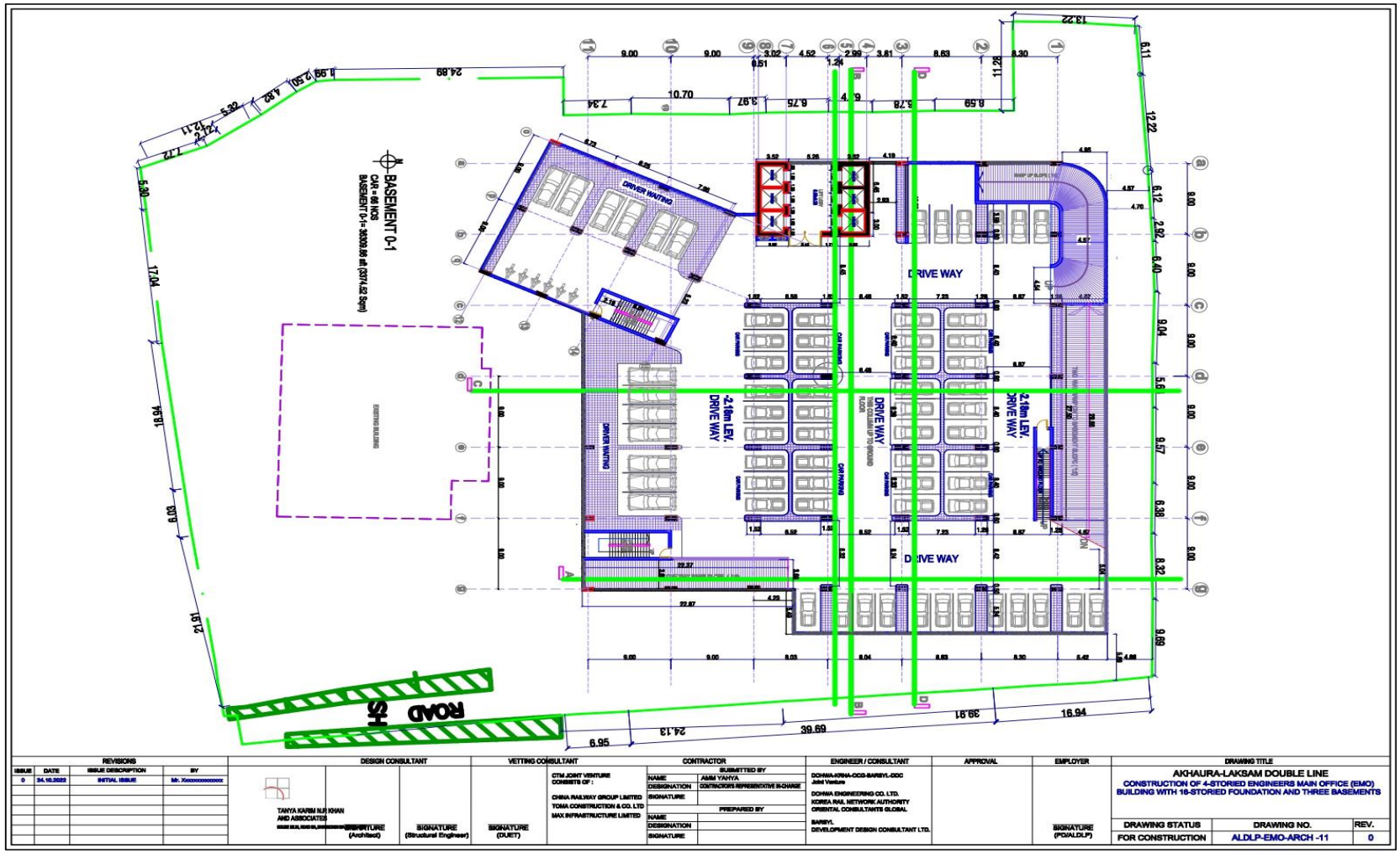


Figure 7: Layout Plan of Proposed EMO Building (Basement-1)

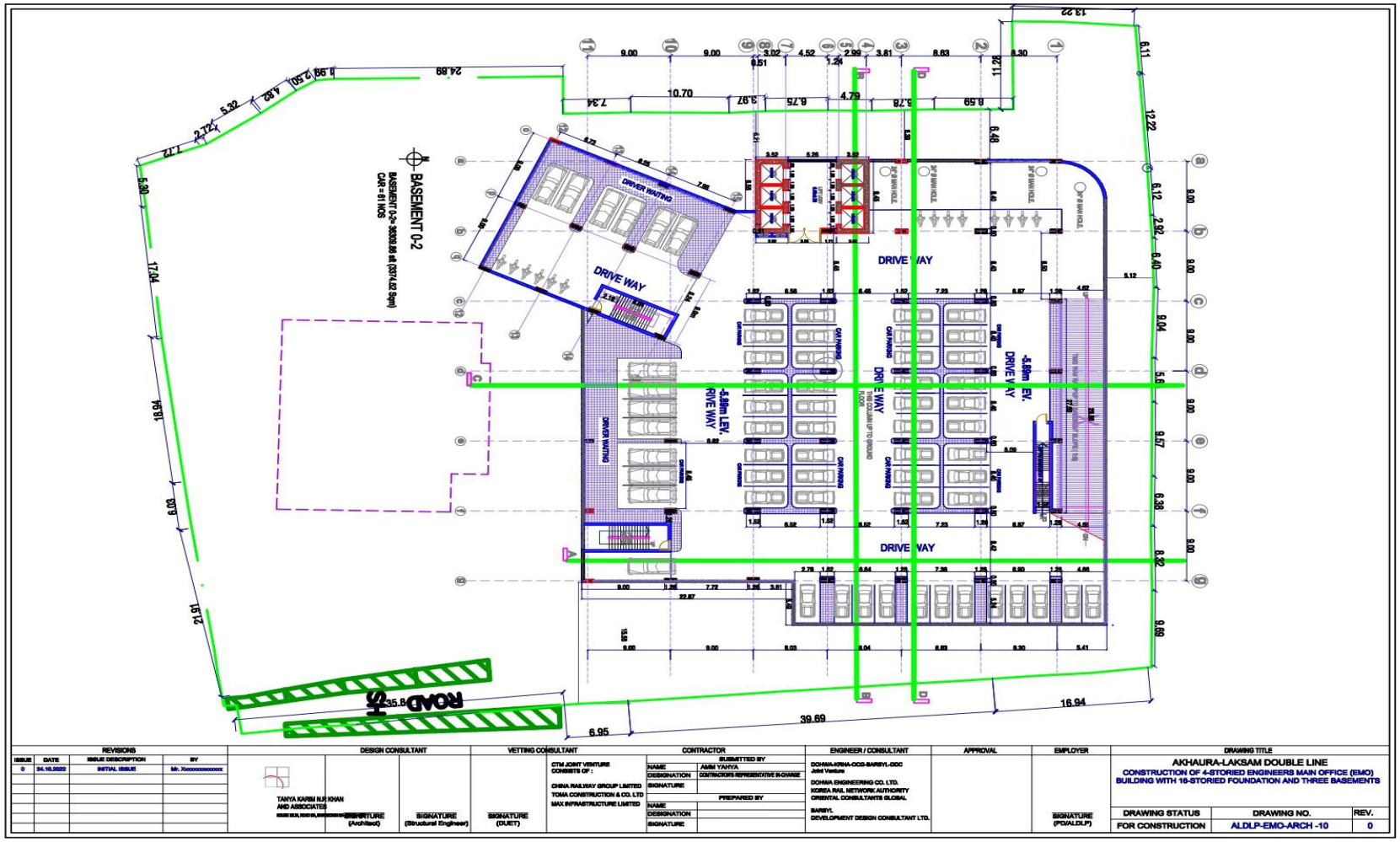


Figure 8: Layout Plan of Proposed EMO Building (Basement-2)

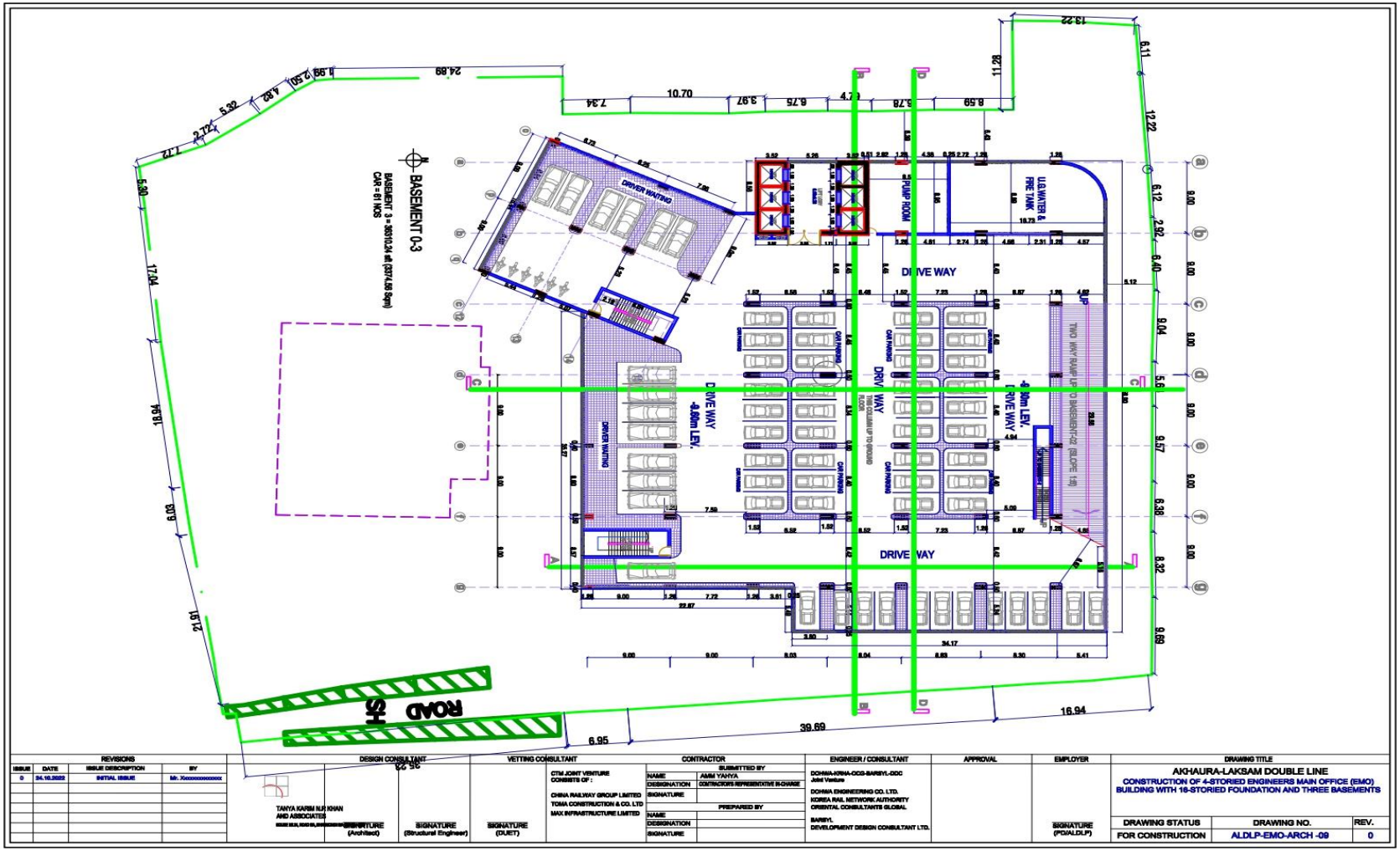


Figure 9: Layout Plan of Proposed EMO Building (Basement-3)

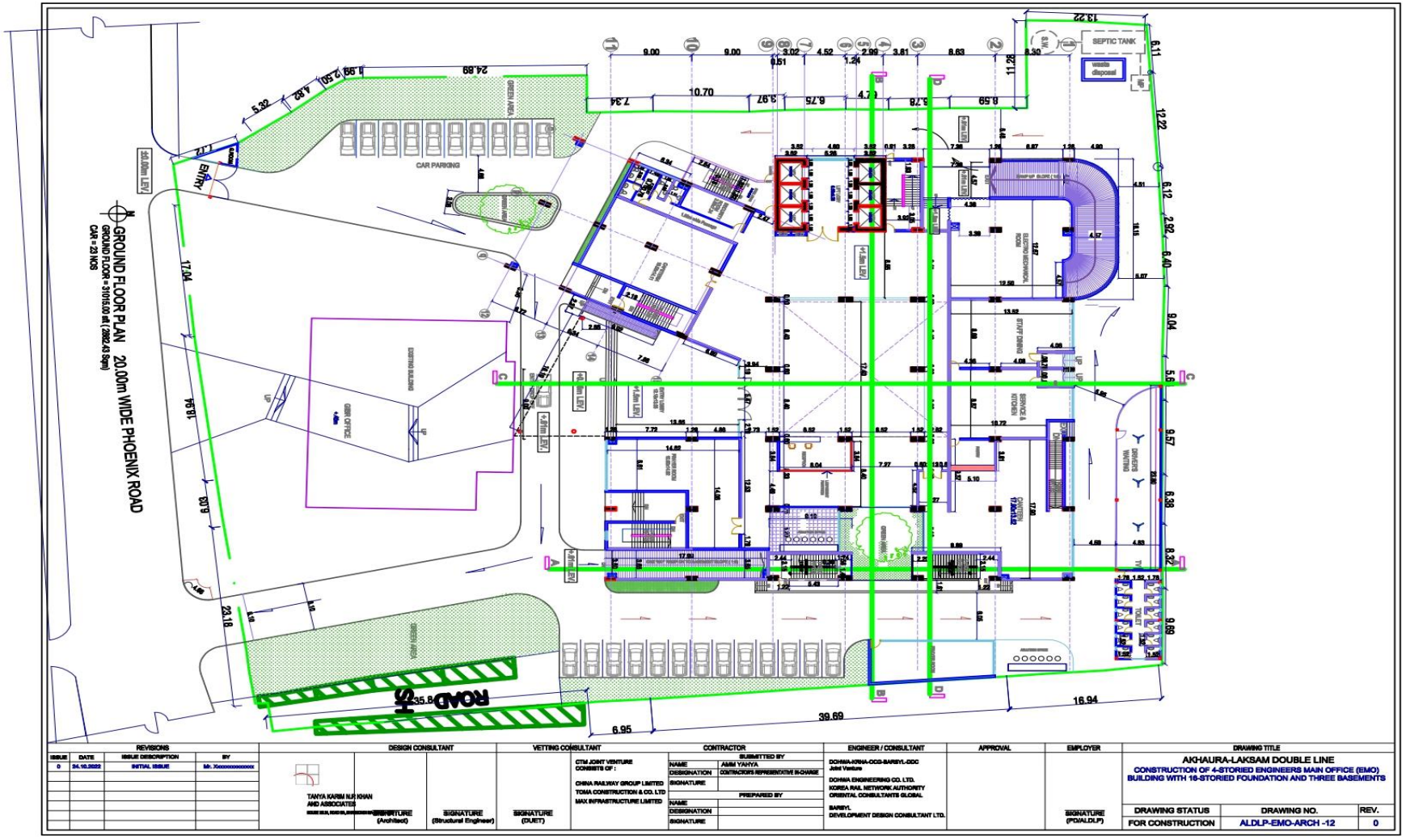


Figure 10: Layout Plan of Proposed EMO Building (Ground floor Plan)

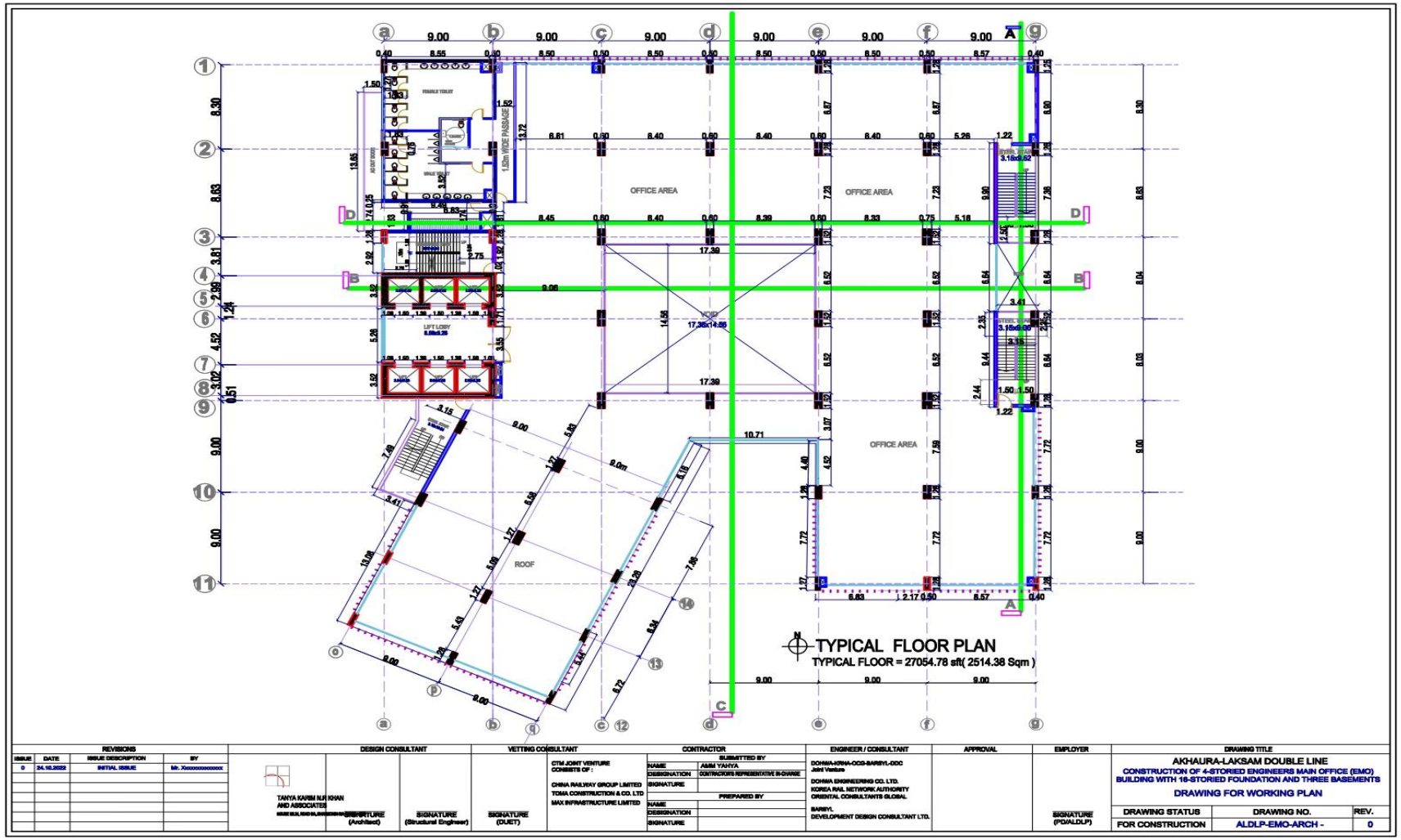


Figure 11: Layout Plan of Proposed EMO Building (Typical Floor Plan)

3.3.4 Construction Period and Equipment

136 The proposed EMO Building is expected to be constructed over a period of 1 year. Most materials for major construction works will be sourced from the country. List of Major Construction equipment are:

- Backhoe
- Pay loader
- Excavator
- Dump Truck
- Crawler Cranes
- Piling Rig
- Long Boom Excavator
- Generator
- Tower Crane
- Concrete Mixer Trucks
- Core Cutter Machine
- De-Watering Pump
- Dozer
- Drilling Machine
- Hammer Drill
- Hand Drill
- Hand Saw
- Hand Vibrator
- Head Pan
- Jack Hammer
- Mixer Machine
- Plate Vibrator
- Road Roller
- Welding Machine Set

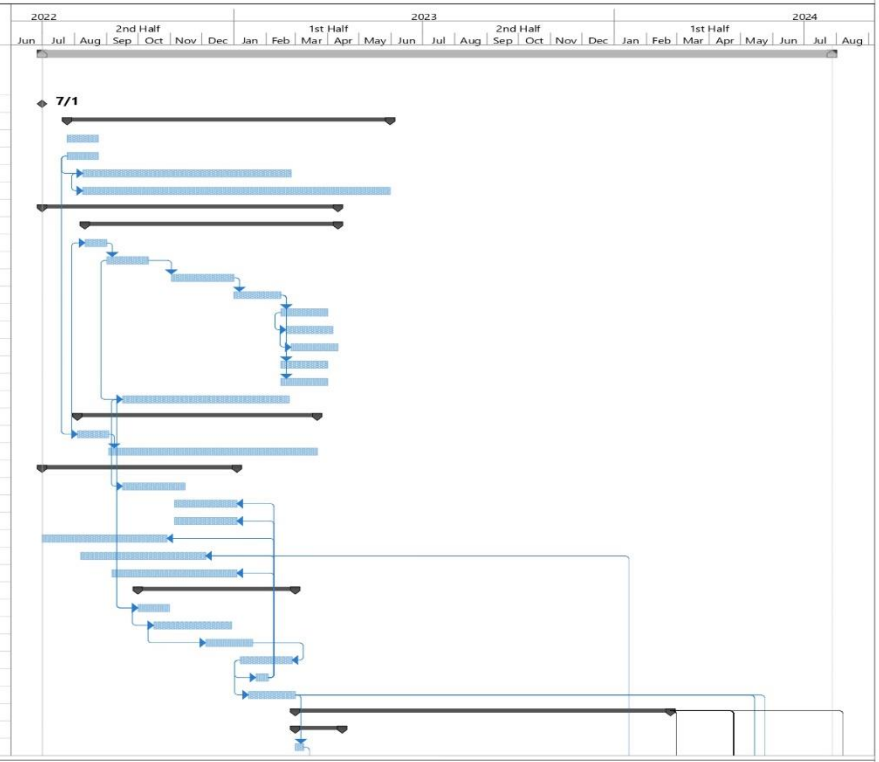
3.3.5 Project Cost

Sl. No.	Details	Total Cost (Taka)
01	CONSTRUCTION OF 16-STORIED ENGINEERS MAIN OFFICE (EMO) BUILDING UPTO 3RD FLOOR WITH 16-STORIED FOUNDATION AND THREE BASEMENTS	5,000,000,000 (Five Billion BDT)

3.3.6 Work schedule

CONSTRUCTION OF 16-STORIED ENGINEERS MAIN OFFICE (EMO) BUILDING UPTO 3RD FLOOR WITH 16-STORIED FOUNDATION AND THREE BASEMENTS UNDER AKHAURA-LAKSAM DOUBLE LINE PROJECT

ID	Task Name	Duration	Start	Finish
0	**CONSTRUCTION OF 16-STORIED ENGINEERS MAIN OFFICE (EMO) BUILDING UPTO 3RD FLOOR WITH 16-STORIED FOUNDATION AND THREE BASEMENTS UNDER AKHAURA-LAKSAM DOUBLE LINE PROJECT**	**758 days**	**Jul 1 '22**	**Jul 27 '24**
1	Project Commencement Date	0 days	Jul 1 '22	Jul 1 '22
2	**General Requirements**	**310 days**	**Jul 25 '22**	**May 30 '23**
3	Handing-over of site	30 days	Jul 25 '22	Aug 23 '22
4	Initial Mobilization	30 days	Jul 25 '22	Aug 23 '22
5	Mobilization of Equipment	200 days	Aug 9 '22	Feb 24 '23
6	Mobilization of Materials	295 days	Aug 9 '22	May 30 '23
7	**Pre-Construction Works**	**284 days**	**Jul 1 '22**	**Apr 10 '23**
8	**Design, Drawings & Approvals**	**243 days**	**Aug 11 '22**	**Apr 10 '23**
9	Approval of Conceptual Design (16-Storied with 03-Basements)	21 days	Aug 11 '22	Aug 31 '22
10	Design of Shore Piles	40 days	Sep 1 '22	Oct 10 '22
11	Approval of Architectural Layout Plan	60 days	Nov 2 '22	Dec 31 '22
12	Approval of Structural Design	45 days	Jan 1 '23	Feb 14 '23
13	Approval of Mechanical Design	45 days	Feb 15 '23	Mar 31 '23
14	Approval of Electrical Design	45 days	Feb 20 '23	Apr 5 '23
15	Approval of Plumbing & Sanitation Design	45 days	Feb 25 '23	Apr 10 '23
16	Approval of Fire Detection & Protection Design	45 days	Feb 15 '23	Mar 31 '23
17	Approval of HVAC Design	45 days	Feb 15 '23	Mar 31 '23
18	Approval of Materials	160 days	Sep 16 '22	Feb 22 '23
19	**Survey and Setting Out**	**230 days**	**Aug 4 '22**	**Mar 21 '23**
20	Topographic Survey & Layout Finalization	30 days	Aug 4 '22	Sep 2 '22
21	Survey and Setting Out	200 days	Sep 3 '22	Mar 21 '23
22	**Procurement**	**187 days**	**Jul 1 '22**	**Jan 3 '23**
23	Civil Construction Materials - Structures	60 days	Sep 16 '22	Nov 14 '22
24	Civil Materials - Finishes	60 days	Nov 5 '22	Jan 3 '23
25	Materials - Sanitary & Plumbing Works	60 days	Nov 5 '22	Jan 3 '23
26	Sub-Station & Electrical Works	120 days	Jul 1 '22	Oct 28 '22
27	Fire Fighting Systems	120 days	Aug 7 '22	Dec 4 '22
28	Lifts, HVAC, etc.	120 days	Sep 6 '22	Jan 3 '23
29	**Shore Piling**	**151 days**	**Oct 1 '22**	**Feb 28 '23**
30	Mobilization of Execution Team	30 days	Oct 1 '22	Oct 30 '22
31	Rebar Fabrication for Sore Pile	75 days	Oct 16 '22	Dec 29 '22
32	Shore Piling Works	45 days	Dec 5 '22	Jan 18 '23
33	Excavation for Foundation	50 days	Jan 7 '23	Feb 25 '23
34	Bracing & Tie-beam Construction	12 days	Jan 22 '23	Feb 2 '23
35	Removal of Excavated Materials	45 days	Jan 15 '23	Feb 28 '23
36	**Structural Construction Works**	**360 days**	**Mar 1 '23**	**Feb 23 '24**
37	**Civil Works (Foundation Construction)**	**45 days**	**Mar 1 '23**	**Apr 14 '23**
38	Blinding Concrete Works	8 days	Mar 1 '23	Mar 8 '23



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Task Split Milestone Summary Project Summary Progress

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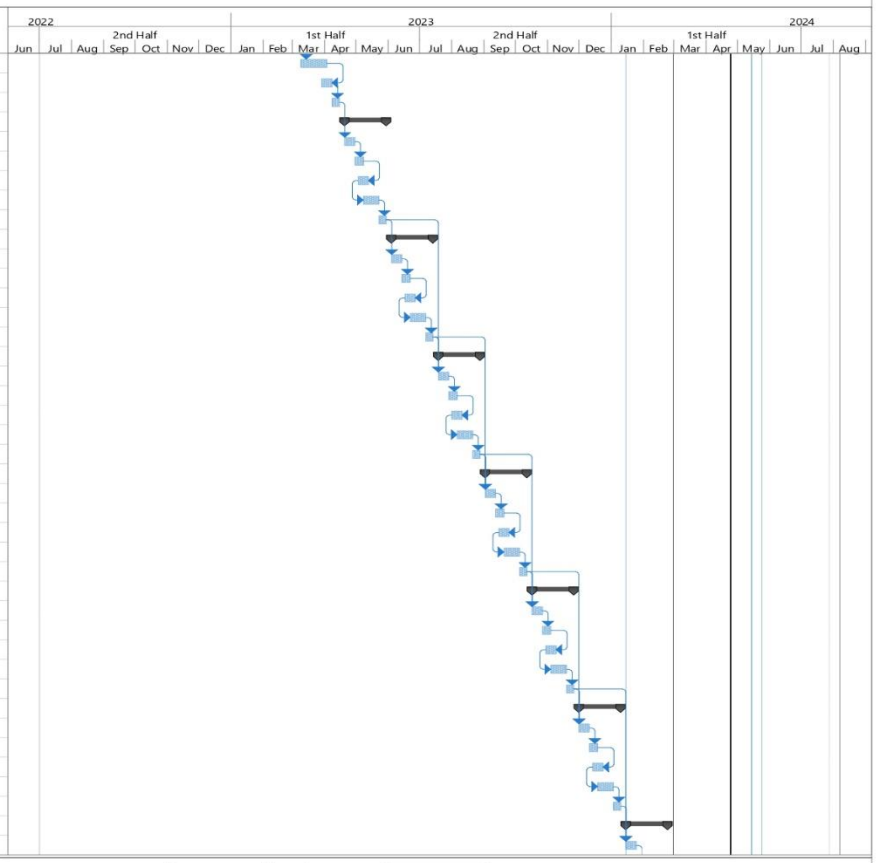
CONSTRUCTION OF 16-STORIED ENGINEERS MAIN OFFICE (EMO) BUILDING UPTO 3RD FLOOR WITH 16-STORIED FOUNDATION AND THREE BASEMENTS UNDER AKHAURA-LAKSAM DOUBLE LINE PROJECT

ID	Task Name	Duration	Start	Finish
39	Rebar Fabrication for Raft Foundation	25 days	Mar 9 '23	Apr 2 '23
40	Formwork for Raft Foundation	10 days	Mar 29 '23	Apr 7 '23
41	Construction of Raft Foundation	7 days	Apr 8 '23	Apr 14 '23
42	**Civil Works (Basement-01 Construction)**	**40 days**	**Apr 20 '23**	**May 29 '23**
43	Rebar Fabrication & Formwork for Columns	10 days	Apr 20 '23	Apr 29 '23
44	Construction of Columns	8 days	Apr 30 '23	May 7 '23
45	Formwork for Roof Slab	10 days	May 3 '23	May 12 '23
46	Rebar Fabrication for Roof Slab	15 days	May 8 '23	May 22 '23
47	Construction of Raft Foundation	7 days	May 23 '23	May 29 '23
48	**Civil Works (Basement-02 Construction)**	**40 days**	**Jun 4 '23**	**Jul 13 '23**
49	Rebar Fabrication & Formwork for Columns	10 days	Jun 4 '23	Jun 13 '23
50	Construction of Columns	8 days	Jun 14 '23	Jun 21 '23
51	Formwork for Roof Slab	10 days	Jun 17 '23	Jun 26 '23
52	Rebar Fabrication for Roof Slab	15 days	Jun 22 '23	Jul 6 '23
53	Construction of Raft Foundation	7 days	Jul 7 '23	Jul 13 '23
54	**Civil Works (Basement-03 Construction)**	**40 days**	**Jul 19 '23**	**Aug 27 '23**
55	Rebar Fabrication & Formwork for Columns	10 days	Jul 19 '23	Jul 28 '23
56	Construction of Columns	8 days	Jul 29 '23	Aug 5 '23
57	Formwork for Roof Slab	10 days	Aug 1 '23	Aug 10 '23
58	Rebar Fabrication for Roof Slab	15 days	Aug 6 '23	Aug 20 '23
59	Construction of Raft Foundation	7 days	Aug 21 '23	Aug 27 '23
60	**Civil Works (Ground Floor Construction)**	**40 days**	**Sep 2 '23**	**Oct 11 '23**
61	Rebar Fabrication & Formwork for Columns	10 days	Sep 2 '23	Sep 11 '23
62	Construction of Columns	8 days	Sep 12 '23	Sep 19 '23
63	Formwork for Roof Slab	10 days	Sep 15 '23	Sep 24 '23
64	Rebar Fabrication for Roof Slab	15 days	Sep 20 '23	Oct 4 '23
65	Construction of Raft Foundation	7 days	Oct 5 '23	Oct 11 '23
66	**Civil Works (First Floor Construction)**	**40 days**	**Oct 17 '23**	**Nov 25 '23**
67	Rebar Fabrication & Formwork for Columns	10 days	Oct 17 '23	Oct 26 '23
68	Construction of Columns	8 days	Oct 27 '23	Nov 3 '23
69	Formwork for Roof Slab	10 days	Oct 30 '23	Nov 8 '23
70	Rebar Fabrication for Roof Slab	15 days	Nov 4 '23	Nov 18 '23
71	Construction of Raft Foundation	7 days	Nov 19 '23	Nov 25 '23
72	**Civil Works (Second Floor Construction)**	**40 days**	**Dec 1 '23**	**Jan 9 '24**
73	Rebar Fabrication & Formwork for Columns	10 days	Dec 1 '23	Dec 10 '23
74	Construction of Columns	8 days	Dec 11 '23	Dec 18 '23
75	Formwork for Roof Slab	10 days	Dec 14 '23	Dec 23 '23
76	Rebar Fabrication for Roof Slab	15 days	Dec 19 '23	Jan 2 '24
77	Construction of Raft Foundation	7 days	Jan 3 '24	Jan 9 '24
78	**Civil Works (Third Floor Construction)**	**40 days**	**Jan 15 '24**	**Feb 23 '24**
79	Rebar Fabrication & Formwork for Columns	10 days	Jan 15 '24	Jan 24 '24



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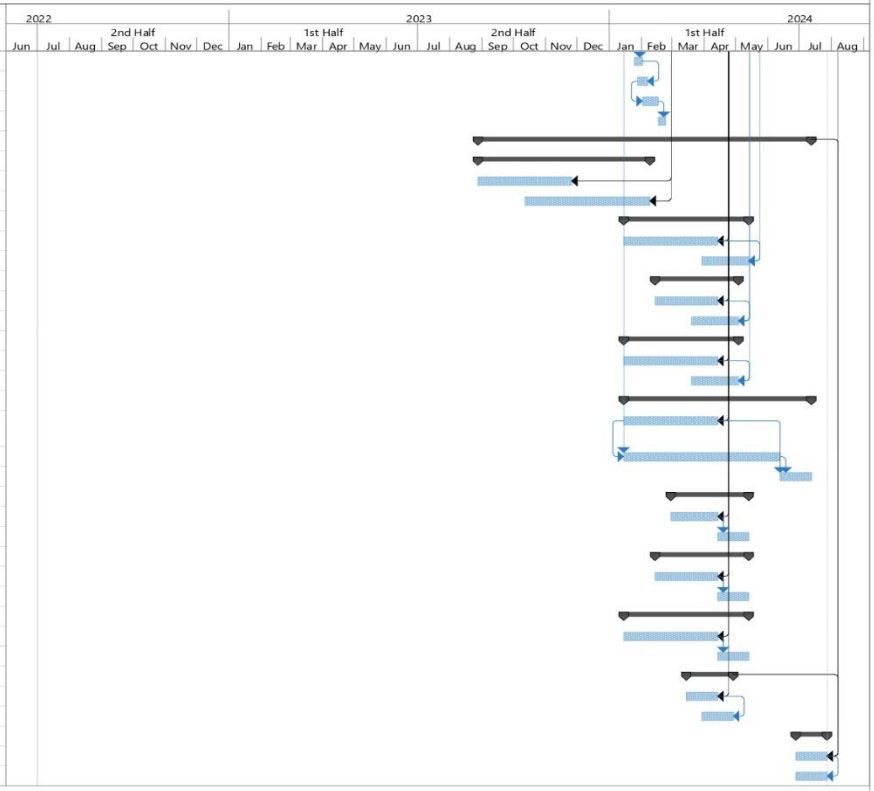
CONSTRUCTION OF 16-STORIED ENGINEERS MAIN OFFICE (EMO) BUILDING UPTO 3RD FLOOR WITH 16-STORIED FOUNDATION AND THREE BASEMENTS UNDER AKHAURA-LAKSAM DOUBLE LINE PROJECT

ID	Task Name	Duration	Start	Finish
80	Construction of Columns	8 days	Jan 25 '24	Feb 1 '24
81	Formwork for Roof Slab	10 days	Jan 28 '24	Feb 6 '24
82	Rebar Fabrication for Roof Slab	15 days	Feb 2 '24	Feb 16 '24
83	Construction of Raft Foundation	7 days	Feb 17 '24	Feb 23 '24
84	**MEP Works**	**320 days**	**Aug 28 '23**	**Jul 12 '24**
85	**Import of Materials & Equipment**	**165 days**	**Aug 28 '23**	**Feb 8 '24**
86	Selection & Approval of Materials & Equipment	90 days	Aug 28 '23	Nov 25 '23
87	Equipment Reached at Site	120 days	Oct 12 '23	Feb 8 '24
88	**Plumbing & Sanitary Works**	**120 days**	**Jan 15 '24**	**May 13 '24**
89	Piping Works Through Ducts	90 days	Jan 15 '24	Apr 13 '24
90	Fixtures & Fittings	45 days	Mar 30 '24	May 13 '24
91	**Electrical Works**	**80 days**	**Feb 14 '24**	**May 3 '24**
92	Electrical Wiring Through Ducts	60 days	Feb 14 '24	Apr 13 '24
93	Fixtures & Fittings	45 days	Mar 20 '24	May 3 '24
94	**Gas Connection Works**	**110 days**	**Jan 15 '24**	**May 3 '24**
95	Gas Piping Works	90 days	Jan 15 '24	Apr 13 '24
96	Fixtures & Fittings	45 days	Mar 20 '24	May 3 '24
97	**Fire Fighting System**	**180 days**	**Jan 15 '24**	**Jul 12 '24**
98	Installation of Fire Detection System, Fire Alarm System, PA System, etc.	90 days	Jan 15 '24	Apr 13 '24
99	Installation of Fire Fighting Equipment	150 days	Jan 15 '24	Jun 12 '24
100	Testing & Commissioning of Fire Fighting System	30 days	Jun 13 '24	Jul 12 '24
101	**Lift**	**75 days**	**Feb 29 '24**	**May 13 '24**
102	Installation of Lifts	45 days	Feb 29 '24	Apr 13 '24
103	Testing & Commissioning of Lifts	30 days	Apr 14 '24	May 13 '24
104	**Sub-Station Works**	**90 days**	**Feb 14 '24**	**May 13 '24**
105	Installation of Sub-Station Equipment	60 days	Feb 14 '24	Apr 13 '24
106	Testing & Commissioning of Sub-Station	30 days	Apr 14 '24	May 13 '24
107	**HVAC Works**	**120 days**	**Jan 15 '24**	**May 13 '24**
108	Installation of Duct, Indoor & Outdoor Equipment for HVAC System	90 days	Jan 15 '24	Apr 13 '24
109	Testing & Commissioning	30 days	Apr 14 '24	May 13 '24
110	**Landscaping & Internal Road**	**45 days**	**Mar 15 '24**	**Apr 28 '24**
111	Base Preparation	30 days	Mar 15 '24	Apr 13 '24
112	Surface Layer Construction	30 days	Mar 30 '24	Apr 28 '24
113	**Post Construction**	**30 days**	**Jun 28 '24**	**Jul 27 '24**
114	Handingover	30 days	Jun 28 '24	Jul 27 '24
115	Demobilization	30 days	Jun 28 '24	Jul 27 '24



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4 Environmental Baseline

4.1 Introduction

139 Baseline condition of environment states the present status of different components of environment i.e. physical, biological, cultural, economic and social environmental characteristics in absence of the project. Environmental baseline study by examining the existing environment, serves as the basis of the project site against which potential impacts from development activities of the project both during implementation and in operation phases can be compared. Mainly there are two principal objectives in examining and defining the existing environment:

- To recognize potential environmental impacts of the project and enable mitigation measures to be identified.
- To provide a base line against which environmental conditions in the future project may be measured and to document conditions which were either existing or developing before the introduction of the project and not due to the project.

140 The baseline environmental quality has been assessed through field studies within the impact zone for various components of the environment (air, noise, water, and land and socio-economic). The study area is 1 km buffer of the project site.

4.2 Physical Environment

A. Climate and Meteorology

141 Bangladesh is located in the tropical monsoon region and is characterized by high temperatures, often excessive humidity, rainfall, atmospheric pressure, and wind circulation reversal between summer and winter, which is an important component of the circulation system of the South Asian subcontinent. (Rashid H., 1991). Brammer (Brammer, 1996) has identified four different seasons resulting from this weather pattern, namely:

- Pre-monsoon hot season (from March to May);
- Rainy monsoon season (from June to September);
- Post-Monsoon Season (October to November) and
- Cool dry winter season (from November to February).

Pre-Monsoon Hot Season (March to May): Characterized by the highest temperatures of the year – up to 36^{0}C. Some rainfall may occur, with tropical cyclones occasionally affecting coastal areas;

Rainy Monsoon Season (June to September): Period of highest rainfall, humidity and cloud cover, with up to 80% of the annual rainfall occurring during this time. Increased rain and cloud cover generally cause a small reduction in mean daily temperatures;

Post-Monsoon Season (October to November): Temperatures remain hot and humid, though cloud cover reduces. Limited tropical thunderstorms may still occur during this period, particularly in coastal areas; and

Cool Dry Winter Season (from December to February): Coolest time of the year with mean minimum temperatures.

142 Despite the general predictability season of Bangladesh, local conditions vary widely across the

country. As such, Bangladesh can be divided into seven climactic sub-zones based on differences in a range of factors including rainfall, temperature, evapotranspiration and local seasonality (Rashid M. A., 1991).

143 South-central zone has high rainfall being above 1,900 mm. The temperature ranges high than south eastern zone and less than west region. This is a transitory zone between the South-eastern, North-western and South-western zones and most of the severe hail storms, nor 'westers and tornadoes are recorded in this area. The project location is in South-Central zone of climatic zone of Bangladesh illustrated in climate map **(**Figure 12**).**

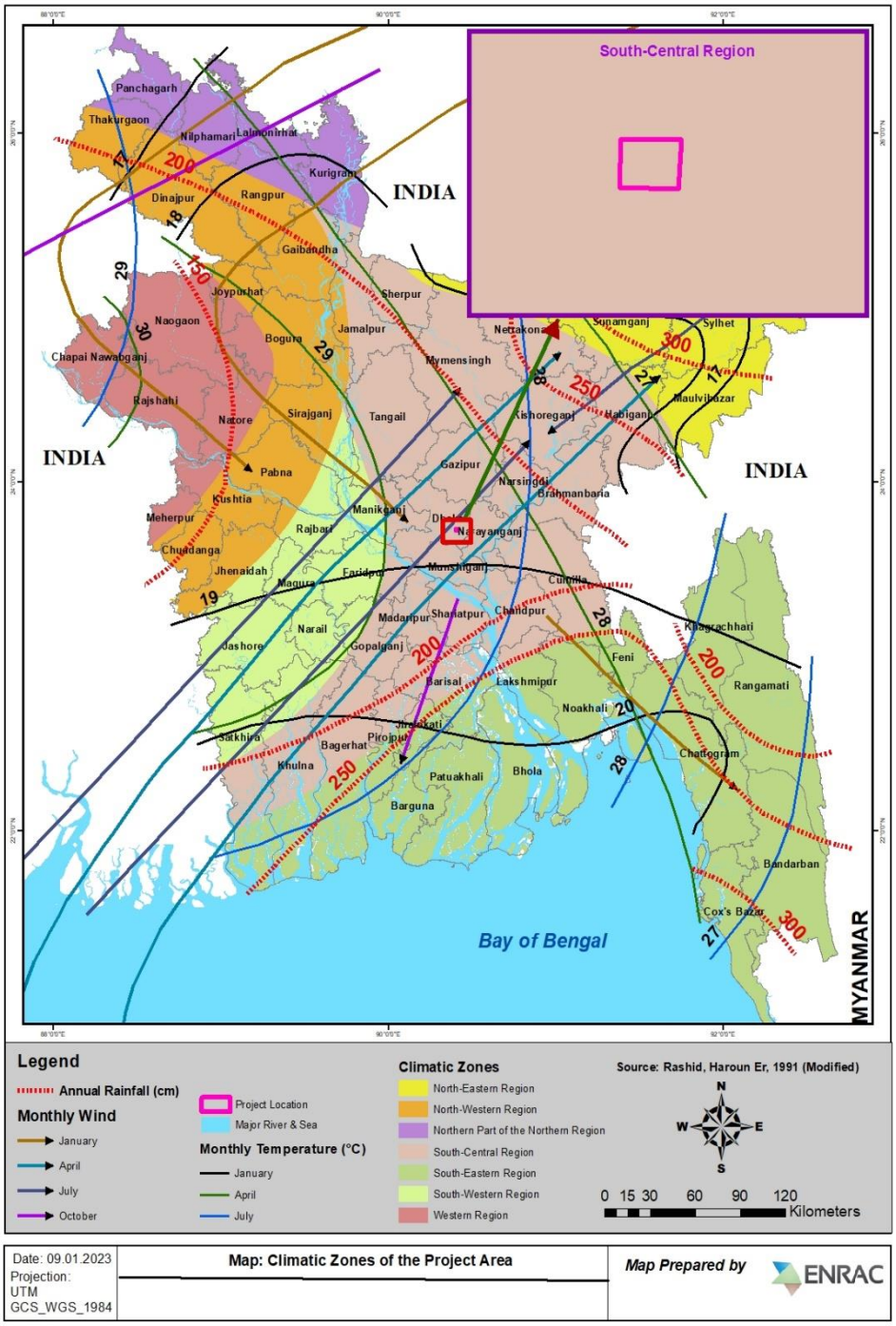


Figure 12: Climatic Map of Bangladesh

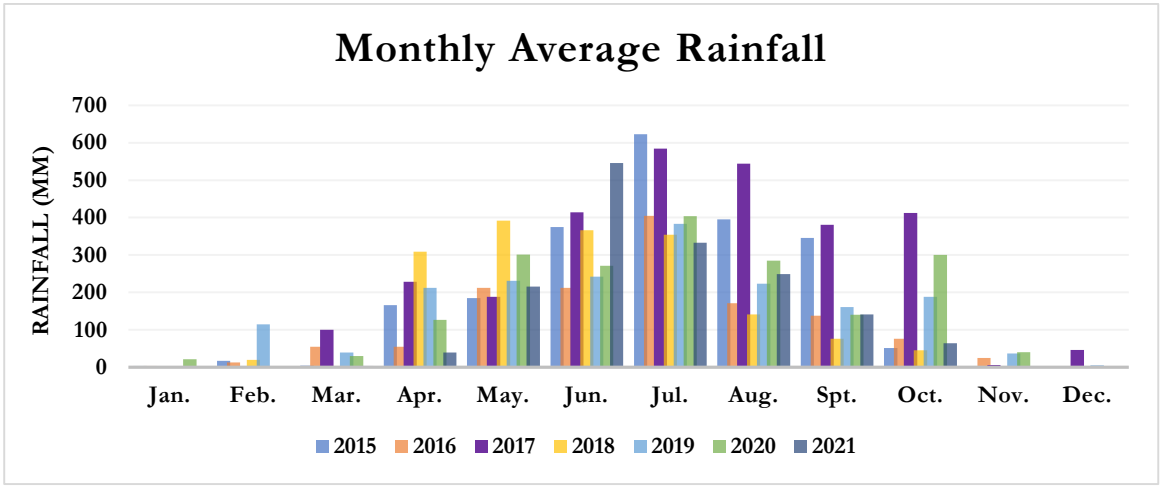
4.2.1 Rainfall

144 The rainy season (June to October) accounts for 70 to 85% of annual rainfall, which ranges from 70% in the east to 80% in the southwest and 85% in the northwest in Bangladesh. Rainfall data recorded at Dhaka Weather Station from 2015 to 2021 have been collected from (Bangladesh Meteriological Department BMD, n.d.) and analyzed to depict maximum and minimum rainfall trend of the project area. The seven years analysis shows the rainfall variation of project area in (**Table 6**).

