Initial Environmental Examination (Draft)

July 2019

BAN: Improving Computer and Software Engineering Tertiary Education Project

Volume 2 - Bangladesh University of Engineering and Technology

Prepared by the University Grants Commission of the Ministry of Education for the Asian Development Bank

CURRENCY EQUIVALENTS
(as of 1 July 2019)

Currency unit	–	Taka (Tk)
Tk1.00	=	$0.012
$1.00	=	Tk84.255

ABBREVIATIONS

ADB	–	Asian Development Bank
DOE	–	Department of Environment
ECA	–	Environment Conservation Act
ECC	–	environmental clearance certificate
ECR	–	Environment Conservation Rules
EIA	–	environmental impact assessment
EMP	–	environmental management plan
EMoP	–	environmental monitoring plan
IEE	–	initial environmental examination
MOE	-	Ministry of Education
MOEF	–	Ministry of Environment and Forests
PIU	–	project implementing unit
PMU	–	project management unit
SPS	–	Safeguard Policy Statement
UGC	-	University Grants Commission

WEIGHTS AND MEASURES

^{o}C	–	degree Celsius
dB(A)	–	A-weighted decibel
ha	–	hectare
lac	–	100,000
mg/L	–	milligram per liter
m^2	–	square meter
$\mu g/m^3$	–	microgram per cubic meter
ppm	–	parts per million

NOTE

(i) In this report, "$" refers to United States dollars.

TABLE OF CONTENTS

Page No.

List of Tables

List of Figures

List of Appendixes

EXECUTIVE SUMMARY

Introduction

The Government of Bangladesh (GOB) through the Ministry of Education (MOE), requested the Asian Development Bank (ADB) for financing of about $100M to cover the costs of the project expected to improve the relevance and quality of computer science and engineering and information technology (CSE/IT) programs in selected universities. These universities are (i) University of Dhaka (DU), (ii) Bangladesh University of Science and Technology (BUET), (iii) Jessore University of Science and Technology (JUST), and the (iv) East West University (EWU).

The project is expected to strengthen the preparation of graduates to take on jobs, improve the connection with industries to understand their requirements for human resource, and to create the required environment in developing the skills for entrepreneurships relevant to CSE/IT.

Project Description

The proposed project will help improve relevance and quality of CSE/IT programs in selected universities. It aims to increase job-ready graduates, increase R&D capacity through industry collaboration and interdisciplinary research projects, and develop technology entrepreneurships. These objectives will be delivered through four outputs elaborated below:

Output	Description
Output 1: An established modern learning, research and startup supporting environment	Supports the four universities in developing classrooms, laboratories, industry collaboration and startup or incubation space, and auxiliary facilities. Establishment of the support environment will adopt green building features for energy efficiency, water saving, climate and disaster resilient design, access of persons with disabilities, and female-friendly amenities such as students' study areas and staff lounges, safety features like access control system, increased lighting at night, and video surveillance system.
Output 2: Quality and industry-relevant CSE/IT programs	Assists the universities in updating and improving their CSE/IT degree programs through the use of new technologies, blended learning, industry-demanded soft-skills, and strengthen the existing digital library to ensure that they are aligned with international standards. JUST will set up an industry certification center for IT professionals in the southwest region. JUST, DU, and BUET will provide undergraduate scholarships to attract more female students to CSE/IT. There will be support to enable the IT industry introduce flexible working hours and telecommuting to boost women participation in the IT industry.
Output 3: Strengthened R&D and technology entrepreneurship	University Grants Commission (UGC) to provide grants on the following research initiatives: (i) industry collaboration addressing industry problems or in developing new products or services; (ii) interdisciplinary work on IT solutions that associate with other areas to develop new products or services; (iii) cutting edge CSE/IT research; and (iv) IT solutions to address disability issues. Research proposals can be developed together with foreign universities.

Output	Description
	There will be support also in introducing training programs on technology entrepreneurships as well as rules and incentives that would be instrumental to have more university-based startups and spinoff firms using the facility in Output 1.
Output 4: Strengthened tertiary education project design and management capacity	Supports GOB to carry out background studies, feasibility studies, and project preparatory activities for new tertiary education initiatives in priority economic sectors. Provides the required resources for effective project implementation and management.

From Output 1, the new building for BUET (ECE Annex Building) will involve a new, fully-furnished and complete 11-storey building of about 11, 856 m^2 to accommodate a maximum of 2,150 graduate and post-graduate students, and 150 faculty members (or planned for 2,700 persons per year intake), computing and IT Incubator (about four-floors) which will accommodate 20 entrepreneurs for R&D, and other features. The new building will also incorporate green building features and will be designed to be climate change-resilient.

Implementation arrangements

MOE will be the executing agency (EA) acting through UGC while the key implementing agencies (IAs) are JUST, DU, BUET, and EWU. A project management unit (PMU) will be set up at UCG and project implementation unit (PIU) at the four universities who will be responsible for the day-to-day management, monitoring, reporting, and coordination during implementation. A project steering committee (PSC) will be arranged at the MOE to provide guidance and direction, monitor and review the overall progress and outputs of project implementation. The PSC will be chaired by the Secretary, MOE with representatives consisting of UGC chairperson, assigned UGC member, vice chancellors of the four universities, and representatives from other agencies to ensure that the project achieves the targets and outcomes as well as coordination in resolving potential issues during implementation. An environmental safeguard consultant will be engaged at the PMU to provide technical support on compliance to ADB requirements.

Environmental Requirements

The Environment Conservation Act (ECA) 1995 and the Environment Conservation Rules (ECR) 1997 are the main environmental regulations in Bangladesh which provides that no project or industrial unit can be undertaken without securing an environmental clearance certificate (ECC) from the Department of Environment (DOE). However, under President's Order No. 10 of 1973, UGC has the autonomy in the university education, and among others, in examining development plans within the universities. In which case, they are not within the purview of ECA 1995 and ECR 1997. The universities have their own development planning, engineering and maintenance units with adequate staff that oversee the projects needed to ensure the sustained provision of education in Bangladesh.

The Safeguard Policy Statement (SPS) 2009 sets out the requirements for environmental safeguard that applies to all ADB-financed projects and grants. Under SPS 2009, projects or grants are screened and categorized based on their potential environmental impacts.

Output 1 will involve construction of three new buildings in JUST, DU, and BUET; and renovation works at EWU. These interventions will have potential environmental impacts, and thus, following SPS 2009, the project has been classified as category B on environment

requiring the preparation of an initial environmental examination (IEE). Based on the requirements of SPS 2009, this IEE is prepared and will be publicly disclosed to ADB website. Aside from SPS 2009, the disclosure of IEE is also required by the Access to Information Policy 2019.

The IEE prepared for the project is presented in four volumes to cover the four implementing universities: (i) Volume 1 – JUST; (ii) Volume 2 – BUET, (ii) Volume 3 – DU, and (iv) Volume 4 – EWU. This Volume 2 of the IEE will discuss the due diligence of the new building for BUET.

Description of the Existing Environment

The new building in BUET as part of Output 1 will be located in the West Palashi Campus. The project area belongs to Aw category based on the Köppen climate classification which is characterized by tropical wet and dry climate (hot and humid summer and dry winter). According to Dhaka Station of the Bangladesh Meteorological Department, the maximum monthly temperature varies from 39.6°C to 30.1°C while minimum temperature ranges from 22.5°C to 6.5°C. Annual average rainfall is 2,066 mm and the highest rainfall recorded was 3,028 mm which occurred in 1984.

Project site is in the urban area and no identified ecologically-sensitive areas close or adjacent to the site. Dhaka falls under seismic zone II (moderate seismic risk) and is subject to normal flooding during the monsoon season (June to September).

DOE maintains three continuous air monitoring stations in Dhaka under the Clean Air and Sustainable Environment Project funded by the World Bank. The three stations are: Sangshad Bhavan, Sher-e-Bangla Nagar; Farmgate, and Darus-salam. Based on their results from January to May 2019, PM_{10}, $PM_{2.5}$, and NO_2 exceed the limits set by National Ambient Air Quality Standards (2005). Ambient air sampling was done on 4 April 2019 in three sampling stations within the 500-m radius from the project site. Results suggest that the station across the project site (Polashi Bazar Market) has more air pollution sources than the in Eden Mohila College, and infront of the existing ECE Building in BUET (West Palashi Campus). Noise level was similarly measured on 4 April 2019 in the same stations and results suggest that Polashi Bazar Market exceeded the daytime and nighttime levels set by Noise Pollution Control Rules 2006. Source of drinking water at the project site was tested on 30 March 2019 for heavy metals (As, Cd, Cr^{+6} and Pb), fecal coliform and pH. Results show that it meets the standards set by Schedule 3(b), Rule 12 of ECR 1997 and WHO.

Vegetation in the project site is limited with less than 10 mature trees and some patches of grass.

Anticipated Impacts and Mitigation Measures

The new building will incorporate green building features which aim to reduce energy and water consumption, and thus, also expected to be a climate change-resilient building. These features are included in the budget with estimated cost of about $3.1853 million which will cover construction materials, energy-efficient lighting systems and electric fans, and relevant Energy Star-certified products.

Prior to construction works, the PMU in UGC and the PIU in BUET will ensure that the Contractor will include the responsibility of compensating for any temporary damage, loss or inconvenience as a result of accident or failure to comply with regulations in implementing the

project. PMU and PIU together with the environmental safeguard consultant will conduct an orientation to the Contractor and their workers about their responsibility to compliance of environmental requirements, awareness of diseases such as HIV/AIDS and tuberculosis, and adherence to best practices in construction on occupational health and safety.

Associated environmental impacts are mainly during construction such as increased noise and dust levels, occupational and community safety risks, generation of waste, movements of construction vehicles, presence of workers within the premises of BUET, and similar impacts due to civil, mechanical and electrical works for the new building. The Contractor will be required to prepare a construction management plan describing the commitments to implement measures in managing these temporary impacts aside from compliance to the environmental management plan.

Construction site will be temporarily enclosed with clear and proper demarcation to separate access of university students, faculty, and administrative staff. Contractor will designate security personnel to prevent unauthorized access to the construction site. The use of personal protective equipment and safety gears such as hardhats, working gloves, ear muffs, googles, masks and similar safety protection will be mandatory. Contractor will provide sanitary facilities, safe drinking water, first aid kit, and fire-fighting system. Good housekeeping at the work site and temporary space during break-time will be enforced at all times. Toolbox meetings will be conducted daily prior to start of work to reinforce the importance of safety in the workplace and compliance to construction site rules and regulations.

The PIU will ensure that ambient air quality limits set by the International Finance Corporation (IFC)-World Bank (WB) Environmental, Health, and Safety (EHS) General Guidelines 2007, the Bangladesh National Ambient Air Quality Standards (2005), and the Noise Pollution (Control) Rules 2006 will not be exceeded during construction. The PIU and the environmental safeguard consultant will monitor compliance of the Contractor.

Analysis of Alternatives

No alternative site was considered for the new building as this is the best option in terms of ownership, adequate area, and availability. The “no project” option will mean that the vacant space behind the ECE Building in West Palashi Campus of BUET will not have its best and highest usage of land. At the same time, the undergraduate and graduate students, faculty, and staff of CSE Department will not have the opportunity to benefit from innovative IT learning environment that the new building will provide.

“With project” option entails that the demand for IT graduates to meet the requirements of the IT industry will be met, temporary jobs for skilled and non-skilled workers during construction will be created, and there will be more options for R & D, training, and link to the private sector which are expected to improve chances of graduates for employment.

Information Disclosure, Consultation and Participation

A total of 61 participants joined the consultation meeting on 3 April 2019 in the West Palashi Campus of BUET. Issues raised were participation of students not from CSE Department to the opportunities that will be provided by the project, behavior of Contractor and workers, alternate access of Contractor and workers to ensure separation from students, potential traffic during construction, emergency preparedness for the new building, and temporary accommodation for students due to traffic. Participants were not extremely concerned about increased noise and

dust level given that the West Palashi Campus is secluded with high concrete fence and existing academic buildings are insulated from noise. The PIU in BUET will ensure that these concerns are taken into consideration in the building design and during construction phase.

Consultations will continue during project implementation. A project brief (a one-page flyer or a Q&A) both in English and Bangla will be made available at the PIU, construction site office, PMU, and BUET administration office. The project brief will be posted to BUET website. The IEE, which provides more information, will be posted to the ADB website following SPS 2009 and Access to Information Policy 2019.

Grievance Redress Mechanism

The PMU at UGC will establish grievance redress mechanism (GRM) to deal with potential complaints that may be lodged on the project. Part of the GRM will be to create a grievance redress committee (GRC) that may consist of: PMU Head, representative from the local government, representative of Contractor, and witness of the complainant. The environmental safeguard consultant at the PMU will act as the secretary of the GRC. Complaint can be lodged either in person to the Site Engineer, in writing or by phone. A complainant can seek redress in three-tiers: (i) through the site engineer of the Contractor or PIU level, (ii) through the GRC, and (iii) or through the DOE under the Environment Court Act 2010. The complainant is not restricted to seek redress through the legal system at any point in the GRM process.

The PIU will disclose details on GRM through the project website of BUET as well as in the billboards at the construction site. Details will include the contact person, a hotline phone number, and a simplified flowchart on how to file a complaint. If needed, the environmental safeguard consultant will provide assistance to the affected person in submitting a complaint.

Environmental Management Plan

The environmental management plan (EMP) describes the measures to be implemented to ensure that the identified impacts during construction and post-construction are mitigated. The EMP includes an environmental monitoring plan (EMoP) identifying the parameters to be monitored, frequency of monitoring, location, implementing responsibility, and supervision (see Table 9.1 and Table 9.2, respectively)**.** The cost of implementing the EMP and the EMoP will be part of the Contractor's budget.

As soon as the project becomes effective, the PIU through the PMU, will prepare environmental monitoring reports and will be submitted to ADB semi-annually during construction and annually post-construction. These monitoring reports will be posted in the ADB website following the requirements of SPS 2009, and Access to Information Policy 2019. The PIU will designate a staff to coordinate with the environmental safeguard consultant at the PMU in submitting environmental monitoring reports and other concerns on environmental safeguard compliance.

Conclusion and Recommendation

While the project will have associated environmental impacts during construction phase, overall, it will have significant contribution in advancing the goals of Vision 2021 through improving computer and software engineering tertiary education.

The project is environment category B based on SPS 2009 and an IEE was prepared. Stakeholders were consulted and a grievance redress mechanism will be set-up consistent with the requirements of SPS 2009. Potential environmental impacts of the project are mainly during construction which are considered temporary, of short duration, and can be easily mitigated through the implementation of the EMP and EMoP, compliance of the Contractor to the approved building design and relevant regulations, and compliance monitoring of the PIU. An environmental safeguard consultant will provide the required technical support to the PIU and the PMU in ensuring that the environmental requirements of ADB are complied.

1.0 INTRODUCTION

To celebrate the 50th year of independence, Bangladesh launched the Vision 2021 which embodies measures to achieve the eight goals identified. The goals identified in Vision 2021 reflect a future Bangladesh as an economically inclusive and politically accountable society.[1] These goals are: (i) to become a participatory democracy; (ii) to have an efficient, accountable, transparent and decentralised system of governance; (iii) to become a poverty-free middle-income country; (iv) to have a nation of healthy citizens; (v) to develop a skilled and creative human resource; (vi) to become a globally integrated regional economic and commercial hub; (vii) to be environmentally sustainable; and (viii) to be a more inclusive and equitable society.

Part of the goal to develop a skilled and creative human resource is to ensure that Bangladesh will be known as a country of educated people with skills in information technology. In addition, one of the outcomes visualized for education, training, and skills development in Vision 2021 is to have established an informed, knowledge-based, technologically-oriented, and gender equitable learning system.[2]

To achieve these goals, the Government of Bangladesh (GOB) through the Ministry of Education (MOE), requested the Asian Development Bank (ADB) for financing of about $100M to cover the costs of the project expected to improve the relevance and quality of computer science and engineering and information technology (CSE/IT) programs in selected universities. These universities are (i) University of Dhaka (DU), (ii) Bangladesh University of Science and Technology (BUET), (iii) Jessore University of Science and Technology (JUST), and the (iv) East West University (EWU).

1.1 Overview of the Project

Specifically, the project is expected to strengthen the preparation of graduates to take on jobs, improve the connection with industries to understand their requirements for human resource, and to create the required environment in developing the skills for entrepreneurships relevant to CSE/IT. Table 1.1 presents the four project outputs while Figure 1.1 presents the project location.

Table 1.1 Project Outputs

Output	Description
Output 1: An established modern learning, research and startup supporting environment	Supports the four universities in developing classrooms, laboratories, industry collaboration and startup or incubation space, and auxiliary facilities. Establishment of the support environment will adopt green building features for energy efficiency, water saving, climate and disaster resilient design, access of persons with disabilities, and female-friendly amenities such as students' study areas and staff lounges, safety features like access control system, increased lighting at night, and video surveillance system.
Output 2: Quality and industry-relevant CSE/IT programs	Assists the universities in updating and improving their CSE/IT degree programs through the use of new technologies, blended

[1] Center for Policy Dialogue, *Bangladesh Vision 2021*, August 2007. http://cpd.org.bd/wp-content/uploads/2007/08/Bangladesh-Vision-2021-English.pdf.

[2] Government of the People's Republic of Bangladesh, General Economics Division, *Outline Perspective Plan of Bangladesh 2010-2021, Making Vision 2021 A Reality*, June 2010. https://unctad.org/meetings/en/Contribution/dtl_eWeek2018c03-bangladesh_en.pdf.

