GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH
LOCAL GOVERNMENT ENGINEERING DEPARTMENT

TECHNICAL ASSISTANCE ON INTEGRATED SOLID WASTE MANAGEMENT IMPROVEMENT PROJECT

PREPARATION AND DESIGN CONSULTANCY SERVICES

ENVIRONMENTAL AND SOCIAL MANAGEMENT PLANNING FRAMEWORK (ESMPF)

ASIAN INFRASTRUCTURE INVESTMENT BANK

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DOCUMENT LEAD SHEET			
Project	Technical Assistance on Integrated Solid Waste Management Improvement Project		
Assignment	Preparation and Design Consultancy Services		
Report	Task 2 – Environmental and Social Management Planning Framework (ESMPF)		
Client	Local Government Engineering Department		
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This ESMPF is a guiding document of the LGED, prepared by the Environmental Specialist assigned by the LGED. LGED, AIIB, and other respective consultants have reviewed the document and made comments and suggestions, which are responded to finalize the ESMPF.

ABBREVIATIONS AND ACRONYMS

ADB	Asian Development Bank
AD	Anaerobic Digestion
AIIB	Asian Infrastructure Investment Bank
BOO	build-operate-own
BOT	build-operate-transfer
BMP	Best Management Practice
CBO	Community Based Organization
CDM	Clean Development Mechanism
CRDP	Second City Region Development Project
CSO	Civil Society Organizations
CTEIP	Coastal Towns Environmental Infrastructure Project
DAE	Department of Agriculture Extension
DIFE	Department of Inspection for Factories and Establishments
DLS	Department of Livestock Services
DED	Detailed Engineering Designs
DoE	Department of Environment
DoF	Department of Fisheries
DPHE	Department of Public Health Engineering
DSM	Design Supervision Management
EA	Environmental Assessment
ECA	Ecological Critical Area
ECA	Environmental Conservation Act
ECC	Environmental Clearance Certificate
ECoP's	Environmental Code of Practices
ECR	Environment Conservation Rules
EHS	Environmental, Health and Safety
EIA	Environmental Impact Assessment
EMF	Environmental Management Framework
EMIS	Environmental Management Information System
EMP	Environmental Management Plan
EMU	Environmental Management Unit
ESA	Environmental and Social Assessment
ESF	Environmental and Social Framework
ESIA	Environmental and Social Impact Assessment
ESMPF	Environmental and Social Management Plan Framework
ESMP	Environmental and Social Management Plan
ESR	Environmental Screening Report
ESS	Environmental and Social Standards
FGD	Focus Group Discussion
GAP	Gender Action Plan
GBV	Gender Based Violence
GoB	Government of Bangladesh
GRC	Grievance Redress Committee
GRM	Grievance Redress Mechanism
IDB	Islamic Development Bank
IEE	Initial Environment Examination
LGD	Local Government Division
LGED	Local Government Engineering Department
ISWMIP	Integrated Solid Waste Management Improvement Project
MLGRDC	Ministry of Local Government Rural Development and Co-operatives
MOA	Ministry of Agriculture
MOE	Ministry of Energy
MOEF&CC	Ministry of Environment and Forest & Climate Change
MoPE&MR	Ministry of Power Energy and Mineral Resources
MOF	Ministry of Finance

MOI	Ministry of Information
LMP	Labour Management Procedures
NGOs	Non-Government Organizations
NOC	No Objection Certificate (NOC)
OHS	Occupational Health and Safety
PA	Protected Area
PAD	Project Appraisal Document
PAU	Project Affected Unit
	Project
PIU	Implementation Unit
PMO	Project Management Office
PMU	Project Management Unit
PPE	Personnel Protective Equipment
RP	Resettlement Plan
RPF	Resettlement Policy Framework
SCC	Site Clearance Certificate (SCC)
SIA	Social Impact Assessment
STS	Secondary Transfer Station
SWM	Solid Waste Management
TOR	Term of Reference
ULBs	Urban Local Bodies (ULBs)

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EXECUTIVE SUMMARY

Objective of the ESMPF: ESMPF is a practical guidance for the Environmental and Social program formulation, design, implementation, and monitoring in the current Integrated Solid Waste Management Improvement Project (ISWMIP) supported by the AIIB, particularly with impacts that are not known as yet. This document will be followed during project preparation and implementation for ensuring environmental and social integration in planning, implementation, and monitoring of project supported activities. For ensuring good environmental management in the proposed Integrated Solid Waste Management Improvement Project (ISWMIP), the ESMPF will provide guidance on pre-investment works/studies (such as environmental and social screening, environmental and social assessment, environmental and social management plans, etc.), provide set of steps, process, procedure, and mechanism for ensuring adequate level of environmental and social consideration and integration in each investment in the project-cycle; and describes the principles, objectives and approach to be followed to avoid or minimize or mitigate impacts and risks according to AIIB Environmental and Social Standards (ESS).

The ESMPF will be a guiding document for project-element specific:

- ✓ Environmental and Social Screening;
- ✓ Assessment of Environmental and Social Impacts (both positive and negative);
- ✓ Environmental and Social Assessment;
- ✓ Public Consultation and Disclosure;
- ✓ **OHS, Labor and Contractor Management Plan;**
- ✓ **GAP and GBV Prevention Plan;**
- ✓ **Stakeholders Engagement Plan,**
- ✓ **Best Management Practices (BMP);**
- ✓ **Traffic Management Plan;**
- ✓ **Waste Management Plan;**
- ✓ Environmental Code of Practices (ECoPs);
- ✓ Environmental and Social Clauses for Bidding Documents;
- ✓ TORs for Environmental and Social Document Preparation and Implementation Firm/NGO;
- ✓ Environmental and Social Management Plans (ESMP);
- ✓ Implementation of ESMP; and
- ✓ Environmental and Social Monitoring and Reporting.

Environmental Safeguard in ISWMIP: Environmental Safeguard in the ISWMIP will cover environmental aspects in carrying out pre-feasibility studies, detailed feasibility studies. It will prepare environment safeguard instruments for the sub-projects. Under Part A: Sector Review, Policy Briefs, ISWMIP Framework Documents, the environmental consultant will produce Policy Brief as a guidance document for ULBs/ULB clusters to identify Best Practicable Options (BPOs) in SWM for collection, transportation, processing and disposal, building on a system for scoring, and applying appropriate weightages, to technologies or non-technological approaches which best respond to:

- any technology restrictions (waste streams accepted, rate and quality of materials recovered, type of outputs, environmental impacts on and by the technology option);
- other likely environmental and social impacts;
- Sub-project identification, screening (including likely environmental and social impacts), phasing (with Phase I investment size around USD150 million) and pre-feasibility reports for entire ISWMIP
- preparation of ISWMIP framework document i.e. Environmental and Social Management Planning Framework (EMSPF)

Once participating UdLBs/ULB clusters are identified under Part B: Phase-I Sub-project Preparation of the project the Environmental Consultant shall prepare detailed sub-projects focusing on their Environment and Social Impact Assessments and Management Plans by:

- producing, for all Phase I sub-projects, sub-project specific Environmental and Social Impact Assessments (ESIAs)

- producing, for all Phase I sub-projects, sub-project specific Environmental and Social Management Plans (ESMPs) including applicable social instruments (e.g. Indigenous Peoples Plan (IPP) and Resettlement Action Plan (RAP)/Livelihood Restoration Plan).

Activities of the ISWMIP: The subproject components are i) Waste Collection ii) Waste Transportation iii) Landfill (closure of polluted landfill sites, construction and rehabilitation of engineered sanitary landfills (standalone or regional/ clustered), iv) Compost Plant, v) MRF (Material Recovery Facility), vi) Plastic Waste to Oil, vii) Anaerobic Digestion, and vii) Leachate Treatment Plant viii) Waste to Energy (WtE). All these shall facilitate comprehensive SWM with the development of a long-term integrated SWM infrastructure for the entire ISWMIP, and thus help reduce environmental impact from inadequately managed SWM of the country.

ESMPF in the ISWMIP: In order to achieve the objectives of the project assignment and the scope of the work mentioned in the ToR, the project work has been divided into two parts. Part A of the project work focuses on the Solid Waste Sector Review, Preparation of Policy Briefs, and ISWMIP framework documents. Part B of the project focuses on the preparation of sub-projects. The time assigned to complete Part A of the consultancy assignment is four months while for Part B it is eight months. The following Figure-E-1 shows the ESMPF documentation of the project along with broad out-puts.

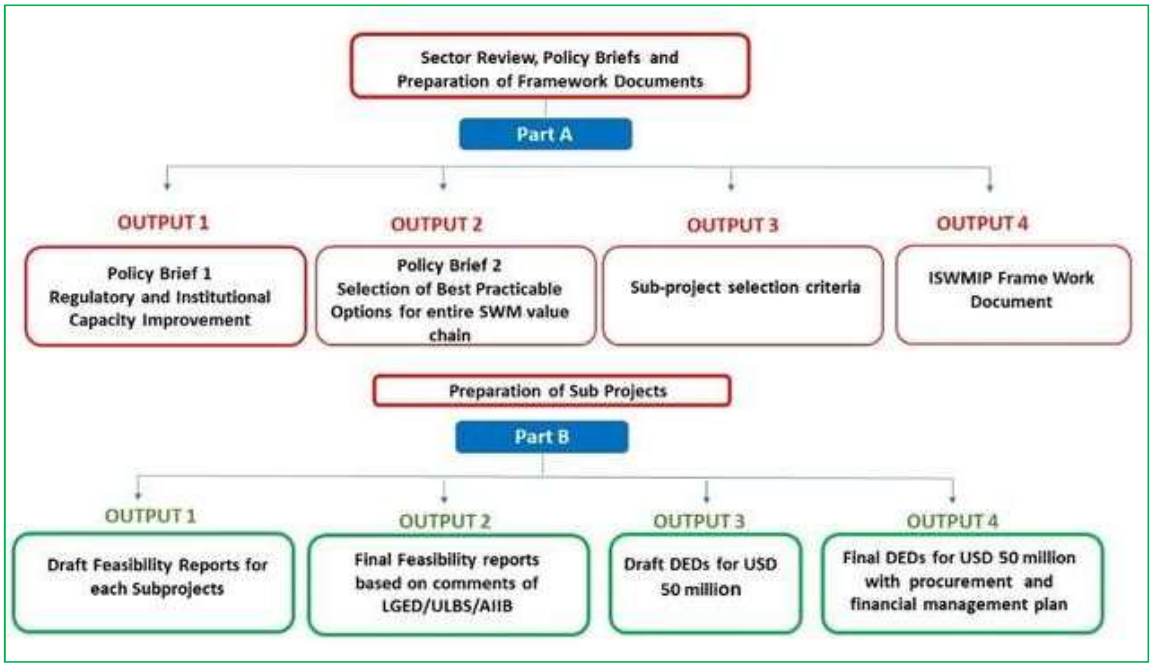


Figure-E-1: ESMPF Document in Output 4

AIIB E&S Framework and Key Gaps: The AIIB Environmental and Social Framework (ESF), 2016 (AIIB, 2016) (Amended February 2019 and May 2021) provides an overview of the AIIB concerning (a) environmental and social sustainability; and (b) its role in meeting the challenge of sustainable development in Asia. The complete objectives of development is framed within the ESF in terms of both local impacts, and global challenges, especially in climate change. The ESF provides general specifications, standards and objectives that clients should adhere to during project preparation and implementation. Thus, the ESF attaches importance to country regulatory systems as sources of legally binding procedures and standards.