Table 6: Annual and Monthly Average Rainfall of the Project Location

Year	Jan.	Feb.	Mar.	Apr.	May.	Jun.	Jul.	Aug.	Spt.	Oct.	Nov.	Dec.	Annual
2015	3	17	4	166	185	375	**623**	395	346	51	0	1	2166
2016	3	13	55	55	212	212	405	171	138	76	25	0	1365
2017	0	2	100	228	188	414	584	544	381	412	6	46	2905
2018	0	20	3	309	392	366	354	141	76	45	0	0	1706
2019	1	115	39	212	231	242	383	223	161	188	37	5	1837
2020	21	1	30	127	301	271	404	285	140	300	40	0	1920
2021	0	0	3	39	216	546	333	249	141	64	0	0	1591

Source: (Bangladesh Meteriological Department BMD, n.d.)



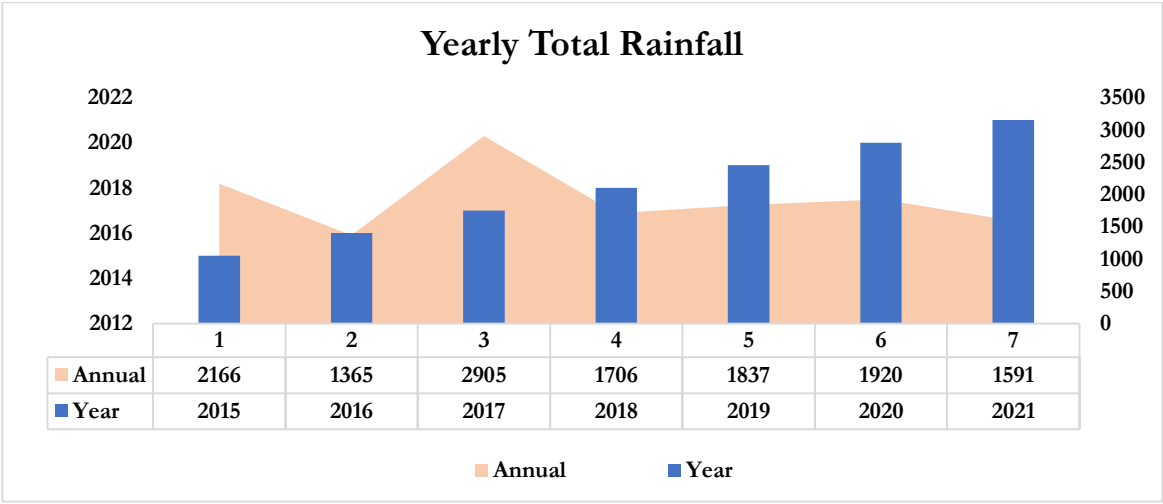


Figure 13: Annual and Monthly Average Rainfall of the Project area

145 Rainfall varies considerably from year to year and month to month. The highest annual rainfall recorded between 2015 and 2021 was in 2017 with peak of 2905 mm whereas the minimum annual rainfall was recorded 1365 mm in 2016. The seven-yearly (2015-2021) maximum rainfall recorded was 623 mm/month and minimum recorded is 0 mm/month. However, no rainfall was recorded during the months of November, December and January. Table 6 and Figure 13 shows the yearly maximum, minimum annual and monthly average rainfall of Dhaka sub-station over last seven years (2015-2021).

4.2.2 Temperature

146 The climate of Bangladesh has had annual temperatures that range from 15°C to 34°C, with an average of around 26°C. The wet season (April-September) has the warmest months, whereas the winter season (December-February) is colder and dull. Temperature data was recorded at Dhaka Weather Station from 2015 to 2021 have been collected from (Bangladesh Meteriological Department BMD, n.d.) and analysed to depict maximum and minimum temperature trend of the project area. Table 7 shows the data variation and **Figure 14** shows the graphical presentation.

Table 7: Annual Average Maximum and Minimum Temperature of Project area

Year	Jan.	Feb.	Mar.	Apr.	May.	Jun.	Jul.	Aug.	Spt.	Oct.	Nov.	Dec.
2015	19.7	22.7	26.4	28.1	29.8	29.7	28.9	29.8	29.5	28.3	25.1	21.1
2016	19.5	24.4	27.8	**31**	29.3	30.5	29.4	30.1	29.7	29.2	24.9	22.4
2017	20.6	23.6	25.4	28.4	30.2	29.8	29.2	29.7	30	28.4	25.4	21.9
2018	**18.1**	23.7	27.8	27.8	28.2	29.9	29.8	30.5	30.5	27.8	25	21.3
2019	20.9	22.6	26.3	28.7	30.1	30.1	29.9	30.5	29.9	28.2	25.6	20.1
2020	19.2	21.9	26.6	28.7	29.1	30.1	30	30.1	30.4	29.5	25.5	21
2021	20.2	23.3	28.8	30.7	30.5	29.2	29.8	30	30.3	30.5	25.5	24.4

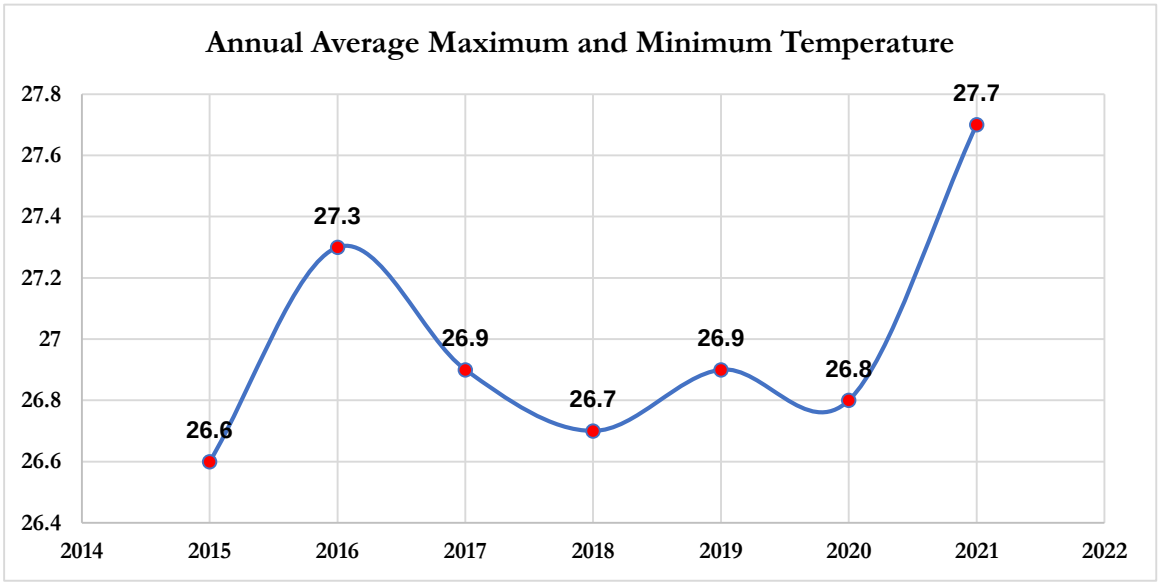


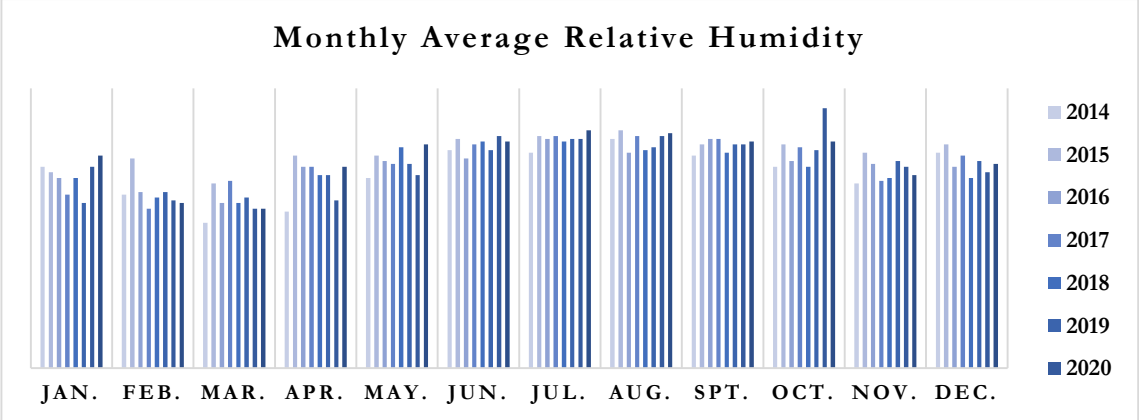
Figure 14: Monthly Average Temperature in the Project's District Area

147 The maximum and minimum temperature according to Table 7 shows that the hottest year of (2015-2021) series is 2021 which accounts for 27.7°C temperature. The hottest month of the seven-year series is 31°C in the month of April of 2016. Also, the minimum temperature is 18.1°C recorded in the

year of 2018. **Figure 14** illustrates the annual ups-downs of temperature of the project area.

4.2.3 Relative Humidity

148 Bangladesh is a very humid country, receiving approximately 2,200 mm of rain per year on average. The highest relative humidity ranges from 75% to 86% were recorded at Dhaka Weather Station and data was collected from (Bangladesh Meteriological Department BMD, n.d.). During the monsoon season, humidity levels are consistently very high, and they decrease for a very brief time near the end of the dry season. Table 8 shows the distribution of relative humidity and



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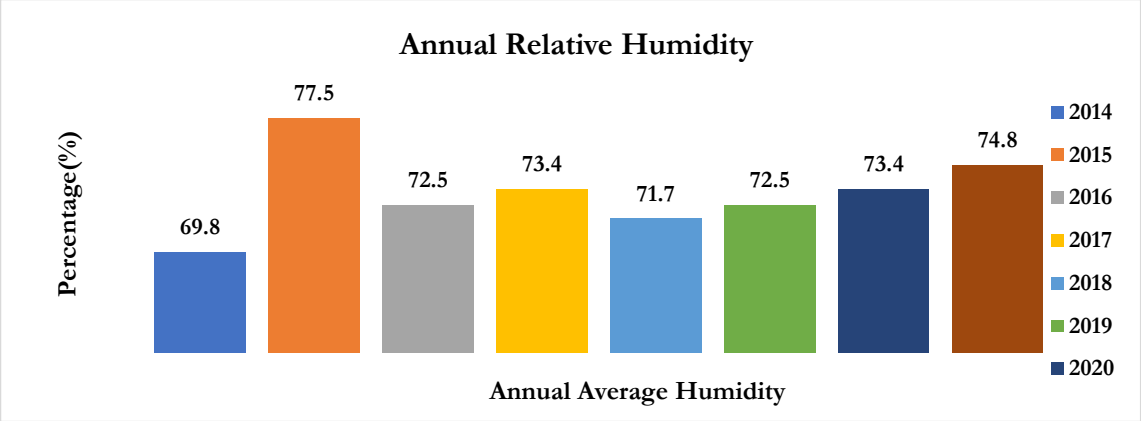


150 **Figure 15** shows the graphical representation.

Table 8: Annual and Monthly Average Relative Humidity of the Project area

Year	Jan.	Feb.	Mar.	Apr.	May.	Jun.	Jul.	Aug.	Spt.	Oct.	Nov.	Dec.
2014	72	62	**52**	56	68	78	77	82	76	72	66	77
2015	70	75	66	76	76	82	83	**85**	80	80	77	80
2016	68	63	59	72	74	75	82	77	82	74	73	72
2017	62	57	67	72	73	80	83	83	82	79	67	76
2018	68	61	59	69	79	81	81	78	77	72	68	68
2019	59	63	61	69	73	78	82	79	80	78	74	74
2020	72	60	57	60	69	83	82	83	80	93	72	70
2021	76	59	57	72	80	81	85	84	81	81	69	73

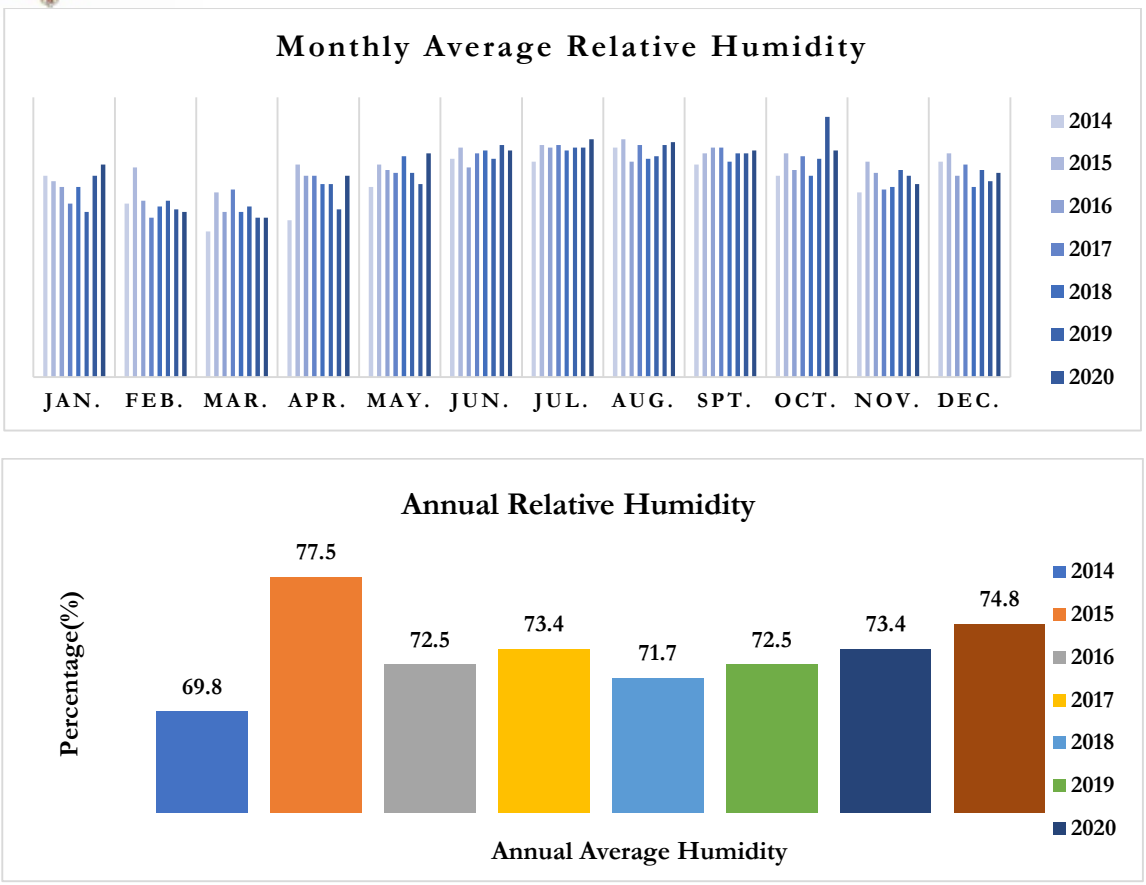
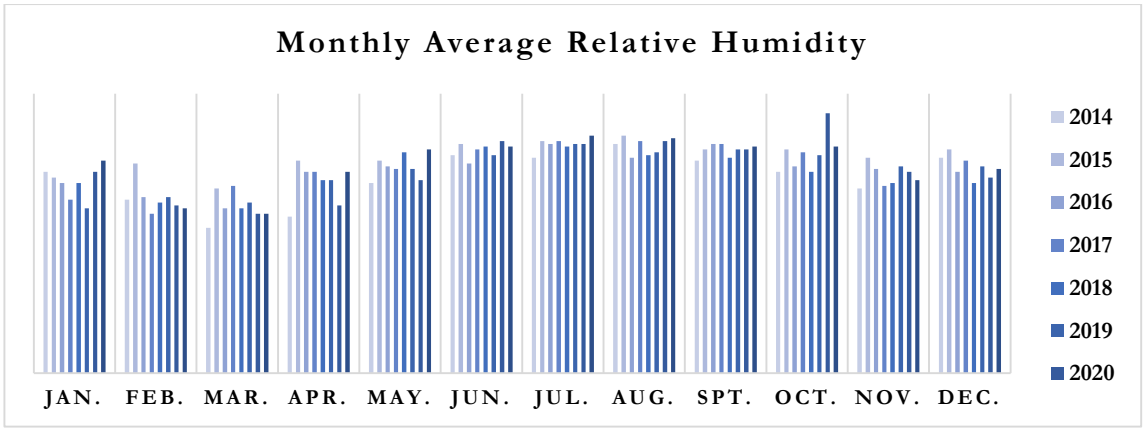


Figure 15: Annual and Monthly Average Relative Humidity of the Project area

151 Table 8 and



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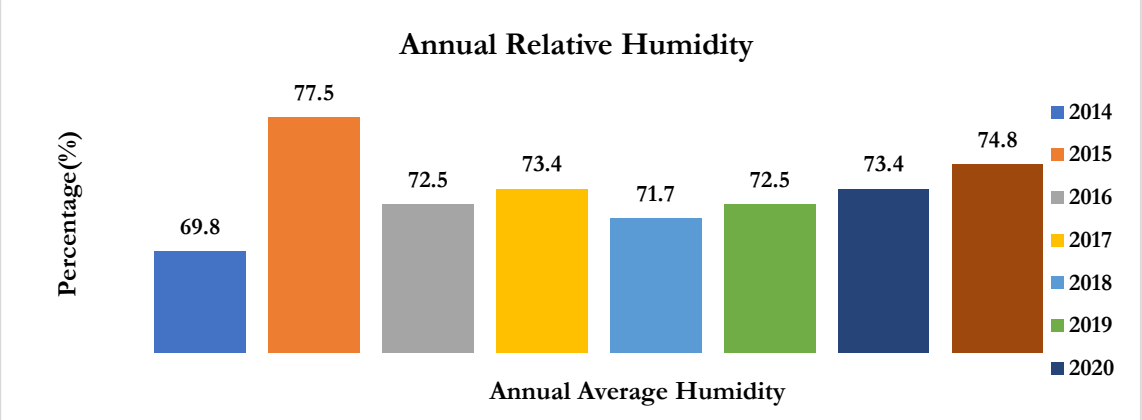


153 **Figure 15** shows that the maximum relative humidity for Dhaka is about 85% recorded in August of 2014. In project the area, relative humidity rises over 75% from May and continues to rise to 86% in October in a year. In 2014, the least humidity is recorded 52% in the month of March. The most humid year of this series is 2021 where highest annual average humidity (77.5%) is recorded.

4.2.4 Wind and Direction

154 Wind is a significant meteorological phenomenon due to its speed, direction and velocity. The wind of a specific location is significantly influenced by its topography, other climatic conditions and seasonal variations. Wind is generally moderate during non-monsoon season, whereas during the monsoon season, it ranges from moderate to strong. Maximum and Minimum Wind Speed and direction of Project area has been described in Table **9** and Figure 16.

Table 9 : Monthly Wind Direction of the Project area

Year	Jan.	Feb.	Mar.	Apr.	May.	Jun.	Jul.	Aug.	Spt.	Oct.	Nov.	Dec.
2014	W	W	W	S	E	S	SE	SE	S	SE	N	W
2015	W	W	NW	S	S	S	SE	SE	SE	W	W	W
2016	W	W	W	S	S	S	E	S	SE	S	N	W
2017	W	W	S	S	S	S	S	E	S	W	NE	W

Source: (Bangladesh Meteriological Department BMD, n.d.)

155 Table **9** shows the series of wind direction over Dhaka city. The recorded data describes that wind blows from west direction in the month from December, January and February. In March, wind blow from west, north-west and south direction. In the month of May and June, wind blow was in the same direction (south) over all years. The wind blows south to south-east direction from July to September. In October, the wind direction was oriented from south-east, west, south and east side. Also, November wind blows from north and west direction.

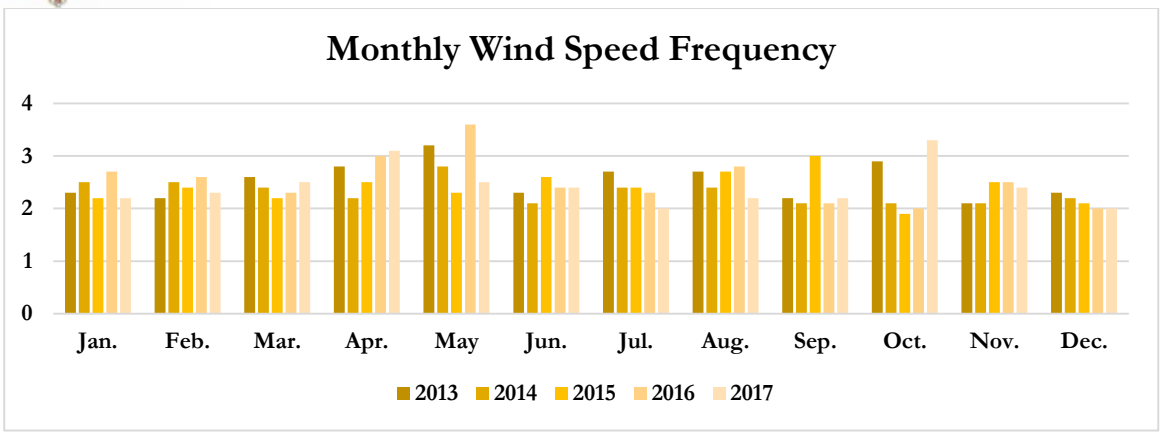


Figure 16: Monthly Wind Speed Frequency of the Project area

156 The wind frequency depends on seasonal phenomenon. The graph (**Figure 16**) shows data series of years (2013-2017). In the pre-monsoon season (November-February), the highest wind speed recorded 2.6 km/h and lowest 2 km/h. Most windy months of the year are March to May. The highest wind speed was 3.6 km/h and lowest 2.2 km/h was recorded in between March to May (monsoon period). Dry season accounts for moderate wind frequency so the highest wind frequency was recorded 3.3 km/h in the month of October, 2017 and the lowest wind frequency was 1.9 km/h in the month of October, 2015.

4.3 Hazard and Disaster

157 Bangladesh is one of the most disaster-prone country in the world due to its funnel shaped bay. The country experiences various natural calamities such as floods, cyclones, storm surge, river bank erosion, earthquake, drought, salinity intrusion, fire and tsunami.

4.3.1 Earthquake and Seismicity

158 According to BNBC-2017, Bangladesh has been divided into four generalized seismic zones: Zone-I, Zone-II and Zone-III Zone-IV where Zone IV is the most vulnerable and Zone I is the least vulnerable to seismic risks. The Project area is located at Dhaka is located in Zone II which refers moderate risk zone and the risk coefficient for this zone is 0.20 illustrated in Figure 17 and Figure 18 shows the history of earthquake.

Table 10: Earthquake History of Bangladesh

SL	Date	Time	Magnitude	Region
1.	18/09/2011	12:40:47.00	6.8	Sikkim, India
2.	18/09/2011	00:26:08.17	4.0	India-Myanmar Border
3.	27/08/2011	00:55:59.00	4.0	Chandpur region, Bangladesh
4.	28/07/2011	17:53:39.12	4.4	Nawgaon Region, Bangladesh
5.	22/07/2011	00:58:49.36	4.1	Bangladesh-India Border Region
6.	03/07/2011	00:15:10.12	3.6	Shilong Region, India
7.	03/07/2011	21:45:33.00	3.6	North Chachar Hills, Assam, India
8.	21/06/2011	04:50:58.93	4.0	Comilla-Chandpur Border Region, Bangladesh
9.	09/06/2011	07:34:23.73	4.5	Rajbari-Faridpur Border Region, Bangladesh.

Source: (Bangladesh Meteriological Department BMD, n.d.)

159 Bangladesh is located on one of the most tectonic active regions in the world and have

experienced several earthquakes in past 200 years at an average rate of one in every 30 years. Earthquake occurs frequently in the wider region due to the active faults i.e. Chittagong-Myanmar Fault, Dauki Fault, Madhupur Fault, Sylhet-Assam Fault and Active faults. The project area is 6.5 km far from Madhupur fault and 13.5 km from Active faults and other faults are out of buffer area.

4.3.2 Cyclones and Storm Surges

160 Cyclones are most devastating storms affecting Bangladesh such storms (Nor'westers) cause a lot of destruction of lives and property. Nor 'westers come mainly from the north westerly direction. This is a very common phenomenon in Bangladesh during late Chaitra and Baishak months and are known as Kalbaishakhi in Bengali. This generally blows over Bangladesh usually in April-May from a north-west direction. According to Figure 19 the project area falls at No Risk Zone.

4.3.3 Flood Risks

Bangladesh is a densely-populated, low-lying and mainly riverine country where flooding is an alarming phenomenon. It happens by intensive rainfall, river floods, pollution in cities, water inflow from upstream catchment, indiscriminate encroachment of waterways, water logging and inadequate capacity of drains and lack of maintenance of the drainage infrastructure. The project area is fall under Not Flood Prone area (**Figure 20**).

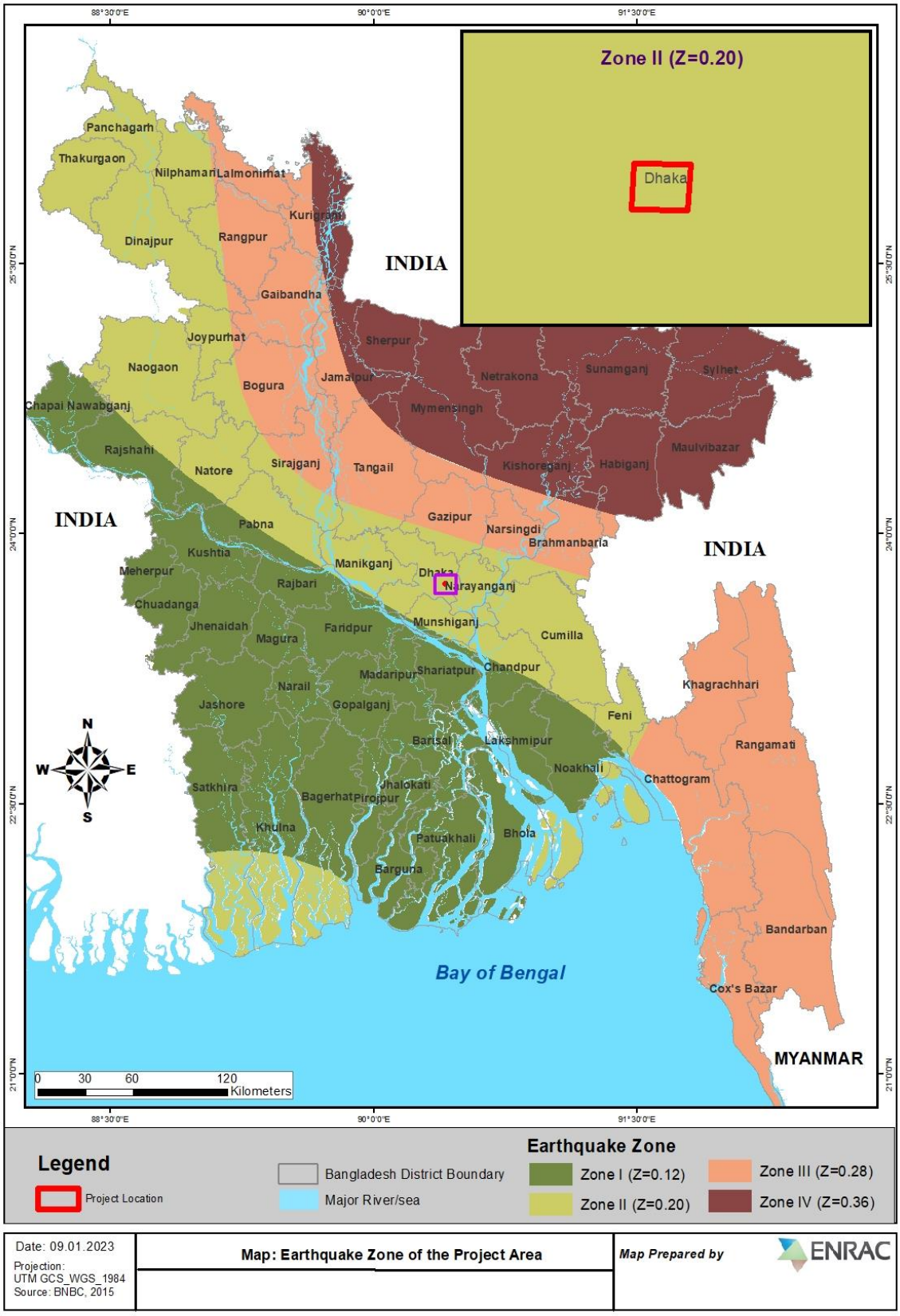


Figure 17: Seismic Map of the Proposed Project Area

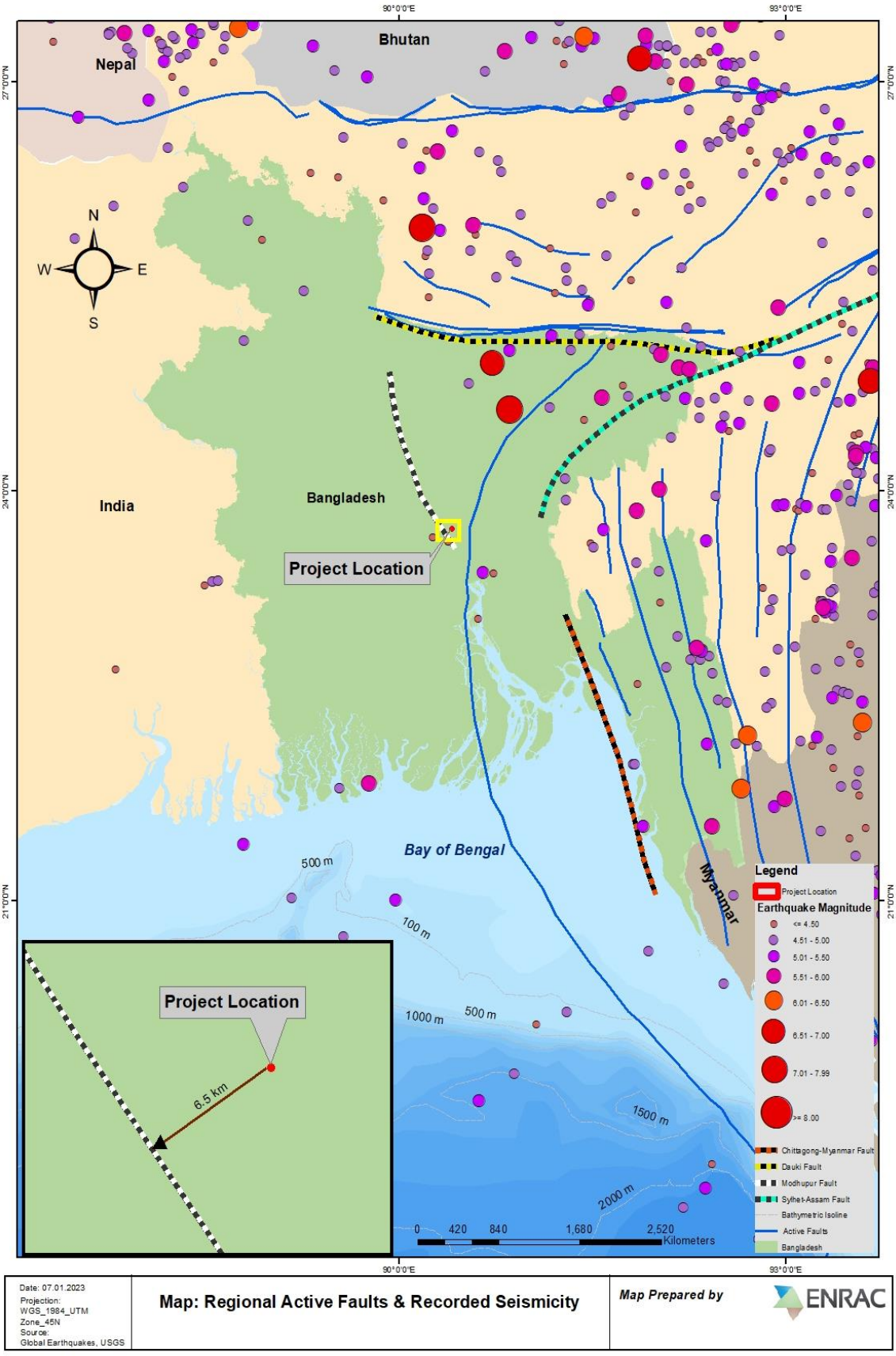


Figure 18: Past History Map of Seismicity

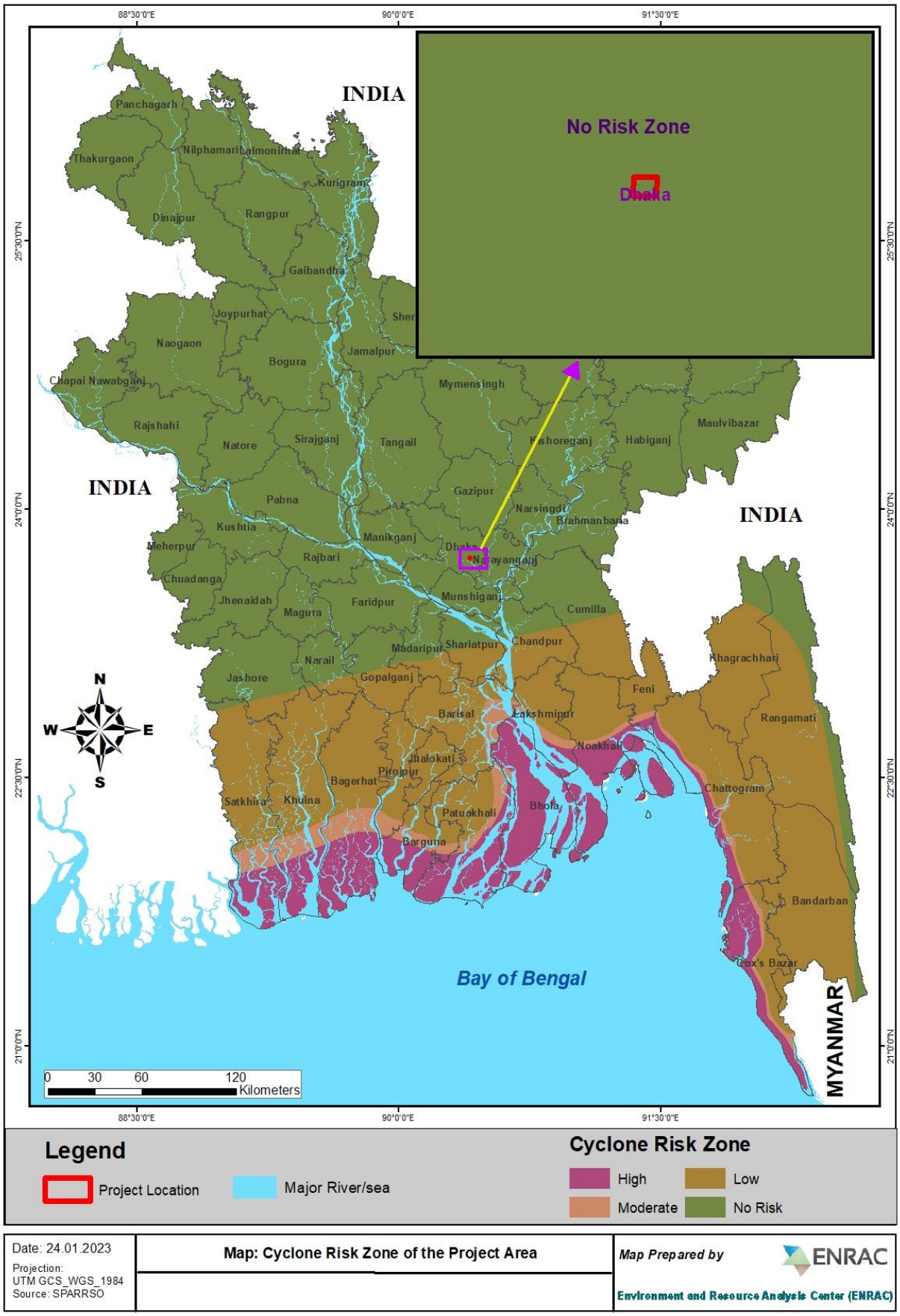


Figure 19: Cyclone Risk Zone of the Project Area

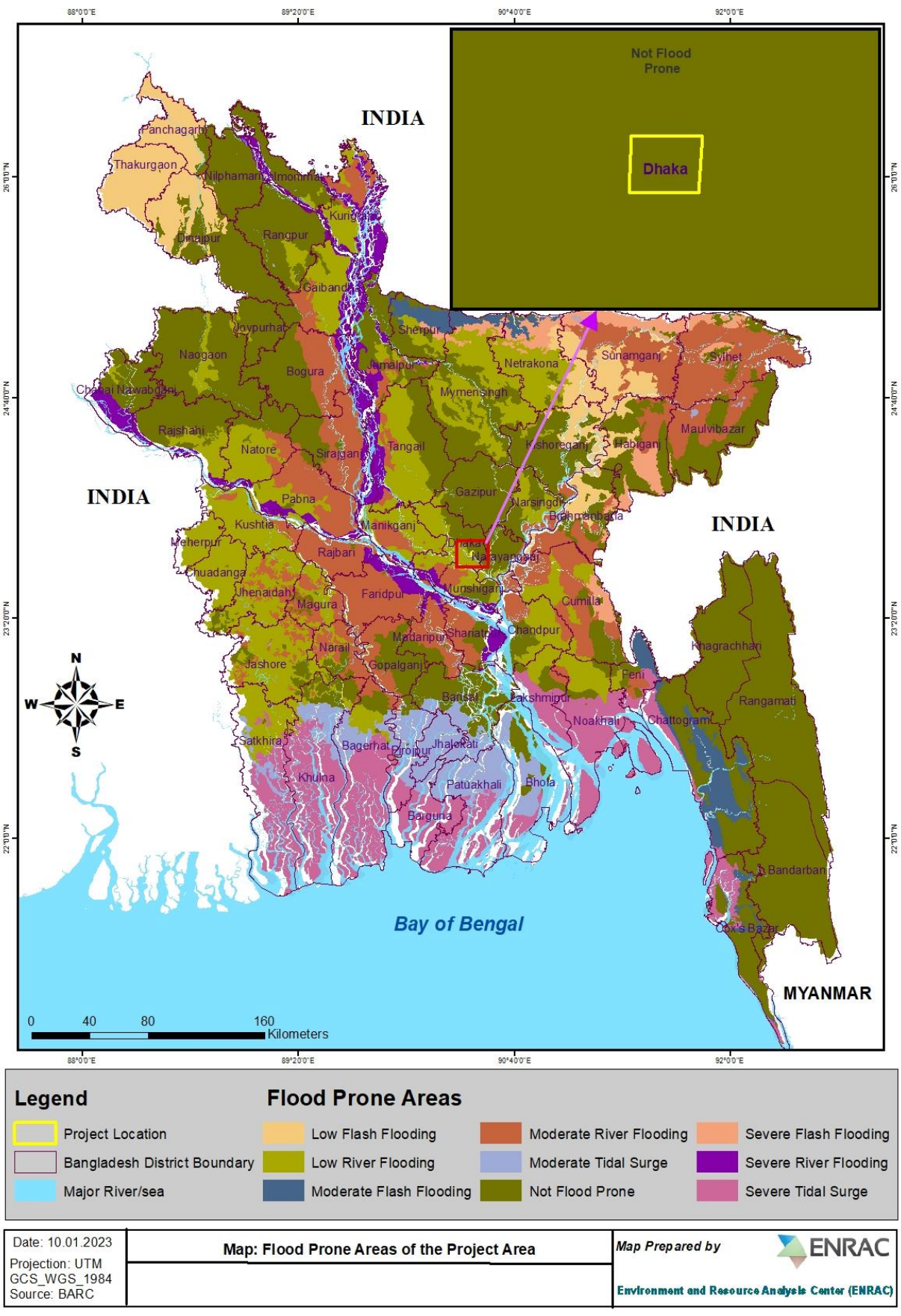


Figure 20: Flood Prone Areas of the Project Area

4.3.4 Topography

The project location is topographically a flat land. Marshes and old river beds flank the edges of the highlands. The surface elevation of Dhaka ranges between 10 and 14 meters, with the majority of the built-up areas located at 6-8 meters (FAP, 1991). Considering 1 km buffer area has been characterized by water resources e.g ponds and has some vegetation cover in the north side, and south region is covered with settlements. However, the elevation of project area is 10-12 meter. **Figure 21** represents the Elevation map of the project area.

4.3.5 Geology and Soil

161 According to SRDI, 1997, the edge of Bangladesh is classified into five major groups and this major group is divided by sixteen geological units. The soil deposits mainly consist of the Alluvial Silt and Clay; Madhupur Clay Residuum and Marsh Clay and Peat of soil. The project area consists of Madhupur Clay Residuum showing in Figure 22.

162 The soil of Bangladesh is consisting of seven soil tracts. Dhaka city is organized with Calcareous Alluvium, Non-Calcareous Dark Grey Floodplain soils, Calcareous Grey Floodplain soils and Calcareous Brown Floodplain soils, Calcareous Grey Floodplain soils and Red-Brown Terrace soils. The project area covered Calcareous Grey Floodplain soils. This soil type occurs on the Ganges tidal floodplain and have grey matrix combic B horizon and lime in their features and ranges from silt loam and silty loam. The Soil classification of project area is illustrated in Figure 23.

4.3.6 Hydrology and Drainage

Dhaka city is surrounded by the rivers of Buriganga in the north side, Turag to the west and Balu to the east. The canals and rivers surrounded by natural drainage system and water reservoir. Buriganga river is close about 1.7 km from the project area. Also, Usmani Uddayan Lake 2 is 50 meters and Shahidullah hall pond is 200 m far from project area.