Output	Description
	learning, industry-demanded soft-skills, and strengthen the existing digital library to ensure that they are aligned with international standards. JUST will set up an industry certification center for IT professionals in the southwest region. JUST, DU, and BUET will provide undergraduate scholarships to attract more female students to CSE/IT. There will be support to enable the IT industry introduce flexible working hours and telecommuting to boost women participation in the IT industry.
Output 3: Strengthened R&D and technology entrepreneurship	University Grants Commission (UGC) to provide grants on the following research initiatives: (i) industry collaboration addressing industry problems or in developing new products or services; (ii) interdisciplinary work on IT solutions that associate with other areas to develop new products or services; (iii) cutting edge CSE/IT research; and (iv) IT solutions to address disability issues. Research proposals can be developed together with foreign universities. There will be support also in introducing training programs on technology entrepreneurships as well as rules and incentives that would be instrumental to have more university-based startups and spinoff firms using the facility in Output 1.
Output 4: Strengthened tertiary education project design and management capacity	Supports GOB to carry out background studies, feasibility studies, and project preparatory activities for new tertiary education initiatives in priority economic sectors. Provides the required resources for effective project implementation and management.

Source: Development Project Proposal, MOE

1.2 Project Implementation Arrangements

MOE will be the executing agency (EA) acting through UGC while the key implementing agencies (IAs) are JUST, DU, BUET, and EWU. A project management unit (PMU) will be set up at UCG and project implementation unit (PIU) at the four universities who will be responsible for the day-to-day management, monitoring, reporting, and coordination during implementation. A project steering committee (PSC) will be arranged at the MOE to provide guidance and direction, monitor and review the overall progress and outputs of project implementation. The PSC will be chaired by the Secretary, MOE with representatives consisting of UGC chairperson, assigned UGC member, vice chancellors of the four universities, and representatives from other agencies to ensure that the project achieves the targets and outcomes as well as coordination in resolving potential issues during implementation.

An environmental safeguard consultant will be engaged intermittently until the completion of construction phase (about 2 years) to provide technical support to the PMU and PIUs on compliance to environmental requirements of ADB, and the building construction requirements of the government. The project is expected to be implemented from January 2020 until June 2025. Figure 1.2 presents the project management structure.

Figure 1.1 Project Location Map

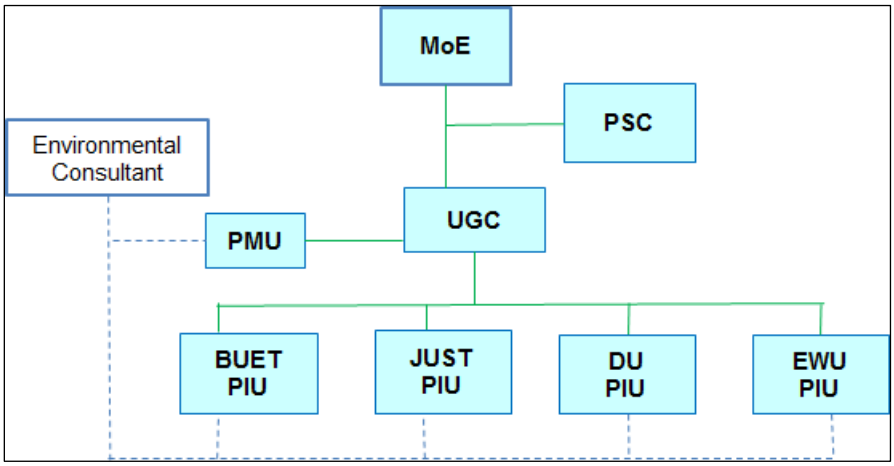


Figure 1.2 Project Management Structure

1.3 Need for Environmental Assessment

1.3.1 Requirements of the Government

The Environment Conservation Act (ECA) 1995 and the Environment Conservation Rules (ECR) 1997 are the main environmental regulations in Bangladesh which provides that no project or industrial unit can be undertaken without securing an environmental clearance certificate (ECC) from the Department of Environment (DOE). The DOE is the government agency authorized to regulate and enforce environmental management regulations to ensure that development projects are implemented sustainably, and to conserve and manage the environment in Bangladesh.

However, under President's Order No. 10 of 1973, UGC has the autonomy in the university education, and among others, in examining development plans within the universities. In which case, they are not within the purview of ECA 1995 and ECR 1997. The universities have their own engineering and maintenance units with adequate staff that oversee the development projects needed to ensure the sustained provision of education in Bangladesh.

1.3.2 Requirements of ADB

The Safeguard Policy Statement (SPS) 2009 of ADB sets out the requirements for environmental safeguard which applies to all the projects and grants they finance.[3]

SPS 2009 requires that projects to be funded by ADB will be subject to screening and categorization based on their potential environmental impacts. The categorization determines the required environmental assessment.

Given the associated civil works that will be involved in the construction of the new buildings, the project is classified as category B on environment requiring an initial environmental examination (IEE). A category B project is considered likely to have adverse environmental impacts that are less adverse, site-specific, few if any of them irreversible, and in most cases mitigation measures can be more readily designed.

1.4 IEE Methodology

Objectives Preparation of an IEE aims to (i) describe the existing environment; (ii) assess the potential environmental impacts of the proposed project; (iii) identify the mitigation and/or enhancement measures corresponding to the potential environmental impacts identified; (iv) describe the environmental management and monitoring plan to be implemented and complied; and, (v) ensure that all the statutory regulatory requirements relevant to the project have been identified and considered to ensure an understanding of what needs to be complied.

Scope This IEE was prepared following the requirements of SPS 2009 of ADB. The scope covers the general existing environmental profile of the project site, assessment of potential environmental impacts during design and/or pre-construction, construction, and operation (or post-construction) stages; and a description of the environmental management plan (EMP) and environmental monitoring plan (EMoP). The following steps were considered:

[3] ADB. Safeguard Policy Statement 2009. https://www.adb.org/documents/safeguard-policy-statement

(i) Undertake site visits to collect relevant secondary data to establish the baseline environmental condition;
(ii) Assess the potential impacts due to location, design, construction and post-construction of the CSE/IT building;
(iii) Examine opportunities for environmental enhancement and identify measures;
(iv) Prepare an EMP outlining the measures to mitigate potential environmental impacts including the institutional arrangements;
(v) Identify key environmental parameters required to be monitored during project implementation and prepare an EMoP;
(vi) Carry out consultation with affected stakeholders, local administrative bodies to identify perceptions of the project, introduce project components and anticipated impacts; and,
(vii) Disclose the draft IEE in ADB website and prepare project brief and/or FAQs in Bangla that can be publicly available at the offices of UGC, JUST, BUET, DU, EWU, and the construction sites.

Specifically for BUET, site visits were conducted in January and March/April 2019 intermittently to collect secondary data, conduct consultations, and coordinate with relevant agencies of the government while environmental sampling was done on 30 March and 4 April 2019.

1.5 Structure of the Report

Following the requirements of SPS 2009, the environmental assessment for the project is presented as follows:

Volume 1 – IEE of JUST
Volume 2 – IEE of BUET
Volume 3 – IEE of DU
Volume 4 – IEE of EWU

The IEE for each university is based on the EIA format given in Annex to Appendix 1 of SPS 2009, pp41-43.

2.0 POLICY, LEGAL, AND ADMINISTRATIVE FRAMEWORK

2.1 National environmental requirements

The following presents the relevant regulatory agency, process, regulations and international environmental agreements.

2.1.1 Environmental agency

The Ministry of Environment and Forests (MOEF) is the agency that plans, promotes, coordinates and oversees the implementation of programs and plans on environment and forestry. MOEF manages all national environmental matters and is responsible for activities such as prevention and control of pollution, forestation and regeneration of degraded areas and protection of the environment, and in the framework of legislations. MOEF also conducts surveys, impact assessment, control of pollution, research, and collection and dissemination of environmental information and creation of environmental awareness among all sectors in Bangladesh.

Created in 1989, the DOE performs the regulatory functions of the MOEF. DOE is the main agency entrusted with regulating and enforcing environmental management regulations in order to ensure sustainable development and to conserve and manage the environment. DOE ensures the consistent application of environmental rules and regulations, and provides guidance, training and promotional campaign on improving the awareness of environmental issues.

2.1.2 Environmental regulations

The main environmental regulations in Bangladesh are the *Environment Conservation Act* (ECA) 1995 (amended 2000, 2002, 2007 and 2010) and the *Environment Conservation Rules* (ECR) 1997.

ECA 1995 provides the requirements on environmental protection, improvement of environmental standards, and control and abatement of environmental pollution. Through the ECA 1995, the DoE is mandated to undertake any activity needed to conserve and enhance the quality of environment and to control, prevent and mitigate pollution.

ECR 1997 provides for the declaration of ecologically-critical areas, categorization of industries and projects and identified types of environmental assessments needed against respective categories of industries or projects. 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) the requirement for and procedures to obtain ECC; and (iii) the requirement for the IEE and their based on categories of industrial and other development interventions.

The ECA 1995 and ECR 1997 outline the regulatory mechanism to protect the environment in Bangladesh. Aside from ECA 1995 and ECR 1997, Table 2.1 presents a summary of relevant environmental regulations.

Table 2.1 Relevant Regulations

Regulation	Brief Description
Bangladesh National Building Code 2006	Sets minimum standards for design, construction, quality of materials, use and occupancy, location and maintenance of all buildings to safeguard, within achievable limits, life, limb, health, property and public welfare
Bangladesh Building Construction Rules 2008	These rules superseded the previous Building Construction (BC) rules of 1984. These rules seek to control development plot-by-plot and case-by-case. It controls development by imposing conditions on set backs, site coverage, construction of garages, access to plot, provision of lift, land use of that particular plot and height of building. Restricting the height of a building in BC Rules 1996 helps to control the density of an area and manage the growth of the city in some way.
Disaster Management Act 2012	Coordinates activities on disaster management, object-oriented and strengthened and to formulate rules to build up infrastructure of effective disaster management to fight all types of disaster
Environment Court Act 2000 (amended in 2002 and 2010)	This Act is under the Judiciary and MOEF to ensure the resolution of disputes on environmental and social damages resulting from any development activities. This Act also allows for the completion of environment-related legal proceedings effectively.
Vehicle Act 1927, the Motor Vehicles Ordinance 1983, and Bengal Motor Vehicle Rules 1940	These are under the Bangladesh Road Transport Authority (BRTA) which regulates vehicular emissions and noise including road safety.
Bangladesh Factories Act 1995	Requires every workplace including small or large scale construction where women are employed to have an arrangement of childcare services. Based on this Act and Labor Laws - medical facilities, first aid and accident and emergency arrangements are to be provided by the authority to the workers at workplaces.
Bangladesh Labour Act 2006 (amended 2013), Bangladesh Labor Rules 2015	These regulations are under the Ministry of Labour which provides for the occupational rights and safety of factory workers and the provision of comfortable work environment and reasonable working conditions including the prohibition of child labor and adolescent
The Antiquities Act 1968 (amended 1976)	Regulation on the preservation and protection of antiquities
The Embankment and Drainage Act, 1952	Consolidates the laws relating to Embankments and drainage providing provision for the construction, maintenance, management, removal and control of embankments and water courses for the better drainage of lands and for their protection from floods, erosion or other damage by water.

2.1.3 Environmental Approval Process

Section 12 of ECA 1995 provides that no industrial unit or project can be established or undertaken without securing an environmental clearance certificate (ECC) from the DOE. Following the requirements of ECR 1997, the DOE has classified various development interventions according to the potential adverse environmental impacts for the purpose of issuing the ECC. This classification includes: (i) green; (ii) orange-A; (iii) orange-B; and (iv) red. The Green classification refers to industries or projects considered to be relatively pollution-free, thus, no environmental study will be required. The Orange-A, Orange-B, and Red category are those projects and industrial units that may have potential adverse environmental impacts and therefore requires an environmental impact assessment (EIA). Securing the ECC for these categories involves two steps: (i) issuance of site clearance certificate (SCC), and then (ii) the ECC.

The SCC will be issued by the DOE upon approval of the initial environmental examination (IEE) and the receipt of the "No Objection Certificate (NOC)." These documents serve as "proof of authorization" to initiate a project. The IEE includes the terms-of-reference (TOR) of the EIA which requires the approval of the DOE. Once the EIA has been reviewed and approved by the DOE, the ECC will be issued. The project proponent cannot open line of credit in favor of importable machineries and cannot start any physical activities for the project without the DoE-approved EIA. Figure 2.1 presents the overview of the approval process.

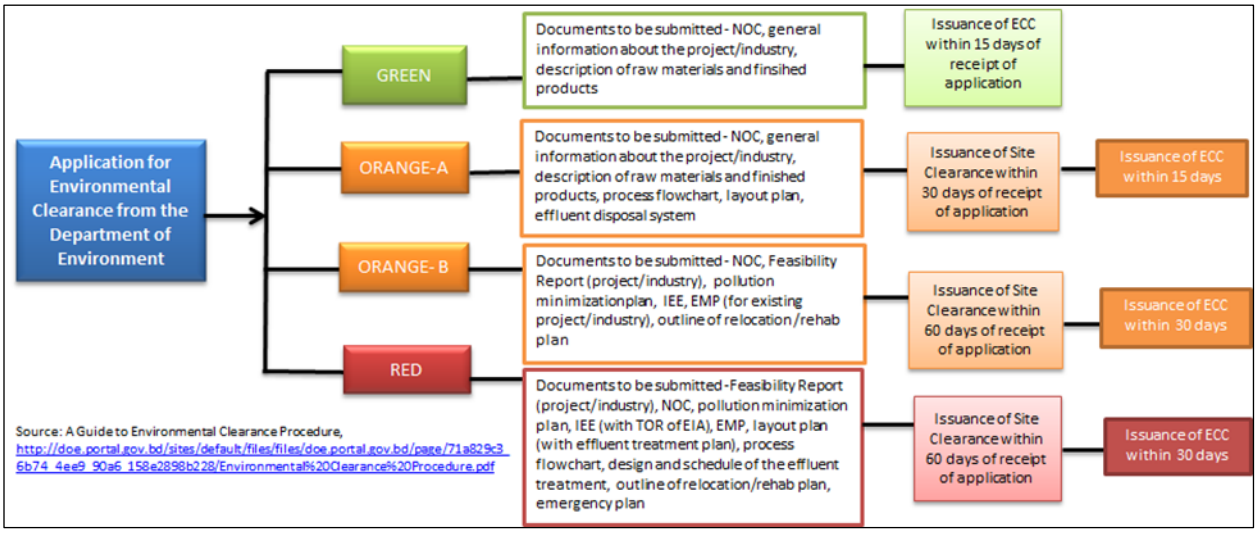


Figure 2.1 Approval Process of DOE for ECC

2.1.4 Applicable environmental standards

Table 2.2 lists the applicable standards to meet national regulations. SPS 2009 provides that during construction, the GOB will apply pollution prevention and practices that are in line with international good practice as given by international standards such as the IFC-WB EHS General Guidelines 2007. In addition, should the regulations of the Government differ from the levels and measures set by the IFC-WB EHS General Guidelines 2007, the Government will achieve whichever is more stringent. The relevant standards from IFC-WB EHS General Guidelines 2007 are given in Table 2.3.

Table 2.2 Relevant National Environmental Standards

AIR[a]		
Pollutant	Standards	Averaging Period
NO_x	100 µg/m^3 (0.053 ppm)	Annual
PM_{10}	50 µg/m^3	Annual
	150 µg/m^3	24-hour
$PM_{2.5}$	15 µg/m^3	1-hour
	65 µg/m^3	24-hour
NOISE[b]		
Zone Class	Limits in dB(A)	
	Daytime (6 am – 9 pm)	Nighttime (9 pm-6 am)
i) A sensitive area where quietness is of primary importance such as schools, hospitals, mosques etc.	50	40
ii) Residential zone	55	45
iii) Mixed areas, which are, used as residential areas as well as commercial and industrial purposes	60	50
iv) Commercial areas	70	60
v) Industrial areas	75	70

Day time shall mean from 6:00 am to 9:00 pm
Night time shall mean from 10pm to 6:00 am
Leq - energy mean of the noise level over a specific period
[a] Ambient Air Quality Standards 2005
[b] Noise Pollution (Control) Rules 2006

Table 2.3 Relevant Environmental Standards from IFC-WB EHS Guidelines 2007

Table 1.1.1: WHO Ambient Air Quality Guidelines[7,8]

	Averaging Period	Guideline value in µg/m^3
Sulfur dioxide (SO_2)	24-hour	125 (Interim target-1) 50 (Interim target-2) 20 (guideline)
	10 minute	500 (guideline)
Nitrogen dioxide (NO_2)	1-year	40 (guideline)
	1-hour	200 (guideline)
Particulate Matter PM_{10}	1-year	70 (Interim target-1) 50 (Interim target-2) 30 (Interim target-3) 20 (guideline)
	24-hour	150 (Interim target-1) 100 (Interim target-2) 75 (Interim target-3) 50 (guideline)
Particulate Matter $PM_{2.5}$	1-year	35 (Interim target-1) 25 (Interim target-2) 15 (Interim target-3) 10 (guideline)
	24-hour	75 (Interim target-1) 50 (Interim target-2) 37.5 (Interim target-3) 25 (guideline)
Ozone	8-hour daily maximum	160 (Interim target-1) 100 (guideline)

Table 1.7.1- Noise Level Guidelines[54]

Receptor	One Hour L_{Aeq} (dBA)	
	Daytime 07:00 - 22:00	Nighttime 22:00 - 07:00
Residential; institutional; educational[55]	55	45
Industrial; commercial	70	70

Source: World Bank Group-International Finance Corporation EHS General Guidelines 2007

2.1.5 Relevant International Environmental Agreements

Aside from the national environmental regulations, international environmental agreements where Bangladesh is a party will be referred to in the design and implementation of the project. Table 2.4 lists the applicable international environmental agreements that can provide guidance during project implementation.