The Environmental and Social Policy (ESP) in the ESF comprises essential environmental and social requirements for each project and is accompanied by:

(a) Three associated mandatory Environmental and Social Standards (ESSs) setting out requirements applicable to clients on, respectively,
    (i) ESS-1: Environmental and Social Assessment and Management,
    (ii) ESS-2: Land Acquisition and Involuntary Resettlement and
    (iii) ESS-3: Indigenous Peoples;
(b) An Environmental and Social Exclusion List (ESEL); and
(c) A Glossary of certain terms used in the ESP and ESSs.

In Bangladesh, there are more than 200 laws and by-laws exist to tackle the challenges related to environmental issues/aspects. Strategies and policies are in place. The Government of Bangladesh (GoB) realizes that good public policy needs to be matched by investments to ensure implementation. Some comparative analysis has been drawn between AIIB policy and GoB policies, then Harmonised framework has been provided in Table-E-1.

Table-E-1: Harmonized environmental policies of AIIB and GoB

Sl. No.	Aspect	AIIB Regulation	National Bangladesh Regulation	Identified gaps and Harmonised Framework
1.	Environmental Policy and Regulations	There are AIIB Environmental and Social Framework, Environmental and Social Policy and Environmental and Social Standards	Environment Conservation Act 1995 is currently the main act governing environmental protection in Bangladesh, which replaced the earlier environment pollution control ordinance of 1992 and provides the legal basis for Environment Conservation Rules, 1997 (ECR'97). The main objectives of ECA'95 are conservation of the natural environment and improvement of environmental standards, and control and mitigation of environmental pollution. According to Article-12 of Environment Conservation Act 1995, "No industrial unit or project shall be established or undertaken without obtaining, in the manner prescribed by rules, an Environmental Clearance Certificate from the Director General". The Ecologically Critical Area (ECA) is an environmentally protected zone where the ecosystem is considered to be endangered to reach a critical condition by the changes brought through various human activities. Section 2 of the Bangladesh Environment Conservation (Amendment) Act (2010) provides that "Ecologically critical Area" means such area which is rich in unique biodiversity or due to the importance of environmental perspective necessary to protect or conserve from destructive activities. ECA also falls within the category of natural and cultural heritage.	In most of the cases national requirements and standards for environment quality are in match with AIIB Policy and Standards (For example, Environmental Assessment is compulsory for both requirements). However, there are some parameters when national and AIIB requirements and standards are different (For example, National legislation does not require a preparation of separate EMP/ESMP or any other environmental documents/plans/checklists for project). In such cases more stringent provisions will be applied for the project.
2.	Screening and categorization	AIIB carries out project screening and categorization at the earliest stage of project preparation when	It is mandatory to obtain Environmental Clearance for each and every type of industry and project as per Bangladesh Environment Conservation Act, 1995 (Amended 2010). For the	AIIB and Bangladesh project categorization could be Harmonised by accepting the following principle: AIIB category: DoE categ ory Category A:

Sl. No.	Aspect	AIIB Regulation	National Bangladesh Regulation	Identified gaps and Harmonised Framework
		sufficient information is available for this purpose	purpose of issuance of Environmental Clearance Certificate, the industrial units and projects shall, in consideration of their site and impact on the environment, be classified into the following four categories: • Green • Orange-A • Orange-B • Red.	Category Red Category B: Orange B (mostly) Category B: Orange A Category C: Green The proposed subprojects can be Category A or B in accordance with AIIB ESS. In the case where AIIB and national categorization requirements differ, the more stringent requirement will apply.
3.	Environmental and Social Impact Assessment Report	In accordance with Environmental and Social Policy (ESP of ESF 2016), ESIA processes report for category A projects includes the following chapters: (a) description of the Project; (b) policy, legal and administrative framework, including the international and national legal framework applicable to the Project; (c) scoping, including stakeholder identification and consultation plan; (d) analysis of alternatives, including the "without Project" situation; (e) baseline environmental and social data; (f) evaluation of environmental and social risks and impacts; (g) public consultation and information	The EIA report has to include: (i) baseline data, (ii) project description, (iii) anticipated environmental impacts, (iv) waste management, (v) analysis of emergency situation, and (vi) and anticipated changes due to project implementation. Information on applicable laws and regulation usually is presented in "Introduction" part. For the projects of category Orange B, the EIA report is more simplified. For Green and Orange-A an EIA report is not required	The present ESMPF has been prepared in fulfilling the national as well as AIIB requirements.
4.	ESMP	ESMP should be prepared and should specify, along with the proposed mitigation	National legislation on EIA requires to identify possible impacts, but it does not require a preparation of separate EMP or any other environmental documents/plans/checklists.	An ESMP has been prepared and included in the present EIA.

Sl. No.	Aspect	AIIB Regulation	National Bangladesh Regulation	Identified gaps and Harmonised Framework
		activities, a monitoring plan and reporting requirements, institutional arrangements for ESMP implementation. For sub-projects category B with low impact ESMP checklist has to be filled.	There is no requirement on environmental monitoring with specification of monitoring parameters and location.	
5.	Public Consultations and Disclosure	The Borrower is responsible for conducting at least one meaningful consultation for all Categories A, B and C projects to discuss the issues to be addressed in the EMP or to discuss the draft EMP itself	Conducting of public consultation is not mandatory. It may be conducted, if required at the time of the EIA (second stage of EIA). Notice to relevant agencies and no object clearance from the local Government authority must be obtained	Public consultations have been carried out with the stakeholders, affected people, NGOs as part of the present EIA, in line with the AIIB requirements. The feedback received from the Public Consultations has been used to finalize the present EIA.
6.	Requirements on Cultural Heritages	AIIB ESS I requires development of Cultural Recourses field-based survey to conserve cultural resources and avoid destroying or damaging them under the Project	Ecologically critical Area" means such area which is rich in unique biodiversity or due to the importance of environmental perspective necessary to protect or conserve from destructive activities. ECA also falls within the category of natural and cultural heritage. Department of Archeology is the concerned authority for the preservation, presentation and promotion of our glorious cultural heritage. At present the department owns 448 heritage sites Article 24 of the constitution of Bangladesh says that the state shall adopt measures for the protection against disfigurement, damage or removal of all monuments, objects or places of special artistic or historic importance or interest. Bangladesh also have the Antiquities Act, 1968 that provides the modes of protection and preservation of things which are part of our national history and heritage.	Chance Find procedures have been included in the ESIA

SUB-PROJECT INFLUENCE AREA: For properly carrying out IEE and EIA, it is important to have a clear understanding about the "sub-project influence area" and "baseline environment". The ESMPF provides guidelines for identification of sub-project specific influence area and defining environmental baseline. In order

to establish a sub-project influence area, the activities to be carried out and processes that would take place during both construction phase and operational phase of the sub-project need to be carefully evaluated. Based on the field visits to sub-project sites, it is apparent that the sub-project influence area would depend not only on the type of sub-project (i.e., Waste Collection and Transportation, Waste Processing and Disposal), but also on the nature of site/ area where it will be implemented. Table-E-2 provides general guidelines for identification of influence area for different types of sub-projects to be implemented under the proposed project.

Table-E-2: Guidelines for identifying influence area for different types of sub-project

Sub-project	Influence Area
Waste Collection and Transportation, Waste Processing and Disposal	The landfill site shall be large enough to last for at least 20-25 years and shall develop 'landfill cells' in a phased manner to avoid water logging and misuse. The landfill site shall be away from habitation clusters, forest areas, water bodies, monuments, National Parks, Wetlands, and places of important cultural, historical or religious interest and the distance to be maintained, as prescribed by the Department of Environment (DOE) on the case to case basis for management of solid waste management plan or 200 meter away from rivers/wetlands/ponds, 250 meter form residential development, 500 meter from National Highways, Habitations, Public Parks and water supply wells and 3 km away from Airports or Airbase. The Landfill site shall not be permitted within wetlands, ECA, sensitive eco-fragile are-as, and flood plains. A 'no development' buffer zone shall be maintained around landfill sites and sites for processing and disposal of solid waste capacity greater than 5tones. The sites for landfills and processing and disposal of solid waste shall be incorporated in the master plan of the city/town prepared by the Development Authorities, UDD or LGED. The buffer zone shall be prescribed by the Department of Environment in the Environmental Clearance Certificate. No fault lines or significant fractured geological structures shall be present within 500 meters of the perimeter of the proposed landfill. The site must not be within a flood plain subject to 10 years flood. There should be no private or public drinking water well 500 meters down gradient of the landfill boundaries. Ground water's seasonal high level should be at least 1 meter below the pro-posed base of any cell excavation.

Potential Significant impacts: After identification of the major sub-project activities including its associated facilities (i.e. office building embankment leachate treatment plant vehicle washing facility and approach road) during construction/operational phase, the next step in the IEE/EIA involves assessment/prediction of the impacts of these activities on the baseline environment. The potential environmental impacts of sub-projects could be categorized into: (a) ecological impacts; (b) physic-chemical impacts; and (c) socio-economic impacts.
Ecological Impacts: Material storage or placement; Air Quality; Water Quality; Vehicle movement; Soil excavation; Noise disturbance; Exhaust from generators; Existing provisions for pedestrians And other Forms of transport; Ash disposal
Physico-chemical impacts: Drainage congestion, Noise pollution, Air pollution, Water pollution, Environmental pollution from solid/construction waste

Socio-economic impacts: traffic congestion, health and safety, employment and commercial activities, Aesthetic and Visual Resources, impacts on land, resettlement, gender, GBV, stakeholders engagement, exclusion of vulnerable HHs, OHS, accidents, COVID 19, Impact on archaeological and historical sites, and safeguarding physical cultural resources (PCR)

Environmental & Social Audit (ESA): An environmental audit provides advice on risks of harm to human health or the environment and may consider the suitability of site uses. The purpose of an environmental audit is to:

- assess the nature and extent of the risk of harm to human health or the environment. This may be from contaminated land, waste, pollution or any activity;
- recommend measures to manage the risk of harm to human health or the environment;
- make recommendations to manage the contaminated land, waste, pollution or activity.

Experienced Consulting Firm's environmental auditors perform audits. The auditors give an independent assessment of site conditions and risks. For a non-greenfield subproject, Environmental and Social Audit would be required to assess the required mitigation measures.

Cumulative Impact Assessment (CIA): The cumulative impact assessment examined the interaction between the subproject's residual effects (i.e., those effects that remain after mitigation measures have been applied) and those associated with other past, existing, and reasonably foreseeable future projects or activities. The interaction of residual effects associated with multiple projects and/or activities can result in cumulative impacts, both positive and negative. The project's potential cumulative effects were considered with respect to valued components in environmental and socioeconomic categories, in four areas:

- Of any potential residual project effects that may occur incrementally overtime;
- Consideration of other known relevant projects or activities within the specified study area boundaries, even if not directly related to the project;
- Potential overlapping impacts that may occur due to other developments, even if not directly related to the proposed subproject; and
- Future developments that are reasonably foreseeable and sufficiently certain to proceed

Environmental & Social Assessment and Management Process: The environment consultant of the Project Implementation Unit (PIU) will perform the environmental and social screening. The environmental consultant will start the task during the preparation stage of sub-projects:

- PIU with the support of the consultant will update the EIA, SIA and RPF;
- LGED will share the EIA report with DoE for Clearance;
- LGED environmental and social consultant's will conduct IEEs/ESIAs for the sub-project's different activities those are have similarity and likely to have same environmental impacts at different locations, hence multiple IEEs/ESIAs should be carried out prior to the project activities;
- PIU will review and clear screening and environmental assessment reports made by Environmental consultant;
- LGED will conduct verification of some screening and assessment through field visit;
- Main consultant/PIU will ensure that environmental and social considerations are given sufficient attention, weight and influence over selection of sub-project site's land acquisition and resettlement.
- Bid documents will be prepared by the PIU and the environmental and social consultants will include the necessary environmental and social clauses in the bidding documents and ESMP implementation would be conducted by the Contractor.
- Project's works will be supervised by PIU/main consultant and LGED.
- All the activities of ISWMI project will follow existing Environmental Code of Practices (ECoP) prepared under ESMPF.
- The project will ensure that environmental and social impact assessment addresses all potential environmental and social direct and indirect impacts of the project and program throughout its life: pre-project, during project and operation stages and mitigation measures have been taken for it. If any additional impacts are identified, ESIAs/ESMPs would be reviewed and updated.

