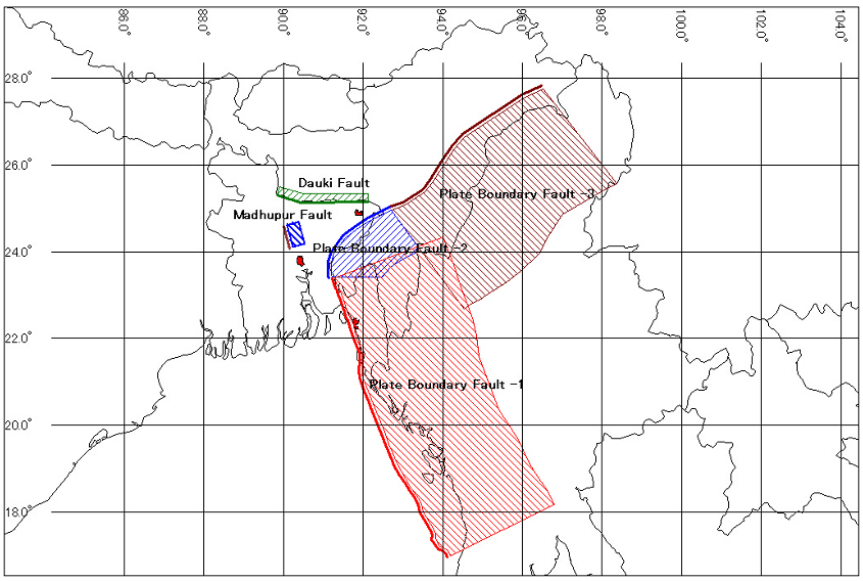
E4722

Bangladesh
Urban Resilience Project

Environmental Management Framework



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Fire Services and Civil Defense, Ministry of Home Affairs

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LIST OF ACRONYMS

AFD	Armed Forces Division
AP	Affected Person
ARIPO	Acquisition and Requisition of Immovable Property Ordinance
BBS	Bangladesh Bureau of Statistics
BDT	Bangladesh Taka
BECA	Bangladesh Environment Conservation Act
BNBC	Bangladesh National Building Code
BOD5	5-day Biochemical Oxygen Demand
BP	Bank Procedures
BUET	Bangladesh University of Engineering Technology
URP	Bangladesh Urban Resilience Project
CCFVI	Climate Change Vulnerability Index
DDM	Department of Disaster Management
DG	Director General
DNCC	Dhaka North City Corporation
Do	Department of Environment
DoE	Department of Environment
DoF	Department of Forest
DPHE	Department of Public Health and Engineering
DRM	Disaster Risk Management
DRR	Disaster Risk reduction
DSC	Design & Supervision Consultant
DSCC	Dhaka South City Corporation
EA	Environmental Assessment
ECA	Environmental Conservation Act
ECC	Environmental Clearance Certificate
ECCRP	Emergency Cyclone Recovery and Restoration Project
ECoP	Environmental Code of Practice
ECR	Environment Conservation Rules
EHS	Environmental, Health and Safety
EIA	Environmental Impact Assessment
EMF	Environmental Management Framework
EMP	Environmental Management Plan
EOC	Emergency Operation Center
ERD	External Resources Division
ESA	Environmental and Social Assessment
ESMF	Environmental and Social Management Framework
FD	Finance Division
FGD	Focus Group Discussion
FSCD	Fire Services and Civil Defense
GAAP	Governance and Accountability Action Plan
GD	Gross domestic product
GoB	Government of Bangladesh
GRC	Grievances Redress Committee
GRM	Grievance Redress Mechanism
HQ	Head Quarter
IDA	International Agency,
IEE	Initial Environmental Examination
IFC	International Finance Corporation
ILO	International Labour Standards

IMED	Implementation Monitoring and Evaluation Division
KII	Key Information Interview
LGED	Local Government Engineering Department
MoCA	Ministry of Cultural Affairs
MoD	Ministry of Defense
MoDMR	Ministry of Disaster Management and Relief
MoEF	Ministry of Environment and Forests
MoHA	Ministry of Home Affairs
MoHFW	Ministry of Health and Family Welfare
MoHPW	Ministry of Housing and Public Works
MoICT	Ministry of Information and Communication Technology
MoLGRD	Ministry of Local Government, Rural Development and Co-operatives
MoPME	Ministry of Primary and Mass Education
NCS	National Conservation Strategy
NDMRTI	National Disaster Management Research and Training Institute
NDRCC	National Disaster Response Coordination Center
NEMAP	National Environment Management Action Plan
NEP	National Environment Policy
NGO	Non-Government Organization
O&M	Operation & Maintenance
OHS	Occupational Health and Safety
OP	Operational Policy
PAP	Project Affected Person
PC	Planning Commission
PD	Project Director
PIA	Project Influence Area
PIU	Project Implementation Unit
PM	Particulate Matter
PM10	Particulate Matter with aerodynamic diameter (10 micrometers)
PM2.5	Particulate Matter with aerodynamic diameter (2.5 micrometers)
PMO	Prime Minister's Office
PMU	Project Management Unit
PSC	Project Steering Committee
RAJUK	Rajdhani Unnayan Kartripakkha (Capital Development Authority)
SCC	Sylhet City Corporation
SESA	Strategic Environmental and Social Assessment
URU	Urban Resilience Unit
WB	World Bank

EXECUTIVE SUMMARY

1. Introduction

Bangladesh has maintained an impressive track record on extreme poverty reduction and shared prosperity since the country's independence in 1971. Dhaka has also been identified as one of the 20 most vulnerable cities in the world to seismic risk[1]. The nearest major fault line is believed to run less than 60 km from Dhaka, and although there is some uncertainty, research suggests that an earthquake of up to magnitude 7.5 is possible. This would have a dramatic, devastating impact on the city.

Outside of Dhaka, the City of Sylhet - like many fast growing secondary cities in the region - suffers from a responsive rather than proactive approach to urban management and development. Sylhet is the third largest city in Bangladesh. Sylhet's own five-year development plan acknowledges that "the shortage of administrative, technical and professional capacity is exacerbated by lack of coordination, an unwieldy bureaucracy and poor organization". In this context, the city's proximity to a fault line that crosses the country compounds vulnerability, and experts believe that Sylhet has the largest earthquake risk in the country.

Objective of the Environment Management Framework (EMF)

The exact locations, size and extent of the activities are remain unknown and the details of the activities to be implemented under URP will be finalized during project implementation phase and therefore, a framework approach has been adopted for Environment Assessment. An Environmental Management Framework (EMF) for the project for overall components has been adopted to ensure that all the activities are adequately screened/assessed for the environmental issues, and to prepare site specific Environmental Management Plan (EMP). The objective of the EMF is to ensure that activities under the proposed operation will address the following activities:

- Minimal potential negative impacts as a result of either individual sub-projects or their cumulative effects;
- Enhance Positive environmental impacts
- Provide a mechanism for consultation and discloser of information
- Ensure compliance and due diligence of National Environmental law and act inline with World Bank's policy for the proposed project.
- Ensure that environmental and related occupation health and safety issues are thoroughly evaluated and necessary interventions are incorporated in planning, decision making, and implementation of project activities;
- Protect environmentally sensitive areas from additional disturbance from project interventions;
- Protect human health and safety;

2. Project Description

The first URP investment consists of four main components that focus on: (1) improving emergency response and preparedness capabilities, (2) establishing an understanding of risk for

[1] Earthquake Disaster Risk Index, Blume Earthquake Engineering Center, Stanford University (1997)

critical facilities and essential facilities, (3) supporting improvements in urban development and construction, (4) providing the institutional arrangements for implementation, monitoring and evaluation to ensure efficiency, transparency, and accountability in the implementation of project activities.

Component A will support the following activities of the URP:

- Renovate and outfit national-level Disaster Risk Management (DRM) facilities (Component A1, US$ 2.5M)
- Build, renovate and outfit local-level City Corporation and Fire Service and Civil Defense (FSCD) DRM facilities in Dhaka and Sylhet (Component A2, US$ 8M)
- Supply, install and integrate specialized ICT equipment for DRM and emergency response within the national-level and local-level agencies (Component A3, US$ 45.5M)
- Supply specialized search and rescue equipment to local-level agencies involved in DRM (Component A4, US$ 37.5M)
- Provide Training, Exercises and Drills (TED) to national-level and local-level agencies involved in DRM. (Component A5, US$ 11.5M)

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

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

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

3. Environmental Policy, Legal and Administrative Framework

The project activities which may trigger environmental safeguard issue are upgrading or construction of emergency management infrastructure and purchase of new safety and disaster equipment to strengthen the resource of the Fire Services and Civil Defense Agency (FSCD) and Emergency Operations Center (EOC) for City Corporation (CC) of Dhaka and Sylhet. The environmental impacts due to the infrastructure development (small scale construction/upgrading buildings to accommodate a National Coordination Center, a National Disaster Management, Research and Training Institute, Emergency Operations Centers and Control Rooms etc.) and due to the installation of new safety equipment of the FSCD, handling, use and disposal of dysfunctional equipment are likely to be short-term, site-specific, non-sensitive or reversible, and in every case, mitigation measures can be designed to overcome or reduce the negative environmental impacts . The activities of proposed project of Bangladesh Government fall under the ‘ORANGE A’ category according to the Bangladesh Environment Conservation Rules (ECR) 1997 and therefore, need to get site clearance and no objection certificate to obtain site and

environmental clearance from the DoE.

Considering the level of possible impact, the environment assessment (OP/BP 4.01) policy has been triggered for the proposed operation and the project is currently classified as "**Category B**". Since the exact location is also not know the project may trigger Natural Habitats (OP/BP 4.04) and physical cultural resources (OP/BP 4.11). The project may consider retrofitting of public building (hospital, office, educational institution etc.) in future phases. In that case, environmental risk associated with the investment will be reviewed." The project **will not** support **any retrofitting activities** in phase I.

4. Disaster Vulnerability and Overall Environmental Setting of Dhaka and Sylhet

Disaster Vulnerability

1. Dhaka and Sylhet are the two project locations for the first phase. Dhaka has been identified as one of the 20 most vulnerable cities in the world to seismic risk[2]. Dhaka city is prone to several hazards both natural and manmade. Some of the hazards are natural like flood, storm and tornado and earthquake; some are mix of natural and human-induced such as water-logging, while some others are more human-induced than natural or accidental such as fire and infrastructure collapse. By virtue of being surrounded by the distributaries of several major rivers, the city has been subjected to periodic flooding since its early days. Until 1990s most part of Dhaka city in the peripheries was flooded. Most severe floods in the recent decades are floods of 1987, 1988, 2004 and 2007. The City of Dhaka is surrounded by four rivers – Turag, Burigonga, Sitalokhya and Balu. In the 1988 flood, it was estimated that about 85 percent of the city was inundated at depths ranging from 0.3 to over 4.5 meters, and about 60 percent of city dwellers were affected. Rapid urbanization, population growth and unplanned development, uncontrolled land filling to develop new residential areas, loss of wetland uncontrolled and haphazard disposal of solid wastes and garbage into the existing drainage system, and encroachment on lakes, khals/canals and rivers with unauthorized construction are, in nutshell, the general man made physical and social activities related to the disappearance of natural drainage system resulting in the water logging in Dhaka city. In addition. Dhaka receives about 2,000 mm of rainfall annually, of which almost 80% falls during the monsoon.
2. Bangladesh and the northeastern Indian states have long been one of the seismically active regions of the world, and have experienced numerous large earthquakes during the past 200 years. Major active fault zones of the country have been delineated through geological trenching and dating methods. Bangladesh has been classified into three seismic zones with zone-3 the most and zone-1 the least vulnerable to seismic risks. Sylhet falls in most vulnerable zone 3 and Dhaka falls in moderately vulnerable zone 2. The building stock in Dhaka is susceptible to collapse – by ground shaking or simply due to gravity – due to poor enforcement of building code regulations and the absence of robust construction standards.
3. Fire happens quite frequently in and around Dhaka city, often in garments factories and slum areas. In the case of factories most incidents are caused by electrical short circuits which can be prevented by periodic checking of electrical wiring, appliances and accessories.

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

4. Northeastern part of Bangladesh especially Sunamganj, Sylhet and Netrokona districts are located in one of the depressed portion of the country. Most of the rivers in these areas are originated from nearby hilly area of India. These rivers are extremely flashy that is characterized by sudden and wide variation in flow as a result of excessive rainfall. When heavy rainfall is occurred in the hilly region of India, water quickly moves towards the Haor area of Bangladesh through a number of rivers and Khals. This floodwater not only carries the water but also carry a huge amount of sediment originated mainly from hill.

Environmental Baseline

The climate of Dhaka experiences mostly a hot, wet and humid tropical climate. The city has a distinct monsoonal season, with an annual average temperature of 25 °C (77 °F) and a variation between 18 °C (64 °F) in January and 29 °C (84 °F) in August. Dhaka extracts groundwater of 1.25 Mm^3/day which is 82% of its daily water supply, from 420 boreholes distributed throughout the city. The natural pattern of groundwater flow at the southern end of the Madhupur Tract has been much disturbed by intensive groundwater extraction for the water supply of Dhaka since the early 1970s. Large-scale groundwater abstraction has resulted in an extensive cone of depression centered on the city, over large parts of which the aquifer has become unconfined. Dhaka is surrounded by rivers and inter-connected with canals which have always formed a life-line for city residents. In the last twenty years, a convergence of unregulated industrial expansion, rural-to-city migration, encroachment of the rivers, overloaded infrastructure have all taken their toll on surface water quality.

Air pollution has become a matter of great concern for the Dhaka city dwellers in recent years. About 50 tons of leads are emitted into Dhaka city's air annually and the emission reaches its highest level in dry season (November-January), revealed a study conducted by scientists of Bangladesh Atomic Energy Commission (BAEC). The worst affected areas in Dhaka city include: Hatkhola, Manik Mia Avenue, Tejgaon, Farmgate, Motijheel, Lalmatia, and Mohakhali. Surveys conducted between January 1990 and December 1999 showed that the concentration of suspended particles goes up to as high as 3,000 micrograms per cubic meter (Police Box, Farmgate, December 1999), although the allowable limits 400 micrograms per cubic meter. The sulphur dioxide in the air near Farmgate as found to be 385 micrograms per cubic meter, where as the maximum permissible limit is 100 micrograms per cubic meter. Similarly, in the Tejgaon Industrial Area the maximum concentration of suspended particles was 1,849micrograms per cubic meter (January 1997), as opposed to the allowable limit of 500 micrograms per cubic meter. Usually the maximum concentration of air pollution in Dhaka is during the dry months of December to March.

The population of Sylhet within the city corporation, was approximately 427,265 as of 2007 and estimated 463,198 in 2008 (density population is 17,479 per km^2).Together with the metropolitan area it has a population of 2,675,346 as of 2001, constituting 2.06% of the national population. Groundwater pollution due to manganese, iron and hardness is a major problem in the project area. With expansion of urban area, more dependency on groundwater sources may increase the pollution level of sub-surface water. Groundwater level of Sylhet city has a considerable lowering over the last few decades. It has been calculated that in 2030 the lowering of ground water level might be 20m (DPHE Report).

5. Environmental Assessment (EAs) Procedure

Environmental Assessment will be required during retrofitting of building. The major activities to be carried out for IEE/EA (including EMP) include: Environment Screening (identification of possible impacts) , Description of Surrounding Environment (establishment of "baseline environment" against which impacts of the proposed sub-project would be evaluated); analysis of alternatives; identification of major sub-project activities during both construction and operational phases; assessment, prediction and evaluation of impacts of major project activities on the baseline environment; carrying out public consultations; preparation of environmental code of practice (ECoP); and identification of mitigation measures and preparation of impact specific environmental management plans (EMP) including monitoring requirements. The EMF presents detail guidelines for carrying out each of these major activities.

6. Possible Environmental Impact Identification for Phase I

Phase I will support purchasing of emergency equipment and construction of storage facilities. The typical impacts are occupational health and safety in handling the equipment, pressure on the utility, air pollution and noise pollution during the construction of the storage facilities. The EMF has prepared the sample environmental management plan for mitigating the impacts

Construction of new warehouse may create additional burden on the existing system of utilities like water supply, sewerage, electricity, gas, telephone and road network etc. Health and safety of workers and users of the equipment must be taken into account while construction activities are on and during maintenance. The contractor must provide safety gears like helmets, hand gloves, eye protectors while welding to the workers. A first aid box must always be available at the site. The safety of the students from dust, noise and staking of rod and sands must be ensured by the contractors following environmental code of practices and management.

7. Environmental Management Plan (EMP)

The EMP clearly lays out: (a) the measures to be taken during both construction and operation phases of a sub-project to eliminate or offset adverse environmental impacts, or reduce them to acceptable levels; (b) the actions needed to implement these measures; and (c) a monitoring plan to assess the effectiveness of the mitigation measures employed. The environmental management program should be carried out as an integrated part of the project planning and execution. It must not be seen merely as an activity limited to monitoring and regulating activities against a pre-determined checklist of required actions. Rather it must interact dynamically as a sub-project implementation proceeds, dealing flexibly with environmental impacts, both expected and unexpected. For all component to be implemented under URP, the EMP should be a part of the Contract Document. Separate mitigation measure is attached in Annex A and Annex B. The Annex A is applicable for the first phase of the project. Annex B is applicable for the retrofitting tasks in the next phase.

8. Strategic Environmental Assessment

RAJUK has already performed a Strategic Environmental Assessment in 2007 for the successful implementation of the Dhaka Metropolitan Development Plan. The SEA did not include the earthquake vulnerability in the SEA. The project will support RAJUK in updating the existing Strategic Environmental Assessment (SEA) to incorporate environmental considerations and the likely environmental effects (risks and opportunities) for Future Structural Retrofitting Program of public building within the area of Dhaka Metropolitan Development Plan (DMDP). The SEA will integrate environmental and social considerations in the building retrofitting program of RAJUK's strategy options and will provide a framework for managing potential environmental impacts

associated with the implementation of these strategy options through the combination of analytical work, consultation and public participation. The EMF includes a sample ToR for the proposed SEA.

9. EMF for Retrofitting Building

The project may support retrofitting of vulnerable building in the future phase. Since it is a new concept in Bangladesh the EMF highlights the comparative analysis of different kind of retrofitting measures from environmental point of view. When the specific project scope will be available for retrofitting any building the existing EMF will be used for any further assessment.

10. Institutional Arrangement

PIUs will be established in each of the implementing agencies for day–to-day execution of the project components. These PIUs will include social and environmental safeguards compliance management. Each implementing agency will appoint an environmental safeguard focal persons, and the PCMU will have an Environmental Specialist with environment background strengthening the project execution at present and in future. The environmental specialist will be responsible to provide support for environmental compliance in the project activities and coordination of the multiagency setup and will share biannual report with the project coordination committee. They will ensure contractor provided due diligence in following the environmental safeguard concern. A social development officer with social science background will be engaged to strengthening its social management capacity of the PIUs.

RAJUK will additionally receive the support of a Senior Environment Specialist for the finalization of SEA. The RAJUK IU will hire a consulting firm for conducting the SEA in close collaboration with the multiple departments. The URU will have an Environmental Unit for the strong execution of environmental safeguard in retrofitting buildings. Environmental safeguard will be given due diligence during independent MTR and Project Completion.

PCMU with the input from each PIU will prepare a **half yearly progress report** on environmental management and will share with the World Bank for review. In addition, the effectiveness of screening, monitoring and implementing the EMP will be carried out by an independent M&E Consultant hired as a third party monitor. The **Annual Environmental Audit Report** prepared by the third party monitoring firm will be shared with the safeguards secretariat.

11. Consultation

Multilevel consultation took place for the project. The first phase of the project will only focus on capacity building, emergency equipment purchase and constructing storage facilities for those equipment. All the implementing agencies assured that any kind of activity will happen inside the project boundary. Two level of consultation took place during the project preparation (i) local level consultation around the office area of each implementing agency and (ii) a national level work shop with the presence of a wide range of stakeholders.

12. Public Disclosure

The EMF will be disclosed on the PCMU website and all the implementing agencies website. The EMF will also be disclosed on the World Bank Infoshop. The Environmental Management Framework documenting the mitigation measures and consultation process will be made available

for public review in both English and Bengali. Hard copy of the EMF will be available at project offices.

PART A: GENERAL

1. INTRODUCTION

1.1 BACKGROUND OF THE PROJECT

5. Bangladesh has maintained an impressive track record on extreme poverty reduction and shared prosperity since the country's independence in 1971. In the past decade alone, the economy has grown at nearly 6 percent per year, and human development went hand-in-hand with economic growth. Poverty dropped by nearly a third, coupled with increased life expectancy, literacy, and per capita food intake. More than 15 million Bangladeshis have moved out of poverty since 1992.
6. The strong economic growth prospects have fueled a massive population shift to Bangladesh's urban areas. The urban share of the total population of 150 million people amounted to approximately 29 percent in 2013, compared to 21 percent 20 years earlier. By 2050 the population will have grown to 200 million, and 52 percent will live in urban areas. Furthermore, the population density in major metropolitan areas is 1,900 people per sq. km. – among the highest in the world. The contribution of agriculture to GDP fell from 30 percent in 1990 to 20 percent in 2010, while the contribution of the urban sector to GDP increased from 37 percent to an estimated 60 percent over the same period.
7. With 7 million people living in the jurisdictional boundaries of Dhaka City Corporation, and 15 million in the wider Dhaka metropolitan area, the greater Dhaka area is particularly at risk.
8. Recent events serve as grim indicators of the extreme vulnerability of the built environment in Dhaka. The collapse of the Rana Plaza building in Savar on April 24, 2013 resulted in the death of 1,127 people and was the latest and most deadly in a series of structural failures in the city. A report commissioned by the Ministry of Home Affairs concluded that poor site location, sub-standard building materials, and illegal construction had contributed to the collapse. The lack of local capacity to conduct search and rescue, which required heavy lifting equipment and specialized training, also resulted in a slow response process. The event highlighted the deficiencies in the emergency management system, which relied more on ad-hoc decisions rather than a structured response operation. A separate study by the Bangladesh University of Engineering and Technology (BUET) assessed garment factories across the city and found that 60 percent were vulnerable to similar collapse.3 The tragedy in Savar has prompted the GoB to consider how to reduce disaster risks in urban areas and simultaneously increase its capacity to respond more effectively to emergencies including disaster events.

1.2 BACKGROUND OF THE DOCUMENT

9. The exact locations, size and extent of the activities are remain unknown and the details of the activities to be implemented under URP will be finalized during project implementation phase and therefore, a framework approach has been adopted for Environment Assessment. An Environmental Management Framework (EMF) for the

[3]http://www.guardian.co.uk/world/2013/jun/03/bangladesh-garment-factories-vulnerable-collapse

project for overall components has been adopted to ensure that all the activities are adequately screened/assessed for the environmental issues, and to prepare site specific Environmental Management Plan (EMP). The subproject eligible for funding under URP are required to satisfy the World Bank's safeguard policies, in addition to conformity with environmental legislation of the Government of Bangladesh (GOB). The purpose of this document is to outline a Framework for Environmental Management, giving brief details of potential Environmental typically associated with the planning and implementation of the project activities envisaged under the URP

10. The Environmental Management Framework (EMF) highlights relevant general policies, guidelines, codes of practice and procedures to be taken into consideration for integration of environmental and social aspects into the project design. Adhering to the principles and procedures and using the checklist of potential environmental issues laid out in this EMF will help the implementing agencies to ensure compliance with the World Bank's safeguard policies and the relevant provisions under the related Government policies, and associated rules, regulations and procedures.

11. Sub-project specific environmental and social impacts cannot be precisely identified upfront before sites are selected and detailed site investigations are carried out. The EMF will provide the necessary background for environmental considerations, a checklist of potential environmental issues of the project activities to be considered and built into the design of the project so that environmentally and socially sustainable implementation can take place. It will provide guidelines to carry out Initial Environmental Examinations (IEE), Environmental Impact Assessment (EIA), and to prepare Environmental Management Plans (EMP), to mitigate project induced negative environmental impacts and enhance positive environmental impacts of the project interventions.

12. This EMF will also serve as the guideline for preparing Terms of Reference (TOR) of the environment safeguard staff designated by the implementing agencies and PCMU to oversee and monitor the environmental compliance of the respective project components coming under their implementation responsibility. Therefore the EMF must be used as the template and guideline to ensure diligent environmental compliance of the planning and implementation of the activities envisaged under the URP projects.

13. The project components eligible for funding under URP will be required to follow the World Bank's safeguard policies, in addition to conformity with environmental and social legislation of the Government of Bangladesh (GOB). The EMF of URP has been developed to ensure compliance with the World Bank's safeguard policies under the current conditions in Bangladesh.

1.3 OBJECTIVE OF THE ENVIRONMENT MANAGEMENT FRAMEWORK (EMF)

14. The objective of the EMF is to ensure that activities under the proposed operation will address the following activities:
    - Minimal potential negative impacts as a result of either individual sub-projects or their cumulative effects;
    - Enhance Positive environmental impacts
    - Provide a mechanism for consultation and discloser of information

- Ensure compliance and due diligence of National Environmental law and act inline with World Bank's policy for the proposed project.
- Ensure that environmental and related occupation health and safety issues are thoroughly evaluated and necessary interventions are incorporated in planning, decision making, and implementation of project activities;
- Protect environmentally sensitive areas from additional disturbance from project interventions;
- Protect human health and safety;

1.4 GENERAL PRINCIPLES FOR ENVIRONMENTAL MANAGEMENT

15. The Environmental Management Procedure establishes the criteria to identify the level of Environmental Assessment (EA) and the processes involved, their sequence to conduct the EA studies for various subprojects under URP including their legal requirements and implications

- Project Coordination Management Unit (PCMU) will be responsible for the environmental compliance monitoring and oversight to ensure overall project environmental compliance. The Consultants that would be hired by PCMU would assist the project implementing unit to carry out this mandate.
- The implementing agency will follow the related government rules (laws, ordinances, acts etc.) and World Bank Operational Policies and Guidelines. This EMF would serve as the basis for ensuring this compliance.
- PCMU will submit the EMF to the Department of Environment (DOE) for their review and concurrence.
- PCMU and all PIU will ensure the participation of local community in planning and implementation of sub-projects.
- No project activities will be carried out in and nearby the environmental protected and critical areas as well as in disputed lands or lands restricted for development.
- All the activities proposed under the project will abide by existing Environmental Mitigation Measures.
- PCMU along with the PIUs will ensure that proper environmental screening will be done by the design consultant.
- Design consultant and contractor will ensure that environmental considerations are given sufficient attention. To this end, it will carry out Environmental Management Plan (EMP) with cost estimate for all subprojects based on screening criterion.
- Bid documents will prepare by the design consultant and Environment Management Plan (EMP). The general mitigation measures, relevant environment clause, text of site specific EMP and the cost of EMP will have to be incorporated in the respective section of bid document.
- Each PIU will report to PCMU for the specific environmental management followed during the construction and warehouse maintenance activities.
- Based on the input from each PIU and by direct monitoring, PCMU will share a half yearly report with the World Bank.
- EMP implementation will be done by the Contractor and supervised by the design consultant and monitoring should be done by management consultant.