Table 2.4 Bangladesh Relevant International Environmental Agreements

International Environmental Agreement	Date Ratified	Description
Convention Concerning the Protection of the World Cultural and Natural Heritage (Paris 1972)	3 November 1983	Entered into force on 23 November 1972, this convention defines and provides for the conservation of the world`s heritage by listing the natural and cultural sites whose value should be preserved.
Vienna Convention for the Protection of the Ozone Layer 22 March 1985	2 August 1990	A framework for efforts to protect the globe's ozone layer by means of systematic observations, research and information exchange on the effects of human activities on the ozone layer and to adopt legislative or administrative measures against activities likely to have adverse effects on the ozone layer.
Montreal Protocol on Substances that Deplete the Ozone Layer (a protocol to the Vienna Convention for the Protection of the Ozone Layer)	2 August 1990	This international treaty was entered into force on 1 January 1989 and is designed to protect the ozone layer by phasing out the production of numerous substances that are responsible for ozone depletion. This treaty also requires controlling emissions of substances that deplete ozone.
Kyoto Protocol (1997)	22 October 2001	An international agreement adopted on 11 December 1997 and entered into force on 16 February 2005, which commits its Parties to set internationally- binding emission reduction targets. This agreement is linked to the United Nations Framework Convention on Climate Change (UNFCCC).
UNFCCC (1992)	15 April 1994	This framework came into force on 21 March 1994 and aims to achieve stabilization of greenhouse gas (GHG) concentrations in the atmosphere at a level low enough to prevent dangerous anthropogenic interference with the climate system.
Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (1989)	1 April 1993	This convention came into force on 5 May 1992 which aims to reduce the amount of waste produced by signatories and regulates the international traffic in hazardous wastes.
UNESCO World Heritage Convention 1972	3 August 1983 (Accession) Accession – the state accepts the offer or the opportunity to	This convention describes the concepts of nature conservation and the preservation of cultural properties. Parties agree to identify and nominate properties on their national territory to be considered for inscription on the World Heritage List, gives details of how

International Environmental Agreement	Date Ratified	Description
	become a party to a treaty already negotiated and signed by other states	a property is protected, and provides a management plan for its upkeep.

2.2 Environmental Requirements of Asian Development Bank

SPS 2009 sets the environmental requirements and review procedures that apply to all projects and grants that ADB finance. SPS 2009 comprises three key safeguard areas: environment, involuntary resettlement, and indigenous peoples; and aims to avoid adverse project impacts to both the environment and the affected people; minimize, mitigate and/or compensate for adverse project impacts; and help Borrowers to strengthen their safeguard systems and to develop their capacity in managing the environmental and social risks.

SPS 2009 uses a categorization system to indicate the significance of potential environmental impacts and is determined by the category of its most environmentally-sensitive component, including direct, indirect, cumulative, and induced impacts within the project's area of influence. The project categorization system is described in Table 2.5.

Table 2.5 Environmental Classification According to SPS 2009

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

Source: ADB. Safeguard Policy Statement 2009, p. 19. http://www.adb.org/sites/default/files/institutional-document/32056/safeguard-policy-statement-june2009.pdf.

2.2.1 Disclosure requirements

Aside from the SPS 2009 requirements, the Access to Information Policy 2019 provides for the requirements of disclosure for project information of projects and grants funded by ADB.[4] Consistent with SPS 2009, this requires the disclosure of documents submitted by the borrower and/or client:

(i) a draft EIA report for category A project, at least 120 days before Board consideration;
(ii) a draft environmental assessment review framework, where applicable, before appraisal;[5]
(iii) the final EIA or IEE, upon receipt by ADB;
(iv) a new or updated EIA or IEE, and a corrective action plan, if any, prepared during project implementation, upon receipt by ADB; and,
(v) the environmental monitoring reports, upon receipt by ADB.

Table 2.6 presents a summary of the implications of SPS 2009 to the project.

Table 2.6 Implications of SPS 2009 to the Project

No.	SPS 2009 Principles	Description
1	Use a screening process for each proposed project, as early as possible, to determine the appropriate extent and type of environmental assessment so that appropriate studies are undertaken commensurate with the significance of potential impacts and risks.	The components with environmental implications have been identified under Output 1 of the Project: (a) construction of three new multi-storey buildings within the university premises of JUST, BUET, and DU; and (b) renovation and upgrading of the existing Computer Science and Engineering structure of the East-West University (EWU). A Rapid Environmental Assessment (REA) checklist was completed for these components, and the environment category based on SPS 2009, is B requiring an IEE.
2	Conduct an environmental assessment for each proposed project to identify potential direct, indirect, cumulative, and induced impacts and risks to physical, biological, socioeconomic (including impacts on livelihood through environmental media, health and safety, vulnerable groups, and gender issues), and physical cultural resources in the context of the project's area of influence. Assess potential transboundary and global impacts, including climate change. Use strategic environmental assessment where appropriate.	An IEE following the requirements of SPS 2009 was conducted for the components with environmental implications.
3	Examine alternatives to the project's location, design, technology, and components and their potential environmental and social impacts and document the rationale for selecting the particular alternative proposed. Also consider the no project alternative.	Alternative sites, where appropriate, were considered and included in the IEE.
4	Avoid, and where avoidance is not possible, minimize, mitigate, and/or offset adverse	An EMP is included in the IEE for each of the components with environmental implications under the four universities

[4] Access to Information Policy 2019 replaces Public Communication Policy 2011
[5] If no further mission for appraisal is required, the document will be posted before the management review meeting or the first staff review meeting for sovereign projects, or before the final investment committee meeting for nonsovereign projects, as applicable (ADB procedures).

No.	SPS 2009 Principles	Description
	impacts and enhance positive impacts by means of environmental planning and management. Prepare an environmental management plan (EMP) that includes the proposed mitigation measures, environmental monitoring and reporting requirements, related institutional or organizational arrangements, capacity development and training measures, implementation schedule, cost estimates, and performance indicators. Key considerations for EMP preparation include mitigation of potential adverse impacts to the level of no significant harm to third parties, and the polluter pays principle.	of the MOE. The EMPs will provide guidance to the construction contractor and their subcontractor (if any) who will be engaged during project implementation to ensure compliance to the relevant provisions in SPS 2009.
5	Carry out meaningful consultation with affected people and facilitate their informed participation. Ensure women's participation in consultation. Involve stakeholders, including affected people and concerned nongovernment organizations, early in the project preparation process and ensure that their views and concerns are made known to and understood by decision makers and taken into account. Continue consultations with stakeholders throughout project implementation as necessary to address issues related to environmental assessment. Establish a grievance redress mechanism to receive and facilitate resolution of the affected people's concerns and grievances regarding the project's environmental performance.	Four consultations events were undertaken during the preparation of the IEE (i.e., one per university). Consultations will continue through the PIUs in each university (as appropriate) during project implementation. A three-tiered grievance redress mechanism (GRM) is included in the IEE including the proposed composition of the grievance redress committee (GRC). The implementation of the GRM will be monitored by the PMU established under the UGC.
6	Disclose a draft environmental assessment (including the EMP) in a timely manner, before project appraisal, in an accessible place and in a form and language(s) understandable to affected people and other stakeholders. Disclose the final environmental assessment, and its updates if any, to affected people and other stakeholders.	The IEE will be endorsed by the MOE for public disclosure through the ADB website.
7	Implement the EMP and monitor its effectiveness. Document monitoring results, including the development and implementation of corrective actions, and disclose monitoring reports.	At the construction phase, the contractor will be responsible for implementing the EMP and will be monitored by the PIU and PMU. Environmental monitoring reports and corrective actions (if needed) will be prepared by the PIUs and will be disclosed to ADB website.
8	Do not implement project activities in areas of critical habitats, unless (i) there are no measurable adverse impacts on the critical habitat that could impair its ability to function, (ii) there is no reduction in the population of any recognized endangered or critically endangered species, and (iii) any lesser impacts are mitigated. If a project is located within a legally protected area, implement additional programs to promote and enhance the conservation aims of the protected area. In an area of natural habitats, there must be no significant conversion or degradation, unless (i) alternatives are not available, (ii) the overall benefits from the project substantially outweigh the environmental costs, and (iii) any conversion or degradation is appropriately mitigated. Use a precautionary	All the proposed interventions with environmental implications are not located in critical habitats as defined by SPS 2009.

No.	SPS 2009 Principles	Description
	approach to the use, development, and management of renewable natural resources.	
9	Apply pollution prevention and control technologies and practices consistent with international good practices as reflected in internationally recognized standards such as the World Bank Group's Environmental, Health and Safety Guidelines. Adopt cleaner production processes and good energy efficiency practices. Avoid pollution, or, when avoidance is not possible, minimize or control the intensity or load of pollutant emissions and discharges, including direct and indirect greenhouse gases emissions, waste generation, and release of hazardous materials from their production, transportation, handling, and storage. Avoid the use of hazardous materials subject to international bans or phaseouts. Purchase, use, and manage pesticides based on integrated pest management approaches and reduce reliance on synthetic chemical pesticides.	Construction activities will generate waste and may increase ambient dust and noise levels. Vegetation and land clearing will be done. No hazardous chemicals will be used in vegetation clearing. The new buildings will use Energy Star certified products and will incorporate green building features. https://www.energystar.gov/about/energy-star-brand/energy-star-brand-book
10	Provide workers with safe and healthy working conditions and prevent accidents, injuries, and disease. Establish preventive and emergency preparedness and response measures to avoid, and where avoidance is not possible, to minimize, adverse impacts and risks to the health and safety of local communities.	Construction works may cause accidents or injuries to workers. Contractors will be required to comply with the EMP and implement to the extent possible the Environmental Codes of Practice. Compliance will be monitored by the PIUs and PMU.
11	Conserve physical cultural resources and avoid destroying or damaging them by using field-based surveys that employ qualified and experienced experts during environmental assessment. Provide for the use of "chance find" procedures that include a pre-approved management and conservation approach for materials that may be discovered during project implementation.	The sites are within the existing premises of the universities and are not known to have physical cultural resources as defined by SPS 2009.

3.0 DESCRIPTION OF THE PROJECT

The project will have four outputs as summarized in Table 1.1. The component that will have environmental implications from Output 1 (see below) will be the construction of new IT buildings for JUST, BUET, DU, and some renovations of classrooms and IT laboratories at EWU.

Output 1: An established modern learning, research and startup supporting environment	Supports the four universities in developing classrooms, laboratories, industry collaboration and startup or incubation space, and auxiliary facilities. Establishment of the support environment will adopt green building features for energy efficiency, water saving, climate and disaster resilient design, access of persons with disabilities, and female-friendly amenities such as students' study areas and staff lounges, safety features like access control system, increased lighting at night, and video surveillance system.

BUET is the premiere technological and engineering university of Bangladesh and CSE Department is the first department in Bangladesh on ICT education. To realize the objectives and goals of the other outputs in the project, a high rise building will be required given the limited space available for BUET within the premises of the university.

The new building will be constructed at the north-east corner of the West Palashi Campus of BUET as an extension of the existing ECE Building (ECE Annex) where the CSE department is hosted (Figure 3.1). The floor space of each floor of ECE Annex building is 912 square meter (m^2) and based on this area, the new building needs to have a total of about 11,856 m^2. Thus, a total of 13 floors (including basement and ground floor) will be required to accommodate 11,856 m^2 (Table 3.1). Some specifications of the new building include:

- Fully furnished 12-storey building (Total area – 11,856 m^2)
- New building will be designed as one storey basement and 20-storey foundation
- Will accommodate 2,150 graduate and post-graduate students, 150 faculty members (or 2,700 persons/year)
- Will have computing and IT Incubator- 4-storey of about 2,788 per floor which will accommodate about 20 entrepreneurs for R&D
- Big data R & D Center (24/7 infrastructure in standard data center, use of Spark and Hadoop[6] as big data analytics) and will incorporate big data analytics in curriculum
- Will include CSE BUET Open Course Ware (establish open access repository with online materials such as digital slides, audio-visual lectures, online ICT-based assignments, online discussion sessions, etc.)
- Separate stream of distance and online learning certification/diploma program

The total estimated cost for civil works for the new building is $10.98 million.

Table 3.1 Tentative Plan for the New Building (ECE Annex Building)

Floor	Planned Usage	Total Floor Space (m^2)	Remarks
Basement	Parking	912	

[6] Apache Spark is lightning-fast unified analytics engine for big data and machine learning while Apache Hadoop is a framework that allows for the distributed processing of large data sets across clusters of computers using simple programming models. https://databricks.com/spark/about and https://hadoop.apache.org/.

Floor	Planned Usage	Total Floor Space (m^2)	Remarks
Ground floor to 7th floor	Infrastructure for increase in intake of students	912 x 8 = 7,296	Around 7,000 m^2 is required
8th floor to 11th floor	Computing and ICT incubation centre	912 x 4 = 3,648	Around 3,000 m^2 is required. Part of 8th floor will be used for classrooms
Total floor space		11,866	

Source: BUET, Revised Final Proposal, March 2019,Table 5.1, p24

The new building will incorporate green building features expected to reduce the use of energy and water resources. The estimated cost allocated for green building features is $3.185 million. This estimated cost will cover construction materials, energy-efficient lighting system, electric fans and relevant Energy Star-certified products available in Bangladesh.

Figure 3.1 Project Site

4.0 DESCRIPTION OF THE ENVIRONMENT (BASELINE DATA)

This chapter describes the existing environment within the study area and is based on baseline measurements but relied heavily on secondary data from government sources, international organizations and other research entities. Baseline measurements on ambient air quality, noise, and drinking water source in BUET were conducted on 3 March 2019, and 4-8 April 2019. Measurements were done within 500-meter radius from the project site (Figure 4.1).

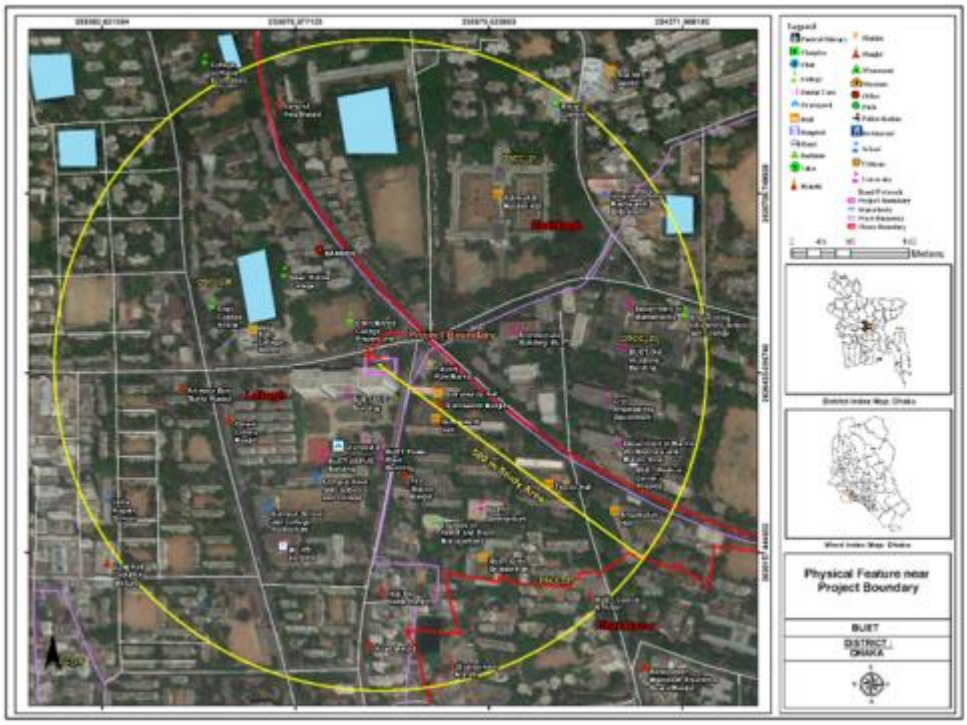


Figure 4.1 Project's Area of Influence

4.1 The Bangladesh University of Engineering and Technology

Located in Dhaka City, the Bangladesh University of Engineering and Technology (BUET) is one of the most prestigious institutions for tertiary studies in Bangladesh. At present, BUET has 18 teaching departments under five faculties and six institutes. Yearly intake of undergraduate students is 1,060 while for graduate students (MSc and PhD) is about 1,000 studente. The total number of faculty member is about 640 while the total number of students is about 10,899

BUET was established in 1962 and is now occupying a total area of 91.37 acres (or 36.98 hectare). Aside from academic buildings, BUET has a medical center, eight residential halls, 285 teacher's quarters, 70 office quarters, and 596 staff quarters. The Department of Computer Science and Engineering (IIT/CSE) was established in 1984 and is under the Faculty of Electrical and Electronic Engineering.

The proposed site for the new building is located within the West Palashi Campus of BUET. Figure 4.2 shows the location map. Table 4.1 presents the summary of the environmental setting within the study area.