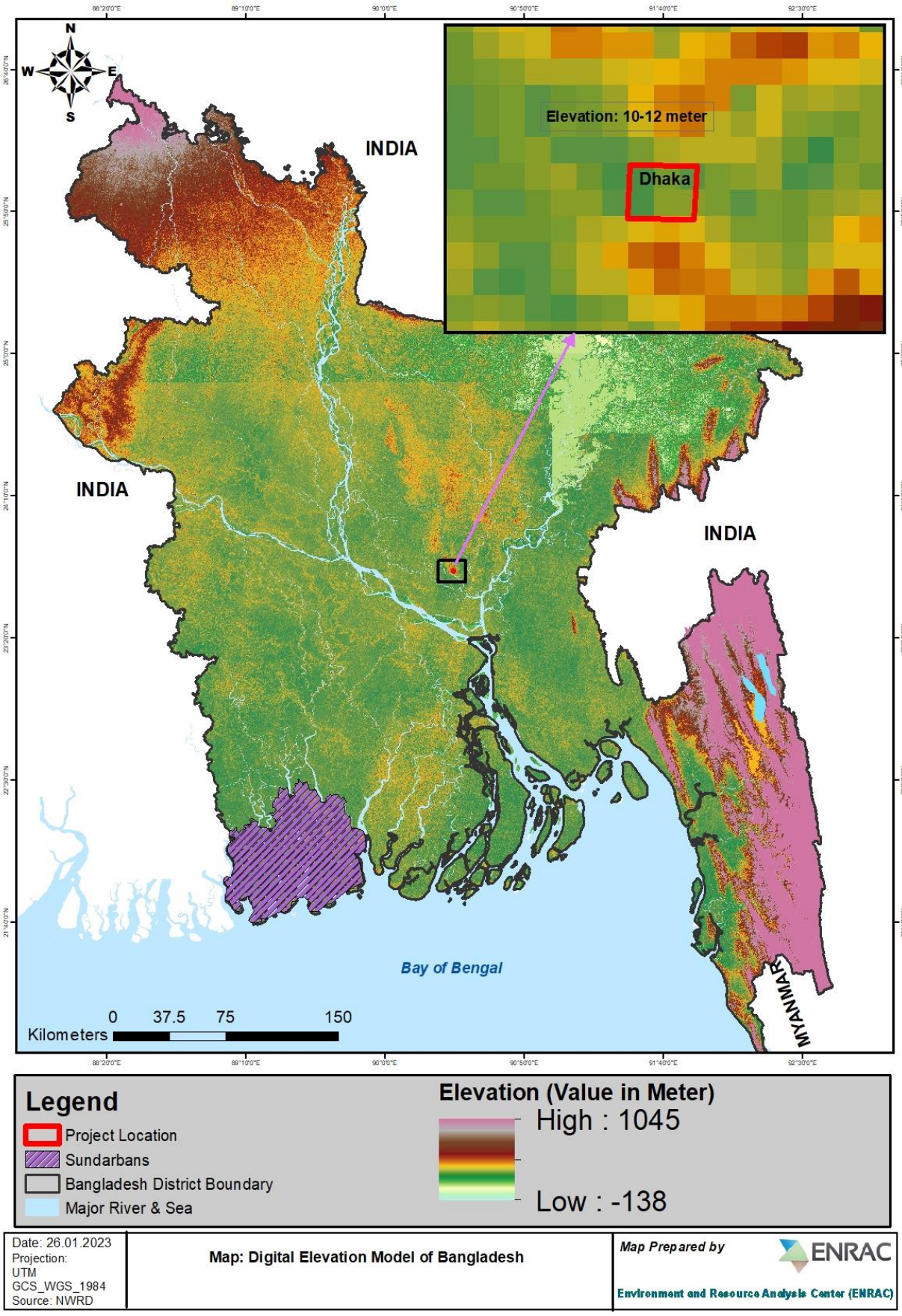


Figure 21: Elevation of the Project area

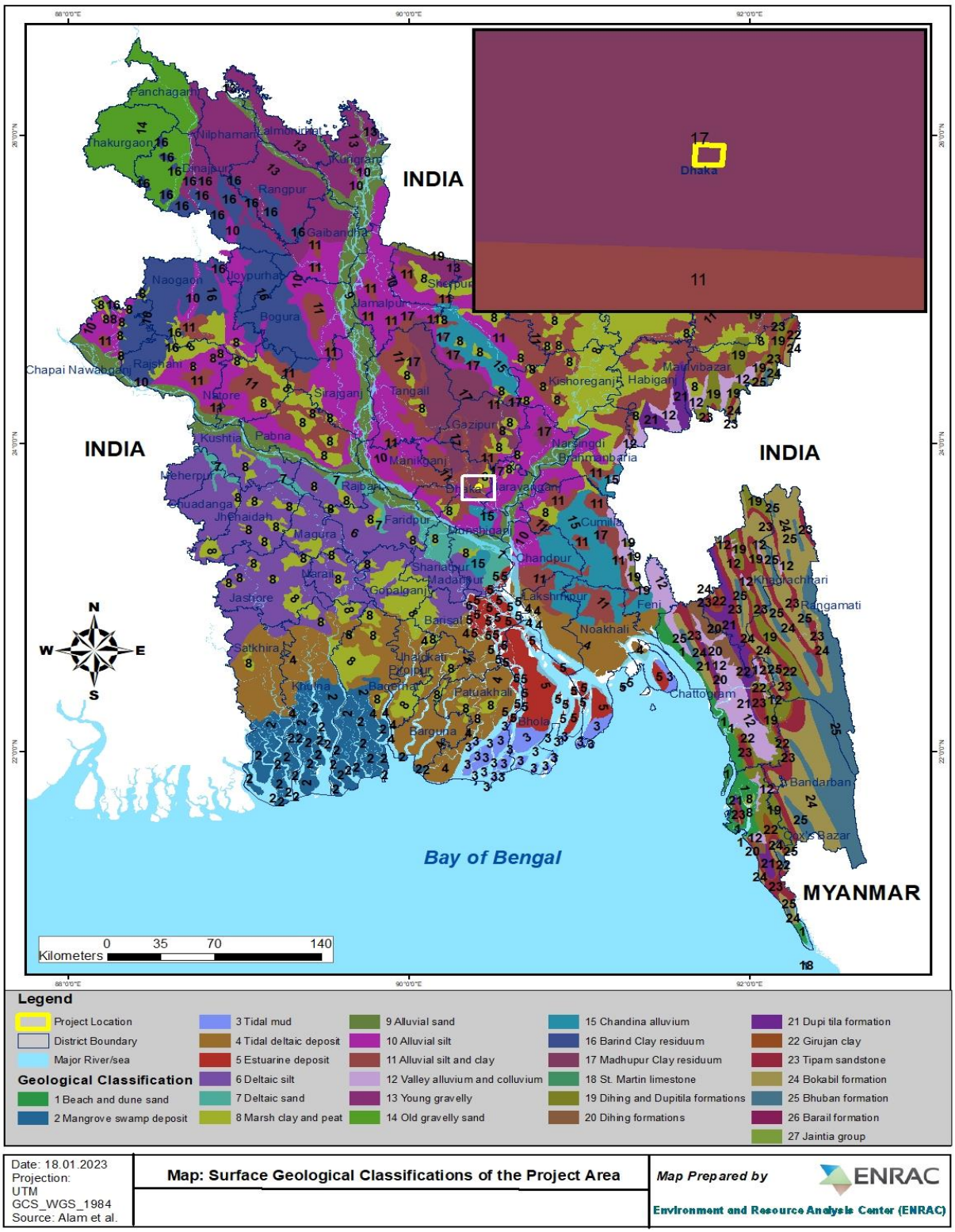


Figure 22: Geological Classification of the Project Area

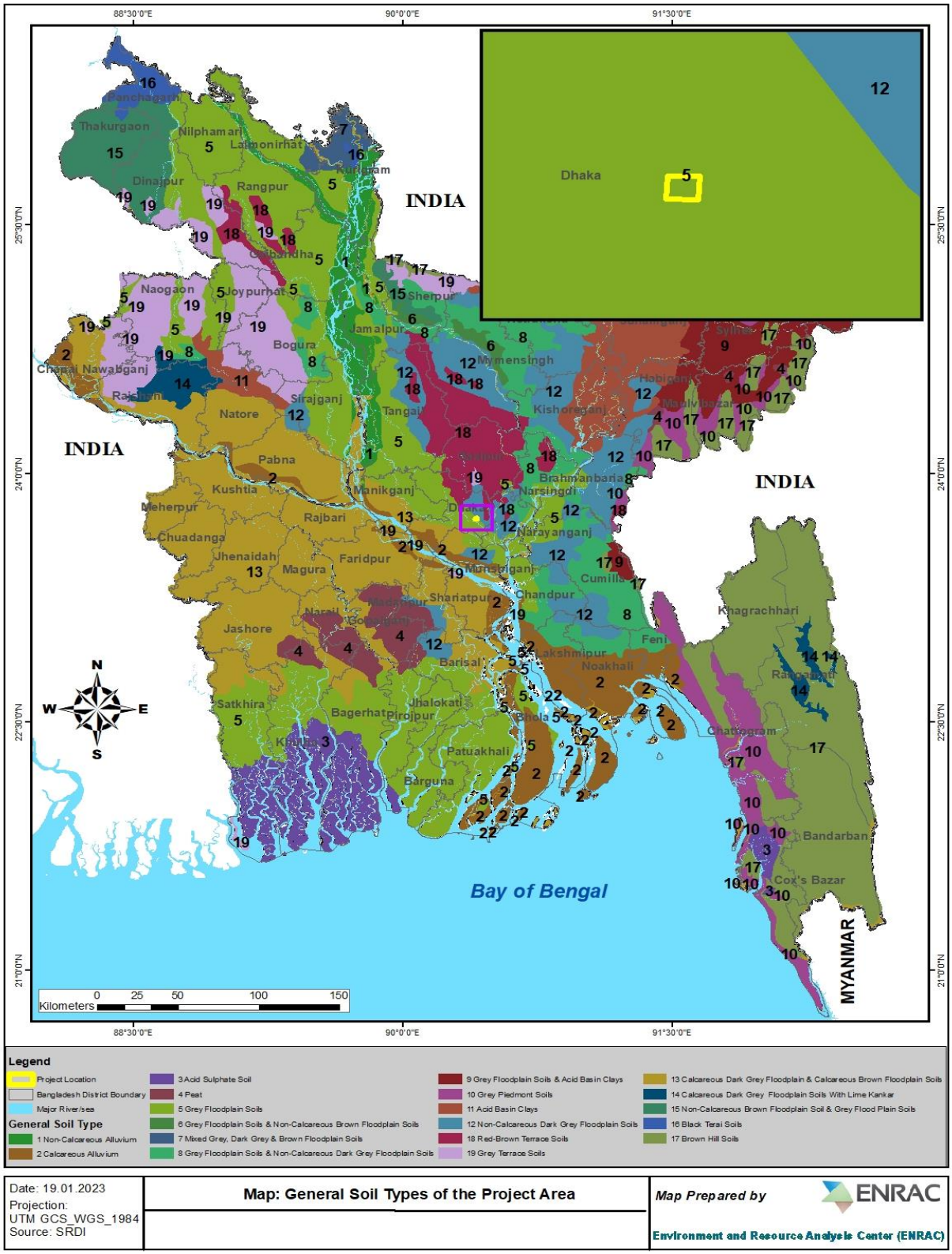


Figure 23: General Soil Classification of the Project Area

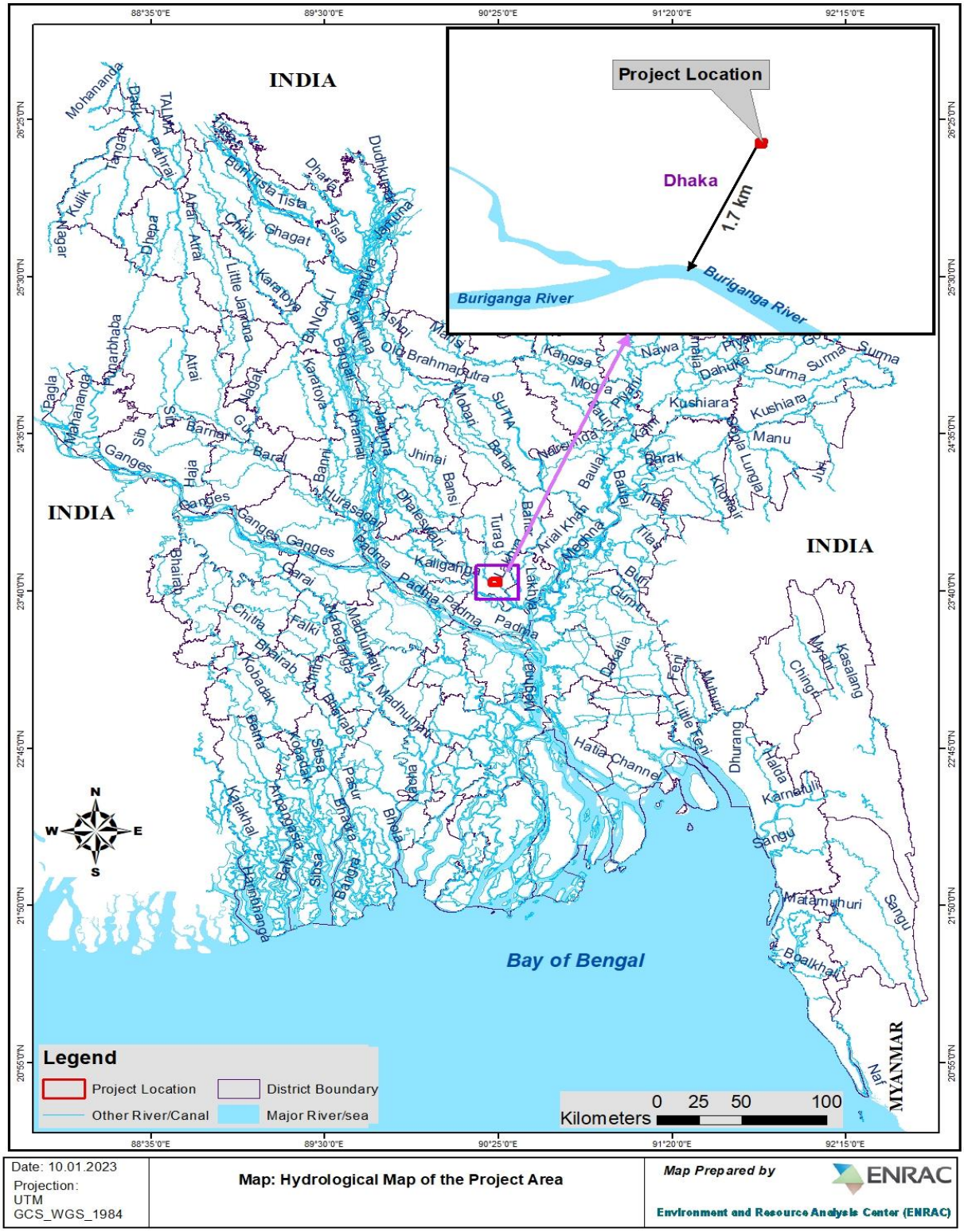


Figure 24: Hydrological Map of the Project Area

4.4 Environmental Quality

4.4.1 Air quality

163 The air environment is most sensitive to any developmental work leading to various type of air pollution. Air environment is one of the most important components of the ecosystem. The prime objective of ambient air quality monitoring of project area is to assess existing air environment. Air pollution forms an important and critical factor to study the environmental issues in the linear project. Air quality has to be frequently monitored to know the extent of pollution due to road traffic and allied activities. This will be useful for assessing the conformity to standards of the ambient air quality during implementation of the proposed project construction activities.

164 Ambient air quality measurement was carried out during February, 2023 at two locations within the Project corridor (day time) for 1 hour (**Figure 25**). The key air quality parameters (CO, NO_2, SO_2, PM_{10} and $PM_{2.5}$) were monitored. Following the methodology described, the eight-hour air quality data were converted to 24 hours' average. These data were used to develop and compared with Bangladesh national standards for ambient air quality. The test result (**Table 11**) shows that the local ambient air quality condition meets the national standard, according to the Bangladesh National Ambient Air Quality Standards defined in the Environmental Conservation Rules amendment 19th July 2005 vide S.R.O. No. 220-Law/2005. Air quality test report has been provided in **Annex. Figure 27** represent the air sampling location map.

Table 11: Existing Air Quality along project corridor (24 hours average), February 2023

Sample ID.	Sampling Location	GPS Coordinates	Concentration of Ambient Air Quality	CO	NO_2	SO_2	PM_{10}	$PM_{2.5}$	Temp
				PPM	µg/m³	µg/m³	µg/m³	µg/m³	°C
AAQ_1	Fulbaria, Dhaka	23.724753°N 90.405944°E	Ave. Data	0.22	57.3	7.0	172.4	95.8	28
AAQ_2	Fulbaria, Dhaka	23.725336°N 90.405850°E	Ave. Data	0.24	60.1	7.1	160.1	80.8	28
GoB Air Quality Standards				**5 (8 hour)**	**40 (Annual)**	**80 (24 hour)**	**150 (24 hour) 50 (Annual)**	**65 (24 hour) 35 (Annual)**	****NSE**

*Note: * Air Pollution Control Rules (APCR), 2022, Department of Environment (DoE)*

165 Carbon monoxide concentration was measured 0.22 mg/m³ and .24 mg/m³. Measured concentrations for NO_2 were 57.3, 60.1 µg/m³ and Sulphur dioxide (SO_2) were 7 µg/m³ and 7.01 µg/m³. Measured concentrations for Particulate matters PM_{10} and $PM_{2.5}$ were 172.4, 160.1 µg/m³ and 95.8, 80.8 µg/m³ respectively. According to Air Pollution Control Rules (APCR) 2022 the concentration of NO_2, PM_{10} & $PM_{2.5}$ had exceeded the DoE Standard. The test results of CO & SO_2 were found within the acceptable limits.

Figure 25: Air Quality Sampling at Fulbaria, Dhaka

4.4.2 Noise Level

166 The noise levels within the study area are well within the World Bank and Bangladeshi standards. Some noise will expect to be observed during the construction stage. The heavy equipment operations of the project have some significant noise both to the employees and the adjacent area and the employee/labor ware earplug to protect noise pollution.

167 According to World Health Organization's Guidelines for Community Noise (1999), daily sound pressure levels of 50 decibels (dB) or above can create discomfort amongst humans, while ongoing exposure to sound pressure levels over 85 dB is usually considered the critical level for at least temporary hearing damage.

168 Noise level measurement was carried out during February, 2023 at two locations of the project corridor (day) for 1 hour (**Figure 26**). These data were used to develop **Table 12** and compared with the amended Schedule-4, 2006, of (Noise Level Measurement Standard) Environmental Conservation Rules, 1997, DoE. The laboratory test result has been provided in **Annex** and **Figure 27** represent the noise sampling location.

Table 12: Noise Level Measurement (February, 2023)

Sampling ID	Sampling Location	GPS Coordinates	Evaluation Criteria	Noise level (L_{eq}) dBA		
				Day		
				Min	Max	Avg.
NM_1	Fulbaria, Dhaka	23.724753°N 90.405944°E	Commercial Area	44.3	68.5	58.2
NM_2	Fulbaria, Dhaka	23.725336°N 90.405850°E	Commercial Area	45.2	67.8	57.1
BD Noise Standards (2006) and World Bank Standard (2007)		**Receptor**		Day (Avg.)		
		Silent areas		50/NP		
		Residential		55/55		
		Mixed		60/NP		
		Commercial		70/70		
		Industrial		75/70		

** The amended schedule-4, 2006, of (Noise Measurement Standard) Environmental Conservation Rules, 1997*

169 The above **Table 12** shows that the proposed location of Dhaka City Corporation was falls under commercial zone. The existing general maximum, minimum and average noise level recorded as 68.5 dB, 44.3 dB, 58.2 dB in location one and 67.8 dB, 45.2 dB, 57.1 dB in location two. The standard of commercial zone (day time) both for DoE and WB 70 dB. The measured value is much below than the standard of commercial zone land use (DoE, 1997) and World Bank Standard.


Figure 26: Noise Level Measurement at Fulbaria Project Site

4.4.3 Groundwater Quality

170 The water table varies across the corridor but is typically shallow at around 4-7 m below the ground surface with a small seasonal variation during dry season. Groundwater table fluctuation indicates the recharge and discharge to the groundwater reservoir. The highest groundwater table occurs during the month of August-September when the aquifer recharges fully and the surface water level and groundwater table merges.

171 Ground water sample was taken once during the study period from one location for Construction of 4-Storied Engineer's Main Office (EMO) Building with 16- Storied Foundation and Three Basements at Fulbaria, Dhaka. The ground water samples were collected on 26th January 2023. Detail Sampling Location and parameter values are provided in the following Table 13.

Table 13: Ground water sampling results for the EMO Building, January 2023

Sample ID	Sampling Location	Coordinates	Results									
			Temp	As	Fe	Mn	pH	DO	TDS	Alkalinity	Chloride	E. Coli
			°C	mg/L	mg/L	mg/L	-	mg/L	mg/L	mg/L	mg/L	CFU/100
GW-01	Fulbaria, Dhaka	23.725313 N 90.406010 E	24.8	0.001	0.05	0.03	6.7	4.1	396	40	70	0
Bangladesh Standard for Ground Water (ECR' 97 mg/L)			20-30	0.05	0.3-1	0.1	6.5-8.5	6.0	1000	-	150-600	0
WHO Guideline for Ground Water, 2004			30	0.01	0.3	0.5	6.5-8.5	6.5-8	500	-	-	0

Arsenic (As)

172 From the analyses of laboratory test the concentration level of Arsenic (As) was found in 0.001 ppm in the tested water samples which complies the Bangladesh Standards for Ground water (ECR, 1997) as 0.05 ppm and WHO guideline 0.01 ppm in the sample shows in Table 13. Considering this level of as found in the samples indicating the water is acceptable for drinking water purpose. Therefore, it is noted that the construction activity has no effect to the groundwater quality.

Iron (Fe)

173 The laboratory tested groundwater samples found the concentrations of Fe is 0.05 mg/L while the standard value ranges from 0.3 to 1.0 mg/L for Bangladeshi perspective (table 9). The concentration level of Fe is varying from region to region. Although high iron in drinking water is not a major health problem, it may unacceptable to users at high concentrations. Besides, it is a problem varied region to region instead of construction effect. Therefore, it is noted that the construction activity has no effect to the groundwater quality. Additionally, contractor provided filtered drinking water for the worker to avoid any kind of health problem.

Manganese (Mn)

174 The laboratory tested report shows (table 9) the Mn value is 0.03 mg/L. Considering the concentration level Mn is not higher than set by the GoB standard (0.1 mg/L) and WHO have set a guideline value of 0.5 mg/L. Considering this level of Mn found in the sample area indicating the water is acceptable for drinking water purpose.

Dissolved Oxygen (DO)

175 Dissolved oxygen refers to the level of free, non-compound oxygen present in water or other liquids. It is an important parameter in assessing water quality because of its influence on the organisms living within a body of water. In limnology (the study of lakes), dissolved oxygen is an essential factor second only to water itself. A dissolved oxygen level that is too high or too low can harm aquatic life and affect water quality. The laboratory tested report shows the DO value found 4.1 mg/L, which complies the Bangladesh Standards for Ground water (ECR, 1997) as 6.0 mg/L and WHO guideline 6.5-8 mg/L in the tested sample.

Total Dissolved Solid (TDS)

176 Total dissolved solids (TDS) are the amount of organic and inorganic materials, such as metals, minerals, salts, and ions, dissolved in a particular volume of water; TDS are essentially a measure of anything dissolved in water that is not an H2O molecule. The laboratory tested groundwater sample found the concentrations of TDS is 396 mg/L while the standard value ranges 1000 mg/L for Bangladeshi and 500 mg/L for WHO perspective. The finding concentration level of TDS is lower than the stand.

Alkalinity

177 The acid neutralizing capacity of water is known as alkalinity. Presence of high alkalinity in water gives a bitter taste to water. At the same time, however, the major concern about water alkalinity is related to the reactions that may occur between alkalinity and certain cations in water. The resulting sediment can lead to clogging of pipes and other water supply network accessories. From the tested value (Table 13) shows the concentration of alkalinity is 40 mg/L. No health-based guideline value is proposed for chloride in drinking-water.

Chloride

178 Chloride is a naturally occurring element that is common in most natural waters and is most often found as a component of salt (sodium chloride) or in some cases in combination with potassium or calcium. The concentration of chloride in the tested value is 70 mg/L while the standard value ranges 150 mg/L to 600 mg/L for Bangladeshi and WHO has no health based guideline for chloride.

E. Coli

179 The laboratory tested report shows 0.0 CFU/100ml levels of E. Coli for all samples. Therefore, it is noted that the construction activity has no effect to the groundwater quality. Considering this level of E. Coli concentration as found in the sample indicating the water is acceptable for drinking water purpose.

180 The ground water concentration of all tested parameter are well within the permissible limit in accordance with the DoE (Environmental Conservation Rules, 1997) and WHO standards. The Ground water quality for EMO building area's is shown in the following Table 13. The concentration levels of Temperature, pH, chloride, As, Mn, Fe, TDS, DO, Alkalinity, Chloride and E. Coli for tube well water were found within limit of drinking water.

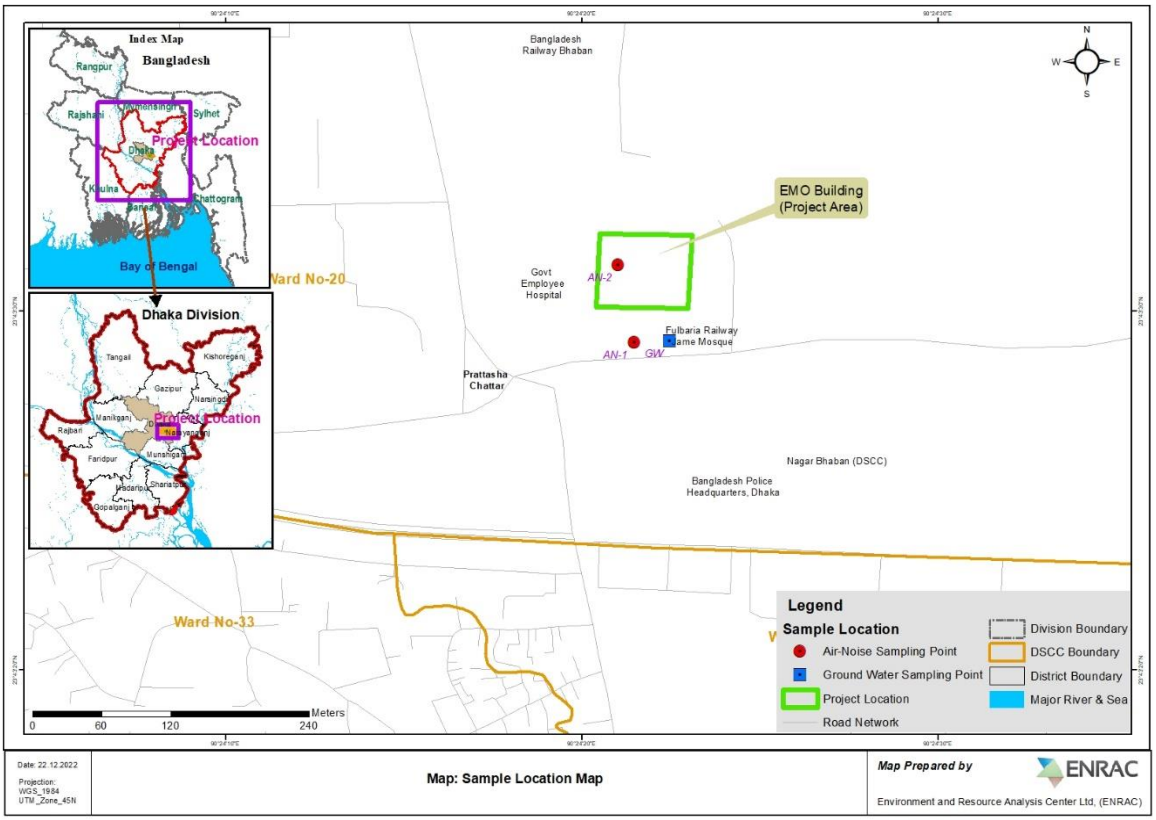


Figure 27: Sample location Map

4.5 Biological Environment

4.5.1 Bio-Ecological Zone of Bangladesh

181 Bangladesh enjoys a diverse array of ecosystems having its relatively small geographic boundary. Each of the ecosystems has many sub-units with distinct characteristics as well. IUCN Bangladesh in 2002 classified the country into twenty-five Bio-Ecological Zones (BEZ). The project location falls within bio-ecological zones: Brahmaputra-Jamuna Floodplain (Zone 4c) **(Figure 29)**.

4.5.2 Ecological Critical Area and Protected Areas of Bangladesh

182 An Ecologically Critical Area (ECA) is an environmental protection zone in Bangladesh. In 1995, specific areas in Bangladesh could be deemed Ecologically Critical Areas as a result of the Environmental Conservation Act. The Government after considering the human habitat, ancient

monument, archaeological site, forest sanctuary, national park, game reserve, wild animal habitat, wetland, mangrove, forest area, biodiversity and other relevant factors of the area can be declared as ECA. As per the legal mandate the MOEF till now declared 13 areas as ECA. DoE as a statutory body is entrusted to manage the ECAs. There is no ECA and EPA area falls within the proposed EMO building project area. However, the nearest ECA area Buriganga and Balu River are 1.7 km and 9.5 km respectively far in an aerial distance from the project boundary. On the other hand, Mirpur Botanical Garden the EPA area is 11 km far in an aerial distance from the project boundary. **Figure 30** and **Figure 31** shows ECA and EPA Map of Bangladesh with the proposed EMO building project.

4.5.3 Terrestrial Ecosystem

183 The major habitats present within the study area were homestead and roadside vegetation with native and exotic planted trees.

4.5.4 Terrestrial Flora

184 Although there is no natural or planted forest near the project area. The plain land is mostly covered under homestead and roadside vegetation containing varieties of fruit trees and other trees. A total of 24 species of plants has been recorded during the field survey. The most common trees recorded in the study area area karoi (*Albizzia procera*), Lal bot (*Ficus benghalensis*), Pakur (*Ficus virens*), Mehogoni (*Swietenia mahagoni*), Akasmoni (*Acacia auriculiformis*), Coconut (*Cocos nucifera*), Boroi (*Ziziphus mauritiana*), etc. However, all these trees are scattered. Mango (*Mangifera indica*), betel nut (*Areca catechu*), jack fruit (*Artocarpus heterophyllus*), jaam (*Eugenia jambolanavav*), banana (*Musa sapientum*), litchi (*Litchi chinensis*), papaya (*Carica papaya*), jambura (*Citrus decumana*), etc. are among common fruits found in this study area. The total list of plant is presented in **Appendix Five.**

Homestead and Roadside Vegetation

Figure 28: Terrestrial Flora near Project Area

4.5.5 Terrestrial Fauna

There are some avifauna, and an artificial lake within the 1 km buffer of the study area. Among the amphibian Common Toad (Duttaphrynus melanostictus), Bullfrog (Hoplobatrachus tigerinus) was spotted. Both of the species were the least concern.

Common Garden Lizard (*Calotes versicolor*), House lizard (*Hemidactylus bowringii*), and Brahminy Skink (*Eutropis carinata*), are frequently seen in the study area and Smooth water snake (*Enhydris enhydris*) very occasionally seen near the study area. All these reptiles are least concern.

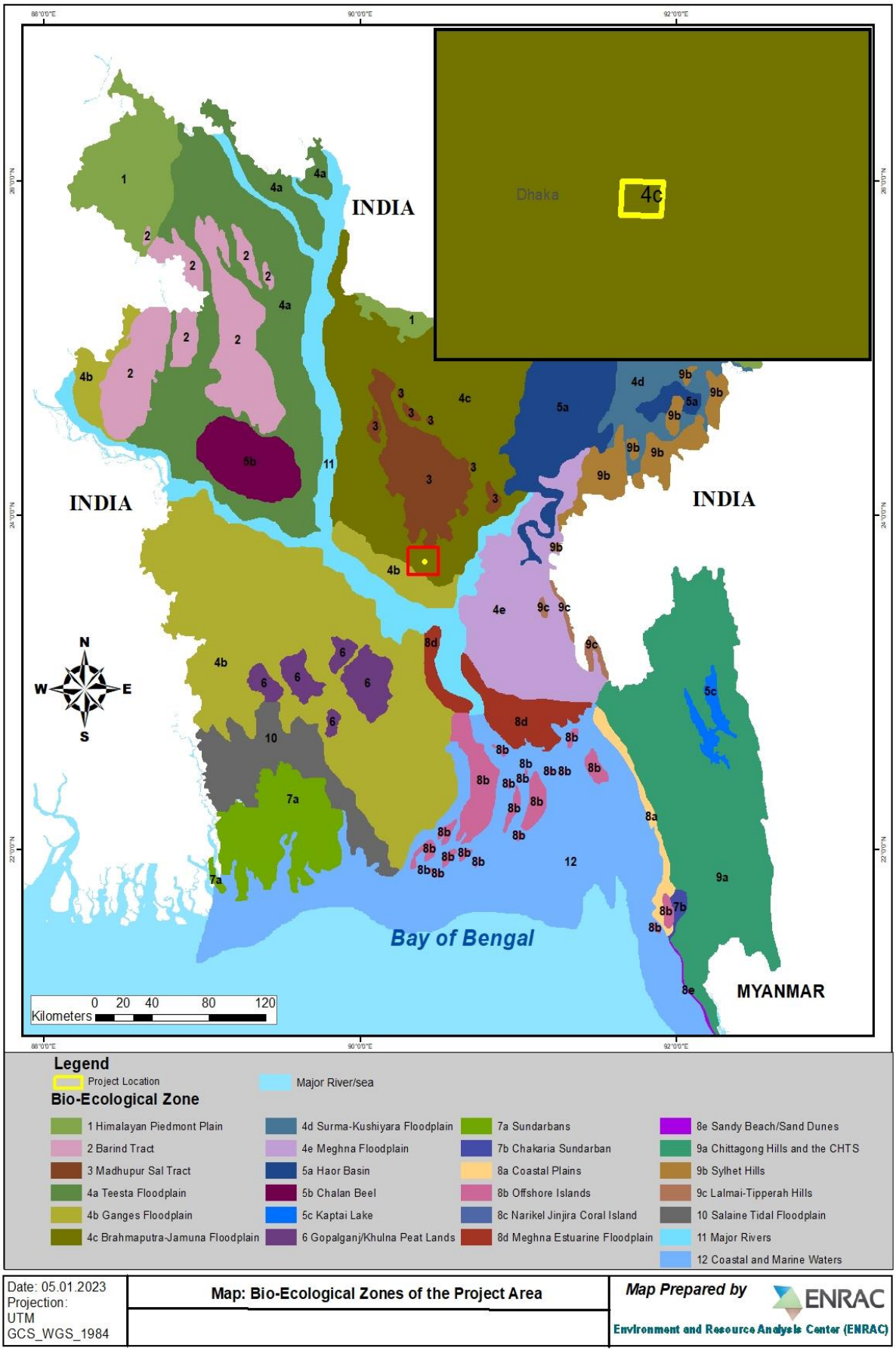
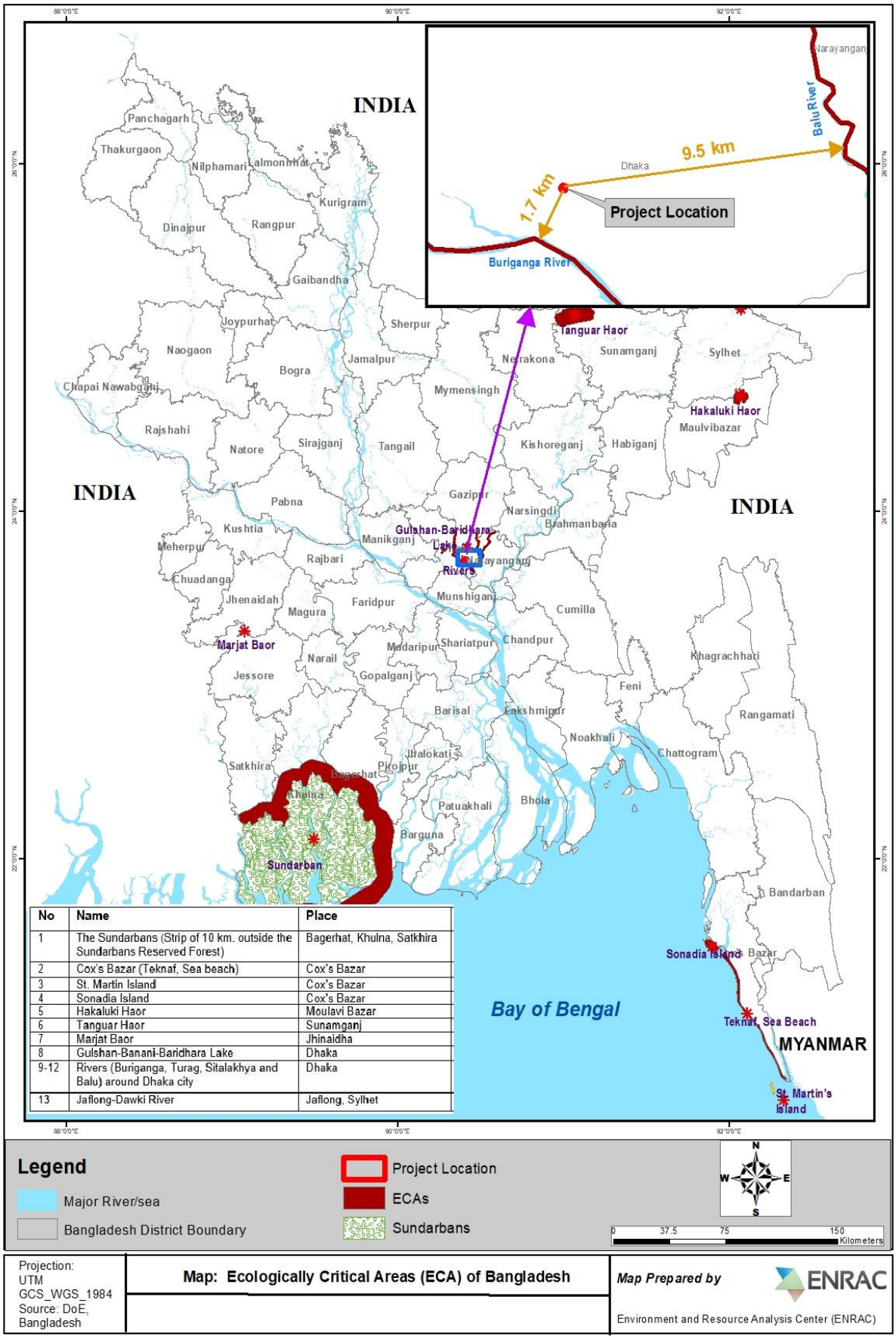


Figure 29: Bio-Ecological Zone of Proposed Project Area



No	Name	Place
1	The Sundarbans (Strip of 10 km. outside the Sundarbans Reserved Forest)	Bagerhat, Khulna, Satkhira
2	Cox's Bazar (Teknaf, Sea beach)	Cox's Bazar
3	St. Martin Island	Cox's Bazar
4	Sonadia Island	Cox's Bazar
5	Hakaluki Haor	Moulavi Bazar
6	Tanguar Haor	Sunamganj
7	Marjat Baor	Jhinaidha
8	Gulshan-Banani-Baridhara Lake	Dhaka
9-12	Rivers (Buriganga, Turag, Sitalakhya and Balu) around Dhaka city	Dhaka
13	Jaflong-Dawki River	Jaflong, Sylhet

Figure 30: Ecological Critical Area of Proposed Project Area

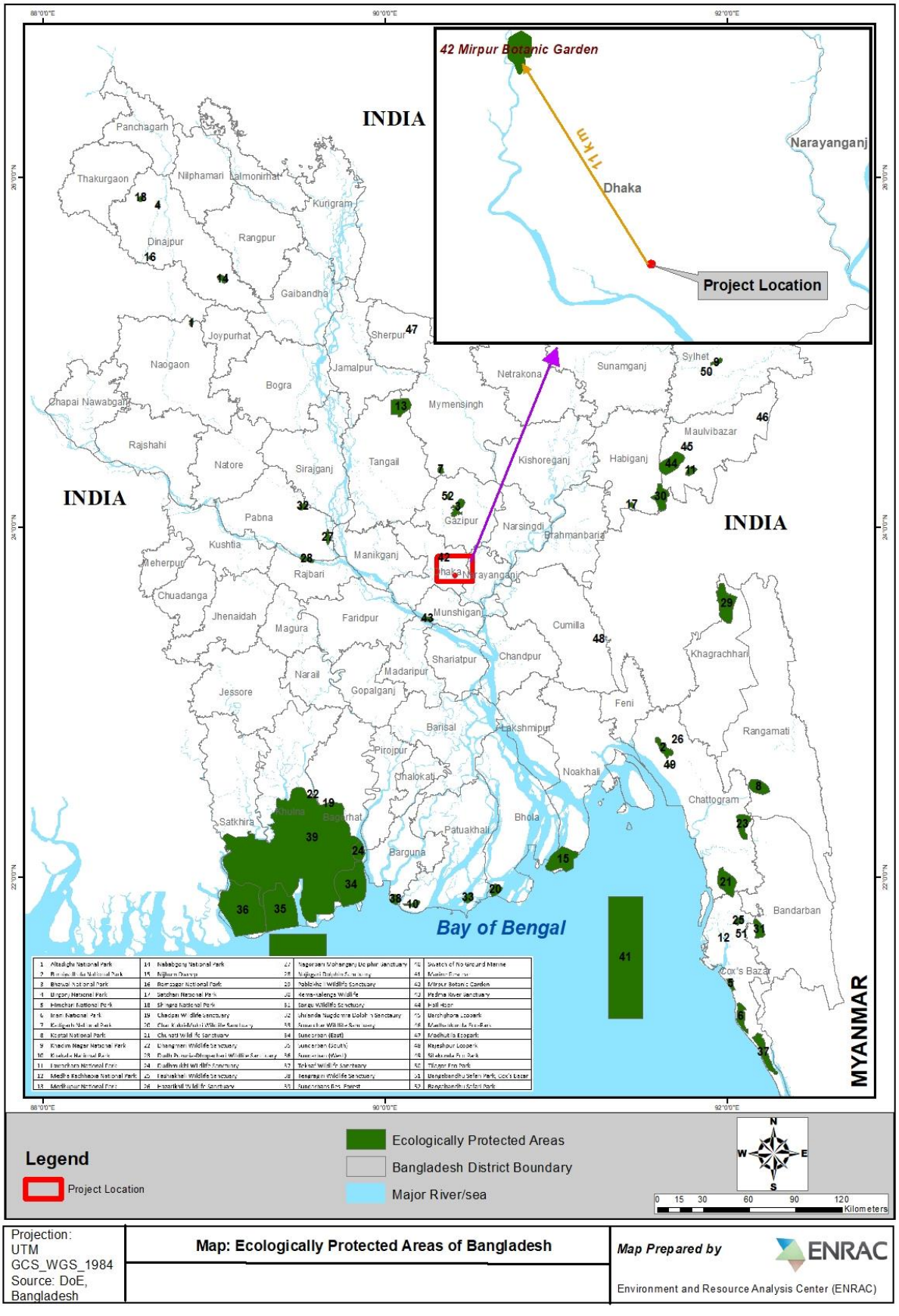


Figure 31: Ecological Protected Area of Proposed Project Area

185 Many colorful and singing birds were found in the study area. Direct observation was followed to document the avifauna during the extensive field survey, and dominant species were noted as Brahminy Kite (*Haliastur indus*), Common Myna (*Acridotheres tristis*), Red-vented Bulbul (*Pycnonotus cafer*), Oriental Magpie Robin (*Copsychus saularis*), Spotted Dove (*Spilopelia chinensis*), House Sparrow (*Passer domesticus*), Jacobin Cuckoo (*Jacobin Cuckoo*), White-browed Wagtail (*Motacilla madaraspatensis*), White rumped Shama (*Copsychus malabaricus*), etc. within the study area. All these species were observed near the homestead, cropland, and roadside vegetation. Full list is presented in **Annexure**.

186 During the field survey, Indian Flying Fox (*Pteropus giganteus*), Common House Rat (*Rattus rattus*) and squirrel (*Callosciurus erythraeus*), were noticed. However, while consultation with the locals, they confirm about the Common Mongoose (*Herpestes edwardsii*) is seen very frequently and Bengal Fox (*Vulpes bengalensis*) is a threatened species which is rarely seen. Apart from that, a few domestic mammals namely cow, cat and goat were found.

Table 14: Summary of IUCN Threatened Status of Wildlife within the Study Area

Group	Total No.	EX	RE	CR	EN	VU	NT	LC	DD	NE
Amphibians	2	-	-	-	-	-	-	2	-	-
Reptiles	4	-	-	-	-	-	-	4	-	-
Birds	16	-	-	-	-	-	-	16	-	-
Mammals	5	-	-	-	-	1	-	4	-	-
Total	**27**	**-**	**-**	**-**	**-**	**1**	**-**	**26**	**-**	**-**

Code: EX-Extinct, RE-Regionally Extinct, CR-Critically Endangered, EN-Endangered, VU-vulnerable, NT-Near Threatened, LC-Least Concern, DD-Data Deficient, NE-Not Evaluated
Source: (IUCN, 2015)

Figure 32: Common Terrestrial Fauna Near Project Area

4.5.6 Aquatic Ecosystem of the Project Area

187 Aquatic ecosystem comprises the ponds, rivers, canals, ditches, beels, etc., are the habitat of the various floral and faunal species. The freshwater provides important nursery ground for native fish.

4.5.7 Aquatic Flora

188 The water bodies of the study area are ornamented by different aquatic plant species such as free floating, rooted floating, submerged, and marginal plants. Aquatic floral within the study area include aquatic vegetation species, *Alternanthera philoxeroides* (Helencha), *Cyperus iria* (Mutha), *Eichhornia crassipes* (Kachuripana), *Lemna minor* (Lemna), *Monochoria hastate* (Kochuripana), *Utricularia exoleta* (Jaji), etc., within the study area.

4.5.8 Aquatic Fauna

189 The faunal species present in the aquatic ecosystems are the common kingfisher (*Alcedo atthis*), Indian pond heron (*Ardeola grayii*), snipe (*Gallinago stenura*), water snake (*Enhydris enhydris*), common toad (*Bufo melanostictus*), and others.

Aquiatic Mixed Vegetation

Kolmi, Helencha, Kochuripana etc.

Indian Pond Heron

White-breasted kingfisher

Figure 33: Common Aquatic Flora and Fauna

4.5.9 Fish Species

190 The study area mostly covered high raise building and settlement area. Therefore, no fishing activity was noticed. However, in the fish marked survey, a good number of variety of fish species were recorded and mostly the species are bought from the other places of the city/country. Some of the commonly available fishes are ruhi or salmon (Labeo rohita), mrigel (Cirrhinus mrigala), kalbous (Labeuca), katla or carp (Catla catla), etc. soal fish (Chann striatus), boal/sheat fish (Wallago atttu), tapsi (Polynemus paradiseus), dhain, chital (Notopterus chitala), pangas (Pangasius pangasius), bain (Mastacembelus armatus), chapila (Gudusia chapra), golhsa (*Mystas bleekeri*), tengra (*Mystus vittatus*), chanda (*Mene muculata*), kachki (*Corica soborna*), baila (*Glossogobius giuris*), tatkeni (*Crosscheilus latius*), pabda

(*Ompok pabda*), koi or climbing fish (*Anabas testudineus*), puti (*Barbus puntius*), sharputi (*Puntius sarana*), taki (*Channa punctatus*), shrimps, and prawn are found in the market. A list of fish species is presented in **Annexure Seven**.