1.5 METHODOLOGY

Table 1-1: A Brief Methodology for the EMF Preparation

Task	Scope of Work	Methods
Task 1	**Review of Existing Documents**	• Identification of stakeholder • Gap analysis by desktop review of the reports and other information • Review the policy and other related act • Review international conventions' and treaty, signed by Bangladesh
Task 2	**Field Visit and Consultation**	• Field visit to Sylhet with a structured questionnaire and checklist • Local level KII and FGD
Task 3	**Drafting the Environmental Management Framework**	• Requirement and details of the controls measures will be suggested in the EMF for implementation by Client during construction and operation phases of the Project. The EMF will comprise of the following aspects based on the impacts assessed for the Project: • Introduction to the purpose of the EMF; • Institutional mechanism - roles and responsibilities for EMF implementation; • Summary of significant adverse impacts and potential hazards; • Mitigation measures and control technologies, safeguards etc to minimise adverse impacts on air, water, soil and biological and socioeconomic environment, measures to minimise associated hazards and control emergency situation; and • Project monitoring programme for effective implementation of the mitigation measures and ascertain efficacy of the environmental management and hazard control systems in place. • This sets out the mitigation and management measures required during Project implementation to avoid or reduce the environmental and/ or social impacts, including developing the Action Plan in accordance with international lenders' requirements. A monitoring plan will be included here, covering the type of monitoring to be done, responsible parties, schedule, standards to be used and resources. Plans that can be developed at a later stage (e.g. construction waste management plan, emergency response plan) will be identified and provided as initial documents which will be updated prior to start of construction activities by the contractor. • Retrofitting is required for structures which are either not designed according to the present code of practice or which have been damaged by earthquake or other disasters. In the present context, a large number of urban structures of Bangladesh may require retrofitting as they are not compliant to Bangladesh National Building Code and other relevant engineering standards. Structures are made stronger, stiffer and/or more ductile so that they can resist code specified loads. Depending on nature of deficiency, whole structural system may be modified by inclusion of bracing, shear wall, damper etc. or individual members like beams, columns, joints or foundations may be retrofitted. Retrofitting may use materials like concrete, micro-concrete, steel, fibre reinforced polymer, ferro-cement etc. Following are the steps to be followed for retrofitting: ▪ Survey of structures to identify vulnerable ones

Task	Scope of Work	Methods
		▪ Detail assessment of vulnerable structures to identify nature of deficiency ▪ Explore options of retrofitting schemes ▪ Select and design preferred retrofitting scheme ▪ Implementation of retrofitting scheme o Prop or stabilize the structure o Break/demolish/drill locations of interventions o Apply or install retrofitting material o Curing if needed o Removal of prop • Environmental implications for retrofitting are similar to those for construction and demolitions works. However, safety, in particular, is a major issue for retrofitting works. Retrofitting may be conducted for structures which are completely or partially in operation or for abandoned or evacuated structures. Thus safety of workers, occupants and near-by habitants must of concern. Use of retrofitting materials and equipment should also follow standard rules of safety and hygiene. Disposal of any debris should consider environmental factors.
Task 4	**Finalizing the Environmental Management Framework and preparing the Bengali Version**	• Draft EMF report has been prepared upon completion of the above tasks as per the WB safeguard policy and The Environment Conservation Rules, 1997 and. A glossary of technical terms and abbreviations will also be provided; • The EMF was translated in Bengali, once finalized; • Based on one set of consolidated comments of Client, this Draft EMF will be finalized for submission to WB.

1.6 OVERALL STRUCTURE OF ESMF

16. This report has been prepared by the PCMU in participation with the implementing agencies. The report has been divided into two parts. The overall structure of the EMF will constitute of the following chapters:

Part A is termed as "General" which discusses the legislative, regulatory, and institutional setup that exists in the Country, as well as the World Bank's safeguard policies relevant to the environmental and social assessment and project description. The section also Background, Basis of EMF, Objectives and General Principles, Overall Structure of EMF in chapter 1 and description of project components and project area in chapter 2. Chapter 3 includes the legislation of World Bank and GoB.

Part B is focused on the Phase I of the project. This part mainly deal with the activities to be supported under phase I that is construction of warehouse, small renovation and safety equipment purchase. Chapter 4 describes the vulnerability of Dhaka and Sylhet city and the environmental setting of these two cities. Chapter 5 Environmental Assessment Procedure includes the environmental assessment process for the proposed project, impact and mitigation. Chapter 7 gives the idea of the environmental management and chapter 8 talks about the institutional set up for the first phase of the project,

Part C Environmental Assessment include the guidelines for conducting Environmental Screening, Analysis of Alternatives (technology, cost, site) for retrofitting the buildings. Since retrofitting concept is new in Bangladesh. This

section will be further updated during the phase 2 of the project.

2. PROJECT DESCRIPTION

2.1 PROJECT COMPONENTS

17. Environmental Management Framework as proposed in the present document is intended for the Bangladesh Urban Resilience Project (URP) of the World Bank. This project seeks to create an enabling environment for coordinated, locally managed Disaster Risk Management (DRM). There are three core pillars of disaster resilience in urban settings according to the project document: i) effective emergency management; ii) improving structural resilience through reduction of existing physical vulnerability; and iii) risk sensitive land use planning and safe construction standards and practices to ensure sustainable growth.

18. The Bangladesh Urban Resilience Project (URP) would serve as the first in a series of investments, which will initially focus on Pillar 1, to improve the critical capacity and infrastructure for emergency planning and response. The proposed project will also lay the foundations for subsequent investments in Pillars 2 and 3 by identifying key risks in the to-be-built environment and developing the practice of risk sensitive urban development. A third project could consider broader investment in priority sectors, for example critical facilities, water systems, power systems, transport, and construction of protective infrastructure.

19. The first URP investment consists of four main components that focus on: (1) improving emergency response and preparedness capabilities, (2) establishing an understanding of risk for critical facilities and essential facilities, (3) supporting improvements in urban development and construction, (4) providing institutional arrangements for implementation, monitoring and evaluation to ensure efficiency, transparency, and accountability in the implementation of project activities.

20. ***Component A: Reinforcing the Country's Emergency Management Response Capacity – US$105 million:*** An emergency management system will be put in place that will mobilize the resources at all levels and assign roles and responsibilities more efficiently. The system will be guided by international standards and principles of emergency management[4] and in conformity with national laws and guidelines incorporated in the Disaster Management Act of 2012 and Standing Orders on Disaster (SOD) 2010. The overall goal is to design and operationalize an integrated emergency management system in Bangladesh that will enable the country to plan and respond to both common, everyday emergencies as well as major disasters in an organized and effective manner. For this purpose, the project will: (1) set up emergency operations centers (EOCs) and other response facilities to international standards; (2) outfit them with modern interoperable emergency communication systems and response equipment; and (3) support the proposed emergency management system with a robust and sustained capacity development program that establishes and trains a cadre of emergency management professionals for Bangladesh that are on par with their international peers.

21. The following activities will be implemented under Component A:

[4] c/o FB

- Renovate and outfit national-level Disaster Risk Management (DRM) facilities (Component A1, US$ 2.5M)
- Build, renovate and outfit local-level City Corporation and Fire Service and Civil Defense (FSCD) DRM facilities in Dhaka and Sylhet (Component A2, US$ 8M)
- Supply, install and integrate specialized ICT equipment for DRM and emergency response within the national-level and local-level agencies (Component A3, US$ 45.5M)
- Supply specialized search and rescue equipment to local-level agencies involved in DRM (Component A4, US$ 37.5M)
- Provide Training, Exercises and Drills (TED) to national-level and local-level agencies involved in DRM. (Component A5, US$ 11.5M)

22. ***Component B: Vulnerability Assessment of Critical and Essential Facilities – US$22 million:*** The objective of this component is to develop the consensus-driven analytical foundation required for longer-term investments to reduce risk in the built environment of Dhaka, Sylhet and other cities in Bangladesh. It concentrates on two activities: i) an assessment of the vulnerability of the built environment in greater Dhaka to earthquakes and other major hazards, focusing on essential and critical facilities and infrastructure. The assessment will establish the patterns of vulnerability of the cities, understand the hotspots, and serve as a basis for a long term vulnerability reduction in greater Dhaka; and ii) the development of risk-sensitive land use planning as a practice in Bangladesh. This will be informed by an understanding of the hazards, vulnerability and risk facing urban centers, and by clearly stated consensus DRR objectives and policies.

23. The following activities will be implemented under Component B:

    - Vulnerability assessment of critical and essential facilities and lifelines (Component B1, US$17 million)
    - Support for development of a risk-sensitive land use planning practice in Dhaka (Component B2, US$5 million)

24. ***Component C: Improved Construction, Urban Planning, and Development – US$31million:*** The objective of Component C is to put in place the institutional infrastructure and competency to reduce long-term disaster vulnerability in Dhaka. It would address both the existing built environment as well as future development. The overall scheme for component C covers three areas of investment in order to:
    - Create an organization within RAJUK, the Urban Resilience Unit (URU) to support DRR mainstreaming and improving Dhaka urban resilience;
    - Put up the infrastructure and process to ensure an efficient and integral process for land use and zoning clearance, building code implementation and enforcement, permitting and approval of site and building plans; and
    - Improve competency (through professional accreditation), trainings, continuous education, forums, and piloting of projects for urban resilience, demonstrating results that address key urban development and manage problems and issues.

25. ***Component D: Project Implementation, Monitoring, and Evaluation – US$10 million:*** The objective of this component is to provide necessary funding for project coordination, monitoring and evaluation. The implementation arrangements for the project are not

included as each implementing agency will be responsible for its own implementation, procurement. The URP will have an implementation structure to engage relevant ministries that will focus on DRM, emergency response, vulnerability assessment, risk-sensitive land use planning and management, and institutional strengthening. Component D will provide the funding that will enable the monitoring and evaluation of URP's key activities. It will also ensure periodic evaluation of the investment program to highlight the outputs and outcomes in support of a longer term investment program.

26. The PCMU will be charged with the responsibility of developing mechanisms to track and analyze the project's effects, including the resulting actions of key stakeholders, particularly the City Corporations. The project will also undergo an independent mid-term review and end-of-project evaluation. In addition, activities under the Bank's Governance and Anti-Corruption Action Plan will be implemented under this component. These activities are meant to provide real time evaluation of the investment program in order to highlight positive results and support the foundation of a longer term investment program.

27. Activities that will be supported under this component include: i) overall support of the activities of the PSC and PCMU; ii) support of activities related to overall progress, monitoring and evaluation, compliance with the project's safeguard and fiduciary requirements, and capacity development; iii) support of communication and promotional activities reflecting project contributions and stakeholder expectations; iv) procurement of vehicles, office furniture, and information technology equipment for the PCMU; v) operating costs of the PCMU; and vi) hiring of experts and specialists to reinforce the staffing and technically support the mission of the PCMU.

28. ***Component E: Contingent Emergency Response – US$ 0 million****:* Following an adverse natural or man-made event or that causes a major disaster, the Government may request the Bank to re-allocate project funds to this component (which presently carries a zero allocation) to support response and reconstruction[5]. This component would allow the Government to request the Bank to reallocate project funds and designate them as Immediate Response Mechanism funds to be engaged to partially cover emergency response and recovery costs. This component could also be used to channel additional funds should they become available as a result of the emergency.

2.2 PROJECT LOCATIONS AND CONSTRUCTION ACTIVITIES FOR THE PROJECT

29. The first phase of the project will be located in Dhaka and City. The country has been selected into three earthquake zones. Dhaka and Sylhet falls under zone II and zone III respectively. Zone III is considered as the highest earthquake vulnerable zone. The detail description of the vulnerability is presented in Chapter 4. Each component comprises a number activities covering different aspects of urban resilience including emergency response, establishment of institutions, mainstreaming of disaster management in land use planning, building permitting process, professional licensing etc., capacity building of

[5] Such a reallocation would not constitute a formal Project restructuring, as permitted under the particular arrangements available for contingent emergency response components (ref. Including Contingent Emergency Response Components in Standard Investment Projects, Guidance Note to Staff, April 2009, footnote 6).

agencies along with some necessary construction activities. Only the construction activities in different components of URP are shown in the following table.

Table 2-1: Construction Activities

SL#	Component	Construction Activities	Proposed Area	Relevant Agencies
1.	A.1	• Renovate and Outfit National-Level Disaster Risk Management (DRM) Facilities	DDM building at Mohakhali	DDM
2.	`A.2	• Disaster Control Room for Dhaka FSCD and Sylhet FSCD	- Existing FSCD Mirpur Training Center - SCC area has not yet selected	FSCD
		• Upgrading of 17 Dhaka FSCD stations	- 17 FSCD surrounding open space	
		• Construction of warehouses (for 10 Zonal Offices & 10 Alpha Fire Stations)	Warehouse construction in the existing land of FSCD at different locations in and around Dhaka. No land acquisition will be required	
		• Refurbish DRM office for SCC • Refurbish EOC for SCC	Not yet selected	SCC
		• Refurbish DRM office for DNCC and DSCC • Refurbish EOC for DSCC	DSCC – Nagar Bhaban DNCC – Not Yet Selected DSCC—Not Yet Selected	DNCC and DSCC & SCC
3.	A4	• Supply specialized search and rescue equipment to local-level agencies involved in DRM		DNCC and DSCC & SCC
4.	C 1	• Renovation of Office Space	Newly constructed building at Gulshan-1	RAJUK
		• Physical Space renovation for URU training facility	Own land of RAJUK at Mohakhali	

3. ENVIRONMENTAL POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

3.1 ENVIRONMENTAL CATEOGORIZATION

30. To address the environmental risks of any proposed project and its associated components; any protect and conserve the environment from any adverse impacts, the GOB and World Bank have specified regulations, policy and guidelines. The activities of proposed project of Bangladesh Government for up gradation of equipment for emergency operation during disaster and its storage facility fall under the '**ORANGE A**' category according to the Bangladesh Environment Conservation Rules (ECR) 1997. 1997. According to World Bank the Project falls under Category B project.

3.2 PROVISION UNDER NATIONAL LAW AND BY-LAWS

National Environmental Policy 1992

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

Bangladesh Environmental Conservation Act (ECA), 1995 amended 2002

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

33. The main provisions of the Act can be summarized as:

- Declaration of ecologically critical areas, and restrictions on the operations and processes, which can be carried or cannot be initiated in the ecologically critical area;
- Regulation in respect of vehicles emitting smoke harmful for the environment.
- Environmental Clearance;
- Regulation of industries and other development activities with regards to discharge permits;
- Promulgation of standards for quality of air, water, noises and soils for different areas for different purposes;
- Promulgation of standard limits for discharging and emitting waste; and
- Formulation and declaration of environmental guidelines;

34. The first sets of rules to implement the provisions of the Act were promulgated in 1997 (see below: "Environmental Conservation Rules 1997"). The Department of Environment (DoE) implements the Act. DoE is headed by a Director General (DG). The DG has

complete control over the DoE and the main power of DG, as given in the Act, may be outlined as follows:

- Identification of different types and causes of environmental degradation and pollution;
- Instigating investigation and research regarding environmental conservation, development and pollution.
- Power to close down the activities considered harmful to human life or the environment.
- Power to declare an area affected by pollution as an Ecologically Critical Area. Under the Act, operators of industries/projects must inform the Director General of any pollution incident. In the event of an accidental pollution, the Director General may take control of an operation and the respective operator is bound to help. The operator is responsible for the costs incurred and possible payments for compensation.

Environment Conservation Rules (ECR) 1997 amended 2003

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

36. However, the rules provide the Director General a discretionary authority to grant ‘Environmental Clearance' to an applicant, exempting the requirement of site/location clearance, provided the DG considers it to be appropriate.

37. Presently, "EIA Guidelines for Industries" published by the Department of Environment and the "Environment Conservation Rules 1997”are the formal documents providing guidance for conducting Environmental Assessment. Any proponent planning to set up or operate an industrial project is required to obtain an "Environmental Clearance Certificate" from the Department of Environment (DoE), under the Environment Conservation Act 1995 amended in 2002.

38. Rule 7 of 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) Orange A, (c) Orange B and (d) Red. Various industries and projects falling under each category have been listed in schedule 1 of ECR 1997. 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 Orange A and B 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.

Environment Court Act, 2000

39. The aim and objective of the Act is to materialize the Environmental Conservation Act, 1995 through judicial activities. This Act established Environmental Courts (one or more

in every division), set the jurisdiction of the courts, and outlined the procedure of activities and power of the courts, right of entry for judicial inspection and for appeal as well as the constitution of Appeal Court.

Bangladesh Labor Act, 2006

40. This Act pertains to the occupational rights and safety of factory workers and the provision of a comfortable work environment and reasonable working conditions. In the chapter VI of this law safety precaution regarding explosive or inflammable dust/ gas, protection of eyes, protection against fire, works with cranes and other lifting machinery, lifting of excessive weights are described. And in the Chapter VIII provision safety measure like as appliances of first aid , maintenance of safety record book, rooms for children, housing facilities, medical care, group insurance etc. are illustrated.

Public Procurement Rule (PPR), 2008

41. This is the public procurement rules of Bangladesh and this rule shall apply to the Procurement of Goods, Works or Services by any government, semi-government or any statutory body established under any law. The rule includes the adequate measure regarding the "Safety, Security and Protection of the Environment' in the construction works. This clause includes mainly, the contractor shall take all reasonable steps to (i) safeguard the health and safety of all workers working on the Site and other persons entitled to be on it, and to keep the Site in an orderly state and (ii) protect the environment on and off the Site and to avoid damage or nuisance to persons or to property of the public or others resulting from pollution, noise or other causes arising as a consequence of the Contractors methods of operation.

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

    Part-1 Chapter-1 of BNBC particularly mentions about Historic and Architecturally Valuable Buildings and allows repairs, alterations and additions necessary for its preservation, restoration, rehabilitation or continued use under some specific provisions.

    Part-7 of BNBC deals with construction practices and safety. Section 1.4.1 of chapter-1, part-7 of the BNBC, states the general duties of the employer to the public as well as workers. According to this section, "All equipment and safeguards required for the construction work such as temporary stair, ladder, ramp, scaffold, hoist, run way, barricade, chute, lift etc. shall be substantially constructed and erected so as not to create any unsafe situation for the workmen using them or the workmen and general public passing under, on or near them".

    Part-7, Chapter -1 of the Bangladesh National Building Code (BNBC) clearly sets out the constructional responsibilities according to which the relevant authority of a particular construction site shall adopt some precautionary measures to ensure the safety of the workmen. According to section 1.2.1 of chapter 1 of part 7, "in a construction or demolition work, the terms of contract between the owner and the

contractor and between a consultant and the owner shall be clearly defined and put in writing. These however will not absolve the owner from any of his responsibilities under the various provisions of this Code and other applicable regulations and bye-laws. The terms of contract between the owner and the contractor will determine the responsibilities and liabilities of either party in the concerned matters, within the provisions of the relevant Acts and Codes (e.g.) the Employers' Liability Act, 1938, the Factories Act 1965, the Fatal Accident Act, 1955 and Workmen's Compensation Act 1923". (After the introduction of the Bangladesh Labor Act, 2006, these Acts have been repealed).

Part-7 , Chapter-2 of the Code provides clauses for safe storage, stacking and handling practices of building materials. Section 2.1.1 of chapter-2, part-7 of the BNBC, states, "Materials shall be stored and placed so as not to endanger the public, the workers or the adjoining property."

Part-7 , Chapter-3 of the Code 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 site during construction and at the same time specifies the specific measures to be taken to prevent such health hazards. According to this chapter, exhaust ventilation, use of protective devices, medical checkups etc. are the measures to be taken by the particular employer to ensure a healthy workplace for the workers.

To prevent workers falling from heights, the Code in section 3.7.1 to 3.7.6 of chapter 3 of part 7 sets out the detailed requirements on the formation and use of scaffolding. According to section 3.9.2 of the same chapter, "every temporary floor openings shall either have railing of at least 900 mm height or shall be constantly attended. Every floor hole shall be guarded by either a railing with toe board or a hinged cover. Alternatively, the hole may be constantly attended or protected by a removable railing. Every stairway floor opening shall be guarded by railing at least 900 mm high on the exposed sides except at entrance to stairway. Every ladder way floor opening or platform shall be guarded by a guard railing with toe board except at entrance to opening. Every open sided floor or platform 1.2 meters or more above adjacent ground level shall be guarded by a railing on all open sides except where there is entrance to ramp, stairway or fixed ladder. The precautions shall also be taken near the open edges of the floors and the roofs".

Part-9 of BNBC deals with alteration, addition to and change of use of existing buildings. The provisions of this part are intended to maintain or increase the current degree of public safety as well as health and general welfare in existing buildings while permitting alteration, addition to or change of use. According to Chapter-1 of Part-9, in case of alteration, addition to or change of use the building has to be investigated and evaluated by competent professionals prior to such works. Chapter-2 of Part-9 states that the evaluation should take into consideration both planning requirements and public safety. Specific issues related to fire safety and life safety during alteration are mentioned in this chapter.

Acts Related to Disaster

43. The Disaster Management Act (2012), Standing Order on Disasters (2010), National Disaster Management Plan (2010-2015) and other DRM-related laws and codes constitute the core of Bangladesh's national disaster management regulatory framework. The Disaster Management Act of 2012 provides the legal basis for DRM mandates of government agencies and non- government actors. Standing Orders on Disaster (SOD) and related Guidelines facilitate monitoring of disaster management activities and guide individual officials and institutions throughout the country on carrying out the DRM mandate. The National Disaster Management Policy (Draft) identifies likely disaster impacts, assesses available resources to cope with disasters, enhances existing institutional capacity for disaster response and recovery, addresses socioeconomic aspects contributing to exposure and to disaster threats, and lays out a framework to reduce risk.

3.3 WORLD BANK ENVIRONMENTAL POLICIES

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

Environmental policies:

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

Social Policies

OP/BP 4.10 Indigenous Peoples
OP/BP 4.12 Involuntary Resettlement

Legal Policies

OP/BP 7.50 International Waterways
OP/BP 7.60 Disputed Areas

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

OP/BP 4.01 Environmental Assessment

46. This policy is considered to be the umbrella safeguard policy to identify, avoid, and mitigate the potential negative environmental and social impacts associated with Bank

lending operations. In World Bank operations, the purpose of Environmental Assessment is to improve decision making, to ensure that project options under consideration are sound and sustainable, and that potentially affected people have been properly consulted. The borrower is responsible for carrying out the EA and the Bank advises the borrower on the Bank's EA requirements. The Bank classifies the proposed project into three major categories, depending on the type, location, sensitivity, and scale of the project and the nature and magnitude of its potential environmental impacts:

- Category A: The proposed project is likely to have significant adverse environmental impacts that are sensitive, diverse, or unprecedented. These impacts may affect an area broader than the sites or facilities subject to physical works.
- Category B: The proposed project's potential adverse environmental impacts on human population or environmentally important areas-including wetlands, forests, grasslands, or other natural habitats- are less adverse than those of Category A projects. These impacts are site specific; few if any of them are irreversible; and in most cases mitigation measures can be designed more readily than Category A projects.
- Category C: The proposed project is likely to have minimal or no adverse environmental impacts.

OP/BP 4.04 Natural Habitats

47. The conservation of natural habitats is essential for long-term sustainable development. The Bank therefore supports the protection, maintenance, and rehabilitation of natural habitats and their functions in its economic and sector work, project financing, and policy dialogue. The Bank supports, and expects borrowers to apply, a precautionary approach to natural resource management to ensure opportunities for environmentally sustainable development. The Bank does not support projects that involve the significant conversion or degradation of critical natural habitats.

OP/BP 4.09 Pest Management

48. The aim of the pest management policy is to minimize and manage the environmental and health risks associated with pesticide use and promote and support safe, effective and environmentally sound pest management. The procurement of any pesticide in a Bank-financed project is contingent on an assessment of the nature and degree of associated risks, taking into account the proposed use and the intended user. To manage pests that affect either agriculture or public health, the Bank supports a strategy that promotes the use of biological or environmental control methods and reduces reliance on synthetic chemical pesticides. In Bank- financed projects, the borrower addresses pest management issues in the context of the project's environmental assessment. In appraising a project that will involve pest management, the Bank assesses the capacity of the country's regulatory framework and institutions to promote and support safe, effective, and environmentally sound pest management.

OP/BP 4.11 Physical Cultural Resources

49. Physical cultural resources are defined as movable or immovable objects, sites, structures, groups of structures, and natural features and landscapes that have archaeological, paleontological, historical, architectural, religious, aesthetic, or other cultural significance. Their cultural interest may be at the local, provincial or national level, or within the international community. Physical cultural resources are important as sources of valuable

scientific and historical information, as assets for economic and social development, and as integral parts of a people's cultural identity and practices. The Bank assists countries to avoid or mitigate adverse impacts on physical cultural resources from development projects that it finances. The impacts on physical cultural resources resulting from project activities, including mitigating measures, may not contravene either the borrower's national legislation, or its obligations under relevant international environmental treaties and agreements. The borrower addresses impacts on physical cultural resources in projects proposed for Bank financing, as an integral part of the environmental assessment (EA) process.

OP/BP 4.36 Forests

50. Forest is defined as an area of land of not less than 1.0 hectare with tree crown cover (or equivalent stocking level) of more than 10 percent that have trees with the potential to reach a minimum height of 2 meters at maturity in situ. A forest may consist of either closed forest formations, where trees of various stories and undergrowth cover a high proportion of the ground, or open forest. The definition includes forests dedicated to forest production, protection, multiple uses, or conservation, whether formally recognized or not. The definition excludes areas where other land uses not dependent on tree cover predominate, such as agriculture, grazing or settlements. In countries with low forest cover, the definition may be expanded to include areas covered by trees that fall below the 10 percent threshold for canopy density, but are considered forest under local conditions. The Bank's forests policy recognizes the importance of forests to reduce poverty in a sustainable manner integrates forests effectively in economic development, aims to reduce deforestation, promote afforestation and enhance the environmental contribution of forested areas. The Bank assists borrowers with the establishment and sustainable management of environmentally appropriate, socially beneficial, and economically viable forest plantations to help meet growing demands for forest goods and services.

OP/BP 4.37 Safety of Dams

51. When the World Bank finances new dams, the Policy Safety on Dams requires that experienced and competent professionals design and supervise construction, and that the borrower adopts and implements dam safety measures through the project cycle. The policy also applies to existing dams where they influence the performance of a project. In this case, a dam safety assessment should be carried out and necessary additional dam safety measures implemented.

OP/BP 4.12 Involuntary Resettlement

52. This policy is triggered in situations involving involuntary taking of land and involuntary restrictions of access to legally designated parks and protected areas. The policy aims to avoid involuntary resettlement to the extent feasible, or to minimize and mitigate its adverse social and economic impacts. It promotes participation of displaced people in resettlement planning and implementation, and its key economic objective is to assist displaced persons in their efforts to improve or at least restore their incomes and standards of living after displacement.The policy prescribes compensation and other resettlement measures to achieve its objectives and requires that borrowers prepare adequate resettlement planning instruments prior to Bank appraisal of proposed projects.

OP 4.10 Indigenous People

53. The term “Indigenous Peoples” is used in a generic sense to refer to a distinct, vulnerable, social and cultural group possessing the following characteristics in varying degrees:

- self-identification as members of a distinct indigenous cultural group and recognition of this identity by others;
- collective attachment to geographically distinct habitats or ancestral territories in the project area and to the natural resources in these habitats and territories;
- customary cultural, economic, social, or political institutions that are separate from those of the dominant society and culture; and
- an indigenous language, often different from official language of the country/ region.

54. The Bank provides project financing only where free, prior, and informed consultation results in broad community support to the project by the affected Indigenous Peoples. Such Bank-financed projects include measures to (a) avoid potentially adverse effects on the Indigenous Peoples’ communities; or (b) when avoidance is not feasible, minimize, mitigate, or compensate for such effects. Bank-financed projects are also designed to ensure that the Indigenous Peoples receive social and economic benefits that are culturally appropriate and gender and inter-generationally inclusive.

IFC Environmental, Health and Safety Guidelines

55. The Environmental, Health and Safety (EHS) Guidelines of the World Bank Group (WBG)/International Finance Corporation (IFC), 2008 is the safeguard guidelines for environment, health and safety for the development of the industrial and other projects. They contain performance levels and measures that are considered to be achievable in new facilities at reasonable costs using existing technologies. When host country regulations differ from the levels and measures presented in the EHS Guidelines, projects are expected to achieve whichever is more stringent. If less stringent levels or measures than those provided in these EHS Guidelines are appropriate, in view of specific project circumstances, a full and detailed justification for any proposed alternatives is needed as part of the site-specific environmental assessment. This justification should demonstrate that the choice for any alternate performance levels is protective of human health and the environment.