Figure 4.2 Project Location

Table 4.1 Summary of Environmental Setting in the Study Area

Item	Details
Location	Within the West Palashi Campus of BUET in Dhaka district under the Dhaka South City Corporation Ward, Lalbagh Thana
Latitude	23.727074
Longitude	90.388938
General elevation	Average ground elevation 6.8 m above mean sea level
Topography	Terrain in the site is generally flat
Major physiographic unit	The area is in the physiographic unit of Madhupur Tract. It comprises central part of Dhaka the course of Brahmaputra – Jamuna Flood Plain.
Major soil type	Soil belongs to a Pleistocene terrace consisting mainly of red coloured and mottled clays. Soils in the valleys are dark grey heavy clays. They are strongly acidic in reaction with low status of organic matter, low moisture holding capacity and low fertility level.
Climatic condition	Humid and sub-tropical, with a typical three season pattern. During the winter season (November-February), cool winds blow from the north-east. The average temperature is 26.1°C. The project area receives on average 2,066 mm of precipitation annually. The prevailing winds vary month to month in the project area, though predominantly in the north-west, south and north-east directions.
Flooding	Area is generally flooded by the ingress of flood water from north, west and south side by the Bangsi, Dhaleswari, Tongi khal, Turag and Buriganga rivers
Seismicity	Area falls within seismic zone II (medium intensity seismic zone)

Item	Details
Nearest water body	Eden Lake in northwest side and about 196 m from the project area; Ramna Lake in northeast side and about 1.57 km from the project area. Buriganga river is in the west side and about 3.15 km from the project area.
Ecologically- critical area	No identified ecologically-critical areas
Reserve/Protected forests	Site is within the urban areas.
Archeologically-important place	Curzon Hall is a British Raj-era building and home of the Faculty of Sciences at the University of Dhaka, about 1.25 km from the proposed site
Major Settlements	Lalbagh Thana

4.2 Physical Environment

4.2.1 Geology and Soil

Dhaka is located in the central-eastern part of Bangladesh. The city is in the extreme south of the Madhupur Tract. The main area is covered by the Pleistocene Madhupur clay, a yellowish brown to 27xidized reddish brown silty clay. The Madhupur Clay makes up most of the surface across the elevated Madhupur Tract. This particular unit is about 45 m in thickness (an average of 10 m thickness in Dhaka) and has a fine sandy layer at its base. The southern part of Dhaka is made of Holocene sediments. The drainage channels and shallow depressions on the Madhupur Tract are partially comprised of grey and yellow organic-rich sands and clays of the Holocene Bashabo Formation.

The major geomorphic units of the city are the high land or the Dhaka terrace, the low lands or floodplains, depressions and abandoned channels. Low lying swamps and marshes located in and around the city are other major topographic features. Madhupur Clay of the Pleistocene age, characterized by reddish plastic clay with silt and very fine sand particles. The soil is non-calcareous dark grey in color in and around the project area. Moreover, dark grey floodplain soil can be found adjacent to the area of Turag and Buriganga.

4.2.2 Climate

According to Köppen climate classification, it falls under Aw category which is characterized by tropical wet and dry climate. This type of climate experiences hot and humid summer and dry winter. According to the climatic characteristics, Bangladesh is divided into 7 different climatic sub-regions. The study area of the project falls under the south-central climatic zone of the country (Figure 4.3).

Meteorological data recorded at Dhaka station of the Bangladesh Meteorological Department (BMD) from January 1980 to December 2013 were used to describe climate within the study area. Average maximum temperature ranges from between 39.6°C to 30.1°C. The monthly variation of the average minimum temperature is 22.5°C to 6.5°C. The maximum recorded temperature in Dhaka station was 39.6°C which occurred in March 1999 and April 2009. In January 1995, the minimum temperature was recorded as 6.5°C in Dhaka. The warmest month is April while the coldest month is January.

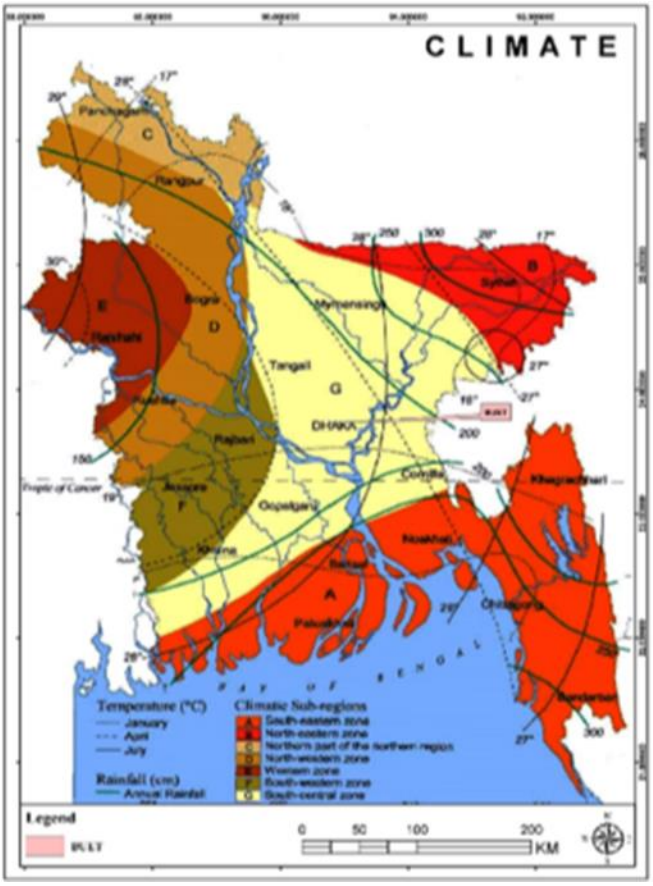


Figure 4.3 Climate Map

The average monthly rainfall is 332 mm while the maximum rainfall is 836 mm. The minimum monthly rainfall is 59 mm. Annual average rainfall is 2,066 mm and the highest recorded annual rainfall was 3,028 mm which occurred in 1984. The driest period of the year is winter when the average monthly rainfall varies from 21 mm to 7.21 mm.

Relative humidity varies from 83.77% to 62.47%.

4.2.3 Natural Hazards

Flooding

Dhaka city was particularly hit by severe floods in 1988 and 1998. During the 1998 flood about 56 percent of the city was inundated, including most of the eastern and 23% of the western part of the city. Over 60% of the area of Dhaka can be demarcated as flood risk zone considering its flood history. Flood in Dhaka is caused by high rainfall or by flooding from the surrounding rivers and canals. The western and most densely settled part of Dhaka is protected from river flooding by raised roads and an encircling embankment built after the 1988 flood. The eastern part of the city where most of the expansion takes place consists of low-lying floodplains that are submerged during the monsoon season. The issues for Dhaka's flood scenario are-

- All sides of Dhaka city are bounded by rivers and canals.

- Above 50% of Dhaka is low-lying and inundated during monsoon.
- Filling of water retention areas and drains increases the risk of seasonal flooding.
- Encroachment of rivers and canals can increase flood hazard susceptibility.
- Internal drainage congestion can make the flood situation more complex.
- Poor/no enforcement of laws in protecting the low-lying areas in and around Dhaka

Seismic Effects

According to the National Seismic Zoning Map produced by the Geological Survey of Bangladesh, Dhaka lies at the end of the Dauki fault in an area of medium seismic risk. This means that shocks of moderate intensity are possible, with a probable maximum magnitude of 6.5-7 on the Richter scale. Seismic events in Bangladesh are relatively infrequent but historically have been severe, such as the earthquakes of 1930 and 1950 that caused widespread damage throughout the country, and the earthquake in 2004 that damaged large parts of Dhaka City. Figure 4.4 shows the seismic zoning and flood prone areas in Bangladesh.

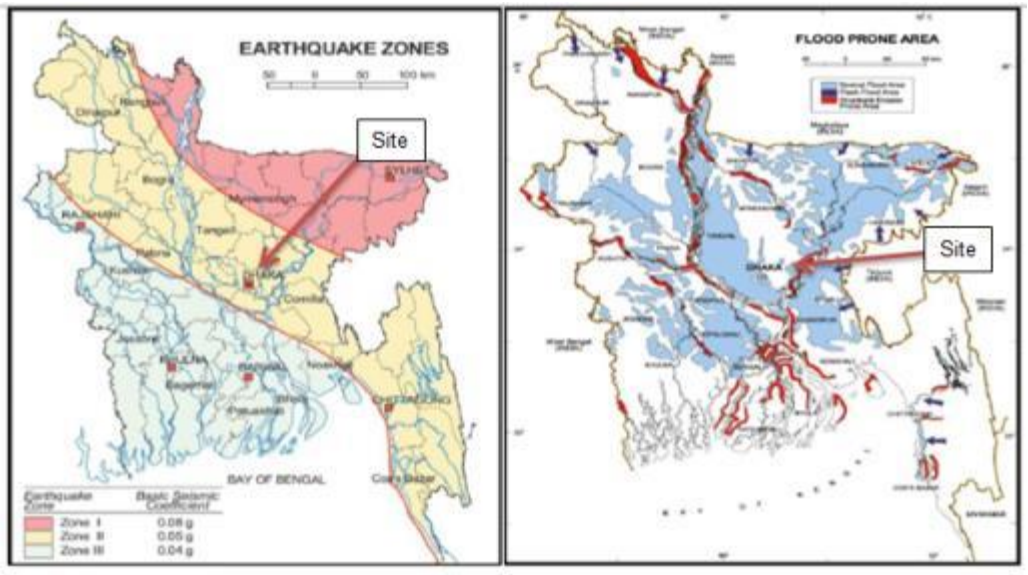


Figure 4.4 Seismic Zoning and Floodprone Areas, Bangladesh

4.2.4 Ambient air quality and noise

Ambient air quality

The DOE maintains three continuous air quality monitoring stations within the Dhaka district. This monitoring is under the Clean Air and Sustainable Environment (CASE) project funded by the World Bank.[7] Table 4.2 shows the summary of monitoring results from January to April 2019 collected through the CASE project and Figure 4.5 shows the location of the monitoring stations.

[7] Department of Environment. Clean Air and Sustainable Development. http://case.doe.gov.bd/index.php?option=com_contact&view=contact&id=1.

Table 4.2 Summary of CASE Monitoring Results, January-May 2019

Parameter	National Ambient Air Quality Standards (2005)	Unit of measure	Station		
			CAMS -1 Sangshad Bhavan, Sher-e-Bangla Nagar	CAMS -2 BARC Farmgate	CAMS -3 Darus-Salam
Average monthly air quality data - January 2019					
SO_2- 24 hr	140	ppb	6.32	2.64	16.8
NO_2	53 (Annual)	ppb	63.3	141	93.2
$PM_{2.5}$-24 hr	65	µg/m^3	131	149	205
PM_{10}-24 hr	150	µg/m^3	DNA	212	302
Average monthly air quality data- February 2019					
SO_2- 24 hr	140	ppb	7.79	2.77	12.4
NO_2	53 (Annual)	ppb	66.1	111	71.0
$PM_{2.5}$-24 hr	65	µg/m^3	124	134	144
PM_{10}-24 hr	150	µg/m^3	DNA	235	244
Average monthly air quality data- March 2019					
SO_2- 24 hr	140	ppb	DNA	2.41	5.99
NO_2	53 (Annual)	ppb	84.0	DNA	45.1
$PM_{2.5}$-24 hr	65	µg/m^3	86.3	114	123
PM_{10}-24 hr	150	µg/m^3	164	206	225
Average monthly air quality data- April 2019					
SO_2- 24 hr	140	ppb	3.16	2.60	DNA
NO_2	53 (Annual)	ppb	54.3	DNA	21.8
$PM_{2.5}$-24 hr	65	µg/m^3	57.2	67.3	71.5
PM_{10}-24 hr	150	µg/m^3	115	149	132
Average monthly air quality data - May 2019					
SO_2- 24 hr	140	ppb	DNA	15.8	DNA
NO_2	53 (Annual)	ppb	DNA	DNA	20.1
$PM_{2.5}$-24 hr	65	µg/m^3	38.2	69.6	49.7
PM_{10}-24 hr	150	µg/m^3	98.7	129	99.8

Results from the CASE air quality monitoring suggest that NO_2, PM_{10} and $PM_{2.5}$ exceeded the limits set by the National Ambient Air Quality Standards (2005). Existing sources of air pollution are mainly vehicular emissions, ongoing construction of large infrastructure projects, and dust-generating activities of densely populated settlements.

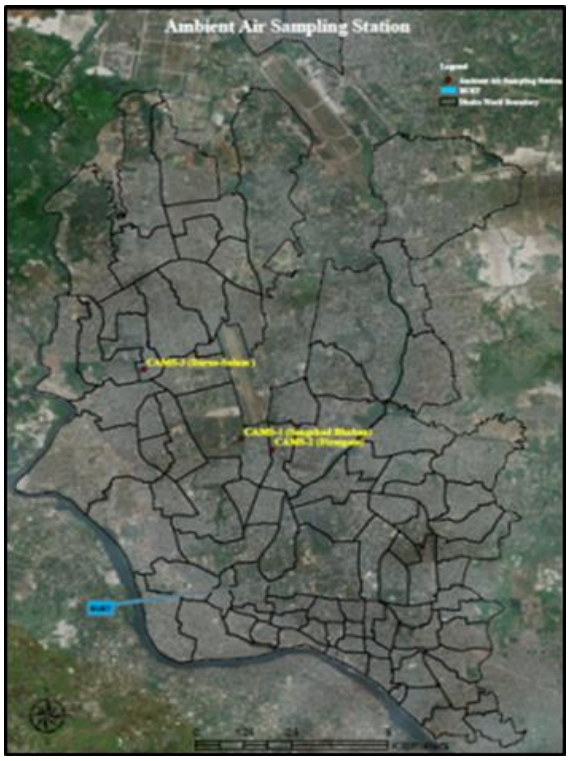


Figure 4.5 CASE Monitoring Stations

Ambient air quality measurements were conducted on 4 April 2019 at and around the project site by EQMS Consulting Limited. Three sampling stations were identified (Figure 4.6) and results are given in Table 4.3.

Table 4.3 Results of Ambient Air Quality Measurements, 4 April 2019

Location	Concentration (µg/m^3)		
	PM_{10}	$PM_{2.5}$	NO_2
AQ1- In front of Electrical and Computer Engineering Building at West Polashi Campus, BUET	53.41	36.93	34.15
AQ2- In front of Polashi Bazar Market	198.67	154.03	144.7
AQ3- In front of Eden Mohila College	35.88	26.33	55.01
Duration (hour)	24	24	1
Standards ECR 1997 and amendment in 2006 Standard (Schedule 2)	150 (24 hours)	65 (24 hours)	100 (Annual)
WB/IFC Standard	50 (guideline)	25 (guideline)	200 (1 hour)

Results from the three stations suggest that there are more sources of air pollution infront of Polashi Bazar Market than infront of West Polashi Campus BUET or at Eden Mohila College.

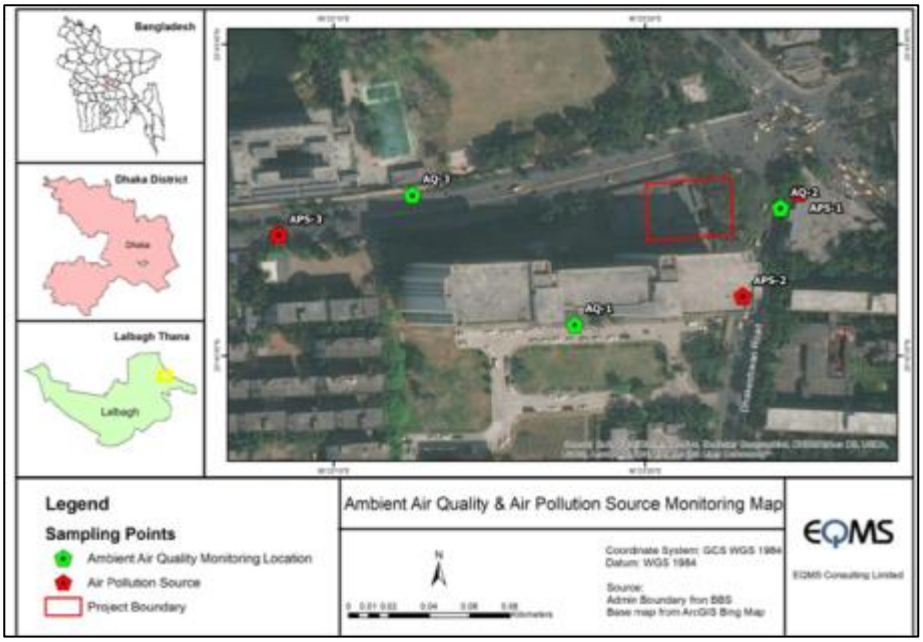


Figure 4.6 Ambient Air Quality Stations, Project Site

Noise

Main sources of increased noise level at and around the project site are due to movements of vehicles and the use of construction equipment at the existing road construction. Three noise sampling stations were identified to do measurements as baseline data. Results suggest that there are more noise-generating sources infront of Polashi Bazar Market as well as in Eden Mohila College. Measurements were done on 4 April 2019 and results are given in Table 4.4 while sampling stations are shown in Figure 4.7.