Figure 34: Market Fish Survey

4.5.10 Conservation Significance

191 The project areas is not the specific habitat for any particular species of flora and fauna hence none such species will be specifically affected due to project implementation. Previously declared protected areas are critical areas were not found within the project area either. Any activities along these areas should be cared for biodiversity conservation issues. In conclusion, the actual study area does not cross into any sensitive ecosystem.

4.6 Socio-economic Environment

192 This section provides a profile and analysis of the socio-economic characteristics that currently exist within the project corridor. The data analyzed in this section have been collected from a number of primary and secondary sources as detailed in the methodology section which includes:

- Interviews with government officials of district and city corporation;
- Field assessments for community property resources, historical, cultural and archaeological sites;
- Published government documents, especially those of the Bangladesh Bureau of Statistics (BBS), including census data on agriculture; and
- Reports by international organizations.

4.6.1 Economic, Cultural and Social Development (Socio-economic Profile)

193 The project area is located in the Fulbaria (Ward-20) area of Shahbag Thana, Ramna Mouza of Dhaka South City Corporation. **Table 15** Summarizes the key demographic characteristics of the Dhaka City Corporation of the project corridor.

Table 15: Demographic Characteristics of Dhaka District

Name of District	Area (sq km)	Household	Household Size	Total Population	Male	Female	Density (per sq km)	Literacy Rate (%)
Dhaka	1463.60	2786133	4.21	12043977	6555792	5488185	8229	70.5

(Statistics, Population & Housing Census 2011)

4.6.2 Population

194 Dhaka is the capital city of Bangladesh. Its stands on the bank of Buriganga river. The zilla is consist of 41 metropolitan Thana's where the project area is located in Shahbagh Thana at Dhaka City Corporation. The density of Shahbagh Thana is 41.2% (per s.q km) and household size is 4.03.

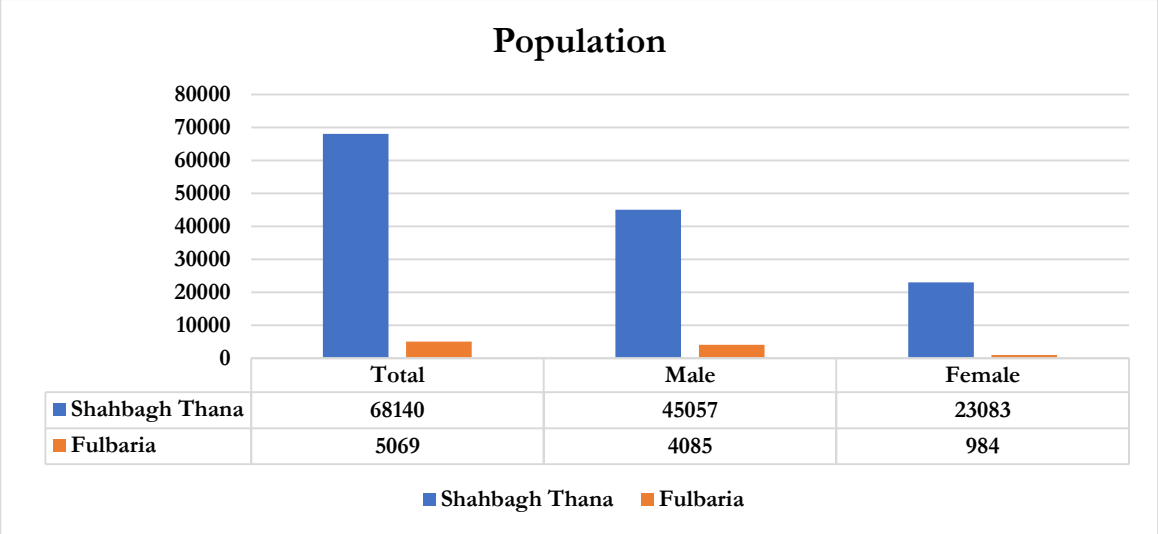


Figure 35: Total Population of Dhaka District

195 **Figure 35** shows that, according to (Statistics, Population & Housing Census 2011), total population of Shahbag thana is 68140 and the study area has about 7.41% population. The male population (4085) is higher than female population (984).

4.6.3 Age Distribution

196 The age distribution of socio-economic analysis connects with death rate, economic and livelihood activity. The economic activity rate determines the percentage of people between the ages of 16 and 64 who are employed or looking for work. A high economic activity rate indicates that a large number of individuals are employed, seeking employment, or in training. 30.1% and 23.6% people are from age of 30-49 in Fulbaria and Shahbag Thana. Also, the age distribution indirectly shows probability or indicates the death rate.

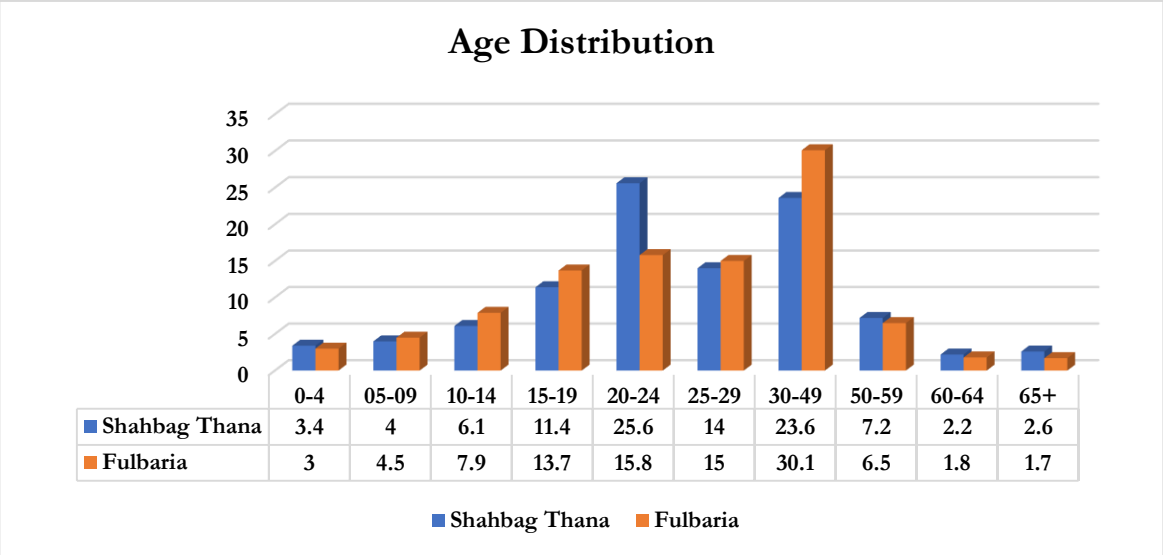


Figure 36: Age Distribution of the Project Area

4.6.4 Literacy Rate

197 The literacy rate of the study area is illustrated below graph. According to (Statistics, Population & Housing Census 2011) community report, it's noticed that total literacy rate is 84.7% and 58% and male literacy rate is higher than female literacy rate in Shahbag thana and Fulbaria.

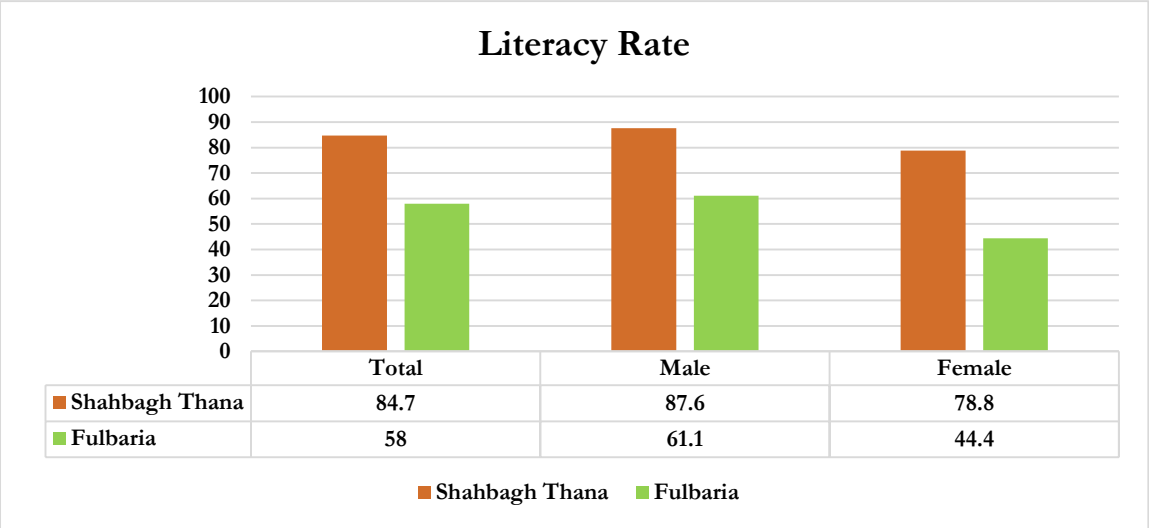


Figure 37: Population with Literacy Rate of Project Access District

4.6.5 Religious Status

There are a number of different religions; Muslims, Hindus, Christians, Buddhists, and others. The majority of the people from the study area were Muslims and very a smaller number of Hindus were present there (**Figure 38)**. According to (Statistics, Population & Housing Census 2011) community report, Most of the people of Shahbagh thana practices Islam. 4982 people Muslim, 68 people hindu, 2 people Christian and 17 people are buddist. The following religions practiced by the people of the project covering district respectively.

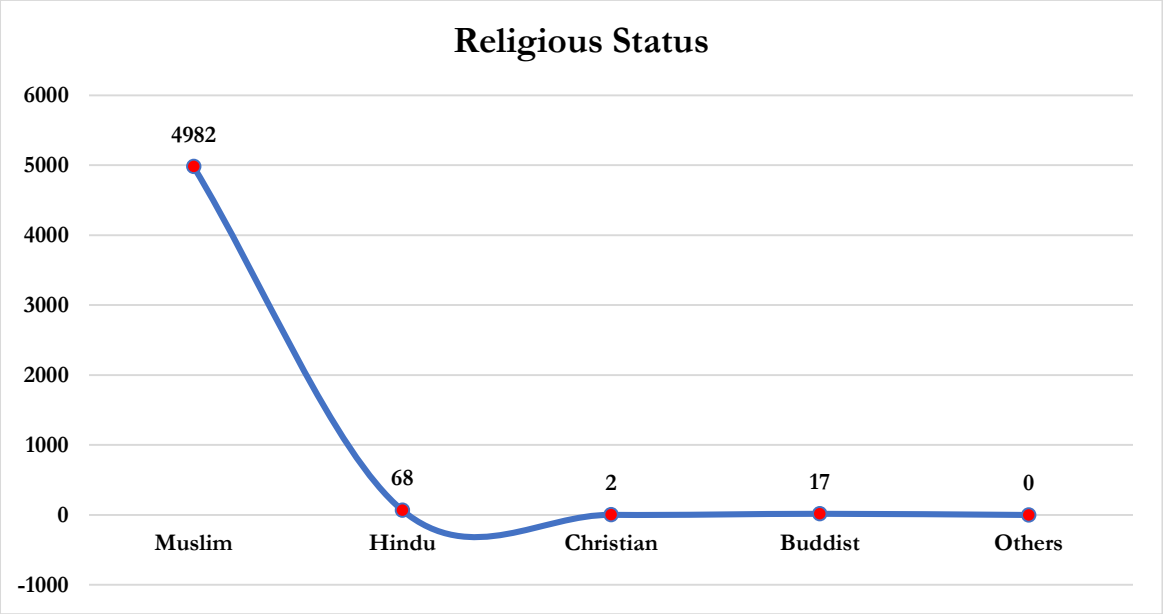


Figure 38: Religious status of the Project Covering Districts

4.6.6 Employment Status

198 According to (Statistics, Population & Housing Census 2011) census data on employment (Figure 40) for study area, the project corridor indicates that about 70% people of Shahbagh thana are serviceholders. The population depend on industrial and service work. Service is the main occupation here (696 are male and 75 are female) among the employed people. After that, industry hold the second position (297 male and 12 female) and then agriculture category (9 male) were observed. Both male and female 198 people does the household work,198 people do not work and 40 people are looking for work.

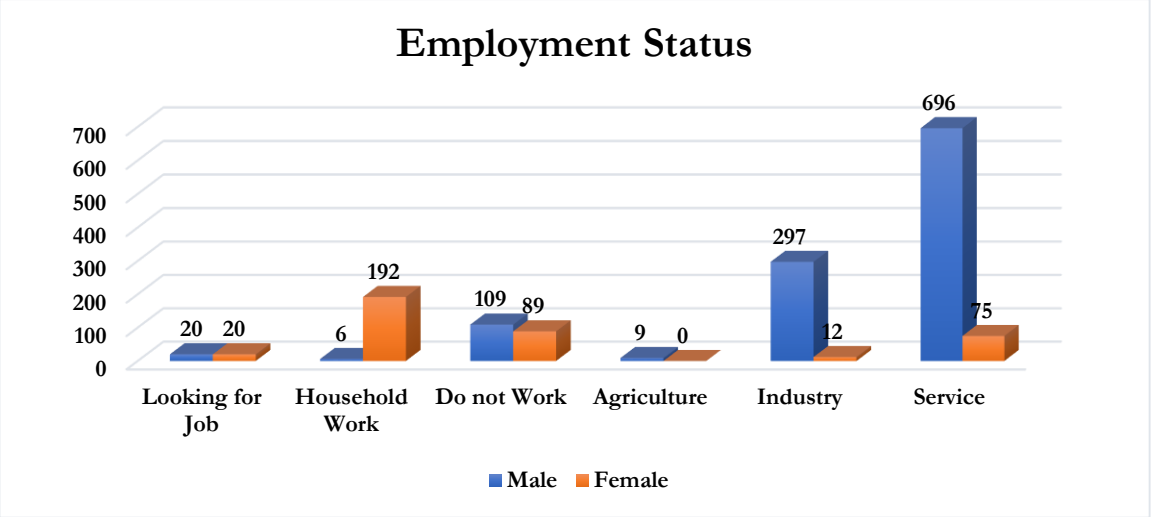


Figure 39: Occupations and Livelihood Status of Project District's Area

4.6.7 Drinking Water

199 According to (Statistics, Population & Housing Census 2011)- community report of study area, most of the people drinking here pure water. 35.85% general households get the facility of drinking water from tube-well, 31.9% from tap and the remaining average 32.3% household get water from other sources (**Figure 40**).

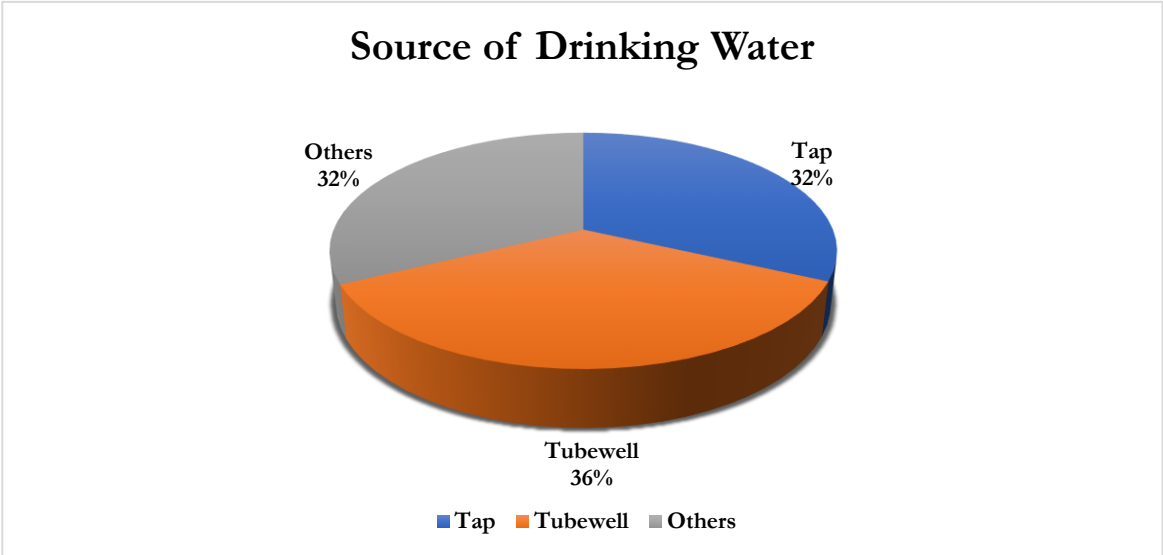


Figure 40: Source of Drinking Water of the Project District's Area

4.6.8 Sanitation Status

200 Sanitation of dwelling households of the study area shows three categories with sanitary latrine, non-sanitary latrine and no toilet facilities. According to (Statistics, Population & Housing Census 2011)-community report, Fulbaria has good sanitation system. Maximum household use sanitary toilet in this district (86%). Non-sanitary system was recorded as 13% and very insignificant percentage (1%) having no sanitary facility. **Figure 41** represents the sanitation facility of the district.

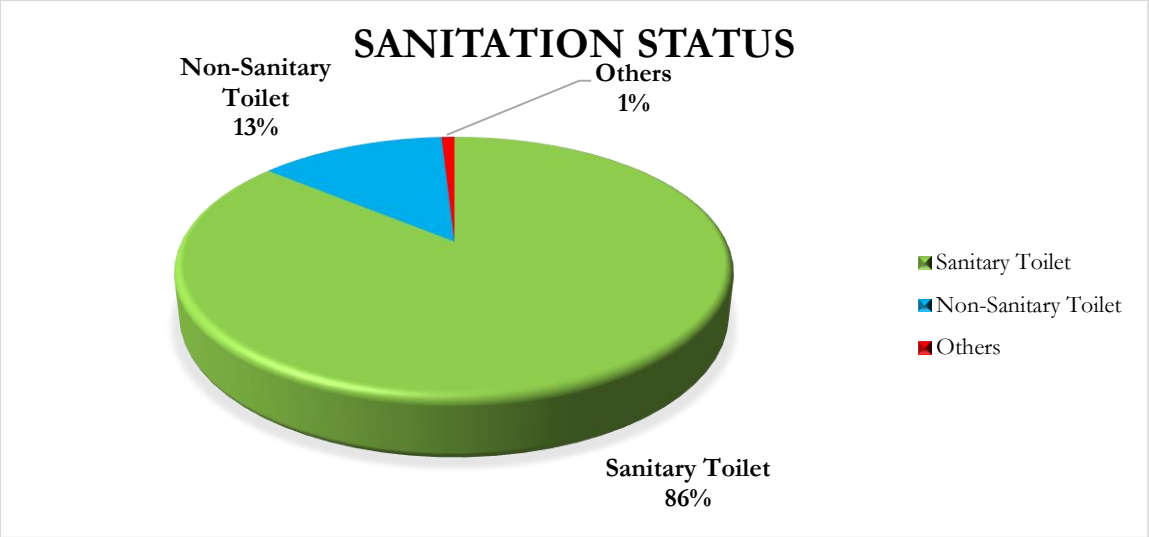
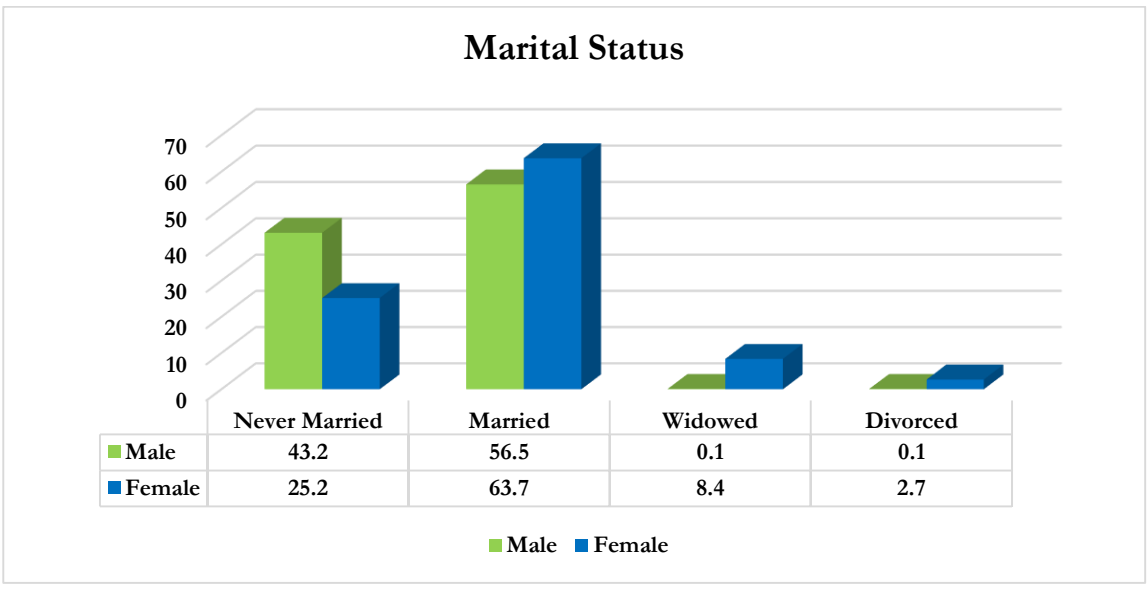


Figure 41: Sanitation Facility of the Project District's Area

4.6.9 Marital Status

Marital status shows four categories with never married, currently married, widowed/widower and divorced/separated. Among these four types, value of currently married is comparatively higher than other three categories (56.5% male and 63.7% female). However, never married recorded as 43.2% for male and 25.2% for female which hold the second position of these four categories, then widowed/widower was recorded as 0.1% for male and 8.4% for female and divorced/separated 0.1%(Male) and 2.7%(female) respectively.



	Never Married	Married	Widowed	Divorced
Male	43.2	56.5	0.1	0.1
Female	25.2	63.7	8.4	2.7

Figure 42: Marital Status of the Project District's Area

4.6.10 Housing types

There are four different types of house in the project district area. Following **Figure 43** illustrates the type of housing the project's district area. The graph also represents the percentage of existing housing in the study area. Among the four types of housing semi pucca were observed the maximum percentage (42%) of the project area. Jhupri were notices as 23% and pucca were 21%. Kutcha type housing was also observed there. 14% housing recorded as kutcha type.

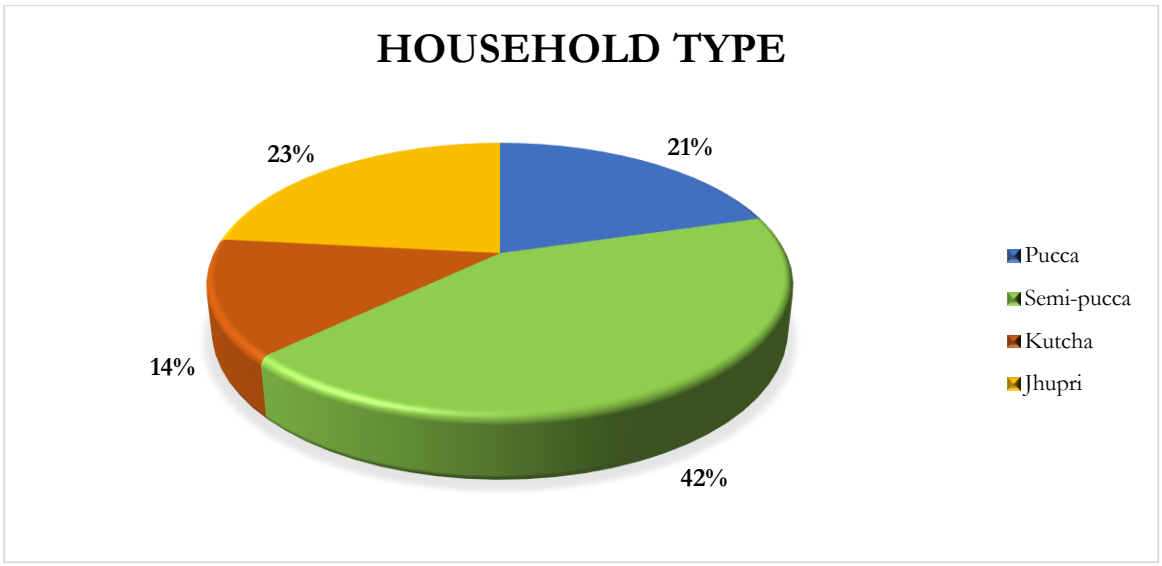


Figure 43: Housing types of the Proposed Project's District Area

4.6.11 Rail, Roads and Traffic

201 The project area is well connected by national and regional road and rail network. Local transport includes trains, trucks, buses, cars, jeeps, baby taxis, tempos, motor cycles, bicycles and rickshaws. In the surrounding rivers, both mechanized and traditional country boats regularly carry passengers and goods. Horse carriage were the traditional transports found around the study area.

4.6.12 Cultural Aspects

202 There are a number of different religions; Muslims, Hindus, Christians, and Buddhists, among others. Besides the general culture and heritage of the area, culture also differs throughout the regions.

203 The annual cultural events, festivals and celebrations are Independence Day (26 March), the International Mother language Day (21 February), Victory Day, Pohela Boishakh, Ekushey Book Fair, Dhaka Art Summit, Rabindra Joyonti and Nazrul Joyonti; the Hindu festivals including the Durga Puja, Janmashtami and Rathayatra; the Muslim festivals of Eid ul-Fitr, Eid ul-Adha, Milad-un-Nabi, Shab-e-Baraat and Muharram; Buddhist festival of Buddha Purnima and Christian festival of Christmas. The old Dhaka people also celebrates a festival named Shakrain. The Shakrain Festival, also known as the Kite Festival and Ghuri Utsob, is celebrated in Dhaka, Bangladesh, and is celebrated by kite flying. At the end of Poush (Bengali calendar) takes place January 14 or 15 (Gregorian calendar) across the city.

4.6.13 Archaeological, Historical Treasures and Scenic Areas

204 Among the archaeological heritages and relics; Lalbagh Fort and the tomb of Pari Bibi (1668), Bara Katra (1641), Chhota Katra, the tomb of BibiChampa (1663), Ancient Fort and the palace of the Nawab (Jail Hospital, 1638), Ahsan Manzil (1872), Husaini Dalan (1642), Binod Bibi Mosque (1456 AD), Seven Domed Mosque (1676), Chawk Mosque (1676), Bibi Meher Mosque (1814), Armanitola Mosque (1716), Khawja Shahbaj Mosque (1679), Shayesta Khan Mosque (1664), Khawja Ambar

Mosque (1677), Moriam Saleh Mosque (1706), Sitara Begum Mosque (1815), Farruk Shayer Mosque (1703), Tara Mosque, Kartalab Khan Mosque (1700), Holy Rosary Church (1678), Setara Begum Mosque (1819), Bagmara Math (Nawabganj), Home stead of Raja Harish Chandra (eighteenth century, Savar), Shree ShreeSani Ashram and Math (1199 AD), Dhakeshwari Mandir (seventeenth century), Jaykali Mondir, Bahadur Shah Park, Nimtali Deuri (Asiatic Society of Bangladesh, 1765), Karzon Hall and Salimulla Muslim Hall of University of Dhaka are notable.

4.6.14 Agro-Ecological Zone

Agro-ecological Zones of Bangladesh define the fertility of land units in terms of Physiography, hydrology, seasonal flooding, soil type and tidal activity. Bangladesh has been tentatively divided into 30 agro ecological zones and 88 agro-ecological sub regions (Statistics, Division, & Planning, Yearbook of Agricultural Statistics, 2020). The proposed project will be established in Dhaka City Corporation. The study area falls under urban area agro-ecological zones of Bangladesh. **Figure 44** shows the Agro Ecological Zone map of the proposed project.

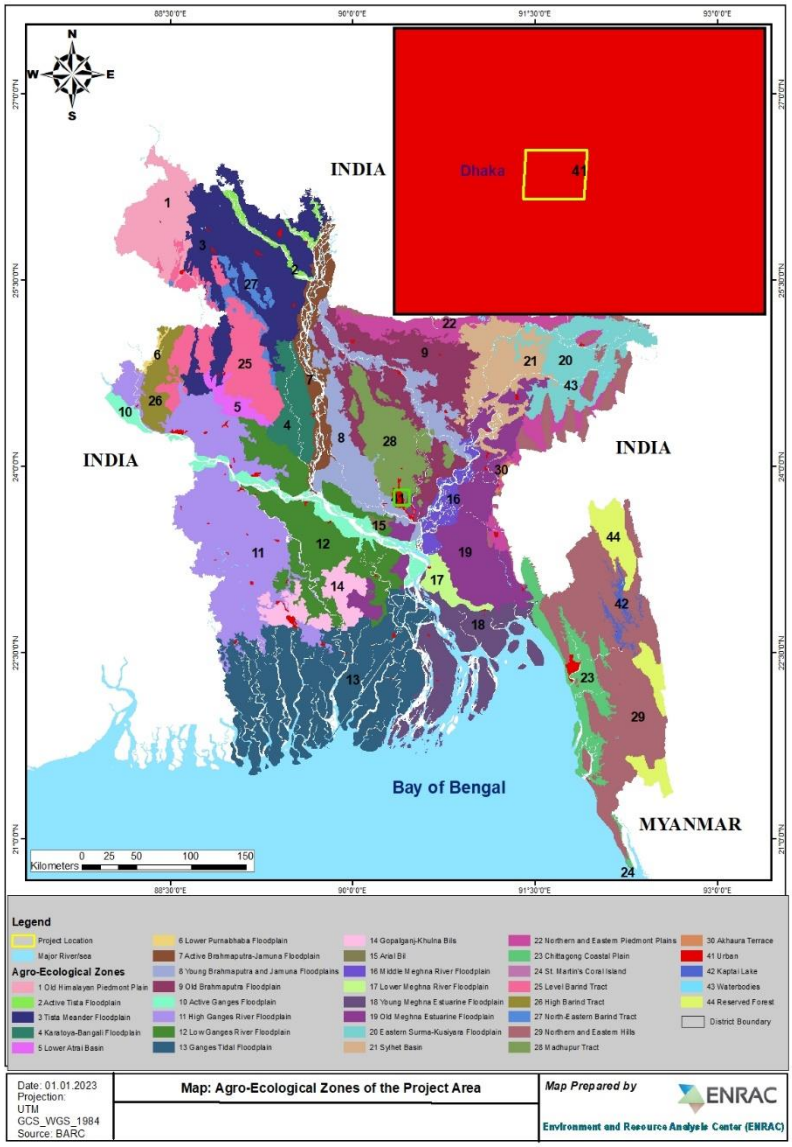


Figure 44: Agro-Ecological Zones of Proposed Project Area

5 Identification of Potential Impacts

5.1 General Considerations

205 Prediction of Impacts is the most important component in the Initial Environmental Examination report. Several scientific techniques and methodologies are available to predict the impacts of developmental activities on physical, ecological, and socio-economic environments. Such predictions are superimposed over the baseline (pre-project) status of environmental quality to derive the ultimate (Post-project) scenario of environmental conditions.

206 The prediction of impacts helps in minimizing the adverse impacts on environmental quality during pre and post-project execution. In the case of water, land, and socio-economic environments, predictions have been made based on available scientific knowledge and judgments. In this chapter, an attempt has been made to predict the incremental rise of various ground-level concentrations above the baseline status due to the emissions from this proposed project.

5.2 Scoping of Impacts

207 The potential impacts due to the implementation of the Project are identified by using a comprehensive checklist. This method is described below:

208 The checklist is a comprehensive list of environmental effects and impacts indicators designed to stimulate the analysts to think broadly about possible consequences of contemplated actions (Munn, 1979). **Table 16** represents the checklists developed for the project. In this checklist, actions, which may affect the various stages of the project activities, are listed and the degrees of Significant Environmental Impacts (SEIs) are shown. The terms none, minor, moderate, and major are used in the checklists to evaluate the magnitude of SEIs. In the checklist, both the construction and operational phases of the proposed development are considered separately to distinguish the short-term and long-term impacts. As can be seen from the checklist, the construction of this project will not have much impact on the environment.

Table 16: Impact Identification Checklist for Proposed Project

Project Activity/ Hazards																						
Item	Environmental Resources											Ecological Resource				Social-Economic Resources						
	Aesthetic & Visual Impact	Land Use	Soil Quality	Air Quality	Noise	Drainage	Surface water resource	Surface water quality	Groundwater resource	Groundwater quality	Traffic (road & river)	Terrestrial Flora	Terrestrial Fauna	Aquatic Flora	Aquatic Fauna	Job & economic opportunity	Economy & Livelihoods	Social & Cultural Structures	Land Use (Economic) Displacement)	Occupational health & safety	Cultural Resources	Community Health & Safety
Plant Location / Pre-Construction Stage																						
Site Clearing																						
Disruption of Earth Surface																						
Construction Phase																						
Site Development, Filling of land																						
Building construction, Building of temporary Structures																						
Heavy equipment operations																						
Storage, handling and disposal of waste																						
Labour camp																						
Influx of construction workers																						

Project Activity/ Hazards																						
Item	Environmental Resources											Ecological Resource				Social-Economic Resources						
	Aesthetic & Visual Impact	Land Use	Soil Quality	Air Quality	Noise	Drainage	Surface water resource	Surface water quality	Groundwater resource	Groundwater quality	Traffic (road & river)	Terrestrial Flora	Terrestrial Fauna	Aquatic Flora	Aquatic Fauna	Job & economic opportunity	Economy & Livelihoods	Social & Cultural Structures	Land Use (Economic) Displacement)	Occupational health & safety	Cultural Resources	Community Health & Safety
Transportation of manpower, equipment & materials by road																						
Storage and handling of chemicals																						
Operation Phase																						
Generation of domestic waste and Discharge																						
Wastewater discharge/ disposal																						
Hazardous material and waste storages																						

Represents "no" interactions is reasonably expected

Represents interactions reasonably possible but none of the outcomes will lead to significant impacts

Represents interactions reasonably possible with one of the outcomes may lead to potentially significant impact

6 Anticipated Environmental Impacts and Mitigation Measures

6.1 General Considerations

209 The methodology adopted for the study of environmental impacts consists of identification, prediction, and assessment/ evaluation of likely effects. The prediction of environmental impacts has a basis in pre-project baseline data and anticipated changes. The main objectives of predicting the effects of project activities are the delineation of an appropriate mitigation plan that would minimize the anticipated effects on the environment.

6.2 Impact Appraisal Criteria

210 The criterion which has been employed to appraise impacts on various social and environmental components is presented in **Table 17.**

Table 17: Impact Appraisal Criteria

Criteria	Sub-Classification	Defining Limit	Remarks
Spread: refers to an area of direct influence from the impact of particular project activity.	Local spread	Impact is restricted within the footprints of the Project boundary.	Except for ecology (which is defined as loss of vegetation only at the site)
	Medium Spread	Impact is spread from up to 2 km from the boundary of the Project.	Except for ecology (which is defined as loss of vegetation at the site including large trees with limited disturbance to adjoining flora & fauna)
	High Spread	Impact is spread up to 2 km to 5 km from the footprint boundary of the Project	Except for ecology (which is defined as loss of vegetation at the site and/or damage to adjoining flora and fauna)
Duration: based on the duration of impact and the time taken by an environmental component to recover back to its current state	Short Duration	When impact is likely to be restricted for less than 1 year	The anticipated recovery of the affected environmental component within 2 years
	Medium Duration	When impact extends up to 3 years	With an anticipated recovery of the affected environmental component within 6 years
	Long Duration	When impact extends beyond 3 years	With anticipated recovery of prevailing condition to happen within 6 years or beyond or upon completion of the project life
Intensity: defines the magnitude of Impact	Very Low intensity	When resulting in changes in the environmental baseline conditions is up to 10%	However, it shall be reconsidered where the baseline values are already high.

Criteria	Sub-Classification	Defining Limit	Remarks
	Low intensity	When resulting in changes in the baseline conditions up to 20%	For ecology, it refers to minimal changes in the existing ecology in terms of their reproductive capacity, survival, or habitat change
	Moderate intensity	When resulting in changes in the baseline conditions for up to 30%	For ecology, it refers to changes that are expected to be recoverable
	High intensity	When change resulting in the baseline conditions beyond 30%	While for ecology, high intensity refers to changes that result in serious destruction to species destruction to species, productivity, or their habitat
Nature: refers to whether the effect is considered beneficial or adverse	Beneficial		Useful to Environment and Community
	Adverse		Harmful to Environment and Community

211 A significance assessment matrix was developed to assess the impacts based on the appraisal criteria developed above, which is given in **Table 18.**

Table 18: Impact Significance Criteria

Spread	Duration	Intensity	Overall Significance	
			Adverse	Beneficial
Local	Short	Low	Insignificant	Insignificant
Local	Short	Moderate	Minor	Minor
Local	Medium	Low		
Local	Medium	Moderate		
Medium	Short	Low		
Local	Long	Low		
Local	Short	High	Moderate	Moderate
Local	Medium	High		
Local	Long	Moderate		
Medium	Short	Moderate		
Medium	Medium	Low		
Medium	Medium	Moderate		
Medium	Long	Low		
Medium	Long	Moderate		
High	Short	Low		
High	Short	Moderate		
High	Medium	Low		
High	Medium	Moderate		

Spread	Duration	Intensity	Overall Significance	
			Adverse	Beneficial
High	Long	Low		
Local	Long	High	Major	Major
Medium	Short	High		
Medium	Long	High		
Medium	Medium	High		
High	Short	High		
High	Medium	High		
High	Long	Moderate		
High	Low	Low		
High	Low	High		

212 The Impacts for the proposed project are covered under the following subsections:

- Pre-construction Stage
- Construction Phase
- Operational phase

Table 19: Impact Significance Criteria

Project Phase	Action Affecting Environmental Resources & Values	Without Mitigation Measures						With Mitigation Measures					
		Insignificant	Minor	Moderate	Major	Adverse	Beneficial	Insignificant	Minor	Moderate	Major	Adverse	Beneficial
Pre-Construction Stage													
Pre-Construction Stage	Landscape Change	✓						✓					
	Eco-systems		✓					✓					
	Ambient Air			✓					✓				
	Ambient Noise			✓					✓				
	Storage and Disposal Areas			✓					✓				
Construction Stage													
	Site Development activities			✓					✓				
	Labor Camp			✓					✓				
	Ecological Impact		✓						✓				
	Impact on Ambient Air			✓					✓				
	Impact on Ambient Noise			✓					✓				
	Impact on Water Bodies			✓					✓				
	Occupational Health and Safety Hazards		✓					✓					
	Impact due to Traffic and Transport			✓					✓				
	Community Health and Safety			✓				✓	✓				

Project Phase	Action Affecting Environmental Resources & Values	Without Mitigation Measures						With Mitigation Measures					
		Insignificant	Minor	Moderate	Major	Adverse	Beneficial	Insignificant	Minor	Moderate	Major	Adverse	Beneficial
	Employment				✓								
Operation Stage													
Operation Stage	Impact on Energy		✓					✓					
	Impact on Water		✓					✓					
	Solid Waste Disposal			✓				✓					
	Impact on Occupational Health and Safety			✓					✓				
	Utilities			✓				✓					

	Insignificant
	Minor
	Moderate
	Major
	Adverse
	Beneficial

6.3 Pre-Construction Stage Impact

213 Associated potential environmental impacts will be mainly during the construction phase of the building, which are temporary, of short duration, localized, and can be easily mitigated through the implementation of the environmental management plan (EMP). Aside from the EMP, these impacts can be avoided and/or mitigated through compliance with relevant provisions of the Bangladesh National Building Code (BNBC) 2006 and adherence to best practices in construction engineering. The environmental monitoring plan (EMOP) will provide the key elements to be monitored to ensure compliance by the Contractor with the approved building design and relevant regulations on building construction, occupational and environmental health, and safety. In response to the COVID-19 pandemic, the Contractor(s) will be required to prepare a health and safety plan (H&SP) and will be an integral component of the EMP

214 Before commencing any construction project in, it is essential to obtain the necessary legal permits from government and local government agencies. These are as below-

- Site Clearance and Land Acquisition: When the project requires land acquisition or clearance, relevant permits must be obtained from the local government agencies. This includes obtaining permission for excavation, demolition, and encroachment. However, in this case the land was owned by BR only NOC was required from the DSCC.
- NOC from local government authorities: The NOC from the DSCC (Ward-20) s required to get the approval for the ECC.
- Environmental Clearance Certificate (ECC): Obtaining an ECC is mandatory for all significant construction projects.
- Building Construction Approval: To ensure compliance with building codes and regulations, the project must obtain building construction approval from the respective local government authorities, in this case Local Government Engineering Department (LGED), Rajuk (Rajdhani Unnayan Kartripakkha),
- Fire Safety Certificate: A Fire Safety Certificate must be obtained from the Fire Service and Civil Defense Authority.
- Utility Connections: To ensure access to essential utilities like water supply, electricity, and gas, construction projects must obtain the necessary permits from the respective utility service providers. The providers are – for water supply: Dhaka Water Supply and Sewerage Authority (DWASA); for electricity Bangladesh Power Development Board (BPDB); for gas Titas Gas Transmission and Distribution Company Limited (TGTDCL).

215 Obtaining the appropriate legal permits is essential before commencing the construction works. Compliance with these legal requirements ensures the sustainability, safety, and legality of the project, contributing to a responsible and well-executed development process.

6.3.1 Landscape Change

6.3.1.1 Impact

216 During the pre-construction phase, there will be changes in landscape due to the construction of boundary walls and other initial activities. As the area is fall under not flood prone zone so the possibility of flooding is less and no damage will occur at the surrounding area.

6.3.1.2 Mitigation Measures

217 The building will be built on BR's own land and already has a boundary wall so there will be no

such landscape change.

6.3.1.3 Impact Significance

Impact Significance for Landscape Change

Aspect	Scenario	Spread	Duration	Intensity	Overall
Landscape Change	Without Mitigation	Local	Short	Low	Insignificant
	With Mitigation	Local	Short	Low	Insignificant

6.3.2 Impact on Eco-systems

6.3.2.1 Impact

218 Removal of plants and vegetation can result in loss of habitat for small mammals and birds. However, the project area falls into the open space so that the impact on the ecosystem is not so high. 56 trees will be required to cut for the building construction.The impact on ecological environment is assessed to be minor for the project.

6.3.2.2 Mitigation Measures

219 Cleaning natural vegetation should be avoided as much as possible, if a tree needs to be cut down, at least 3 trees should be planted instead. The labour camps should not be located within or nearby the sensitive cultural structures.

220 Conducting special briefing and/or on-site training for the contractors and workers on the environmental requirement of the project to understand the requirement of the project and implementation of mitigation measures.

6.3.2.3 Impact Significance

Impact Significance for Eco-systems

Aspect	Scenario	Spread	Duration	Intensity	Overall
Eco-systems	Without Mitigation	Local	Medium	Moderate	Minor
	With Mitigation	Local	Short	Low	Insignificant

6.3.3 Impact on Ambient Air

6.3.3.1 Impact

221 Loose soil particles will reduce air quality. On the other hand, transportation of filling soil will create air pollution. Site preparation in readiness may require ground levelling and compaction. These activities will open-up the ground to wind action and thus potentially resulting in dust generation. This is because of the following:

- Disruption of earth surface may create temporary air pollution for short period of time;
- Loose dust and soil particle will degrade air quality during land filling;
- Transportation of filling soil will create added air pollution;

6.3.3.2 Mitigation Measures

222 The proposed mitigation measures are as follows:

- Waste from site should not be burned;
- Proper handling of materials to ensure minimal emission of dust.
- Removal of soil/mud from trucks and other appliances prior to leaving the project area.
- Transport of materials in tarpaulin- covered trucks

6.3.3.3 Impact Significance

223 Impact Significance for Ambient Air

Aspect	Scenario	Spread	Duration	Intensity	Overall
Ambient Air	Without Mitigation	Medium	Medium	Moderate	Moderate
	With Mitigation	Local	Medium	Low	Minor

6.3.4 Impact on Ambient Noise

6.3.4.1 Impact

- Land filling activity will create some noise pollution
- Transportation of filling soil will create some noise pollution

6.3.4.2 Mitigation Measures

224 The proposed mitigation measures are as follows:

- Maintenance of vehicles and machineries to maintain the noise level;
- Regular maintenance of equipment's should be ensured to keep noise level under limits.

6.3.4.3 Impact Significance

Impact Significance for Ambient Noise

Aspect	Scenario	Spread	Duration	Intensity	Overall
Ambient Noise	Without Mitigation	Medium	Medium	Moderate	Moderate
	With Mitigation	Local	Medium	Low	Minor

6.3.5 Storage and Disposal Areas

6.3.5.1 Impact

225 The unplanned storage and disposal area may have a direct impact on land and water resources. The solid and non-hazardous wastes generated from these areas will be collected and segregated at the point of generation and stored in properly designated areas and disposed of through waste disposal contractors or authorized recyclers.

6.3.5.2 Mitigation Measures

226 The following measures will be implemented for the storage and handling of chemicals and to minimize impacts to soil/sediment:

- Fuel tanks and chemical storage areas will be sited on sealed areas and provided with locks to prevent unauthorized entry;
- Use of spill or drip trays to contain spills and leaks;
- Use of spill control kits to contain and clean small spills and leaks;
- The storage areas of oil, fuel will be surrounded by bunds or other containment devices to prevent spilled oil, fuel from percolating into the ground or reaching the receiving waters;
- The Contractor will prepare guidelines and procedures for immediate clean-up actions following any spillages of oils, fuels;
- The construction contractor will implement a training program to familiarize staff with emergency procedures and practices related to contamination events

6.3.5.3 Impact Significance

227 Impact Significance for Storage and Disposal Areas

Aspect	Scenario	Spread	Duration	Intensity	Overall
Storage and Disposal Areas	Without Mitigation	Medium	Medium	Moderate	Moderate
	With Mitigation	Local	Medium	Low	Minor

6.4 Construction Stage Impact

228 The construction phase, in general, has an adverse influence on all the components of the environment. Most of these impacts are short-lived and reversible in nature. Construction works generally involve are site clearance, excavation, filling of soil materials, dumping of unusable debris materials, transportation of materials to the construction site, and other constructional activities and associated works like mobilization of constructional equipment, setting up of workforce camp, transportation of material, material storage, etc. These activities have certain impacts of various magnitudes on different components of the environment. Proper care is essential to minimize the adverse impacts to the possible extent to facilitate the restoration of the environment and can be discussed under the following sub-heads.