ESIA Associated Action/Plan:

Gender and Social Inclusion Action Plan (GAP)

A project specific GAP is a tool used to ensure gender mainstreaming is clearly visible in project design and implementation. The project GAP is not a separate component. It mirrors the logical framework of the project and is an integral part of project design. GAPs include clear targets, gender design features and measurable performance indicators to ensure women's participation and benefits.

Occupation Health and Safety Management Plan (OHSMP)

An Occupational Health and Safety Management Plan covers all subproject activities including contractors' activities during the construction and operational phases. The implementation of this Plan by contractors is addresses in the Environmental and Social Management and Monitoring Plan (Chapter-6). This Occupational Health and Safety Management Plan is part of the overall suite of Management Plans developed for the subproject and cross linkages to number of the other Management Plans as Environmental and Social Management and Monitoring Plan.

OHSMP ensures the work safety of the employees working at site and aims to minimize the risks on employees arising from work-related activities. The measures contained in this Plan should be applicable to all subproject personnel, including subcontractors' personnel and covers both construction and operation phases.

Gender Based Violence (GBV) Prevention Plan

Violence against women (VAW) is one type of GBV which is very prevalent in Bangladesh and is often rooted in gender inequalities and harmful gender norms.

Waste Management Plan (WMP)

Waste Management Plan (WMP) addresses management of all solid and liquid refuse, including hazardous and non-hazardous waste, produced as a result of all phases (Preconstruction, Construction and Operation) activities within the subproject area.

Contractor Management Plan (CMP)

The contractor management plan ensures a systematic approach in selecting and managing contractors to prevent or minimize potential health and safety risks.

LGED and Contractors must ensure that risks related to the conduct of contractors and works impacting facilities, are suitably managed and controlled.

Labor Management Plan (LMP)

Labor Management Plan ensures appropriate worker management procedures and enhances the development benefits of a project by treating workers in the subproject fairly and providing safe and healthy working conditions for subproject sustainability. During the construction period, contractors will follow this LMP to prepare a simplified labor management plan and Code of Conduct (CoC).

Stakeholder Engagement Plan (SEP)

Stakeholder Engagement Plan (SEP) ensures that a consistent, comprehensive and coordinated approach is taken to stakeholder engagement and subprojects disclosure throughout the project. It is further intended to demonstrate the commitment of the LGED, as a subproject developer and the main implementing party, to an 'international best practice' approach to engagement. The LGED is committed to full compliance with all National EIA Regulations, as well as aligning to the international standards namely the AIIB Principles on Stakeholder Engagement.

Traffic Management Plan (TMP)

The principal role of this document is to provide framework guidance on traffic management measures, to be further developed and detailed prior to construction commencing.

Environmental and Social Management Plan (ESMP): The ESMP will be managed through a number of tasks and activities and site-specific management plans. One purpose of the ESMP is to record the procedure and methodology for management of mitigation identified for each negative impacts of the program. The management will clearly delineate the responsibility of various participants and stakeholders involved in planning, implementation and operation of the program.

Possible impacts during pre-construction phase from construction, rehabilitation and maintenance activities should be identified beforehand. Detail activities need to be identified first and thereafter set of actions or interventions are to be demarcated and any possible effect due to an action is to be determined. Best practice of mitigation or enhancement measures should be explored accordingly and deployed in the field.

Climate Change Impacts of Sub-Projects on GHG Emissions: Landfill gas contains many different gases. Methane and carbon dioxide make up 90 to 98% of landfill gas. The remaining 2 to 10% includes nitrogen, oxygen, ammonia, sulfides, hydrogen and various other gases. Landfill gases are produced when bacteria break down organic waste. The amount of these gases depends on the type of waste present in the landfill, the age of the landfill, oxygen content, the amount of moisture, and temperature. For example, gas production will increase if the temperature or moisture content increases. Though production of these gases generally reaches a peak in five to seven years, a landfill can continue to produce gases for more than 50 years.

Greenhouse gases, or GHGs, are gases that trap heat or longwave radiation in the atmosphere. Their presence in the atmosphere makes the Earth's surface warmer. Sunlight or shortwave radiation easily passes through these gases and the atmosphere, is absorbed by the surface of the earth and is released again as heat or longwave radiation. The molecular structure of GHGs allows them to absorb this released heat and re-emit it back to the earth. This heat-trapping phenomenon is known as the greenhouse effect.

Climate change could have an impact on the future development and operation of waste management facilities and infrastructure as it could result in changes to a number of factors that affect waste management processes including changes in temperature, cloud cover, rainfall patterns, wind speeds and storms. The timescales for climate change and waste management are similar.

Many of the projected impacts of climate change will reinforce the baseline environmental, socio-economic and demographic stresses. Climate change is likely to result in:

(i) Increased flooding, both in terms of extent and frequency, associated with sea level rise, greater monsoon precipitation and increased glacial melt
(ii) Increased vulnerability to cyclone and storm surges
(iii) Increased moisture stress during dry periods leading to increased drought
(iv) Increased salinity intrusion
(v) Greater temperature extremes

Grievance Redress Mechanism: Grievance Redress Mechanism (GRM) is a valuable tool, which will allow affected people to voice concerns regarding environmental and social impacts of the proposed project. LGED/Municipality/City Corporation should be the first-line recipient of any grievance. The sub-project-affected persons can register their grievances at the complaint cell of the PMU (available online at the LGED website link: https://www.lged.gov.bd) either in writing or online. LGED would duly address their grievances within one month of the receipt of the complaint. A Grievance Redress Committee (GRC) will be considered in outstanding cases that cannot be resolved directly and require mediation by a third party.

GRC will be formed for each sub-project, headed by a local Govt. representative of relevant area (an official of the city corporation). Members will be taken to represent the communities and other stakeholders, which may include representatives from local administration, school teachers, local NGOs, and women. The local Govt. representative will nominate members of the GRC. The local Govt. representative will form the GRC and forward the composition to the PMU of the sub-project. The size of the GRC may be changed depending on the extent of the sub-project to make its operation feasible and acceptable to the project affected persons (PAPs).The GRC will ensure proper presentation of complaints and grievances, as well as impartial hearings and transparent decisions. If required, the GRCs will meet periodically to discuss the merit of outstanding cases and fix a date for hearing and notify the PAP to submit necessary documents in proof of her/his claim/case; resolve grievances within one month of receipt of complaint. LGED will try to address the grievances on their own as a first-line recipient, however, if a GRC formation becomes necessary in certain cases, the committee has to be funded by LGED.For sub-projects to be implemented by LGED, a Project Management Unit (PMU) headed by the Project Director (PD) of this project will be formed who will oversee the project activities. An "Environmental and Social Unit" within the PMU will oversee the environmental and social management issues associated with the project. The "Environmental and Social Unit" should be manned by personnel competent in undertaking environmental and social screening and monitoring and will report directly to the PD. The "Environmental and Social Unit" with support from relevant local authorities/Municipality/City Corporation/local communities (if necessary) will carry out "Environmental/Social Screening" and "Analysis of Alternatives" of sub-projects, following the guidelines contained in the Environmental and Social Management Framework (ESMF). For Part-B of the project, the project consultants (environmental and social specialists) will carry out these screening activities.

Environmental and Social Monitoring and Cost: The monitoring plan is the key element of ESMP to be prepared on the basis of impact assessment described in earlier section. The Plan describe the potentially negative impacts of each program activity, lists mitigation and control measures to address the negative impacts, and assigns responsibilities for implementation and monitoring of these measures. The Plans for the ISWMIP will be prepared and included in the ESIA; similar plans will be prepared for the later phases and included in the associated ESIAs. Table-E-3 presents the sample format of these plans.

Table-E-3: Format of Monitoring Plan-During Project Implementation Period (Sample)

Environmental Impact/Issue	Actions	Responsibility		Key Performance Indicator	Timing	Cost Allocation
		Execution	Monitoring			
1. Activity: Design / pre-construction considerations of infrastructures						
1.1 Changes in land use, loss of properties, cultivated land and grazing land, relocation of settlements and amenities	−The RP will be implemented for permanent land acquisition and loss of assets/ livelihood and other similar impacts	LGED-PIU	ESU	• Documentary evidence of RP implementation • Establishment of resettlement sites • Payment of compensation amounts • People resettling in new villages • Income levels of displaced households • Number of public grievances re resettlement and compensation	Before construction	Included in Overall program Cost
	- Contractors will lease the land for construction facilities on temporary basis. Proper documentation will be carried out for this leasing. Site selection will be carried out in consultation with the community and local officials; approval from DSM will also be required for the selected sites.	Contractor	DSM/ESU	• Documentary evidence of land leasing for temporary facilities • DSM approval for the selected site(s) • Absence of grievances regarding temporary facilities	Before contractor mobilization	Included in contractors' costs
1.2 borrowing construction material	- A material (particularly river sand and soil from agricultural land/wetlands, if required) borrowing plan will be prepared	Contractor	DSM/ESU	• Approved plan • Plan itself will outline appropriate KPIs for its implementation.	Before construction	Included in Contractors' costs

SECTION-1: DESCRIPTION OF THE PROJECT

1.1 BACKGROUND

Bangladesh is one of the fastest Urbanising and most densely populated countries in the region, putting great pressure on basic urban services and infrastructure. Solid Waste Management (SWM) has been one of the major urban challenges in the country given its rapid urban growth. Despite the Government's efforts in improving the SWM system, waste collection and disposal capacity is still limited. Less than half of total waste generated is collected, while uncollected waste is often informally burned, buried, or illegally dumped in streets, public spaces, drainage channels, and waterways. This has resulted not only in public health hazards and the contamination of the environment, including air, water, and soil, but also the blocking of major drainage channels and sewerage networks.

The current Integrated Solid Waste Management Improvement Project (ISWMIP) is prepared by the LGED and supported by the consulting firms (Waste Concern, IPE Global, Aqua & RPMC), therefore, will improve the SWM system in selected municipal areas. This will help: (i) improve public health and quality of life by reducing exposure to pollutants and disease vectors associated with solid waste; (ii) strengthen the government's capacity to plan for and implement effective waste management services; and (iii) improve SWM practices in the country, encouraging waste minimization, recycling, and segregation at source. The Project is aligned to the Government of Bangladesh (GoB)'s priorities for providing sustainable urban infrastructure. The country is, in particular, facing an immense challenge in its solid waste management. The Project would directly contribute to one of the key objectives of the 8th Five Year Plan and the long-term Perspective Plan for 2020-2025, that is to improve the urban environment and quality of life.

The ISWMIP has four components as mentioned below:

- ***Component 1: Waste Collection and Transportation.*** This will help improve and optimize solid waste collection and transport services in selected Urban Local Bodies (ULBs), including collection containers and fleet, mechanical cleaning equipment, and transfer stations etc.
- ***Component 2: Waste Processing and Disposal Systems.*** This will finance prioritized waste processing and disposal infrastructure, including closure of polluted landfill sites, construction and rehabilitation of engineered sanitary landfills (standalone or regional/ clustered), and provision of facilities related to composting, resource recovery, and waste-to-energy.
- ***Component 3: Project Management and Supervision Support.*** This will support in the areas of project management, monitoring and evaluation, procurement, financial management, and environmental and social safeguards (including public awareness campaigns and public consultation), and provision of support with respect to supervision and maintenance of infrastructure investments.
- ***Component 4: Policy Support and Capacity Building.*** This will support: (i) improvement of the SWM sector policy and legal framework; (ii) policy and guideline development related to waste minimization and recycling, private sector participation, inclusion of informal workers, and multi-jurisdictional waste management; and (iii) institutional capacity strengthening for relevant central and local agencies in SWM.