56. The section 4 of EHS Guidelines for “Construction and Decommissioning” provides additional, specific guidance on prevention and control of community health and safety impacts that may occur during new project development, at the end of the project life-cycle, or due to expansion or modification of existing project facilities.

Public Consultation

57. For all Category A and B projects proposed for IBRD or IDA financing, during the EA process, the borrower consults project-affected groups and local nongovernmental organizations (NGOs) about the project's environmental aspects and takes their views into account. The borrower initiates such consultations as early as possible. For Category A projects, the borrower consults these groups at least twice: (a) shortly after environmental screening and before the terms of reference for the EA are finalized; and (b) once a draft EA report is prepared. In addition, the borrower consults with such groups throughout project implementation as necessary to address EA-related issues that affect them.

Disclosure

58. For meaningful consultations between the borrower and project-affected groups and local NGOs on all Category A and B projects proposed for IBRD or IDA financing, the borrower provides relevant material in a timely manner prior to consultation and in a form and language that are understandable and accessible to the groups being consulted.

59. For a Category A project, the borrower provides for the initial consultation a summary of the proposed project's objectives, description, and potential impacts; for consultation after the draft EA report is prepared, the borrower provides a summary of the EA's conclusions. In addition, for a Category A project, the borrower makes the draft EA report available at a public place accessible to project-affected groups and local NGOs. For projects described in paragraph 9 above, the borrower/FI ensures that EA reports for Category A subprojects are made available in a public place accessible to affected groups and local NGOs.

60. Any separate Category B report for a project proposed for IDA financing is made available to project-affected groups and local NGOs. Public availability in the borrowing country and official receipt by the Bank of Category A reports for projects proposed for IBRD or IDA financing, and of any Category B EA report for projects proposed for IDA funding, are prerequisites to Bank appraisal of these projects.

61. Once the borrower officially transmits the Category A EA report to the Bank, the Bank distributes the summary (in English) to the executive directors (EDs) and makes the report available through its InfoShop. Once the borrower officially transmits any separate Category B EA report to the Bank, the Bank makes it available through its Info Shop. If the borrower objects to the Bank's releasing an EA report through the World Bank Info Shop, Bank staff (a) do not continue processing an IDA project, or (b) for an IBRD project, submit the issue of further processing to the EDs.

Implementation

62. During project implementation, the borrower reports on (a) compliance with measures agreed with the Bank on the basis of the findings and results of the EA, including implementation of any EMP, as set out in the project documents; (b) the status of mitigatory measures; and (c) the findings of monitoring programs. The Bank bases supervision of the project's environmental aspects on the findings and recommendations of the EA, including measures set out in the legal agreements, any EMP, and other project documents.

3.4 IMPLICATIONS OF THE ENVIRONMENTAL POLICIES TO THE PROJECT

63. The project activities which may trigger environmental safeguard issue are upgrading or construction of emergency management infrastructure and purchase of new safety and disaster equipment to strengthen the resource of the Fire Services and Civil Defense Agency (FSCD) and Emergency Operations Center (EOC) for City Corporation (CC) of Dhaka and Sylhet. The environmental impacts due to the infrastructure development (small scale construction/upgrading buildings to accommodate a National Coordination Center, a National Disaster Management, Research and Training Institute, Emergency Operations Centers and Control Rooms etc.) and due to the installation of new safety equipment of the FSCD, handling, use and disposal of dysfunctional equipment are likely to be short-term, site-specific, non-sensitive or reversible, and in every case, mitigation

measures can be designed to overcome or reduce the negative environmental impacts . Considering the level of possible impact, the environment assessment (OP/BP 4.01) policy has been triggered for the proposed operation and the project is currently classified as "**Category B**". Since the exact location is also not know the project may trigger Natural Habitats (OP/BP 4.04) and physical cultural resources (OP/BP 4.11). The project may consider retrofitting of public building (hospital, office, educational institution etc.) in future phases. In that case, environmental risk associated with the investment will be reviewed."

64. The project **will not** support **any retrofitting activities** in phase I. The type of construction supported by the project may fall under handling of heavy equipment with the storage facilities. It may be noted that machinery and equipment handling is considered as the 'Orange A' category which requires site clearance and No Objection Certification. According to the suggestion from the EMF disclosure workshop, the DoE Clearance procedure is added to the document.

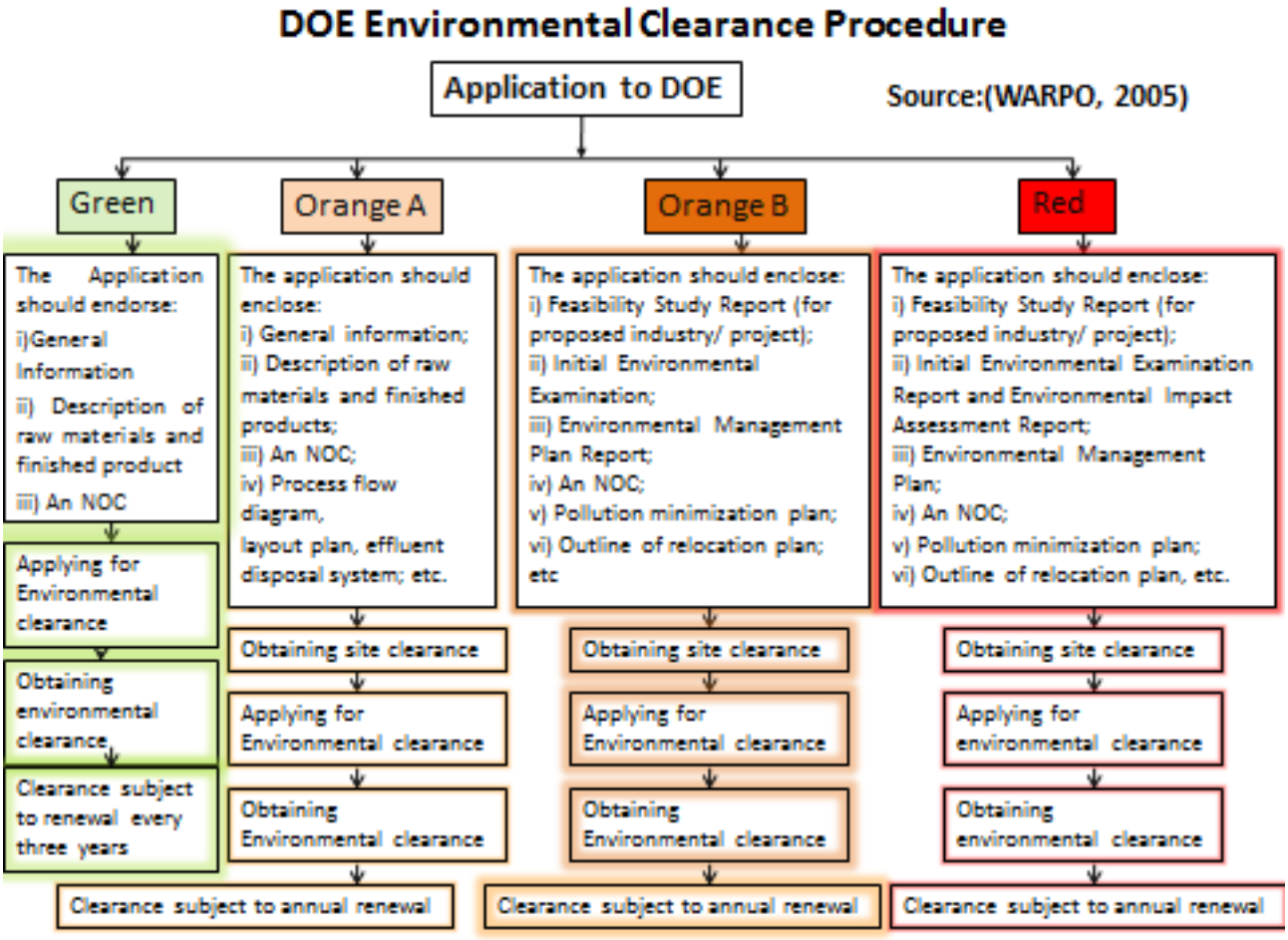

Figure 3-1: DoE Clearance Procedure

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

66. It is the responsibility of the respective implementing agency to screen, take mitigation measures and monitor the environmental issues in both Construction and Operation & Maintenance phase.

PART B: PHASE I
RECONSTRUCT/REFURBISH/UPGRADING OF EOC

4. Disaster Vulnerability and Overall Environmental Setting of Dhaka and Sylhet

4.1 DISASTER VULNERABILITY

67. Dhaka and Sylhet are the two project locations for the first phase. Dhaka has been identified as one of the 20 most vulnerable cities in the world to seismic risk[6]. The nearest major fault line is believed to run less than 60 km from Dhaka, and although there is some uncertainty, research suggests that an earthquake of up to magnitude 7.5 is possible. This would have a dramatic, devastating impact on the city. Moreover, the city and its inhabitants are poorly prepared to respond to a crisis on this scale within the metropolitan area. A joint research project conducted by the University of Kansas and Dhaka University found that 83% of Dhaka's residents do not consider themselves prepared for an earthquake.[7]

68. Outside of Dhaka, the City of Sylhet – like many fast growing secondary cities in the region – suffers from a responsive rather than proactive approach to urban management and development. Sylhet is the third largest city in Bangladesh. Sylhet's own five-year development plan acknowledges that "the shortage of administrative, technical and professional capacity is exacerbated by lack of coordination, an unwieldy bureaucracy and poor organization". In this context, the city's proximity to a fault line that crosses the country compounds vulnerability, and experts believe that Sylhet has the largest earthquake risk in the country.

4.1.1 MAJOR HAZARDS IN DHAKA CITY CORPORATION AREAS

69. Dhaka city is prone to several hazards both natural and manmade. Some of the hazards are natural like flood, storm and tornado and earthquake; some are mix of natural and human-induced such as water-logging, while some others are more human-induced than natural or accidental such as fire and infrastructure collapse.

70. **Flood & Drainage Congestion:** After Shanghai of eastern China, Dhaka has been marked as the most flood prone metropolis among nine major coastal cities, according to a vulnerability index (CCFVI) worked out by Dutch researchers and the University of Leads. Meanwhile, environment experts have been saying that at least 20 million people would be displaced as 17 per cent of Bangladesh, mainly in the coastal areas would be inundated when the sea level is expected to rise a meter by 2050 due to global warming. It is also warned that social vulnerability to flooding will double in the cases of Dhaka, Manila and Shanghai by 2100. Dhaka is located in wetlands and virtually surrounded by rivers, some of the greatest in the world.

- Dhaka is 20 miles (32 kilometers) east of the Padma River, which is the main course of the Ganges River.
- Only a few miles north of this point, the Padma is joined by the Jamuna River, which is the main course of the Brahmaputra River.

[6] Earthquake Disaster Risk Index, Blume Earthquake Engineering Center, Stanford University (1997)
[7] Disasters. 2010 Apr;34(2):337-59

- The Meghna River, the secondary Brahmaputra River course is 15 miles (25 kilometers) to the east of Dhaka.
- Little more than 30 miles (50 kilometers to the south is the confluence of the Padma River and the Meghna River, which flows the last few miles to the Bay of Bengal as the Meghna.

71. Though Dhaka is 100 miles (160 kilometers) from the Bay of Bengal (the Indian Ocean), the lowest parts of the city are little more than five feet (two meters) above sea level. This means serious flooding. The risk is illustrated in Figure 4-1. The extent of the risk is illustrated by the fact that the areas not prone to flooding cover *less* land than the urban area. That means that the necessary urban expansion will be very expensive. With the understandable exodus from rural areas to the city, the problems of high density and, particularly slums could become more acute.

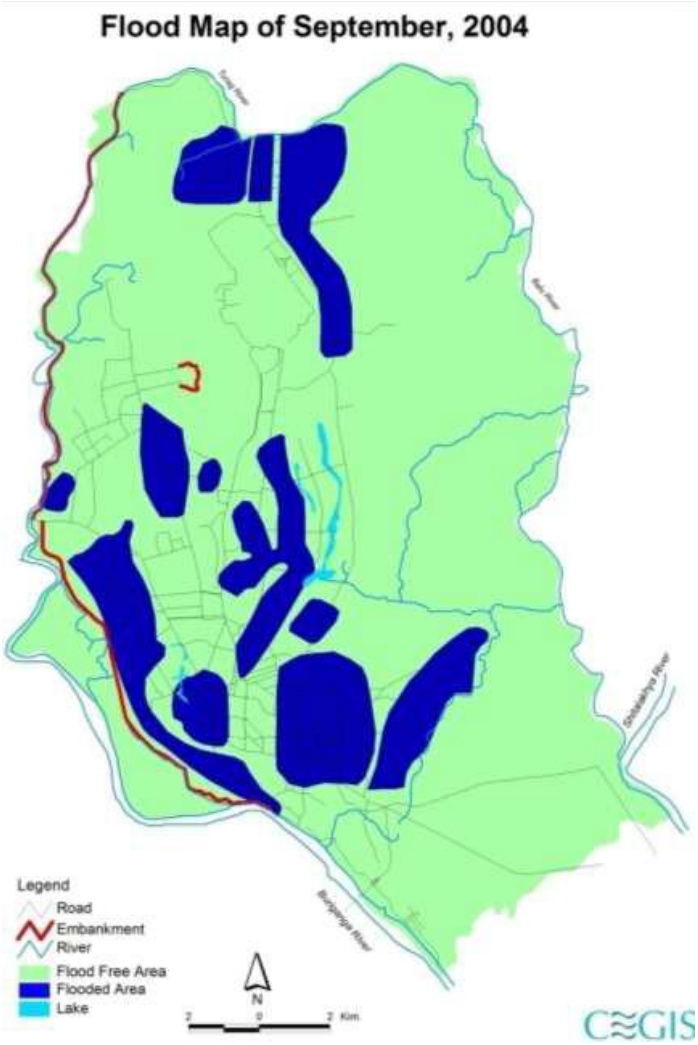

Figure 4-1: Flood Map of Dhaka City (CEGIS)

72. By virtue of being surrounded by the distributaries of several major rivers, the city has been subjected to periodic flooding since its early days. Until 1990s most part of Dhaka city in the peripheries was flooded. Most severe floods in the recent decades are floods of 1987, 1988, 2004 and 2007. The City of Dhaka is surrounded by four rivers – Turag,

Burigonga, Sitalokhya and Balu. In the 1988 flood, it was estimated that about 85 percent of the city was inundated at depths ranging from 0.3 to over 4.5 meters, and about 60 percent of city dwellers were affected. It also disrupted city life, air travel, and communication from the capital city to the outside world. The 1998 flood was most severe in terms of extent and duration. It was estimated that about 56 percent of the city was inundated, including most of the eastern and 23 percent of the western parts of the city. The flood protection embankment and floodwalls constructed after 1988 flood along the Turag and the Buriganga rivers protected the western part of the city from river flooding but eastern part remains unprotected.

73. Rapid urbanization, population growth and unplanned development, uncontrolled land filling to develop new residential areas, loss of wetland uncontrolled and haphazard disposal of solid wastes and garbage into the existing drainage system, and encroachment on lakes, khals/canals and rivers with unauthorized construction are, in nutshell, the general man made physical and social activities related to the disappearance of natural drainage system resulting in the water logging in Dhaka city. In addition. Dhaka receives about 2,000 mm of rainfall annually, of which almost 80% falls during the monsoon. Floods are one of the main natural hazards affecting the city and are associated with river water overflow and rain water stagnation. The city has become more vulnerable to intense urban flooding due to heavy and unpredictable rainfall in recent years. If the current rate of loss of wetland continues, before the year 2031 all temporary wetlands of Dhaka will disappear[8]. This is alarming for earthquake scenario, all these lands are continuously being converted into urban land through landfill and these filled lands are vulnerable to liquefaction effect.

74. **Earthquake:** Bangladesh and the northeastern Indian states have long been one of the seismically active regions of the world, and have experienced numerous large earthquakes during the past 200 years. Major active fault zones of the country have been delineated through geological trenching and dating methods. A seismicity map of Bangladesh and its adjoining areas has also been prepared by BMD and GSB. Bangladesh has been classified into three seismic zones with zone-3 the most and zone-1 the least vulnerable to seismic risks. Sylhet falls in most vulnerable zone 3 and Dhaka falls in moderately vulnerable zone 2. Bangladesh lies on the seismically active Indian plate. Studies by the Geological Survey of Bangladesh divide the country into three seismic zones. A seismic zoning map of Bangladesh is presented in Figure 4-2.

[8] Chowdhooree, I. 2010. "Policies and Legislations for the Built Environment in Earthquake Mitigation Planning: A Case-Study of Dhaka", an unpublished Area of Concentration (AOC) Paper, Summer 2010, Department of Urban and Regional Planning, University of Hawaii at Manoa, Honolulu, Hawaii, USA.

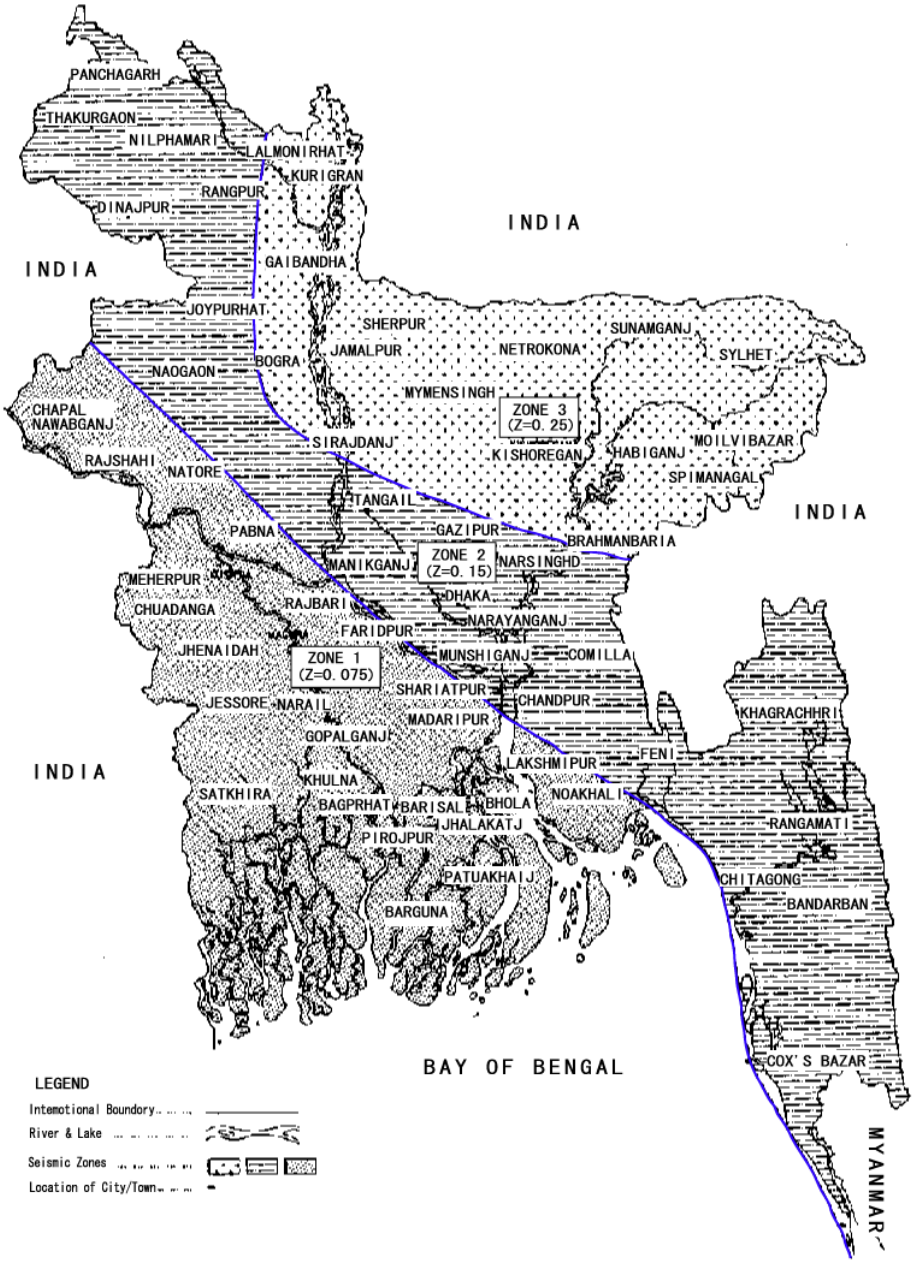

Figure 4-2: Earthquake Zoning Map of Bangladesh

75. Earthquake risk increases towards the north and east of the country, and no area is immune from seismic threat. The five fault lines passing underneath Bangladesh are presented below.

Table 4-1: Fault Line Sources and Estimated Maximum Magnitude

Source	Estimated Maximum Magnitude
Madhupur Fault	7.5
Dauki Fault	8.0
Plate Boundary Fault 1	8.5

Plate Boundary Fault 2	8.0
Plate Boundary Fault 3	8.3

76. The building stock in Dhaka is susceptible to collapse – by ground shaking or simply due to gravity – due to poor enforcement of building code regulations and the absence of robust construction standards. Vulnerability is exacerbated by rapid urbanization and increasing pressure on land: Dhaka is the most densely populated city in the world. Dhaka, the capital city of Bangladesh, has been identified as one of the 20 most vulnerable cities in the world to seismic risk[9]. The nearest major fault line is believed to run less than 60 km from Dhaka, and although there is some uncertainty, research suggests that an earthquake of up to magnitude 7.5 is possible. This would have a dramatic, devastating impact on the city. Historical records show that in the last 150 years, Bangladesh and neighboring states in India have experienced seven major earthquakes of magnitude 7 or above on the Richter Scale. The table below indicates the earthquakes that have impacted Dhaka.

Table 4-2: **Earthquakes Impacting Dhaka**

Intensity	**Earthquake Details**
VIII	• Bengal Earthquake, 1885, Magnitude 7 • Great Indian Earthquake, 1897, Magnitude 8.1
VII	• Srimangal Earthquake, 1918, Magnitude 7.6
VI (intensity where structural damaged being to occur)	• 1923, Magnitude 7.1 • 1934, Magnitude 8.1 • 1935, Magnitude6.0 • 1943, Magnitude 7.2 • 2001, Magnitude 5.1

77. According to the Hazard, Vulnerability, Risk Assessment undertaken by the Bangladesh Urban Earthquake Resilience Project (BUERP) all areas of Dhaka are subject to potentially strong ground motion. The Madhupur fault is to the north of the city. Ground motions generally decrease from north to south and are amplified in areas of soft soil. The Plate Boundary 2 fault is to the east of the city and ground motions decrease going east to west. The Magnitude 6 event under Dhaka has the highest ground motions near the arbitrary location of the fault. An event of this nature could occur anywhere but the likelihood of such an event is less than the Madhupur or Plate Boundary 2 events. The maps below indicate how ground motion would affect Dhaka based on the three modeled scenarios.

[9] Earthquake Disaster Risk Index, Blume Earthquake Engineering Center, Stanford University (1997)

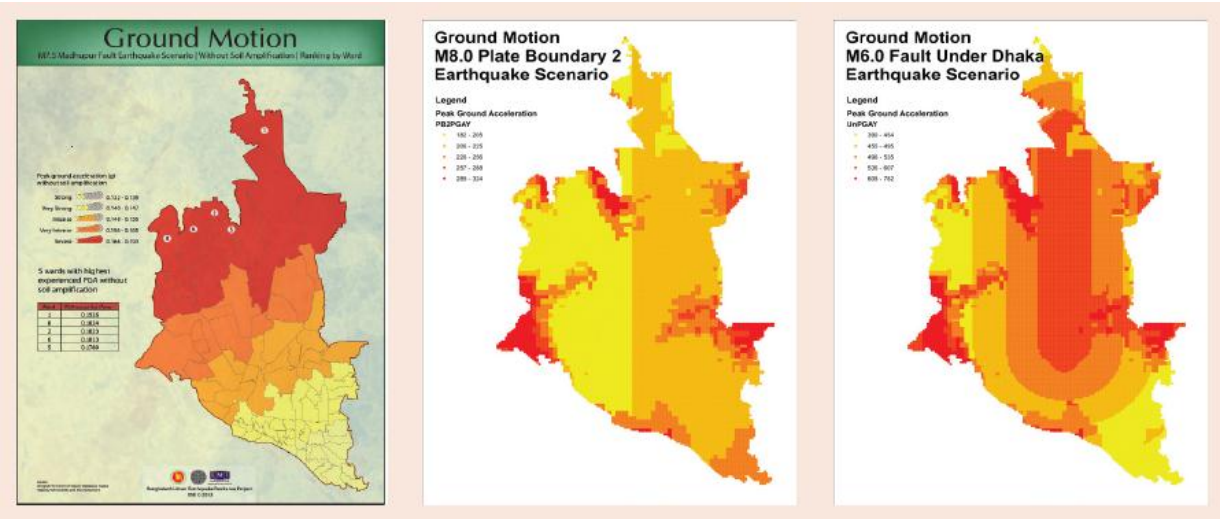

Table 4-3: **Ground Motion Distribution for Dhaka Earthquake Scenarios**

78. **Fire:** Fire happens quite frequently in and around Dhaka city, often in garments factories and slum areas. In the case of factories most incidents are caused by electrical short circuits which can be prevented by periodic checking of electrical wiring, appliances and accessories. In the case of slums and residential area fire, most incidents occur due to negligence like not putting off gas stove after cooking or drying clothes in the kitchen. Casualties in the case of fire in the factories can be minimized if extra stairs made fire exit are kept open but such areas are often dumped with various materials and even locked on the plea of preventing pilferages. Gatemen and other staff responsible to manage them are not often found on emergencies. The situation is changing now with continued efforts from the BGMEA and buyers on worker safety but still lot more need to be done particularly in factories who supply clothes on sub contract basis, hence not accessed by buyers.

Record of Fire Accidents from 1990 to 2014

The fire service department of the government says that nearly 150 workers died due to fire accidents in garment factories from 1990 to 2000. Over this period, at least 40 incidents of fire have been recorded in different garment factories. In the year 2000 alone, three major fire accidents in three different factories claimed at least 60 lives and injured over 200 people.

In 1990, a fire in the Saraka Garments in Mirpur Dhaka left 32 workers dead in stampede. In September 2000, 12 women workers died in a stampede following a fire in Globe Knitwear in Dhaka. In October of the same year 50 workers were seriously injured in stampede following a fire in another Dhaka factory. The year ended with the Narsingdi incident where 50 workers died.

Tazreen Incident

UPI reported on Sunday Nov 25, 2012 that at least 137 people were killed of which 124 dead bodies recovered due to a fire at a Garments Factory at Ashulia area near Dhaka city. The fire started Saturday night and quickly moved through the lower floors of the building. The fire left scores of workers trapped on the upper floors while rescue workers contended with difficult access. The main

difficulty to put out fire was lack of proper access road for the fire fighting vehicles.

Nimtali Tragedy

On 3rd June 2010, at least 125 people, mostly women and children, were killed and many others injured in the Nimtali fire in the Old Dhaka. After the tragedy, the government compensated each of the victim families with an amount of Tk 1, 20,000.

Four fire incidents same day in Dhaka

Other than in the factories, four separate incidents of fire have been reported in the capital on Friday afternoon 3rd Feb 2014. A total of 20 units of fire-fighters from different stations, Fire Service and Civil Defence (FSCD) and the headquarters doused the blazes that originated in four different areas of the capital.

The same day second fire broke out in Hajaribagh area at a leather factory in Hajaribagh around 2:30pm in the afternoon of 13th Feb 2014. Md Mainul Islam, officer-in-charge of Hajaribagh police station said a devastating fire broke out at at 'Jeans Treat Ltd', adjacent to Karim Leather, at around 2:30pm. FSCD official Mohammad Ali said the fire first broke

out at the warehouse of the factory made of which was made of bamboos and tins and spread engulfed the factory. He said the fire might have originated from an electric short circuit but the amount of loss inquired in fire could not be known yet.