6.4.1 Site Development Activities

6.4.1.1 Impact

229 The preparation works generally done during construction stage which includes:

- Soil Removal
- Infrastructure erection
- Cut and fill operation
- Drainage works etc.

230 The impacts generally arise from the above activities are as follows:

- Noise
- Fugitive dust
- Runoff and flooding
- Soil erosion
- Water Pollution through runoff and sedimentation
- Safety Concerns

231 The proposed site has no homestead land so there is no impact from property removal activities. However, soil excavation and hauling activities will involve the movement of heavy machinery which will generate temporary dust and noise. Construction activity during monsoon may lead to runoff and flooding of excavated material and construction material which may increase sedimentation load in nearby water bodies and may disrupt the aquatic ecosystem temporarily.

6.4.1.2 Mitigation Measures

232 Cutting and filling operations will be in minimum level. The project authority should ensure the construction of a proper drainage facility. Regular water sprinkles should be used to minimize fugitive dust emissions. Safe working procedures should be ensured by the contractor. The construction work (Cutting and filling) must be undertaken during dry season.

6.4.1.3 Impact Significance

233 Impact Significance for Site Development

Aspect	Scenario	Spread	Duration	Intensity	Overall
Site Development	Without Mitigation	Local	Medium	High	Moderate
	With Mitigation	Local	Medium	Low	Minor

6.4.2 Impacts due to Excavation

6.4.2.1 Impact

234 Excavation will be undertaken in construction stage. Excavation causes unloading and reloading of subsoil and the intensity of these impacts depends on geotechnical parameters of the subsoil and geometry of excavation (depth, width and length). Hence, the unloading effect for small excavations has negligible influence on displacements. The closeness of the excavation to the adjacent building is also a cause for concern. The weight of the adjoining building (height of the structure) is also an important factor. Problems of settlement or structural damage often occur if the adjoining building is a high-rise building.

235 Method of construction including type of excavation, type of support, dewatering methodology and vibrations due to sheet pile wall installation causes changes in subsoil and impacts adjacent constructions is induced by the excavation and loading by the construction.

6.4.2.2 Mitigation Measures

236 Proper protestation should be given before start the excavation work. Before excavation work talk with the adjoining structure owner and take their opinion and take information of their building height and foundation details. After knowing everything take proper action according to gather information.

6.4.2.3 Impact Significance

237 Impact Significance for Excavation work

Aspect	Scenario	Spread	Duration	Intensity	Overall
Excavation work	Without Mitigation	Local	Medium	High	Moderate
	With Mitigation	Local	Medium	Low	Minor

6.4.3 Labour Camp

6.4.3.1 Impact

238 It is expected that at any given time during the construction phase, the peak manpower strength on the construction site comprising of technical staff, supervisors, skilled and unskilled workers would be about 25-30 persons. Since the design of the building is complicated so the construction of this building will require skilled labour excluding the construction workers, so some of the skilled labour may be brought from outside. Maximum labour will choose to stay in a camp. The health of the project personnel, construction workers and labourers living at the base camp could be impacted if the arrangement of sanitation and drinking water is not ensured adequately and properly. During the construction stage, a lot of labourers will work and hence they would generate a considerable amount of human waste. These are the potential source for the spread of diseases, as various insects will play a dominating role in the spread of diseases. There are chances for the spread of water-borne diseases also. From the construction labour camp, 1 to 2 kg of solid waste will be generated daily. During the project construction phase, the major source of water pollution will be sewage from labour camps. It is assumed that about 80% of the water required will be generated as sewage. A Septic tank with a soak pit will be provided to manage the wastewater generated from the construction labour camp.

239

6.4.3.2 Mitigation Measures

240 The labour camp if constructed shall meet the Safeguard Policy Statement (SPS) requirement as per the EHS guideline. A proper sanitation system should be provided and at the same time, regular, proper and safe disposal of human waste should be ensured. Contractors and workers should obey appropriate means of waste removal and sanitation measures. Adequate number of toilets and bathrooms at the rate of four number of toilet and four number of urinal separate for male and female per 30 numbers of workers should be made for the construction labour camp. A proper disposal system of sewage waste should be implemented for sanitation purposes and the workers should be aware to practice those facilities. Sewage generated from the construction camp will be disposed of through a septic tank and soak pit.

6.4.3.3 Impact Significance

241 Impact Significance for

Aspect	Scenario	Spread	Duration	Intensity	Overall
Labor Camp	Without Mitigation	Local	Medium	High	Moderate
	With Mitigation	Local	Medium	Low	Minor

6.4.4 Ecological Impact

6.4.4.1 Impact

242 There does not appear to be any significant vegetation that would be affected due to the project. Hence, the impact on terrestrial ecology is minor negative. The Proponent could consider planting trees on the roadside, at least on the corner.

6.4.4.2 Mitigation Measures

243 As the project is located in Dhaka and the area is already developed, the construction work will not have much impact on the ecology. Plant trees on the roadside. The noise-generating activities should be scheduled during the daytime only.

6.4.4.3 Impact Significance

244 Impact Significance for Ecology

Aspect	Scenario	Spread	Duration	Intensity	Overall
Ecology	Without Mitigation	Local	Medium	Moderate	Minor
	With Mitigation	Local	Medium	Low	Minor

6.4.5 Impact on Ambient Air

6.4.5.1 Impact

245 Dust is a cause for concern in building projects in residential areas and areas with public institutions such as schools. Research has shown that fine dust particles from cement, aggregate, silicates and wood can cause a variety of illnesses such as allergies, asthma and bronchitis and have also been linked to cancer in case of long term exposure. Sensitive individuals such as those with asthma or sinusitis will be affected most during construction activities. In the Bangladesh, fine cement dust from finishing works for interior of walls (sanding) is one of the main causes for concern in building projects. Cutting tiles in tiling is another dusty operation.

246 Transportation of material to site will also generate sand or silica dust while the operation of construction equipment/machinery on site. However, the proposed projects will use mainly manual labour and use of machinery will be limited mainly to concrete works. Therefore, emissions due to the

project is considered to be minimal. In the proposed project, no significant impact on ambient air quality is expected as a result of operation of construction equipment or consumption of electric power. The major construction activities from which air emission mostly dust emission may occur are;

- Site clearing activities;
- Ground excavation;
- Transportation of construction materials to the site;
- Handling and mixing of cement

Ground Excavation

Ground Excavation activities will open up the ground to wind action and thus potentially resulting in dust generation.

Delivery of Construction Materials to Site

Construction materials such as cement, sand, the ballast will be bulky and thus will require to be delivered on-site by a fleet of trucks driving in and out of the construction site. During this exercise dust is likely to be generated from the following:

- Handling of cement which is dusty by nature of the way it is
- Handling of ballast that could contain loose dust particles
- Site clearing of an area of holding ballast and sand will expose the site to wind action

Handling and Mixing of Cement

- Opening-up of cement bags and emptying the cement in order to mix with other construction material
- During loading and offloading of cement

6.4.5.2 Mitigation Measures

247 Like high background noise, high background dust, compared to other district in the Bangladesh, is an everyday phenomenon in Dhaka due to increasing number of construction activities occurring concurrently in a given area at a given time. The dust from the proposed construction work is not going to be any worse than the everyday dust that people may be prone to. However, on-site carpentry or aluminum works and other similar works shall be avoided to the greatest possible extent by installing precast-units. If necessary, such dusty operations shall be undertaken in confined space with appropriate personal protective equipment provided to personnel. Pre-fabricated doors and windows shall be encouraged. Good engineering standards, quality materials and material preservatives as well as paint shall be used in order to avoid release of toxic substances during the operational phase.

248 Following mitigation measures are also proposed to minimize air pollution during the construction stage:

- Regular sprinkling (twice a day) of water to be done on the open surface for dust suppression;
- Transport of materials in tarpaulin-covered trucks;
- The sand and other such dispersible material should be stored at the site for a minimum working period;
- Removal of soil/mud from trucks and other appliances prior to leaving the project area;
- Storage of soil in a safe space;
- Complaints of dust-related ailments among employees and neighbors to be given access to medical attention;

The emissions are temporary and not expected to contribute significantly to the ambient air quality and will be within prescribed limits.

6.4.5.3 Impact Significance

249 Impact Significance for Ambient Air

Aspect	Scenario	Spread	Duration	Intensity	Overall
Ambient Air	Without Mitigation	Medium	Medium	Moderate	Moderate
	With Mitigation	Local	Medium	Low	Minor

6.4.6 Impact on Ambient Noise

6.4.6.1 Impact

250 The impacts on ambient noise levels are expected only during the project construction phase, due to demolition works and the operation of construction equipment and electric tools.

251 Noise levels in the immediate proximity of most work sites are expected to be only slightly higher during construction. This is because of the high background noise levels. The duration of this exposure will also be relatively brief. This exposure represents temporary, localized, minor adverse residual effect of low significance for affected receptors. While building damage due to ground vibrations is unlikely, there may be annoyance to spatially located receptors during construction. Noise levels associated with the operation of construction equipment will be moderate.

6.4.6.2 Mitigation Measures

252 Considering the capacity and nature of the project, the use of construction machinery shall be very limited. Most noise-generating activities like excavation, use of heavy earthmoving machinery, etc. shall be limited for the construction phase.

253 Noise generating activities should be scheduled not to have simultaneous exposure. All construction equipment shall comply with the applicable noise standards. Regular maintenance of equipment will be ensured to keep noise levels under limits. Noise generating activities should be limited to daytime only. The personnel as may involve in high noise-generating activities should be provided with personal protective devices to minimize their exposure to high noise levels. Construction vehicles and machinery should be well maintained and confirm the noise standards.

6.4.6.3 Impact Significance

254 Impact Significance for Ambient Noise

Aspect	Scenario	Spread	Duration	Intensity	Overall
Ambient Noise	Without Mitigation	Medium	Medium	Moderate	Moderate
	With Mitigation	Local	Medium	Low	Minor

6.4.7 Impact on Water Bodies

6.4.7.1 Impact

255 The major source of groundwater pollution during project construction phase would be due to effluents from construction site.

256 Substantial quantities of water would be used in the construction activities. With regard to water quality, wastewater from construction activities would mostly contain suspended impurities. The effluent from construction site needs to be properly treated and disposed; otherwise it can spread over nearby areas under natural slope of the area. Concrete mixing will be undertaken within the project area; therefore, the potential to block any roadside drains will be Moderate. However, if effluents from washing concrete mixers are disposed inappropriately, there is the potential for blocking drains or hardening of the ground.

257 Surface run-offs from construction material storage areas, construction waste storage areas,

hazardous waste (waste oil, used oil, etc.) and chemical storage areas may lead to pollution of receiving natural drainage channels etc.

6.4.7.2 Mitigation Measures

258 Septic tank with soak pit should be provided in the labour area, so that, no contamination due to discharge of sewage may take place. The natural slope of the site should be maintained to the extent possible in order to avoid any change in the drainage pattern. Adequate arrangements for storm water management during the construction period should be made to avoid sediment runoff from the site. Strict supervision should be maintained to avoid the blockage of natural creeks during the construction period.

6.4.7.3 Impact Significance

259 Impact Significance for Water Bodies

Aspect	Scenario	Spread	Duration	Intensity	Overall
Water Bodies	Without Mitigation	Medium	Medium	Moderate	Moderate
	With Mitigation	Local	Medium	Low	Minor

6.4.8 Occupational Health and Safety Hazards

6.4.8.1 Impact

260 Loading and unloading operation of the construction material may cause an injury if not handled properly. During construction works, physical injury can result due to road accidents, construction accidents and other occupational hazards. Over-exertion injuries and illness shall potentially be the most common health hazards associated with construction activities. Further, there is potential for slips and falls on the same elevation associated with poor housekeeping, such as excessive waste debris, loose construction material, liquid spills, which results in injuries and time loss during construction.

6.4.8.2 Mitigation Measures

- An H&S plan should be prepared prior to construction. H&S training should be conducted, including good housekeeping, clean-up of debris and spills, and working in confined spaces and at height. The workers should wear PPE (Personal Protective Equipment), safety goggles, and other necessaries. Segregation of pedestrians and traffic on-site should be segregated.
- For community Health and Safety, EHS guidelines should be planned and documented. Public access to the site must be restricted.
- WHO guidelines for Covid 19 context should be followed.
- Excessive waste debris and liquid spills should be cleaned up regularly. Good housekeeping should be ensured at the construction site to avoid slips and falls. PPEs such as safety glasses with side shields, face shields, hard hats and safety shoes should be mandatory at the construction site.

6.4.8.3

6.4.8.4 Impact Significance

261 Impact Significance for Health and Safety Hazards

Aspect	Scenario	Spread	Duration	Intensity	Overall
Occupational Health and Safety Hazards	Without Mitigation	Local	Short	Moderate	Minor
	With Mitigation	Local	Short	Low	Insignificant

6.4.9 Impact due to Traffic and Transport

6.4.9.1 Impact

262 The construction activities shall require the transportation of construction material and other components to the site. Transportation of construction material in open trucks/tippers can also lead to dust generation along the route. Excess traffic on the road shall create discomfort for locals due to increment in noise level and fugitive dust and gaseous pollution expected to exhaust from the vehicles.

6.4.9.2 Mitigation Measures

263 Considering the project activities, increase in traffic nos. will be very marginal. The access road has adequate carrying capacity to accommodate the additional traffic due to the construction activities.

- The traffic movement in settlement areas should be limited to daytime only.
- Only PUC-certified vehicles should be deployed for the project to keep the air pollution under check. Tool Box training should be arranged for the driver to create awareness about road safety.
- Management to provide for adequate internal parking, for all vehicles coming to the construction site;
- Proper signage should be displayed for road and traffic safety.
- The traffic management plan should minimize inconvenience to the community by choosing the best alternative routes with less community disturbance, by restricting the unnecessary use of horns while bypass sings any sensitive areas (hospitals, schools, residential areas etc.)

6.4.9.3 Impact Significance

264 Impact Significance for Traffic and Transport

Aspect	Scenario	Spread	Duration	Intensity	Overall
Traffic and Transport	Without Mitigation	Medium	Medium	Moderate	Moderate
	With Mitigation	Local	Medium	Low	Minor

6.4.10 Community Health and Safety

6.4.10.1 Impact

265 Improper health policies at work sites may lead to an outbreak of different diseases in the surrounding communities/public, if construction workers are sick. Further, construction vehicles may also pose a risk to local communities.

6.4.10.2 Mitigation Measures

- The awareness raising of the risk will be provided from pre-construction to operation.
- Information and public awareness programs, as well as placement of safety signage's within the vicinity can reduce this risk.
- Traffic management will be required with special care in project sites adjacent to public or project components requiring large number of trucks to transport the construction materials.

6.4.10.3 Impact Significance

266 Impact Significance for Community Health and Safety

Aspect	Scenario	Spread	Duration	Intensity	Overall
Community Health and Safety	Without Mitigation	Medium	Medium	Moderate	Moderate
	With Mitigation	Medium	Short	Low	Minor

6.4.11 Employment

267 The project would be able to employ a significant number of individuals (Unskilled) from the locality during the construction phase thereby contributing to the social and economic wellbeing of the community. During construction, the project will also create job opportunities for a good number of skilled and semi-skilled labors. Although the numbers of people who got benefited in this way were relatively small, the impacts on individuals might be disproportionately high compare to the other local people.

6.4.11.1 Impact Significance

268 Impact Significance for Employment

Aspect	Scenario	Spread	Duration	Intensity	Overall
Employment	Mitigation	Medium	Medium	High	Beneficial Major

6.4.12 Impact on Indigenous People

269 There is no impact on indigenous people as there are no indigenous people around the project site.

6.4.13 Impact on Cultural Heritage

270 There is no cultural heritage site in the vicinity of the project site. Thus, the construction work of the project has no impact on the cultural heritage.

6.4.14 Socio-Economic Environment

271 There are a few minor negative socio-economic impacts of little or no significance during the construction phase. These include the disturbance to vehicular and pedestrian movements during loading and unloading of materials to site, especially during the concrete works. At present, vehicular movement in the project is almost is very high. Noise from construction equipment, which has been discussed earlier, poses no potential concerns.

272 There is also the impact due to cultural differences with foreign labour force, which is not a cause for concern due to the small labour requirement for the project as well as the fact that the community is already socially integrated and generally tolerant of people from other cultures. Therefore, this impact is considered negligible.

273 It is also believed that there will be several opportunities for locals including direct or indirect employment and provision of goods and services during the project implementation. This is considered as an important positive impact of the project.

6.5 Operation Stage Impact

274 The project will have no such impact during operation stage. The possible some impact has been discusses below section.

6.5.1 Land

275 No major impacts are anticipated on land environment during project operation phase. However, it is anticipated that the new building will have some landscaping the responsibility of which will be carried on to the operational phase. This is expected to improve the overall aesthetics of the area.

6.5.2 Impact on Ecology

276 No major adverse impacts will be anticipated on ecology during operation phase.

6.5.3 Energy

6.5.3.1 Impact

277 The proposed project will have additional energy uses including fans, lights and equipment that will be associated with the operational phase. So overall electricity demand will increase. However, BR required to construct a 4-story Engineer's Main Office (EMO) structure with a 16-story foundation and three basements to ensure smooth continuation of the railway project and not consume so much electricity that it would be affected. On the other hand, solar facility will be used during the operation stage so the impacts of emissions related to burning of fossil fuel due to this increase in energy consumption would be negligible.

6.5.3.2 Impact Significance

278 Impact Significance for Energy

Aspect	Scenario	Spread	Duration	Intensity	Overall
Energy	Without Mitigation	Local	Medium	Low	Minor
	With Mitigation	Local	short	Low	Insignificant

6.5.4 Impact on Ambient Air and Noise

279 The building will be constructed to be used as an Engineer's Main Office where no activities will be conducted that will affect the air and noise of the surrounding area. No major impacts are anticipated on air and noise environment during project operation phase.

6.5.5 Impact on Water

6.5.5.1 Impact

280 On-site fuel oil storage will pose a risk to surface water if mishandled or in the event of an accident. On the other hand, groundwater from spillages and septic tanks will also be affected. If the proponent uses groundwater for drinking, it will also decrease the water level.

6.5.5.2 Mitigation Measures

281 A proper water management plan will be maintained in this project. A rainwater harvesting system is also present in this project. In order to minimize potential impacts on the water environment, the design and running of building must ensure that:

- An appropriate water management system should be used,
- Sustainable drainage systems should appropriate;
- A risk assessment should carried out for the development covering the failure of critical equipment; fire; spillage hazards from stores, delivery and pipe failure;
- An emergency plan should be formulated and tested through exercises to ensure that procedures to prevent or mitigate impacts due to accidents or spillages are in place and operate effectively;

6.5.5.3 Impact Significance

282 Impact Significance for Water

Aspect	Scenario	Spread	Duration	Intensity	Overall
Water	Without Mitigation	Local	Medium	Low	Minor
	With Mitigation	Local	short	Low	Insignificant

6.5.6 Solid Waste Disposal

6.5.6.1 Impact

283 Some solid waste will be generated during operation stage which are includes:

- Paper waste
- Food waste
- Plastic waste
- General office waste
- e-waste waste

284 Paper waste is the major solid waste that will be generated from office building. Other wastes will be generated in small quantities.

6.5.6.2 Mitigation Measures

The highest solid waste generated from office buildings is recyclable waste. Recyclable waste will be sold to third parties. The following steps should be followed during the operation phase:

Reduce:

- Take reusable bags to the grocery store instead of single-use plastic bags
- Select items with limited or no packaging.
- Use a refillable container for water in place of bottled water.
- Think twice before printing material from the internet. When possible, print on both sides of the paper.
- Recycle paper

Reuse:

- Think of ways to use packaging materials and ways to reuse items that no longer serve their function.
- Use cloth napkins and plates instead of paper.

Recycle/Compost:

- Make it a habit to separate out all items that are recyclable.
- Check with local repair shops to see if they can use your old appliances for spare parts.
- Buy recycled-content

6.5.6.3 Impact Significance

285 Impact Significance for Solid Waste

Aspect	Scenario	Spread	Duration	Intensity	Overall
Solid Waste	Without Mitigation	Local	Short	High	Moderate
	With Mitigation	Local	Short	Low	Insignificant

6.5.7 Impact on Occupational Health and Safety

6.5.7.1 Impact

286 Slips and trips will be the most common accident during operation stage. Other hazards include sprains and strains, poor workstation ergonomics, indoor air-quality problems, insufficient or excessive lighting, noise, electrical hazards and random acts of violence.

6.5.7.2 Mitigation Measures

287 Being aware of Occupational Health and Safety related dangers is the first step in eliminating

them and reducing the odds of injuries occurring. Some action should be taken for reduction of impact for example: identifying dangers and correct problems, including instituting safety walkthroughs, setting up a formal reporting system for unsafe conditions and conducting training sessions on correcting safety hazards.

6.5.7.3 Impact Significance

288 Impact Significance for Occupational Health

Aspect	Scenario	Spread	Duration	Intensity	Overall
Occupational Health	Without Mitigation	Local	Medium	Moderate	Moderate
	With Mitigation	Local	Medium	Low	Minor

6.5.8 Socio-Economic Impacts

289 The primary objective of the project is to improve office facility of BR Engineer. The improvement of office facility will not have much impact on Socio-economic in and around the project area during operation stage. The project will also create direct and indirect business opportunities, increase the value of the land/project site, improve surrounding environment and provide economic opportunities and contribute directly and indirectly to health and wellbeing.

6.5.9 Utilities

6.5.9.1 Impact

290 During operation stage the office staff and engineers will use water for drinking and sanitation facilities which will effect water supply facility. On the other hand, during operation stage additional energy will used for fans, lights and equipment which will impact on power system.

6.5.9.2 Mitigation Measures

291 There is no significant impact on the existing water supply, sewerage, power system and waste management system as BR will keep every facility, such as proper waste management plan, solar facility, rain water harvesting and reuse facility. So impact on utilities will be minimum.

6.5.9.3 Impact Significance

292 Impact Significance for Utilities

Aspect	Scenario	Spread	Duration	Intensity	Overall
Utilities	Without Mitigation	Local	Medium	High	Moderate
	With Mitigation	Local	short	Low	Insignificant

6.6 Uncertainties in Impact Prediction

293 Environmental impact prediction involves a certain degree of uncertainty as the natural and anthropogenic impacts can vary from place to place due to even slight differences in ecological, geomorphological or social conditions in a particular place. However, the level of uncertainty, in the case of the proposed infrastructure project may be expected to be low due to the experience of similar projects in Dhaka. Given that there may be uncertainties in terms of structural failures of neighbouring structures as well as potential claims of damage or nuisances such as availability of groundwater during the dewatering period, it is important to undertake monitoring as described in the monitoring programme given in this report.

7 Environmental Management Plan (EMP)

294 In the context of a project, Environmental Management Plan is concerned with the implementation of the measures necessary to minimize or offset adverse impacts and to enhance beneficial impacts. All mitigation and monitoring measures will follow the ADB, IFC EHS Guidelines and Bangladesh national Rules and Regulations. To ensure strict adherence to the EMP fully implementation, the mitigation and benefit enhancement measures that identified in this report need to be followed meticulously, all the measures are said to be successful when they comply with the Environmental Quality Standard (EQS) of Bangladesh. Thus, the objectives of EMP for the present project would be

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

295 Feasible and economically expedient measures are planned to be implemented at EMP which can reduce to a reasonable level and/or exclude possible environmental impacts.

296 At EMP, in particular:

- Expected adverse environmental impacts at construction stage and operation are identified and generalized;
- Impact reduction measures are described;
- Interrelation with existing impact reduction plans is established;
- Parameters subject to measurement, monitoring methods to be applied, places of supervision, frequency of measurements are specified.

297 The environmental management plan includes the following elements facilitating its timely and effective realization:

- Management system - reflects implementation mechanism of EMP;
- Roles and responsibilities - identify persons responsible for realization of measures on impact reduction and monitoring;
- Impact importance assessment - is intended for timely reveal of aspects invoking particular measures on impact reduction;
- Environmental management plan includes the list of actions on impact decrease, monitoring, and also amount of expenses for their realization.

298 In case any non-compliance, change in scope, or unanticipated impact arises during project implementation, corrective action will be taken accordingly as per IFC, ADB and national requirements.

7.1 System of Environmental and Social Management

299 For effective implementation of recommendations on impact reduction it is necessary to organize a system of environmental and social management.

300 The model of the management system consists of four basic components:

- Planning includes development of particular actions and procedures on their realization;
- Introduction and functioning - are direct realization of actions;

- Checks and correcting actions include monitoring of environmental objects and control over execution of actions;
- Analysis includes reporting and efficiency assessment of the introduced actions.

301 The system of environmental and social management assumes conformity to the Standard of environmental management system ISO 14001 according to which constant improvement of the developed model is necessary. It is important to note, that special attention during management is paid to interaction with stakeholders, including submission of report and processing notes and offers received.

302 The site-specific environmental management plan given in Table 21 should be followed.

7.2 Institutional Arrangements

7.2.1 Bangladesh Railway Project Implementation Unit (BR PIU)

303 The Bangladesh Railway (BR) is the Executing Agency that is responsible for the the Akhaura-Laksam Double Line Project (ALDLP) in behalf of the Bangladesh Government. BR will designate a Project Director that will manage the overall implementation of the ALDLP. A Project Steering Committee (PSC) will also be created that is made up of representatives of concerned inter-governmental body, that will provide policy guidelines for the Project and is chaired by the BR Director General. BR will likewise be responsible for the tendering of the Construction contract, Supervision Consultancy and INGO Resettlement services following ADB procurement guidelines.

7.2.2 Bangladesh Railway Project Implementation Unit (BR PIU)

304 The BR PIU is the an ad hoc body that had been created by the Bangladesh Railway to implement the Akhaura-Laksam Double Line Project (ALDLP). BR-PIU shall provide guidance to all other implementing units under the ALDLP on matters related to the conduct of the Project, including the Environmental Management Plan (EMP). The BR-PIU will be headed by a full-time Project Director, who will be answerable to the ALDLP Project Steering Committee (PSC). The BP-PIU will be supported by career BR staff that will take on responsibilities relevant to the conduct of the Project such Chief Engineer, Additional Chief Engineer, Deputy Director (Headquarters), Deputy Director (Works & Ways), Deputy Director (Resettlement), Additional Director (Resettlement) and Additional Director (Signal & Telecom).

7.2.3 BR PIU Environment Focal Person

305 The BR PIU Deputy Directors will also take on additional duties, concurrent to their present position. In the case of the ALDLP, the ACE had been designated also as focal person responsible for the Environment sector. The Environment focal person will oversee the implementation of the EMP at the headquarters level, coordinate with the concerned ADB Environmental Safeguards Specialist and/or its Technical Assistance Consultant, on matters related to the EMP implementation, as well as other concerned agencies such as the Department of the Environment.

7.2.4 Construction Supervision Consultant (CSC)

306 The CSC is responsible for supervising the implementation by the Civil works Contractor of its scope of works, in behalf of the Employer. The CSC is headed by a international Team Leader (herein called the "Engineer") that manage the operations of the CSC team. The CSC will have an International Resident Environmental Specialist (RE Environment) who is responsible for the review and recommend approval of the Contractor's Site Environmental Management Plan (SEMP), and conduct

the day to day supervision of the contractor in the implementation of the approved SEMP as well as the conduct of monthly environmental quality monitoring by a third party monitor. The RE Environment will be assisted by a Senior national and 2 Junior Environment Specialists. The CSC through the RE Environment will prepare Semi-Annual Environment Monitoring Reports (6 months period) on the SEMP implementation for submission to ADB in compliance with the provisions of the loan agreement. CSC RE Environment will also participate in Public consultation meetings where the Project's environmental concerns are discussed, and respond to grievances brought forward by local people related to Project environmental concerns.

7.2.5 Contractor

307 The Contractor will carry out the construction works, delivery of equipment and conduct of services as called for in their Contract. Among their scope is the preparation of the Site Environmental Management Plan (SEMP), and implementation of the same once approved by the Engineer. The Contractor is to subcontract the third party Environmental monitoring to a competent consultancy/NGO subject to the approval of the Engineer. The Contractor will cooperate with the BR PIU, Engineer and other relevant authorities during field inspections and provision of appropriate reports as may be required by these oversight bodies. The Contractor will take note of findings made by BR-PIU, the Engineer, and other relevant authorities, and comply with relevant corrective action required. Regular and special reports are to be submitted by the Contractor to BR-PIU through the Engineer, on the progress of their SEMP implementation.

7.2.6 Third Party Environmental Monitor

308 The third-party environment monitor (henceforth called the "Monitor") will be responsible for the independent monitoring on the implementation of the SEMP by the Contractor. The Monitor will review the progress of the Contractor's implementation of their SEMP, conduct site verification of the Contractor's report, assess the performance and prepare a report containing their (Monitor) findings and prescribe corrective action when necessary. The Monitor will also conduct environmental quality monitoring to determine the efficiency of the approved SEMP based on the results of instrumental and/or laboratory analysis of samples taken from the site. The environments to be monitored include air quality, noise level, ground and surface water quality. The parameters to be used will be based on the Project Initial Environmental Examination (IEE) and Department of Environment laws/policies specifically set standards for air and water quality. The Monitor will coordinate their activities with the Engineer and Contractor. The Monitor will submit monthly, quarterly and semi-annual reports to the Engineer through the Contractor.

7.3 Roles and Responsibility

309 For realization of EMP, it is necessary to identify persons responsible for performance of impact decrease/prevention actions, and also those responsible for control over the given actions and to define their role at all stages of the project implementation. The Contractor of this project, and BR will be overall responsible for EMP implementation of the project.

7.4 EMP Implementation during Construction Phase

310 During construction stage, Project Implementation unit (PIU) will be overall responsible for EMP implementation. Construction contractor will be responsible for construction as well as maintenance of sanitary and health condition at construction site including labour camp. The construction contractor will be responsible for preparation and maintenance of records and all required

reporting data as stipulated in the EMP. The PIU will play oversight supervisory role for implementation of EMP at site. The roles and responsibilities of EMP implementation during construction stage are heighted in **Table 20.**

Table 20: Roles and Responsibilities of EMP Implementation during Construction Stage

Role	Responsibilities
EHS Manager	Preparation and implementation of the Environmental monitoring Plan during construction Ensure that all construction personnel are informed of the intent of the EMP and are made aware of the required measures for environmental and social compliance and performance Supervision of contractor performance on implementation of the Construction and Work Camp Management Plan Reporting any incidents or non-compliance with the EMP to the PMU Ensuring adequate training and education of all staff involved in environmental supervision
Asst. EHS Manager	Prepare and maintain records and all required reporting data as stipulated by the EMP Ensure that all construction personnel are informed of the intent of the EMP and are made aware of the required measures for environmental and social compliance and performance Preparation and implementation of the Environmental Monitoring Plan during construction EHS Audit, Training of project Personnel
Community Manager	GRC / Public & Stake Holder Consultation

7.5 EMP Implementation during Operation Phase

311 Main tasks of Project Coordination Management unit during operation stage include:

- Evaluation of construction related environmental impacts and monitoring of adherence of the EMP
- Responsible for modifications of the EMP when there are adaptation/changes during implementation.
- Implementation of environmental monitoring measures (such as environmental quality monitoring, tree plantation, landscaping, wild life monitoring) during O/M stage of the Project.
- Monitoring of water supply, sanitation and health conditions at the project site
- Preparation of environmental and social monitoring reports
- Management and administration of environmental enhancement fund
- Maintain liaison with other government, semi-government and non-government organizations institutes

312 Environmental, health and safety trainings will also be provided to staff in the following areas:

- Orientation on how to conform with the cultural/religious sensitivity of the people in the project area and other codes of conduct
- On the job training on EMP implementation.
- Orientation of health and safety standards requirements and health and safety measure of the site.

7.6 Mitigation/Benefit Enhancement Measures

313 For effective and environmentally friendly operation of a project, a set for guiding tools and suggestions are necessary which need to be followed at various stages of project installation, operation and maintenance. This plan generally has various components of management depending on the type of project activity and types of discharge and their pollution potential. This Environmental Management Plan (EMP) once prepared forms the basis of environmental management actions from the part of the project authority may need modification or up-gradation because of changes in the project operation or accurate pollution load/environmental problems detected afterwards. The project authority may also need to expand the suggested outline of the EMP proposed in this report.

314 All beneficial and adverse impacts which may likely to occur at different phases of the project are identified and aspect of mitigation and benefit enhancement measures has also been discussed. In view of the earlier discussion summary of recommended mitigation and benefit enhancement measures, proposed EMP are presented in **Table 21.**

7.7 Construction Stage Site Specific Management Plans

315 In addition to the EMP provided with this IEE, the construction contractor(s) will be required to prepare and implement a site specific Environmental Management Plan (SEMP). The contractors will need to obtain Consultant's approval for the SEMP. The key elements of SEMP will include the following:

- Pollution Prevention Plan will be prepared and implemented by the contractor on the basis of the mitigation measures given in this EMP. This plan serves as a practical guide for the contractor, outlining the specific steps and measures to be taken in order to reduce or eliminate pollution throughout the construction period. By aligning with the mitigation measures outlined in the EMP, the contractor ensures that the plan is tailored to address the specific environmental concerns identified in the assessment.
- Waste Disposal and Effluent Management Plan will be prepared and implemented by the Contractor on the basis of the EMP. This plan focuses on effectively managing waste disposal and effluent to ensure environmental protection and compliance with regulations. Regular monitoring and evaluation will be conducted to ensure the proper implementation of this plan. The contractor will continually review and update the plan as needed to address any emerging waste management challenges and advancements in sustainable practices.
- Construction Camp Management Plan will be prepared by the contractor. The Plan will include the camp layout, details of various facilities including supplies, storage, and disposal. This plan ensures efficient management of the construction camp and its associated resources while adhering to proper procedures for various camp facilities. Regular monitoring and review of this plan will be conducted to address any operational challenges and make necessary adjustments based on evolving requirements.
- Spoil Management Plan will be prepared by the contractor on the management of excess spoils from various excavation activities. The plan typically includes specific measures for the collection, transportation, and disposal of excess spoils. It outlines procedures for proper segregation, containment, and storage of spoils to prevent contamination and potential harm to the environment. Additionally, this plan will address opportunities for beneficial reuse of the spoils, such as backfilling, landscaping, or other construction activities, where appropriate. This approach promotes sustainable practices by minimizing waste and maximizing the utilization of available resources.

- Drinking Water Supply and Sanitation Plan will be needed for the temporary facilities including offices, labor camps and workshops in order not to cause shortages and/or contamination of existing drinking water sources. Additionally, the plan outlines measures to maintain proper sanitation practices within the temporary facilities. This includes the installation and regular maintenance of appropriate sanitation facilities, to prevent the contamination of water sources and promote hygiene. By implementing this plan, the project ensures that the water requirements of the temporary facilities are met without negatively impacting the availability or quality of drinking water resources in the surrounding area.
- Fuel and Hazardous Substances Management Plan will be prepared by the contractor in accordance with the present EMP, standard operating procedures and other relevant guidelines, and where applicable, material safety data sheets (MSDS). The Plan will include the procedures for handling the oils and chemical spills. Through the preparation and implementation of this plan, the contractor will demonstrate their commitment to responsible management practices and their ability to effectively respond to any potential fuel or chemical spills that may occur during the course of the project.
- Occupational Health and Safety (OHS) Plan will be prepared and implemented by the contractor on the basis of the present EMP and other relevant standards. This plan will outline the measures and protocols to ensure the health and safety of workers involved in the project. The OHS Plan will address various aspects of occupational health and safety, including hazard identification, risk assessment, and control measures. It will also incorporate guidelines for personal protective equipment (PPE), emergency preparedness and response, as well as health and safety training requirements. By aligning the OHS Plan with the EMP and relevant standards, the contractor aims to establish a safe working environment and minimize potential risks to workers.
- Emergency Preparedness Plan will be prepared by the contractor after assessing potential risks and hazards that could be encountered during construction. the plan will include protocols for immediate response, evacuation procedures, communication strategies, and coordination with relevant authorities. The plan will also define the roles and responsibilities of personnel involved in emergency response, as well as establish a system for regular drills and training exercises to ensure preparedness. It will be periodically reviewed and updated as needed to address any changes in site conditions or potential risks.
- Communication Plan to deal with the interaction of the community, complaints management, workers recruitment, notice of works and workers conduct with locals. The plan will outline strategies and channels for engaging with the local community, fostering positive relationships, and addressing any concerns or issues that may arise. Through the effective implementation of this plan, the contractor aims to foster a harmonious relationship with the community, address concerns promptly, ensure transparent communication, and promote a positive and inclusive project environment.
- Traffic Management Plan will be prepared by the contractor after discussion with BR and authorities responsible for roads and traffic. The Plan will be submitted to the construction monitoring consultants for their review and approval before contractor mobilization. The Plan will identify the routes to be used by the contractors, procedures for the safety of the local community particularly pedestrians, and monitoring mechanism to avoid traffic congestion. This collaborative approach ensures that the plan effectively addresses traffic management concerns while considering the local community's safety and convenience.

Table 21: The Environmental Management Plan

Issues	Potential Environmental Impacts	Proposed Mitigation Measures	Responsible Institutions	
			Implementation	Supervision
Pre-construction Stage				
Impact on Eco-systems	Removal of plants and vegetation can result in loss of habitat for small mammals and birds. A total of 52 trees are to be cut	Cleaning natural vegetation should be avoided as much as possible, if a tree needs to be cut down, at least 3 trees should be planted instead. The labour camps should not be located within or nearby the sensitive cultural structures. Conducting special briefing and/or on-site training for the contractors and workers on the environmental requirement of the project to understand the requirement of the project and implementation of mitigation measures. Bangladesh Railway is the owner of the land and the trees to be cut, so no compensation has to be paid but trees have to be planted (follow tree plantation plan given in Annex-VIII).	Contractor	Bangladesh Railway
Impact on Ambient Air	Loose soil particles will reduce air quality. On the other hand, transportation of filling soil will create air pollution. Site preparation in readiness may require ground levelling and compaction. These activities will open-up the ground to wind action and thus potentially	• Waste from site should not be burned; • Proper handling of materials to ensure minimal emission of dust. • Removal of soil/mud from trucks and other appliances prior to leaving the project area. • Transport of materials in tarpaulin-covered trucks	Contractor	Bangladesh Railway

Issues	Potential Environmental Impacts	Proposed Mitigation Measures	Responsible Institutions	
			Implementation	Supervision
	resulting in dust generation. This is because of the following: • Disruption of earth surface may create temporary air pollution for short period of time; • Loose dust and soil particle will degrade air quality during land filling;			
Impact on Ambient Noise	• Land filling activity will create some noise pollution • Transportation of filling soil will create some noise pollution	• Maintenance of vehicles and machineries to maintain the noise level; • Regular maintenance of equipment's should be ensured to keep noise level under limits.	Contractor	Bangladesh Railway
Storage and Disposal Areas	The unplanned storage and disposal area may have a direct impact on land and water resources.	• Fuel tanks and chemical storage areas will be sited on sealed areas and provided with locks to prevent unauthorized entry; • Use of spill or drip trays to contain spills and leaks; • Use of spill control kits to contain and clean small spills and leaks; • The storage areas of oil, fuel will be surrounded by bunds or other containment	Contractor	Bangladesh Railway

Issues	Potential Environmental Impacts	Proposed Mitigation Measures	Responsible Institutions	
			Implementation	Supervision
		devices to prevent spilled oil, fuel from percolating into the ground or reaching the receiving waters; • The Contractor will prepare guidelines and procedures for immediate clean-up actions following any spillages of oils, fuels; • The construction contractor will implement a training program to familiarize staff with emergency procedures and practices related to contamination events • The solid and non-hazardous wastes generated from these areas should be collected and segregated at the point of generation and stored in properly designated areas and disposed of through waste disposal contractors or authorized recyclers.		
Legal permits and clearance	• Surrounding environment and ecosystem may be affected • Hospital patient will feel disturbed due to high noise work. • Activities of nearby university halls may be affected if high noise work is carried out.	• NOC should be obtained from local authority (city corporation or ward) before construction work • Before high noise work, permission should be obtained from the nearest hospital and university hall • Construction work cannot be done at night	Contractor/ Bangladesh Railway	Bangladesh Railway

Issues	Potential Environmental Impacts	Proposed Mitigation Measures	Responsible Institutions	
			Implementation	Supervision
	Moreover, if the construction work is done at night, there will be problems in the students' studies	• Before construction work RAJUK permission should be taken		
Construction Stage				
Site Development activities	The preparation works generally done during construction stage which includes: • Soil Removal • Infrastructure erection • Cut and fill operation • Drainage works etc. The impacts generally arise from the above activities are as follows: • Noise • Fugitive dust • Runoff and flooding • Soil erosion • Water Pollution through runoff and sedimentation • Safety Concerns	Cutting and filling operations will be in minimum level. The project authority should ensure the construction of a proper drainage facility. Regular water sprinkles should be used to minimize fugitive dust emissions. Safe working procedures should be ensured by the contractor. The construction work (Cutting and filling) must be undertaken during dry season.	Contractor	Bangladesh Railway
Demolition work, Drainage congestion and top soil	• Demolition activities will have the below impact –	The Mitigation measures for demolition activities will be as below-		

Issues	Potential Environmental Impacts	Proposed Mitigation Measures	Responsible Institutions	
			Implementation	Supervision
	• Dust generation • Noise • Demolition waste • Erosion of Soil • Water Pollution through runoff and sedimentation • Safety Concerns	• Dust Suppression: ○ Implement water spraying or misting systems to minimize dust generation during demolition activities. ○ Cover debris piles with geotextile or plastic sheets to prevent wind dispersal of dust particles. ○ Regularly water the demolition site and access roads to reduce airborne dust. • Noise Control: ○ Schedule demolition activities during daytime hours and avoid working during sensitive hours or near noise-sensitive areas. ○ Install noise barriers or use sound-damping materials to minimize noise propagation to surrounding areas. ○ Provide ear protection to workers and nearby residents, if necessary. • Waste Management: ○ Separate and properly dispose of different types of waste, such as hazardous materials, recyclables, and general debris. ○ Recycle or reuse materials whenever feasible, reducing the amount of waste sent to		

Issues	Potential Environmental Impacts	Proposed Mitigation Measures	Responsible Institutions	
			Implementation	Supervision
		landfills. ○ Comply with local regulations and engage licensed waste management service providers for the collection and disposal of hazardous waste. • Traffic Management: ○ Develop a traffic management plan to ensure safe movement of vehicles and pedestrians around the demolition site. ○ Clearly mark designated routes for construction vehicles and establish appropriate signage to guide traffic. ○ Coordinate with local authorities to minimize traffic disruptions and ensure public safety during demolition activities. • Erosion and Sediment Control: ○ Implement erosion control measures, such as installing silt fences, sediment traps, or sediment ponds to prevent soil erosion and sediment runoff into nearby water bodies. ○ Stabilize exposed soil surfaces with mulching or vegetative cover to minimize erosion risks. ○ Regularly inspect and maintain erosion control measures throughout the demolition		

Issues	Potential Environmental Impacts	Proposed Mitigation Measures	Responsible Institutions	
			Implementation	Supervision
		process. • Hazardous Material Handling: ○ Identify and safely remove hazardous materials (e.g., asbestos, lead-based paint) prior to demolition, following appropriate procedures and guidelines. ○ Engage certified professionals for the handling, removal, and disposal of hazardous materials. ○ Provide training and personal protective equipment (PPE) to workers involved in the handling of hazardous materials. • Air Quality Monitoring: ○ Conduct regular air quality monitoring at the demolition site and in surrounding areas to assess any potential impacts. ○ Maintain records of air quality data to track compliance with standards and identify necessary corrective actions if required.		
Impacts due to Excavation	Method of construction including type of excavation, type of support, dewatering methodology and vibrations due to sheet pile wall installation causes changes in subsoil	• Proper protestation should be given before start the excavation work. • Before excavation work, talk with the owner of the adjacent structure and get their opinion and details about the height and foundation of	Contractor	Bangladesh Railway

Issues	Potential Environmental Impacts	Proposed Mitigation Measures	Responsible Institutions	
			Implementation	Supervision
	and impacts adjacent constructions is induced by the excavation and loading by the construction.	their building. After knowing everything, the engineer has to take proper design and protection measures. • Shore piles or sheet piles should be placed around existing buildings during excavation		
Labour Camp	Construction site comprising of technical staff, supervisors, skilled and unskilled workers. Maximum labour will choose to stay in a camp. The health of the project personnel, construction workers and labourers living at the base camp could be impacted if the arrangement of sanitation and drinking water is not ensured adequately and properly. Labour would generate a considerable amount of human waste. These are the potential source for the spread of diseases, as various insects will play a dominating role in the spread of diseases. There are chances for the spread of water-borne diseases also. From the construction labour camp, 1 to 2 kg	The labour camp if constructed shall meet the Safeguard Policy Statement (SPS) requirement as per the EHS guideline. A proper sanitation system should be provided and at the same time, regular, proper and safe disposal of human waste should be ensured. Contractors and workers should obey appropriate means of waste removal and sanitation measures. Adequate number of toilets and bathrooms at the rate of four number of toilet and four number of urinal separate for male and female per 30 numbers of workers should be made for the construction labour camp. A proper disposal system of sewage waste should be implemented for sanitation purposes and the workers should be aware to practice those facilities. Sewage generated from the construction camp will be disposed of through a septic tank and soak pit.	Contractor	Bangladesh Railway