The GoB has received a Project Preparation Special Fund (PSF) from AIIB to support the preparation of proposed ISWMIP for consideration of USD500 million AIIB financing. The investment shall be undertaken in a phased manner with a likely investment size for Phase I of USD 150 million. The PSF is being implemented by the Local Government Engineering Department (LGED) under the Local Government Division (LGD), the Ministry of Local Government Rural Development and Co-operatives (MLGRDC).

The project will function under the overall guidance of a Steering Committee (SC) which will be chaired by the Secretary, Local Government Division (LGD), the Ministry of Local Government Rural Development and Co-operatives (MLGRDC). The SC will play a significant role in high-level decision making, ensure seamless coordination among the various governmental actors, and accelerate the implementation of the proposed activities under various Components. The SC will comprise representatives from various Ministries.

The LGED will adopt this ESMPF[1] findings, which lays out the requirements for the environmental and social impact assessment, environmental management plans, best management practices, and social management plans, for the ULBs where sites for ISWM are finalized and for the ULB areas once the ISWM areas are identified. This

[1] LGED would like to express its deepest appreciation to all those who have provided the support and cooperation in completing this ESMPF report. A special gratitude is being conveyed to the concerned officials of AIIB for their invaluable cooperation and continued sharing of information. Further, it's a matter of gratefulness to put on record the services so kindly extended by Consulting Firms and others involved in the ESMPF study.

ESMPF is intended to provide policies, guidelines and procedures to be integrated into the design and implementation of component 1, 2, 3 & 4 respectively, under the proposed project.

1.2 SUBPROJECT COMPONENTS TO IMPROVE THE ENVIRONMENT

The subproject components are i) Waste Collection ii) Waste Transportation iii) Landfill (closure of polluted landfill sites, construction and rehabilitation of engineered sanitary landfills (standalone or regional/ clustered), iv) Compost Plant, v) MRF (Material Recovery Facility), vi) Plastic Waste to Oil, vii) Anaerobic Digestion, and vii) Leachate Treatment Plant viii) Waste to Energy (WtE). All these shall facilitate comprehensive SWM with the development of a long-term integrated SWM infrastructure for the entire ISWMIP, and thus help reduce environmental impact from inadequately managed SWM of the country. The proposed components of the subproject are summarized here under:

- **Waste Collection and Transport:** Studies show that nearly a fourth (24%) of global greenhouse gas emissions come from road transport, with diesel usage increasing by over 200% between 1990 and 2017. The large diesel trucks and collection vehicles that transport waste from millions of businesses across the globe doubtlessly make up a large percentage of this carbon footprint.
  The heavy diesel trucks that collect our rubbish and recycling not only contribute to carbon emissions, but also release foul odours and particulate emissions into the air, presenting health hazards to the public and polluting the neighbourhood's air. Large amounts of waste require additional waste collection, increasing road traffic and in turn, air pollution. This project will help in reducing the carbon footprint by implementing a best waste management system for the Municipalities and City Corporations under this project.
- **Landfill:** The landfill will be designed to provide safe disposal of waste with minimal effect on the environmental components such as soil, groundwater, surface water, air and people. The cells will maximize waste disposal quantity within the available space of the selected site.
- **Compost Plant:** The compost plant will divert significant portion of the incoming waste for land filling. The facility can utilize significant portion of organic waste in a cost-effective way. This compost plant is designed mainly to focus on `organic waste' (fresh organic waste coming mainly from kitchens, restaurants, vegetable wholesale markets, parks and lawns). Three major activities are carried out in compost plant; they are `collection' of segregated waste from the source, `processing' of waste using aerobic compost technology, `marketing' of resources produced from waste.
- **MRF (Material Recovery Facility):** This facility will accommodate secondary sorting, baling and storage of recyclable in an environment friendly way. Selected registered by the landfill operator, informal waste recyclers can be engaged in this facility to properly sort the valuables from waste instead to carrying out their work in un-hygienic matter.
- **Plastic Waste to Oil:** Waste Plastic Recycle to Fuel Oil. By using of the pyrolysis technology, this component shall mainly work on collecting and recycling MSW into highly value energy to help get the fuel oil from landfill garbage sorting.
- **Anaerobic Digestion:** Biogas is produced from organic waste under the action of anaerobic decomposition. The biogas produced from the biogas plant will able to supply enough gas for cooking purpose for the staffs of compost plant and the rest biogas can be utilized for production of electricity for the internal lighting of the integrated landfill and resource recovery facility.
- **Leachate Treatment Plant:** The Plant shall contain leachate collection ponds to treat the leachate coming from the landfill cells. The stared leachate will be aerated, and later filtered using trickling filters. The treated leachate will be sprayed back to the landfill cells, and are used in the biogas digester.
- **Waste to Energy:** Waste-to-Energy plants covering site layouts, civil and structural drawings for all buildings (administrative, bunker, delivery hall etc.), access and internal service roads, all drawings for MEP and telecommunications systems, power supply (own power production and generator set),combustion system, process control systems, fire safety measures, air pollution control systems (dioxin and furan emissions), waste water treatment, fly-ash management, prevention of chemical leakage, arrangements for cooling water supply, monitoring and control systems.

In dealing with the implementation process of the solid waste management project, a substantial amount of land area is required for each subproject to implement the following components: Materials Recovery Facility (MRF), Composting, Anaerobic Digestion (AD), RDF, Incineration, Controlled Landfill, Integrated Landfill & Resource Recovery Facility (controlled, landfill, MRF, composting plant and AD, etc.).

1.3 PRIVATE SECTOR IN THE SWM VALUE CHAIN

At presently the participation of the private sector is mainly limited to the primary collection of waste. The following Figure-1.1 shows the involvement of the private sector in the solid waste management value chain.

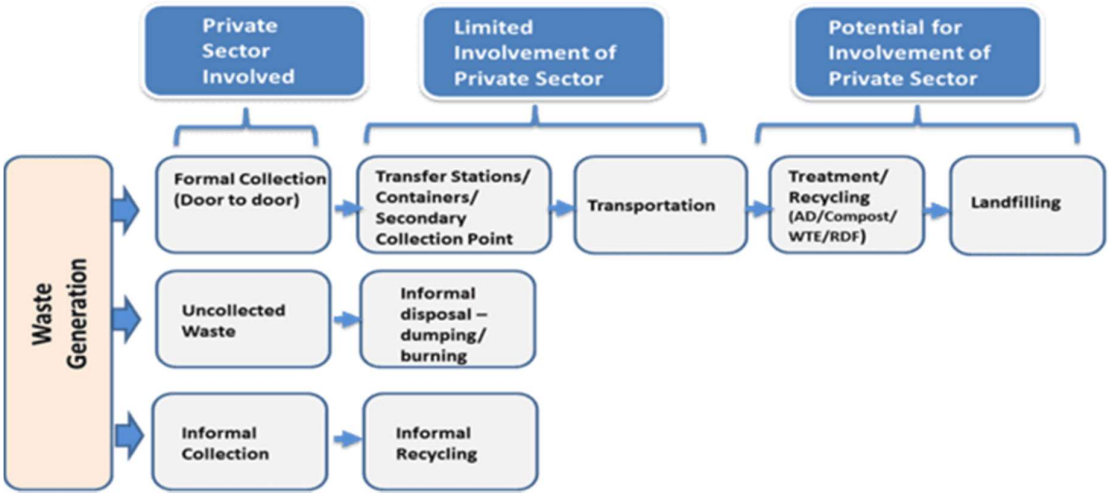


Figure-1.1: Private Sector Involvement in Solid Waste Management in Bangladesh

The private sector is very keen to invest in waste management projects in Bangladesh and is constantly requesting the government to provide incentives and simplify procedures for establishing waste treatment and recycling projects. These incentives include providing land, free delivery of waste, tipping fee, and sovereign guarantee from the GoB for purchase of electricity or other by-products. Most Bangladeshi private companies lack access to both concessionary funds and the technology for setting up waste treatment and recycling projects. All recent waste-to-energy projects using the Build Own and Operate (BOO) model are being established via joint ventures. Local businesses possess full capabilities to handle waste collection and transportation projects. However, local businesses have teamed up with foreign companies to implement large-scale projects that involve generating electricity from waste.
Bangladesh has been very successful in small to medium-scale waste recycling projects. There are more than 300 companies recycling plastic waste in the country. Apart from plastic waste, there are around 40 companies involved in the production of organic fertilizer from waste.

1.4 ENVIRONMENTAL SAFEGUARD IN ISWMIP

Environmental Safeguard in the ISWMIP will cover environmental aspects in carrying out pre-feasibility studies, detailed feasibility studies. It will prepare environment safeguard instruments for the sub-projects.
Under Part A: Sector Review, Policy Briefs, ISWMIP Framework Documents, the environmental consultant will produce Policy Brief as a guidance document for ULBs/ULB clusters to identify Best Practicable Options (BPOs) in SWM for collection, transportation, processing and disposal, building on a system for scoring, and applying appropriate weightages, to technologies or non-technological approaches which best respond to:

- any technology restrictions (waste streams accepted, rate and quality of materials recovered, type of outputs, environmental impacts on and by the technology option);
- other likely environmental and social impacts;
- Sub-project identification, screening (including likely environmental and social impacts), phasing (with Phase I investment size around USD150 million) and pre-feasibility reports for entire ISWMIP
- preparation of ISWMIP framework document i.e. Environmental and Social Management Planning Framework (EMSPF)

Once participating UdLBs/ULB clusters are identified under Part B: Phase-I Sub-project Preparation of the project the Environmental Consultant shall prepare detailed sub-projects focusing on their Environment and Social Impact Assessments and Management Plans by:

- producing, for all Phase I sub-projects, sub-project specific Environmental and Social Impact Assessments (ESIAs)

- producing, for all Phase 1 sub-projects, sub-project specific Environmental and Social Management Plans (ESMPs) including applicable social instruments (e.g. Indigenous Peoples Plan (IPP) and Resettlement Action Plan (RAP)/Livelihood Restoration Plan).

1.5 PURPOSE OF THE ESMPF

ESMPF is a practical guidance for the Environmental and Social program formulation, design, implementation, and monitoring in the current Integrated Solid Waste Management Improvement Project (ISWMIP) supported by the AIIB, particularly with impacts that are not known as yet. This document will be followed during project preparation and implementation for ensuring environmental and social integration in planning, implementation, and monitoring of project supported activities. For ensuring good environmental management in the proposed Integrated Solid Waste Management Improvement Project (ISWMIP), the ESMPF will provide guidance on pre-investment works/studies (such as environmental and social screening, environmental and social assessment, environmental and social management plans, etc.), provide set of steps, process, procedure, and mechanism for ensuring adequate level of environmental and social consideration and integration in each investment in the project-cycle; and describes the principles, objectives and approach to be followed to avoid or minimize or mitigate impacts and risks according to AIIB Environmental and Social Standard (ESS). The specific objectives are to:

- Project components are formulated considering potential environmental and social issues, especially of those people who would be directly benefited or impacted by the proposed project;
- Project components are designed considering unique socio-cultural and environmental situation prevailing at the areas where the specific project component would be implemented;
- Ensure all relevant environmental and social issues are mainstreamed into the design and implementation of the projects/sub-projects and also in the subsequent phases of the ISWMIP;
- Possible environmental and social impacts of major sub-project activities during both construction and operational phases are identified during project formulation and design, appropriate mitigation/ enhancement measures are devised and monitoring plan prepared, as a part of the overall environmental and social management plans;
- Integrate the environmental and social concerns into the identification, design and implementation of all project interventions in order to ensure that those are environmentally sustainable and socially feasible;
- Consider in an integrated manner the potential environmental and social risks, benefits and impacts of the program and identify measures to avoid, minimize and manage risks and impacts while enhancing benefits;
- Ensure compliance with national and AIIB's requirements. The ESMPF presents potential impacts of the ISWMIP, mitigation, enhancement, contingency and compensation measures, environmental and social management and monitoring plan, and institutional framework including inter-agency cooperation for implementing ESMP. The ESMPF will facilitate compliance with the Government of Bangladesh's policies, acts and rules as well as with the AIIB's environmental and social standards (ESSs) of the Environmental and Social Framework (ESF), and
- Guide conducting the detailed ESIA of the later stages of the ISWMIP as appropriate to the project components/sub-components.