Table 4.4 Results of Ambient Noise Sampling

Location	Coordinates	Leq day (dBA)	Leq night (dBA)
NL1- Infront of ECE building	$23^0$43'35.50" N $90^0$23'18.88" E	55.28	43.88
NL2- In front of Polashi Bazar near Polashi West Campus, BUET	$23^0$43'37.37" N $90^0$23'22.17" E	68.00	~~64.58~~
NL3- In front of Eden Mohila College near Polashi West Campus, BUET	$23^0$43'37.58" N $90^0$23'16.27" E	55.21	48.1
Noise Pollution Control Rules 2006	Mixed use	60	50
IFC-EHS Guidelines 2007	Residential, institutional, educational	55	45

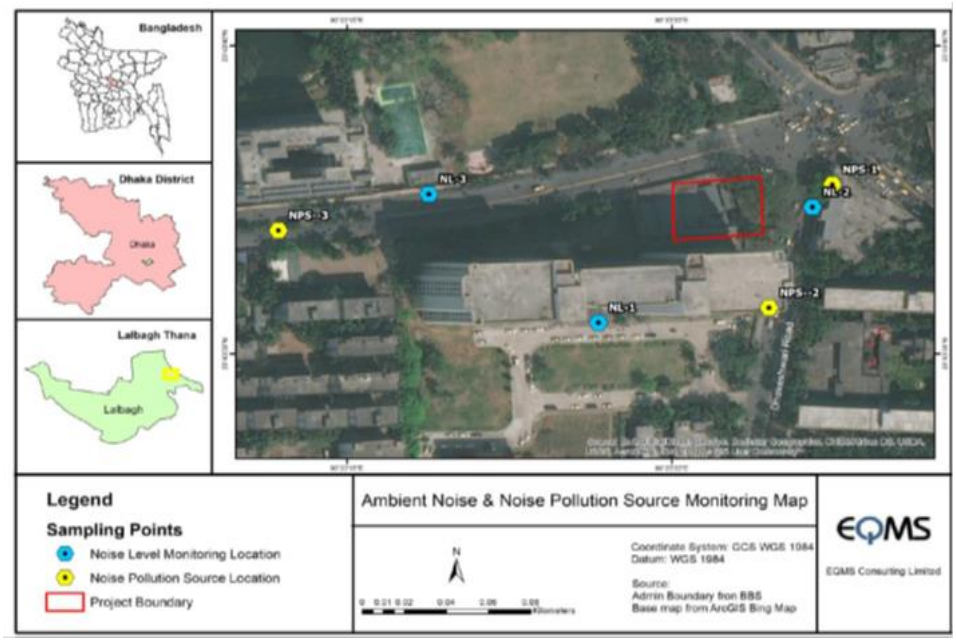


Figure 4.7 Noise Sampling Station, Project Site

4.2.4 Groundwater Quality

On 30 March 2019, drinking water sample was collected from the faucet within the project site (Figure 4.8) at West Polashi Campus for laboratory analysis of fecal coliform, pH, arsenic, lead, cadmium, and chromium (hexavalent). Table 4.5 shows the result of sampling.

Figure 4.8 Water Sampling at the Project Site

Table 4.5 Result of Drinking Water Analysis

Water Quality Parameter	Unit of Measure	Allowable limit		Sampling Station: Project site, West Polashi Campus
		Bangladesh EQS Standards	WHO	Result of Analysis
Fecal Coliform	n/100 ml	0	Must not be detectable in any 100 ml sample	0

Water Quality Parameter	Unit of Measure	Allowable limit		Sampling Station: Project site, West Polashi Campus
		Bangladesh EQS Standards	WHO	Result of Analysis
pH	-	6.5-8.5	-	6.78
Arsenic (As)	mg/l	0.05	0.01	<0.010
Lead (Pb)	mg/l	0.05	0.01	0.002
Cadmium (Cd)	mg/l	0.005	0.003	BDL (below detectable limit)
Chromium (Cr^{+6})	mg/l	0.05	0.05	0.001

4.3 Biological Environment

The project site has minimal vegetation (see Figure 3.1) with about less than 10 mature trees. No natural terrestrial flora of significance for protection remains at the project site. The composition of the plant community is low growing and herbaceous vegetation as well as other flora typical for urban sites. Some of the major types of trees found in the project area include mahogany, rain tree, Kul, and Sishu.

Terrestrial Fauna No wild mammal species were observed during the visit to the site and ocular inspection.

Aquatic Flora and Fauna There is no natural water source within the study area.

4.4 Socioeconomic Environment

Dhaka is the most populated city in Bangladesh, and it is also one of the most populated cities in the world. According to Population and Housing Census, 2011 the city itself has a population estimated at about 8 million.

BUET is located in Lalbagh Thana with a total land area of about 4.1 km^2. According to Dhaka District Statistics (2013), the population was 7,650 consisting of 1,652 households. The average household size of 4.63 and the population density is 1,866 person/km^2.

Based on the 2011 census, religion in the project area is dominated by Muslim community (94.66%) followed by Hindu (3.79%).

Lalbagh is mainly part of Old Dhaka city with narrow road networks and old houses of two to four-storey building areas. The OId Dhaka City has developed freely with mixed land use showing less or no regard to any urban planning. It has typical land use pattern, a strip of land along the main roads generally used for commercial purpose and the inner areas used for manufacturing and residential purposes. Most of areas of the OId Dhaka City are densely built with low to medium rise structure of different forms and designs.

Within the 500-m radius from the project site, there are eight mosques, four schools, two colleges, one graveyard, and one temple. Table 4.6 presents a list of important historical sites close to BUET.

Table 4.6 Important Historical Sites

Site Name	Importance	Distance (km)
Tin Netar Majar	Monument to three renowned political leaders of the sub-continent.	0.95
Doyel Chattar	Monument of national symbolic importance, expressed by Doyel bird.	0.98
Curzon Hall	British-era building; example of aesthetic architecture of that time.	1.14
Old High Court Building	Historical building important for the history, culture and heritage of country.	1.0
Bangladesh National Museum	National museum representing the national history, culture and heritage.	0.26
Bangla Academy	Building of historical and cultural importance.	0.65
Shourawardy Uddayan	Historical place with historical links with national independence.	0.22

5.0 ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

Associated potential environmental impacts will be mainly during the construction phase which are temporary, of short duration, localized and can be easily mitigated through the implementation of the environmental management plan (EMP). Aside from the EMP, the environmental monitoring plan (EMoP) will provide the key elements to be monitored to ensure compliance by the Contractor to the approved building design and relevant regulations on building construction, occupational and environmental health and safety.

5.1 Pre-construction and design phase

At this stage, activities include preparation of project proposal, design the new building, desktop and ground surveys of the proposed site, preliminary consultations, and drafting of the Development Project Proforma/Proposal. These activities are not expected to have significant environmental impacts as the activities will have minimal physical disturbances to the environment.

Green building features were incorporated in the design of the new building which aims to reduce energy and water consumption, and thus, also expected to be climate change-resilient building. These features are included in the budget with estimated cost of about $3.1853 million which will cover cost of construction materials, use of energy-efficient lighting system and electric fans, and relevant Energy Star-certified products available in Bangladesh.

Aside from incorporating green building features, relevant provisions set forth in BNBC 2006 and BNBC 2015 (draft) will be adhered to in the design and construction of the new building.

5.2 Construction phase

This phase will involve the recruitment of workers and staff, mobilization of contractors, equipment and machineries, site preparation, delivery and storage of construction materials; civil, mechanical, and electrical works; landscaping and clean-up of construction debris, and occupancy of the new building.

Prior to construction works, the PMU in UGC and the PIU in BUET will ensure that the Contractor will include the responsibility of compensating for any temporary damage, loss or inconvenience as a result of accident or failure to comply with regulations in implementing the project. The Contractor will be required to conduct baseline environmental quality measurements for air, noise, and source of drinking water to be provided to construction workers before start of construction.

Environmental Codes of Practice (ECoP) relevant during construction phase are given in Appendix 1. ECoPs are general non-site specific guidance from best construction practices that be implemented for this project to ensure that potential associated construction environmental impacts will be minimized. Contractors will be required to refer to these ECoPs as well as comply to the EMP.

5.2.1 Prepare construction management plan

Before any construction works, the Contractor will be required to prepare a construction management plan to guide the implementation of earth-moving works, construction of the building, civil, mechanical, and electrical works including restoration of the site and the existing

access roads. The plan will cover work scheduling, occupational and community health and safety, temporary pedestrian and traffic management, spoils disposal and construction waste, noise and dust control, drainage and stormwater management, materials storage and management, protocol in dealing with students, faculty and staff of BUET particularly those in the West Palashi Campus, and emergency/disaster preparedness. Critical information to know during emergency will be included in an emergency kit such as evacuation or assembly point, what they need to do and what they should not do. Emergency contact details will be posted in billboards clearly at the construction site.

5.2.2 Hiring of staff and workers

There will be potential job opportunities for both skilled and unskilled workers during construction phase. These opportunities, however, may cause conflict over lack of transparency in recruitment. Hiring of local labour will be given priority. The Contractor will be required to comply with the relevant provisions in the Bangladesh Labour Act 2006 (amended 2013) and Bangladesh Labor Rules 2015 on recruitment and working conditions.

Due to construction works, there will be workers present within the premises of BUET particularly in the construction site. The Contractor will be required to ensure that their workers will strictly observe the applicable rules and regulations of BUET including occupational health and safety rules that will be imposed on them by the Contractor.

5.2.3 Orientation of workers and staff

Before any construction works begin, the PIU in BUET and PMU together with the environmental safeguard consultant will conduct an orientation to the workers and staff of Contractor on occupational health and safety, applicable rules and regulations of BUET as well as environmental requirements of GOB and ADB. The orientation aims to create awareness on their responsibility for implementing and compliance to the EMP, effective record keeping, and environmental reporting. The orientation will also include awareness on communicable disease like tuberculosis and about HIV/AIDS to prevent potential incidence in the workplace.

The Contractor will be required to designate an Emergency and Disaster Coordinator to guide the workers in case of an emergency or disaster. Workers will be informed that mock drills will be conducted regularly and participation will be mandatory. The Contractor will be required also to invite resource persons from relevant government agency or private sector to conduct training on proper emergency response at least once a year throughout construction phase.

5.2.4 Site preparation and construction works

The Contractor will coordinate with respective government agencies before any site preparation to determine the connections of utilities such as natural gas pipeline, water pipes, sewers, and other services that may be affected.

If the Contractor decides to operate quarry to meet the requirements of the construction works, the necessary permits and clearances from relevant agencies of the government should have been obtained prior start of operation. The Contractor need to ensure that the quarry providing materials to the construction of the new ECE Annex building is maintained in stable condition, appropriately and adequately landscaped, and when taken from the river, it should not disrupt the flow of river or damage the river banks causing erosion. The stockyard and construction site

will be temporarily and properly enclosed with designated security personnel to prevent entry of unauthorized persons.

The area within the premises of BUET (West Palashi Campus) is not known to have sites of archeological and historical value. Nonetheless, ECoP 1.0 provide measures in case of encounter with physical cultural resource.[8]

Impacts on air quality

Site preparation will involve land and minimal vegetation clearing. Potential increase in dust level may be expected as a result of these activities. This impact may cause inconvenience to the occupants of the VC residence and may be experienced up to the staff housing/dormitory. To contain the potential increase in generation of dust, the Contractor will be required to do the following:

- Provide temporary fencing and enclosures of the construction site (at least 2 m-high);
- Spray water to any opened area and work sites, as and when needed particularly during the summer season;
- All excavated soil and stockyard will be covered with tarpaulin or other appropriate cover material during non-working time, and excess soil will be removed from the worksite to the designated disposal site;
- Provide a space onsite to accommodate the required materials so that transport and delivery of construction materials will be minimized including vehicular emissions;
- Alternate access route to the site will be used (see Figure 5.1) to minimize safety risks to the university students, faculty members, and other people using the main roads of the university;
- Provide workers assigned to dusty areas with safety masks or googles;
- Vehicles that will deliver construction materials to the site that generate dust will be covered with suitable material to contain dust;
- Regularly maintain construction vehicles, generators (if required), and heavy equipment to avoid smoke belching;
- Prohibit burning of garbage, liquid waste and other combustible materials within the construction site; and,
- ECoP 2.0 presents some measures on managing quality.

Figure 5.1 Alternative Access to the Site

[8] PCR as defined in SPS 2009 are 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. Physical cultural resources may be located in urban or rural settings and may be above or below ground or under water. Their cultural interest may be at the local, provincial, national, or international level.

The PIU will ensure that ambient air quality limits set by the IFC-WB EHS General Guidelines 2007 and GOB will not be exceeded during construction phase. GOB ambient air quality limits (2005) are less stringent compared to the IFC-WB EHS General Guidelines 2007. SPS 2009 requires that should host country regulations differ from the levels and measures set by the IFC-WB EHS General Guidelines 2007, the host country will achieve whichever is more stringent. In this case, the IFC-WB EHS General Guidelines 2007 will be the relevant limits that the Contractor needs to comply.

Impacts on noise

The major sources of noise generation are movement of construction vehicles, associated land clearing, and from the construction of the new building. These activities, together with daily university activities, in some occasions, may exceed the limits provided for in the Noise (Pollution) Control Rules 2006. This intermittent increase in noise levels will be temporary, of short duration and can be mitigated.

Exposure of workers to increased noise levels is an occupational as well as a public health hazard. Table 5.1 presents the typical noise levels of tools and equipment. As a comparison, Table 5.2 presents the common sources of noise and decibel levels that people are generally exposed to. In order to mitigate the temporary negative impact on noise, the Contractor will be required to:

- Orient, prior to construction works, and inform workers about noise level requirements;
- Provide workers assigned to high-level noise-generating activities with personal protective equipment such as ear muffs and earplugs and will be rotated every two hours;
- Undertake activities that generate noise during daytime only (but will be adjusted contingent to weather and season;
- Require drivers of construction vehicles to observe low speed and blowing of horns or whistle will not be allowed unless absolutely necessary;
- Assign staff to maintain the flow of traffic to avoid inconvenience to students, faculty members and administrative staff;
- Require regular tune-up of construction vehicles and proper maintenance of machinery; and,
- ECoP 3.0 gives some measures on managing noise and vibration.

Table 5.1 Typical Noise Levels of Tools and Equipment

Equipment	Noise Level, dB(A)
Cranes	78 - 103
Backhoes	85 - 104
Loaders	77 - 106
Dozers	86 – 106
Scrapers	97 - 112
Trenchers	95 - 99
Pile drivers	119 - 125
Compactors	90 – 112
Grinders	106 -110
Chainsaws	100 - 115
Concrete saw	97 – 103
Sandblasting nozzle	111 - 117

Equipment	Noise Level, dB(A)
Jackhammers	100 - 115
Compressors	85 – 104
Note: These noise levels are measured at the operator's position.	

Source: Infrastructure Health & Safety Association, Chapter 14, Hearing Protection, Table 14-4.
http://www.ihsa.ca/About.aspx

Table 5.2 Common Sources of Noise and Decibel Levels

Everyday Sounds and Noises	Average Sound Level (dBA)	Typical Response (after routine or repeated exposure)
Softest sound that can be heard	0	Sounds at these dB levels typically don't cause any hearing damage.
Normal breathing	10	
Ticking watch	20	
Soft whisper, quiet library	30	
Refrigerator hum	40	
Moderate rainfall	50	
Normal conversation, air conditioner	60	
Washing machine, dishwasher	70	You may feel annoyed by the noise
City traffic (inside the car)	80–85	You may feel very annoyed
Gas-powered lawnmowers and leaf blowers	80-85	Damage to hearing possible after 2 hours of exposure
Subway, passing motorcycle, gas mower	91	Dangerous to hearing; wear earplugs or earmuffs
Hair dryer, kitchen blender, food processor	94	Dangerous to hearing; wear earplugs or earmuffs
Motorcycle	95	Damage to hearing possible after about 50 minutes of exposure
Approaching subway train, car horn at 16 feet (5 meters), and sporting events (such as hockey playoffs and football games)	100	Hearing loss possible after 15 minutes
The maximum volume level for personal listening devices; a very loud radio, stereo, or television; and loud entertainment venues (such as nightclubs, bars, and rock concerts)	105–110	Hearing loss possible in less than 5 minutes
Shouting or barking in the ear	110	Hearing loss possible in less than 2 minutes
Standing beside or near sirens	120	Pain and ear injury
Jet plane takeoff, siren, pneumatic drill	120	Not safe for any period of time
Jackhammer	130	Not safe for any period of time
Firecrackers	140–150	Pain and ear injury

Sources:
1. US Department of Health & Human Services. Centers for Disease Control and Prevention. Centers What Noises Cause Hearing Loss? https://www.cdc.gov/nceh/hearing_loss/what_noises_cause_hearing_loss.html.
2. American Speech-Language-Hearing Association. Loud Noise Dangers.https://www.asha.org/public/hearing/Loud-Noise-Dangers/#signs.

Generation of waste

Construction works are expected to generate waste such as spoils, construction materials, wood, cleared vegetation, waste food, cement container, and other similar debris. If not managed properly, this waste will be unsightly and may pose health and safety risks to workers and the community within BUET. To mitigate this impact, the Contractor will be expected to implement the following measures:

- Implement the waste management plan which is part of the overall Construction Management Plan submitted to PIU before the start of construction;
- Provide adequate garbage bins and will require workers to separate waste for easier collection and management (i.e., residual oil and lubricants, paints, thinners will not be mixed with other waste);
- Observe good housekeeping at the construction site at all times and monitor compliance;
- Burning of solid waste at the construction site will not be allowed at any time; and,
- ECoP 4.0 presents additional measures on waste management.