Issues	Potential Environmental Impacts	Proposed Mitigation Measures	Responsible Institutions	
			Implementation	Supervision
	of solid waste will be generated daily.			
Ecological Impact	There does not appear to be any significant vegetation that would be affected due to the project.	Plant trees on the roadside. The noise-generating activities should be scheduled during the daytime only.	Contractor	Bangladesh Railway
Impact on Ambient Air	The major construction activities from which air emission mostly dust emission may occur are; • Site clearing activities; • Ground excavation; • Transportation of construction materials to the site; • Handling and mixing of cement	• Regular sprinkling (twice a day) of water to be done on the open surface for dust suppression; • Transport of materials in tarpaulin-covered trucks; • The sand and other such dispersible material should be stored at the site for a minimum working period; • Removal of soil/mud from trucks and other appliances prior to leaving the project area; • Storage of soil in a safe space; • Complaints of dust-related ailments among employees and neighbors to be given access to medical attention;	Contractor	Bangladesh Railway
Impact on Ambient Noise	The impacts on ambient noise levels are expected only during the project construction phase, due to demolition works and the operation of construction equipment and electric tools.	Considering the capacity and nature of the project, the use of construction machinery shall be very limited. Most noise-generating activities like excavation, use of heavy earthmoving machinery, etc. shall be limited for the construction phase.	Contractor	Bangladesh Railway

Issues	Potential Environmental Impacts	Proposed Mitigation Measures	Responsible Institutions	
			Implementation	Supervision
		Noise generating activities should be scheduled not to have simultaneous exposure. All construction equipment shall comply with the applicable noise standards. Regular maintenance of equipment will be ensured to keep noise levels under limits. Noise generating activities should be limited to daytime only. The personnel as may involve in high noise-generating activities should be provided with personal protective devices to minimize their exposure to high noise levels. Construction vehicles and machinery should be well maintained and confirm the noise standards.		
Impact on Water Bodies	The major source of groundwater pollution during project construction phase would be due to effluents from construction site. Concrete mixing will be undertaken within the project area; therefore, the potential to block any roadside drains will be Moderate. However, if effluents from washing concrete mixers are disposed inappropriately, there is the potential for blocking drains or hardening of the ground. Surface run-offs from construction material storage areas, construction waste storage areas, hazardous waste	Septic tank with soak pit should be provided in the labour area, so that, no contamination due to discharge of sewage may take place. The natural slope of the site should be maintained to the extent possible in order to avoid any change in the drainage pattern. Adequate arrangements for storm water management during the construction period should be made to avoid sediment runoff from the site. Strict supervision should be maintained to avoid the blockage of natural creeks during the construction period.	Contractor	Bangladesh Railway

Issues	Potential Environmental Impacts	Proposed Mitigation Measures	Responsible Institutions	
			Implementation	Supervision
	(waste oil, used oil, etc.) and chemical storage areas may lead to pollution of receiving natural drainage channels etc.			
Occupational Health and Safety Hazards	Loading and unloading operation of the construction material may cause an injury if not handled properly. During construction works, physical injury can result due to road accidents, construction accidents and other occupational hazards. Over-exertion injuries and illness shall potentially be the most common health hazards associated with construction activities. Further, there is potential for slips and falls on the same elevation associated with poor housekeeping, such as excessive waste debris, loose construction material, liquid spills, which results in injuries and time loss during construction.	• An H&S plan should be prepared prior to construction. H&S training should be conducted, including good housekeeping, clean-up of debris and spills, and working in confined spaces and at height. The workers should wear PPE (Personal Protective Equipment), safety goggles, and other necessaries. Segregation of pedestrians and traffic on-site should be segregated. • For community Health and Safety, EHS guidelines should be planned and documented. Public access to the site must be restricted. • WHO guidelines for Covid 19 context should be followed. • Excessive waste debris and liquid spills should be cleaned up regularly. Good housekeeping should be ensured at the construction site to avoid slips and falls. PPEs such as safety glasses with side shields, face shields, hard hats and safety shoes should be mandatory at the construction site.	Contractor	Bangladesh Railway

Issues	Potential Environmental Impacts	Proposed Mitigation Measures	Responsible Institutions	
			Implementation	Supervision
Impact due to Traffic and Transport	Transportation of construction material in open trucks/tippers can also lead to dust generation along the route. Excess traffic on the road shall create discomfort for locals due to increment in noise level and fugitive dust and gaseous pollution expected to exhaust from the vehicles.	• The traffic movement in settlement areas should be limited to daytime only. • Only PUC-certified vehicles should be deployed for the project to keep the air pollution under check. Tool Box training should be arranged for the driver to create awareness about road safety. • Management to provide for adequate internal parking, for all vehicles coming to the construction site; • Proper signage should be displayed for road and traffic safety. • The traffic management plan should minimize inconvenience to the community by choosing the best alternative routes with less community disturbance, by restricting the unnecessary use of horns while bypass sings any sensitive areas (hospitals, schools, residential areas etc.)	Contractor	Bangladesh Railway
Community Health and Safety	Improper health policies at work sites may lead to an outbreak of different diseases in the surrounding communities/public, if construction workers are sick. Further, construction vehicles may also pose a risk to local communities.	• The awareness raising of the risk will be provided from pre-construction to operation. • Information and public awareness programs, as well as placement of safety signage's within the vicinity can reduce this risk. • Traffic management will be required with special care in project sites adjacent to public or project components requiring large	Contractor	Bangladesh Railway

Issues	Potential Environmental Impacts	Proposed Mitigation Measures	Responsible Institutions	
			Implementation	Supervision
		number of trucks to transport the construction materials.		
Employment	During construction, the project will also create job opportunities for a good number of skilled and semi-skilled labors. Although the numbers of people who got benefited in this way were relatively small, the impacts on individuals might be disproportionately high compare to the other local people.	• The contractor must follow the labor and working conditions specified in the contract and national labor laws • Try to involve the maximum number of local people as employee	Contractor	Bangladesh Railway
Waste Management	• Construction camps will generate huge amounts of waste • If construction waste is not properly managed, it will degrade soil quality, affect water • Poor waste management will pose health risks to workers	• Develop a plan for waste management prior to commencing of construction and get approval from BR • Separate dustbins should be used for different types of waste at construction sites • Proper waste management plan given in annexure should follow	Contractor	Bangladesh Railway
Socio-Economic Environment	Disturbance to vehicular and pedestrian movements during loading and unloading of materials to site, especially during the concrete works.	Noise-related work should be done in the day time. Give priority to local people as employees.		Bangladesh Railway
Site Reinstatement	Disturbed areas should be restored as soon as the disturbance is over Note: Once construction completed, all unused materials/waste must be taken away. Site should be cleared. No payment should be made if the site is not cleared.		Contractor	Bangladesh Railway

Issues	Potential Environmental Impacts	Proposed Mitigation Measures	Responsible Institutions	
			Implementation	Supervision
Operation Stage				
Energy	The proposed project will have additional energy uses including fans, lights and equipment that will be associated with the operational phase. So overall electricity demand will increase.	The solar facility should be used as an alternative source of energy	Bangladesh Railway	Bangladesh Railway
Impact on Water	On-site fuel oil storage will pose a risk to surface water if mishandled or in the event of an accident. On the other hand, groundwater from spillages and septic tanks will also be affected. If the proponent uses groundwater for drinking, it will also decrease the water level.	• Use Rainwater • An appropriate water management system should be used, • Sustainable drainage systems should appropriate; • A risk assessment should carried out for the development covering the failure of critical equipment; fire; spillage hazards from stores, delivery and pipe failure; • An emergency plan should be formulated and tested through exercises to ensure that procedures to prevent or mitigate impacts due to accidents or spillages are in place and operate effectively;	Bangladesh Railway	Bangladesh Railway
Solid Waste Disposal	Some solid waste will be generated during operation stage which are includes:	The following steps should be followed during the operation phase: **Reduce:**	Bangladesh Railway	Bangladesh Railway

Issues	Potential Environmental Impacts	Proposed Mitigation Measures	Responsible Institutions	
			Implementation	Supervision
	• Paper waste • Food waste • Plastic waste • General office waste • e-waste waste Paper waste is the major solid waste that will be generated from office building.	• Take reusable bags to the grocery store instead of single-use plastic bags • Select items with limited or no packaging. • Use a refillable container for water in place of bottled water. • Think twice before printing material from the internet. When possible, print on both sides of the paper. • Recycle paper **Reuse:** • Think of ways to use packaging materials and ways to reuse items that no longer serve their function. • Use cloth napkins and plates instead of paper. **Recycle/Compost:** • Make it a habit to separate out all items that are recyclable. • Check with local repair shops to see if they can use your old appliances for spare parts. • Buy recycled-content		

Issues	Potential Environmental Impacts	Proposed Mitigation Measures	Responsible Institutions	
			Implementation	Supervision
Impact on Occupational Health and Safety	Slips and trips will be the most common accident during operation stage. Other hazards include sprains and strains, poor workstation ergonomics, indoor air-quality problems, insufficient or excessive lighting, noise, electrical hazards and random acts of violence.	Being aware of Occupational Health and Safety related dangers is the first step in eliminating them and reducing the odds of injuries occurring. Some action should be taken for reduction of impact for example: identifying dangers and correct problems, including instituting safety walkthroughs, setting up a formal reporting system for unsafe conditions and conducting training sessions on correcting safety hazards.	Bangladesh Railway	Bangladesh Railway
Utilities	During operation stage the office staff and engineers will use water for drinking and sanitation facilities which will effect water supply facility. On the other hand, during operation stage additional energy will used for fans, lights and equipment which will impact on power system.	Waste management plan, solar facility, rain water harvesting and reuse facility should properly followed/maintain	Bangladesh Railway	Bangladesh Railway

8 Environmental Monitoring

8.1 Objectives

316 The main objectives of the pre-construction, construction and operation phase monitoring plans will be to:

- Monitor the actual impact of the works on physical, biological and socioeconomic receptors within the project corridor for indicating the adequacy of the environmental study;
- Monitor impacts of construction works on water quality and fauna, and take necessary corrective measures in case monitoring results exceeds limits of certain parameters;
- Ensure compliance with legal and community obligations including safety on construction sites;
- Evaluate the effectiveness of the mitigation measures proposed in the EMP and recommend improvements, if and when necessary;
- Ensuring controllability of risks and environmental impacts;
- Permanent environmental control throughout the project implementation period (construction works and operation).

8.2 Environmental Monitoring Plan

317 The monitoring plan is one of the important tools of the implementing the mitigation plan for the proposed project. The Monitoring plan provides guidance regarding environmental issues/parameters, location, frequency and means of monitoring.

318 The aim of environmental monitoring during the pre-construction, construction and operation phases of the proposed project is to compare the monitored data against the baseline condition collected during the study period to assess the effectiveness of the mitigation measures and the protection of environmental components (e.g. air, water, soil, noise etc.) based on the national environmental standards (e.g. ECR 1997). Since the project is likely to have impact on various components of the environment, a comprehensive monitoring plan covering soil drainage congestion, air quality, water quality, noise, workers' and community health and safety and so on need to be developed.

319 An Environmental Monitoring Plan has been prepared along with this report for the execution as a means to mitigate or minimize the adverse impacts associated with construction and operational activities of the project on the natural and social environments.

Table 22: The Environmental Monitoring Plan may be structured as follows

Environmental Issues	Monitoring Method			Responsible Organization	
	Monitoring Parameters	Location	Duration and Frequency	Implement	Supervise
Preconstruction stage					
Impact on Eco-systems	Monitoring activities; Avoid cutting down trees as much as possible.	Project site	During tree felling and site clearing operations	PIU/ Contractor	BR
Air Pollution and Dust	PM2.5, PM10, SO2, NOx, CO	In and around project site.	At least 8 hours continuous by the contractor. Quarterly	Contactor	BR
Noise and Vibration	Measurement of noise level in dBA Equivalent Sound Level (Leq) with GPS location of measuring site.	In and around project site	Checking the functionality of the technology daily before the work gets started. Quarterly	Contactor	BR
Groundwater Quality	Alkalinity, As, Fe, Mn, pH, Chlorid, TC, FC and Temperature	Near Construction work sites	Quarterly	Contactor	BR
Change of Local Hydrology/Drainage Congestion	Inspect waste and field management at camps and record actions taken when non-compliance recorded.	In and around project site	Construction and operation stage/ Monthly inspection/ Long term	Contractor	BR
Occupational Health & Safety	Contractor must ensure that they have received occupational health and safety training. A Health and Safety plan should be prepared and implemented	In and around project site	Continuous	Contractor	BR

Environmental Issues	Monitoring Method			Responsible Organization	
	Monitoring Parameters	Location	Duration and Frequency	Implement	Supervise
Construction stage					
Site Development activities	• Cutting and filling operation kept at a minimum level • Regular water sprinkle • Work (Cutting and filling) undertaken during dry seasons.	In and around project site	When required	Contactor	BR
Loss of Top Soil	Top soil management	In and around project site	Construction stage/Monthly inspection	Contactor	BR
Soil Contamination	Parameters: Total Organic Matter, Phosphate, Nitrate, Ammonia, Sulphate, Al, As, Cd, Ca, Co, Cr-III and Cr-VI	In and around project site;	Quarterly	Contactor	BR
Construction camp	Conduct safe Environmental activities	In and around project site;	Construction stage/ inspection weekly	Contactor	BR
Terrestrial Fauna	As part of the monthly site inspection, examine storage areas, to confirm these facilities are not contributing to environmental degradation	In & around project site;	Twice in a year in dry and rainy seasons	Contactor	BR
Aquatic Species	Evaluation of existence of species;	Major surface water bodies	Twice in a year in dry and rainy seasons	Contactor	BR
Air Pollution and Dust	PM2.5, PM10, SO2, NOx, CO	In and around project site.	At least 8 hours continuous by the contractor. Quarterly	Contactor	BR

Environmental Issues	Monitoring Method			Responsible Organization	
	Monitoring Parameters	Location	Duration and Frequency	Implement	Supervise
Noise	Measurement of noise level in dBA Equivalent Sound Level (Leq) with GPS location of measuring site.	In and around project site	Checking the functionality of the technology daily before the work gets started. Quarterly	Contactor	BR
Groundwater Quality	Alkalinity, As, Fe, Mn, pH, Chloride, TC, FC and Temperature	Near Construction work sites	Quarterly	Contactor	BR
Pollution from Wastes	Waste and effluents to be collected and disposed safely to the designated sites;	Construction yard	Weekly	Contactor	BR
Solid waste management	Labelled areas for temporary waste disposal should be allocated on construction site; The place for hazardous waste storage should be protected from foreigners and weather influence; Waste is not kept for long on the site;	Construction area; Waste temporary storage area;	Visual observation – during each working day; Weekly by PMU/Supervision Consultant.	Contactor	BR
Construction Waste Disposal (Waste water, Oil, Hazardous Waste etc.)	Checking storage, transportation, handling, and disposal of hazardous waste;	Construction yard	Weekly	Contactor	BR
Waste Disposal Management Plan	Toilet facilities and waste water An adequate number of toilets shall be supplied. Regular inspections shall be carried out to ensure toilets are kept in a hygienic state. Toilet paper shall be supplied to all toilets. Staff shall be advised to use the provided toilets at all times.	In & around project site;	Continuous or as necessary	Contactor	BR

Environmental Issues	Monitoring Method			Responsible Organization	
	Monitoring Parameters	Location	Duration and Frequency	Implement	Supervise
Social acceptability of Construction workers to the host communities	Unskilled workers in the construction phase; Influx of migrant workers; Social & religious acceptability.	Construction yard	continuous	Contactor	BR
Traffic and Transport	limited traffic movement in settlement areas;	Major access road near the project area	continuous	Contactor	BR
Occupational Health and Safety (OHS)	Check quality of food and accommodation at construction camp; Check safe water supply, hygienic toilet at camps, construction of drain at camp sites; Check toilets are close to construction site and separate toilet for female workers; First Aid Box with required tools and medicines;	Construction site and labor camp	Regularly	Contactor	BR
Community Health and Safety	General site condition, traffic condition, presence of signage and signalling for rerouting traffic and pedestrian, safety signs for pedestrians, pedestrian movement, vegetation clearance etc. by a visual survey (photographs)	At / near project sensitive site (ex. School, college, mosque, bazar etc.)	Regularly	Contactor	BR
Operation Stage					
Ecology	Not plant exotic plant species (Flora & fauna) Unnecessary vehicular disturbances	In & around project site;	Quarterly	BR	BR
Construction Period Decommissioning	Inspect to be sure that work camps, fuel storage areas, waste dumps, toilet facilities and construction access roads have been properly decommissioned and no contamination is likely.	All semi-permanent farcicalities	Within one month of operation	BR	BR
Air Quality	PM2.5, PM10, SO2, NOx, CO	In and around project site	Annually for operating	Third party	BR

Environmental Issues	Monitoring Method			Responsible Organization	
	Monitoring Parameters	Location	Duration and Frequency	Implement	Supervise
Noise	Measurement of noise dB(A)	In and around project site	Annually for operating	Third party	BR
Water pollution	GW: Alkalinity, As, Fe, Mn, pH, Chloride, TC, FC and Temperature	At major surface water bodies and disposal site	Annually for operating;	Third party	BR
Water supply, usage and effluent disposal	Inspect the site for burst, blocked or leaking water pipes. Clean and pollution free water supply Minimisation of waste volumes, water conservation and optimum water housekeeping Drainage of effluent discharging equipment including hand-wash basins, sterilizers and boot washes must not occur across floors in traffic zones.	Project site	Daily	BR	BR
Sewage Services	The sewage system must be inspected for leakages on a regular basis and any leakages must be attended to immediately.	In and around project site	Daily	BR	BR
Waste Management	Solid & liquid waste.	In and around project site	Continuously	BR	BR
Occupational Health	Ensuring the compliance with health and safety standards; Existence of the individual safety equipment and regular check for its functionality	At constructions sites, In and around project site	Regular	BR	BR

8.3 Environmental Monitoring Budget

320 The estimated budget for implementation of the mitigation and monitoring measures proposed in the EMP is presented in **Table 23**. The overall costs of the EMP will comprise:

- Environmental monitoring through sample collection and analysis;
- Any remedial measures necessary to reduce or avoid environmental damage;
- Designing and implementing all mitigating and enhancement measures;
- Supervision staff and consultants including direct costs and travel subsistence.

321 The total budget is estimated as BDT. 30,37000 Taka.

Table 23: Environmental Budget

Sl. No	Environmental Component	Item	Unit	Frequency (No./ Year)	Time (Project-Year)	Qty.	Rate	Amount
1	Air Quality	$PM_{2.5}$, PM_{10}, SO_2, NOx, CO	1	4	1	4	20,000	80,000
2	Noise Pollution	Ambient noise level (Day) level (LAeq)	1	4	1	4	5,000	20,000
3	Ground Water/ Drinking Water Quality	Alkalinity, As, Fe, Mn, pH, Chloride, FC, TC and Temperature	1	4	1	4	18,000	72,000
4	Soil Quality	Total Organic Matter, Phosphate, Nitrate, Ammonia, Sulphate, Al, As, Cd, Ca, Co, Cr	1	1	1	1	15,000	15,000
5	Waste Management	Handling, storage and disposal in the designated area	Lump Sum				50,000	50,000
6	Occupational and Health and Safety (H&S)	H&S measures for workers (such as PPEs for workers, safety equipment such as barriers, posters, banners etc. portable sanitation facilities (if required), potable water supply facilities, first aid box and medical services etc)	Lump Sum				500,000	500,000
7	H & S Training	Contractor's workforce with special attention to mitigating COVID-19 related threat	Lump Sum				50,000	50,000
	Others	Dust suppression measure, tree plantation	Lump Sum				50,000	50,000
8	Environmental, health and safety officer	Salary	Person-Month		2 X 12= 24		70,000	1,680,000
9	Transport (for monitoring team)		Days		10		10,000	100,000
10	Reporting and others (Yearly DoE renewal cost)		Lump Sum				100,000	100,000
11	Contingency						100,000	100,000
Total								**2,817,000**

9 Stakeholder Consultation

322 This Chapter presents the objectives, process, and outcome of the consultations carried out with the key stakeholders of the project during the study. The FGD with different stakeholders was carried out in compliance with DoE guidelines. The consultation and participation plan for the EMO building construction Project has been developed in accordance with the Asian Development Bank (ADB) guidelines. During this study, efforts were undertaken to consult with a wide range of stakeholders in order to gain their perspectives on project interventions.

9.1 The main objectives of consultation are to:

i) Provide information to beneficiaries and vulnerable groups to enable them to participate in design and implementation of the Project;
ii) Obtain feedback from beneficiaries and stakeholders about the potential impact and effectiveness of the Project and to enhance positive benefits and mitigate negative impacts; and
iii) Provide interested stakeholders and civil society with information about the Project including potential impacts, safeguard plans, mitigation measures and institutional arrangements.

Consultation with, and participation of, affected communities and stakeholders leads to a better design, reduce risks and increase beneficiary impact, and increases local ownership. Dissemination of project information can help reduce potential opposition to a project, or conflicts that may occur during project implementation. It helps to minimize the risk of potential project delays.

9.2 Regulatory Requirements

9.2.1 Bangladesh Guidelines

323 The guidelines formulated by DoE in 1997 stated that since the general public is the ultimate recipient of the economic benefit and environmental damages, an EIA/IEE study should involve the public as part of the decision-making process development. To achieve effective public participation, it is necessary to communicate with as many people as possible and in as many different ways as possible. This requires pre-planning, resources, identification of target groups and several techniques for effective communication.

9.2.2 Meaningful consultation is a process that is (ADB Safeguard Policy 2009):

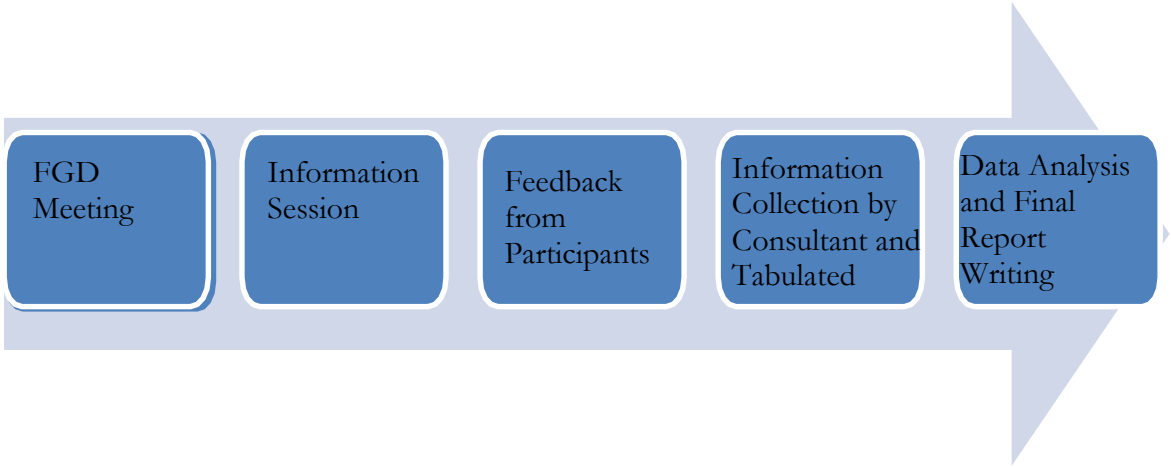
i) Participatory: Communication is two-way, and views of stakeholders are incorporated into decision-making;
ii) Timely: Participants receive relevant and adequate information so that they are equipped to engage in decision-making processes, formulation of mitigation measures, sharing of development benefits discussion, and implementation issues;
iii) Socially inclusive: Participation must be responsive to gender issues, needs and priorities of vulnerable and disadvantaged groups; and
iv) Open: Undertaken in an atmosphere free of intimidation and /or risk.

9.3 Methodology

324 FGDs were conducted following participatory approaches. The participatory approach was

followed from the very beginning during the identification of the participants as well as conducting the consultation /discussion sessions. However, consultation were held mostly informally using some social tools like Key Informant Interview (KII), Focus Group Discussion (FGD), etc.

325 Initially, the study team consulted with the Project Proponent for understanding the Project boundaries and the potential stakeholders. The key stakeholders including occupational groups were identified through consultation with local knowledgeable people. The meeting ensured the common and equal platform of the participants so that stakeholders can express their opinion in an enabling environment. The Consultants unfolded the issues and in return, the participants gave feedback on these issues and in some cases opened two-ways discussions 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.



326 For holding consultation meetings and correctly gathering the comments and views of the participants, a participative approach was used. The possible implications of the interventions on environmental and social aspects, as well as socio-economic, agricultural, hydrological, fisheries, and ecological issues, were all thoroughly explored. Institutional concerns were also thoroughly examined, with participants freely offering their ideas and solutions.

9.3.1 Approach and Methodology for Consultation

The FGD with different stakeholders was carried out in compliance with DoE and ADB guidelines. The approach undertaken for information disclosure and consultation involved the following key processes.

- Mapping and Identification of key stakeholders such as primary (direct project influence) and secondary (indirect project influence) stakeholders;
- Undertaking expert consultation, interviews with the respective stakeholders
- Assessing the influence and impact of the project on these stakeholder's groups;
- Summarizing of key findings and observations from the consultation;
- Preparing a future stakeholder engagement strategy consultation plan for a more detailed assessment at a microscopic level taking into account the various project lifecycle phases and their implications on the stakeholders.

9.3.2 Stakeholder identification and analysis

People who live near and around the project who will be directly and indirectly affected by the project are considered as the stakeholders. For this particular project, stakeholders are the

business man, resident, people who live near the project. For the sake of their interest, it is an absolute necessity to consult all primary and secondary stakeholders.

- **Primary Stakeholders**

327 Primary stakeholders are people who would be directly affected by the proposed project. In this context, Bangladesh Railway, Local adjacent business man was considered as the primary stakeholders.

- **Secondary Stakeholders**

328 This category of stakeholders pertains to those who may not be directly affected but have interests and could contribute to the study, play role in implementation at some stage, or affect decision making on project aspects. In this project, local elite persons, people who are living in the close vicinity, occupational groups and government departments fall under this category.

329 Apart from categorization, the stakeholders can also be classified in accordance with the level of influence they have over the project as well as their priority to the project proponent in terms of importance.

330 The influence and priority have both been primarily rates as:

- **High Influence/Priority (Manage Closely):** People who have high power and interest are grouped in this category. They always must be managed closely. This implies a high degree of influence of the stakeholder on the project in terms of participation and decision making or high priority for the project proponent to engage that stakeholder.
- **Medium Influence/Priority (Keep Satisfied/ keep informed):** People who have high power but low interest, as well as those who have high interest but low power, should be kept satisfied or informed. This implies a moderate level of influence and participation of the stakeholder in the project as well as a priority level for the project proponent to engage the stakeholder who is neither highly critical nor are insignificant in terms of influence.
- **Low Influence/Priority (Monitor with minimum effort):** This implies a low degree of influence or interest of the stakeholder on the project in terms of participation and decision making or low priority for the project proponent to engage that stakeholder.

Table 24: Stakeholder Identification

Stakeholders	Category of Stakeholder	Brief profile	Overall influence on the project	Basis of influence rating
Project Management				
Bangladesh Railway (BR)	Primary	EMO Building construction is the major proponent and will have complete control over the project's construction.	Highest	• Are the primary project proponents; • Responsible for the establishment of this project; • Responsible for project-related risks and impact liabilities.

Stakeholders	Category of Stakeholder	Brief profile	Overall influence on the project	Basis of influence rating
Dhaka South City Corporation	Primary	Local authority of the project area	Highest	• Primary financial beneficiaries;
Community people				
Local Community	Primary	Primarily includes adjacent community to the project site.	Medium	• Improvement of the infrastructure in the area; • The project will bring development to their area; • Increase in employment opportunities and preference in a job;
Vulnerable Groups (poor, old aged, women, children and destitute)	Primary	The marginal groups around the project area primarily comprise landless households, households below the poverty threshold, men-headed households, old aged & destitute.	Low	• Employment opportunity during pre-construction and construction phase; • Job prospect for their children; • Secondary business opportunities; • Priority for getting further assistance if any;
Local workers, laborers, Local butcher	Primary	Laborers and workers were recruited from the area of influence mostly during the pre-construction and construction phase of the project.	Medium	• Responsible for undertaking mostly un-skill and semiskilled based work during pre-construction and construction phase of the project; • Engagement level primary in the

Stakeholders	Category of Stakeholder	Brief profile	Overall influence on the project	Basis of influence rating
				civil construction part of the work.
Govt. officials				
Department of Environment (DoE), Bangladesh	Primary	The Department of Environment is the primary government regulatory authority for Environmental protection in Bangladesh.	High	• Government Regulatory agency to provide Environmental Clearance Certificate (ECC) to the project based on evaluation and approval of IEE/EIA study, • Responsible for monitoring project • Environmental compliance throughout the project lifecycle; • High influence and high interest.
Forest Department, Ministry of Environment, Forest and Climate Change, Bangladesh	Primary	The forest department under the Ministry of Environment, Forest and Climate Change, Climate Change is responsible for the management of forests and ecological assets of national or international importance within Bangladesh.	Low	• No major influence on project-related activities.
Local Government Engineering Department (LGED)	Primary	LGED is one of the largest public sector organizations in Bangladesh entrusted with the planning and implementation of local-level infrastructure	Low	• No major influence on project-related activities.

Stakeholders	Category of Stakeholder	Brief profile	Overall influence on the project	Basis of influence rating
		development programs.		
Roads and Highways Department (RHD)	Primary	RHD is one of the largest public sector organizations in Bangladesh entrusted with the planning and implementation of highways and bridges	Low	• No major influence on project-related activities.
Bangladesh Water Development Board (BWDB)	Primary	BWDB is responsible for surface water and groundwater management in Bangladesh.	Low	• No major influence on project-related activities. • Responsible for monitoring the reservoirs and rivers adjacent to the project site
Department of Public Health Engineering (DPHE)	Secondary	The primary department responsible for managing the overall water supply and sanitation facilities in the City Corporation	Low	• No major influence on the project-related activities; • Controlling out-break of any major disease and monitoring the disease pattern.
Department of Fisheries	Primary	• It is responsible for managing, developing fisheries resources in the surrounding area	Low	• No major influence on project-related activities.
Power Development Board / Bangladesh Rural Electrification Board	Primary	• Responsible for supplying necessary power	Medium	• Responsible for supplying necessary power
Other regulatory & permitting authorities	Primary		High	• Agencies required for obtaining permits and licenses for

Stakeholders	Category of Stakeholder	Brief profile	Overall influence on the project	Basis of influence rating
				establishment and operation of the project; • Primary involvement during pre-construction and construction phases.
Contractor and Sub-contractor				
Other Contractors (local and foreign)	Primary	Other Contractors include part suppliers, mechanical installers and maintenance service providers who would be engaged during the project lifecycle.	Medium	• The pre-construction and construction phase will require many peoples (for both civil and mechanical work) including both local and migrant workers • Engagement levels would be mostly during pre-construction, construction, operation and decommissioning phases.
Migrant Workers and Laborers	Primary	Laborers and workers arriving from outside for participating in pre-construction and construction activities.	Medium	• Responsible for undertaking mostly skill-based work during the construction phase; • Engagement level during both civil and mechanical phases of work.

Stakeholders	Category of Stakeholder	Brief profile	Overall influence on the project	Basis of influence rating
Thana/Upazila' Political Administration	Secondary	Elected representative of people at City corporation/District/ Thana/Upazila level for a fixed tenure.	Medium	• The key linkage between the community and the project proponent; • Low interest with high influence.
Other Institutional Stakeholders Groups				
Local NGOs and Community & Social Welfare Groups (CSWG)	Secondary	Agencies working in the project area	Low	• No major involvement in the project yet;
Printed and Electronic Media	Secondary	-	Low	• Public watchdog on the project-related activities; • No major influence on the project.

9.4 Details of Consultation Meetings and Outcomes

331 The details of consultation meetings are presented below:

9.4.1 Informal consultation

332 Informally, a number of occupational groups and other interested parties were consulted. When the team was visited in the project region, these talks were conducted on the scene. This was done to raise knowledge of the Project and dispel any misconceptions about it, as well as to gain support from the local community to perform baseline environmental, ecological, fisheries, and socio-economic surveys. People were consulted by individual team members in terms of the sectors (agricultural, fishing, socioeconomic, etc.) to which they were allocated.

9.4.2 Focus Group Discussion

333 FGDs were held during field visit with businessman, local authorities and others to obtain their feedback. The FGDs were held to gather information on a variety of topics, including how noise and air pollution affect nearby communities and whether the proposed project will aid in any socio-economic development; the availability of construction materials near the Project site; the availability of local labour; site safety and security; community involvement; and long-term sustainability. The conclusions of these conversations were utilized to rank and prioritize the consequences and risks, as well as to develop the EMP. Consultation picture given in Figure 45.


Figure 45: Consultation at EMO Building Construction project area

9.4.3 Consultation Outcomes

334 The following **table** presents the comments, suggestions, concerns obtained and action points taken to address them during FGDs, informal consultations and formal public consultation Greetings: At the outset, the team spelled greetings to all participants. Welcomed them for attending and stated the entire design of the meeting.

Table 25: Comments, suggestions, concerns and action points from different stakeholders

Environmental & Social Issues Identified		
Issues	**Issues raised/ Comments/ Suggestions/Concerns**	**Reply from Consultant/Action Points**
Environmental Issues	• The participants stated that they have no objection to the construction of the EMO Building Construction project. The project deserves to be highly praised. For the continuous development of the country such projects are very important. • They reported that noise could be generated due to the movement of vehicles, and heavy equipment running during construction. • They demanded employment for the local manpower in each phase of the project from construction to operation based on their skill (unskilled, semi-skilled and skilled).	• Thank you for your good positive comments. Consultant noted the point of optimism. • Mitigation measures will be taken properly for noise protection. • Local people should be given priority in terms of involvement in the project activities.

Environmental & Social Issues Identified		
Issues	**Issues raised/ Comments/ Suggestions/Concerns**	**Reply from Consultant/Action Points**
	• Regarding waste management take necessary measures to keep the environment clean especially in work place & workers camp area. • Proper action plans should be implemented in order to mitigate issues regarding noise and air pollution during construction period. • Due to the implementation of the project, existing environment will be imbalanced. What will be the solution for existing educational institute, mosque, temple etc. • If trees cutting is required, it will have negative impact on environment. How it will be managed? What will be solution about the tree owner?	• The environmental management plan will address these issues and will have provision for good hygienic housekeeping in construction camps. • Consultant noted the point of optimism. • Consultant noted the point of optimism. • If one tree will need to cut, then three seedlings will be planted. Compensation will be given to the tree owner as per the resettlement action plan.
Social Issues Identified	• The project deserves to be highly praised. To progress development of the country such kind of project are very important. • The proposed project would have a positive impact on socio-economic development • How about the land acquisition due to the implementation of the project especially in congested densely populated areas? Who will bear the cost of land acquisition?	• Thank you for your good positive comments. Consultant noted the point of optimism. • This project will help to conduct the services better than before. • The land for the proposed project is government land under the Rail Ministry.

Environmental & Social Issues Identified		
Issues	**Issues raised/ Comments/ Suggestions/Concerns**	**Reply from Consultant/Action Points**
	• If there any houses or shelter for the helpless people in the project area what compensate will give them. • Where the construction camp will be built. If the camps will be built in any public place, then that will be harmful for the local people. • They also believe that the successful construction and operation of the proposed project will yield considerable employment opportunities for local people.	• Proper compensation will be applicable for the affected household. • Consultant noted the point of optimism. Construction camp will be built in open spaces, away from settlement, market, school, mosque etc. • Local people should be given priority in terms of involvement in the project activities.

Source: ENRAC Field Survey

9.5 Disclosure Requirement

335 Information is disclosed through public consultation and making available relevant documents in public locations. The following documents will be submitted to ADB for disclosure on its website:

(i) IEEs (including subproject EMP);

(ii) Updated IEEs (including EMP) and corrective action plan prepared during project implementation, if any; and

(iii) Environmental monitoring reports.

336 The EAs/IAs will send a written endorsement to ADB for disclosing these documents on the ADB website. The PIUs will provide relevant safeguards information in a timely manner, in an accessible place and in a form and language understandable to affected people and other stakeholders. For illiterate people, other suitable communication methods will be used. Disclosure will follow ADB's Access to Information Policy, 2019.

10 Grievance Redress Mechanism

10.1 Introduction

337 As a partner in the delivery of this Project, ADB's environmental safeguard requirements were carefully considered during the preparation of this IEE. The description of a grievance redress mechanism (GRM) is not required under the GoB environmental legislation but is mandatory for any ADB-funded Project. To that end a step-by-step process is defined in this chapter.

338 Grievance redress is intended to provide a mechanism to anyone negatively impacted by the Project, enabling a grievance to be filed and prompt resolution obtained, using a pre-defined set of time-bounded steps. The overriding principle of the GRM is that it must be non-threatening, easily accessible, quick and impartial; delivering decisions to the complainant in an unbiased a-political manner.

10.2 The Grievance Redress Committee

339 Rather than suggesting a route normally taken when a citizen has a concern, namely the local administrative official route, grievance redress committees (GRCs) will be organised in ward level. The project area is located in the Fulbaria (Ward-20) which is under the Ramna Mouza of Shahbag Thana of Dhaka South City Corporation. Each Project will likely trigger both environmental and social impacts and therefore the GRC will need to be able to address both. Prior to the start of construction, BR will meet with ward heads to request each to nominate committee members who could form part of the GRC, and meet when complaints are received. As a minimum the composition of a GRC will be as follows:

BR Project Director or Representative
GRC Chair and convener
Ward Commissioner or Representative
GRC Committee member
Female member of concerned ward
GRC Committee member
Local NGO Representative
GRC Committee member (Social)
DoE representative from District
GRC Committee member (Environment)

340 When dealing with environmental matters, the GRC should have five permanent members, with the DoE representative replacing the local NGO and a female representative of the affected people. In order to convene a GRC meeting a quorum of three people will be required. Further, the GRC would only be convened if direct communication between the contractor, the complainant and the Engineer cannot solve the issue quickly. Once the complaint reaches the GRC, the GRC has two weeks to render a decision, based on discussion with all parties involved. The GRC will be used as the third step when filing a complaint.

10.3 Steps to a Solution

341 **Step 1** - The complainant will be advised to first attempt to settle the complaint through direct communication with the either in person or by a phone, and a call to the local BR office. If the discussion with the Complainant/Community is successful, the contractor will be responsible for undertaking corrective measures as defined in the grievance decision and recording the decision and filing that with BR, via the Engineer or the BR ESSU.

342 **Step 2** – Should the complaint not be addressed within a week, the next level is to notify the ward

office and BR of the unresolved issue. The ward official will then communicate either to the contractor or BR and a solution will be discussed with the complainant within one working week. If more time is required, The ward or BR should communicate directly with the complainant describing the reasons of the delay.

343 **Step 3** - If Step 2 fails to resolve the issue within two weeks of the receipt of the complaint the GRC should be formed and a formal hearing undertaken. At this point a decision must be rendered within two weeks or the complainant's concerns will be deemed correct and immediate mitigative actions will be required and fully executed within five days of the end of the two-week period.

344 **Step 4** – If Step 3 fails to resolve the issue, the complainant may proceed to legal arbitration.

345 All GRC decisions will be recorded by the GRC, and sent to the local and head office of Bangladesh Railway. **Figure 18** shown the Flow Chart of proposed Grievance Redress Mechanism of the Project.

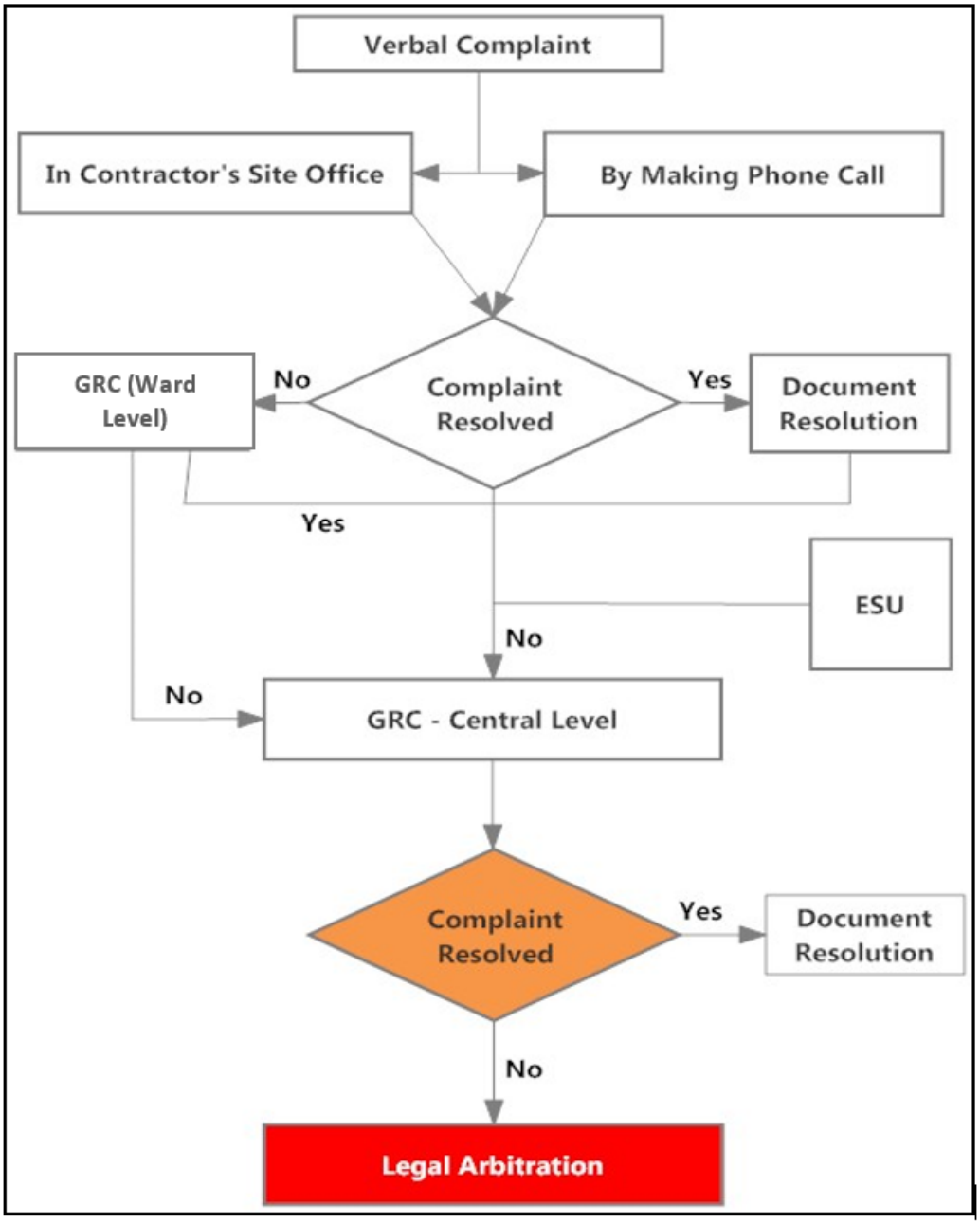


Figure 46: Proposed Grievance Redress Mechanism of the Project

10.4 Publicising the Grievance Redress Steps and the Committee

346 Prior the start of the construction, BR or its representative will publicise the establishments of the grievance redress steps and the process, and advertise all via contact information and the grievance redress steps posted at ward office involved. The poster(s) will be in the local language(s) and posted within 30 days of the start of construction. The BR representative will check at least monthly to insure that the posters are prominently displayed and provide clear contact instructions and numbers. This procedure and monitoring will be reported in the semi-annual monitoring report submitted to the ADB.

10.5 Reporting

347 Any grievance filed with the GRC, must be reported in the Annual report to the Engineer who will then submit a consolidated report to ADB, via BR.

10.6 Grievance Resolving Cost

348 At construction sites, work camps and on-the-job, labourers and other unskilled hired employees of the contractor have little recourse when either their living conditions are badly degraded, they are not paid according to agreement, or basics, such as potable water, are not supplied. Under this contract, as part of the written agreement with each hired worker, the contract or letter of assignment with the work, will include the name and contact information of who within BR and/or the Engineer the person can contact with their concerns and a second statement indicating that the contractor will not penalise the worker for reporting a complaint. If the worker is penalised, the Contractor will be levied with a fine equal in value to the worker's contract duration from the time of the incident to the end of the contract period. This fine will be paid to the complainant.

349 The Grievance respect to environmental safeguards point of view resolving action will be taken by the respective contractor during the contract period. If after inspecting by BR or other regulatory agencies of any of the Contractors' working areas or mitigative actions, rule them to be in contravention of GoB legislation and/or DoE regulations, the Contractor shall rectify the problems immediately. If any government agency imposes a penalty on BR as a result of the Contractor's contravention either directly or indirectly attributable to the Contractor's non-compliance, BR will pay such amount as applicable and deduct the amount together with any additional financing or related legal charges which BR may have incurred, from the Contractor in accordance with GCC Clause 2.5 [Employer's Claims].

350 In the contractual agreement the employee will be provided specific contact information for a responsible person within BR and the Engineer who will address grievances.

11 Emergency Response, Safety and Disaster Management Plan

11.1 Emergency Response

351 The initial response to an incident is a critical step in the overall emergency response. Like all other project, this project must have adequate measures against accidents or incidents to meet the emergency. The purpose of having an Emergency Response Plan (ERP) is to:

- Assist personnel in determining the appropriate response to emergencies.
- Provide personnel with established procedures and guidelines.
- Notify the appropriate Company Emergency Response Team personnel and regulatory/ Govt. agencies.
- Manage public and media relations.
- Notify the next-to-kin of accident victims.
- Respond to immediate requirements to safeguard the subtending environment and community.