The ESMPF will be a guiding document for project-element specific:

- ✓ Environmental and Social Screening
- ✓ Assessment of Environmental and Social Impacts (both positive and negative)
- ✓ Environmental and Social Assessment
- ✓ Public Consultation and Disclosure
- ✓ OHS, Labor and Contractor Management Plan
- ✓ GAP and GBV Prevention Plan
- ✓ Stakeholders Engagement Plan,
- ✓ Best Management Practices (BMP)
- ✓ Traffic Management Plan
- ✓ Waste Management Plan
- ✓ Environmental Code of Practices (ECoPs)
- ✓ Environmental and Social Clauses for Bidding Documents
- ✓ TORs for Environmental and Social Document Preparation and Implementation Firm/NGO
- ✓ Environmental and Social Management Plans (ESMP)
- ✓ Implementation of ESMP; and
- ✓ Environmental and Social Monitoring and Reporting.

1.6 APPROACH AND METHODOLOGY OF ESMPF

In order to achieve the objectives of the project assignment and the scope of the work mentioned in the ToR, the project work has been divided into two parts. Part A of the project work focuses on the Solid Waste Sector Review, Preparation of Policy Briefs, and ISWMIP framework documents. Part B of the project focuses on the preparation of sub-projects. The time assigned to complete Part A of the consultancy assignment is four months while for Part B it is eight months. The following Figure-1.2 shows the ESMPF documentation of the project along with broad out-puts.

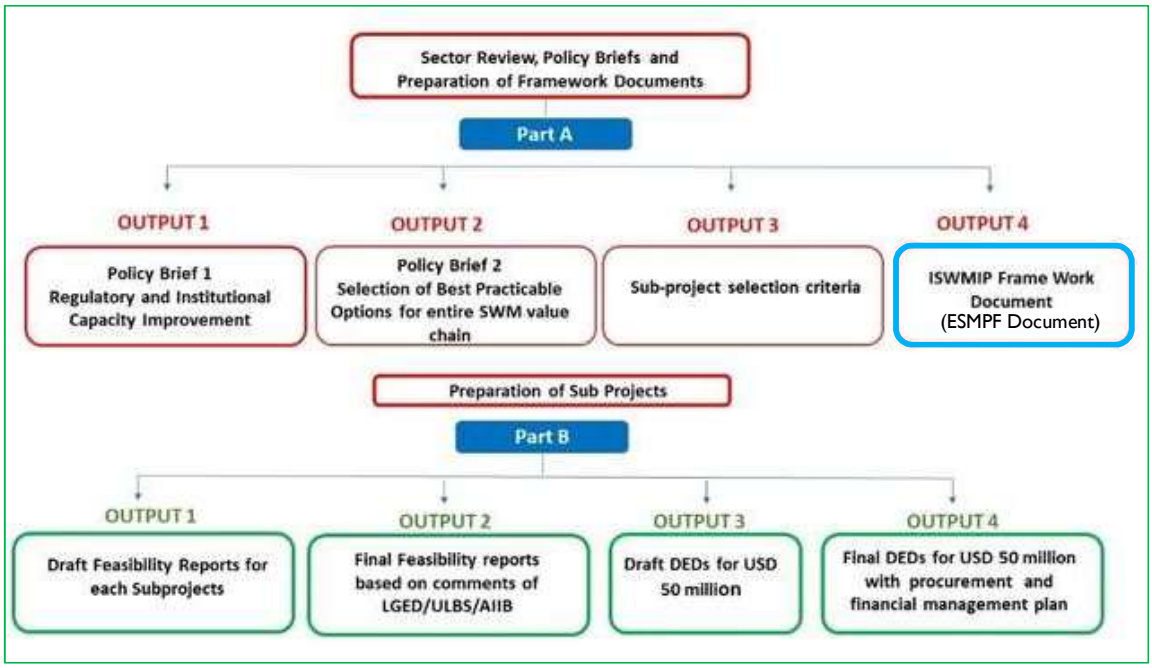


Figure-1.2: ESMPF Document in Output 4

The methodology followed in preparing the ESMPF consists of the following steps:

- Review of the project details and meeting/discussions with various stakeholders including project proponent, local authorities, concern organizations, NGOs and AIIB
- Review of the policy and regulatory requirements
- Review and verify the policy and regulatory requirements
- Reconnaissance field visits and initial scoping and screening to determine the key environmental and social parameters and aspects that are likely to be impacted by the sub-project activities
- Collection and analysis of baseline environmental and social data, with the help of secondary literature review, and field data collection
- Consultations with the stakeholders including beneficiary/ affected communities and developing the consultation process
- Reviewing the potential and likely impacts of the program activities and carrying out the screening of the sub-project in order to define the required safeguards instruments that need to be prepared
- Compile the ESMF document

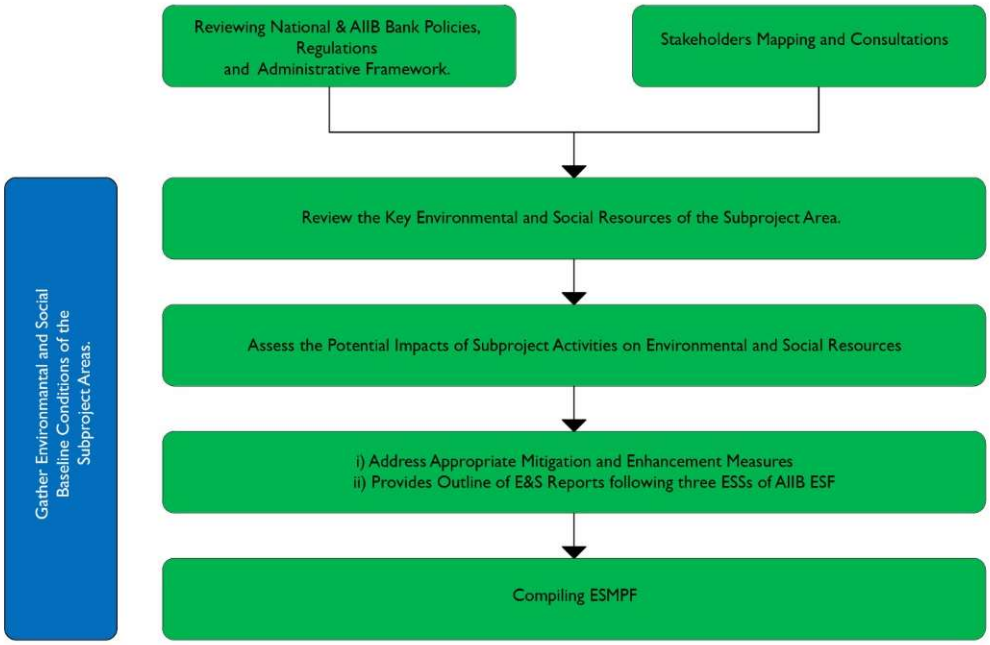


Figure-1.3: Approach of the ESMPF Preparation

1.7 OVERALL STRUCTURE OF THE ESMF

Under the proposed "Integrated Solid Waste Management Improvement Project", LGED will be responsible for the identification of their respective project elements (e.g., Waste Collection and Transportation, Waste Processing and Disposal Systems, Project Management and Supervision Support and Policy Support and Capacity Building), and preparation of element specific project documents. According to the ESMPF, LGED will be responsible for preparation of an adequate description of each project component (or sub-project) (in accordance to the format provided in the ESMPF), including sub-project layout and other relevant information. LGED will also be responsible for carrying out "environmental/social screening" and "analysis of alternatives" of each project component in accordance to the formats provided in the ESMPF. Based on the "screening" and "analysis of alternatives", LGED may re-design the project component (e.g., selecting alternative sites).

Based on the results of the environmental/ social screening and analysis of alternatives, and after finalizing the sites, LGED will be responsible for preparing IEE/ EMP/ SMP and carrying out ESIA, as required. The ESMPF presented in this report provides detail guideline for carrying out environmental and social assessment (including preparation of EMP/ SMP). The environmental and social assessment will be carried out following the framework presented in this report. The LGED will also be responsible for getting necessary environmental clearance from the Department of Environment (DoE), if required.

SECTION-2: LEGAL, REGULATORY AND POLICY FRAMEWORK

2.1 INTRODUCTION

The proposed Integrated Solid Waste Management Improvement Project will be implemented in compliance with applicable Environmental, Social and Solid Waste Management laws and regulations. Bangladesh has a wide range of laws and regulations related to environmental protection, natural resources conservation as well as social issues, which are mostly cross-sectoral and would be applicable to the proposed project. The Asian Infrastructure Improvement Bank (AIIB) also has certain Social and Environmental safeguard policies, which needs to be adhered to for the purpose of the implementation of this project. This section presents an overview of the major national environmental, social and Solid Waste Management laws, policies and regulations that are relevant and may apply to activities supported by the project, institutional arrangement and national and sub-national level, and AIIB safeguard policies.

2.2 REVIEW OF NATIONAL ENVIRONMENTAL AND SOCIAL POLICY, LEGAL AND REGULATORY FRAMEWORK

Some most important applicable key GOB acts, rules and regulations and their relevance to this project of LGED is listed in Table-2.1

Table-2.1: Summary of Applicable Environmental, Social and Safeguards Regulations of GOB

Sl. No.	Policies/Act/Rules	Key provisions and purpose	Applicability to the sub-projects/LGED
1.	Bangladesh Environmental Conservation Act (ECA), 1995	This umbrella Act includes laws for conservation of the environment, improvement of environmental standards, and control and mitigation of environmental pollution. According to this act (Section 12), no industrial unit or project shall be established or undertaken without obtaining, in a manner prescribed by the accompanying Rules, an Environmental Clearance Certificate (ECC) from the Director General of DoE.	Yes, sub-projects have to get ECC.
2.	Bangladesh Environmental Conservation Rules (ECR), 1997	The Rule 7 classifies industrial units and projects into four categories depending on environmental impact and location for the purpose of issuance of ECC. These categories are: Green, Orange A, Orange B, and Red. The ECR'97 describes the procedures for obtaining Environmental Clearance Certificates (ECC) from the Department of Environment for different types of proposed units or projects.	Yes, some of the LGED sub-projects may be fallen under Orange B category, hence require both IEE, ESIA and ESM P approved by the DoE and have to deposit prescribe fees according to the schedule 13 to obtain ECC.
3.	Bangladesh Environment Court Act, 2010	Bangladesh Environment Court Act, 2010 has been enacted to resolve the disputes and establishing justice over environmental and social damage raised due to any development activities.	According to this act, government can take legal actions if any environmental problem occurs due to ISWMI sub-project interventions.
4.	National Environmental Policy 2018	Taking into account the challenges of environment, environment and biodiversity conservation and management, the government adopted the National Environment Policy 2018 and published it in 2019 with the aim of developing the overall environmental conservation management of the country. In the newly adopted National Environmental Policy 2018, out of 9 more sectors/areas including the previous 15 sectors, mountain environment, biodiversity and environment	According to this policy, government can take legal actions if any challenges of environment, environment and biodiversity conservation and management occurs due to ISWMI sub-project interventions.