Impacts on people

Associated works during site preparation and construction of the new building may pose health and safety risks to workers and community. This could be working on heights and constrained spaces. Non-compliance to relevant regulations on codes and standards on civil, mechanical and electrical works may also trigger accidents to workers. Given the site, construction camps will not be located within BUET premises (West Palashi Campus). To minimize the occupational and community health and safety risks, the Contractor will be required to implement the following measures:

Occupational health and safety risks To prevent accidents, provide workers and staff with appropriate PPE and safety clothes such as hard hats, steel-toed boots, ear muffs/plugs, etc., and will train and/or orient workers on safe building construction practices and other issues on safety. Wearing of safety gears will be mandatory and the statutory age requirements for employment as provided for in Bangladesh Labour Act 2013 will be strictly enforced. Consider to provide group insurance to construction workers for accidents resulting to disabilities or death.

Sanitary facilities and safe drinking water will be provided to the workers and appropriate scaffoldings will be installed. Clear and visible warning signs and lighting will be installed. In case of medical emergency, first aid kits will be provided at the construction sites. Fire-fighting equipment will be provided onsite.

BUET has a Medical Centre at Fuller Road campus and is about 600 m from the West Palashi Campus (where the new building will be located). Students, teachers including their family members and all employees of BUET receive treatment, investigation and medical services from this Medical Centre. The Contractor can coordinate with BUET to ensure that there will be immediate medical assistance in the event of an emergency at the construction site.

At the start of each day, toolbox meetings that last for a few minutes will be held to remind workers of the importance of compliance to safety rules and procedures.

Community safety risks Prior to start of construction works, conduct awareness orientation and/or briefing about safety to key stakeholders in BUET (i.e., faculty staying in housing/dormitory, students, etc.). Inform PIU and key stakeholders (if required) on the schedule of construction activities that may pose risks to public safety. Proper fencing and enclosure (at least 2 m-high) will be installed at the site to prevent unauthorized access. Security personnel will be posted to discourage pilferage and vandalism.

Set boundary line between construction site and areas accessible to BUET community. Provide proper identification of workers and staff at the construction site. Clear and visible warning and danger signs at and around the site will be installed. ECoP 5.0 gives additional measures on occupational health and community safety.

5.2.5 Completion of construction works

Improper clean-up and disposal of construction debris may cause safety and health risks; and reduced aesthetics value. To ensure clean-up and restoration of construction sites, the Contractor will be required to restore/reinstate all the areas potentially damaged during construction works. Workers that may be assigned to clean-up and restoration works will be provided with proper safety gear and equipment.

5.3 Post-construction phase

Upon completion **o**f construction phase, the potential impacts will be mainly beneficial since the students, faculty members, and academic staff of the CSE Department will now have a new and fully furnished ECE Annex building. At this stage, they will enjoy the comfort of a new building.

5.3.1 Occupancy of the new building

Occupancy of the new building may give rise to improper use and lack of care, and inadequate maintenance. Absence of proper building management plan may lead to premature wear and tear. The use of the new building may result to generation of waste from occupants.

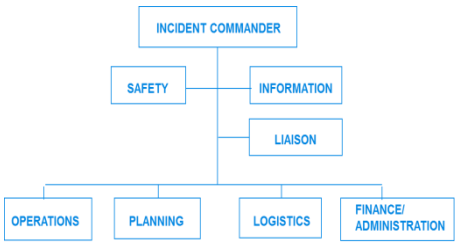
To mitigate these potential impacts, BUET administration through the CSE Department will prepare building maintenance and management plan which will include management of waste. The Chief Engineering Section will designate a waste management coordinator. The CSE Department can consult with other applicable institutes/departments in developing a building waste management program which will incorporate the principles of reduce, reuse, and recycle.

The CSE Department will conduct yearly orientation and briefing to staff, students and other building users on the proper management and care of the new ECE Annex building.

5.3.2 Emergency response plan

Fire-fighting systems will be strategically located in the new building. There will be a security team to ensure safety and security of all building users. As part of emergency preparedness, a draft emergency response plan (ERP) will be finalized in consultation with students, faculty, and administrative staff. Table 5.3 presents the key elements of the draft ERP.

Table 5.3 Key Elements of ERP (Draft)

Elements	Description
Approach	The aim of this emergency response plan is to guide personnel in an accident or emergency situation to prevent or minimize injury, damage and material loss and also to prevent or mitigate environmental impact from the accident or emergency.
Types of emergency	• Earthquakes • Cyclones • Energy/utility outages • Fire hazards • Hazardous materials releases • Terrorism
Planning	• Identify hazards and assess risk • Assess capabilities and resources • Develop an emergency plan and procedures • Conduct training • Public relations • Conduct drills and exercises • Develop audit procedures
Emergency preparedness requirements	• Identified assembly points and/or evacuation points • A well-defined escape routes • Fire-fighting system will be supplied in strategic locations • Proper security arrangements functioning at all times • Efficient transport and communications system • Smoking will be prohibited within areas with flammable substances (if any) • Water will be kept available for fire-fighting • Availability of sufficient number of trained staff to deal with any emergency situation • Clear and audible emergency alarm/whistles and public address system • Conduct drills to familiarize students, faculty, and administrative on the evacuation routes and use of the fire-fighting system • Emergency contact number of the medical centre (and nearest hospital), ambulance and fire service and police station) • Main electrical equipment is switched off when not in use
Incident command system	

6.0 ANALYSIS OF ALTERNATIVES

Given the limited space within the government-owned area in BUET, there were no alternatives considered that may require land acquisition. However, a “no project” option was considered and compared with “with project” option.

6.1 “No project” option

The “no project” option will mean that the vacant space/piece of land behind the existing ECE Annex in the West Palashi Campus of BUET will not have its best and highest usage of land. In addition, the undergraduate and graduate students, faculty and staff of CSE Department will not have the opportunity to benefit from innovative IT learning environment that the new building will provide. Table 6.1 presents a comparison of “no project” option and “with project” option.

Table 6.1 Comparison of “with project” and “no project” options

Description	“With Project” Option	“No Project” Option
Producing students equipped with state-of-the-art training and education fit to the requirements of the IT industry	There will be demand for IT graduates to meet the requirements of the IT industry	Limited or no possibility of producing better graduates due to poor IT facilities
Inconvenience and disruption to daily activities during construction	There will be temporary disruption to BUET community	Potential traffic congestion may also occur due to increased population and vehicle owners
Ecological impacts	Site has less than 10 mature trees with some patches of grass	Existing environmental condition will be the same
Creation of temporary employment	There will be temporary jobs for skilled and non-skilled workers during construction	No temporary jobs will be created
Opportunities for students to have more options for IT training	There will be more options for R & D, training, and link to the private sector expected to improve chances of employability	No opportunities
Contribution to Vision 2021	Will contribute to the goals and objectives	No contribution

7.0 INFORMATION DISCLOSURE, CONSULTATION, AND PARTICIPATION

7.1 Introduction

Consultations aim to engage key stakeholders throughout the project implementation and to know their concerns and perceptions, if any about the project. These events give the opportunities for the public to share their views to BUET about the proposed construction of the new multi-storied ECE Annex building and also for BUET to present to the stakeholders relevant information on the project. Consultation will not be limited during the preparation of IEE but will be carried out during project implementation.

7.2 Methodology

Identification of stakeholders Stakeholders are considered to be primary if they will be directly affected during construction and post-construction such as students, faculty members, administrative staff, and support services staff. Secondary stakeholders are persons, organizations, or businesses that may not be directly affected but may have interests on the project such as relevant government agencies, NGOs, transport cooperatives and the general public. Stakeholders were invited by BUET project team focal person through phone calls, letter, and visit in person.

Approach Participants were informed of the proposed project and the potential environmental impacts due to the project. After the presentations, participants were given the time for questions and answers to raise their concerns. Discussions were done in Bangla and English.

Record of the meeting General information of the participants such as name, gender, occupation, and signature were collected and shown in the attendance list.

7.3 Results of consultation

The consultation was held on 3 April 2019 at the Information Access Centre of the CSE Department, BUET. A total of 61 participants joined the consultation consisting of faculty staff from the Eden Mohila College[9], representative from the Bangladesh Bureau of Educational Information and Statistics, students and faculty from Department of Electrical and Electronics, students and Faculty from CSE Department, Secretary of Polashai Bazar Market Association (located east side of the proposed building), and residents from the settlements along Dhakeshwari Road.

BUET CSE Department faculty members made a presentation about the CSE program in BUET and also about the proposed project (i.e., Outputs 1-4) which includes the new building. The consultants briefly discussed the requirements for environmental due diligence and measures to be implemented to ensure that the temporary adverse impacts of construction will be mitigated including the grievance redress mechanism. Appendix 2 gives the list of participants and some photographs of the event. Table 7.1 presents the summary of consultations.

[9] Eden Mohila College is a women's college in Azimpur, Lalbag first established in 1873 in the Farashganj area of Dhaka. It has about 35,000 students in an area of about 17 acres. http://www.emc.edu.bd/.

Table 7.1 Summary of Consultations

Issues Raised	Response from Project Team
R&D opportunities may be limited to students from CSE Department only	Any student opportunity that the project will provide will be open to other students of BUET if applicable to their circumstances regardless of race or gender
May have minimal impacts on academic activities during construction. The campus is secluded from outside community and existing academic buildings are well insulated from noise levels.	To make sure that there will be minimal impacts on air quality and noise levels, mitigation measures will be required from the Contractor.
Access of Contractor and workers during construction works	Contractor will have two access options: (i) existing temporary gate behind the main ECE Building used during the ongoing construction of Cafeteria, and (ii) another temporary gate can be used along the Dhakeshwari Road. Contractor wil finalize the alternate access in consultation with PIU in BUET.
Emergency evacuation points and better alarm system in the new building to warn students of an emergency	The new building will be designed to withstand natural hazards to the extent possible and will be equipped with better emergency alarm and public address systems. An emergency response plan/program will be finalized which will include regular mock drills for students, faculty members and staff.
Regular emergency training and awareness program to be provided by the Chief Engineer Office of the university	Training and awareness program will be included in the Emergency Response Plan not only for the new building but for BUET
Positive impact is anticipated through use of solar panel and LED as well as incorporation of automation/high tech in design	New building will incorporate green building features and will be designed to be climate change-resilient
Proper road signage and speed control measures with traffic lights for pedestrian road crossing at the Polashi-Dhakeshwari Road	Clear and visible warning signs will be required from the Contractor to minimize safety risks to students and to community. If needed, the Contractor will be required to designate staff to manage traffic on the stretch of Polashi-Dhakeshwari Road close to the project site during construction.
Opportunity to create more graduates from CSE Department	It is the goal of the project to create opportunities for more quality graduates from CSE Department to meet the emerging requirements of the IT industry not only in Bangladesh but also globally
Accommodation facilities for graduate students due to traffic jam	Providing hostel or temporary student accommodations during traffic jam is not part of the building design but BUET can explore the possibility particularly for training participants.
Contractor's behavior and access to construction materials	Contractor and their workers will be required to comply with applicable rules and regulations of BUET including the GOB and ADB. Project site will be temporarily enclosed and the Contractor will be required to assign security personnel to prohibit unauthorized access and to ensure separation of student access to workers.

7.4 Consultations and information during implementation

Consultations with students, faculty, and adminstrative staff will continue. This could be on construction practices, building management and emergency preparedness. To meet disclosure requirements of ADB, project brief (both in Bangla and English) will be posted in the website of BUET. A one-page project brief (also both in English and Bangla) will be made available to interested individuals in BUET and UGC. The one-page flyer or Q&A will include details on the grievance redress mechanism. Also, the IEE which will be posted to ADB website will provide more information on the project.

8.0 GRIEVANCE REDRESS MECHANISM

To ensure that complaint(s) will be addressed properly during project implementation the PMU, through the PIU, will establish a grievance redress mechanism (GRM) as soon as the ADB loan becomes effective. The GRM is a process of handling complaints from affected people on the environmental performance of the project, in reviewing, and in facilitating the resolution.

Objectives of GRM This ensures a process of receiving and resolving complaint(s) promptly from persons that may be affected by the new ICT building. Following the requirements of SPS 2009, the GRM will involve a process that is understandable, transparent, gender-responsive, culturally-appropriate, and easily accessible to affected persons without cost and retribution.

Structure A grievance redress committee (GRC) will be created and may consist of: (1) PMU Head, (2) representative from the local government, (3) representative of Contractor, and (4) witness of the complainant. The environmental safeguard consultant at the PMU will act as the secretary of the GRC. Ideally, the GRC will continue to function from construction until post-construction. However, given the nature of the project, where environmental issues may be of concern during construction phase, the GRC may be inactive post-construction. MOE and UGC will ensure the representation of women in GRC.

GRC will be responsible for resolving complaint(s) and will convene once a month to review the complaint(s) received, if any. GRC will resolve complaint(s) within 15 days from the date of receipt and will keep a record indicating the name of complainant and nature of complaint, status of resolving the complaint, decisions or actions undertaken, and the date the decision was effected.

The PMU will review the implementation of the GRM regularly to assess the effectiveness of the process and to examine their ability to address grievances. Cost of implementing the GRM will be part of the administration cost borne by the PMU.

Information disclosure PIU will disclose details on GRM through the project website of BUET as well as in the billboards at the construction site. Details will include the contact person, a hotline phone number, and a simplified flowchart on how to file a complaint.

Record-keeping A record of all complaints received including contact details of the complainant, date the complaint was received, nature of grievance, decisions and date, and date the complainant was informed of the decision. Grievances filed and resolved will be summarized and included in the semi-annual monitoring reports submitted to ADB during construction stage and annually during post-construction/operation stage.

Procedure Complaint can be lodged either by approaching the Site Engineer of the Contractor, in writing or by phone. A complaint form is given in Appendix 3. Transparency will be maintained on the grievances received and their resolution. The environmental safeguard consultant will provide support to the complainant in filing the complaint. Affected persons can seek redress to their complaints in three levels (see Figure 8.1): (i) through the PIU or through the Site Engineer of the Contractor, (ii) through the GRC, and (iii) the DOE under provisions set forth by the Environment Court Act 2000 (amended in 2002 and 2010) or the appropriate courts of law. The complainant is not restricted to seek redress through the legal system at any point in the GRM process. The three-tier entry points include:

(i) *First level – Contractor Site Engineer/PIU Head* Complaint to be resolved at the PIU level within seven days and advise the Complainant accordingly.

(ii) *Second level - GRC* If complaint is not resolved at the first level, the Complainant can submit the complaint to the GRC chaired by the PMU Head. The GRC will review the submission and make a decision within 15 days. The Complainant will be informed of the decision in person, by mail or by phone.

(iii) *Third level – Appropriate Courts of Law* If the complaint remains unresolved, this will be referred by the GRC to the DOE or the appropriate courts of law.

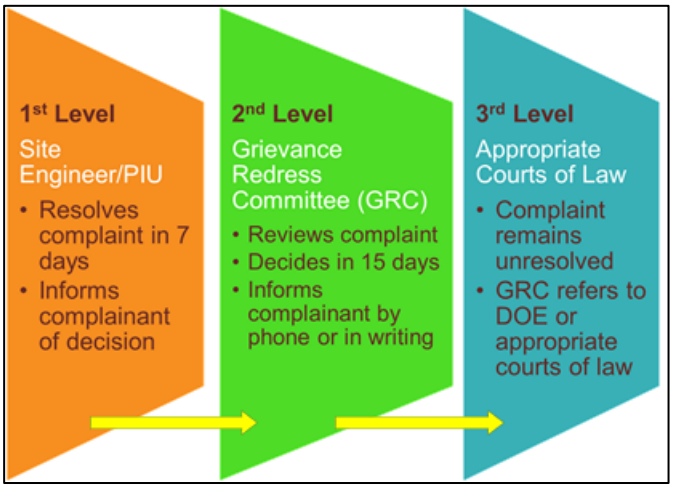


Figure 8.1 Three-tier Grievance Redress Mechanism

9.0. ENVIRONMENTAL MANAGEMENT PLAN

The summary of impacts and measures that will be conducted to mitigate the adverse impacts are presented in the environmental management plan (EMP). The EMP covers the monitoring plan and the institutional arrangements required. Table 9.1 presents the EMP.

9.1 Monitoring

The environmental monitoring is a time-bound process to ensure that non-compliance of the Contractor will be avoided or will be immediately addressed. Environmental monitoring reports will be submitted to ADB twice a year during construction and annually post-construction. The environmental monitoring reports submitted to ADB will be publicly disclosed in their website as required by SPS 2009 and Access to Information Policy 2019. Table 9.2 presents the environmental monitoring plan (EMoP).

9.2 Implementation Arrangements

Project management unit (PMU) PMU will be set-up at UGC who will be responsible for the overall management of the project. Supported by an environmental safeguard consultant, the PMU will be also responsible in ensuring that the EMP and EMoP are properly implemented and complied with by the Contractor, submission of environmental monitoring report to ADB, and in handling complaints following the GRM. The terms-of reference of the environmental safeguard consultant for the PMU is given in Appendix 4.