"A total of 11 units of the firefighters from different stations of the FSCD fought for over one and a half hours to douse the fire together with police and local people", said FSCD Mobiloizing officer Shahjadi Sultana. She said the firefighters brought the fire under their control after 4pm.

The third fire broke out in Dhanmondi area at the 2nd floor of Archeda Plaza, a six-storey building in the afternoon. Shahjadi Sultana said four units of fire-fighters brought the blaze under the control around 3pm but the cause of the fire could not be known.

The fourth fire broke out in Bongshal area at a warehouse of motor parts at Mokimbazar in around 2pm. The FSCD Mobilising officer said almost the entire warehouse was damaged in the fire. Abul Hasan, officer-in-charge of Bongshal police station, said the warehouse located at the ground floor of the building was shut during the fire. "The fire might have originated from an electric short circuit," the OC said.

In Motijheel another fire broke out at a building in Motijheel however the local people managed to douse it before the FSCD officials reached the spot, said Shahjadi Sultana.

79. **Infrastructure collapse:** When the Rana Plaza factory building collapsed in the Bangladesh capital on 24th April 2013 at Savar, Dhaka, at least 1,129 garment workers

were killed, crushed under eight stories of concrete. A total of 2,515 people were rescued from the building alive, but some suffered terrible injuries. It is considered the deadliest garment-factory accident in history, as well as the deadliest accidental structural failure in modern human history. The building contained clothing factories, a bank, apartments, and several other shops. The shops and the bank on the lower floors in the same building immediately closed after cracks were discovered. Warnings to avoid using the building after cracks appeared the day before but had been ignored. Garment workers were ordered to work also next day and the building collapsed during the morning rush-hour. The immediate cause was starting heavy generators on the roof following power cut and the building collapsed in minutes leaving no time to escape. Fire Service, Police, Rapid Action Battalion and even Army came to the spot immediately but most of the surviving victims were rescued by local volunteers using simple tools.

4.1.2 MAJOR HAZARDS IN SYLHET CITY CORPORATION AREAS

80. **Flood & Drainage Congestion of Sylhet:** A flood, which is caused by heavy or excessive rainfall in a short period of time over a relatively small area, is referred as flash flood. In flash flood, water level rises and falls quite rapidly with little or no advance warning. Northeastern part of Bangladesh especially Sunamganj, Sylhet and Netrokona districts are located in one of the depressed portion of the country. Most of the rivers in these areas are originated from nearby hilly area of India. These rivers are extremely flashy that is characterized by sudden and wide variation in flow as a result of excessive rainfall. When heavy rainfall is occurred in the hilly region of India, water quickly moves towards the Haor area of Bangladesh through a number of rivers and Khals. This floodwater not only carries the water but also carry a huge amount of sediment originated mainly from hill. Over the time this sediment has deposited on the rivers and canals bed and has reduced the conveyance capacity more or less all of the water resources system with in the Haor area. As a result, when flash flood due to sudden heavy rainfall creates pressure on the water resources system, water easily overtopped and creates breaching at several locations on the submersible embankment eventually water quickly enter into the haor. Most of the cases, flood water comes into the haor very early in the monsoon and farmers are not get sufficient time to harvest their standing boro crop. In North-east region of Bangladesh, normally first flash flood came between middle of April to end of April. But according to the local people it is learned that in the recent year first flash flood is coming much earlier.

81. **Landslide:** A landslide in Sylhet's Jaflong left three workers dead and two others injured in March 2013. The mishap happened when the workers were excavating land to dig up stones in the Ballaghat area at around noon," Officer-in-Charge of Goainghat police station Shafiqur Rahman said. Rahman said the injured had been hospitalized. Presently indiscriminately hill cutting is one of the major causes of landslides in Sylhet. Stones are collected by unplanned cutting of hills. During rainfall, water dissolves the minerals of the soil of the hills and loosens its compaction. Soils of the hills also become heavy by absorbing rain water. In the rainfall intensity is too high, minerals of soils dissolve very quickly and the soil turns into mud and becomes very heavy. The steep slope of the hill cannot bear the mass weight of the wet soil or mud that results the landslide. Deforestation in the hill areas is another major reason of landslide. Vegetation makes the slope stabilized which reduces the risk of landslide. Large trees provide strong root structures that anchor the soil and protect it from any erosion.

82. **Earthquake:** Sylhet city is located in the seismic zone 3 and so it is highly vulnerable to earthquake. Sylhet was hit by earthquake in 1897, 1918, 1087, 2004 and 3 earthquakes in 2011. Unplanned and unregulated urbanization and disregard to BNBC rules in building construction aggravate the situation more. With the implementation of Sylhet Master Plan the planned urbanization will strictly follow the actual zoning plan and following of BNBC rule will minimize the earthquake damage. In DMDP Urban Area Plan Volume- II, (Part-3, Interim Planning Rules) development restriction considering the geological fault line areas states "Structures above 2 storeys situated within 500 meters of a geological fault is not allowed unless built to the BNBC standards for Seismic Zone 3 (BNBC Section 6 Chapter 2.25)". Similar measures are also suggested for Sylhet town.

83. **Fire:** Fire incidents have reached an alarming rate in Sylhet over the years. More than 20 fire incidents had already been recorded in one month (July 2014). The fire service officials opined that lack of caution in houses and factories, faulty electric supply lines and use of defective gas cylinders were responsible for this rise in fire incidents. Sylhet Divisional office, public residence and a furniture shop were gutted in separate incidents in the Sylhet city's Alompur and Dakshin Surma industrial areas. The incidents burned down assets worth Tk 2.5 million Assistant director of Fire Service and Civil Defence Sylhet, said fire originating from an electric short-circuit had engulfed a Sylhet Divisional office in Alompur area under Dakshin Surma police station. Another fire broke out at Raykhail in Dakshin Surma area. Fire service officials estimated the loss to be worth Tk 1.5 million. He said overheated machineries also caused fire some time because of frequent fluctuation in electric voltage, adding that the rate could be reduced if the people could be made more aware of such incidents, he said. New Nation Jul 23, 2014

4.2 ENVIRONMENTAL BASELINE

4.2.1 DHAKA CITY ENVIRONMENTAL BASELINE

84. **Climate:** The climate of Dhaka experiences mostly a hot, wet and humid tropical climate. The city has a distinct monsoonal season, with an annual average temperature of 25 °C (77 °F) and a variation between 18 °C (64 °F) in January and 29 °C (84 °F) in August. Nearly 80% of the annual average rainfall of 1,854 millimetres (73.0 in) occurs during the monsoon season which last from May till the end of September.

85. **Geology and Hydrology of Dhaka**[10]**:** Dhaka lies at the southern end of the Plio–Pleistocene Madhupur Tract, the surface of which is elevated 1.5–10 m (average 6 m) above the surrounding floodplains. At the margins of the Madhupur Tract are the Recent flood plain deposits of the Rivers Turag, Buriganga, Balu and Tongi Khal. The Madhupur Tract itself is a remnant block of Plio–Pleistocene sediments comprising the Dupi Tila and Madhupur Formations, isolated following widespread incision of the land surface during the late Quaternary, and its boundaries are in part fault-controlled. The implication is that the hydrogeological equivalent of the Dupi Tila sediments might be present at depth

[10] Burgess, W. G., Hasan, M. K., Rihani E. , Ahmed, K. M. , Hoque, M. A. , Darling, W. G.; "Groundwater quality trends in the Dupi Tila aquifer of Dhaka, Bangladesh: sources of contamination evaluated using modelling and environmental isotopes", International Journal of Urban Sustainable Development, June 2011, http://www.tandfonline.com/loi/tjue20

beyond the rivers bounding the Dhaka city region; however, there remains uncertainty over the nature of the boundaries to the Madhupur Tract. The Madhupur Clay is widely used for the sequence of reddishbrown to grey silty clays of uncertain origin that crops out at the surface across much of the elevated Madhupur Tract. This unit is up to 45 m in thickness (an average of 10 m thick in Dhaka) and has a fine sandy member at its base. Drainage channels and shallow depressions on the Madhupur Tract are partially infilled with grey and yellow organic-rich sands and clays of the Holocene Bashabo Formation.

86. **Current groundwater flow regime:** Dhaka extracts groundwater of 1.25 Mm^3/day which is 82% of its daily water supply, from 420 boreholes distributed throughout the city. The natural pattern of groundwater flow at the southern end of the Madhupur Tract has been much disturbed by intensive groundwater extraction for the water supply of Dhaka since the early 1970s. Large-scale groundwater abstraction has resulted in an extensive cone of depression centered on the city, over large parts of which the aquifer has become unconfined. Steep potentiometric gradients close to the River Buriganga suggest that further spread of the cone of depression is restricted by induced river recharge. To the east of the city, expansion of the cone of depression is limited by recharge induced from the deeply flooded lowlands between Dhaka and the River Balu. Here, where the Bashabo Sands are present and directly overlie the aquifer rather than the Madhupur Clay. Despite the increasing potentiometric drawdown in the aquifer, it is apparent that the impact of groundwater pumping in Dhaka city is restricted in a regional sense by the combined effects of induced recharge from peripheral rivers and enhanced vertical leakage through the Madhupur Clay. The more recent expansion of the cone of depression northwards is the effect of new abstraction boreholes drilled as Dhaka city has grown in that direction. A recent study by the Geology department of Dhaka University shows that the land subsidence of Dhaka city is approximately 12.24 mm/year, they have identified excessive groundwater extraction as one of the major reasons.

87. **Groundwater quality:** Groundwater from the Dupi Tila aquifer in the Madhupur Tract region beyond Dhaka is of calcium-bicarbonate to sodium-bicarbonate type, with total dissolved solids normally less than 350 mg/l, and is oxygenated, with a slightly acidic pH[11]. These features result from successive periods of oxidation and weathering of the original Dupi Tila sediments under stages of low sea level during the Late Quaternary, which have transformed the less stable minerals, flushed the aquifer of the more mobile constituents and rendered the aquifer oxidizing[12]. These baseline characteristics of groundwater in the Dupi Tila aquifer have been modified in Dhaka by the pervasive influence of recharge modification that has resulted in a general increase in the concentration of chloride, nitrate and sulphate, the principal inorganic indicators of urban contamination[13]. Contamination of groundwater by arsenic is a severe and widespread problem across the Holocene floodplain regions of central and southern Bangladesh[14]. However, conditions in the Plio–Pleistocene Dupi Tila sands of the Dhaka region are pervasively oxidizing, and arsenic concentration in groundwater from the Dupi Tila aquifer of Dhaka is less than 3 µg/l[15], well below the 10 µg/l provisional WH guideline

[11] Ibid[9]
[12] Ibid[9]
[13] Ibid[9]
[14] BGS and DPHE 2001
[15] Ibid[13]

value for arsenic in drinking water. A sample ground water quality near to the Shah Jalal International Airport is as follows:

Table 4-4: Ground water quality of WASA water near

SL#	Parameter	Unit	Result	Standard for Drinking*
1.	pH	mg/L	7.1	6.5-8.5
2.	Manganese, Mn	mg/L	0	0.1
3.	Arsenic, As	mg/L	0.01	0.05
4.	Iron, Fe	mg/L	0.5	0.3-1
5.	Ammonia Nitrogen, NH3-N	mg/L	0	0.5
6.	Total Hardness	mg/L	378	200-500
7.	Chlioride	mg/L	450	150-600
8.	Fecal Coliform, FC	n/100ml	0	0
9.	Total Coliform, TC	n/100mL	0	0

Note: * According to ECR' 97; SCHEDULE – 3 (B) Standards for drinking water, [Rule 12]

88. **Surface Water:** Dhaka is surrounded by rivers and inter-connected with canals which have always formed a life-line for city residents. In the last twenty years, a convergence of unregulated industrial expansion, rural-to-city migration, encroachment of the rivers, overloaded infrastructure have all taken their toll on surface water quality. There is only one sewage treatment plant at Pagla which is currently operating below capacity because of sewerage system failures, and few industries operate effluent treatment systems. Almost all the waste from humans, industry, and millions of farm animals, along with tonnes of pesticides and fertilizers, make their way into Dhaka's surface water untreated, and a percentage of these wastes infiltrate to the groundwater. As a result, pollutant levels in the groundwater are increasing, and many sections of the rivers and canals in the city and surrounding areas, especially the Buriganga and Sitalakhya, are biologically dead during the dry season, spurring widespread public concern.

89. **Air Quality:** Air pollution has become a matter of great concern for the Dhaka city dwellers in recent years. About 50 tons of leads are emitted into Dhaka city's air annually and the emission reaches its highest level in dry season (November-January), revealed a study conducted by scientists of Bangladesh Atomic Energy Commission (BAEC). The density of lead in the air of Dhaka city in dry season reaches 463 monograms, the highest in the world. The air quality standards are different for residential, industrial, commercial, and sensitive areas. The worst affected areas in Dhaka city include: Hatkhola, Manik Mia Avenue, Tejgaon, Farmgate, Motijheel, Lalmatia, and Mohakhali. Surveys conducted between January 1990 and December 1999 showed that the concentration of suspended particles goes up to as high as 3,000 micrograms per cubic meter (Police Box, Farmgate, December 1999), although the allowable limits 400 micrograms per cubic meter. The sulphur dioxide in the air near Farmgate as found to be 385 micrograms per cubic meter, where as the maximum permissible limit is 100 micrograms per cubic meter. Similarly, in the Tejgaon Industrial Area the maximum concentration of suspended particles was 1,849micrograms per cubic meter (January 1997), as opposed to the allowable limit of 500 micrograms per cubic meter. Usually the maximum concentration of air pollution in Dhaka is during the dry months of December to March. Summary Air Quality and Meteorological data measured during October 2014 is presented below.

Table 4-5: Summary Air Quality and Meteorological data measured during October 2014 at different CAMS operated under DoE

Location	$PM_{2.5}$ (µg/m3)	PM_{10} (µg/m3)	SOx ppb	NOx ppb
SangshadBhaban, Sher-e-Bangla Nagar	49.2	72.7	DNA	DNA
BARC, Farmgate	43	DNA	3.07	DNA
Darussalam	67.2	98.5	DNA	41.8
Bangladesh Ambient Air Quality Standard*	65	150	140	53 (annual)
Sampling Duration (hours)	*24hrs*	*24hrs*	*24hrs*	*24hrs*

Note: * DoE; DNA: data not available

90. **Noise Level:** With the increase of industrialization and urbanization, noise pollution has become more pervasive in urban settings of Bangladesh. The table below shows the noise level is higher in any type of zones than the Bangladesh standard.

Table 4-6: Summarizes the measured ambient noise levels at each monitoring location near Shah Jalal International Airport

Sl #	Sampling Location	Zone (according to Environmental Quality Standard 1997 and subsequent amendment in 2006)	Noise Level in dB (A)	
			Result (Average)	Bangladesh Standard
1.	Naddar Mor Bazar	Commercial	81.3	70
2.	Hallan Bazar	Commercial	78.9	50
3.	Khilgaon Road	Mixed	73.8	60
4.	Concord lake City, Khilgaon	Residential	68.4	55
5.	Kawla Mor	Mixed	79.7	60

Ref: EIA Study approved by DoE (2011)

91. **Flora and Fauna-** Rapid urbanization has reduced the vegetation covered area of the city. The major tree species found in Dhaka are mahogany, , rain-tree and (in Bengali and colloquial) Sishu, Arjun, Kul, Jarul, Sheaora, Khaer, Siris etc. No endangered floral species are reported. The dominant fruit-bearing trees include mango, jackfruit, bananas, coconut etc. Besides domestic animals, wild dogs, jungle cat, squirrels, and rodents like ants are reported. Some birds found in common Bengali name include Chorui, Doel, Shalik, Kak, Tuntuni, Bulbuli, Kokil etc. Endangered species are not reported.

92. **Demography:** The population of Dhaka (areas under the jurisdiction of the Dhaka South City Corporation and Dhaka North City Corporation) stands at approximately 7.0 million. The city, in combination with localities forming the wider metropolitan area, is home to over 15 million as of 2013. The population is growing by an estimated 4.2% per year, one of the highest rates amongst Asian cities. The continuing growth reflects ongoing migration from rural areas to the Dhaka urban region, which accounted for 60% of the city's growth in the 1960s and 1970s. More recently, the city's population has also grown

with the expansion of city boundaries, a process that added more than a million people to the city in the 1980s. According to Far Eastern Economic Review, Dhaka will become a home of 25 million people by the year 2025. The literacy rate in Dhaka is also increasing fairly quickly. It was estimated at 62.3% in 2001. The literacy rate had gone up to 72.7% by 2010 which is significantly higher than the national average of 56.5%.

4.2.2 SYLHET CITY ENVIRONMENTAL BASELINE

93. **Climate:** The climate of Sylhet is humid subtropical with a predominantly hot and humid summer and a relatively cool winter. The city is within the monsoon climatic zone, with annual average highest temperatures of 23 °C (Aug–Oct) and average lowest temperature of 7 °C (Jan). Nearly 80% of the annual average rainfall of 3,334 mm occurs between May and September.

94. **Geology and Soil Quality:** Geologically, the region is complex having diverse sacrificial geomorphology; high topography of Plio-Miocene age such as Khasi and Jaintia hills and small hillocks along the border. At the centre there is a vast low laying flood plain of recent origin with saucer shaped depressions, locally called Haors. Available limestone deposits in different parts of the region suggest that the whole area was under the ocean in the Oligo-Miocene. The city is located within the region where there are hills and basins which constitute one of the most distinctive regions in Bangladesh. The physiography of Sylhet consists mainly of hill soils, encompassing a few large depressions known locally as "beels" which can be mainly classified as oxbow lakes, caused by tectonic subsidence primarily during the earthquake of 1762. It is flanked by the Indian states of the Meghalaya in the north, Assam in the east, Tripura in the south and the Bangladesh districts of Netrokona, Kishoregonj and Brahmanbaria in the west. The area covered by Sylhet Division is 12,569 km², which is about 8% of the total land area of Bangladesh.

95. **Surface Water:** The surface water quality of Surma River, Kuigang Khal, ponds and haors are polluted in respect of pH, turbidity and coliform bacteria with national standard. The present pollution level of these sites is found to be low except coliform bacteria. The main causes of surface water pollution are city wastewater, sanitary sewage, solid waste dumping. With implementation of this project, the surface water pollution level may further increase for high volume of discharge of wastewater, sanitary sewerage, over spilling of pit and septic tank, industrial effluents, surface run-off of katcha bazars, indiscriminate solid and medical waste dumping. A research conducted on the water quality of the Sylhet vicinity area shows that the main waste water quality parameters such as DO, BOD5, fecal coliform, ammonia and turbidity etc. have greatly exceeded the acceptable level of a good water source for water supply. The obtained values for pH ranges from 7.18 to 6.6, for total dissolved solids ranges from 162.75 to 328.75 mg/L, for dissolved oxygen from 6.24 to 5.28 mg/L, ammonia from 0.155 to 0.3333 mg/L, fecal coliform from 15.5 to 48.91N/100 ml and turbidity from 4 to 10 NTU. The study concludes that, the water is certainly unfit for drinking purposes without any form of treatment. [16]

[16] Rahman, A., Zafor, M.A., Rahman, M.; Surface water quality and risk assessment in the vicinity of Sylhet City; International Journal of Water Resources and Environmental Engineering Vol. 5(1), pp. 29-34, January 2013; Available online at http://www.academicjournals.org/IJWREE

96. **Groundwater:** Groundwater pollution due to manganese, iron and hardness is a major problem in the project area. With expansion of urban area, more dependency on groundwater sources may increase the pollution level of sub-surface water. Groundwater level of Sylhet city has a considerable lowering over the last few decades. It has been calculated that in 2030 the lowering of ground water level might be 20m (DPHE Report). Eventually fall of groundwater table is a common phenomenon in project area during dry period (Feb.-May). Some deep-set pumps of SCC remain out of function during dry season for fall of groundwater table. With expansion of urbanization and industrialization through this project, the groundwater table may further fall if present tradition of using groundwater is continued.

97. **Air Quality:** As Sylhet city is not an industrial area traffic movement contribute maximum concentration to air pollution. Most vehicles have neither fitness certificate nor necessary papers. The density of carbon dioxide was measured-the highest being 550ppm at Zindabazar and the lowest 420ppm at Upashahar. The average density of carbon dioxide in the air is 350 ppm. The level of sulphur dioxide at different places was measured 840 micrograms per cubic metre, while the standard level is 100 micrograms per cubic metre, according to the Department of Environment (DOE). Besides, the level of floating dust in the city's air was found excessively high. The highest level of dust was 3333 microgram per cubic meter while the accepted level of dust in the air is 400 to 500 micrograms per cubic meter. The worst affected places are Amberkhana, Zindabazar, Shibganj, Upashahar, Rikabibazar and Tantipara areas.

98. **Noise Level:** Noise is unacceptable level of sound that creates annoyance, hampers mental and physical peace and may induce severe damage to the health. Along with the increasing degree of air and water pollution, noise pollution is also emerging as a new threat to the inhabitants of Sylhet City. Motorized traffic is one of the major sources of noise pollution in urban areas. Although there are many sources of noise, which include industries, construction works and indiscriminate use of loud speakers, motorized traffic is the principal source of creating noise in urban areas. With the increase in the number of motorized vehicles in the city, the hazard of noise pollution has increased and exceeded the level of tolerance. The more noisy area are Sylhet Bus Terminals, Bondar bazar, Amberkhana, Zindabazar,Chowhatta. It has been reported that the hearing ability of the inhabitants of the City has reduced during the last ten years. About five to seven percent of the patients admitted to the Sylhet Osmani Medical College are suffering from permanent deafness.

99. **Flora and Fauna-** Sylhet City Corporation office area has some flora of commercial importance. The major tree species found in the area are rain-tree and (in Bengali and colloquial) Sishu, Arjun, Kul, Minjiri, Jarul, Siris etc. No endangered floral species are reported. The dominant fruit-bearing trees include mango, jackfruit, bananas, coconut etc. Besides domestic animals, wild dogs and jungle cat are reported. Some birds found in common Bengali name include Chorui, Doel, Shalik, Chil Kak etc. Endangered species are not reported.

100. **Demography:** The population of Sylhet within the city corporation, was approximately 427,265 as of 2007 and estimated 463,198 in 2008 (density population is 17,479 per km²).Together with the metropolitan area it has a population of 2,675,346 as of

2001, constituting 2.06% of the national population. The population growth rate of the city is 1.73%, which has reduced from 1.93% in 1991. As of 2001, it had average literacy rate of 69.73%. The highest literacy rate was 84.24% in Ward 22 and the lowest was 48.15% in Ward 10 (2001). The total number of households in the city was 55,514.

5. ENVIRONMENTAL ASSESSMENT PROCEDURE

5.1 INTRODUCTION

101. The major activities to be carried out for IEE/EA (including EMP) include: (i) Environment Screening (identification of possible impacts) (ii) Description of Surrounding Environment (establishment of "baseline environment" against which impacts of the proposed sub-project would be evaluated); (iii) analysis of alternatives; (iv) identification of major sub-project activities during both construction and operational phases; (v) assessment, prediction and evaluation of impacts of major project activities on the baseline environment; (vi) carrying out public consultations; (vii) preparation of environmental code of practice (ECoP); and (viii) identification of mitigation measures and preparation of impact specific environmental management plans (EMP) including monitoring requirements. The EMF presents detail guidelines for carrying out each of these major activities.

5.2 STEP I: ENVIROENMENTAL SCREENING

102. All the construction activities and equipment for emergency operation to be funded under URP will be subject to an environmental screening in order to prevent execution of projects with significant negative environmental impacts and possibility of occupational hazard. An environmental impact is an estimate or judgment of the significance and value of environmental effects on physical, biological, social or economic environment. Low, medium and high representing impact or level of importance associated with a factor. The impact level depends on duration, reversibility, magnitude, benefit, significance etc.

103. Environmental screening is a part of the IEE. The purpose of the environmental screening is to get relevant concerns addressed early on before further design of a project and to ensure that actions to mitigate environmental impacts or enhance environmental opportunities are budgeted for. The field Engineer of the implementing agency/s with the coordination of Environment Specialist of the M&E consultant will be responsible for carrying out environmental screening. The environmental screening would involve: (i) reconnaissance of the sub-project area and its surroundings; (ii) identification of the major sub-project activities; and (iii) preliminary assessment of the impacts of these activities on the ecological, physic-chemical and socio-economic environment of the sub-project surrounding areas.

104. The participation and consultation with local communities are important identifying the potential impacts of the project interventions. A sample Screening checklists are shown in Annex-A-1 and AnnexB-1.

5.3 STEP 2: GENERAL BASELINE GUIDELINE

105. For proper environmental assessment (as a part of IEE and EIA), it is very important to adequately define the "environmental baseline" against which environmental impacts of a particular sub-project would be subsequently evaluated. The characteristics of "environmental baseline" would depend on:

• Nature of the activity location,
• Nature/ extent of the activity and its likely impact,
• Type of equipment to be used,
• Level of environmental assessment (e.g., screening versus full scale EIA)

106. **Define the Project Influence Area (PIA):** For this project, the PIA for proposed sites for Warehouses and other constructions will be generally confined within a radius of 0.5 km from the center of the development site since the nature of the project is such that most of the potential impacts are likely to occur within this area. However, in case of some particular parameters, if potential impact was envisaged beyond 0.5 km, information need to be gathered up to that distance to foresee the impact.

107. The base line description collection should take into account the existing and proposed developments in the area. Based on the field visit baseline data needs to be collected from secondary and primary sources to describe the baseline conditions. Environmental baseline should include collection and interpretation of information on the status and trends of the environment that are likely to be affected by the development action.

108. The base line description collection should take into account the existing socio-economic condition, physical environment of selected indicators and proposed developments in the area so that cumulative impacts can be assessed. On the field visit baseline data needs to be collected from secondary sources (consult FRE) and public consultation (FGD) to describe baseline condition. The following sections provide guideline on identification of important features/parameters and collection of sub-project specific environmental baseline data.

109. **Physical Environment-**The description should include information on

- Climate: Temperature, rainfall, humidity wind speed and direction, air quality etc.
- Topography and land/soil type
- Noise and dust
- Flooding and drainage pattern: If and when the area is flooded by normal flood and any river is around the project that may represent a risk of flooding.
- Access road
- Protected area, physical and cultural Heritage

110. Information should be gathered from both published sources as well as public consultation. Mention if the sub-project falls under protected, or is in heritage area

111. **Water Quality and Quantity-**Baseline data of the intake water quality is necessary. In addition, given the competing water usage of the river water, availability of enough water during the lean season needs to be assessed as part of the baseline data collection.

112. **Biological/Ecological Resources-**Fisheries: There may be fishing in the river stretch adjacent to the project which may get disrupted by the intake and discharge of the construction disposals. Hence the nature and scale of fisheries around the project area will need to be assessed.

113. **Aquatic and Terrestrial Biology (Flora and Fauna):** Any flora and fauna of importance that include terrestrial flora (forests) especially any endangered species, sensitive habitats and species of commercial importance, wetland flora, terrestrial fauna (sensitive habitat/Wildlife and coastal resources).

114. **Trees**: Number and species of existing trees and plants in the proposed shelter sites must be reported. The felling of tree/s because of the shelter construction must be reported mentioning the number and species.

115. **Flooding and Drainage-**If any river is around, specially in the SCC, the project this may represent a risk of flooding, historical hydrological data needs to be reviewed to ensure that the project is flood proofed. The 50 year project flood level should ideally be taken as the plinth level when leveling/filling the site. Drainage situation in and around the shelter site must be described with connection to outfall or river system.

116. **Economic Development**-Information to be gathered should include infrastructure facilities like water supply, power source etc., transportation such as road type, net-work, accessibility etc., industries including cottage industries and tourism Facilities

117. **Archaeological, Historical and Cultural Sites/Resources:** For example, felling of vegetation/tree, water quality, ambient air quality and noise level are important parameters for describing baseline scenario for the construction under URP, because these parameters are likely to be impacted by the project works.