Sl. No.	Policies/Act/Rules	Key provisions and purpose	Applicability to the sub-projects/LGED
		conservation and life security, eco-friendly tourism, etc. sectors have been included with special emphasis.	
5.	The Protection and Conservation of Fish Act (1950)	This Act provides power to the government to: make and apply rules to protect fisheries; prohibit or regulate erection and use of fixed engines; and construction of temporary or permanent weirs, dams, bunds, embankments and other structures.	Yes, as the sub-projects includes Waste Collection and Transportation, Waste Processing and Disposal Systems etc. which has potential risk for Air and water pollution, habitat alternation, hinder of natural flow/migration.
6.	Protection and Conservation of Fish Rules (1985)	Section 6 states, "No person shall destroy or make any attempt to destroy any fish by poisoning of water or the depletion of fisheries by pollution, by trade effluents or otherwise in inland waters.	Yes, during construction and operation of the sub-projects.
7.	Bangladesh Wildlife (Protection and Preservation) Act 2012	The Act protects 1,307 species of plants and animals, including 32 species of amphibian, 154 species of reptile, 113 species of mammal, 52 species of fish, 32 species of coral, 137 species of mollusk, 22 species of crustacean, 24 species of insect, six species of rodent, 41 species of plant and 13 species of orchid. Of these, eight amphibian, 58 reptile, 41 bird, and 40 mammal species are listed as endangered in the IUCN Red Data Book (2000, updated in 2015).	Yes, the sub-projects area might have presence of these listed threatened animals.
8.	Biodiversity Act, 2017	It provides for the creation of the National Committee and the Biodiversity Management and Surveillance Committees at local levels (i.e. Districts, Upazilas, Municipalities, and Unions). In general, all these committees are mandated to: assist the Government in implementing the National Biodiversity Strategy and Action Plan (NBSAP) and to visit the biodiversity enriched areas in their respective territories; and, monitor the progress of implementation of the NBSAP.	Yes, all sub-projects need to include these local committees, so that they can monitor project impact on the local biodiversity.
9.	Forest Act 1927 (Amendment 2000)	The act empowers the government to regulate the felling, extraction, and transport of forest produce in the country.	Yes, sub-projects will include felling of trees and social forestry.
10.	Embankment and Drainage Act, 1952	The Act 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.	Yes, sub-projects will include interventions in the water bodies, construction of bridges, ghats, etc.
11.	Bangladesh Water Act, 2013	As per this Act, all forms of water (e.g., surface water, ground water, sea water, rain water and atmospheric water) within the territory of Bangladesh belong to the government on behalf of the people. Without prior permission issued by the Executive Committee, no individuals or organizations will be allowed to extract, distribute, use, develop, protect, and conserve water resources, nor they will be allowed to build any structure that impede the natural flow of rivers and creeks.	Yes, LGED is permitted to implement water projects covering impact area below 1000 hectare (<1000 ha).

Sl. No.	Policies/Act/Rules	Key provisions and purpose	Applicability to the sub-projects/LGED
12.	Bangladesh Labor Act, 2006	It provides the guidance of employer's extent of responsibility and workmen's extent of right to get compensation in case of injury by accident while working.	Yes, sub-projects require substantial Labor from local and external areas.
13.	National Occupational Safety and Health Policy, 2013	Through the legal provisions on OSH related issues, Bangladesh established tripartite National Industrial Health and Safety Council in 2009. The Council has formulated a National Occupational Safety and Health Policy in 2013 and working towards implementation of the policy in every industrial sector. OSH Policy deals with the issues of workplace accident prevention	Yes, sub-projects require substantial workers to work at the construction sites to deal with the issues of workplace accident prevention.
14.	Bangladesh National Building Code, 2006	The BNBC clearly sets out the constructional responsibilities according to which the relevant authority of a particular construction site shall adopt some precautionary measures to ensure the safety of the workmen. The Code also clarifies the issue of safety of workmen during construction.	Yes, sub-projects will include construction of STS, Landfill Sites, etc.
15.	The Noise Pollution Control Rules, 2006	The Noise Pollution Control Rules have been established in order to manage noise generating activities which have the potential to impact the health and wellbeing of workers and the surrounding communities.	Yes, many activities of sub-projects will be performed under the densely populated areas.
16.	Road Transport Act, 2018	The new Road Transport Act 2018 has finally come into effect at the start of November. After the long-standing Motor Vehicle Ordinance of 1983, the new act introduces a myriad of updated laws and adds new definitions for what constitutes an offence, with most of the fines and punishments receiving major bumps.	Yes, sub-projects will use heavy vehicles, deploy drivers and operators of machineries.
17.	Solid Waste Management Rules 2021	These rules require (i) source segregation of waste into dry and wet waste, (ii) standards for composting, (iii) an-aerobic digestion and waste-to-energy projects, (iv) guidelines for landfilling, and (v) standards for the placement of secondary storage bins, and primary and secondary collection of waste. Promotion of 3Rs, site selection criteria for landfills, recycling plants, and applicable environmental standards are typically articulated by MoEF&CC. For landfill site selection and construction of large-scale organic waste recycling plants, an environmental impact assessment would also be overseen by the environmental agency. MoEF&CC also monitors the local government's performance for compliance of such rules and environmental regulations.	Yes, Sub-project will be well guided by the SWM rules.
18.	Medical Waste Management and Processing Rules 2008	These rules deals with the waste disposal of different medicals and hospitals in our country. There are no other legislation pertaining to management and processing of medical wastes.	Rule no. 8 of the Medical Waste Management and Processing Rules devises to establish dumping zones. Rule-9 described the Standards for Incinerators.
19.	Rules for Removal of Wrecks and Obstructions in	Rules for removal of wrecks and obstructions	Yes, if obstruct natural canals/rivers or any other natural water ways

Sl. No.	Policies/Act/Rules	Key provisions and purpose	Applicability to the sub-projects/LGED
	inland Navigable Water Ways (1973)		(includes seasonal water bodies).
20.	The Water Supply and Sanitation Act (1996)	Regulates the management and control of water supply and sanitation in urban areas.	Yes, sub-projects will include construction of water supply and sanitation facilities
21.	The Ground Water Management Ordinance (1985)	Describes the management of ground water resources and licensing of tube wells	Yes, construction sites of the sub-projects may require deep tube wells for meeting up water use.
22.	The Antiquities Act (1968)	Describes the preservation of cultural heritage, historic monuments and protected sites	Yes, sub-projects areas may have elements of cultural, historic and protected value.
23.	Acquisition and Requisition of Immovable Property Act, 2017	The principal legal instrument governing land acquisition in Bangladesh is the Acquisition and Requisition of Immovable Property.	Yes, both acquisition and requisition of land, and other properties would require by the sub-projects.

2.3 LEGAL FRAMEWORK

At present, there is no specific guidelines on Solid Waste Management. The City/Municipality Act (2009), National Environmental Policy (1992), Environment Conservation Act (1995), Environment Conservation Rules (1997), and National 3R Strategy for Waste Management (2010) are the primary guidelines used for solid waste management in Bangladesh. Recently, Solid Waste Management Rules (2021) has been approved by the government under the environment conservation act by the Ministry of Environment, Forest & Climate Change. Policies, Laws, and Regulations related to Waste Management in Bangladesh are shown in the following Table-2.2.

Table-2.2: Policies, Laws and Regulations Related to Waste Management in Bangladesh

Policy, Act, Rule, Strategy	Year	Description
National Policy for Water Supply and Sanitation	1998	The government shall maximize adoption of waste recycling measures and use organic waste materials for compost and biogas production.
Urban Management Policy Statement	1998	Recommends privatization of services to municipalities, prioritizes facilities for slum dwellers (including water supply, sanitation, and solid waste disposal).
Bangladesh Environment Conservation Act,	1995	Replaced the Environmental Pollution Control Ordinance, 1977; provides for environmental conservation, environmental quality and control, and mitigation of pollution. Although it does not include specific provisions on solid waste management, it authorizes the Director-General of the DOE to take necessary measures for control, abatement, and mitigation of environmental pollution.
National Environment Policy	1992	Restricts disposal of municipal, industrial, and agricultural waste in water bodies (e.g., rivers, ponds, drains) and discourages open truck transportation of waste during the day.
Bangladesh Standards and Testing Institution Ordinance	1985	Adopts standards related to materials, commodities, and products and provision of secure their compliance. Sets standards regarding whether a product is suitable for local consumption, import, and export and awards the Bangladesh Standards and Testing Institution seal to products conforming to such standards.
Private Sector Housing Development Guideline	2004	Recommends private sector investment in waste management sector (all types of waste).
Industrial Policy	2005	Provide all necessary assistance for producing an environmentally friendly product, with the objective of creating a pollution-free environment in the industrial sector.

Policy, Act, Rule, Strategy	Year	Description
		Assists with waste management to minimize waste, waste removal, and production of pollution-free goods. Environmental pollution control: The Environmental Protection Act 1995 and other related legislation have been gradually implemented to control environmental pollution. Industries that pollute and endanger public health must develop pollution control measures. Industrial enterprises will be encouraged to obtain ISO-14000 certificates
Private Sector Housing Development Guideline	2005	Recommends space in new housing areas for waste recycling, especially composting and biogas generation.
Dhaka Environment Management Plan	2005	Promotes recycling, discourages use of landfills, and promotes environmental management system (EMS) in industry.
National Clean Development Mechanism Strategy	2005	Harnesses carbon financing to promote pro-poor Clean Development Mechanism projects in waste sector.
Draft National Urban Policy	2006	Covers all aspects of land and housing in urban areas. Emphasizes the Clean Development Mechanism and recycling.
Biomedical Waste Management Rules	2008	Recommends source separation of hospital waste and separate collection, transportation, treatment, and disposal of all hospital and clinical waste.
National Renewable Energy Policy	2008	Promotes production of biogas and other green energy from waste and provides incentives for development of the Clean Development Mechanism to promote green energy projects.
Bangladesh Climate Change Strategy and Action Plan	2009	Carbon mitigation and low-carbon development is a key pillar of this strategy; the waste sector has been considered a potential contributor to achieving Bangladesh's mitigation objectives.
Local Government (City Corporation) Act	2009	City corporations are under the purview of this act. There is a need to Harmonised this act with the E-Waste Rules and Urban Solid Management Handling Rules to address the issues related to source segregation of plastic, collection, labelling, transportation, disposal, and recycling.
Jute Packaging Act	2017	Requires that all commodities be packaged in jute bags. Violators face a maximum 1 one year in jail, a BDT50, 000 fine, or both for using nonbiodegradable synthetics for packaging. Originally mandated those six agricultural commodities—paddy, rice, wheat, maize, sugar, fertilizer—have jute packaging and later added 11 more commodities—ginger, garlic, onion, potato, fish feed, poultry feed, flour, chilies, pulse, coriander, rice bran. **Note**- There is a need for specific plastic packaging rules for Bangladesh to address the overall packaging waste.
Import Policy	2015–2018	Prohibits importation of waste into Bangladesh.
Electrical and Electronic Waste (Management and Handling) Rules	2021	Mandates extended producer responsibility for manufacturers and assemblers, with 5-year e-waste collection targets. These rules are applicable to all producers, traders, shopkeepers, stores, collectors, transporters, repairers, collection centers, crushers, grinders, refurbishes, recyclers, auction dealers, exporters, distributors, and large users involved in production, marketing, purchase, sale, or distribution of electrical and electronic products
National Environment Policy	2018	Refines the Environment Policy 1992 to ensure sustainable development and ensure that the protection and improvement of environment, improvement of biodiversity is adopted in the Constitution of Bangladesh as the fundamental principles of state policy, in case of environmental degradation, disasters, and the impact of climate change and limitations of natural resources. It consists of two main parts: environmental policies for 24 sectors or areas and implementation plans and activities.
Public Private Partnership (PPP) regulatory framework	2019	Provides guidelines on how to implement PPP projects and the roles and responsibilities of various line ministries. **Note:** PPPs will help develop innovative technologies and skilled manpower to promote investments in the recycling of plastic.
National Water and Sanitation Strategy	2021	Emphasizes resource recovery and recycling (instead of disposal) to improve urban sanitation. Recommends 50% of municipalities to have integrated