Project implementation unit (PIU) BUET will set-up a PIU who will be responsible for managing the project. The PIU will ensure that the EMP and EMoP are properly implemented, timely reporting to PMU of the environmental monitoring report required by ADB (see Appendix 5 and Appendix 6 for proposed format), public consultations (as appropriate), and in handling of complaints according to the GRM. Key responsibilities of PIU are as follows:

- Designate a staff to oversee implementation of EMP and EMoP;
- Ensure compliance of contractor to EMP and EMoP;
- Engage stakeholders, as appropriate;
- Conduct onsite spot-checks to monitor compliance of contractor (see Environmental Inspection and Monitoring Checklist in Appendix 7);
- In the event of non-compliance by Contractor or any unanticipated environmental impacts, coordinate with the PMU environmental safeguard consultant in preparing a corrective action plan (CAP) to address the issue with time-bound actions; CAP will be submitted to ADB for review and will be disclosed to ADB website;
- Ensure that any grievance/complaint received are addressed in a timely manner;
- Maintain a record of grievance/complaint received, resolution or action taken, and include the details in the environmental monitoring report;
- Keep a list of relevant permits issued by the GOB for the project, if any; and,
- Prepare the respective environmental monitoring report and submit to the PMU for consolidation and finalization by the environmental safeguard consultant.

In the event there will be a change in the design of the new ECE Annex building, this IEE will be updated/revised and submitted ADB prior to any construction works. The updated/revised IEE will be also disclosed to ADB website.

Contractor of civil works The EMP which includes the EMoP will be an integral part of the Bid and Contract documents. This will be verified by the PIU and the PMU. The contractor will designate their environmental staff who will be responsible in overseeing the implementation and compliance to EMP and EMoP during construction phase. Maintain a record of complaint/grievance submitted at the project level through the contractor including the action taken to address the issue.

The designated environmental staff will submit a monthly compliance and monitoring report to the PIU-designated environmental staff. The compliance and monitoring report will cover the EMP, EMoP, and the specific environmental clause(s) in their contract.

Table 9.1 Environmental Management Plan

Project Activity	Potential Environmental Impacts	Mitigation/Enhancement Measures	Estimated Cost	Implementing Unit	Supervising and Monitoring Unit
Design and Pre-Construction Stage					
Site survey and design of the new building	• Failure of the building to withstand climate change and natural hazards • Potential safety and health risks to students and building users due to poor building design	• Green building features were incorporated • Design will comply with the requirements of BNBC 2006 and relevant provisions in the BNBC 2015 (draft)	Included in project cost	PIU, Design consultant	PMU and Environmental Safeguard consultant
	• Lack of technical capacity on safeguards at BUET (CSE Department)	• PIU will designate staff to coordinate with the environmental safeguard consultant in PMU • PIU team will undergo orientation training on the safeguards requirements and compliance under SPS 2009 • PIU may consider engaging intermittent consultant on safeguards	PIU Budget	PIU, Environmental Safeguard consultant	PMU and ADB
Construction Stage					
Complete construction management work plan	• Avoid impacts of Contractor unplanned activities • Smooth work implementation	• Temporary pedestrian and traffic management plan to minimize disturbance from vehicular traffic and workers	Included in the project cost	Contractor, PIU	PMU, Environmental Safeguard consultant
		• Spoils disposal and construction waste management plan			
		• Noise and dust control plan			
		• Drainage and stormwater management plan			
		• Materials management plan			
		• Emergency/disaster preparedness plan • Provide list of contact details during emergency to workers or post in billboards at construction site			
Orientation of workers and	• Awareness to environmental	• Conduct briefing on EMP, records	Included in the	PIU, Environmental	PMU

Project Activity	Potential Environmental Impacts	Mitigation/Enhancement Measures	Estimated Cost	Implementing Unit	Supervising and Monitoring Unit
staff	requirements and their responsibility • Understanding the responsibility of Contractor in implementing the EMP, compliance to ADB requirements and the government • Provide HIV-AIDS education and disease prevention awareness talks to the workers and staff	management, compliance and reporting • Identify areas to be monitored and the required mitigation measures • Create awareness of sexually-transmitted diseases such as HIV/AIDs	Contractor cost	Safeguard consultant	
Prepare for emergency situation	• Create awareness of workers on emergency situation	• Designate Disaster Coordinator to guide during emergency • Conduct mock drills regularly • Provide information like emergency hotline, evacuation routes, etc. • Provide training or orientation on proper response during emergency	---	Contractor, PIU	PMU, Environmental Safeguard Consultant
Hiring of project staff and workers	• Dispute over transparency in hiring	• Contractor will be required to give priority to local labour	---	Contractor, PIU	PMU, Environmental Safeguard consultant
• Site preparation and construction works	• Disturbance and inconvenience to people due to traffic, increased noise and dust levels, and disposal of waste • Emissions from heavy equipment machinery and construction vehicles	• CMP will be strictly implemented • Use of proper safety clothes/equipment • Provide temporary enclosures (at least 2 m-high) to contain dust and minimize noise	Included in the costs of Contractor	Contractor, PIU	PMU, Environmental Safeguard consultant
	• Potential chance find during site excavation	• Chance find procedures in ECoP 1.0 will be followed			Environmental Safeguard consultant
	• Potential safety risks to community	• Provide fence or barricade, sufficient lights, clear warning signs and danger signals, and take all precautions identified in the community and safety plan of CMP • Assign security staff prevent accidents, trespassing, and pilferage • Contractor to direct drivers to strictly follow			PMU, Environmental Safeguard consultant

Project Activity	Potential Environmental Impacts	Mitigation/Enhancement Measures	Estimated Cost	Implementing Unit	Supervising and Monitoring Unit
		road regulations			
	• Potential occupational health and safety risks to workers	• Provide workers with hard hat, safety shoes and belts • Set up first aid at construction site • Comply with relevant safety measures required by law and best engineering practices			PMU, Environmental Safeguard consultant
	• Heavy equipment and construction vehicles may increase vehicular emissions • Transport of materials to construction site may increase dust level • Earthmoving works and opened land areas increase dust levels • Increase in noise level and vibration from excavation and heavy equipment and construction vehicles	• Construction vehicles will be maintained to minimize vehicular emissions • Provision of temporary enclosures • Provide space onsite for construction materials to reduce trips of material delivery • Contractor will be required to maintain construction vehicles, equipment and machineries regularly to reduce emissions, avoid smoke belching, and reduce noise • Spray water in opened land areas or in sources of dust • Transport of dust-generating materials will be covered • Observance of low speed by vehicles to reduce noise • Noise-generating works will be done between 6AM and 11PM only. • No blowing of horns will be allowed • Comply with traffic management plan			PMU, Environmental Safeguard consultant
Construction of ICT building	• Non-compliance to relevant regulations • Potential accidents due to working on heights • Occupational and community safety risks • Generation of waste	• Monitor compliance to regulations • Provide PPE to workers • Provide first aid kits and fire-fighting system • Conduct daily toolbox meeting prior to start of work • Conduct work only from 6AM to 11PM	Included in Contractor costs	Contractor, PIU	PMU, Environmental safeguard consultant

Project Activity	Potential Environmental Impacts	Mitigation/Enhancement Measures	Estimated Cost	Implementing Unit	Supervising and Monitoring Unit
		• Provide enclosures to noise-generating works and equipment, and areas generating dust			
Clean up of construction sites after completion of construction works	• Improper disposal of construction debris	• Restore/reinstate all the areas potentially damaged during construction works • Workers will be provided with proper safety gear and equipment • Dispose remaining waste and debris at designated sites	Included in Contractor costs	Contractor, PIU	PMU, Environmental safeguard consultant
Post-construction stage					
Occupy new building	Improper use and lack of care to the new building	• BUET to conduct orientation and awareness to staff and students on proper care of the facility	Include in the operation cost	PIU, CSE Department	PMU
	Generation of waste	• Designate waste management coordinator • Prepare waste management plan with time-bound targets • Conduct yearly training/orientation to trainees on waste management, proper collected, and disposal • Explore measures to implement effectively the principles of reduce, reuse and recycle.	Include in the operation cost of the	PIU, CSE Department	PMU
	Potential incidence of emergency or natural disaster	• Prepare emergency/disaster preparedness plan and procedures • Designate a Disaster Coordinator • Conduct training/orientation/drills on safety and emergency awareness • Provide clear and visible emergency warning signs	---		PMU

Table 9.2 Environmental Monitoring Plan

Project Stage	Parameter	Location	Method of Measurement	Frequency	Responsibility	
					Implementation	Supervision
Construction	Generation of waste and other construction debris	Construction site	Volume of waste or number of trips	Twice a month	Contractor	PIU
	Increase in dust level	Construction site	• Frequency of water spraying • Ocular inspection	Daily	Contractor	PIU, Environmental safeguard consultant
	Ambient air quality	Sampling stations in Table 4.3	• PM_{10} and $PM_{2.5}$	Quarterly		
	Ambient noise level	Sampling stations in Table 4.4	Sound level meter (dBA)	Quarterly		
	Availability of project information	PIU and construction site	One-page flyer, project brief or Project Q&A	Quarterly	Contractor, PIU	Environmental safeguard consultant, PMU
	Recruitment from local labour	PIU office	Number of local workers and staff recruited	Monthly	Contractor, PIU	PMU
	Orientation of workers on health and safety	Construction site	Number of participants	Semi-annually	Environmental safeguard consultant, Contractor, PIU	PMU
	Orientation of Contractor and workers on issues like HIV/AIDS, compliance to EMP and ADB requirements, etc.	Construction site	Number of participants	Once before construction	Environmental safeguard consultant, PIU	PMU
	Solid waste management	Construction site	Volume of waste disposed Ocular inspection/spot checks	Every week	Contractor	PIU, Environmental safeguard consultant
	Clear and visible warning signs for safety of workers and BUET community	Construction site and access roads	Ocular inspection/spot checks	Once a month	Contractor	PIU, Environmental safeguard consultant
	Announcement to the public of works schedule	BUET community	Work schedule log sheet	As needed	Contractor	PIU, Environmental safeguard consultant
	Smoke belching construction vehicles	Construction site and access roads	Ocular inspection/spot checking	Weekly	Contractor	PIU, Environmental safeguard consultant
	Proper storage and management of construction materials and wastes	Construction site	Number of vehicles Ocular inspection/spot checking	Weekly	Contractor	PIU, Environmental safeguard consultant
	Use of personal protective equipment (PPE) and safety gear	Construction site	Ocular inspection/spot checks	Twice a week	Contractor	PIU, Environmental safeguard

Project Stage	Parameter	Location	Method of Measurement	Frequency	Responsibility	
					Implementation	**Supervision**
						consultant
	Condition of sanitary facilities and safe drinking water	Construction site	Ocular inspection/spot checks	Weekly	Contractor	PIU
	Good housekeeping	Construction site	Ocular inspection/spot checks	Twice a week	Contractor	PIU
Post-construction	Orientation of students, faculty, and administrative staff on care and maintenance of the building	BUET	Number of trainees	Annually (at start of each term)	• Office of Chief Engineer • Office of Director of Planning, Development and Works	PIU
	Good housekeeping (also garbage collection and disposal)	BUET	Ocular inspection/spot checks	Monthly	Office of Chief Engineer	PIU
	Condition/maintenance of fire extinguishers/fire-fighting units/fire alarms	BUET	Ocular inspection/spot checks	Annual	Office of Chief Engineer	PIU
	Safety/emergency/disaster manual and procedures	BUET	Check manuals	Annually	Office of Chief Engineer	PIU
	Emergency mock drills	BUET	Number of trainees	Semi-annual	Office of Chief Engineer	PIU
	Greening program/grounds maintenance	BUET	Types of plants, area planted	Annually	Office of Chief Engineer	PIU
	Condition of safety gears and emergency equipment	BUET	Ocular inspection/spot checks	Annual	Office of Chief Engineer	PIU
	Building condition • Roof • Electrical panel and wiring • Door handles, windows, hinges and closures • Walls and ceilings • Fume hoods • Stairways and fire exit/escape • Storm water drains	BUET	Ocular inspection/spot checks for cracks, signs of water leaks, damage, fire hazards, etc.	Semi-annual	Office of Chief Engineer	PIU

10.0 CONCLUSION AND RECOMMENDATION

Assessment of potential environmental impacts associated with the construction of the new ECE Annex building within the premises of BUET (West Palashi Campus) show that they are mainly during construction phase, of short duration, temporary, reversible, and can be easily mitigated by good and best practices in engineering construction. The potential impacts can be mitigated also by adhering to the design provisions set forth in the BNBC 2006. The mitigation measures are outlined in the EMP and the parameters to be monitored are listed in the EMoP.

Stakeholders were consulted and a GRM to deal with potential complaints on the project was described. Public consultations will continue in varying degrees throughout the project implementation. An environmental safeguard consultant will be engaged at PMU throughout construction phase to ensure capacity and technical support in complying with the requirements of ADB. Environmental monitoring reports will be submitted by the PMU to ADB semi-annually during construction and annually post-construction. These monitoring reports will be similarly disclosed to ADB website.

Given this, UGC and BUET are committed to comply with the requirements of ADB.

Appendix 1
Environmental Code of Practice (ECoP)

Table below presents the environmental codes of practice (ECoP) to provide guidance in managing potential environmental impacts during construction phase.

ECoP 1.0 "Chance find" of physical cultural resources
ECoP 2.0 Managing air quality
ECoP 3.0 Managing noise and vibration
ECoP 4.0 Waste Management
ECoP 5.0 Occupational health and community safety

Area of Concern		Project Activity	Management Measures
ECoP 1.0	"Chance find" of physical cultural resources	Excavation for building foundation and other earthmoving works	The Contractor will ensure that: • Excavation works within the area of "chance find" will be stopped • Identify and mark the area with a global positioning system (GPS) unit to determine the exact location and take photographs • Secure the area discovered to avoid potential damage, loss or removal of any movable or transportable object • Inform the PIU of the "chance find" and designate a security personnel until a representative from the Ministry of Cultural Affairs arrives
ECoP 2.0	Managing air quality	• Use of construction vehicles and machinery	Contractor will do the following: • Prepare air quality management plan as part of the overall construction management plan and consult PIU for concurrence • Keep construction vehicles in good working condition and limit idling time of not more than 2 minutes • Cover trucks and other vehicles transporting materials that generate dust • Implement speed limits on vehicular movement within the construction sites • Sprinkle water to crusher and orient workers to follow good practices while handling material in concrete-mix plant

Area of Concern		Project Activity	Management Measures
		• Construction activities	The Contractor will do the following: • Spray water regularly (or as needed) to unpaved and opened land areas, material stockpiles, and access roads to contain dust • Dust-generating construction activities will be enclosed to contain dust dispersion • Workers assigned to activities generating high dust level will be provided with PPE such as masks, goggles, etc. • Must ensure that there will be minimum generation of dust and waste while unloading the materials from delivery trucks or construction vehicles • Materials generating dust such as sand and gravel will be covered particularly during non-working hours. • Re-vegetate opened areas (if possible) to limit area of exposed land • Stock cement and other dust-generating materials in covered space • Provide area for mixing and loading of construction materials. • Burning of solid waste within the construction site will not be allowed. • Batching plant will be located upwind of the construction site.
ECoP 3.0	Managing noise and vibration	• Vehicular traffic	The Contractor will ensure: • Regular upkeep and maintenance of construction vehicles to minimize generation of unwanted noise • Drivers of construction vehicles to comply with speed limits • Use of horns will be allowed only when necessary • Divert routes to minimize traffic, observe loading and unloading procedures, and to minimize unnecessary noise at the construction site

Area of Concern		Project Activity	Management Measures
		• Use of construction machinery and equipment	The Contractor will ensure: • Enclosure and/or isolation of noise-generating machinery and equipment to contain noise levels • Identify and organize all noise-generating activities to minimize increase in ambient noise levels • Proper and regular maintenance of equipment and machinery to avoid unwanted generation of noise • Avoid the use of alerts, horns, or sirens unless absolutely necessary like emergency
		• Construction works	Contractor will ensure that: • Nearby local residents are notified of noise generating activities, time and duration • Operators of heavy equipment and machineries will be educated/oriented on construction techniques to reduce generation of noise • Temporary noise barriers or enclosures are installed, where needed • Onsite deliveries will be planned to minimize noise from delivery trucks • Noise-generating activities will be conducted only during daytime (6AM to 11 PM) • Schedule of noise-generating activities and deliveries of materials will be coordinated with the PIU to ensure minimal disruption to students and activities in BUET (West Palashi Campus)
ECoP 4.0	Waste Management	• Generation of waste at construction sites	Contractor will do the following: • Identify the activities that will generate waste and identify location for disposal • Develop waste management plan for different waste streams prior to start of construction works • Orient workforce on disposal of waste, the location of disposal site and specific requirements for management of these sites • Wastes that cannot be re-used will be disposed of safely at designated sites • Minimize generation of waste by

Area of Concern		Project Activity	Management Measures
			implementing 3Rs (Reduce, Re-use, Recycle), and segregate waste at source • Waste will be transported in fully covered trucks to prevent spillage along the way • Provide appropriate bins/containers for waste at construction site • Conduct orientation to workforce on waste management practices • Require workers to observe good housekeeping at all times
		• Handling of hazardous waste	Contractor will ensure that: • Chemical wastes are stored in sealed container and properly labeled • All chemical containers such as paints are labeled properly for easy identification • Material Safety Data Sheets (MSDS) of all chemicals onsite during construction are maintained and properly recorded • Chemical and other hazardous materials are stored in bunded place or in an area lined with impervious material to prevent soil contamination and away from drainage system • Store sufficient stock of absorbent materials for used chemicals or spent lubricants, lube oil, etc.
ECoP 5.0	Occupational health and community safety The Contractor will be responsible to include the protection of every person and nearby property from construction accidents. The Contractor will be responsible for complying with all safety requirements of GOB and any other measures necessary to avoid accidents, including the following:	• Construction works at the new ECE Annex building	The PIU and the Contractor shall inform the BUET (West Palashi Campus) community and adjacent settlements (Polashi Bazar Market Association) along the access roads of the following: • Schedule of construction works, routing of traffic (if needed), possible health concerns (exposure to dust, noise, and vibration) Contractor will do the following: • Set-up a health and safety committee and designate a Safety Officer • Provide workers with personal safety equipment (PPE) such as footwear, gloves and eye protection devices, helmets, etc.