352 Generally, the initial response is guided by three priorities Ranked in importance these priorities are:

1 People
2 Property
3 Environment

353 Emergency Response Procedures will identify who does what and when in the event of an emergency. Responsibility for who is in charge and their coordination of emergency actions shall be identified. Nature of Emergency & Hazardous Situations may be of any or all of the following categories:

I. Emergency

- Fire,
- Accidental spillage
- Electric shock,
- Medical emergency.

II. Natural Disasters

- Flood,
- Earthquake/ cyclone,
- Storm/ typhoon/ tornados, and
- Cloud burst lightning.

III. External Factors

- Food poisoning/water poisoning,
- Sabotage, and
- War.

354 Six Steps in Emergency Response

Step-1

a) Determine the potential hazards associated with the incident, substance or circumstances and take appropriate action identify the type and qualities of dangerous goods involved and any known associated

hazards.

b) Determine potential hazards stemming from local conditions such as inclement weather water bodies etc. and ensure that the initial response team is aware of these conditions.

Step-2

Determine the source/ cause of the event resulting to the emergency and prevent further losses.

Step-3

Assess the incident site for any further information on hazards or remedies.

Step-4

Initiate redress procedures.

Step-5

Report the incidence its nature because impact applied redress procedures and any further assistance required etc. to the appropriate company, government and/or land owner.

Step-6

Take appropriate steps with respect to hazards to wildlife, other resources and addressing public and media concerns and issues, as applicable. Response priorities are to protect human lives, property and the environment.

11.2 Emergency Response Procedure

i. Fire Incident

11.2.1 Emergency response procedural steps

- All personnel at site – shall move out of their workplace and assemble at the nearest safe assembly point
- Emergency mitigating (Fire fighting) team – Mitigate the Fire as per procedure (Trained)
- Emergency technical support team – Mobile resources as need for the situation
- First aid team – Provide first-aid to the affected persons before sending them to actual medical aid
- Rescue team – Assist and ensure all personnel in the emergency affected site are evacuated; carry out intensive search in the area to make double sure that no person is left un attended
- Security – Stop vehicle / personnel entry in to the site; control traffic within site
- Head – HR - Coordinate with rescue team and arrange for additional help such as logistics and other medical arrangements for the affected personnel
- Incident controller – Blow siren for all clear indication after the emergency is over.

11.2.2 Clean-up and/or restoration

355 The Emergency mitigating (Fire fighting) team and the Emergency technical support team shall ensure clean-up of affected area to enable restoration of normalcy for work– Mobile resources as need for the situation

11.2.3 Reporting

356 The concerned contractor organization's safety representative / safety officer shall report the emergency incident. This reporting is done on completion of the emergency response.

357 Fire, caused from other sources (with a less magnitude of severity)

358 Following materials used at construction site has the potential to cause fire:

A. Electrical short circuits
B. Flammable materials storage areas – materials that can cause fire incident include adhesives (at stores), diesel, hydraulic oil, lubrication oil /grease
C. Oil rags/waste at work locations

Fire mitigation:

359 Use a fire extinguisher only if all of the following apply:

a) The fire is small, contained and not spreading beyond its starting point;
b) You can avoid smoke inhalation;
c) A proper extinguisher is readily available; and
d) You know how to use the extinguisher.

360 If any of these conditions do not apply, do not use the fire extinguisher. Call on "Emergency Number" for help and leave the area immediately

11.3 Emergency plan in case of spills

361 An emergency response plan for oil spills would be in place prior to commencement of the construction. This plan would be consisting of the following precautionary and preparatory measures including;

- Placement of the fuel storage area away from sensitive environment.
- Training of the workers on good practices in fuel handling and response protocols;
- Installation of warning signs;
- Installation of response kits at easily accessible locations. The kit would include absorbents, personal protective equipment and clean-up equipment such as oil boom.
- Risk assessment, including identification of hazards, potential triggers, contaminant pathways, and impact thresholds for different chemicals
- Response procedure, defining roles and responsibilities of key personnel
- Communication protocols- among responsible personnel, and to authorities and neighbours, if required

11.4 Occupational Health and Safety

362 Occupational health and safety issues will be more likely to arise during the excavation and landfilling of the construction area. Dust can be released into the air during landfilling. Moreover, the use of heavy equipment can cause physical hazards.

11.5 Environmental, Health and Safety (EHS) Plan

363 Health and safety aspects of the entire facility should be given due attention. An Environment, Health and Safety register is essential for monitoring of performance of the entire facility community in relation to the environment. The management will use this as a self-auditing tool. This register should include:

- Fire extinguisher servicing records
- EHS meeting schedules and training records

- Electrical installations
- Generator inspection and maintenance records
- Waste disposal records
- Emergency response procedure.
- Record off all incidents, accidents, near miss etc.

364 Safety Hazard Prevention, Control and Mitigation Measures

Event	Prevention, Control and Mitigation Measures
General Instruction of Workers	○ Personal and continuous visual supervision of the worker who is not competent to perform the job. ○ Workers to be conversant on the codes and standards of safety. ○ Workers must be confident that they have adequate training on handling of unsafe hazards material.
Maintenance of Equipment	○ 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. ○ Will perform the function for which it is intended or was designed ○ Is of adequate strength for that purpose ○ Is free from potential defects.
Illumination	○ Ensure that illumination at a work site is sufficient to enable work to be done safely. ○ 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 a) Leave the work site in safety b) Initiate emergency shutdown procedures c) Restore normal lighting
Sanitary facilities & drinking Water	○ Ensure that an adequate supply of drinking water is available at the work site. ○ Ensure toilet facilities in accordance with the requirement of general health protection guidelines.
Head protection	○ Ensure that during the work process adequate alternative means of protecting the workers head is in place.
Eye protection	○ Where there is a danger of injury to or irritation of a worker's eyes, his employer shall ensure that the worker wears property fitting eye protective equipment.
Foot protection	○ 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.

11.6 Disaster Management Plan

365 Disaster Management is a planned and systematic approach to minimize damage to life, property and environment. It involves the systematic observation and analysis of measures relating to disaster prevention, mitigation, preparedness, emergency response, rehabilitation and reconstruction. It is also to

be realized that disaster management involves community preparedness so as to achieve the desired objective of minimization of damage. Community preparedness plan involves all pre- disaster planning to reduce the loss. It is basically a synthesis of various specific plans to solve a common purpose.

366 Community-Based Disaster Risk Management (CBDRM) is a process in which at-risk communities are actively engaged in the identification, analysis, treatment, monitoring and evaluation of disaster risks in order to reduce their vulnerabilities and enhance their capacities. This means that people are at the heart of decision- making and implementation of disaster risk management activities. The involvement of most vulnerable social groups is considered as paramount in this process, while the support of the least vulnerable groups is necessary for successful implementation.

367 CBDRM approach is people and development oriented. It views disasters as an issue of community's vulnerability. It covers prevention and mitigation, preparedness, emergency response and recovery.

368 The key aspect of community involvement is the sustainability of community level initiatives for disaster mitigation. Unless the disaster risk management efforts are sustainable at individual and community level, it would be difficult to reduce the vulnerability and losses.

369 Disasters can occur in project area due to floods, earthquakes, bank erosion. Therefore, appropriate management plan should have to be taken by the project operator to prevent any unwanted disaster in the project.

370 The disaster management plan should consist of preventive measures including, among others, the following.

- Formulation and strict implementation of safety codes and measures;
- Preventive maintenance;
- Aware the workers about electric shock
- Declaring the project area, a "no smoking zone"
- Mock drills by the fire fighting cells/ groups
- Provision and inspection of fire fighting equipment and fire hydrant system in all the sections;
- Proper training of the employees about the importance of codes;
- Training the employees and the residents of the surrounding villages about the actions to be taken during an accident, disaster etc.

371 It is imperative to develop entire facility environment policy and display necessary documentation for ease in accessing information. Some of these documents include:

- Emergency contacts;
- Emergency response procedures for fires, accidental spillage etc.

372 The facilities operations and monitoring are carried out under the management and help from both the employees and relevant government lead agencies. In order to take care of any hazards the following control should be adopted:

- ❖ All safety precautions and provisions covering the general cleanliness of the entire facility down to, ventilation, lighting, sanitary, waste collection, first aid box provision, adequate fire extinguishers and site security by fencing.

11.6.1 Earthquake

373 In case of earthquake, no siren will be given. All the personnel inside the project area should shut down their operations and come to open yard and assemble at the assembly points. If required,

transportation should be arranged for sending the people to safer places. Rescue operation should be carried out by security personnel for any possible casualties and the same are given first aid treatment and should be sent to the nearest hospitals in case of requirement.

11.6.2 Flooding (Heavy rains)

374 When floods are caused by heavy rains, those who will work in the project area should move to safer places. Should stay in safe place until the water recedes. All the goods and equipment needed to be shifted as early as possible.

375 Actions to be taken:

a) Monitor conditions and escape routes.
b) Shut off electrical power and utilities if flooding is imminent.
c) Call fire services if needed

376 Recovery action:

a) Ensure that facilities and equipment are cleaned, dehumidified, sanitized and deodorized before allowing the re-entry of employees.
b) Be sure water supplies are safe to drink. Disposed-off any food or consumables that may have been in contact with flood waters.
c) Begin mitigation planning to avoid repetition of same problems in future.

11.6.3 Cyclones / heavy winds

- Know about the severity / direction of the cyclone from news bulletins / meteorological dept.
- Review the activities / operations planned and stop operations which may create an emergency situation due to cyclone / high winds
- Ensure emergency equipment such as batteries / torches etc., are in availability
- Ensure food supplies to the work force
- Ensure readiness of emergency vehicles / medicines, medical centre with staff etc.

12 Conclusion and Recommendation

12.1 Conclusion

377 Construction of a 4-story Engineer's Main Office (EMO) structure with a 16-story foundation and three basements is required by BR in order to ensure the smooth continuation of the railway project. Modern amenities like as environmentally friendly solar panel systems, rainwater harvesting systems, better station facilities, and accessibility for those with physical disabilities will be included in the construction of EMO buildings.

378 Although development of this magnitude may have potential environmental and social implications, this study has provided appropriate mitigation measures for all potential impacts and environment consultant continually worked with concerned design team two address all environmental and social issues in the building designs. The PMU of this project is committed to the implementation of proposed mitigation measures including full implementation of environmental management plan.

379 During the preparation of this report for the development of the proposed building project it was observed and established that most of the negative impacts on the environment are rated low and short term thus can be abated through the proposed mitigation measures. The positive impacts are highly rated and will benefited. The project proponents should aim to prudently implement the Environmental Management Plan.

12.2 Recommendation

For any project, both positive and negative impacts are present but based on impact identification in this report, it is seen that most of the impacts are negligible and the construction of EMO building, using modern technology will reduce the negative impact on the environment. So, EIA is not required for this project. In conclusion the following are recommended.

- Integrate suitable mitigation measures as outlined in this report in the designs for all sections of the project for implementation during construction and use of the building.
- Consult with the community and other stakeholders, if they have any comments, accept it and resolve any objections they may have.
- Implement the environmental management plan throughout the project implementation with assistance of appropriate expert including development and implementation of HIV/AIDS and other communicable diseases program in conjunction with line ministries.
- During the preparation of this report for the development of the proposed project it was observed and established that most of the impacts on the environment are rated low and short term thus can be abated through the proposed mitigation measures.
- The project proponents should aim to prudently implement the Environmental Management Plan.

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14 Appendix

ANNEX I Air Quality Measurement Report

Certified-ISO: 9001:2015, 14001:2015, 45001:218

Environment and Resource Analysis Center Ltd. (ENRAC)

Block-C, Road-7, House-15, Level-3, Niketon, Gulshan-1, Dhaka-1213
Cell: +880248810445, E-mail: info@enrac.com.bd

ENRAC REF: ENRAC 0540/23

AMBIENT AIR QUALITY TESTING REPORT OF EMO

COMPANY NAME	: BANGLADESH RAILWAY
PROJECT NAME	:"Construction of 4-Storied Engineer's Main Office (EMO) Building with 16-Storied Foundation and Three Basements at Fulbaria, Dhaka".
CLIENT REF.	: N/A
CLIENT ADDRESS	: Bangladesh Railway, Railbhaban, Dhaka, Bangladesh
SAMPLE COUNT	: Duration: 01 hour
SAMPLING DATE	: 26/02/2023
ANALYSIS DATE	: 28/02/2023
SAMPLING ID	: AAQ_01 and AAQ_02

Ambient Air Quality (AAQ) Test Results

Sampling Site Description	Description of Parameters	Unit	Concentration of Ambient Air Quality Parameters		GoB Air Quality Standards*
			Average (Day) AAQ_01	Average (Day) AAQ_02	
• Environmental Perimeter Air Station (EPAS) was set on the bed of the constructing EMO building premises, at phonix road, Fulbaria under Shahbag thana in Dhaka District. (AAQ_01) • There was a road near the sampling point and a market was near the point of the sample collection. • Bus, Mini truck, private car, CNG and others vehicles were running continuously on nearby road. • Some construction work was running nearby during sampling. • Excavator and various heavy vehicle were running. • There is mosque named Railway Masjid beside the east side of the point and a police hostel was north side of the project and sampling point. (AAQ_01) • Emission from heavy engine & nearby restaurant may contribute for air pollution • Dust particle were flying when vehicles were running during sampling.	Carbon Monoxide (CO)	mg/m3	0.22	0.24	9 (8 hour)
	Nitrogen Dioxide (NO_2)	µg/m3	57.3	60.1	100 (Annual)
	Sulfur Dioxide (SO_2)	µg/m3	7.0	7.1	365 (24 hour) 80 (Annual)
	Particulate Matter (PM_{10})	µg/m3	172.4	160.1	150 (24 hour) 50 (Annual)
	Particulate Matter ($PM_{2.5}$)	µg/m3	95.8	80.8	65 (24 hour) 15 (Annual)
	Temperature	°C	28	28	**NSE

* The amended Schedule-2, 2005, of (Air Quality Standard) Environmental Conservation Rules, 1997
** NSE- No standards established yet

Prepared By
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Environmental Officer

Approved By
Mehedi Hasan
Environmental Specialist

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ENRAC REF: ENRAC 0110/23

NOISE LEVEL MEASUREMENT REPORT OF EMO

COMPANY NAME	: BANGLADESH RAILWAY
PROJECT NAME	: "Construction of 4-Storied Engineer's Main Office (EMO) Building with 16-Storied Foundation and Three Basements at Fulbaria, Dhaka".
CLIENT ADDRESS	: Bangladesh Railway, Railbhaban, Dhaka, Bangladesh
SAMPLE COUNT	: Time:- 01 hour
SAMPLING DATE	: 26/02/2023
DATE OF ANALYSIS	: 28/02/2023
SAMPLING ID	: NM_01 and NM_02
Sampling Site Description	
The Noise Level Measurement NM_01 had been set on the bed of the construction site, at phonix road, Fulbaria under Shahbag thana in Dhaka District. NM_02 was taken from road side. There was a road and a market was near the point of the sample collection (NM_01). Bus, Mini truck, private car, CNG and others vehicles were running continuously on road.	

Noise Measurement (NM) Results

Sampling ID	Time	Unit	Noise Measurement Data		
			Minimum	Maximum	LAeq
NM_01_ Day	01 hour	dBA	44.3	68.5	58.2
NM_02_ Day	01 hour	dBA	45.2	67.8	57.1
GoB Noise Standard*	Zone	Day		Night	
	Silent Zone	50		40	
	Residential Zone	55		45	
	Mixed Area (Residential together with areas used for commercial and industrial purposes)	60		50	
	Commercial Area	70		60	
	Industrial Area	75		70	

* The amended Schedule-4, 2006, of (Noise Level Measurement Standard) Environmental Conservation Rules, 1997

Analysed and Prepared by

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Environmental Officer

Approved by

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ANNEX III Ground Water Quality Test Report

Government of the People's Republic of Bangladesh
Office of the Chief Chemist
Department of Public Health Engineering
Central Lab, 38-39, Mohakhali C/A, Dhaka-1212
Phone: 88-02-9881927, Fax: 88-02-9882003 , Email: wqmsc_central_lab@yahoo.com

Lab Memo: 756/ CC, DPHE, CL, Dhaka — Date: 08-02-2023

Physical /Chemical/ Bacteriological Analysis of Water Sample

Sample ID: CEN2023020050	Sample Receiving date: 26-01-2023
Ref. Memo No: ENRAC/2023/Nill & Dated: 26-01-2023	Sample Source: Ground Water
Sent by:Md. Giash Uddin ,Environmental Officer , ENRAC, Gulshan-1, Dhaka-1213.	Dist:Dhaka, Upa:
Care Taker: ENRAC (Sample ID -EMO(GW))	Union:, Vill.:Fulbaria
Sample Collection date:	Date of Testing: 26/01/2023-07/02/2023

LABORATORY TEST RESULTS:

Sl.#	Water quality parameters	Bangladesh Standard	Concentration present	Unit	Analysis Method	LOQ
1	Alkalinity	-	40	mg/L	Titrimetic	-
2	Arsenic (As)	0.05	0.001	mg/L	AAS	0.001
3	Chloride	150-600	70	mg/L	Titrimetic	-
4	Iron (Fe)	0.3-1	0.05	mg/L	AAS	0.05
5	Manganese (Mn)	0.1	0.03	mg/L	AAS	0.03

Comments: Sample was collected & supplied by client.
N.B: AAS - Atomic Absorption Spectrophotometer, UVS - UV-Visible Spectrophotometer, MFM-Membrane Filtration Method, LOQ - Limit of Quantitation.

Test Performed by:

1.) Name: Md. Saiful Alam Khosru
Designation: Sample Analyzer
Signature: 08.02.2023

2.) Name: Taslima Akhter
Designation: Sample Analyzer
Signature: 08.02.2023

Countersigned/Approved by:

1.) Name: Mita Sarker
Designation: Senior Chemist
Signature: 08/02/2023

2.) Name: Md. Biplab Hossain
Designation: Chief Chemist
Signature: 08/02/2023
Md. Biplab Hossain
Chief Chemist
Department of Public Health Engineering
Central Laboratory Mohakhali, Dhaka

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ANNEX IV Inventory of Plant Species within the Project Corridor

Sl. No.	Family	Local name	English Name	Scientific Name
1	Anacardiaceae	Am	Mango	*Mangifera indica*
2	Moraceae	Kathal	Jackfruit	*Artocarpus heterophyllus*
3	Myrtaceae	Jaam	Black berry	*Eugenia jambolanavav*
4	Moraceae	Lal bot	Banyan	*Ficus benghalensis*
5	Arecaceae	Narical	Coconut	*Cocos nucifera*
6	Arecaceae	Supari	Betel nut	*Areca catechu*
7	Moraceae	Pakur	Grey Fig	*Ficus virens*
8	Mimiosacae	Sada koroi	White siris	*Albizia procera*
9	Meliaceae	Mehogoni	Mahogany	*Swietenia mahagoni*
10	Fabaceae	Akasmoni	Earleaf acacia	*Acacia auriculiformis*
11	Myrtaceae	Eukalyptus	River redgum	*Eucalyptus camaldulensis*
12	Rhamnaceae	Boroi	Indian jujube	*Ziziphus mauritiana*
13	Musaceae	Kola	Banana	*Musa sapientum*
14	Sapindaceae	Litchi	Lichu	*Litchi chinensis*
15	Rutaceae	Jambura	Pomelo	*Citrus maxima*
16	Caricaceae	Pepe	Papaya	*Carica papaya*
17	Rubiaceae	Kodom	Burflower-tree	*Anthocephalus cadmba*
18	Moringaceae	Sajna	Horseradish tree	*Moringa oleifera*
19	Moraceae	Debdaru	False ashoka	*Polyalthia longifolia*
20	Meliaceae	Neem	Indian lilac	*Melia azederach*
21	Verbenaceae	Lantana	Spanish flag	*Lantana camera*
22	Solanaceae	Tit begun	Black nightshade	*Solanum nigrum*
23	Myrtaceae	Peyara	Guava	*Psidium guajava*
24	Malvaceae	Jaba	China rose	*Hibiscus rosa-cinensis*

ANNEX V Inventory of Birds Species within the Study Area

Sl. No.	Family	Local Name	English Name	Scientific Name	Status in Bangladesh
1	Accipitridae	Cheel	*Brahminy Kite*	*Haliastur indus*	LC
2	Muscicapidae	Doyel	*Oriental magpie-robin*	*Copsychus saularis*	LC
3	Passeridae	Chorui	*House Sparrow*	*Passer domesticus*	LC
4	Sturnidae	Vat shalik	*Common Mayna*	*Acridotheres tristis*	LC
5	Cuculidae	Kokil	*Jacobin Cuckoo*	*Clamator jacobinus*	LC
6	Corvidae	Kak	*House Crow*	*Corvus splendens*	LC
7	Columbidae	Tila ghughu	*Spotted Dove*	*Spilopelia chinensis*	LC
8	Ptcnonotidae	Sipahi Bulbuli	*Red-whiskered Bulbul*	*Pycnonotus jocosus*	LC
9	Ptcnonotidae	Bulbuli	*Red-vented Bulbul*	*Pycnonotus cafer*	LC
10	Dicruridiae	Finge	*Bronzed Drongo*	*Dicrurus aeneus*	LC
11	Dicruridiae	Kalo finge	*Black Drongo*	*Dicrurus macrocercus*	LC
12	Muscicapidae	Shyama	*White-rumped Shama*	*Copsychus malabaricus*	LC
13	Motacilidae	Khonjona	*White-browed Wagtail*	*Motacilla madaraspatensis*	LC
14	Ardidae	Go bok	*Indian Pond Heron*	*Ardeola grayii*	LC
15	Alcedinidae	Machranga	Common Kingfisher	*Alcedo atthis*	LC
16	Accipitridae	Shikra	Shikra	*Accipiter badius*	LC

ANNEX VI Inventory of Fish Species within the Project Corridor

Sl. No.	Family	English Name	Local Name	Scientific Name	Status in Bangladesh
1	Siluridae	Freshwater shark	Boal, boali, patari	*Wallago attu*	VU
2	Bagridae	Long-whiskered catfish	Air, ayre, bhangat	*Sperata aor*	VU
3	Cyprinidae	Hill-stream Carp	Kala Bata	*Crossocheilus latius*	EN
4	Channidae	Giant snakehead	Gajar, gajori	*Channa marulius*	EN
5	Notopteridae	Humped featherback	Chital	*Chitala chitala*	EN
6	Mastacembelidae	Tire-track spinyeel	Baim, sal baim,	*Mastacembelus armatus*	EN
7	Siluridae	Pabda catfish	Pabda, madhu pabda	*Ompok pabda*	EN
8	Pangasiidae	Pungas, pungas catfish	Pangas, pangwash	*Pangasius pangasius*	EN
9	Bagridae	Gangetic mystus	Golsha, golsha tengra	*Mystus cavasius*	NT
10	Nandidae	Mottled nandus	Bheda, meni, roina	*Nandus nandus*	NT
11	Cyprinidae	Mrigal carp	Mrigel	*Cirrhinus mrigala*	NT
12	Cyprinidae	Rohu	Rui	*Labeo rohita*	LC
13	Cyprinidae	Catla	Katla	*Catla catla*	LC
14	Cyprinidae	Black rohu	Kalbous	*Labeo calbasu*	LC
15	Bagridae	Bleeker's mystus	Tengra, gulsha tengra	*Mystus bleekeri*	LC
16	Clariidae	Walking Cat fish	Magur	*Clarias batrachus*	LC
17	Heteropneustidae	Stinging Cat fish	Shing	*Heteropneustes fossilis*	LC
18	Bagridae	Striped dwarf catfish	Tengra	*Mystus vittatus*	LC
19	Anabantidae	The climbing perch	Koi	*Anabas testudineas*	LC
20	Channidae	walking snakehead	Telotaki, cheng	*Channa orientalis*	LC
21	Channidae	Spotted snakehead	Taki, chaitan, lati	*Channa punctatus*	LC
22	Channidae	Snakehead murrel	Shol, shoul	*Channa striatus*	LC
23	Schilbeidae	Batchwa vacha, bacha	Bacha, garua bacha	*Eutropiichthys vacha*	LC
24	Gobiidae	Fresh water goby	Bele, baila	*Glossogobius giuris*	LC

ANNEX VII Attendance list

Public Consultation Participants

Project Name: "Construction of 4-Storied Engineer's Main Office (EMO) Building with 16-Storied Foundation and Three Basements"

Location: Fulbaria, Shahbag, Dhaka South City Corporation, Dhaka-1000. **Date:** -26/01/2023

Sl.	Name	Designation/ Organization	Phone Number	Signature
1.	মোঃ বাবুল মিয়া	দোকান	01960-181497	বাবুল
2.	" শফিকুল ইসলাম	ব্যবসায়ী	01625234116	শফিকুল
3.	" আতিকুল ইসলাম	"	01764-168634	আতিক
4.	" হাবু আহমেদ	ইলেক্ট্রিক	01610-391447	হাবু
5.	" মজনু মিয়া	ড্রাইভার	01306-717693	মজনু
6.	" ভুয়াল আকবর	বিজ্ঞাপন	01400[illegible]18000	ভুয়াল
7.	মোঃ মামুন	দোকান	01753-40349[illegible]	মামুন
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9.	রবিউল ইসলাম	রাজমিস্ত্রি	01707-487646	রবিউল
10.	আবু সাঈদ	চাকুরী	01919-840692	আবু সায়েদ
11.	সুমন রহমান	"	01925-577204	[illegible]
12.	আলামিন হোসেন	মিস্ত্রি	01977-438480	আলামিন
13.	মোঃ হাবিবুর	"	01750-262165	হাবিবুর
14.	সাকিব হোসাইন	সাইট ইঞ্জি:	01724-740805	Shakib
15.				
16.				
17.				
18.				
19.				
20.				

Government of the People's Republic of Bangladesh

BANGLADESH RAILWAY

CONSTRUCTION OF ENGINEER'S MAIN OFFICE (EMO) BUILDING OF BANGLADESH RAILWAY

Tree Plantation and Replacement Plan

1. INTRODUCTION

From the perspective of environmental responsibilities for restoration of green environment in EMO BUILDING and also compliance requirement, project will conduct tree plantation across the affected locations. As project design, three plant saplings will be planted against each tree felled from the project site. This Tree Plantation Plan will guide contractors to properly execute the tree plantation activities, including sourcing, planting and posting plantation nursing and protection with the cooperation of local people and communities to a major extent.

1.1 Objective

The objective of the tree plantation plan is to compensate for the loss of trees due to implementation of the EMO BUILDING. Other major objectives of the plan are

- To protect the affected cultural/sensitive receptors adjacent to the building area from environmental pollution and disturbance.
- To restore health of the ecosystem.
- To reduce the impacts of air pollution and dust as trees are known to be natural sink for air pollutants.
- To prevent soil erosion

2. SCOPE

A total of **52 timber** trees of different sizes will be impacted due to implementation of EMO BUILDING. As part of **environmental compensation**, it will be required to plant **three tree saplings against each tree removal**, which means a **total of 156 trees** will be planted under EMO BUILDING before completion of this project. These trees are calculated on north side of the proposed new alignment, proposed station building areas, and new station access road areas (associated facilities).

The following areas have been identified for development of plantation sites in the Project areas:

- Boundary Area of the Building
- Main entrance gate of the building
- If area does not permit, then remaining trees may be planted on ALDLP RoW or station areas

3. SELECTION OF TREE SPECIES

Plantation is one of the most important constituents of soft landscaping. Trees, shrubs and climbers have been used to enhance the soft natural ambience against harsh elements in most of the enhancement schemes. The planting species are decided based on the physical growth characteristics of trees, like form and shape, foliage pattern, growth rate, branching pattern, soil characteristics and conditions of the strip like water logged areas etc. While selecting the species of trees for landscaping a great care should be taken to choose the species, which already exist along the project corridor. On the other hand, if a pure avenue of single species is planted for a considerable length of the road, it gives a harmonious and pleasing look.

Tree Planting guidelines of BR should be followed to ensure environmental, aesthetic and safety concern of railway station yard, track, platform and residential areas of staff. In addition, the selection of appropriate species is essential for plant survival and the ability of the new plant community to compete with weed species.

The main consideration for selection of species for the EMO BUILDING is to

- restore vegetation coverage and habitats for fauna,
- minimize environmental impacts as barriers to noise and air pollution, and

- improve aesthetics of the building.

In addition to above environmental benefits, tree plantation contributes to climate change mitigation through carbon sequestration. Intense thunderstorms with more lightning are important phenomena under climate change regime. Plantation of palm trees may act as lightning arrester.

Keeping above discussed issues in consideration, following tree species are proposed to be planted in the project area.

Tree Type	Example
Timber Trees:	Garjan *(Dipterocarpus turbinatus),* Shal *(Shorea robusta),* Shilkoroi *(Albzia procera),* Mehogani *(Swietenia mahagoni),* Bokul *(Mimusops elengi),* Kodom *(Neolamarckia cadamba),* Babla *(Acacia nilotica),*
Fruit Trees:	Date Tree *(Phoenix sylvestris),* Amloki *(Phylanthus embelica)* Koromcha *(Carissa carandas)* Kamranga *(Averrhoa carambola L)* Lichu *(Litchi chinensis),* Peyara *(Psidium guajava),* *Dewa (Artocarpus lacucha)*
Medicinal Trees:	Arjun *(Terminalia arjuna),* Neem *(Azarlira chlaindica)* Sajina *(Moringa Oleifera),* Bohera *(Terminalia bellericha),*
Fuel Trees:	Epil-epil *(Leucaena leucocephala),* Koroi.*(Samania saman)* Khejur *(Phoenix dactylifera,)* Radhachura *(Caesalpinia pulcherrima),* Krisnachura *(Delonix regia)*

4. Implementation Agreement

Contractor will be responsible for the successful implementation of tree plantation and replacement programme without involving PAPs and FD.

The tasks of the BR are as follows:

- Training of the local BR staff on tree maintenance;
- Preparation of the tree replacement programmes in accordance with this plan and get them approved by the Forest Department if necessary;
- Coordination of sapling procurement process of approved species prescribed above; and
- Supervision of nurseries for raising saplings.

5. Responsibility

It was decided that the Contractor will be responsible for tree plantation throughout the project area and other areas as prescribed above. The Contractor will be responsible to procure and raise saplings until they survive. They can set up nurseries in consultation with BR and Engineer at the early stage of the Project. Alternatively, the Contractor can purchase saplings from the local nursery.

The Environmental Officer of BR/Engineer will be responsible for overall coordination and supervision of the programme. It is recommended that BR should start dialogue with the Forest Department if required for the tree replacement programme in the pre-construction stage, so that setting up of nurseries can be done in the early stages of the Project.

6. Budget and Payment Method

The budget for the proposed tree replacement programme is provided in below Table 2. The budget includes maintenance for first two years from the date of plantation to ensure that all planted saplings will survive and provision for an additional plantation.

The budget also includes procurement and development of all facilities required to establish a nursery such as, collection of suitable soils, decomposing cow dung, procurement of fertilizers, etc. additionally, the budget includes measure required for maintenance of plantation, such as watering, weeding, fertilizer application, replacing of dead saplings (if any) etc., for first two years.

Considering these the total estimated budget for tree replacement is USD 568. Contractor will be paid for the tree replacement programme after survival of each sapling at a rate mentioned in Table 2.

Table 26: Cost Estimates for the Tree Replacement Plan

Tree Replacement Area	Unit	Rate (USD)	Quantity	Amount (USD)
Boundary area	No.	3	100	**300**
Entrance area	No.	3	56	**168**
Misc.	LS			**100**
			Total	**568**

7 TREE PLANTATION PROGRAM

The planting season ranges from pre-monsoon and monsoon season, i.e. from April to July. Based on plantation plan and schedule sapling should be made available to plantation sites. Manpower and other resources including plantation tools, organic and inorganic fertilizers and supporting stack must be arranged well advance of commencement of plantation in pre-monsoon.

7.1 Size of Tree Saplings:

Saplings of 4 to 6 feet height are preferred to adapt new environment and survive against threats. Planters should sort out comparatively low height saplings for areas where watcher/guarding are available at least during daytime. Tall saplings must be planted in cattle grazing areas.

7.2 Prepare pre-plantation site map with GPS location:

Pre-plantation survey can be conducted in phases prior to start of plantation. It is assumed that nursery workers with basic knowledge on plant species, suitable land and plantation will conduct survey and mark plantation pits.

The tree plantation shall start in April of Year-1 and continued till end of July of Year-2 followed by necessary nursing, watering, weeding and protection for next two years until saplings can withstand any physical and natural calamities.

7.3 PLANTATION TECHNIQUES AND MAINTENANCE

Tree plantation must follow below protocols starting from preparation of plantation pits to nursing plant saplings until these are independent to grow. The steps involved in planting saplings include:

- Prepare Plantation Pits: Dig plantation pit (1ft x 1ft x 1ft) and leave pits open for 2 weeks before plantation.
- Soil preparation: Mix 5 kg of compost or decomposed cow dung with 0.5kg of loamy soil for each pit and then put and mix these manures properly with the soil in the pit. Pulverize the soil, mix it with compost/ cow dung, remove all debris, root pieces and plant the seedlings by taking off the poly bags carefully.
- Support stack: Provide stack for saplings fastening shootly.
- Fertilization: Apply nitrogenous fertilizers (Urea @ 30 gm/ pit) after two months of planting saplings.
- Weeding: weeding and clear bottom of planted saplings 3 times during the first year and 3 times during the second year.

7.4SOURCES OF SAPLINGS

The saplings needed for plantation will be collected from different plant nurseries spread over across areas. Procurement contract should mention clearly about species wise quantity, size of saplings and type of bottom packing (packed with poly or earthen pot). Procurement clause must clearly mention that undersized and unhealthy saplings will be rejected instantly upon arrival at plantation site.

7.5 POST PLANTING RESPONSIBILITY

After planting saplings in selected area, the contractor will remain responsible for saplings until these are handed over to BR after two years from date of planting. To enhance the survival ability of sapling contractor should ensure nursing and maintenance plan as discussed below.

7.6 DEPLOYMENT OF PLANTATION WATCHER

Contractor must deploy adequate numbers of watch guards to protect planted saplings from grazing cattle and unwanted threats across the plantation sites. For any plantation 2 years of protection by plantation watchers or BR guard will be essential for successful growth.

7.7 MONITORING REPORT

Plantings will be monitored regularly throughout two years by the joint team of contractor and CSC to ensure they are establishing well. Prescribed monitoring formats will be used to identify status of plants based on their survival condition, such as very good, good, moderately good, weak and dead. Every joint team monitoring visit will be ended up with a monitoring report and recommended measures related to weeding, fertilization, providing stack, mulching, watering and any other relevant. Survival, mortality and morbidity details of plants should be illustrated with charts, figures, status/problem, recommended measures, timeline of execution, etc. Report will specifically recommend replacement of weak and dead plants within the stipulated timeline in the correction action measures of the monitoring report.

7.8 REPACEMENT OF WEAK AND DEAD PLANTS

Contractor will implement recommended measures provided in the monitoring report within the stipulated timeline for success of the plantation. Any dead plants, plants that appear extremely weak or plants that do

not perform as would be expected will be replaced as soon as possible following instructions as mentioned in the monitoring report.

7.9 CAPACITY BUILDING TRAINING

A total of three capacity building trainings will be organized by the contractor and CSC for workers and watch guards to be deployed for plantation works, including preparation of planting pits, mixing of soil and compost materials, plantation and post plantation nursing (weeding, watering, mulching, fertilization, etc).

ANNEX IX TRAINING PLAN

Title: Training Plan for the Engineering Management Office (EMO) Building Construction

1. Background

The Bangladesh Railway will implement the EMO Building Construction at its existing land at Fulbara, Dhaka, through a competent Contractor. To ensure that the construction engineer, supervisors and workers are able to efficiently and safely carry out the works, a training program will be implemented in order that all concerned will be familiarize with the work at hand, policies of the Employer and Founding Source/s, and other relevant information vital to the Project's success. This training program identifies all the relevant courses that each member of the Contractor personnel will require and their respective schedules for holding.

2. Training Participants

The training participants will include all concerned members of the Contractor construction team, from supervising engineers, supervisors and skilled and unskilled workers. Of the 180 Contractor's personnel, 160 are the construction supervisors and skilled workers, while the remaining 20 are non-skilled workers. The names of the participants and courses that they will be involved in will be nominated by their respective supervisors/construction managers. The list of trainers and courses will be subject to the review and approval of the Engineer (Construction Supervision Consultant Team Leader).

Members of other Project Implementing organizations such as BR PIU and CSC are not covered in this training program. They have some similar training/awareness activity relevant to their respective mandates, that are implemented in other components of the Akhaura-Laksam Double Line Project.

3. Training Courses

There will be 2 types of training courses, a) Technical Skills and b) Non-technical. Included in the technical skills training are courses that are relevant to the specific tasks of each member of the Contractors team which may be refresher courses or advance skills (i.e. First aide; welding, working at heights, crane operations, etc.); while the non-technical training will involve courses dealing with Employer, government/funding institution requirements (i.e. HIV/AIDS STI prevention awareness seminar, health & sanitation, COVID-19 prevention awareness seminar, etc.). Additional training courses may be included in the Program as may be required. The training course will be held throughout the construction period, with each course held depending on its urgency. Orientation course will be held early in the construction period so that the participants will already be aware of the Project's nature, rules/regulations that each need to follow, health & safety skills that they individually need to avoid accidents that may affect their ability to work or significantly disrupt the construction schedule. It is important to schedule the courses in a manner that will not significantly disrupt the construction works. The Contractor's Human Resources Officer or the Health & Safety Officer will be responsible to provide the detailed schedule of the training courses, names of the participants and make available the appropriate resource person/s. A list of the training courses are found in Table 1 below.

Table 1. Training Courses to be Conducted in the Project

S.I.	Training Course	Participants	Schedule /Frequency	Remarks
1	Project Orientation for Workers	All new Construction Workers	One time per person upon recruitment.	Health & Safety Engineer to conduct. The course will also delve on the Project's Health & Safety Program. Refresher courses may be held as the need arise.
2	Tool-Box Meetings	All workers	Every day prior to the start of construction work	Health & Safety Engineer or Construction Supervisor to conduct
3	Safe Driving Skills	All Contraction Vehicle drivers	One time per peson upon recruitment	Health & Safety Engineer to conduct
4	Advance Welding Skills	All welders	One time per person upon recruitment	Resource person to be hired to conduct training
5	HIV/AIDS STI Prevention Awareness Program	All Contractor personnel	One time per person. One session held every month.	HIV/AIDS STI Program INGO to coordinate with construction supervisors to schedule course during the worker's lunch break.
6	Covid-19 Prevention Awareness Seminar	All Contractor personnel	One time per person. One session held every month.	HIV/AIDS STI Program INGO to coordinate with construction supervisors to schedule course during the worker's lunch break.
7	Health and Sanitation in the Workplace	All Contractor personnel	One time per person upon recruitment	Health & Safety Engineer to conduct

4. Resource Persons/Trainers:

The Resource Persons or trainers that will be tapped to implement the training courses will come from the Contractor's staff such as the Health & Safety Officer, or can be hired from relevant government/private training/academic institutions, depending on the type of training course to be conducted. It is essential that all trainers are recruited based on their qualifications, experience and ability to convey the relevant skills/information to the participants.

5. Training Budget

The total cost for the training program is a lumpsum amount of about BDT300,000. This will cover cost of training materials and honoraria for resource persons external to the Contractor's Organization.

ANNEX X Health Safety and Environment Training Plan For EMO Building, Fulbaria, DhakaTRAINING PLAN

Contractor's Internal Process for Assurance of Quality of the Submittal

Action(s)	Title	Department	Sign. with date
Prepared By	HSE Manager	HSE	
Reviewed By	Contractor's Representative/ Project Manager	N/A	
Approved By	Contractor's Representative/ Project Manager	N/A	

Revision, Publication, and Amendment History

Previous Rev. No.	Date	Reason for Issue

1. INTRODUCTION AND SCOPE OF WORK

Training is one of the most important components of our company's safety management system. It gives employees an opportunity to learn their jobs properly, bring new ideas into the workplace, reinforce existing ideas and practices, and it helps to put our Safety and Health Program into action.

Everyone in our company will benefit from safety and health training through fewer workplace injuries and illnesses, reduced stress, and higher morale. Productivity, profits, and competitiveness will increase as production costs per unit, turnover, and workers' compensation rates lower.

2. SCOPE.

This plan establishes the requirements for the EHS Training Plan at EMO Building, Fulbariya, Dhaka. Training is one of the most important elements of a comprehensive EHS program. This plan applies to all employees of the EMO Building including Employees, Workers, Stakeholders, Assistants, and in some cases volunteers.

3. MANAGEMENT COMMITMENT OF CONTRACTOR.

Contractor will provide the necessary funds and scheduling time to ensure effective safety and health training is provided. This commitment will include paid work time for training and training in the language that the worker understands. Both management and employees will be involved in developing the program.

To most effectively carry out their safety responsibilities, all employees must understand

a. Their role in the program,
b. The hazards and potential hazards that need to be prevented or controlled, and
c. The ways to protect themselves and others. Contractor will achieve these goals by:
    - educating everyone on the natural and system consequences of their actions;
    - educating all managers, supervisors, employees and workers on their safety management system responsibilities;
    - educating all employees about the specific hazards and control measures in their workplace;
    - training all employees on hazard identification, analysis, reporting and control procedures; and
    - training all employees on safe work procedures and practices.

Our training program will focus on health and safety concerns that determine the best way to deal with a particular hazard. When a hazard is identified, CONTRACTOR will first try to remove it entirely. If that is not feasible, CONTRACTOR will then train workers to protect themselves, if necessary, against the remaining hazard. Once CONTRACTOR have decided that a safety or health problem can best be addressed by training.

4. TRAINING AND ACCOUNTABILITY

Contractor's safety culture must support training. A culture of consequences is essential. To help make sure Contractor's efforts in safety and health are effective Contractor have developed methods to measure performance and administer consequences. Supervisors and managers must understand that their first responsibility is to make sure they have met their obligations to their employees before considering disciplinary action.

Managers and safety staff will be educated on the elements (processes) within the safety accountability system. Training will focus on improving the Safety and Health Program whenever hazardous conditions and unsafe or inappropriate behaviors are detected.
Safety orientation will emphasize that compliance with safety policies, procedures, and rules as outlined in the safety plan is a condition of employment. Discipline will be administered to help the employee increase desired behaviors, not to in any way punished. An explanation of the natural and system consequences of behavior/performance will be addressed in every safety training session.

5. TYPES OF TRAINING

a. New Employee Orientation.

The format and extent of orientation training will depend on the complexity of hazards and the work practices needed to control them. Orientation will include a combination of initial site office room and follow-up on-the-job training.

- For some works/jobs, orientation may consist of a quick review of site safety and health rules; hazard communication training for the toxic substances present at the site, electrical wearying, hot works, fire protection, lockout/tag out, etc. and, a run-through of the job tasks. This training will be presented by the new employee's supervisor or delegated employee.
- For larger tasks with more complex hazards and work practices to control them, orientation will be structured carefully. Contractor will make sure that contractor's new employees start the job with a clear understanding of the hazards and how to protect themselves and others.

Contractor will follow up supervisory training with a buddy system, where a worker with lengthy experience is assigned to watch over and coach a new worker, either for a set period of time or until it is determined that training is complete.
Whether the orientation is brief or lengthy, the supervisor will make sure that before new employees begin the job, they receive instruction in responding to emergencies. All orientation training received will be properly documented.

b. On-the-Job Training. On-the-Job Training relates principles and theories to work skills that are then taught and applied in the work environment. On-the-Job Training is designed to reinforce formal site office room training. All new-hire employees require training to perform their jobs effectively. On-the-Job Training assignments may be provided concurrently with formal training to emphasize and complement material covered in formal training courses. Time allotted to accomplish the On-the-Job Training assignments should be compatible with the new hire's current knowledge, skill, and experience levels. The employee's supervisor should assess the employee's ability to successfully complete the On-the-Job Training.

c. Contract workers. Will receive training to recognize Contractor's specific workplace hazards or potential hazards.

d. Experienced workers. Will be trained if the installation of new equipment changes their job in any way, or if process changes create new hazards or increase previously existing hazards.

e. All workers. Will receive refresher training as necessary to keep them prepared for emergencies and alert them to ongoing housekeeping problems.

f. Personal Protective Equipment (PPE). Workers needing to wear appropriate personal protective equipment (PPE) and persons working in high risk situations will need special training. Supervisors and workers alike must be taught the proper selection, use, and maintenance of PPE. Since PPE sometimes can be cumbersome, employees may need to be motivated to wear it in every situation where protection is necessary. Therefore, training will begin with a clear explanation of why the equipment is necessary, how its use will benefit the wearer, and what its limitations are. Remind Contractor's employees of Contractor's

desire to protect them and of Contractor's efforts, not only to eliminate and reduce the hazards, but also to provide suitable PPE where needed. Individual employees will become familiar with the PPE they are being asked to wear. This is done by handling it and putting it on. Training will consist of showing employees how to put the equipment on, how to wear it properly, and how to test for proper fit and how to maintain it. Proper fit is essential if the equipment is to provide the intended protection. Contractor will conduct periodic exercises in finding, donning, and properly using emergency personal protective equipment and devices.

g. **Equipment and Vehicular Safety.** All workers operating a safe use of machinery and motor vehicle on the job (on or off premises) will be trained in its safe vehicle operation, safe loading and unloading practices, safe speed in relation to varying conditions, and proper vehicle maintenance. Contractor will emphasize in the strongest possible terms the benefits of safe driving and the potentially fatal consequences of unsafe practices.

h. **Emergency Preparedness and Response:** Contractor will train their employees to respond to emergency situations. Every employee at every worksite will understand:

- Emergency telephone numbers and who may use them;
- Emergency exits and how they are marked;
- Evacuation routes; and
- Signals that alert employees to the need to evacuate.
- Train workers on emergency procedures, including evacuation plans, emergency contact information, and assembly points.
- Conduct drills and simulations to practice responses to various emergency scenarios, such as fires, chemical spills, or medical emergencies.