Policy, Act, Rule, Strategy	Year	Description
		waste management facilities by 2030. Also recommends City Corporations to pursue waste to energy projects using incineration.
Solid Waste Management Rules	2021	The Solid Waste Management Rules (2021) has recommended the following criteria for selection of landfill sites considering the environmental concerns. The landfill site shall be large enough to last for at least 20-25 years and shall develop 'landfill cells' in a phased manner to avoid water logging and misuse. The landfill site shall be away from habitation clusters, forest areas, water bodies, monuments, National Parks, Wetlands, and places of important cultural, historical or religious interest and the distance to be maintained, as prescribed by the Department of Environment (DOE) on the case to case basis for management of solid waste management plan or 200 meter away from rivers/wetlands/ponds, 250 meter form residential development, 500 meter from National Highways, Habitations, Public Parks and water supply wells and 3 km away from Airports or Airbase. The Landfill site shall not be permitted within wetlands, ECA, sensitive eco-fragile areas, and flood plains. A 'no development' buffer zone shall be maintained around landfill sites and sites for processing and disposal of solid waste capacity greater than 5tones. The sites for landfills and processing and disposal of solid waste shall be incorporated in the master plan of the city/town prepared by the Development Authorities, UDD or LGED. The buffer zone shall be prescribed by the Department of Environment in the Environmental Clearance Certificate. No fault lines or significant fractured geological structures shall be present within 500 meters of the perimeter of the proposed landfill. The site must not be within a flood plain subject to 10 years flood. There should be no private or public drinking water well 500 meters down gradient of the landfill boundaries. Ground water's seasonal high level should be at least 1 meters below the proposed base of any cell excavation.

2.4 APPLICABLE INTERNATIONAL TREATIES SIGNED BY THE GOB

Bangladesh has signed most international treaties, conventions and protocols on environment, pollution control, bio-diversity conservation and climate change, including the RAMSAR Convention, the Bonn Convention on Migratory Birds, the Rio de Janeiro Convention on Biodiversity Conservation, and the Kyoto Protocol on Climate Change. An overview of the relevant international treaties signed by GoB is shown in Table-2.3

Table-2.3: International Conventions, Treaties and Protocols Signed by Bangladesh

Conventions	Years	Ratified/Accessed (AC)/Accepted (AT)/ Adaptation (AD)	Relevance
International Plant Protection Convention (Rome,) & Plant Protection Agreement for SE Asia and Pacific (1999 Revision)	1951 & 1999	01.09.1978 04.12.1974 (AC) (Entry into Force)	Ensuring that the Project work or construction materials do not introduce plant pests.
Convention on Wetlands of International Importance ("Ramsar Convention":1971)		20.04.1992 (ratified)	Protection of significant wetland and prevention of draining or filling during construction
Convention Concerning the Protection of the World Cultural and natural Heritage (Paris, 1972)		03.08.1983 (AT) 03.11.1983 (ratified)	Prevention of damage or destruction of culturally and/or historically significant sites, monuments, etc.
Convention on Biological Diversity, (Rio de Janeiro, 1992.)	1992	05.06.1992	Protection of biodiversity during construction and operation.
Convention on Persistent Organic Pollutants, Stockholm.	2001	In process	Restrict use of different chemicals containing POPs.

Conventions	Years	Ratified/Accessed (AC)/Accepted (AT)/ Adaptation (AD)	Relevance
United Nations Framework Convention on Climate Change, (New York, 1992.)	1992	15.04.94	Reduction of emission of greenhouse gases.
Convention on Biological Diversity, (Rio De Janeiro, 1992.)	1992	03.05.94	Conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of the benefits arising out of the utilization of genetic resources.
Kyoto protocol to the United Nations Framework Convention on Climate Change		21.8.2001 (AC) 11.12.1997 (AD)	Reduction of emission of greenhouse gases
International Convention for Protection of Birds, Paris	1950	Signed	Protection of the birds in their wild state.
Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matters (as amended), London-Mexico City-Washington	1972	Signed	Effective control and prevention of all sources of pollution of the sea by the dumping of waste and other matter that is liable to create hazards to human health, to harm living resources and marine life, to damage amenities or to interfere with other legitimate uses of the sea.
Convention Concerning the Prevention and Control of Occupational Hazards caused by Carcinogenic Substances and Agents, Geneva.	1974	Signed	To protect workers against hazards arising from occupational exposure to carcinogenic substances and agents.
Convention Concerning the Protection of Workers Against Occupational Hazards in the Working Environment due to Air Pollution, Noise and Vibration, Geneva	1977	Signed	Protection of workers' health against occupational hazards in the working environment due to air pollution, noise and vibration.
Convention on the Conservation of Migratory Species of Wild Animals, Bonn.	1979	Signed	Conservation and sustainable use of migratory animals and their habitats
Convention Concerning Occupational Safety and Health and the Working Environment, Geneva.	1981	Signed	Ensuring occupational health and safety of workers in all branches of economic activity.
Vienna Convention for the Protection of the Ozone Layer, Vienna	1985	02.08.90 (AC) 31.10.90 (entry into force)	Preventing human activities that may have adverse effects on ozone layer.
Convention Concerning Occupational Health Services, Geneva.	1985		Convention Concerning Occupational Health Services, Geneva.
Montreal Protocol on Substances that Deplete the Ozone Layer, Montreal.	1987	31.10.90 (entry into force)	Reduction of the abundance of the substances that deplete the ozone layer in the atmosphere, and thereby protect the earth's fragile ozone Layer.
Convention Concerning Safety in the Use of Chemicals at Work, Geneva.	1990	Signed	Regulating the management of chemicals in the workplaces I order to protect workers

Conventions	Years	Ratified/Accessed (AC)/Accepted (AT)/ Adaptation (AD)	Relevance
			from the harmful effects of these substances.
London Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer, London.		18.03.94 (AC) 16.06.94 (entry into force)	To strengthen the control procedure and extend the coverage of Montreal Protocol to new substances.
Preparedness, Response and Cooperation (London, 1990.)30.11.90United Nations Framework Convention on Climate Change, New York	09.06.92	15.04.94	Achieving stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system.
Convention on Biological Diversity, Rio De Janeiro	05.06.92	03.05.94	Conservation of biological diversity (or biodiversity) and sustainable use of its components.
International Convention to Combat Desertification, Paris.	14.10.94	26.01.1996 (Ratification) 26.12.1996 (entry into force)	Combating desertification and mitigating the effects of drought.
Agenda 21, UNCED, Rio de Janeiro	1992	Signed	Ensuring sustainable development.
Copenhagen Amendment to the Montreal protocol on Substances that Deplete the Ozone Layer, Copenhagen, 1992	1992	27.11.2000 (AT) 26.2.2001 (Entry into force)	Extending the coverage of Montreal Protocol to new substances
Montreal Amendment of the Montreal Protocol on Substances that Deplete the Ozone Layer, Montreal		27.7.2001 (Accepted) 26.10.2001 (Entry into force)	Controls in the trade of ozone depleting substances and the use of licensing procedures to control the import and export of new, recycled and reclaimed ozone depleting substances.

Source: MoEF, 2013

2.5 ASIAN INFRASTRUCTURE INVESTMENT BANK (AIIB) ENVIRONMENT AND SOCIAL FRAMEWORK AND STANDARDS

The AIIB Environmental and Social Framework (ESF), 2016 (AIIB, 2016) (Amended February 2019 and May 2021) provides an overview of the AIIB concerning (a) environmental and social sustainability; and (b) its role in meeting the challenge of sustainable development in Asia. The complete objectives of development is framed within the ESF in terms of both local impacts, and global challenges, especially in climate change. The ESF provides general specifications, standards and objectives that clients should adhere to during project preparation and implementation. Thus, the ESF attaches importance to country regulatory systems as sources of legally binding procedures and standards.

The Environmental and Social Policy (ESP) in the ESF comprises essential environmental and social requirements for each project and is accompanied by:

(d) Three associated mandatory Environmental and Social Standards (ESSs) setting out requirements applicable to clients on, respectively,
    (i) ESS-1: Environmental and Social Assessment and Management,
    (ii) ESS-2: Land Acquisition and Involuntary Resettlement and
    (iii) ESS-3: Indigenous Peoples;
(e) An Environmental and Social Exclusion List (ESEL); and
(f) A Glossary of certain terms used in the ESP and ESSs.

The three ESSs mentioned in the ESP are, ESS 1: implementation of environmental and social assessment and management, ESS 2: prevent/minimize involuntary resettlement and ESS 3: protection of vulnerable/indigenous people. These standards require clients to implement structured process of impact assessment, planning, and

mitigation to address the adverse effects of projects throughout the project cycle. Together, the ESP and the ESSs comprise an environmental and social management approach designed to:

(i) ensure environmental and social screening and categorization,
(ii) analyze future project environmental and social threats, and impacts;
(iii) identify measures to prevent, reduce, mitigate, cover or make up for project environmental and social impacts;
(iv) provide a process to consult the public on environmental and social risks and impacts of projects and to disclose information.

The AIIB classifies all its projects into four categories.

- The project is categorized as Category A if it is likely to have significant adverse environmental and social impacts that are irreversible, cumulative, diverse or unprecedented and requires the client to conduct an Environmental and Social Impact Assessment (ESIA) with Environmental and Social Management Plan (ESMP).
- A project is categorized as Category B when: it has a limited potentially adverse environmental and social impacts; the impacts are not unprecedented; few if any of them are irreversible or cumulative; they are site-specific; and can be successfully managed using good practice in an operational setting and requires clients to conduct an initial review of the environmental and social implications of the Project.
- A Project is categorized C when it is likely to have minimal or no adverse environmental and social impacts and the client is required to prepare a review of the environmental and social aspects of the Project.
- A Project is categorized FI if the financing structure involves the provision of funds to a financial intermediary (FI) for the Project, whereby the Bank delegates to the FI the decision-making on the use of the Bank funds, including the selection, appraisal, approval and monitoring of Bank-financed sub-projects. The Bank requires the FI to develop and apply an appropriate ESMS that is proportional to the environmental and social risks associated with the Bank-supported portfolio, is consistent with this ESP, excludes from Bank support activities covered in the ESEL and incorporates applicable provisions of the ESSs.

AIIB requires the client to establish, in accordance with the ESP and applicable ESSs, a suitable grievance mechanism to receive and facilitate resolution of the concerns or complaints of people who believe they have been adversely affected by the Project's environmental or social impacts, and to inform Project-affected people of its availability. People who believe they have been or are likely to be adversely affected by a failure of the Bank to implement the ESP may also submit complaints to the Bank's oversight mechanism in accordance with the policies and procedures to be established by the Bank for such mechanism.