5.4 STEP 3: ANALYSIS OF ALTERNATIVES

118. The primary objective of the "analysis of alternatives" is to identify the location/design/technology for a particular activity that would generate the least adverse impact, and maximize the positive impacts.

119. Project alternative is applicable when and if the impacts of environmental components and issues have significant changes to the area and also the capacity of adaptation to the changes is widely varied with selection of technology and materials in construction or type of equipment to be stored and connecting roads. In this case there is no such situation. First alternative is not to take project to have warehouse construction or zero option. In zero option, the situation will only worsen as there will be no intervention to save and protect the life and living from fire fighting and the after effects of the disasters. Hence this option is not considered.

120. **Step 2 and 3 are applicable for retrofitting the building in Part C.**

5.5 STEP 4: ASSESSMENT AND PREDICTION OF IMPACT

121. After identification of the sub-project activities, the next step in the IEE/EIA involves assessment/ prediction of the impacts of these activities on the baseline environment. Construction of multi-purpose shelter involves environmental issues in different phases of the project. Based on the construction activities the following environmental issues will be raised generally.

- Surface Water Pollution
- Ground Water Pollution
- Air Pollution
- Soil Erosion
- Noise Pollution
- Disruption of natural systems
- Damage of Trees and Vegetation

122. The impacts can be sub divided in pre-construction, construction and operation & maintenance phase. The following sections will describe environmental impacts in different phases due to the subproject activities.

Pre-Construction Phase

123. ***Loss of Land-*** The construction does not require any land acquisition or trigger loss of any agricultural land as these will be constructed on the existing institutes. During design phase it should be assessed and alternate options must be explored to identify suitable land, which has less impact on agricultural production.

124. ***Setting up of Labour Camps***: Improper site selection for labour camp may affect environment.

Construction Phase

125. ***Surface Water Pollution***-Nearby water body may be polluted due to disposal of construction wastes or wastes from labor camps of the building project.

126. ***Ground Water Pollution***-Septic tank and soak-well deepened up to underground water table may act as media to pollute water, which may be cause of waterborne disease.

127. ***Air Pollution***-Air pollution may be triggered from a wide range of construction activities, including movement of vehicles, operation of construction equipment and generators.

128. ***Drainage congestion***-Temporary drainage congestion often results from obstruction to natural flow of drainage water due to the storage of materials, piled up excavated material/soil, and temporary embankments constructed to keep the work area dry. Improper dumping shall impact natural drainage courses.

129. ***Soil Erosion***-Soil erosion increases in the construction site because of indiscriminate removal of grasses and turf from the site and dumping of carried earth on the site without proper compaction layer by layer.

130. ***Noise Pollution and increased Vehicular traffic-***Could generate from Heavy machineries used during construction, especially during pile driving works and also from movement of vehicles, operation of construction equipment and generators.

131. ***Disruption of natural systems-*** Construction of shelters disrupts the existing ecology and natural system of the locality. Wild animals like foxes, jackals, snakes, frogs, etc. have to leave the area.

132. ***Trees*** and ***Vegetation***-Tree felling may be required to clear the site for building construction. Live vegetation will be disrupted. Water bodies are sometimes filled, which causes destruction of plants grown under water.

133. **Ecological impacts**-Based on primary assessment of the nature and scale of the proposed activity and assessment of activity locations (based on field visits), it appears that ecological impacts are not likely to be significant for most of the proposed construction. However, the ecological impact should focus on:

(a) Impact on flora (aquatic and terrestrial);
(b) Impact on fauna (aquatic and terrestrial) including fish;

134. ***Health and Safety of Workers -*** Health and safety of workers must be taken into account while construction activities are on. The contractor must provide safety gears like helmets, hand gloves, eye protectors while welding to the workers. A first aid box must always be available at the site. The safety of the students from dust, noise and staking of rod and sands must be ensured by the contractors following environmental code of practices and management.

135. ***Environmental Pollution From Solid/ Construction Waste***-In many sub-projects, considerable construction debris (e.g., demolition of existing structures) is likely to be generated from different sub-project activities. Solid wastes will also be generated from labor sheds, particularly for labor-intensive sub-projects. Improper management of construction debris and solid waste could cause blockage of drainage line/ path and environmental pollution.

136. ***Socio-Economic Impacts***- Possible socio-economic impacts from the sub-project activities may include: loss of income and displacement, traffic congestion, impact on top soil, health and safety, impact on archaeological/historical sites/physical and cultural resources, and employment and commercial activities.

Operation and Maintenance Phase due to Construction

137. Water Logging-Due to improper planning and construction storm water drainage congestion / water logging may be created. This may affect commercial activities in the market and cause potential risk to community health. Detrimental effect may cause on the paved/road surfaces in the market areas.

138. Additional Burden on Utilities-Construction of new warehouse especially if it is multi-storied, creates additional burden on the existing system of utilities like water supply, sewerage, electricity, gas, telephone and road network etc.

139. Operation and Maintenance of Environmental Utilities-Lack of O&M of the environmental utilities is very nuisance to environment and worsens the environment if they are not there at all. Regular cleaning person of the utilities (sweepers) should be appointed.

5.6 *STEP 5: STAKEHOLDER CONSULTATION PROCEDURE AT VARIOUS STAGES*

140. Participation is a process, through which stakeholders influence and share control over development initiatives, the decisions and the resources, which affects them. The effectiveness of environment and social management plan is directly related to the degree of continuing involvement of stakeholders in the project development process. Participation of stakeholders in the projects is also a primary requirement in developing an appropriate EMP that addresses project's requirement and suited to the needs of the stakeholders. Stakeholder's involvement is also vastly increases the probability of successful implementation of management plan. In order to make consultation and disclosure process effective and fruitful, comprehensive planning is required to assure that local government, NGOs, host population and project staff interacts regularly and purposefully, throughout all stages of the project and contribute toward a common goal.

5.6.1 APPROACH AND METHODOLOGY FOR CONSULTATION

141. 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 consultations, interviews and focus group discussions (FGD) with the respective stakeholders;
    - Undertaking structured on field consultations, interviews and focus group discussions (FGD) with the respective stakeholders;
    - Assessing the influence and impact of the project on these stakeholder groups;
    - Summarizing of key findings and observations from the consultations; and
    - Preparing a future stakeholder engagement strategy consultation plan for a more detailed assessments at a microscopic level taking into account the various project lifecycle phases and their implications on the stakeholder.

5.6.2 Stakeholder Assessment

142. A stakeholder is defined as "a person, group, or organization that has direct or indirect stake in a project/organization because it can affect or be affected by the Project or its Proponent's actions, objectives, and policies". Stakeholders vary in terms of degree of interest, influence and control they have over the Project or the proponent. In the present study, all the stakeholders have been primarily categorized into two categories that have been identified as:
    - Primary Stakeholders: include people, groups, institutions that either have a direct influence on the project or are directly impacted (positively or adversely) by the project and its activities; and
    - Secondary stakeholders: are those that have a bearing on the project and its activities by the virtue of their being closely linked or associated with the primary stakeholders and due to the influence they have on the primary stakeholder groups.
    - Apart from categorization, the stakeholders have also been 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.
    - The influence and priority have both been primarily rates as:
    - High Influence/Priority: This implies a high degree of influence of the stakeholder on the project in terms of participation and decision making or high priority for project proponent to engage that stakeholder.
    - Medium Influence/Priority: This implies a moderate level of influence and participation of the stakeholder in the project as well as a priority level for project proponent to engage the stakeholder who are neither highly critical nor are insignificant in terms of influence.
    - Low Influence/Priority: This implies a low degree of influence of the stakeholder on the project in terms of participation and decision making or low priority for project proponent to engage that stakeholder.

    Based on the above attributes, the following table delineates the stakeholders identified for the project and their analysis.

5.6.3 Information, Disclosure and Consultation Framework

143. A combination of mixed methods of information disclosure and consultation process was adopted at this stage of EMF preparation. The method selected for consultation was basically designed keeping in mind the profile of the stakeholders, type of information desired and level of engagement required. In each consultation session the consultant introduced themselves, introduced the project and the purpose of engagement with the respective stakeholder. The primary methods followed in the consultation process are:
    - Individual level consultation/discussion;
    - Socio-economic survey;
    - Group discussion;
    - Focus group discussion; and
    - Community meeting

5.6.4 Grievance Redress Mechanism

144. To address the grievances, the project will have three tier grievance redress mechanism (GRM). As **first tier** of GRM, an officer will be designated as project facilitator at the City Corporation Zonal Office level who will be the first level contact for an aggrieved person. On a fixed date of every month, the facilitator will visit concerned ward where individuals / community will approach the project facilitator. Also there will be a system of registering complaints at the ward and zonal level and the facilitator will examine those complaints and set appointment with aggrieved persons at the ward level when he/she visits the ward. The complains will be registered in books kept at the ward level and zone level based on written complaints or phone call or SMS or email.

145. As **second tier** of GRM, an Integrated Grievance Redress Mechanism (IGRM) will be established at the City Corporation level where designated officer will register appeals should some aggrieved person claim to have not been responded positively. This too will record appeal based on written application or email but non-written appeal will not be entertained at this level .

146. The project will commit itself for proactive disclosure and sharing of information with the key stakeholders, including the communities/ beneficiaries. The project will have a communication strategy focusing on efficient and effective usage of print and electronic media, bill boards, posters, wall writing, and adoption of any other method suiting local context, logistics, human and financial resources. As part of IGRM, a Grievance Redress Cell (GRC) will be set up at project headquarters at the DMD as **third tier**.

6. FINDINGS FROM THE CONSULTATION

6.1 INTRODUCTION

147. Multilevel consultation took place for the project. The first phase of the project will only focus on capacity building, emergency equipment purchase and constructing storage facilities for those equipment. All the implementing agencies assured that any kind of activity will happen inside the project boundary. Two level of consultation took place during the project preparation (i) local level consultation around the office area of each implementing agency and (ii) a national level work shop with the presence of a wide range of stakeholders. The summary of the findings of both type of consultation are summarized below:

6.2 LOCAL LEVEL CONSULTATION

148. The consultation about the project to the local people was first initiated through the environment and social team. They were discussed about the typical impact of the project and they understood the project will help to rescue more efficiently in case of earthquake related disaster in the long term. As a short term benefit they mentioned about the job opportunity during the up gradation of the storage centers. They have been informed no activity will happen outside the office boundary.

6.3 NATIONAL LEVEL CONSULTATION

149. The project coordination management unit in collaboration with DSCC, SCC, DNCC, RAJUK and DDM held a national level disclosure workshop. Revenant Government officials, representatives from civil society, representatives from Department of Environment were present in the meeting. The audience all applauded the initiatives of the project objective. As per the recommendation of the DoE, the DoE clearance procedure is added in the document (Figure 3.1). The implementing agency agreed that due diligence will be followed to ensure environmental rules and regulations. The audience also expressed that the project should also consider other disaster other than earthquake. The list of people attended the work shop is attached in Annex A-6 (C).

7. ENVIRONMENTAL MANAGEMENT PLAN

12.1 INTRODUCTION

150. The primary objective of the environmental management plan (EMP) is to record environmental impacts resulting from all component activities and to ensure implementation of the identified "mitigation measures", in order to reduce adverse impacts and enhance positive impacts. Besides, it would also address any unexpected or unforeseen environmental impacts that may arise during construction and operational phases of the sub-projects.

    The EMP should clearly lay out:

    (a) the measures to be taken during both construction and operation phases of a sub-project to eliminate or offset adverse environmental impacts, or reduce them to acceptable levels;

    (b) the actions needed to implement these measures; and

    (c) a monitoring plan to assess the effectiveness of the mitigation measures employed.

    The environmental management program should be carried out as an integrated part of the project planning and execution. It must not be seen merely as an activity limited to monitoring and regulating activities against a pre-determined checklist of required actions. Rather it must interact dynamically as a sub-project implementation proceeds, dealing flexibly with environmental impacts, both expected and unexpected. For all component to be implemented under URP, the EMP should be a part of the Contract Document.

151. The major components of the EMP include:
    - Mitigation and enhancement measures
    - Monitoring plan
    - Grievance redress mechanism
    - Estimation of cost of EMP
    - Institutional arrangement for implementation of EMP

152. An Environment Management Plan (EMP) outlines the environmental management procedures that will be implemented during the project period and also in the operation & maintenance period to minimize the negative impacts and implementation of enhancement measures. An EMP should be drawn up as part of the Environmental Assessment (EA) at both IEE and EIA stages, to deal with follow-up activities during subsequent stages of project development: detailed design, construction, implementation, maintenance and decommissioning.

153. An Environmental Management Plan (EMP) should be developed to deal with all follow up activities during project construction, implementation, maintenance and abandonment (if required). EMPs have been formulated for the disaster shelters in pre-construction, construction and operation and maintenance phases. It will serve as guidelines for implementing agency authorities, including DOE, as well as for the selected contractors

and other parties involved in mitigating potential environmental impacts.

154. The overall impact assessment of the proposed sub-projects to be implemented under URP reveals that most of the adverse impacts could be minimized or eliminated by adopting standard mitigation measures; there is also scope to enhance some of the beneficial impacts to be generated from the proposed sub-projects.

155. Environmental Management Plan (EMP) is prepared in a matrix on possible impacts, impact category/intensity and proposed mitigation measures resulting from the construction and operation of the project for warehouse, building and connecting roads for warehouse. It also assigns responsibility for implementation of mitigation and enhancement measures. The table shows below describes the standard mitigation and enhancement measures that could be applied to the component under URP. The EMP should be integrated with the bid documents for procurement of contractor services to ensure the implementation of the mitigation measures. **For the Phase I investment Annex A is applicable for environmental management and monitoring.**

12.2 METHOD OF ESTIMATION OF COST FOR EMPS

156. Some activities included in EMPs have certain monetary involvement. The cost of the environmental mitigation measures in the EMP will be estimated and. Cost of implementing environmental management plan (EMP) including monitoring activities needs to be estimated as a part of the preparation of EMP and will be included in the bill of quantities of bid document. Many of the activities to be carried out as a part of EMP would not involve any additional direct cost e.g., employing local work force, where appropriate; keeping sub-project vehicles in good operating condition; scheduling deliveries of materials/ goods in off-peak hours; use of fuel; etc. On the other hand, a number of activities would require additional cost. Environmental monitoring during both construction and operational phases would involve direct cost. At the same time, a number mitigation measures (including health and safety measures) would also require additional cost; these include of installation of septic tank/sanitary latrine/portable toilets, installation of health and safety signs, awareness documents (signs/ posters), water sprinkling on aggregates , plantation etc. The generic method of determining the cost of the EMP is outlined below:

Table 7-1: Method/ basis of estimation of cost of Monitoring

Item	Basis of cost / Estimated cost
Monitoring:	
Air Quality (SPM or PM_{10} or $PM_{2.5}$)*	Prevailing rate (~ Tk. 10,000/- per unit)
Noise level	Prevailing rate (~ Tk. 5000/- per unit per day)
Water quality (pH, BOD_5 /COD, Oil and grease	Prevailing rate (~ Tk. 15,000/- per sample)
Water quality (pH, BOD_5 or COD, NH_3)	Prevailing rate (~ Tk. 7,000/- per sample)
Installation of septic tank/ sanitary latrine/ portable toilet	Prevailing rate/ Latest PWD/ LGED rates
Health/ safety signs (size and number)	Prevailing PWD/ LGED/RAJUK rate / Lump sum
Water sprinkling on aggregates or unpaved roads in work area	Latest PWD/ LGED /RAJUK rate (if available)/ A fixed rate per square meter
Traffic control (estimate number of flagman needed and duration of work)	Latest PWD/ LGED /RAJUK rate (if available)/ A fixed rate per flagman per day/ Lump sum amount
Traffic light	Latest PWD/ LGED /RAJUK rate (if available)/

	Lump sum amount
Protective gear	Contractor to quote rate of items of works considering provision of adequate protective gear for workers, in accordance to work
Plantation (including protection/ fencing and conservation during project period)	Prevailing rate (~ Tk. 1,000/- per plant)

* Depending on availability of facility for measurement

12.3 SPECIAL ENVIRONMENTAL CLAUSES (SECS) FOR TENDER DOCUMENT

157. Apart from the provisions under "General Specification" and "Particular Specification" for different sub-project components, the following special environmental clauses (SECs) shall be included in the Tender Document under General/Particular Specification. These clauses are aimed at ensuring that the Contractor carries out his responsibility of implementing the EMP and other environmental and safety measures.

Environmental Management Plan (EMP):

158. The Contractor shall carry out all mitigation and enhancement measures (including those related to mitigation of air/noise/water pollution; drainage/traffic congestion) as specified in the Environmental Management Plan (EMP), annexed to this Contract.

Temporary Works:

159. The Contractor shall make sure that all equipment and safeguards required for the construction work such as temporary stair, ladder, ramp, scaffold, hoist, run away, barricade, chute, lift, etc. are substantially constructed and erected, so as not to create any unsafe situation for the workmen using them or the workmen and general public passing under, on or near them.

Health and Safety:

- The Contractor shall observe and maintain standards of Health and Safety towards all of his employees not less than those laid down by the national standards or statutory regulations.
- Where appropriate, to prevent workers falling from heights, the Contractor shall make sure that every temporary floor openings shall either have railing of at least 900 mm height or shall be constantly attended; every floor hole shall be guarded by either a railing or a hinged cover, or constantly attended; every stairway floor opening shall be guarded by railing at least 900 mm high on the exposed sides; every ladder way floor opening or platform shall be guarded by a guard railing; every open sided floor or platform 1.2 m or more above adjacent ground level shall be guarded by a railing on all open sides.
- The Contractor shall provide all appropriate protective clothing and equipment for the work to be done and ensure its proper use. Where required, safety nets, belts, harnesses and lines shall be provided by the contractor. The "safety directives for work equipment" and "safety directives for protective gears", as specified in the Occupational Health and Safety Guidelines (attached) shall be followed.
- The Contractor shall provide and maintain in prominent and well-marked positions all necessary first-aid equipment, medical supplies and other related

facilities. A sufficient number of trained personnel will be required to be available at all times to render first aid.

- The Contractor must provide or ensure that appropriate safety and/or health signs are in place at their work sites where hazards cannot be avoided or reduced.
- The Contractor shall report to the Engineer promptly and in writing particulars of any accident or unusual or unforeseen occurrences on the site, whether these are likely to affect progress of the work or not.

Disposal and Pollution:

- The Contractor shall not dispose any waste, rubbish or offensive matter in any place not approved by the Engineer or Statutory Authority having jurisdiction. The Contractor shall not discharge into any watercourse oil, solids, noxious or floating materials.

- The Contractor shall take all reasonable precautions to keep public or private roads clean of any spillage or droppings from his vehicles or equipment. Any spillage or droppings which accrue shall be cleaned without delay to the satisfaction of the Engineer.

- The Contractor shall construct sanitary latrine or septic tank system or install portable cabin toilet for disposal of human waste in the site office and temporary labor sheds for workers/ employees; the Contractor shall provide waste bins/ cans for collection of solid waste at appropriate locations (as directed by the Engineer), and ensure proper transfer/ disposal of solid waste with support from the local government authority.

Earthworks:

- During excavation of trenches in natural soils, the Contractor shall make sure that the first 300 mm to 450 mm of topsoil be excavated and stored on one side of the trench and the rest of the excavated soil is stored separately/ on the other side; during back filling of trench, the topsoil should be placed on the top again.

160. A description of environmental items needed to be considered in the budget estimates and subsequently these items have to be incorporated in the bid document.

12.4 REPORTING RESPONSIBILITY

161. The contractor is responsible for implementation of the mitigation measures. The contractor will report to the environmental focal person of the concerned PIU. The environmental focal person will be responsible for supervising the work of the contractor will provide environmental status of the report to the PCMU. The PCMU environmental specialist will share the half yearly annual report with World Bank. The environmental specialist of the M&E consultant will help the PCMU for preparing the report. World Bank will supervise the status of the environmental monitoring during the implementation support mission.

8. INSTITUTIONAL ARRANGEMENT AND CAPACITY DEVELOPMENT

8.1 INSTITUTIONAL ARRANGEMENT

162. The Government of Bangladesh (GoB) has overall responsibility for implementing this multi-Sectoral and multi-Ministerial Project. The GoB shall ensure proper planning, management, and co- ordination of the Project through five of its Ministries i.e. Ministry of Planning (MoP), Ministry of Local Government, Rural Development and Co-operatives (MoLGRDC), Ministry of Home Affairs (MoHA), Ministry of Disaster Management and Relief (MoDMR), and Ministry of Housing and Public Works (MoHPW). On behalf of GoB, these Ministries shall oversee that the key components of the Project are being implemented efficiently.

163. The Ministry of Planning (MoP) will be responsible for overall coordination and monitoring of the project. On behalf of the Secretary, Ministry of Planning, the Division Chief (Programming) of the Planning Commission will oversee Component D, which is the PCMU as Project Director (PD). The Emergency Cyclone Recovery and Restoration Project (ECRRP) PCMU, which is headed by a full time PD will take on the additional responsibilities required for the proposed project. The PD PCMU will be assisted by a full time small group of core professionals.

164. A Project Implementation Unit (PIU) will oversee efficient and effective implementation and regular monitoring of activities with respect to relevant components. Each PIU will be under the supervision of a Project Director. Each PIU shall consist of: 1 (one) Project Director (PD) for planning and management; 1 (one) Deputy/ Assistant Project Director (DPD/ APD) for administration and governance; 1 (one) DPD/ APD for financial management, budgeting and accounts; 1 (one) DPD/ APD for procurement and contract management; and 1 (one) DPD/ APD for monitoring and evaluation. An environmental focal person will be assigned for each of the PIU.

165. The 3 (three) components (A,B & C) of the Project shall be implemented by (3) three Implementing Agencies (IAs) namely DNCC (for DNCC itself, DSCC and SCC within MoLGRDC and BFSCD within MoHA); RAJUK within MoHPW and DDM within MoDMR. Component D will be implemented by the Project Coordinating Monitoring Unit (PCMU) of the Programming Division, Planning Commission, Ministry of Planning

166. Figure 7-1 presents the project management structure for URP and the requirement of environmental person.

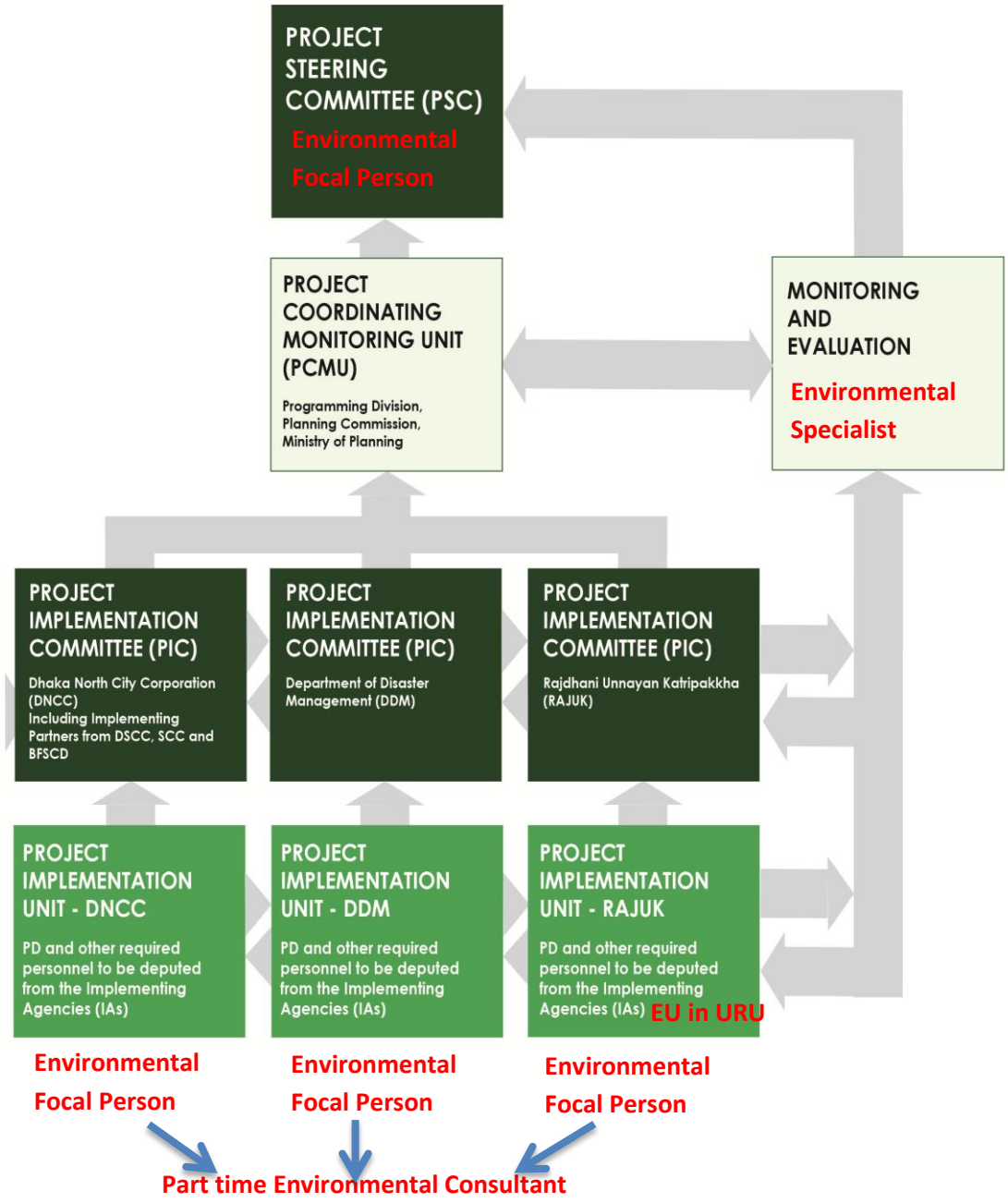

Figure 8-1: URP Program Management Structure with the placement of the Environmental Person

8.2 EU-FUNCTIONING AND RESPONSIBILITY

167. An environment unit will be created in the URU of RAJUK. Main tasks of the Environmental Unit (EU) include:
    - Planning and implementation of EMP
    - Preparation of TOR for studies/surveys/data collection to be carried out under EMP for retrofitting the building;
    - Selection of consultants, NGOs for different components of EMP implementation, including environmental enhancement plans

- Supervision and monitoring of the progress of activities of the consultants and NGOs engaged by PIU for implementation of different components of EMP
- 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 RS and project end facilities.
- Preparation of reports to PCU and co-financers
- Management and administration of environmental enhancement fund
- Maintain liaison with other government, semi-government and non-government organizations, universities, research institutes in the country on the matters of mutual interest related to environmental management.
- Facilitate consultations necessary with stakeholders related to environmental management

8.3 PROPOSED INSTITUTIONAL STRENGTHENING OF PIU

168. Following institutional strengthening and capacity building programs are proposed for PIU for strengthening their capacity in EMP implementation.

Step A: Creation of Safeguards (Environment and Social Unit) Department in URU

Step B: Capacity building initiatives involving oriented trainings for the staff of the PIU

8.4 CAPACITY BUILDING PROGRAMS INVOLVING TRAINING FOR THE STAFF

169. This involves continuous and subject-oriented trainings on developing capacity of the PIU staff and other capacity building initiatives on

- Social and Environmental issues of the Project
- Social and Environmental laws and regulations, norms, procedures and guidelines of GOB and co-financiers
- Environmental and Social safeguards, their importance and benefits
- Preparation of EIA/SIA such as screening and/or scoping and adequacy of impact assessment, EMP provisions, Costing, etc.
- Preparation of ToRs and other documentation
- Environmental Management System
- Preparation of Environmental and Social covenants in loan agreement
- Disciplines like Environmental Management, Sustainable development, Environment Economics, Environment Auditing, etc.
- Behavioral Sciences

- Some of the senior representatives should receive environmental and social safeguard training under a recognized program (national and/or overseas).