Area of Concern		Project Activity	Management Measures
	(i) Notice or signboards shall be properly installed at the construction site (ii) Conduct safety training or orientation to workers prior to start of work; (iii) Provide required PPE to workers and its use will be mandatory; (iv) In case of an emergency, suspend all work. To maintain good community relations, the Contractor will: (i) Inform local authorities and community about construction and work schedules, interruption of services, and rerouting of traffic. (ii) Restrict construction activities at night. If needed, ensure that night work is carefully scheduled and the community is properly informed so they can take necessary measures.		• Prepare an emergency action plan • Maintain PPE properly by cleaning dirty ones and replace damaged sets. • Provide adequate lighting, drainage systems to prevent water stagnation, and adequate space to administer first aid • Implement appropriate standards of safety to all workers and site visitors to comply with the national requirements and the World Bank-IFC Environmental, Health and Safety Guidelines 2007 • Conduct toolbox meetings prior to start of construction works. Record names of workers present during the meetings. Worker not joining toolbox meeting will not be allowed to work. • Enforce safety procedures and provide training on PPE to workers • Designate someone to deal with community and occupational health and safety • Clear and visible danger and warning signs shall be placed as soon as construction begins and will remain until works are completed. • Keep a record of workers and place assigned
		• Child labor	Contractor will not hire workers below 15 years old
		• Training and record keeping	The Contractor will: • Keep a record of occupational accidents, diseases, and injuries • Prevent work-related accidents or injury by minimizing workplace hazards consistent with international best practice • Ensure health care facilities and first aid kits are readily available • Train construction workers about general health and safety practices, and on specific hazards related to their work

Area of Concern		Project Activity	Management Measures
		• Security of construction site	Contractor will ensure that: • Security personnel will be deployed to prevent unauthorized entry at construction site • All the tools, equipment and construction materials at the site are accounted for, identified, clearly labeled/marked, and recorded • Maintain a record of tools' serial numbers and check inventory on a regular basis • Implement an inventory system where tools and equipment are checked in and out, securely stored when not in use to prevent theft • Provide proper fencing of construction site perimeter with secured chain and lock • Construction site will have controlled access points to allow for close monitoring of entry and exit from the site • Workers will have proper identification while within the site • Staff or workers required to have access to the site after working hours will be notified with the PIU • Job site will be adequately lighted • Pre-employment investigations are conducted to verify previous employment, references (if needed), education and criminal background

Appendix 2
List of Participants and Photographs during Consultation

BAN: Innovations in Tertiary Education for Competitiveness in Information Technology Project

Public Consultation Meeting
held on April 3, (Wednesday), Time: 3.00 pm
Venue: Information Access Centre, CSE Department, BUET

List of Participants -1

Sl No	Name	Occupation	Male	Female	Cell No.	Signature
01	Dr. Md. Abdur Rahim	Teaching	[illegible]		01552380-217	[illegible]
02	Nadira Tasmin Ahmed	Programmer, Registrar Office, BUET.		✓	01916555[illegible] 01556[illegible]	[illegible]
03	MD. MIZANUR RAHMAN	Teaching	[illegible]		[illegible]	[illegible]
04	[illegible]	Teaching	✓		[illegible]	[illegible]
05	Dr. Md. Forkan Uddin	Teaching	✓	X	01678024 389	[illegible]
06	Md. Osman Bhuiyan	Govt. Service	✓		01552379[illegible]3	[illegible] 3/4
07	MD. HEZANUR RAHAMAN	Programmer, BANBEIS	✓		[illegible]	[illegible] 3/4/19
08	Dr. Md Shahinoor Islam	Teaching	✓		01752 782128	[illegible]
09	Md Tarikul Islam [illegible]	Teaching	✓		01918297[illegible] 70	[illegible]
10	Sharif Ahmed	Teaching	✓		[illegible]	[illegible]
11	Md. Saiful Islam	Teaching	✓		01516156[illegible]	[illegible]
12	Sadman Sakib Fuad	Teaching	✓		[illegible]	[illegible]
13	Md Fazlay Rabby	Asst. Programmer BANBEIS	✓		[illegible]	[illegible]

BAN: Innovations in Tertiary Education for Competitiveness in Information Technology Project

Public Consultation Meeting
held on April 3, (Wednesday), Time: 3.00 pm
Venue: Information Access Centre, CSE Department, BUET

List of Participants-2

Sl No	Name	Occupation	Male	Female	Cell No.	Signature
14	MD. Kabil Hossain	[illegible]	✓		01766[illegible] 651	[illegible]
15	Dr. Md. Shafiqul Islam	Professor & Head, EEE	✓		[illegible]	[illegible]
16	Abu Nahid	[illegible]	✓		01716[illegible]	[illegible]
17	Dr. Shahmeen Jahan	Asst. Professor Dept. of [illegible]		✓	[illegible]	[illegible]
18	Laila Parvin Suchi	Government Service		✓	01717925[illegible]	[illegible]
19	Dr. S. Shahnewaz Ahmed	Professor, EEE Dept. BUET	✓		0155[illegible]	[illegible] 3/4/19
20	Dr. Mohammad [illegible]	Prof. [illegible] BME BUET	✓		[illegible]	[illegible]
21	MD. Mahbubul Hoq	Sec. Buet [illegible]	✓		[illegible]	[illegible]
22	Mahmudur Rahman Hera	Lecturer, CSE, BUET	✓		[illegible]	[illegible]
23	[illegible]	Lecturer, CSE, BUET	✓		[illegible]	[illegible]
24	[illegible]	[illegible] Consultant		✓	–	[illegible]
25	Dr. A.K.M. Ashikur Rahman	Professor CSE, BUET	✓		[illegible]	[illegible]
26	Md. Mostafizur Rahman	STO, CSE BUET	✓		01817093[illegible]	[illegible]

Public Consultation Meeting
held on April 3, (Wednesday), Time: 3.00 pm
Venue: Information Access Centre, CSE Department, BUET

List of Participants-3

Sl No	Name	Occupation	Male	Female	Cell No.	Signature
27	Shaikh Rafiqul Islam	Service	✓		01711265931	[illegible] 3-4-19
28	Md Saleh Ahmed	Service	✓		01715753444	Saleh 2-4-19
29	Dr. M. Hasanuzzaman	Teaching	✓		[illegible]	[illegible] 03/04/2019
30	Richard Baroi	Service	✓		0167210443 68	[illegible] 03/04/19
31	Md Lookman Hossain	Services	✓		01715785349	[illegible] 03-04-19
32	Md Reza Shakhawat Hossain	Service	✓		0181991664	[illegible] 3-4-19
33	Kanak Das	Student	✓		01845754445	[illegible] 3-4-19
34	[illegible]	Student	✓		[illegible]	[illegible] 3-4-19
35	M. Sohel Rahman	Professor	✓		[illegible]	[illegible] 3-4-19
36	Md. Abdul Mannan	Service	✓		[illegible]	[illegible] 3-4-19
37	Dr. Mahmuda Nazin	Professor, CSE, BUET		✓	01726[illegible]	[illegible] 3-4-19
38	Helena Begum	Service		✓	01722024[illegible]	[illegible] 3/4/19
39	Md. Bahauddin Mia	Service	✓		[illegible]552015695	[illegible]

BAN: Innovations in Tertiary Education for Competitiveness in Information Technology Project

Public Consultation Meeting
held on April 3, (Wednesday), Time: 3.00 pm
Venue: Information Access Centre, CSE Department, BUET

List of Participants-4

Sl No	Name	Occupation	Male	Female	Cell No.	Signature
40	Md. Nazmul [illegible]	Job	✓		0130304-3413	[illegible]
41	Masud Alam	Service	✓		0171173-0487	M. Alam 3-4-19
42	Md. Amdadul Haq	Service	✓		0191 53793 45	[illegible] 3/4/2019
43	Md. Tanjul Islam	Service	✓		0155 7958 143	[illegible] 03-04-19
44	Mohammad Wahiduzzaman	S T O	✓		01759429 449	[illegible] 3-4-19
45	Aziz Ahmed	Job	✓		01552015 712	[illegible]
45	Dr. Muhammad Masroor Ali	BUET	✓		01819 263263	M Masroor [illegible]
46	Dr. Md. Saifur Rahman	BUET	✓		0155234 7884	[illegible]
47	Md. Yusuf Mia	Buet Job	✓		[illegible] 826	[illegible]
48	Md. Abu Naser	Job	✓		0181[illegible] 3323	[illegible]
49	Samsul [illegible]	TAC Mostlab CSE, BUET	M		[illegible]	[illegible]
50	CH. MD. Rabi Hinder	CSE, BUET [illegible]	M		0155785[illegible] 44	Rabi
51	Dr Md. Monirul Islam	CSE, BUET Professor	M		01731666 933	[illegible] 3/4/19

List of Participants-5

Sl No	Name	Occupation	Male	Female	Cell No.	Signature
52	Osman Goni	Office Att. BUET.	✓		0182217 8836	[illegible]
53	Md Rezaul Karim	Service	✓		0174208442	[illegible]
54	Md. Rafiqul Islam	Service	✓		01616201[illegible]	Rafiq
55	Dr. Anindya Iqbal	Associate Prof.	✓		0185 7916 847	[illegible]
56	Md. Habib-E-Kowser	Attendant	✓		018210 48154	[illegible]
57	Md. Shahin pramanik	Service	✓		0155873721 24	[illegible]
58	Dr. Md. Shohrab Hossain	Associate Prof	✓		01819-250196	Shohrab
59	Madhusudan Basak	Assistant Professor	✓		01710-288910	Madhusudan
60	Md. Iftekharul Islam Sakib	Assistant Professor	✓		01711-375911	[illegible]
61	Md Belal	Service	✓		01680383757	Bel

Appendix 3
Sample Complaint Form for GRM

Complaint/Suggestion/Comment Form			
Loan No.: _____BAN: Improving Computer and Software Engineering Tertiary Education Project			
Please provide the following information:			
	Date of Filing:		
Name of Person/Organization:			
Contact Details:			
Address			
Telephone/Mobile Phone			
Email (if available)			
Signature of Person Filing Complaint			
Representative in filing this complaint?	Yes		
Please provide details	Name		
	Address		
	Telephone		
	No		
	Not applicable		
Complaint/Suggestion/Comment (*Please provide details as appropriate: what happened, how and why it happened, when and where, how many times it occurred*)			
Please describe any inconvenience/harm caused or may have been caused			
Please provide suggestion to resolution of your complaint (if any)			
Please let us know how you prefer to be contacted	Mail or email		
	Phone		
	Meeting		
Contractor/PIU/PMU Use only			
Recorded by (Name of designation of Contractor/PIU staff)			
Reviewed by (Name and designation of Contractor/PIU staff)			
Action(s) taken to resolve the complaint/comment/suggestion			
	No action needed		
Action/decision disclosed to Complainant	Yes	No	Not required
	Date		
Manner of disclosure	Mail		
	Phone		
	Meeting		
	Not required		

PMU Environmental Safeguard Form 1 - GRM

Appendix 4
Terms of Reference
Environmental Safeguard Consultant, PMU

(National, 4 person-months within 24 months, intermittent)

Preferably a post-graduate degree in environmental engineering, environmental sciences or equivalent discipline with a minimum of 7 years in environmental management and monitoring and in oversight of project implementation and compliance. A strong knowledge of the applicable environmental regulations and other construction requirements in Bangladesh as well as the environmental requirements of ADB following the Safeguard Policy Statement (SPS) 2009 will be mandatory. The candidate should have good communication skills (oral and written), a good team player with strong organizational and problem solving skills.

Duties and tasks include, but not limited to the following:

(i) Provide technical support to the PMU to ensure that all environmental requirements of ADB including occupational health and safety requirements of the GOB are complied with by the project;
(ii) Ensure that the EMP and EMoP are included in the bid documents and civil works contracts;
(iii) Implement a system for monitoring the environmental safeguards;
(iv) In coordination with the PIU-designated staff, conduct regular site visits at the construction sites to verify/check compliance to EMP and EMoP including adherence to occupational health and safety provisions and core labor standards.
(v) Together with the PIU-designated staff and the representative of the contractor, conduct stakeholder consultations, as appropriate, to determine if there is any concern during construction;
(vi) Assist in obtaining associated government permits (if any) prior to start of construction works;
(vii) Take immediate action in the event of unexpected adverse impact or ineffective mitigation measures identified during implementation and in preparing the corrective action plan;
(viii) Provide technical support to the PIU-designated staff in drafting the environmental monitoring reports required by ADB, and in monitoring compliance of contractor to the environmental, health and safety requirements;
(ix) Address any grievances through the GRM in a timely manner, prepare record of such grievances for inclusion in the environmental monitoring report;
(x) Prepare the semi-annual environmental monitoring reports to be submitted to ADB, and upon ADB review, address any comments raised (if any); and,
(xi) Assist in any relevant works that may be assigned by PMU/PIU.

Appendix 5
Proposed Format of Environmental Monitoring Report during Construction Phase

Environmental Monitoring Report

Reporting Period {From Month, Year to Month, Year}
Date {Month, Year}

BAN: Improving Computer and Software Engineering Tertiary Education Project

Prepared by the University Grants Commission of the Ministry of Education for the Asian Development Bank

TABLE OF CONTENTS

Page

Appendix 6
Proposed Format of Environmental Monitoring Report Post-construction

Environmental Monitoring Report

Reporting Period {From Month, Year to Month, Year}
Date {Month, Year}

BAN: Improving Computer and Software Engineering Tertiary Education Project

Prepared by the University Grants Commission of the Ministry of Education for the Asian Development Bank

TABLE OF CONTENTS

Page

Appendix 7
Sample Environmental Site Inspection and Monitoring Checklist

Loan No.:

Name of University	Location
Inspection Date	Inspection Time
Inspector	Weather at time of inspection:

Items for Inspection	Y	N	NA	Remarks (i.e. problem observed, possible cause of non-compliance and/or proposed corrective action)
Site Office				
Site office established				
Contractor appointed an EHS supervisor				
EHS supervisor or designated person on-site				
Copies of EMP, contract document, and environmental clauses on-site				
Details of construction (i.e., name of contractor, duration of construction, emergency hotline, safety, etc.) disclosed on-site				
Details of grievance redress mechanism (i.e., contact person, complaints hotline, etc.) disclosed onsite				
Complete first aid kits on-site				
Photographs of before and after completion of work on board				
Incident register book on-site				
Complaint/visitor's comment book available				
Record of regular consultation of Contractor to University management and/or nearby residents to check if there are environmental concerns				
Any complaint filed with the contractor by staff and settlements				
Disturbed areas properly re-vegetated after completion of work				
Emergency Preparedness and Response				
Fire extinguishers/fire-fighting equipment properly maintained and not expired				
Fire escapes properly marked, clear, and not obstructed				
Emergency contacts available in case of any incident				
Accidents/incidents reported, reviewed, and corrective/preventive actions recorded				
Occupational Health and Safety				
Provision of labor and equipment shed				

Items for Inspection	Y	N	NA	Remarks (i.e. problem observed, possible cause of non-compliance and/or proposed corrective action)
Provision of sanitation facilities and safe drinking water				
Use of personal protective equipment (PPEs)				
Installation materials and equipment storage				
Separate storage of fuel and lubricant				
Training on OHS, use of PPE, etc. done before construction works				
Clear danger and warning signs on-site for students, faculty, and community				
Fencing of construction site and designation of security personnel				
Good housekeeping - site kept clean and tidy				
Containers properly labelled for easy recycling or waste segregation				
Special facilities for female workers				
Bin for collecting garbage and food waste				
Air Quality				
Opened land and construction sites sprayed with water to minimize generation of dust				
Any evidence of excessive dust generation				
Stockpiles of dusty materials and dust-generation activities like handling of cement done in enclosed areas or sprayed with water				
Vehicles carrying dusty loads/materials covered or watered over before leaving the site				
Construction equipment well maintained (any black smoke or smoke belching observed)				
Demolition work areas watered				
Speed control measures applied (e.g. speed limit sign)				
Noise				
Evidence of excessive noise				
Any noise mitigation measure adopted (e.g. use noise barrier/enclosure)?				
Prohibition of using megaphone or whistle on-site				
Use of well-maintained equipment and vehicles				
Water Quality				
Sanitary facilities for workers equipped with on-site treatment system				
Wastewater discharged to soil				

Items for Inspection	Y	N	NA	Remarks (i.e. problem observed, possible cause of non-compliance and/or proposed corrective action)
Evidence of oil spill				
Chemicals properly stored and labelled				
Spill kits/sand /saw dust used for absorbing chemical spillage readily accessible				
Special facilities for female labor				
Construction waste/recyclable materials and general refuse removed off-site regularly				
Water pipe leakage and wastage prevented				

Reviewed by:

Name and signature _____ Date _____
Designation in PIU _____