Contractor will practice evacuation drills at least semi-annually, so that every employee has a chance to recognize the signal and evacuate in a safe and orderly fashion. Supervisors or their alternates will practice counting personnel at evacuation gathering points to ensure that every worker is accounted for. Contractor will include procedures to account for visitors, contract employees, and service workers such as cafeteria employees. At sites where weather or earthquake emergencies are reasonable possibilities, additional special instruction and drilling will be given.

i. **Periodic Safety and Health Training.** At the EMO worksites, complex work practices are necessary to control hazards. Elsewhere, occupational injuries and illness are common. At such sites, Contractor will ensure that employees receive periodic safety and health training to refresh their memories and to teach new methods of control. Where the work situation changes rapidly, weekly meetings will be conducted as needed.

j. **Toolbox Talks and Safety Meetings:**

- Encourage regular toolbox talks and safety meetings to reinforce HSE training.
- Provide guidelines for conducting effective toolbox talks, focusing on specific hazards, safe work practices, and lessons learned from incidents.

k. **Identifying types of training.** Specific hazards that employees need to know about should be identified through total site health and safety surveys, job hazard analysis, and change analysis. Accident and injury records may reveal additional hazards and needs for training. Near-miss reports, maintenance requests, and employee suggestions may uncover still other hazards requiring employee training.

6. MONITORING THE TRAINING PROGRAM.

Monitoring the employee's progress through the developmental period is critical to ensure success of the training program. Monitoring provides information to the supervisor regarding the benefits and effectiveness of the training received. In addition, it provides information on the ability of the employee to achieve training goals and objectives. Both the employee's supervisor

and training staff play major roles in the monitoring process. To ensure adequate monitoring of the safety training program the actions below must occur.

- The supervisor will ensure that each employee has completed the necessary prerequisites before the start of work.
- The supervisor will review the employee's performance of task assignments.
- The supervisor will conduct a review with the new-hire employee following each required training activity. This review provides the supervisor with information on the progress of the employee and can assist in identifying areas requiring further training.
- When the supervisor determines that the new-hire employee has sufficient experience to successfully complete a task, the On-the-Job Training review may be discontinued.
- The supervisor and employee will complete training documentation.

7. DOCUMENTATION AND RECORD KEEPING:

- Provide guidance on maintaining accurate HSE records, including training records, incident reports, inspection logs, and safety meeting minutes.
- Explain the purpose of record keeping and the potential use of these documents in legal compliance, audits, and lessons learned.

8. SAFETY AND HEALTH TRAINING PROGRAM EVALUATION.

An evaluation of the effectiveness of the training program will be conducted periodically. Staff from the training department will interview managers, supervisors and employees who have participated in the program to determine the effectiveness of the training, and to obtain suggestions for program improvement.

Evaluation will help determine whether the training provided has achieved its goal of improving employee safety and performance. When carefully developed and carried out, the evaluation will highlight training program strengths and identify areas of weakness that need change or improvement.

- Evaluation will include analysis of employee attendance at training sessions. Training will not work for an employee who does not show up. Absenteeism can signal a problem with the worker, but it can also indicate a weakness in training content and presentation.
- Contractor will compare pre-and post-training injury and accident rates overall. The periods of time being compared must be long enough to allow significant differences to emerge if training has made a difference.
- Contractor will determine whether the training provided has achieved its goal of improving employee safety performance. Evaluation will highlight training program strengths and identify areas of weakness that need change or improvement.
- The contractor safety team/coordinator will evaluate training through the following methods:
    - observing employee skills;
    - surveys and interviews to determine employee knowledge and attitudes about training;
    - reviewing the training plan and lesson plans;
    - comparing training conducted with hazards in the workplace;
    - reviewing training documents; and
    - comparing pre-and post-training injury and accident rates.

If evaluation determines program improvement is necessary, the Contractor safety team will develop recommendations.

ANNEX XI TRAFFIC MANAGEMENT PLAN

1. Background

The Bangladesh Railway (BR) will implement the construction of the Engineers Management Office (EMO) Building located at Fulbaria Ward, Dhaka. This will be the future iconic building of BR that will host its Headquarters, where top officials from the agency will carry out their mandate in the service of the Bangladesh people. These functions include railway planning, policy making, holding meetings and receiving official dignitaries from international and national organizations.

The implementation of the EMO building construction however, is expected to create adverse environmental impacts to the natural and human environments, which include among others the increase in the volume of vehicular traffic that will ply the roads adjacent to the building site. In this regard, this traffic management plan is being developed, in order to assess the possible impact the construction of the Project will create to the existing vehicular traffic volume, as well as pedestrians that frequent the streets adjacent to the EMO Building site.

2. Existing Site Conditions

The EMO Building site is located at Fulbaria Ward, Dhaka; and is bounded on the east by the Phoenix road; on the north by the Usmani Uddan park, to the west by the Bangladesh Police Dormitory and the South by the Government employees hospital. The Project site is accessible through the Phoenix road, which is a minor City road that links to the main Saiyad Nazrul Islam Sharani road, the North-South Road and the S. Kamruzzaman Sharani road through the Old Secretariat Road.

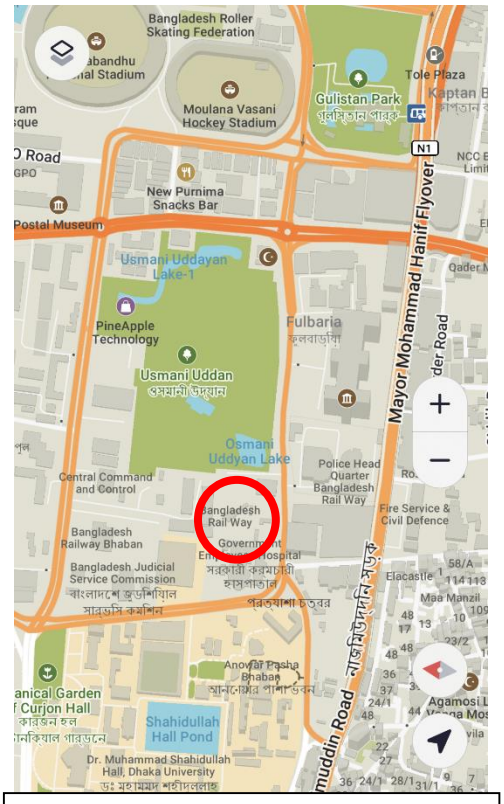

Figure 1.EMO Building location Map

Currently, the Phoenix road serves as the access road also for the Bangladesh Police Headquarters. Other government offices and private commercial establishments that are found along the Phoenix road also have other access facilities such as North-South Road for the Dhaka South City Corporation office, the Kazi Alauddin Road for the commercial market, and the Abdul Gani Road and the North-South Road for the Usmani Uddan park.

A traffic study was conducted along the Phoenix road during peak morning and evening. The study shows that an average of 2,326 vehicles ply the route during morning peak time, where about 1,190 vehicles go on the Golap Shah Majan to Sarekari Kormochari Hospital route; and 1,136 go to the opposite direction. During night peak period, about 2,119 vehicles take Phoenix road, where 1,210 are on the Golap Shah Majan to Sarekari Kormochari Hospital route, while 909 follow the opposite direction. Details of the traffic count can be found in Table 1.

Majority of the vehicles that ply the Phoenix road are rickshaw (344 numbers average), followed by motorcycles (240 numbers average), then private car (168 numbers average) and CNG (158 numbers average. The vehicle type and their respective numbers would suggest that the traffic are

mostly individuals that are enroute to their respective places of work or school/university, many of which are found in the vicinity of the Project site.

Table 1. Vehicular count along the Phoenix Road

Date				
Time	8:15 AM - 9:15 AM	8:15 AM - 9:15 AM	6:45 PM - 7:45 AM	6:45 PM - 7:45 AM
Route	Golap Shah Majan to Sarekari Kormochari Hospital	Sarekari Kormochari Hospital to Golap Shah Majan	Golap Shah Majan to Sarekari Kormochari Hospital	Sarekari Kormochari Hospital to Golap Shah Majan
Vehicle type				
Rickshaw	348	402	209	417
CNG	152	153	220	108
Motorcycle	209	277	280	193
Bicycle	7	31	27	22
Private car	182	198	199	92
Microbus	25	24	12	7
Bus	49	7	23	2
Minibus	15	2	8	1
Pick-up	102	24	137	46
Truck	3	1	22	4
Leguna	98	17	73	17
Total	1,190	1,136	1,210	909

*Source: traffic survey

3. Project Impact

The construction of the Project may result in the possible increase in vehicular traffic at the main access road to the site which is the Phoenix road. Considering that the road is only 2 lanes with a center island divider, it is most possible that vehicular traffic congestion may occur, thereby resulting in commuters being delayed or being tardy in their place of work or school. Similarly, considering that the road is the main access for the Police Headquarters, it may also lead to the delay in the delivery of law enforcement services to the people of Dhaka City corporation.

4. Traffic Management Plan

The Traffic Management Plan will entail the following components: a) Public information on the Project, its potential impact to the local population which includes increase in vehicular traffic conditions; b) Proper scheduling of Project vehicular traffic to avoid the peak traffic hours, most especially the delivery of construction materials such as ready mixed concrete during cement casting works, transport & disposal of construction waste materials, and travelling of heavy construction equipment to and from the site; and c) coordination with the police and City law enforcement agencies to inform them of the construction delivery schedules and seek support such as posting traffic officers that shall control the vehicular traffic along the major roads leading to the Phoenix road during the delivery of construction materials, transport of construction waste to the Contractor's designated depository area; or traveling to and from the site by heavy construction equipment.

The Health and Safety Engineer will be the main responsible person that will implement the traffic management plan. He/she will plan out the schedule of construction materials delivery or waste

disposal and travelling of construction equipment in coordination with the Construction manager; and coordinate with the local authorities and police on the schedule. The traffic management plan will be subject to the approval of the Engineer.

5. Budget

The cost for implementing the traffic management plan will be part of the Construction Cost that will be integrated into the Contractor's overhead cost.

ANNEX XII Occupational Health and Safety Plan

Safety is the science that helps people prevent accidents at work and always toward the preservation and protection of labour and capital takes a step. Safety is basically a string of measures to set principles and rules are being told that using them can be labour and capital against the various risks in industrial environments such as effective and efficient maintenance and thereby a safe and healthy work environment created staff efficiency. safety is defined as the degree of risk away from the term (Hazard) that is a scientific definition of safety the circumstances that bring potential harm to personnel, equipment and buildings, eliminating or reducing the materials performance in the execution of a task is predetermined. When (Hazard) there is a possibility there will be negative effects mentioned.

Word (Danger) indicates exposure to a (Hazard) is just the opposite of immunity (Danger) has been, and sought to eliminate potential hazards in the workplace is available. There are not hundred percent safety and belonging, and virtually never be the reason of this is that safety is partial protection against the risks.

Since an accident can enter to the economic and social damage to individuals and to society, this result causes of construction and operational accidents, financial and human resources part of the community are to maintain economic production factors and the pressures and psychological distress injured workers and their families and society would prevent. Thus, although a good understanding of the extent and pattern of accidents in the construction and power generation industry in the world but there is a brief review of the full range of management factors and individual workshop.

1. Workplace Safety

Safe work practices are generally written methods outlining how to perform a task with minimum risk to people, equipment, materials, environment, and processes.

Safe work practices should be developed as a result of completing a job safety analysis (JSA) or a hazard risk assessment (HRA) and should closely reflect the activities most common in the company's type or sector of construction.

All safe work practices should be kept in a location central to the work being performed and readily available to the workforce. Some safe work practices will require specific job procedures, which clearly set out in a chronological order each step in a process.

Below are the items required to develop safe practices/procedures to address specific hazards.

- Checklists and Forms
    - Contractor Health and Safety Checklist
    - Contractor Performance Checklist
    - Documentation Checklist
    - Safe Job Procedures Review
    - Safe Work Practices Review
    - Written Procedures Checklist
    - Overhead Powerlines Checklist

- Equipment
    - Elevating Work Platforms #1
    - Forklifts
    - Lifting Practices (Hoisting)
    - Mounting/Dismounting Heavy Equipment
    - Portable Ladders
    - Rigging
    - Scaffolding
    - Starting Equipment
- Fall Protection
    - Fall Protection
    - Fall Protection Equipment
    - Guardrails
    - Guardrail Removal
- Hazards
    - Electrical Safety
    - Fire and Fire Extinguishers
    - Housekeeping
    - Tagging and Lockout
    - Tagging and Lockout Procedure
    - Tagging and Lockout Responsibilities
    - Trenches and Excavation
    - Welding, Cutting and Burning
- Occupational Health
    - Asbestos
    - Dust
    - Gas Cylinders
    - Hazardous Materials
    - Hearing Protection
    - Manual Lifting
    - Propane
    - Propane and Temporary Heat
    - Solvents and Flammable Liquids
    - Welding Fumes
    - WHMIS
- Traffic Control
    - Moving Vehicles and Equipment
    - Traffic Control (Temporary Signage)
    - Traffic Control Procedures
    - Traffic Control Management Program

2. OHSE Communication

The purpose of this section is to detail the requirements for OHSE consultation and communication with employees and other stakeholders

2.1 Employees and Contractors

The BR's OHSE Policies, OHSE MS and Process Safety Standards, and relevant OHSE issues and performance shall be communicated to employees and contractors. Where required, OHSE information shall be provided in languages other than English. Methods of communication include:

- OHSE Inductions; Health Safety and Environmental Committees;
- Toolbox meetings; Presentation of OHSE and Process Safety KPIs;
- OHSE training; Awareness programs and initiatives.
- OHSE notice boards and bulletins;

2.2 Site OHSE Communication Meetings

Regular meetings shall be held including communication and discussion of OHSE matters at BR's SPS site. The meetings shall be led or coordinated by the site OHSE Manager.

Contractors, whether on-site full time or on a sporadic or inconsistent basis, are required to send a representative to each OHSE Meeting. Committee members shall undergo appropriate training to ensure that they can effectively participate. A meeting agenda shall be prepared and distributed prior to each meeting. Records of the meetings shall be kept, including:

- status of actions from previous meetings;
- attendees;
- matters discussed;
- actions arising from the meeting.
- committee members;
- site supervisors; and
- appropriate managers.

The minutes shall also be posted on the site notice boards and filed for future reference.

2.3 Management & Operational Meetings

All meetings, where appropriate, should start with a discussion of relevant OHSE issues.

Toolbox Meetings

Toolbox meetings shall be held for work groups including the relevant supervisor, employeesand relevant contract personnel.

The meetings should be held at a set time, preferably at the start and/or finish of each day.The meetings should:

- review any environmental, safety or process safety issues occurring since the last meeting;

- review new relevant hazards and incidents;
- include "toolbox talks" on specific OHSE issues of interest; and
- plan, communicate and delegate the day's work.

To ensure that the Toolbox meeting is effective the Supervisor shall:

- prepare for their Toolbox meetings;
- involve participants in the meeting;

2.4 External Communication

Communication shall be maintained, both proactively and upon request, on OHSE matterswith external stakeholders.

- OHSE information may be provided to interested parties including:
- OHSE Policies;
- OHSE Standards
- General brochures and information sheets; and
- Material Safety Data Sheet (MSDS) for chemical products and wastes.

3. Contractor OHSE Program

BR Constructors will verify that the respective contractor OHSE program and/or systems in place meet the applicable standards and are integrated with the BR Program. Where there is a discrepancy between programs and legislation, the higher standard will be applied. In addition, contractors will agree to adopt the minimum expectation from BR. All contractors are required to meet all applicable legislated standards. All contractors will ensure compliance with the Alcohol and Drug policies. Testing of subcontractor employees is the responsibility of the subcontractor. The contractor shall designate a representative to be responsible for the administration of the subcontractor OHSE program. This person must be a line manager or supervisor.

Contractor shall abide by the following –

- Personal Protective Equipment
- Incident Reporting
- Investigations
- Audits and Inspections
- Training
- Meeting Attendance
    - Weekly OHSE Meetings
    - Project OHSE Committee Meetings (Joint Health and Safety Committee Meetings)

4. Monitoring and Measurement

This procedure is used to implement a measurement and monitoring program designed to support the OHSE Management System and specific OHSE objectives and targets.

4.1 Responsibility

The area and functional managers will be responsible for providing data and monitoring operations that are specific to their functions. The site OHSE Manager will be responsible for consolidating all the data and conducting facility-wide monitoring.

4.2 Procedure

A. Measurement

- The area and functional managers will track the OHSE Monitoring Matrix by collecting and charting data relevant to the metric at the frequency indicated in the matrix. Site OHSE Manager or his delegate shall be responsible for consolidating the data from each functional unit and shall document the metrics on a facility wide basis.
- The area and functional managers will measure the instances of non-compliance in their areas. This data will be consolidated by the site OHSE Manager in order to assess facility wide compliance.
- The developed metrics shall be evaluated and revised as objectives and targets are modified and/or added.

B. Monitoring

- The Executive Engineer and the key facility staff will review facility and target-specific measurement and monitoring data every 3 months to identify trends, evaluate progress toward meeting OHSE objectives and targets, and discuss overall OHSE performance.
- The area and functional managers will ensure that data obtained to monitor their specific activities is continually evaluated to ensure compliance with applicable OHSE statutes and regulations.
- The Executive Engineer will be responsible for providing an annual summary of the results of the facility monitoring program to Project Director. The site OHSE Manager will be responsible for ensuring that the results of the facility monitoring program is broadly communicated to all employees in accordance with the Consultation and Communications procedure.

4.3 Frequency

The monitoring and measurement aspects will be evaluated as objectives and targets are modified or added. A Facility Monitoring Report shall be developed on an annual basis.

4.4 Personal Protective Equipment

The purpose of personal protective equipment (PPE) is to provide an effective barrier between a worker and potentially dangerous objects, substances, and processes. BR will ensure all personnel have the right PPE while perform the job.

4.4.1 Basic Personal Protective Equipment

At a minimum, basic PPE must include:

- Hard hat;
- Safety Glasses;
- High vis vests;
- Gloves (applicable to task); and
- Safety footwear.

Note: All personal protective equipment must meet the applicable standard as defined by legislationand policy.

4.4.2. Inspection Defective/Damaged PPE

Workers must inspect PPE prior to use to verify it is fit for use. Defective or damaged PPE must be immediately removed from use. All PPEs removed from service will be tagged as out of service.

4.4.3 Selecting Personal Protective Equipment

PPE will be selected based on the following information:

- Hazard assessments;
- Material safety data sheet (MSDS);
- Customer/client requirements; and
- Legislative jurisdictional requirements

4.4.4.Mandatory Full Time PPE Requirements

Head Protection

- Personnel shall wear hard hats that are in good condition and meet legislative jurisdictional requirements and standards.
- Bump hats and metal hard hats shall not be worn as head protection.
- Personnel must wear hard hats with their company logo and the workers name clearly displayed on the hard hat.
- Alteration of hard hats is prohibited
- Hard hats shall be worn in the manner prescribed by the manufacturer
- Only head apparel designed to be worn under a hard hat will be allowed.
- Hardhats are required while welding. They are to be fitted with the appropriate shield.

Eye and Face Protection

- All personnel must wear properly fitting eye and face protection commensurate with policy on active work sites.
- Face and eye protection shall be kept clean and in good repair.
- If a worker cannot wear safety glasses, as documented by a physician's note, alternatearrangements must be made to verify the individual's face and eyes are protected.
- All components of prescription glasses that are being used for eye protection must meetapproved applicable regulatory standards.
- The prescription glasses will include side-shields that must meet the applicable regulatorystandards.
- Coverall glasses or goggles shall be required for prescription glasses that do not meet thestandard.
- Face shields are required when grinding/cutting steel, concrete, chemical use.
- When using a face shield, safety glasses are also required under the face shield.

Hand Protection

All personnel must have appropriate gloves available for their task on their persons. Gloves are to be

worn when conducting work activities with hazards that may cause injury to hands.

Foot Protection

- All personnel on a work site must wear safety footwear.
- The minimum is a CSA approved, Grade one (green triangle), 6" high cut boot appropriate tothe task.
- No running shoes of any kind are permitted on work sites.
- Safety footwear must be in good repair. It is the responsibility of the employee to verify thattheir footwear is in proper working condition.

High Visibility Vests

High visibility apparel shall meet WorkSafeBC (WSBC) regulations and will be worn whenever worker and mobile equipment are working in a common area.

Hearing Protection

Personnel will receive an overview of hearing protection requirements during the project orientation. The training shall include identification of any hearing protection required areas, the hazards associated with noise exposure, and the purpose, use, maintenance, and limitations of the protective equipment provided on site. Personnel should not be exposed to noise in excess of the occupational exposure limits (OEL) as 85 dBA Lex daily noise exposure level and 140 dBC peak sound level. This may be accomplished by:

- Instituting engineering controls;
- Work practices/administrative control; and/or
- Providing personal hearing protection.

There are two types of recognized hearing protection available for use in effectively reducing noise exposure – earplugs and earmuffs. In most instances, earplugs are acceptable hearing protection. Cotton plugs are not acceptable and shall not be used. When using earmuffs for hearing protection special care must be given to check they are disinfected before being used by another employee.

Workers are to be informed of the hazards associated with exposure to noise and the purpose and limitations of protective hearing devices by their respective Supervisors. As per legislated requirements hearing testing is required to be conducted within six months of tenure and annually after that. To assist sub-contractors / trade contractors in meeting this requirement hearing testing will be scheduled throughout the tenure of the project and dates communicated to the stakeholders.

Limb and Body Protection

Where there is risk of injury to a worker's limb and/or body, adequate limb and body protection must be worn and equipment designed to protect employees from injury to their limbs and body must be used (i.e. chainsaw chaps).

Where there is risk of injury due to congested work area and/or the movement of heavy equipment in and/or around the work area, all employees must wear high visibility apparel. When work is being done in extreme hot or cold temperatures, the protective clothing being worn must be reviewed to verify that it is adequate.

Personnel must be informed of any special precautions that need to be taken or special protective

clothing that needs to be worn. At a minimum a 4 inch sleeve is required (no tank tops / muscle shirts are permitted)

Respiratory Protection

This section provides a description of various types of respirators that may be used at the jobsite for respiratory protection. Respiratory Protection Options include:

Disposable Dust/Particulate Respirators - Single use disposable particle masks (double strapped types) are designed to protect the lungs from nuisance particles.

Air Purifying, Half Mask Respirators - Air purifying, half mask respirators have a rubber face seal that fits over the nose and under the chin. It is fitted with cartridges which purify the air as the wearer breathes. Different types of cartridges are available for different types of air contaminants.

Air Purifying, Full Face-piece Respirators - Air purifying, full face-piece respirators work onthe same principal as the half-mask respirators described above. The face-piece extends around theentire face, covering the eyes, nose, chin, and mouth. This type of mask should be used when working with highly corrosive chemicals to protect the eyes and face from chemical splashes or where a face-shield and respirator combination is required.

Powered Air Purifying Respirators (PAPR) - PAPR features a battery powered, portable fan which draws air through a particulate or chemical filter and blows it to the face-piece. The fan

and filter unit may be an integral part or the face-piece or mounted on the wearer's back or belt. Full and half mask face-pieces are available as well as a variety of helmets and hoods. This type of respirator is typically used when high particulate concentrations are present.

Airline Respirators - Airline respirators provide clean, fresh air to the wearer from a stationary source such as compressor or compressed air cylinders. They may be equipped with a fullor half mask face-piece, helmet, or hood. Breathing air must be high quality and meet regulatory specifications.

Respirator Fit Testing

Prior to issuing a reusable, face-fitting respirator to a worker, the worker must successfully pass a qualitative fit test on that respirator. Aspects of the fit test requirements are outlined below:

- A worker cannot be fitted with a face-sealing respirator if there is any facial hair present that would come between the skin and facemask sealing surface. Moderate stubble at the sealingsurface is considered excessive facial hair.
- Any worker who exhibits difficulty breathing or a severe psychological reaction during any phase of fit testing the worker must be examined by a physician, and the examining physicianmust be provided with sufficient information to allow the physician to advise the employer of the ability of the worker to wear a respirator.
- Fit testing repeated at least annually, or more frequently, if any change occurs which may alter respirator fit (i.e. weight loss or gain)

Note: Records of fit tests are to be submitted to the BR Superintendent

Fire Retardant Clothing

Fire Retardant Clothing (FRC) must be used where there is risk of fire (i.e. welding) or explosion,

legislative requirements dictate, or client requirements dictate. Where FRC is required, the outer layer of worker's clothes, including rain gear, must be made of fire retardant material.

Clothing and Jewelry

For personal protection and to limit the spread of construction related contaminates throughout the facility, workers will not be permitted to wear:

- loose fitting clothing or jewelry
- greasy or oily clothing;
- torn or ragged clothing;
- cut-off or "muscle" shirts (4" sleeve shirt is the minimum sleeve length allowed); or

Work site personnel wearing shirts, other clothing and stickers displaying any offensive language or opinion will be asked to remove the offensive material or leave the site immediately.

5. Site Security

The purpose of this section is to prevent loss caused by intentional acts and reduce the opportunity for public incidents in our workplaces. Deputy Director- Security of BR will ensure appropriate security measures exists.

Fencing and/or Physical Barriers

The purpose of fencing and/or physical barriers is to keep the general public off the site andto keep materials and equipment inside the site. No fencing is to be removed unless it has been authorized by the BR site Chief Engineer.

Gates

All gates will be identified and numbered as well the gates will be identified on the site safety plan. Gates should be closed when not in use and opened only when required for specific deliveries or other authorized entries.

Lighting

BR will illuminate walkway areas and "common" areas to an adequate degree of brightness. For safe access and egress, (Task lighting is by trades) each site will have specific identified emergency route lighting that is automatically initiated when there is an electrical power loss. These emergency light systems will be inspected and tested on a regular basis, and identified on the site safety plot plan.

Visitor Control (inspectors, "one off deliveries")

All visitors must report to the project office prior to going on site and be provided with an escort. All visitors will be required to sign in and out at the project office. The responsible personfrom BR Constructors or the applicable Contactor who has completed the full orientation will be responsible to escort and supervise the visitor and be present at all times. The escort will be responsible for the safe acts and conditions of the visitor while they are on site as well as completing a PSI with his or her visitor(s). All visitors must wear the required personal protective equipment while on the project site.

After Hours Activities

Any personnel and sub-contractors'/trade contractors' that return to the project after hours oron weekends must be authorized to do so by the project superintendent or operations designate. An extended hour's work permit must be completed and submitted to the BR's site OHSE Manager for approval.

Key Control

The BR site Chief Engineer is responsible for key control. Keys that access general areas will only be issued to supervisors. An inventory and signature system will be set up to control keys, including vehicle and equipment keys.

5.1 Traffic Control

Parking Overview

Parking is not provided for workers on the Project. If parking is required to facilitate the workit is to be arranged through the BR site Chief Engineer. Consideration of the project traffic plan is to be given for all vehicular traffic including deliveries to the site. BR Contractors are to ensure companies delivering material and/or equipment to the site is familiar with delivery locations,procedure and safety/environmental requirements prior to coming to the site.

Vehicle Access

Only authorized vehicles are allowed on site. BR Project management will control vehicle entry. All vehicles entering and exiting site are subject to search.

Tools and Equipment

The security of the tools and equipment is the responsibility of the applicable owner. Contractors are responsible for their equipment on the project.

Shipping, Receiving, and Material Control

Each Contractor is responsible for their own shipping and receiving of materials and equipment.

6. Preventative Maintenance

The purpose of this Preventative Maintenance standard is to verify that the tools and equipment provided to workers are properly maintained.

Inspection

Tools and vehicles/equipment shall be inspected daily and prior to each use by the user/operator to verify that they are in proper working order. Equipment that has a pre-operation inspection checklist must have them completed and be kept on the piece of equipment for verification. Damaged or defective tools must be tagged "DO NOT USE / OUT OF SERVICE" and returned to the Supervisor immediately. Under no circumstances may tools or equipment in need of inspection or repair remain in service.

Maintenance

Competent workers will maintain all tools, vehicles, and mobile equipment in accordance with the

manufacturer's maintenance requirements. Records of maintenance will be kept. Only "Qualified" persons may repair tools and equipment.

Site Requirements

All tools and vehicles/equipment, company owned or rented, dispatched to the site shall be sent in good mechanical condition and with the required OHSE equipment installed and be accompanied by operation manuals, testing (inspection) forms, and maintenance instructions. This isa requirement of legislation, codes, and company procedure.

7. OHSE Audit/ Environmental Audit

- Internal OHSE audits will focus on verifying that activities conform to documentedprocedures and that corrective actions are undertaken and are effective. All audits are conducted by trained auditors. Records of auditor training are maintained in accordance with the Records procedure.
- When a candidate for OHSE auditor is assigned to an audit team, the Lead Auditor will prepare an evaluation of the candidate auditor's performance following the audit.
- The Executive Engineer is responsible for maintaining OHSE audit records including a list of trained auditors, auditor training records, audit schedules and protocols, and audit reports.
- OHSE audits are scheduled to ensure that all OHSE MS elements and plant functions are audited at least once each year.
- The Lead Auditor is responsible for ensuring that the audit, audit report and any feedback to the plant areas or functions covered by the audit is completed per the audit schedule.
- The site OHSE Manager, in conjunction with the Lead Auditor, is responsible for ensuring thatCorrective Action Notices are prepared for audit findings, as appropriate.

7.1 Audit Plan

- The Lead Auditor will review previous audit report findings and the status of CARs or PARs prior to preparing the audit plan. Areas identified by previous audits for corrective or preventive action should be included in the scope of the audit.
- Lead Auditor will complete the audit plan. The audit plan includes the date, audit number, scope and objective; specify sections of OHSE MS being audited and areas of the facility being audited, an audit schedule with auditor assignments, questionnaires and non- conformance report. Auditors may modify the scope and plan if necessary. These changes must be documented.

7.2 Conducting the Audit

- The Lead Auditor shall convene the opening meeting to brief the Audit Team on the general scope of the audit, the details of the audit plan, receive input on the audit plan and schedule and discuss assignments.
- Review key OHSE documentation before touring the site and conducting interviews.
- Records that shall be reviewed include but are not limited to: OHSE Policy and System Procedures, OHSE Management Program, OHSE audit reports, Results of Management Reviews, Status of compliance with regulatory requirements, Tour the site. Interview staff and observe activities and conditions. Responses and evidence shall be documented.
- Look for objective evidence to verify information from interviews through observations, records or independent sources paying particular attention to items previously identifiedfor corrective or preventative action or findings from other audits.
- The Audit Team shall then meet and report on audit progress as directed by the audit plan and schedule.

- Findings and observations will be documented by the Lead Auditor; including any corrective action taken during the audit. An internal audit report is drafted in preparationfor the closing meeting.
- The Lead Auditor conducts the closing meeting to present audit findings, clarify any conflicting or confusing information, identify positive practices, review objective evidence that supports the findings, and summarize the audit results.

7.3 Reporting Audit Results

- After the closing meeting, the Lead Auditor prepares the final audit report. The final audit report includes a summary of the audit scope, identifies the audit team, describes the source of evidence used and summarizes the findings and results. Copies of the final report will be submitted to the site OHSE Manager and Executive Engineer. Once review thereport, site OHSE Manager will forward to site chief Engineer and Executive Engineer (Management Representative).
- For findings that require corrective action, the site OHSE Manager will prepare a CAR notice upon consultation with relevant managers and maintain action track records. The original will be assigned to the appropriate department by the site OHSE Manager, as appropriatefor implementation.
- The Executive Engineer ensures the availability of the audit report(s) for Management Review.

7.4 Audit Follow-up

- The site OHSE Manager and Head of the departments are responsible for any follow-upactions needed as a result of the audit.
- The site OHSE Manager is responsible for tracking the audit action progress and report toExecutive Engineer on monthly basis.
- All audit action progress will be discussed in the monthly EHS meeting lead by site OHSEManager.

7.5 Record Keeping

- A copy of this procedure shall be maintained with the records of the division and with eachrelevant staff person
- Records shall be maintained
- The official document will have original signatures and be located in the OHSE Manual inthe office of the Executive Engineer.
- Changes and updates to this procedure will be made in accordance with the DocumentControl System Procedure and Record Management System Procedure.

8. Documenting and Reporting

All serious incidents including near misses must be reported, investigated, and documented immediately. The success of the company OHSE program depends entirely on the cooperation and commitment of all employees to all phases of the program. It is of the utmost importance that all managers and supervisors know and comply with the procedures as outlined herein. Investigation action items are to be signed off by the project manager.

Regulatory Reporting

All contact and reporting to government officials is to be done by the district OHSE manager in consultation with Director Technical of BR. In regards to injuries, all compensation carriers have specific legislative reporting requirements for the employer, worker, and attending physician(s).

Internal Reporting

All incidents must be reported to the site supervisor immediately. All incidents that require medical attention, or have the potential for medical attention require the immediate notification of the project OHSE supervisor or superintendent. All serious incidents must be reported to the district OHSE manager immediately – the notification of any government agencies will be coordinated by OHSE manager.

First Aid Injuries

All injuries, major and minor, must be recorded in the project first aid treatment log maintained by the first aid attendant.

Medical Aid Injuries

- All injuries requiring medical attention must use the following administrative procedures:
- The foreman or project OHSE supervisor initiates the company medical treatment memorandum.
- If possible, accompany the injured worker to the medical facility.
- After treatment, the attending physician completes the memorandum.
- The supervisor forwards copies of the memorandum to the OHSE manager and retains a copy for the site records.

Reporting Equipment and Property Damage

The OHSE manager and the district administration manager must be promptly notified of equipment or property damage. The Incident Report Form must be completed for all incidents and forwarded to the district office for administrative processing.

9. OHSE Training

Task-Specific Training

A training program will be developed to ensure that employees are capable of accomplishing the tasks required to meet OHSE objectives and targets. This program will identify training topics, who should receive the training, when training should be given, and the training method. The program will also distinguish between training conducted to comply with OHSE regulations and other training.

A critical first step in developing a training program is to assess employee training needs. The Executive Engineer and functional managers will review past training and the nature of the employee's work. Based on this review, specific training requirements for each employee or type of employee will be documented.

Specific documentation pertaining to training received will be maintained by the operational work areas for a minimum of two years, or as required by regulation.

Training effectiveness will be evaluated to ensure that the OHSE Management System is being implemented effectively when changes are made to significant risks, objectives, targets or operational controls. Improvements to the training plan will be made accordingly.

General EMS Training

All employees shall receive introductory training to make them aware of the OHSE Management

System. The human resources representative shall be responsible for coordinating the effort to assure that all new and existing employees have received suitable training.

ANNEX XIII Demolition and Waste Management

1.1 Responsibility for Construction Phase Waste Management

A suitably competent and experienced representative of either the client or the lead contractor will be nominated as Construction & Demolition (C&D) Waste Manager for the project. The function of the C&D Waste Manager is to effectively communicate the aims and objectives of the Waste Management Programme for the project to all relevant parties and contractors involved in the project, for the duration of demolition and construction works on site.

The C&D Waste Manager will be assisted in this role by the external Safety Consultant. Site Inspections will be carried out on a weekly basis and will incorporate inspection and monitoring of the requirements of this Construction and Demolition Waste Management Plan.

2. DEMOLITION WASTE GENERATED BY THE PROPOSED DEVELOPMENT

Demolition waste will be generated during development activities. The management of spoil generated by demolition of the constructing building and excavation on site is described within the following section of this document.

The typical type of waste can be summarized as:

- Soil and stones;
- Concrete (including blocks);
- Timber;
- Glass;
- Mixed Metals;
- Gypsum based materials;
- Tiles / Ceramics;
- Insulation Materials (asbestos free);
- Waste electrical and electronic equipment;
- Fixtures and fittings etc

2.1 Estimated Waste Arising

During construction for typical waste materials expected to be generated during the demolition of the buildings are as follows:

Table 1- Waste Catalogue

Waste Material	**Amount**
Non-Hazardous	
Concrete, bricks, tiles, ceramics	
Wood, glass and plastic	

Bituminous mixtures, coal tar and tarred products	
Metals (including their alloys)	
Soil, stones and dredged spoil	
Gypsum-based construction material	
Hazardous	
Electrical and Electronic Components	
Batteries	
Wood Preservatives	
Liquid Fuels	
Soil and stones containing dangerous substances	
Insulation materials containing asbestos	
Other insulation materials consisting of or containing dangerous substances	
Construction materials containing asbestos	
Construction and demolition waste containing mercury	
Construction and demolition waste containing PCBs	
Other construction and demolition wastes containing dangerous substances	

2.2 Demolition Waste Estimates

The demolition waste will be estimated based on the gross internal floor area (please refer to the Construction and Environmental Management Plan enclosed as part of this planning application for reference to demolition construction traffic.

Table 3 - Calculated Demolition Waste

Building Type	**Area to be Demolished (m^2)**	**Waste (tonnes)**
Industrial		

The breakdown of demolition waste produced on a typical construction site is classified as follows:

Table 4 – Typical Breakdown of Demolition Waste

Waste Type	**Proportion of Total**
Glass	
Concrete, Bricks, Tiles, Ceramics	
Plasterboard	

Asphalt, Tar, and Tar Products	
Metals	
Slate	
Timber	
Total	

2.3 Mitigation Measures

Construction of the proposed development will be under the control of a lead contractor, who will be appointed following a grant of planning permission. Upon appointment, once familiar with the site and having developed final detailed methodologies for demolition and construction, the lead contractor will expand upon the present C&D WMP and agree specific mitigation measures prior to commencement of works. These measures will ensure effective waste management and recycling of waste generated at the site.

General mitigation measures proposed are summarized below:

- On-site segregation of all waste materials into appropriate categories including:
  - Made ground, soil, subsoil, bedrock
  - Concrete, bricks, tiles, ceramics, plasterboard metals
  - Dry recyclables e.g. cardboard, plastic, timber
- All waste materials will be stored in skips or other suitable receptacles in a designated area of the site.
- An asbestos survey will be carried out in each extant structure on the development site, prior to its demolition.
- Wherever possible, left over materials (e.g. timber off cuts) and any suitable demolition materials shall be re-used on-site.
- Any potentially contaminated soil to be removed from site will be tested to confirm its contamination status and subsequent management requirements.
- All waste leaving site will be recycled, recovered or reused where possible, with the exception of those waste streams where appropriate facilities are currently not available.
- All waste leaving the site will be transported by suitable permitted contractors and taken to suitably licensed or permitted facilities.
- All waste shall be tracked to its destination and a log be drawn up on left on site. The log shall include the hauler employed, the respective driver, receiving gate receipts for all waste (both demolition and excavation material) etc.

3. CONSTRUCTION WASTE GENERATED BY THE PROPOSED DEVELOPMENT

3.1 Construction Waste Classification

Waste generated during construction at a typical site includes the following:

- Concrete, bricks, tiles, and cement
- Wood
- Glass
- Plastics
- Bituminous mixtures, coal tar, and tarred products
- Metals (including their alloys)
- Soil and stones
- Insulation materials (possibly including asbestos-containing materials)
- Gypsum-based construction material
- Materials containing mercury
- PCB-containing materials (e.g. sealants, resin-based floorings, capacitors, etc.)
- Waste electrical and electronic equipment
- Oil wastes and waste of liquid fuels
- Batteries and accumulators
- Packaging (paper/cardboard, plastic, wood, metal, glass, textile, etc.) Classification of wastes will follow table 1 previously provided in Section 5.

3.2 Waste Management and Mitigation Measures

The following measures are proposed to ensure effective management of construction waste at the development site, to maximize recycling of construction waste, and to minimize the environmental impact of construction waste.

- On-site segregation of all waste materials into appropriate categories, including:
  - top-soil, sub-soil, bedrock;
  - concrete, bricks, tiles, ceramics, plasterboard;
  - asphalt, tar, and tar products;
  - metals;
  - dry recyclables (e.g. cardboard, plastic, timber).

- All waste material will be stored in skips or other suitable receptacles in a designated waste storage area on the site.
- Wherever possible, left-over material (e.g. timber cut-offs) and any suitable demolition materials shall be reused on or off site.
- Uncontaminated excavated material (top-soil, sub-soil) will be reused on site in preference to the importation of clean fill, as soil to be reused or removed from site must be tested to confirm its contamination status and subsequent management requirements.
- All waste leaving the site will be transported by a suitably licensed/permitted contractor and taken to a licensed/permitted facility.
- All waste leaving the site will be recorded and copies of relevant documentation retained.

3.3 Predicted Impacts of the Proposed Development

Waste materials will be generated during the construction of the proposed development, including the initial site clearance and excavation. Careful management of these, including segregation at source, will help to ensure maximum recycling, reuse and recovery is achieved, in accordance with current local and national waste targets. It is expected, however, that a certain amount of waste will still need to be disposed of at landfill.

Given the provision of appropriate facilities, environmental impacts (e.g. litter, contamination of soil or water, etc.) arising from waste storage are expected to be minimal. Particular attention will be given to the appropriate management of any construction waste containing contaminated or hazardous materials. The use of suitably licensed waste contractors will ensure compliance with relevant legal requirements and appropriate off-site management of waste.

With a high level of due diligence carried out on site and with the implementation of the proposed mitigation measures, the proposed development's demolition and construction phases are not expected to have a significant environmental impact with respect to waste management. Any such environmental impact shall be limited to the period during which demolition and construction works take place on site.

4. RECORD KEEPING

Records will be kept for all waste material which leaves the site, either for reuse on another site, recycling, recovery or disposal. A recording system will be put in place to record the C&D waste arising on site. A copy of the Waste Collection Permits, CORs, Waste Facility Permits and Waste/IED Licenses will be maintained on site at all times. The Waste Manager or delegate will record the following;

- Waste taken for reuse off-site;
- Waste taken for recycling; and
- Waste taken for disposal.

For each movement of waste off-site, a signed docket will be obtained by the Waste Manager from the waste contractor, detailing the weight and type of the material and the source and destination of the material. This will be carried out for each material type removed from site.

The system will allow the comparison of these figures with targets established for the recovery, reuse and recycling of construction waste and to highlight the successes or failures against these targets.

5. TRAINING PROVISIONS

An individual from the main contractor's team will be appointed as the Waste Manager for the project to ensure commitment, operational efficiency and accountability during the excavation and construction phases of the project. The main contractor or project managers for the overall development should ensure that each contractor engaged throughout the project has a suitable person nominated as a point of contact for waste management.

5.1 Waste Manager Training and Responsibilities

The nominated Waste Manager will be given responsibility and authority to select a waste team if required, i.e. members of the site crew that will aid him/her in the organization, operation and recording of the waste management system implemented on site. The Waste Manager will have overall responsibility to oversee, record and provide feedback to the Project Manager on everyday waste management at the site associated with project works. Authority will be given to the Waste Manager to delegate responsibility to sub-contractors, where necessary, and to coordinate with suppliers, service providers and sub-contractors to priorities waste prevention and material salvage.

The Waste Manager will be trained in how to set up and maintain a record keeping system, how to perform an audit and how to establish targets for waste management on site.

5.2 Site Crew Training

Training of the site crew is the responsibility of the Waste Manager and, as such, a site induction waste management brief will be organized. A basic awareness course will be held for all site crew to outline the C&D WMP and to detail the segregation methods of waste materials at source. This may be incorporated with other site training needs such as general site induction, health and safety awareness and manual handling.

This basic course will describe the materials to be segregated, the storage methods and the location of the waste storage areas. A sub-section on hazardous wastes will be incorporated into the training program and the particular dangers of each hazardous waste will be explained.

6. CONSULTATION WITH RELEVANT BODIES

6.1 Local Authority

Once the main contractor has been appointed and prior to removal of any waste materials off-site, details of the proposed destination of each waste stream will be provided to the local authority for their approval.

The authority will also be consulted, as required, throughout the construction phases in order to ensure that all available waste reduction, reuse and recycling opportunities are identified and utilized and that compliant waste management practices are carried out.

6.2 Recycling/Salvage Companies

Companies that specialize in C&D waste management will be contacted to determine their suitability for engagement. Where waste contractor(s) are engaged, each company will be audited in order to ensure that relevant and up-to-date waste collection permits and facility COR/permits/license are held. In addition, information regarding individual waste materials will be obtained where possible, including the feasibility of recycling each material, the costs of recycling/reclamation, the means by which the wastes will be collected and transported off-site and the recycling/reclamation process each material will undergo off site.

7. CONCLUSION

This document outlines the principles and measures by which the waste generated during the demolition and construction phases of the proposed development will be managed and disposed of in compliance with the provisions of the Waste Management and Waste Management Plan. It describes the measures by which optimum levels of waste reduction, re-use and recycling shall be achieved.

Waste materials will be generated during the construction of the proposed development, including the initial site clearance and excavation. Careful management of these, as described within this report will help to ensure maximum recycling, reuse and recovery is achieved. Appropriate facilities will be provided in order to minimize environmental impacts such as litter, contamination of soil or water, etc.
Given the provision of appropriate facilities and training, environmental impacts such as litter, contamination of soil or water, etc arising from waste storage are expected to be minimal with a high level of due diligence carried out on site and with the implementation of the proposed mitigation measures, the proposed development's demolition and construction phases are not expected to have a significant environmental impact with respect to waste management.