170. Contractor for major components of the project shall have Environmental, Health and Safety Manager. In addition, capacity building and training for the contractors' staff will be provided in the following areas:

- Orientation program on HIV/AIDS and sexually transmitted diseases
- Orientation on how to conform with the religious sensitivity of 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
- Subscription of relevant environmental publications and creation of library for knowledge upkeep.
- Creation of databank for future reference and use.

An initial model of training program will comprise of the following schedule:

Training Module 1:

(i) Environmental issues related to URP Project

(ii) Environment policy & legislation of Bangladesh, guidelines on E&S safeguards of co-financiers

Training Module 2:

(iii) Environment Impact assessment of building and related studies conducted for the purpose.

(iv) Environment baseline data of including physical, ecological and social aspects and environment quality.

Training Module 3:

(v) Environment Management and monitoring Plan.

(vi) Organisational responsibilities and implementation schedules

Training Module 4:

(vii) Monitoring and Evaluation: analysis of environment data and its interpretation.

(viii) Reporting of environmental monitoring.

9. SAMPLE TERMS OF REFERENCE FOR UPDATING THE STRATEGIC ENVIRONMENTAL ASSESSMENT FOR BANGLADESH URBAN RESILIENCE PROJECT –PHASE I

A. Background

1. Bangladesh has maintained an impressive track record on extreme poverty reduction and shared prosperity since the country's independence in 1971. In the past decade alone, the economy has grown at nearly 6 percent per year, and human development went hand-in-hand with economic growth. Poverty dropped by nearly a third, coupled with increased life expectancy, literacy, and per capita food intake. More than 15 million Bangladeshis have moved out of poverty since 1992.

2. The strong economic growth prospects have fueled a massive population shift to Bangladesh's urban areas. The urban share of the total population of 150 million people amounted to approximately 29 percent in 2013, compared to 21 percent 20 years earlier. By 2050 the population will have grown to 200 million, and 52 percent will live in urban areas. Furthermore, the population density in major metropolitan areas is 1,900 people per sq. km. – among the highest in the world. The contribution of agriculture to GDP fell from 30 percent in 1990 to 20 percent in 2010, while the contribution of the urban sector to GDP increased from 37 percent to an estimated 60 percent over the same period.

3. The sustained growth and rapid urbanization is exerting great pressure on urban development and the delivery of basic public services, and substantial efforts are needed to improve quality of life for all. Bangladesh's cities are characterized by an ever-widening infrastructure deficit and more and more people are bound to living in sub-standard conditions. Sound planning and development are lacking, and new projects are encroaching on already limited open space. Processes for quality control of construction and adherence to building code provisions and other standards are insufficient. Furthermore, the government lacks the capacity to tackle the threat of man-made and natural disasters within this context, putting millions at risk. To sustain accelerated and inclusive growth, Bangladesh will need to manage the urbanization process more effectively.

4. Bangladesh is the most disaster prone country in the world[17], and is highly exposed to a variety of hazards such as floods, cyclones and earthquakes. The Government of Bangladesh (GoB) has instituted disaster risk reduction policies and invested in infrastructure along coastal areas to mitigate the risk from floods and cyclones, primarily after the catastrophic cyclones of 1970 and 1991. Over the years, the GoB has demonstrated that investments in flood management and cyclone preparedness saves lives, reduces economic losses, and protects development gains. As a result, the Government's actions are often cited in the argument for proactively investing in Disaster Risk Management (DRM) globally. Despite these tangible gains, the vulnerability of Bangladesh's urban areas is not as well understood – or addressed – in the country's policy framework.

[17]Maplecroft Global Risk Analytics.http://maplecroft.com/about/news/ccvi.html

5. With 7 million people living in the jurisdictional boundaries of Dhaka City Corporation, and 15 million in the wider Dhaka metropolitan area, the greater Dhaka area is particularly at risk. Approximately 28 percent of the population is already classified as poor, and an estimated 300,000 to 400,000 poor migrants arrive in the city on a yearly basis. Land use planning regulation, and public service delivery in the urban areas of Bangladesh has failed to keep up with the pace of growth. The current regulatory environment is somewhat opaque and the enforcement mechanisms for urban development control do not address structural safety, creating an environment that lacks practical enforcement capability and accountability. In this context, physical and social vulnerabilities keep increasing and any hazards such as floods, building collapses, or earthquakes present a formidable threat to life and prosperity.

6. Recent events serve as grim indicators of the extreme vulnerability of the built environment in Dhaka. The collapse of the Rana Plaza building in Savar on April 24, 2013 resulted in the death of 1,127 people and was the latest and most deadly in a series of structural failures in the city. A report commissioned by the Ministry of Home Affairs concluded that poor site location, sub-standard building materials, and illegal construction had contributed to the collapse. The lack of local capacity to conduct search and rescue, which required heavy lifting equipment and specialized training, also resulted in a slow response process. The event highlighted the deficiencies in the emergency management system, which relied more on ad-hoc decisions rather than a structured response operation. A separate study by the Bangladesh University of Engineering and Technology (BUET) assessed garment factories across the city and found that 60 percent were vulnerable to similar collapse.[18] The tragedy in Savar has prompted the GoB to consider how to reduce disaster risks in urban areas and simultaneously increase its capacity to respond more effectively to emergencies including disaster events.

7. Dhaka has also been identified as one of the 20 most vulnerable cities in the world to seismic risk[19]. The nearest major fault line is believed to run less than 60 km from Dhaka, and although there is some uncertainty, research suggests that an earthquake of up to magnitude 7.5 is possible. This would have a dramatic, devastating impact on the city. Moreover, the city and its inhabitants are poorly prepared to respond to a crisis on this scale within the metropolitan area. A joint research project conducted by the University of Kansas and Dhaka University found that 83% of Dhaka's residents do not consider themselves prepared for an earthquake.[20]

8. Outside of Dhaka, the City of Sylhet - like many fast growing secondary cities in the region - suffers from a responsive rather than proactive approach to urban management and development. Sylhet is the third largest city in Bangladesh. Sylhet's own five-year development plan acknowledges that "the shortage of administrative, technical and professional capacity is exacerbated by lack of coordination, an unwieldy bureaucracy and poor organization". In this context, the city's proximity to a fault line that crosses the country compounds vulnerability, and experts believe that Sylhet has the largest earthquake risk in the country.

B. Linking SEA to Bangladesh Urban Resilience Project Phase 1 Development Objectives

9. The proposed Bangladesh Urban Resilience Project Development Objective is to increase the effectiveness of disaster preparedness and response, while addressing existing and emergent risks in Dhaka and Sylhet.

[18] http://www.guardian.co.uk/world/2013/jun/03/bangladesh-garment-factories-vulnerable-collapse
[19] Earthquake Disaster Risk Index, Blume Earthquake Engineering Center, Stanford University (1997)
[20] Disasters. 2010 Apr;34(2):337-59

10. The Project will enhance the capacity of municipal public organizations in Dhaka and Sylhet to effectively prepare for, respond to, and recover from small and large emergency events. It will also identify an investment program to reduce critical vulnerabilities and will support an improvement in the quality of new building construction.

11. This project seeks to create an enabling environment for coordinated, locally managed DRM. There are three core pillars of disaster resilience in urban settings, including: i) effective emergency management; ii) improved structural resilience through reduction of existing physical vulnerability; and iii) risk-sensitive land use planning and safe construction standards and practices to ensure sustainable growth.

12. A comprehensive approach to increasing urban resilience requires coordinated, long-term investment across all three pillars. This framework draws from the experience in urban earthquake resilience in other countries, notably the World Bank's Istanbul Seismic Risk Mitigation and Emergency Preparedness Project. The proposed project would serve as the first in a series, which will initially focus on Pillar 1, to improve the critical capacity and infrastructure for emergency planning and response. The proposed project will also lay the foundations for subsequent investment in pillars 2 and 3 by identifying key risks in the built environment, and developing the practice of risk-sensitive urban development in the country.

13. With the key elements of effective urban response in place, future attention could then shift to reversing the trend of risk accumulation, and to increasing physical resilience through broader investments in priority sectors. Under this strategy, a second project would seek to further improve construction standards for future developments and reduce the existing physical vulnerabilities in Dhaka and major cities across Bangladesh including Sylhet. A third project could consider broader investment in priority sectors, for example water system, power system, transport, and construction of protective infrastructure.

14. The project is to be implemented by the following agencies, Local Government Division and Dhaka North City Corporation within the MoLGRD&C, RAJUK within the MoHPW and the Department of Disaster Management within the MoDMR.

C. Objective of Consultancy

15. The main objective of the proposed consultancy services is to assist RAJUK in updating the existing Strategic Environmental Assessment (SEA) to incorporate environmental considerations and the likely environmental effects (risks and opportunities) for Future Structural Retrofitting Program of public building within the area of Dhaka Metropolitan Development Plan (DMDP).

D. Scope of Work

Strategic Environmental Assessment (SEA)

16. The SEA will integrate environmental and social considerations in the building retrofitting program of RAJUK's strategy options and will provide a framework for managing potential environmental impacts associated with the implementation of these strategy options through the combination of analytical work, consultation and public participation. These ToR specify the activities the Consultant should undertake for the SEA.

Task 1: Review Strategic Reference Framework (SRF)

a) Review the existing Dhaka Metropolitan Development Plan Strategic Environmental Assessment 2007 (DMDP SEA 2007).
b) Assess the relationship between the DMDP and the Bangladesh National Building Code and the Private housing rules and update the existing DMDP SEA accordingly.
c) Review strategic macro policies framework of Construction sector, institutional policies of RAJUK and Environmental policies of Department of Environment;
d) The SRF should provide the policy orientations and targets that provide strategic direction.;
e) The SRF should also recognize and consider other relevant planning and programmatic orientations that may have synergies and conflicts with the Retrofitting program.

Task 2 : Develop Governance Framework

a) Develop a Governance framework for Environmental Assessment of the retrofitting program by establishing a platform of relevant government agencies (RAJUK, PWD, DoE etc.) and non-governmental organizations (NGOs, civil societies etc);
b) Development of Governance Framework will be based on analysis of i) institutional (decision) responsibility, and its overlaps and gaps, ii) institutional cooperation (including governance instruments), and iii) stakeholders engagement (including public participation).

Task 3: Public Participation in the SEA process

a) Identify the key public and private stakeholders analyzing their involvement in urban planning and development. The consult will review the role, mandate and linkages of various stakeholders. Establish a participatory plan and timeframe for the SEA process jointly with RAJUK to consult with and involve, as needed, various organizations, stakeholders and the public. In addition to determine their concerns and priorities on the environmental issues related earthquake and other urban disasters with the implementation of the DAPs, the participatory process should contribute to institutional strengthening and improved governance for urban planning in earthquake management. The consultant should formulate a participatory plan comprising consultations to reach agreements that take into account the concerns and interests of vulnerable or affected stakeholders and future generations.

Deliverable 1-Inception report including stakeholders analysis and consultations participatory plan and identification of critical decision factors.

Task 4 : Identifying Environmental and Sustainability Issues (ESI)

a) Update the environmental information stated in the DMDP SEA 2007.
b) Identify environmental and sustainability issues related to retrofitting works of public buildings in the DMDP areas of RAJUK;
c) This proposed identification of key issues should be based on analytical work using spatial analysis, case studies and participatory appraisal methods;
d) Spatial analysis will be applied in mapping and for overlaying different sets of information to identify critical areas of concentration of environmental issues;

e) Case studies/Environmental Assessment of the existing structures will be aimed at in-depth understanding of key issues, inter-sectoral linkages, and potential policy trade-offs in key areas;
f) Participatory appraisal would be the main vehicle for identifying key environmental and social issues at the community level.

Task 5 : Identify Critical Decision Factors (CDF)

a) Setup priorities is of the environmental and sustainability issues identified in task 4 by expert technical consultation and dialogues with relevant stakeholders;
b) A national workshop will be convened to validate identified CDF.

Analyze Context and Trends

a) Spatial and Temporal variation of CDF will be analyzed and interpreted by Secondary data analysis;
b) Based on the interpretation future trends or scenarios will be suggested;

Task 6 : Suggest strategic options

a) The consultant will propose strategy options for environmental sustainability of the retrofitting program of RAJUK;
b) The strategic options will include description of the arrangements for implementing the specific project(s), activity(-ies), or policy(-ies)/regulation(s) with a focus on the procedures for (i) screening and assessment of site-specific environmental and social impacts; (ii) the preparation of time-bound action plans for reducing, mitigating, and/or offsetting any adverse impacts; (iii) the monitoring of the implementation of the action plans, including arrangements for public participation in such monitoring;
c) Particular institutional needs will be analyzed for environmental sustainability of retrofitting program. This should include a review of the authority and capability of institutions at different administrative levels (e.g. local, district, provincial/regional, and national), and their capacity to manage and monitor EA implementation.
d) An outline of capacity building actions for the entities responsible for implementing the EA will be recommended.
e) Requirements for technical assistance to public- and private-sector institutions, communities, and service providers to support implementation of the EA will be identified;
f) An outline of the budget for implementing the EA will be proposed;
g) A validation workshop for the Strategic Options will be convened at the national level.

Deliverable 2- Interim Report including Records of Consultation

Task 7 : Identify Opportunities and Risks

a) Assess the possible futures impacts of different strategic options with regard to biophysical, social and cultural values in a sustainability context;

Task 8 : Develop guidelines for Planning and Management of EA

a) Develop guidelines which would include planning, management and monitoring issues, as well as a programme of indicators for monitoring;

b) Arrange a national level workshop for discussion on the proposed guidelines and based on the feedbacks from the workshop, finalize the guidelines.

Deliverable 3 & 4 – Draft Final with Consultation Report, Final Report

E. **Schedule and Deliverables**

17. Table 1 below summarizes the main activities, deliverables and schedule for the implementation of the SEA process. Key intersection points with other activities of the progress of the urban resilience project will be updated.

Delivery	Anticipated Date	Payment
Inception Report		15%
Interim Report		15%
Draft final with Consultation Report		40%
Final Report		30%

F. **Composition of SEA Team**

18. The SEA process will be undertaken by a consortium made up of members of an international consulting company and of a Bangladesh consulting company or local NGO. The international company members should lead the SEA's analytical work, have proven experience in applying World Bank safeguard policies and be responsible for the quality control of the whole SEA process. The local company members are expected to lead the consultation and public participation process and contribute to SEA's analytical work. The minimal technical expertise required for the SEA will include the following:

a) **Team leader** should have proven experience in leading sector or national reviews or assessments of public policies or development strategies. At least 15 years experience, of which 10 years are relevant experience in developing countries, is required. This expert should have at least 2 years of experience in the South Asian countries. Experience in Bangladesh is desirable. S/he must have academic training in structural/geotechnical engineering, environmental sciences. Experience in SEA or SESA is desirable.

b) **Structural Engineer** should have at least 10 years of experience in building design and construction of projects. Knowledge on the legal, regulatory and institutional framework of structural construction, retrofitting of building is desirable.

c) **Stakeholder engagement specialist** should have at least five years of experience in Bangladesh. Proven knowledge of stakeholders at the national, regional and local level on urban dwellers is required.

d) **Environmental Specialist** should be able to cover all environmental issues of the project. S/he may have at least 10 years of experience in environmental assessment in developing countries. Familiarity with environmental issues associated with urban and public structures in Bangladesh and the World Bank environmental safeguard policies is required. Experience in environmental valuation is desirable. Priority will be given first to experience in Bangladesh and then in developing countries.

10. All members of the team should be fluent in English. Specific technical inputs on legal, infrastructure development projects, gender and environmental and natural resources valuation, retrofitting building should be provided by the Consultant as needed.

PART C: PHASE II: RETROFITTING BUILDING

10. ENVIRONMENTAL MANAGEMENT GUIDELINE FOR RETROFITTING BUILDING

10.1 PURPOSE OF RETROFITTING

171. 'Retrofitting' is a technical jargon used in two different contexts, entirely unrelated to each other. One is used in the context when a structure, inadequate to withstand expected loads due to design/construction deficiencies or due to damages incurred in some disaster, is strengthened, stiffened or made ductile so that it becomes adequate as per certain engineering standards. The other context is when a building, not designed and/or constructed for energy efficiency, is subjected to changes in its electrical, mechanical and plumbing services, so that it becomes energy efficient. In the present report, 'retrofitting' refers to the former context with the notion of structural retrofitting.

172. A large number of structures in Bangladesh possess structural deficiencies due to lack of regulation in the construction sector. Such deficiencies result both from faulty design and construction. There is no formal licensing system for professional designers in Bangladesh; neither there is any mechanism for checking structural designs in the design approval process. Thus probability of design faults is quite high. There is no practice, either, of inspecting structural details by any regulatory body during construction. As a matter of fact, there is little or no enforcement of the relevant act, rules and the building code during design or construction. As a result a huge number of structures in Bangladesh are vulnerable to disasters like earthquakes. According to a recent study (CDMP, 2009), the level of seismic risk of different cities in Bangladesh is quite considerable. Thus there is necessity of structural retrofitting of buildings in Bangladesh on a large scale.

173. One of the principal objectives of Bangladesh Urban Resilience Project (URP) is to build institutional capacity for undertaking large scale structural retrofitting of buildings in Bangladesh. For this purpose, initially vulnerability of critical and essential facilities like schools, hospitals and transportation facilities in Dhaka and Sylhet, will be identified by RAJUK and SCC respectively. A new unit of RAJUK, namely Urban Resilience Unit (URU) to be set up under URP, will undertake activities related to retrofitting. SCC will establish a similar unit, although in a smaller scale, in this project with the same objectives. To meet the goals of another component of URP, buildings accommodating Emergency Operation Centers (EOCs) and Control Rooms for emergency management will be retrofitted from seismic design considerations.

10.2 METHODS OF RETROFITTING

174. Building structures in Bangladesh are supposed to be designed and constructed following the requirements of Bangladesh National Building Code (BNBC, 2006) and construction rules applicable for the locality (e.g., Dhaka Mohanagar Building Construction Rules, 2008). However, as mentioned above, due to lack of enforcement, a

large number of structures did not follow these standards; a fact for which these structures need to be retrofitted. In Part 9 of BNBC, the regulatory requirements for alteration of a structure are discussed. However, BNBC or the Building Construction Rules do not give any details of structural requirements for retrofitting a structure.

175. For the purpose of identification of vulnerabilities of a building structure against earthquakes, assessment of loads and selection of analysis methods, ASCE 31-07 (ASCE: American Society of Civil Engineers) is usually employed. For concrete structures ACI 318 (ACI: American Concrete Institute) and for steel structures 'Special Publication on Seismic Design' of AISC (American Institute of Steel Construction) are followed in designing retrofitting schemes. ACI 440 is followed to design Fiber Reinforced Polymer (FRP) based retrofitting schemes.

176. Depending on the nature of structural deficiency, two different retrofitting methods are adopted, i.e., Global and Local Retrofitting. If the problem lies in the global structural configuration of a building, a global retrofitting scheme may be adopted. For example, if a shear wall is placed eccentrically resulting in planer/torsional irregularity, new shear walls or bracings may be inserted which make necessary changes in the global structural configuration. On the other hand, if individual components of a structure like beams, columns or foundations are deficient, local retrofitting schemes are adopted to overcome deficiencies of those particular components. For example, if shear capacity of beams is not sufficient, the beams may be concrete jacketed or steel plates or FRP wraps may be attached to the beams. In some cases both global and local retrofitting measures become necessary for the structure to achieve a desired/satisfactory level of performance.

177. With the adoption of either a global or local retrofitting measure or a combination of both, four different characteristics of a structure are played with for the structure to achieve the desired level of performance. These are: i) Strength/Capacity – Level of load that the structure can sustain, ii) Stiffness – Load that it can resist for unit amount of deformation, iii) Ductility – Deformation that it can go through after yielding and before breaking and iv) Damping – Energy it can absorb during vibration. Different retrofitting measures affect these properties of a structure in different ways. Selection of a particular scheme which may be a combination of different measures depends on the overall performance of the structure after alteration of the above mentioned structural characteristics. The procedure of selection and methods of simulation of structural performance are discussed in detail in ATC-40 (ATC: Applied Technology Council).

178. Different materials may be used for the purpose of retrofitting, e.g., concrete, steel, FRP, micro-concrete, ferrocement etc. Some are common civil engineering materials while some others are proprietary items. A plethora of customized/improvised materials are also used for retrofitting purposes. Different materials have different effects on the structural properties. For example, jacketing of columns with concrete will result in increase in strength and stiffness but will have little effect on ductility and damping. On the other hand, steel jacketing will increase strength, slightly enhance stiffness, significantly improve ductility and may decrease damping.

179. Ramifications of choice of material on the architecture, maintenance, cost and environment may significantly vary. For example, concrete jacketing may require more space but the finish may be aesthetically pleasing. Concrete jacketing needs little maintenance and the cost is relatively low. During construction, concrete jacketing may affect the environment due to dust, noise of concrete mixing etc. On the other hand, steel jacketing requires less space and the aesthetics of the surface depends on architectural considerations. Steel jacketing needs regular maintenance and the cost is relatively higher. There is little environmental effect during construction. However, the paints used for maintenance of steel may be toxic for plants and animals. Choice of a material should be based upon consideration of all these factors.

10.3 STEPS OF RETROFITTING

180. Procedure for retrofitting will differ depending on type of structure, type of retrofitting (global or local), type of material and conditions of construction (structure in operation or out of operation). However, generally the following steps may be identified.
    - Survey of structures to identify vulnerable ones: This step includes conducting survey following ASCE 31-07. For this purpose, as-built drawings and sub-soil investigation report should be available. Reports of material properties are necessary. If not available then Non-Destructive and Semi-Destructive tests have to be performed.
    - Detail assessment of vulnerable structures to identify nature of deficiency: More precise information on material strength is collected from a larger number of samples. Amount of steel reinforcement is assessed using Ferro-scanning or GPR (Ground Penetrating Radar). Based on the collected information, a computer model of the structure is prepared and its performance is simulated.
    - Explore options of retrofitting schemes: Different retrofitting schemes are considered with different retrofitting methods (global and/or local) and different materials, conforming to the constraints imposed by architectural, cost and environmental considerations. Computer models are prepared for different schemes and performance is simulated.
    - Select and design preferred retrofitting scheme: Performance of different schemes are assessed through simulation and the most optimum solution is selected. In some cases, where improvised material or construction procedure is adopted, physical models are tested in the laboratory to assess performance. In many cases, the retrofitting scheme is selected in a participatory approach, with participation of different stake-holders, since trade-offs are necessary among architectural, cost, maintenance, operational and environmental aspects.
    - Implementation of retrofitting scheme: The selected retrofitting scheme is then implemented. Implementation plan differs depending on if the retrofitting is conducted while the building is in operation or not in operation. However, following are generally adopted steps of implementation:
        - Prop or stabilize the structure: In many cases, some breaking, drilling or partial demolition is necessary for retrofitting. Before

such intervention stabilization or propping of the structure is mandatory.

- Break/demolish/drill locations of interventions: For purposes like inserting shear keys between old and new concrete, joint reinforcing, bolting steel plate, rebuilding section of weaker concrete, drilling, breaking or demolishing of portions of existing structures may be necessary.
- Apply or install retrofitting material: Retrofitting material is then applied or installed. Application/installation of retrofitting material usually requires special skill. Bonding of existing structure with new material is of particular importance. Thus surface preparation has to follow certain quality control requirements. For damaged structures, existing cracks and other distresses are repaired before application of retrofitting materials. Load distribution on new material needs to be ensured by proper contact and placement.
- Curing if needed: Some materials require curing like concrete, micro-concrete, ferrocement, non-shrinkage grout, epoxy, FRP etc. Appropriate time, temperature and moisture should be maintained for proper curing.
- Removal of prop: Only after the new material gains enough strength props may be removed. Proper sequence should be followed while removing props.

- Operations and maintenance: In many cases, retrofitted portion of a building are given cosmetic rendering for aesthetic purposes. However, it is very important that performance of retrofitting is monitored by periodic monitoring and inspections. Any appearance of distress is closely monitored. For important structures, Structural Health Monitoring (SHM) Systems are installed for constant monitoring.

10.4 GENERAL PRINCIPLES FOR ENVIRONMENT MANAGEMENT

181. General principles of environment management for retrofitting works are basically very similar to those for construction works as detailed in Section 4. The only difference is due to the fact that retrofitting works may be conducted in a facility while that is in operation. Thus management of indoor air quality, water quality, human, animal and plant lives which may be impacted due to retrofitting works is of importance. Workers' as well as occupants' safety is very critical for such works. Management plan should include consideration of situations of intentional demolition or unintentional collapse of portion of the structure. Effect of such collapse should be minimum on occupants of other parts of the structure. Waste and debris removal should observe more stringent policies as there will be greater possibility for occupants to get exposed to the debris.

10.5 OPTIONS FOR ANALYSIS OF ALTERNATIVES

182. Retrofitting measures for a building depend on the types of deficiencies present in the

structure. Global retrofitting measures are required for buildings having problems in its overall structural system. On the other hand local retrofitting measures are taken for individual deficient components of a building. Both for global and local retrofitting, alternative measures can be taken to overcome the same deficiency. These alternatives may be in the form of different materials or installation techniques. Selection of an option is usually based on cost and architectural considerations. However, even for comparable cost and similar architectural effects, there still may be a number of alternative retrofitting schemes available for a designer to choose. Selection in such a case should be based on environmental considerations. The option which has least unfavorable impact on the environment should be selected. While assessing costs, costs involved with environmental impacts should also be considered.

183. In the present section, comparisons of some alternative retrofitting measures for structural deficiencies, which are typically observed in Bangladesh, are presented from a socio-environmental point of view. However, it should be noted that for the structural deficiencies discussed here, there may exist numerous other possible solutions which are not included here for comparison. As it is almost impossible to envisage myriad different innovative techniques that a creative structural engineer may design for a specific case, only typically employed measures are considered here for present discussion.

10.5.1 INADEQUATE CAPACITY OF REINFORCED CONCRETE BEAM/COLUMN

184. It is frequently observed in reinforced concrete (RC) structures that beams or columns lack in capacity to sustain code specified design loads. In such cases, beams and columns are usually jacketed/retrofitted with concrete (Figures 10-1 and 10-2), steel (Figures 10-2 and 10-3) or FRP (Figures 10-4 and 10-5). A comparison of different methods of beam/column retrofitting is presented in Table10-1.

Figure 10-1: Beam retrofitting with RC – before casting

Figure 10-2: Column retrofitting with RC – before casting

Figure 10-3: Beam retrofitting with steel plates

Figure 10-4: Column retrofitting with steel angles

Figure 10-5: Beam retrofitting with FRP

Figure 10-6: Column retrofitting with FRP

Table 10-1: Comparison of different methods of beam/column retrofitting

Socio-Environmental Issue	Concrete Jacketing	Steel Jacketing	Retrofitting with FRP
Operational disruption	High	Moderate to Low	Low
Reduction of useable space	High	Low	Low
Change in appearance	Low	High	Moderate to Low
Air pollution with dust	High	Low	Low
Noise pollution	High	High	Low
Presence of toxic /hazardous material	Low	Moderate	Moderate
Vulnerability to Fire	Low	Moderate	High
Maintenance requirement	Low	High	Low
Safety concern during retrofitting	High	Moderate	Moderate to Low
Concern during debris disposal	Low	Low	High
Cost	Low to Moderate	Moderate	High

10.5.2 TORSIONAL IRREGULARITY, EXCESSIVE DRIFT OR POUNDING

185. In cases of torsional irregularity, excessive drift or pounding problems of RC structures, the structural system requires stiffening. Torsional irregularity arises due to eccentric positioning of stiff structural elements like shear-walls. To balance the eccentricity, the structure needs to be stiffened in other locations or directions. Lack of stiffness may cause excessive drift in a structure which may result in non-functioning of non-structural components. To restrain such drift the structure system is stiffened. Pounding may occur during earthquakes when there is insufficient gap between two adjacent structures. Structures are stiffened to reduce deformation so that pounding do not occur during a seismic event. For the purpose of stiffening the lateral load resisting system of a structure, highly rigid structural systems like RC shear-walls (Fig.10- 7) or steel bracings (Fig. 10-8) are added to the structure. A comparison between RC shear wall system and steel bracing system is presented in Table 10-2.

Figure 10-7: Retrofitting with RC shear-wall – before casting

Figure 10-8: Retrofitting with steel bracing

Table 10-2: Comparison between RC shear-wall system and steel bracing system as retrofitting measures

Socio-Environmental Issue	RC Shear-Wall	Steel Bracing
Operational disruption during construction	High	Moderate
Obstruction to day-light and natural ventilation	High	Low
Reduction of useable space	Low	Low
Change in appearance	High to Moderate	High
Air pollution with dust	High	Low
Noise pollution	High	High
Presence of toxic /hazardous material	Low	Moderate
Vulnerability to Fire	Low	Moderate
Maintenance requirement	Low	High
Safety concern during retrofitting	High	Moderate
Concern during debris disposal	Moderate	Low
Cost	High	High

10.5.3 SOFT-STORY

186. In majority of apartment buildings in Bangladesh, ground floor is used as parking lot where no in-fill wall is placed; whereas in the stories above ground floor masonry in-fill walls are placed between columns. The in-fill walls make the upper stories significantly stiff compared to the ground story. Such soft ground stories are vulnerable to earthquake loading. Columns may be jacketed (Fig.10- 2) or steel bracing (Fig. 8) may be placed to increase stiffness of the ground story. Table 10-3 shows a comparison between these two measures.

Table 10-3: Comparison between concrete column jacketing and steel bracing for retrofitting soft ground story

Socio-Environmental Issue	Concrete Column Jacketing	Steel Bracing
Operational disruption during construction	High	Moderate
Obstruction to functionality	Low	High
Reduction of useable space	High	Low
Change in appearance	Low	High
Air pollution with dust	High	Low
Noise pollution	High	High
Presence of toxic /hazardous material	Low	Moderate
Vulnerability to Fire	Low	Moderate
Maintenance requirement	Low	High
Safety concern during retrofitting	High	Moderate
Concern during debris disposal	Low	Low
Cost	Low to Moderate	Moderate

10.5.4 INADEQUATE PUNCHING SHEAR CAPACITY OF FLAT PLATES

187. Structural systems with slabs placed directly on columns without any beams are called Flat Plates. Flat plates are vulnerable if the joints between columns and slabs are not strong enough. The predominant mode of failure of flat plates is punching of columns through slabs. To retrofit flat plates with inadequate punching shear capacity, columns may be jacketed (Fig. 2), thickness of slabs may be increased (Fig. 10-9) or column-capital/drop panel may be introduced (Fig. 10-10). A comparison among these alternative retrofitting measures is presented in Table 10-4.

Figure 10-9:Slab thickening – before casting

Figure 10-10: Column Capital

Table 10-4: Comparison between concrete column jacketing, slab thickening and inserting column-capital to increase punching-shear capacity

Socio-Environmental Issue	Concrete Column Jacketing	Slab thickening	Inserting Column-Capital
Operational disruption during construction	High	High	High
Obstruction to functionality	Low	Low	Low
Reduction of useable space	High	Moderate	Low
Change in appearance	Low	Low	High
Air pollution with dust	High	High	High
Noise pollution	High	High	High
Presence of toxic /hazardous material	Low	Low	Low
Vulnerability to Fire	Low	Low	Low
Maintenance requirement	Low	Low	Low
Safety concern during retrofitting	High	Moderate	High
Concern during debris disposal	Low	Low	Low
Cost	Moderate	High	Moderate

10.6 ENVIRONMENTAL ASSESSMENT (EAS)PROCEDURE

The environmental category will be determined based on the scope of work under

retrofitting the building. Once the category is determined the clearance procedure will be according to Figure 3.1 and the environmental assessment will be performed according to Chapter 5 and Annex B.

10.7 STAKEHOLDER CONSULTATION PROCEDURE AT VARIOUS STAGES

Environmental management of retrofitting works will be conducted in a participatory approach through stakeholder's consultation at various stages. In order to make consultation and disclosure process effective and fruitful, comprehensive planning is required to assure that local government, NGOs, host population and project staff interacts regularly and purposefully, throughout all stages of the project and contribute toward a common goal. Modes and plans for consultation; information, disclosure and consultation framework; and grievance redress mechanism will be similar to as mentioned in Chapter 5.

10.8 POSSIBLE ENVIRONMENTAL IMPACT IDENTIFICATION

In addition to the environmental impacts identified in Section 5 above, further environmental and safety impacts may be relevant for retrofitting works due to use of some specialized materials. Retrofitting works may be carried out using concrete, steel, ferrocement or fiber-reinforced polymer (FRP). Among these materials, for the conventional ones like concrete, steel and ferrocement the environmental impacts are similar to those mentioned in Section 5. However, installation of FRP requires special precautionary measures. FRP plates and wraps are added to the structure with high-strength epoxy based adhesive. If such adhesive comes in direct contact with human skin, skin is damaged with intense burning sensation. The adhesives are injurious to animals and plants too. Thus these materials should be disposed with caution as hazardous material.

10.9 ENVIRONMENTAL MANAGEMENT PLAN

Environment management plan has been detailed in Chapter 6 including those aspects relevant for retrofitting works like chemical and hazardous waste. Detail Plan is provided in Annex B.

10.10 MONITORING AND POST AUDITING

For the Phase II investment Annex B is applicable for environmental management and monitoring. For retrofitting of building RAJUK URU will be responsible for sharing quarterly monitoring report.

ANNEX A: ANNEXES RELATED TO PHASE I RECONSTRUCT/REFURBISH/UPGRADING OF EOC

ANNEX A-1: ENVIRONMENT SCREENING (ES) REPORT FOR CONSTRUCTION OF WAREHOUSE/EOC

SECTION I: General Information

Address/ Project location :

(Ward/City Corporation/District)

Who/ which government department owns the land :

Brief Description of site location :

Date of public consultation and number of attendance :

Type of activity :

SECTION-II: PROPOSED ACTIVITIES AS PER PRELIMINARY SCHEME DESIGN

Title of Activities	Description of Proposed Activities (length, width, area, volume, height etc.)	Remarks
Land development	Filling a low land by Sand filling (30ft X 20 ft X 10 ft)	
Construction of Warehouse/EOC		
Construction of boundary wall		
Construction of Internal Road		
Construction of Toilet/WASH Block		

SECTION III: PIA map (please draw an updated site map containing key environmental features and proposed interventions including outlet of the drainage network)

PIA map to be drawn by ES team

Screening Questions	Yes	No	Scale of Impact			Remarks (The following questions need to be answered)
			High	Medium	Low	
A Project Site						

• **UNDERGROUND UTILITIES**						What type of utility? How it will be impacted by the activity?
• **CULTURAL HERITAGE SITE**						What type of cultural heritage? How far?
• **PROTECTED AREA**						What type of area? How far?
• **WETLAND**						How far?
• **ADJACENT TO OR WITHIN ANY OF THE ENVIRONMENTALLY SENSITIVE AREAS?**						What type of area? How far?
B. POTENTIAL ENVIRONMENTAL IMPACTS WILL THE PROJECT CAUSE…						
▪ Encroachment on historical/cultural areas?						What type of historical/ cultural area
▪ Encroachment on precious ecology (e.g. sensitive or protected areas)?						What type of ecological/ sensitive area
▪ Lead to any agricultural land loss or crop loss?						Where is the agricultural land? What type of crop is grown and mention about the season, amount of production
▪ Involve any land acquisition and involuntary resettlement						Give the history and owner ship of the land
▪ Destruction of trees and vegetation						How many trees around? How many will be cut? Type of vegetation and tree?
▪ Impact on pond or fish						How far is the pond? How many? What species? How will be affected?
▪ Effects on surface water /groundwater quality						How far is the surface water body? What is the depth of ground water
▪ Impact on drainage or create water logging in the area						What is the existing drainage condition?
▪ Traffic disturbances due to construction material transport and wastes?						Is there any road? How many and what type of vehicles move everyday?
▪ Increased noise due to construction activities or movement of materials						Is there any other noise now?

▪ Negative effects on neighborhood or community						Has the community been discussed?
▪ Degradation or disturbance of historical or culturally important sites (mosque, graveyards, monuments etc.)						What and how far?
▪ Accident risks associated with increased vehicular traffic, leading to loss of life?						Where is the access road connectivity? Any major accident Point? Where the access road connected with Main Road? Traffic condition of the existing access road?
Impediments to movements of people and livestock						
Produce health hazard from generated air/dust pollution from machineries						
Impact due to on site or off-site disposal of construction waste or household waste (from labor camp)						

Signature/Date

Prepared by DSCC/DNCC/DDM/RAJUK/FSCD Field Engineer

Reviewed by DSCC/DNCC/DDM/RAJUK/FSCD Focal Person

Reviewed by PCMU/RAJUK URU Environment Specialist

ANNEX A-2: TYPICAL ENVIRONMENTAL MITIGATION MEASURES FOR SMALL SCALE CONSTRUCTION/RENOVATION DURING CONSTRUCTION PERIOD BY CONTRACTOR

Reporting Time: Every Month to the PCMU

Impact	Impact Description	Mitigation Measures	Location	What has been done
Change in land use and loss of agricultural land	Change in land use pattern and topography of the project	* Avoid agricultural land for subproject activities * If avoidance is not possible, analyze the alternative and choose the best option		
Drainage congestion/water logging	Improper site selection and construction can create localized drainage problem/water logging	* Consider the drainage system of the whole area in subproject design * Maintain cross-drainage at all times during construction * Prevent all solid and liquid wastes entering waterways by collecting solid waste and wastewater from brick, concrete		
Losses of tress and vegetation	Cutting or trimming of trees, losses of vegetation	* Consider alternation options to reduce the loss of trees and vegetation * A green fence will be raised with native tree species around the school * Plant same species of trees and vegetation as compensatory measures		
Dust and noise pollution	Dust generation during construction phase. Spillage of the material will be occurred from physical works Noise generation from physical interventions	* Spray of water during dry season and in windy conditions * Immediate compaction after construction of base course * Cover the stockpiles of fine materials in construction yard * Plan the work schedule of noise creating activities in consultation of local community * Employ best available work practices on-site to minimize occupational noise levels		

Impact	Impact Description	Mitigation Measures	Location	What has been done
Blocking of Roads/access/approach	Improper storage of construction material may block the roads/access/approach to the school or the community	* Construction materials and machinery should not be placed in a manner that blocks any roads, paths or local accesses * unloading of construction materials should be carried in a manner and time so as to avoid blockage of roads/paths/access * Waste should not be placed on the roads		
Surface Water Pollution	Improper disposal of solid and liquid waste generate from construction sites will pollute the water quality	* Prohibit direct disposal of solid and liquid wastage into nearby water body. * Spoil Management Plan should be implemented by the contractor		
Occupational health and safety	Chances of any accidents, spread of communication diseases	* Implement suitable safety standards for all workers and site visitors * Provision of first aid facility * Arrangement of safe drinking water and sanitation facilities for the labors working in the "subprojects"		
Day Lighting and ventilation system	Poor lighting and ventilation may impact on students and teachers	* Adequate windows in proper direction in consultation with students and teachers		
Selection of appropriate Water Supply Technology	Without proper analysis, the new source can be arsenic contaminated	* Identify unions and upazillas based on DPHE survey where shallow or deep tube-wells are feasible * Analyze local surrounding arsenic test results and recommend for tube-wells or not		
Selection of appropriate location for water source and sanitary latrine	Location may not be convenient to female students and impacts on natural resources and common property resources. Close distance between water point and sanitary latrine can contaminate groundwater.	* Discuss with school committee and students and select a location which is convenient for school and not impacting on trees or any other common property resources. * A minimum distance of 15 m should be maintained between a tube-well and a latrine to prevent contamination of water resources. In case of shallow shrouded hand tube-wells, this distance should be 20 m as horizontal filters are used in this type of tube-wells.		

Impact	Impact Description	Mitigation Measures	Location	What has been done
Integration of drainage facilities with water supply and sanitary latrine	In absence of proper drainage facilities, water logging can be created around school.	* Drainage facilities will be integrated with water supply options and sanitary latrine facilities in planning and design.		
Water quality testing	New water source may not be safe for drinking	* After installation of tube-wells, arsenic will be tested and be used only it satisfy the Bangladesh standard		
Any other				

Name/Signature and Date

Prepared by environmental specialist of contractor:

Checked by Environmental Focal Person RAJUK/DSCC/DNCC/FSCD/DDM:

Reviewed by PCMU:

ANNEX A-3: ENVIRONMENTAL MONITORING DURING CONSTRUCTION PHASE

ACTIVITY IDENTIFICATION

Name of the Work: _____

Name of the institution: _____
Location: _____

Type of Activity:_____

Description of Parameter	Whether followed or not	What has been followed? Is it sufficient?
The contractor will erect sufficient number of temporary sanitary toilets and shelter both for male and female workers at the site with proper sanitation system.	Yes ☐ NO ☐	
The contractor will ensure supply of pure drinking water to the workers during the time of construction.	Yes ☐ NO ☐	
The contractor will keep a first aid box at the site for any accident.	Yes ☐ NO ☐	
The contractor will take necessary precaution for the safety of his workers and also for the safety of the pedestrians.	Yes ☐ NO ☐	
The contractor will stack materials systematically in a safe place so that pedestrians do not fall in troubles/ accident and do not occupy any classroom.	Yes ☐ NO ☐	
The contractor will not engage any child labor in the work.	Yes ☐ NO ☐	
The contractor will not pollute any nearby source of surface water by any of their activities.	Yes ☐ NO ☐	
The contractor will try to minimize sound pollution. If such sound producing activity become unavoidable, it should be matched with the local	Yes ☐ NO ☐	

Description of Parameter	Whether followed or not	What has been followed? Is it sufficient?
condition so that the adverse impact can be kept minimum.		
The contractor will engage local people in the work as far as possible. The vulnerable destitute women should get preference.	Yes ☐ NO ☐	
The contractor will not hamper the drainage network of the area by any of their activity.	Yes ☐ NO ☐	
The contractor will not cut or damage any tree in and around the project area without the permission of the supervising authority.	Yes ☐ NO ☐	
The contractor will take every initiative to reduce dust emission during the construction work i,e sprinkling of water on the dust etc.	Yes ☐ NO ☐	
The contractor will not set any temporary burner under any tree.	Yes ☐ NO ☐	
If required, the contractor will collect filling earth from existing ditches, ponds and fallow lands to avoid land loss.	Yes ☐ NO ☐	

Comments and recommendations of the monitoring team:

Signature of the Environmental Monitoring Team/Officer in charge:

ANNEX A-4: GUIDE LINES TO BE FOLLOWED DURING CONSTRUCTION OF INFRASTRUCTURE

The following environmental guide lines stated below should be followed during the construction work. Such as:

1. The contractor will erect sufficient number of temporary sanitary toilets and shelter both for male and female workers at the site with proper sanitation system.
2. The contractor will ensure supply of pure drinking water to the workers during the time of construction.
3. The contractor will keep a first aid box at the site for any accident.
4. The contractor will take necessary precaution for the safety of his workers and also for the safety of the pedestrians.
5. The contractor will stack materials systematically in a safe place so that pedestrians do not fall in troubles/ accident and will not occupy any class room.
6. The contractor will not engage any child labor in the work.
7. The contractor will not pollute any nearby source of surface water by any of their activities.
8. The contractor will try to minimize sound pollution. If such sound producing activity become unavoidable, it should be matched with the local condition so that the adverse impact can be kept minimum.
9. The contractor will engage local people in the work as far as possible. The vulnerable destitute women should get preference.
10. The contractor will not hamper the drainage network of the area by any of their activity.
11. The contractor will not cut or damage any tree in and around the project area without the permission of the supervising authority.
12. The contractor will take every initiative to reduce dust emission during the construction work i,e sprinkling of water on the dust etc. .
13. The contractor will not set any temporary burner under any tree.
14. If required, the contractor will collect filling earth from existing ditches, ponds and fallow lands to avoid land loss.
15. Any adjacent school's class rooms, playground, office will not be used by the contractors for the construction work.

ANNEX A-5: GUIDELINES FOR STACKING OF EMERGENCY EQUIPMENT IN WAREHOUSE/EOC

SECTION I: General Information

Address/ Project location :

(Ward/City Corporation/District)

Who/ which government department owns the land :

Brief Description of the type of equipment to be stored :

Handling and Storing Objects

- The loads need to be distributed as much possible.
- The equipment need to be grabbed easily during emergency.
- There are provisions to minimize reaching above shoulder level.
- There are provisions to minimize frequent bending down.
- More frequently used objects are kept at the waist level.
- The carrying distance is kept short for heavier equipment.
- There is adequate lighting.
- There are provisions to minimize exposure to excessive heat and cold.
- The workers are properly trained for proper manual handling.

Floors and Walkways

- The aisles are clear of materials and equipment.
- The main aisles are at least 1.12 m wide to ensure safe mobility of the equipment during emergency.
- The doorways are clear of materials and equipment.
- Floor is free of tipping hazard.
- Floors are always kept dry.

Stairs and Ladders

- Ladders are safe and in good condition.
- Stairs and handrails are in good condition.
- Stairs and ladders are provided with anti-slip means.

Equipment and Machinery

- The fire extinguishers should regularly be inspected.
- Fire machineries are securely guarded.
- There needs to be enough work space.

First Aid

- The first aid kit is clearly labeled and accessible.
- The first aid kit is adequate and complete.
- The emergency numbers are displayed in the equipment warehouse.

Personal Protective Equipment

The workers need to know where to find

- Eye/face protection
- Footwear

- Gloves
- Protective Clothing
- Aprons
- Respirators

ANNEX A-6 (A): KEY INFORMATION FROM IMPLEMENTING AGENCY

Institution	**SCC** 	**RAJUK** 	**DSCC** 	**FSCD** 
Date	June 9, 2014	July 17, 2014	July 17, 2014	September 9, 2014
Interviewed	Ariful Haque Choudhury Mayor	Abdul Latif Helaly Superintendent Engineer	Md. Sirajul Islam, Chief Urban Planner, DSCC	Muhammad Salim Miah, Sr. Station Officer
Questions				
1. What are some of the major issues with building/ warehouse projects on the environment that have been observed in the past?	- Land/ resettlement - Air Pollution for the surrounding area - Traffic and - Approach Road	- Land/ resettlement - Air Pollution for the surrounding area - Traffic and - Approach Road	- Land/ resettlement - Air Pollution for the surrounding area - Traffic and Approach Road	- Land/ resettlement - Air Pollution for the surrounding area - Traffic and Approach Road
2. Has there been any major industrial accident that has occurred in Sylhet Sadar in the past	- No major industrial accidents that have occurred within Sylhet Sadar	No	No	No
3. Information on the status of land	- The land belonged to the SCC	The land belonged to the RAJUK	The land belonged to the DSCC	The land belonged to the FSCD

acquisition for the project.				
4. What is the general land acquisition process carried out by the Department when land is acquired for a Corportation? What do they expect the Corporation to do?	- Government is the only owner of the natural resources. Hence all rights on natural resources are vested on Government. - The land acquisition process for Corporation also follows the same process as of land acquisition for public use. The Corporation as the requiring body pays for the land price (compensation) or lease amount whatever is applicable.	Government is the only owner of the natural resources. Hence all rights on natural resources are vested on Government. The land acquisition process for Corporation also follows the same process as of land acquisition for public use. The Corporation as the requiring body pays for the land price (compensation) or lease amount whatever is applicable.	- Government is the only owner of the natural resources. Hence all rights on natural resources are vested on Government. The land acquisition process for Corporation also follows the same process as of land acquisition for public use. The Corporation as the requiring body pays for the land price (compensation) or lease amount whatever is applicable	- Government is the only owner of the natural resources. Hence all rights on natural resources are vested on Government. The land acquisition process for Corporation also follows the same process as of land acquisition for public use. The Corporation as the requiring body pays for the land price (compensation) or lease amount whatever is applicable.

Disclaimer: This document provides a working summary of the main facts captured during the consultation/key-informant interview held, and should not be treated as a formal minutes. It is therefore deliberately not exhaustive or chronological. Its purpose is to capture significant information/feedbacks and not intended for official review or approval.

ANNEX A-6 (B): KEY INFORMATION FROM LOCAL LEVEL CONSULTATION

Institution	**Near SCC Office**	**Mohakhali near RajukLocation** 	**Tongi near FSCD Office** 
Date	September 9, 2014	September 9, 2014	September 9, 2014
Interviewed adjacent local residents	1. Md. Sukkur Ali 2. Abdul Halim 3. Mohammad Karim 4. Jalil Sarder 5. Md. Baser Ahmed 6. Md. Khalilullah	1. Alamgir Ali 2. Md. Akkash Uddin 3. Zannat 4. Md. Ismail	5. Md. Ashraful Islam 6. Al-mamun 7. Kamrul Hasan
Questions			
1. What are some of the major issues with building/ warehouse projects on the environment?	- Air Pollution for the surrounding area - Traffic and - Approach Road	- Air Pollution for the surrounding area - Traffic and - Approach Road	- Air Pollution for the surrounding area - Traffic and - Approach Road
2. View regarding the project	No major industrial accidents that have occurred within Sylhet Sadar	-	No
3. What are the benefits they want from the project	Job placement and labour work in construction stage	Job placement and labour work in construction stage	Job placement and labour work in construction stage

4. Has anyone talked about this project before?	No	No	No

Disclaimer: This document provides a working summary of the main facts captured during the consultation/key-informant interview held, and should not be treated as a formal minutes. It is therefore deliberately not exhaustive or chronological. Its purpose is to capture significant information/feedbacks and not intended for official review or approval.

ANNEX A-6 (C): NATIONAL LEVEL CONSULTATION WORKSHOP ON DRAFT EMF

Government of the People's Republic of Bangladesh
Planning Commission
Programming Division
ECRRP:PCMU
Block-13, 2nd Floor, Sher-E-Bangla Nagar, Dhaka-1207

Sub. : Stakeholder Consultation Workshop on "Environment Management Framework (EMF)' & 'Social Management Framework (SMF)" of Bangladesh Urban Resilience Project.

Date : 30 November 2014.

Venue : NEC Committee Room-1, Planning Commission, Sher-e-Bangla Nagar, Dhaka.

No.	Name & Designation	Organization	Phone/e-mail	Signature
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03	SHAMSUDDIN AHMED Deputy Director Bangladesh Meteorological Department (BMD)	BMD	Ph.: 01713434488 E-mail: shamsbmd@yahoo.com	30.11.2014
04	ASM Abdur Rahim Joint Chief	SEID Plan. Comm.	Ph.: 9180760 E-mail: rahimizsbd@yahoo.com	30/11/2014
05	Mohammad Nazmul Ansan Senior Asstt Chief	H/O Social welfare	Ph.: 9577252 E-mail: nazmuled2@yahoo.com	30.11.2014
06	Md. Shameem Khan Deputy Director	ECRRP: PCMU	Ph.: 0172 019265 E-mail: shkhan068@yahoo.com	30.11.2014
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09	Md. Mozibur Rahman Director	PCMU: ECRRP	Ph.: 9180902 E-mail: riddheemuj13@gmail.com	30.11.14

No.	Name & Designation	Organization	Phone/e-mail	Signature
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ANNEX-A-7 : FORMAT OF HALF YEARLY MONITORING REPORT

1. **Introduction**
2. **Background of the Project**
   - Basic project information including a synopsis of the project organization,
   - Description of the physical component of project and the updated progress.
   - A synopsis of work undertaken during last six months;
   - Project Environmental key personnel, contact names and telephone numbers;
3. **Environmental Requirement**
   - Summarize the environmental protection and pollution control/mitigation measures, as recommended in the agreed EMF report and subproject specific EMP.
4. **Environmental Status**
   - summarize the major activities undertaken by the different activities during the time with showing the inter-relationship with environmental protection/mitigation measures;
   - describe the monitoring methodology;
   - a half yearly assessment of construction impacts on water, air and noise quality as well as the construction waste management, labor camp management and safety assurance at the subproject site;
   - Suggestion of appropriate mitigation measures if the half yearly assessment results demonstrate that the environment is declining ;
   - a summary description of the actions taken in the event of non-compliance of the activities those were visited in last six months;
   - a summary description of the actions to be taken in the event of non-compliance those were visited this quarter and any follow-up procedures related to earlier non-compliance;
   - a summary record of all complaints received (written or verbal) and subsequent redress for each subproject during this quarter.
5. **Screening/EA Document Preparation :**
   - submission the list of activities for those site specific environment screening/assessment have been carried out during this period.,
   - summarize the key environmental issues of these activities.
6. **Others**
   - weather conditions that may affect the results;
   - any other factors which might affect the monitoring results;
   - graphical plots of the monitored parameters during the period;
   - regulatory compliance progress (environment clearance certificate/renewal certificate from department of environment) etc.
7. **Meeting and Discussion;**

Summarize the meeting and the subsequent decision on the environment management those have been taken this quarter.

8. **Conclusions And Recommendations**
9. **Annexure**
   - Photograph of the different subprojects
   - Environmental Monitoring Report
   - Lab Test Report

(Notes: Format is shown for Half Yearly Monitoring Report on environment compliance. The report will be shared with World Bank during each mission. Updated format will be used for retrofitting building.)

ANNEX B: ANNEXES RELATED TO RETROFITTING BUILDING

ANNEX B-1: ENVIRONMENT SCREENING (ES) REPORT FOR CONSTRUCTION OF WAREHOUSE/EOC/RETROFITTING BUILDING

SECTION I: General Information

Address/ Project location :

(Ward/City Corporation/District)

Who/ which government department owns the land :

Brief Description of site location :

Date of public consultation and number of attendance :

Type of activity :

Type of Building

Use of the building
Time the work will take to perform

SECTION-II: PROPOSED ACTIVITIES AS PER PRELIMINARY SCHEME DESIGN

Title of Activities	Description of Proposed Activities (length, width, area, volume, height etc.)	Remarks
Land development		
Retrofitting of Building		
Construction of boundary wall		
Construction of Internal Road		
Construction of Toilet/WASH Block		

SECTION III: PIA map (please draw an updated site map containing key environmental features and proposed interventions including outlet of the drainage network)

PIA map to be drawn by ES team

Screening Questions	Yes	No	Scale of Impact			Remarks (The following questions need to be answered)
			High	Medium	Low	
A Project Site						
• **UNDERGROUND UTILITIES**						What type of utility? How it will be impacted by the activity?
• **CULTURAL HERITAGE SITE**						What type of cultural heritage? How far?
• **PROTECTED AREA**						What type of area? How far?
• **WETLAND**						How far?
• **ADJACENT TO OR WITHIN ANY OF THE ENVIRONMENTALLY SENSITIVE AREAS?**						What type of area? How far?
B. POTENTIAL ENVIRONMENTAL IMPACTS WILL THE PROJECT CAUSE…						
▪ Encroachment on historical/cultural areas?						What type of historical/ cultural area
▪ Encroachment on precious ecology (e.g. sensitive or protected areas)?						What type of ecological/ sensitive area
▪ Lead to any agricultural land loss or crop loss?						Where is the agricultural land? What type of crop is grown and mention about the season, amount of production
▪ Involve any land acquisition and involuntary resettlement						Give the history and owner ship of the land
▪ Destruction of trees and vegetation						How many trees around? How many will be cut? Type of vegetation and tree?
▪ Impact on pond or fish						How far is the pond? How many? What species? How will be affected?
▪ Effects on surface water /groundwater quality						How far is the surface water body? What is the depth of ground water
▪ Impact on drainage or create water logging in the area						What is the existing drainage condition?

▪ Traffic disturbances due to construction material transport and wastes?						Is there any road? How many and what type of vehicles move everyday?
▪ Increased noise due to construction activities or movement of materials						Is there any other noise now?
▪ Negative effects on neighborhood or community						Has the community been discussed?
▪ Degradation or disturbance of historical or culturally important sites (mosque, graveyards, monuments etc.)						What and how far?
▪ Accident risks associated with increased vehicular traffic, leading to loss of life?						Where is the access road connectivity? Any major accident Point? Where the access road connected with Main Road? Traffic condition of the existing access road?
Impediments to movements of people and livestock						
Produce health hazard from generated air/dust pollution from machineries						
Impact due to on site or off-site disposal of construction waste or household waste (from labor camp)						
C. BUILDING CONDITION						
• **OCCUPANCY**						Will there be any change of occupancy after retrofitting?
• **OPERATION**						Will the building be in operation during retrofitting?
• **DEMOLITION**						If any, which part of the structure be demolished?
• **HERITAGE STRUCTURE**						Is there any structure or part thereof under the retrofitting scheme listed as a heritage structure?
• **DAMAGED OR DISTRESSED STRUCTURE**						Is there any already damaged, cracked, excessively deformed structural component under the retrofitting scheme?

• **WEAK BUILDING MATERIAL**						Is there any visible weakness in concrete, brick or other building material for which extra precaution is necessary?
• **UTILITY SERVICES**						Is there any chance of disruption of utility services? For how long?
• **LEAKAGE OF WATER OR GAS**						Is there any chance of leakage of water and gas during retrofitting? At what location?
• **RETROFITTING MATERIAL**						Will any material hazardous to human, animal and plant be used for retrofitting?
• **STORAGE OF MATERIAL**						Does any material have special storage requirements?
• **DISPOSAL OF DEBRIS, WASTE AND UNUSED MATERIAL**						Does any material have special requirements for disposal? How and Where to be disposed?
• **RETROFITTING PROCEDURE**						Is there any retrofitting procedure particularly risky to occupants and workers as compared to regular construction?
What Type of Building? **What is the use of the building?** **How long the work will take to perform?**						

Signature/Date

Prepared by DSCC/DNCC/DDM/RAJUK/FSCD Field Engineer

Reviewed by DSCC/DNCC/DDM/RAJUK/FSCD Focal Person

Reviewed by PCMU/**RAJUK URU Environment Specialist**

ANNEX B-2: ENVIRONMENTAL MANAGEMENT PLAN

	Potential Environmental Impacts	Proposed Mitigation measures	Responsible Institutes	
			Implement	Supervising
Construction Stage				
Air Pollution	– Construction vehicular traffic: Air quality can be affected by vehicle exhaust emissions and combustion of fuels. – Construction machinery: Air quality can be adversely affected by emissions from machinery and combustion of fuels. – Construction activities: Dust generation from construction sites, material stockpiles and access roads	• Fit construction materials carrying vehicles with appropriate exhaust systems and emission control devices. • Maintain vehicles and construction equipment in good working condition including regular servicing. • Operate the vehicles in a fuel efficient manner • Cover haul vehicles carrying dusty materials moving outside the construction site • Impose speed limits on all vehicle movement at the worksite and through access roads to reduce dust emissions • Control the movement of construction traffic in the access road • Water spray to the construction materials (specially sands & boulder/brick chips) prior to loading and transport • Focus special attention on containing the emissions from generators • Machinery causing excess pollution (e.g. visible smoke) will be banned from construction sites or fixed immediately prior to usage • Provide filtering systems, duct collectors or humidification or other techniques (as applicable) to the concrete mixing plant to control the particle emissions at all its stages, including unloading, collection, aggregate handling, cement dumping, circulation of trucks and machinery inside the installations • Water spray to the material stockpiles, access roads and bare soils as and when required to minimize the potential for environmental nuisance due to dust. Increase the watering frequency during periods of high risk (e.g. high winds and dry periods). Stored materials such as boulders and sand shall be covered and confined to avoid them being wind-drifted • Erect dust barriers along the boundary of the land to reduce dust movement to the surrounding areas • Minimize the extent and period of exposure of the bare surfaces • Reschedule earthwork activities when practical, if necessary to avoid during periods of high wind and if visible dust is blowing off-site	Contractor	PIU/RAJUK/PCMU

	Potential Environmental Impacts	Proposed Mitigation measures	Responsible Institutes	
			Implement	Supervising
		• Restore disturbed areas as soon as possible by vegetation/grass-turfing • Establish adequate locations for storage, mixing and loading of construction materials, in a way that dust dispersion is prevented because of such operations		
Noise Pollution	– Construction vehicular traffic: Noise quality will be deteriorated due to vehicular traffic – Construction machinery: Noise and vibration will have an impact on adjacent surrounding residents. – Construction activity: Noise will have an impact on adjacent residents.	• Maintain all vehicles in order to keep them in good working order in accordance with manufacturers maintenance procedures • Make sure all drivers will comply with the traffic codes concerning maximum speed limit, driving hours, etc. • Organize the loading and unloading of trucks, and handling operations for the purpose of minimizing construction noise on the work site • Appropriately site all noise generating activities to avoid noise pollution to local residents • Modify equipment to reduce noise (for example, noise control kits, lining of truck trays or pipelines, silencers) • Maintain all equipment in order to keep it in good working conditions in accordance with manufacturers maintenance procedures. Equipment suppliers and contractors shall present proof of maintenance register of their equipment. • Install acoustic enclosures around generators to reduce noise levels. • Fit high efficiency mufflers to appropriate construction equipment • Avoid the unnecessary use of alarms, horns and sirens • Notify adjacent landholders prior any typical noise events outside of daylight hours • Educate the operators of construction equipment on potential noise problems and the techniques to minimize noise emissions • Employ best available work practices on-site to minimize occupational noise levels • Install temporary noise control barriers where appropriate • Notify affected people if major noisy activities will be undertaken, e.g. pile driving • Plan activities on site and deliveries to and from site to minimize impact • Monitor and analyze noise and vibration results and adjust construction practices as required.	Contractor	PIU/RAJUK/PCMU

	Potential Environmental Impacts	Proposed Mitigation measures	Responsible Institutes	
			Implement	Supervising
		• Avoid undertaking the noisiest activities, where possible, when working at night near the residential areas		
Sewage Pollution/ Sanitation Hazard	Lack of proper sanitation facilities will increase pressure on health hazards of workers.	• Provide hygienic sanitary facilities and sewerage system. The toilets and domestic waste water will be collected through a common sewerage. Provide separate latrines and bathing places for males and females with total isolation by wall or by location. The minimum number of toilet facilities required is one toilet for every ten persons. • Ensure the sanitary facilities are kept clean and without any odor • Educate the workers of using the facilities	Contractor	PIU/RAJUK/PCMU
Solid Waste Pollution	Solid waste pollution will increase pressure on health hazards of workers.	• Organize disposal of all wastes generated during construction in an environmentally acceptable manner. This will include consideration of the nature and location of disposal site, so as to cause less environmental impact at the off site. • Minimize the production of waste materials by 3R (Reduce, Recycle and Reuse) approach. • Segregate and reuse or recycle all the wastes, wherever practical. • Prohibit burning of solid waste • Train and instruct all personnel in waste management practices and procedures as a component of the environmental induction process. • Provide refuse containers at each worksite and worker camps. • Request suppliers to minimize packaging where practicable. • Place a high emphasis on good housekeeping practices. • Maintain all construction sites in a cleaner, tidy and safe condition and provide and maintain appropriate facilities as temporary storage of all wastes before transportation and final disposal by local authority. • Ensure proper collection and disposal of wastes within the construction camps from where local authority will take by their truck and dispose at their dumping area.		

	Potential Environmental Impacts	Proposed Mitigation measures	Responsible Institutes	
			Implement	Supervising
		• Insist on waste separation and store by source; organic wastes in one container and inorganic wastes in another container. • Clear wastes on daily basis to waste collector. Establish waste collection, transportation and disposal at the dumping site in the adequate size of concrete chambers/boxes. • Dispose organic wastes in a designated safe place and should be kept covered so that flies, mosquitoes, dogs, cats, rats, etc. are not attracted. Encourage composting of organic waste that can be used for tree planting purposes. • Locate the garbage pit/waste disposal site away from the residence so that peoples are not disturbed with the odor likely to be produced from anaerobic decomposition of wastes at the waste dumping places. Encompass the waste dumping place by fencing and tree plantation to prevent children from entering and playing. • Do not establish site specific landfill sites. All solid waste will be collected and removed from the work camps and disposed in approved waste disposal sites.		
Landscape	Construction activities especially earthworks, stock piling of construction materials, parking of vehicles etc. will change topography and disturb the natural rainwater drainage as well as will change the local landscape temporarily.	• Ensure the topography of the construction yard is conducive to enhance natural draining of rainwater at all times • Parking of construction vehicles and stockpiling of construction materials should be done in systematic way to avoid any drainage blockages, to enhance the aesthetics of the site. • Duration of stockpiling should be minimized as much as possible	Contractor	PIU/RAJUK/PCMU

	Potential Environmental Impacts	Proposed Mitigation measures	Responsible Institutes	
			Implement	Supervising
Access Road/ Traffic Congestion	– Construction vehicular traffic: Increased traffic use of narrow access road by construction vehicles will affect the movement of normal road traffics and the safety of the road-users.	• Prepare and submit a traffic management plan to the PIU for approval at least 30 days before commencing work on any project component involved in traffic diversion and management. • Include measures in the traffic management plan to ensure uninterrupted traffic movement during construction: detailed drawings of traffic arrangements showing all detours, access roads, necessary barricades, warning signs / lights, road signs, etc. • Provide signs at strategic locations of the roads complying with the schedules of signs contained in the Bangladesh Road Traffic Regulations of BRTA. • Install and maintain a display board at each important road intersection on the roads to be used during construction, which shall clearly show the following information in Bangla: – Location: ward name – Duration of construction period – Period of proposed detour / alternative route – Suggested detour route map – Name and contact address/telephone number of the concerned personnel – Name and contact address / telephone number of the Contractor – Inconvenience is sincerely regretted • Restrict truck deliveries to day time working hours (as common practice in Bangladesh) to avoid road accidents and to reduce inconveniences to the road users. • Restrict the transport of oversize loads. • Operate construction vehicles to non-peak periods (night) to minimize traffic disruptions. • Enforce on-site and access road speed limits.	Contractor	PIU/RAJUK/PCMU

	Potential Environmental Impacts	Proposed Mitigation measures	Responsible Institutes	
			Implement	Supervising
Liquid/ hazardous waste	Improper storage and handling of fuels, lubricants, chemicals and hazardous liquid on-site, and potential spills from these liquid materials may harm the environment and health of construction workers.	• Train the relevant construction personnel in handling of fuels and spill control procedures. • Store dangerous goods in enclosed areas with a covering of a sealed plastic sheet away from watercourses. • Refueling shall occur only within enclosed areas. • Provide protective clothing, safety boots, helmets, masks, gloves, goggles, to the construction personnel, appropriate to handle construction materials. • Make sure all containers, drums, and tanks that are used for storage are in good condition and are labeled with expiry date. Any container, drum, or tank that is dented, cracked, or rusted might eventually leak. Check for leakage regularly to identify potential problems before they occur. • Put containers and drums in temporary storages in clearly marked areas, where they will not be run over by vehicles or heavy machinery. The area shall be established in higher ground if possible preferably with a slope or drain to a safe collection area in the event of a spill. • Put containers and drums in permanent storage areas on an impermeable floor. • Take all precautionary measures when handling and storing fuels and lubricants, avoiding environmental pollution. • Ensure basic firefighting equipment are in place outside these storage areas in case of a fire	Contractor	PIU/RAJUK/PCMU
Construction Camp Management	Siting and Location of construction camps: Campsites for construction workers are the important locations that have significant impacts such as health and safety hazards on local resources and infrastructure of nearby communities.	• Locate the construction camps inside the proposed construction area. • Consider the location of construction camps away from communities in order to avoid social conflicts in using the natural resources such as water or to avoid other possible adverse impacts of the construction camps on the surrounding communities. • Submit to the PIU for approval a detailed layout plan for the development of the construction camp showing the relative locations of all temporary buildings and facilities that are to be constructed together with the location of site roads, fuel storage areas (for use in power supply generators), solid waste management and dumping locations, and drainage facilities, prior to the development of the construction camps. • Local authorities responsible for health, religious and security shall be duly informed on the set up of camp facilities so as to maintain effective surveillance over public health, social and security matters	Contractor	PIU/RAJUK/PCMU

Potential Environmental Impacts	Proposed Mitigation measures	Responsible Institutes	
		Implement	Supervising
	• Create awareness among the camp users on health and safety requirements to be maintained and code of conduct		
Construction Camp Facilities: Lack of proper infrastructure facilities, such as housing, water supply and sanitation facilities will increase pressure on the local services and generate substandard living standards and health hazards.	• Adequate housing for all workers should be provided avoiding over crowing • Safe and reliable water supply. Water supply from deep tube wells of 300 m depth that meets the national standards • Hygienic sanitary facilities and sewerage system. The toilets and domestic waste water will be collected through a common sewerage. Provide separate latrines and bathing places for males and females with total isolation by wall or by location. The minimum number of toilet facilities required is one toilet for every ten persons. • Treatment facilities for sewerage of toilet and domestic wastes • Storm water drainage facilities. • Paved internal roads. Ensure with grass/vegetation coverage to be made of the use of top soil and there is no dust generation from the loose/exposed sandy surface. Pave the internal roads of at least haring-bond bricks to suppress dusts and to avoid possible muddy surface during monsoon.	Contractor	PIU/RAJUK/PCMU
Disposal of waste: Management of wastes is crucial to minimize impacts on the environment	• Ensure proper collection and disposal of solid wastes within the construction camps • Insist waste separation by source; organic wastes in one container and inorganic wastes in another container at household level. • Store inorganic wastes in a safe place within the household and clear organic wastes on daily basis to waste collector or compost the waste. • Dispose organic wastes in a designated safe place on daily basis. At The organic wastes should be always covered with a thin layer of sand so that flies, mosquitoes, dogs, cats, rats, etc. are not attracted. • Locate the garbage pit/waste disposal site min 500 m away from the resident area so that people are not disturbed with the odor likely to be produced from anaerobic decomposition of wastes at the waste dumping places. • Do not establish site specific landfill sites. All solid waste will be collected and removed from the work camps and disposed in approval waste disposal sites.	Contractor	PIU/RAJUK/PCMU
Health and Hygiene: There will be a potential for diseases to be transmitted including malaria,	• Provide adequate health care facilities within construction sites. • Provide first aid facility round the clock. Maintain stock of medicines in the facility and appoint fulltime designated first aider or nurse.	Contractor	PIU/RAJUK/PCMU

	Potential Environmental Impacts	Proposed Mitigation measures	Responsible Institutes	
			Implement	Supervising
	exacerbated by inadequate health and safety practices. There will be an increased risk of work crews spreading sexually transmitted infections and HIV/AIDS.	• Provide ambulance facility for the laborers during emergency to be transported to nearest hospitals. • Conduct an initial health screening of the laborers coming from outside areas • Train all construction workers in basic sanitation and health care issues and safety matters, and on the specific hazards of their work • Provide HIV awareness programming, including STI (sexually transmitted infections) and HIV information, education and communication for all workers on regular basis • Establish a code of conduct for the contractor staff • Provide adequate drainage facilities throughout the camps to ensure that disease vectors such as stagnant water bodies and puddles do not form. • Regular mosquito repellant spraying during monsoon periods.		
	Safety: In adequate safety facilities to the construction camps may create security problems and fire hazards	• Provide appropriate security personnel (police / home guard or private security guards) and enclosures to prevent unauthorized entry into the camp area. • Maintain register to keep a track on a head count of persons present in the camp at any given time. • Encourage use of flameproof material for the construction of labor housing / site office. Also, ensure that these houses/rooms are of sound construction and capable of withstanding wind storms/cyclones. • Provide appropriate type of fire fighting equipments suitable for the construction camps • Display emergency contact numbers clearly and prominently at strategic places in camps. • Communicate the roles and responsibilities of laborers in case of emergency in the monthly meetings with contractors.	Contractor	PIU/RAJUK/PCMU
Worker Health and Safety	Best practices: Construction work may pose health and safety risks to the construction workers and site visitors leading to severe injuries and deaths. The population in the proximity of the construction site and the construction workers will	• Implement suitable safety standards for all workers and site visitors which shall not be less than those laid down on the international standards (e.g. International Labor Office guideline on 'Safety and Health in Construction; World Bank Group's 'Environmental Health and Safety Guidelines') and contractor's own national standards or statutory regulations, in addition to complying with the national standards of the Government of Bangladesh (e.g. `The Bangladesh Labor Code, 2006') • Provide the workers a safe and healthy work environment, taking into account	Contractor	PIU/RAJUK/PCMU

	Potential Environmental Impacts	Proposed Mitigation measures	Responsible Institutes	
			Implement	Supervising
	be exposed to a number of (i) biophysical health risk factors, (e.g. noise, dust, chemicals, construction material, solid waste, waste water, vector transmitted diseases etc), (ii) risk factors resulting from human behavior (e.g. STD, HIV etc) and (iii) road accidents from construction traffic.	inherent risks of this particular construction activity and specific classes of hazards in the work areas, • Provide personal protection equipment (PPE) for workers, such as safety boots, helmets, masks, gloves, protective clothing, goggles, full-face eye shields, and ear protection. Maintain the PPE properly by cleaning dirty ones and replacing them with the damaged ones. • Safety procedures include provision of information, training and protective clothing to workers involved in hazardous operations and proper performance of their job • Appoint an environment, health and safety manager to look after the health and safety of the workers • Inform the local authorities responsible for health, religious and security before commencement of civil works and establishment of construction camps so as to maintain effective surveillance over public health, social and security matters		
	Child and pregnant labor	• Not hire children of less than 14 years of age and pregnant women or women who delivered a child within 8 preceding weeks, in accordance with the Bangladesh Labor Code, 2006	Contractor	PIU/RAJUK/PCMU
	Accidents: Lack of first aid facilities and health care facilities in the immediate vicinity will aggravate the health conditions of the victims	• Provide health care facilities and first aid facilities are readily available. Appropriately equipped first-aid stations shall be easily accessible throughout the place of work • Document and report occupational accidents, diseases, and incidents and actions taken. • Prevent accidents, injury, and disease arising from, associated with, or occurring in the course of work by minimizing, so far as reasonably practicable, the causes of hazards in a manner consistent with good international industry practice. • Identify potential hazards to workers, particularly those that may be life-threatening and provide necessary preventive and protective measures. • Provide awareness to the construction drivers to strictly follow the driving rules • Provide adequate lighting in the construction area and along the roads	Contractor	PIU/RAJUK/PCMU
	Construction Camps: lack of proper infrastructure facilities, such as housing, water supply and sanitation	• Adequate ventilation in all facilities • Safe and reliable water supply. Water supply from deep tube wells that meets the national standards	Contractor	PIU/RAJUK/PCMU

	Potential Environmental Impacts	Proposed Mitigation measures	Responsible Institutes	
			Implement	Supervising
	facilities will increase pressure on the local services and generate substandard living standards and health hazards.	• Hygienic sanitary facilities and sewerage system. The toilets and domestic waste water will be collected through a common sewerage. • Treatment facilities for sewerage of toilet and domestic wastes • Storm water drainage facilities. • Recreational and social facilities • Safe storage facilities for petroleum and other chemicals • Solid waste collection and disposal system • Arrangement for trainings • Paved internal roads. • Security fence at least 2 m height. • Sick bay and first aid facilities		
	Water and sanitation facilities at the construction sites: lack of Water sanitation facilities at construction sites cause inconvenience to the construction workers and affect their personal hygiene.	• The contractor shall provide portable toilets at the construction sites, if about 25 people are working the whole day for a month. • Contractor shall provide bottled drinking water facilities to the construction workers at all the construction sites.	Contractor	PIU/RAJUK/PCMU
	Other management: potential risks on health and hygiene of construction workers and general public	To reduce health risks to the construction workers and nearby community should follow: • **Liquid Waste Mitigation Measures** • **Air Pollution Mitigation Measures** • **Noise Mitigation Measures** • **Road/Road Traffic Management**	Contractor	PIU/RAJUK/PCMU
	Trainings: lack of awareness and basic knowledge in health care among the construction workforce, make them susceptible to potential diseases.	• Train all construction workers in basic sanitation and health care issues (e.g., how to avoid malaria and transmission of sexually transmitted infections (STI) HIV/AIDS.	Contractor	PIU/RAJUK/PCMU
Operational Stage				
Drainage congestion:	Local drainage system may get clogged due to improper	– Maintain drains regularly as and when required – Solid wastes should not be dumped into the drain.		

	Potential Environmental Impacts	Proposed Mitigation measures	Responsible Institutes	
			Implement	Supervising
	management of Solid waste, and other materials.	– Blocked drains should be cleaned properly and debris disposed at approved sites.		
Solid Waste Generation and Disposal	▪ Water, air and land pollution ▪ Cause diseases to man and other lives ▪ Public health, eyesore, odour ▪ Disease vector proliferation, sanitary problems	▪ Setting up of separate waste collectors at different points ▪ Regular cleaning and replacing of waste collectors ▪ Waste disposal at a safe place ▪ collect solid waste everyday and disposed to the landfill site ▪ Encourage waste sorting by the facility users		
Sewage waste	▪ Prohibition of water uses for intended purposes ▪ Causes water borne diseases	▪ Maintenance of Septic tanks, soak wells, pipes, etc. as and when required ▪ Provide a Sewage Treatment Plant (STP) and Soak Pit ▪ Regular monitoring of water quality		

ANNEX B-3: ENVIRONMENTAL MONITORING PLAN

Environmental Aspect	Monitoring Parameter	Means of Monitoring	Frequency	Location	Responsible Agency	
					Implemented By	Supervised By
Construction Stage						
Ground Water Quality	pH, Manganese(Mn), Arsenic(As), Iron(Fe), Ammonia Nitrogen(NH3-N), Total Hardness, Chlioride, Fecal Coliform(FC), Total Coliform(TC)	Laboratory analysis against the baseline established	During construction (1 in 3 months)	Inside the boundary	Contractor through a nationally recognized laboratory	PIU/RAJUK/PCMU
Air Quality	SPM, SO_2, NOx	Laboratory analysis against the baseline established	During construction (1 in 3 months)	At the construction site	Contractor through a nationally recognized laboratory	PIU/RAJUK/PCMU
Noise Level	Measurement of noise dB(A)	– Laboratory analysis against the baseline established – Visual inspection to ensure good standard equipment are in use, – Visual inspection to ensure ear plugs are in use by the construction workers – Inspection of vehicle and equipment maintenance records	During day time and whenever any complains are received about disturbance due to construction noise Noise measurements and routine checks on maintenance records once in 3 months	Near residential area, mosque institutional area and site.	Contractor through a nationally recognized laboratory	PIU/RAJUK/PCMU

Environmental Aspect	Monitoring Parameter	Means of Monitoring	Frequency	Location	Responsible Agency	
					Implemented By	Supervised By
Occupational health	– Check of personal protective equipment (PPE) for workers at the sites – Check if Health, First-Aid facility, and staff trained in First Aid are available at the sites – Check if medical checkup of workers is on going	– Visual inspection	Weekly	Construction Site	Contractor through a nationally recognized laboratory	PIU/RAJUK/PCMU
Other specified mitigation measures as per the EMP	– Check if all requirements are adhered to	– Visual inspection	Weekly	Construction Site, the surroundings including access roads and contractor-managed off sites	Contractor through a nationally recognized laboratory	PIU/RAJUK/PCMU
Operation Stage						
Ground Water Quality	pH, Manganese(Mn), Arsenic(As), Iron(Fe), Ammonia Nitrogen(NH3-N), Total Hardness, Chlioride, Fecal Coliform(FC), Total Coliform(TC)	Laboratory analysis	Yearly	Building water supply system	PIU through a nationally recognized laboratory	Donor Agency
Noise Level	Measurement of noise dB(A)	Laboratory analysis	Quarterly (24 hours) and whenever any complain is received about disturbance due to noise level	Four corners of the site boundary, at 200 m and 300 m from the following locations: (i)	PIU through a nationally recognized laboratory	Donor Agency

Environmental Aspect	Monitoring Parameter	Means of Monitoring	Frequency	Location	Responsible Agency	
					Implemented By	Supervised By
				residential, (ii) institutional (school, mosque), (iii) silent (hospital) area		
Air Quality	SPM, SO_2, NOx	Laboratory analysis	Quarterly (8 hours continuous for two days)	Inside the project boundary	PIU through a nationally recognized laboratory	Donor Agency
Tree plantation Program	Select healthy sapling to confirm survival rate Monitoring plantation procedure Maintenance of plants	Visual inspection to ensure plantations in green areas and other designated sites.	Monthly	As per project details Design	PIU through a nationally recognized laboratory	Donor Agency
Relocation of the Occupants	Occupants are given sufficient facilities Their daily activity is not hampered due to retrofitting of the building	Visual inspection. The exact parameter depends on the type of the building use	Monthly	As per the building selected.	Contractor/PIU/RAJUK/PCMU	Donor Agency
Operation Stage						
Occupations are moved back to the original building	Their daily activity is not hampered due to retrofitting of the building	Visual inspection. The exact parameter depends on the type of the building use	During operation (once)	As per the building selected.	PIU/RAJUK/PCMU	Donor Agency

ANNEX B-4: EIA REPORT STRUCTURE

The Environment Assessment (EA) Report would cover the following issues:

Policy, Legal and Administrative Framework:

A brief description of the policy, legal and administrative setting under which the proposed project is to be implemented.

Project Description:

A brief description of the nature and objectives of the proposed project and how it functions oroperates, including the proposed location and why it was chosen

Baseline Data:

This section would include a brief description and evaluation of the current environmental situation in the project area. This would include a qualitative description of the existing environmental conditions in the project area including atmospheric, aquatic and terrestrial systems.

Environmental Impacts:

This section would identify potential environmental impacts that may arise as a result of the proposed project. All cumulative effects will be considered – positive and negative, direct and indirect, long term and short term.

Analysis of Alternatives:

This section would address alternatives for the proposed action, which would include the "no project" alternative as well as other alternatives considered before selecting the proposed action.

Mitigation Measures:

This section would include a detailed explanation of how the potential environmental impacts identified above could be mitigated.

Monitoring Plan:

This section should include a long term plan for monitoring to ensure that there no adverse impacts due to the project.

Environmental Management Plan:

Considering the nature and complexity of the sub-projects and technical assistance to be financed under the Credit, it is unlikely that any major or irreversible environmental impacts will be encountered. Therefore, the most important section of the EA would be the section on Environmental Management Plans (EMPs). EMPs should be prepared after taking into account comments from DOE and IDA as well as any clearance conditions. In view of this, a more detailed explanation of EMPs is given below. Prediction of potential adverse environmental and social impacts arising from project activities will be at the core of the environmental impact assessment process. By following the procedure described above, the environmental assessments to be conducted under the Project will be able to identify environmental and social impacts as a result of implementing the sub-projects. While impact identification is important, an equally essential element of this process is to develop measures to eliminate, offset or reduce impacts to acceptable levels during implementation and operation of the projects. The integration of such measures into project implementation and operation is supported by clearly defining the environmental requirements within a EMP. EMPs provide an essential link between the impacts predicted and mitigation measures specified within the EIA and implementation and operation activities. The plan outlines the anticipated environmental impacts, the mitigation measures to minimize these impacts, responsibilities for mitigation, timescales, and costs of mitigation and sources of funding.

World Bank guidelines state that detailed EMP's are essential elements for Category A projects, but for many Category B projects, a simple EMP alone will suffice. While there are no standard

formats for EMPs, it is recognized that the format needs to fit the circumstances in which the EMP is being developed and the requirements which it is designed to meet. The EMP will address the following aspects:

- Summary of impacts
- Description of Mitigation Measures
- Description of Monitoring Programs
- Institutional Arrangements
- Implementation Schedule and Reporting Procedures
- Cost estimates and sources of funds
- Items added to the Bill of Quantities (BoQ)