ESF 2016 (amended in 2019) has also provisions for identify measures to avoid, minimize, or mitigate potentially adverse impacts on and risks to physical, biological, socioeconomic and cultural resources, safety of both workers and affected community and natural resources during the design, construction, operation, and decommissioning of the project.

All AIIB funded Investment Project Financing are required to follow the Environmental and Social Framework (ESF) consisting three (3) Environmental and Social Standards (ESS). These ESSs set out their requirement for the borrowers relating to the identification and assessment of environmental and social risks and impacts associated with any project. The ESSs supports the borrowers in achieving good international practice relating to environmental and social sustainability, assist them in fulfilling their national and international environmental and social obligations, enhance transparency and accountability and ensure sustainable development outcome through ongoing stakeholder engagement.

Section below discusses the relevance of ESF Policy, each of the three standards and associated Directive; their requirements are tabulated in Table-2.4

Table-2.4: Applicability of the AIIB ESS to the Project

Sl. No.	AIIB ESS Policy and Standards	Objectives	Requirements	Relevance to the sub-project/project and Actions to be taken
1.	AIIB environmental and Social Policy of ESF	It sets out the mandatory requirements of the Bank in relation to the projects it supports through Investment Project Financing.	The types of E&S risk and impacts that should be considered in the environmental and social assessment. The use and strengthening of the	Applicable to the ISWMI project and it's all sub-projects

Sl. No.	AIIB ESS Policy and Standards	Objectives	Requirements	Relevance to the sub-project/project and Actions to be taken
			Borrower's environmental and social framework for the assessment, development and implementation of AIIB financed projects where appropriate.	
2.	ESS-1: Environmental and Social Risks Assessment and Management	To conduct an environmental and social assessment relating to these risks and impacts, and design appropriate measures to avoid, minimize, mitigate, offset or compensate for them, all as required under ESS 1. Adopt differentiated measures so that adverse impacts do not fall disproportionately on the disadvantaged or vulnerable, and they are not disadvantaged in sharing development benefits and opportunities	The types of E&S risk and impacts that should be considered in the environmental and social assessment. The use and strengthening of the Borrower's environmental and social framework for the assessment, development and implementation of AIIB financed projects where appropriate.	E&S risks and Impacts have been preliminary identified based on consultations with primary stakeholders including communities and implementing agency. Detailed ESIA and ESMP has to be prepared in addition to this ESMPF.
3.	ESS-2: Involuntary Resettlement	Avoid or minimize involuntary resettlement by exploring project design alternatives. Avoid forced eviction. Mitigate unavoidable adverse impacts from land acquisition or restrictions on land use by providing compensation at replacement cost and assisting displaced persons in their efforts to improve, or at least restore, livelihoods and living standards to pre-displacement levels or to levels prevailing prior to the beginning of project implementation, whichever is higher. Improve living conditions of poor or vulnerable persons who are physically displaced, through provision of adequate housing, access to services and facilities, and security of tenure. Conceive and execute resettlement activities as sustainable development programs.	Applies to permanent or temporary physical and economic displacement resulting from different types of land acquisition and restrictions on access. Does not apply to voluntary market transactions, except where these affects third parties. Provides criteria for "voluntary" land donations, sale of community land, and parties obtaining income from illegal rentals. Prohibits forced eviction (removal against the will of affected people, without legal and other protection including all applicable procedures and principles in ESS 2). Requires that acquisition of land and assets is initiated only after payment of compensation and resettlement has occurred. Requires community engagement and consultation, disclosure of information and a grievance mechanism.	Land will be required for the project development work i.e. waste processing and disposal. Hence impacts on land, private and community owned assets including structures, trees and crops within existing and proposed sites are likely. Physical and economic displacement too is very likely.

Sl. No.	AIIB ESS Policy and Standards	Objectives	Requirements	Relevance to the sub-project/project and Actions to be taken
4.	ESS-3: Indigenous-Peoples	Ensure that the development process fosters full respect for affected parties' human rights, dignity, aspirations, identity, culture, and natural resource-based livelihoods. Promote sustainable development benefits and opportunities in a manner that is accessible, culturally appropriate and inclusive. Improve project design and promote local support by establishing and maintaining an ongoing relationship based on meaningful consultation with affected parties. Obtain the Free, Prior, and Informed Consent of affected parties in three circumstances. Recognize, respect and preserve the culture, knowledge, and practices of Indigenous Peoples, and to provide them with an opportunity to adapt to changing conditions in a manner and in a timeframe acceptable to them.	Applies when the Indigenous Peoples are present or have a collective attachment to the land, whether they are affected positively or negatively and regardless of economic, political or social vulnerability. The option to use different terminologies for groups that meet the criteria set out in the Standard. The use of national screening processes, providing these meet AIIB criteria and requirements. Coverage of forest dwellers, hunter gatherers, and pastoralists and other nomadic groups. Requirements for meaningful consultation tailored to affected parties and a grievance mechanism. Requirements for a process of free, prior and informed consent in three circumstances.	This ESS will identify the measures to minimize disruption of the livelihoods due to the project development. This project work will avoid the Indigenous person.

2.6 BRIEF OVERVIEW OF LABOUR LEGISLATION: TERMS AND CONDITIONS

Standards for Labour and Working Conditions are defined in Bangladesh Labour Act, 2006 (amendments in 2013 and 2018) and Bangladesh Labour Rules 2015 and Occupational Health and Safety Policies 2013. Bangladesh Labour Act, 2006 is a comprehensive legislation. The Act addresses three areas:

(i) Conditions of service and employment including wages and payment, establishment of Wages Boards, employment of young people, maternity benefits, working hours and leave;
(ii) Health, safety, hygiene, and welfare, and compensation for injury; and,
(iii) Trade unions and industrial relations. Beside this, due to ongoing pandemic of COVID 19 World Health Organization (WHO) and Directorate General of Health Services (DGHS), under the Ministry of Health and Family Welfare, provided guideline for infection prevention and control. The government has incorporated the life-threatening novel corona virus (COVID-19) in 'The Communicable Diseases (Prevention, Control and Eradication) Act, 2018'. With the issuance of the gazette the government has got a legal power to take action against the people not following the government's direction that relates to COVID 19. The health and safety issues relevant to COVID-19 should be addressed with reference to ILO Occupational Safety and Health Convention, 1981 (No. 155), ILO Occupational Health Services Convention, 1985 (No. 161), ILO Safety and Health in Construction Convention, 1988 (No. 167), WHO International Health Regulations, 2005, WHO Emergency Response Framework, 2017.

Table-2.5: Analysis of AIIB-ESS 1 with Provisions in Bangladesh Labour Act, 2006 (including its amendment till 2018)

Sl. No.	ESS-1 & Topic	Bangladesh Labour Act 2006 (amendment 2018)
(i)	Working conditions and management of Labour relations ▪ Written Labour management Procedures ▪ Nondiscrimination and equal opportunity ▪ Timely Payment ▪ Working Hour and over time ▪ Minimum Wages ▪ Regular leave and benefit	▪ The Labour Act does not specifically require that development be assessed and reviewed in terms of Labour and working conditions before approval. ▪ The Labour Act does not require development projects to prepare Labour Management Plans/Procedure. ▪ Section 195-made it unlawful to discriminate against any person in regard to any employment, promotion, condition of employment or working condition; ▪ Section 123 – wages shall be paid before the expiry of seventh working day after the last day of wage period in respect of which the wages are payable. ▪ Section 102 – maximum working hours in a week is restricted to 48hours, but as of section 108 workers working over 48hrs will be entitled to extra allowance for overtime which would be twice the ordinary basic wage rate.
(ii)	Right of Woman -Maternity Pay	Section 46 – maternity leave and benefit applicable for women workers who are employed for not less than six months immediately preceding the day of her delivery and no maternity benefits shall be payable if at the time of her confinement she has two or more surviving children.
(iii)	Protecting the work force - Child Labour - Forced Labour	The Bangladesh Labour Act, 2006 Section 34- No child shall be employed to work in any occupation. Section 44- Anyone under the age 14 is considered as child and less than 18 but over 14 is considered as adolescent. But child over 12 years of age can be employed for light work. Section 37- this suggests a fitness certificate required for adolescents to get employed. Forced Labour Convention, 1930 ratified by Bangladesh on 22.06.1972 -Forced Labour is prohibited in Bangladesh. The country's Constitution prohibits forced Labour
(iv)	Grievance mechanism- GRM should be in place for direct and contracted workers	Section 33 provides a complete procedure of grievance where it is vividly described of whom to complaint and also the actions of employer regarding enquiries and the actions to be taken by the Labour court. In case of any grievance against his employer relating to his apprenticeship and if it is not redressed by the employer, applies to the competent authority for redress, and shall abide by the decision of the competent authority, Section 280 (f).
(v)	OHS- Detailed Procedure required for each and every project. ▪ Requirements to protect workers, train workers, document incidents, emergency preparation, addressing issues; ▪ Monitor OSH performance	-The Labour Act does not specifically require that development be assessed and reviewed in terms of OHS requirements before approval. - The Labour Act does not require development projects to prepare OHS Plan. The Bangladesh Labour Act, 2006 Section 79- vividly states that any hazardous operations to be declared beforehand and prohibits employment of any women, children, adolescent or any unfit person for such jobs. Section 80- In case of accidents or any loss of life or bodily injury in project site, the employer is obliged to inform the Inspector within two working days.

Sl. No.	ESS-1 & Topic	Bangladesh Labour Act 2006 (amendment 2018)
		Section 89- first aid appliances to be strictly maintained and provided as to be readily accessible during working hours. Section 91 to section 94 includes the facilities to be provided to workers during working hours, namely canteens, washing facility, shelters, rooms for children under age 6 of women workers. Section 99- it is compulsory for establishments wherein minimum two hundred (200) permanent workers are employed, to introduce group insurance. Section 150- in case of injuries of workers caused by accident in the course of employment, the employer shall be liable to pay any compensation in accordance with certain provisions.
(vi)	Age of Employment	As per Bangladesh Labour Act, 2006, no one below the age of 14 (minimum age) will be employed as a Labour. A child over the minimum age (14) and under the age of 18 may be employed or engaged in connection with the project only if the work is not likely to be hazardous or interfere with the child's education or be harmful to the child's health or physical, mental, spiritual, moral or social development; an appropriate risk assessment is conducted prior to the work commencing;
(vii)	Employee assessment-procedure for determination of compliance of the worker of post (the performed work) by assessment of execution of job responsibilities, level of knowledge, skills and professional training.	Section 195-made it unlawful to discriminate against any person in regard to any employment, promotion, condition of employment or working condition;
(viii)	Freedom of association and collective bargaining	The Bangladesh Labour Act, 2006 Section 176- focuses on the Rights of Workers, guarantees all workers of their right to freely form, join or not join a trade union for the promotion and protection of the economic interest of that worker; and collective bargaining and representation. The procedures for registration of trade unions are set out in detail under Sections 177 and 178 and the requirement for registration are clearly stated in Section 179. The 2006 Act has made a direct provision that if a single trade union remains then that shall be treated as the Collective Bargaining Agent.
(ix)	To anticipate and avoid adverse impacts on the health and safety of project-affected communities during the project lifecycle from both routine and non-routine circumstances. To avoid or minimize community exposure to project-related traffic and road safety risks, diseases and hazardous materials. To have in place effective measures to address emergency events. To ensure that the safeguarding of personnel and property or minimizes risks to the project-affected communities.	The Bangladesh Labour Act, 2006, Section 61- Inspectors will assess the condition of building, machinery or plant in an establishment and recommend if any measures are required for handling imminent danger to human life or safety. Section 62- in case of sudden fire, necessary precautions to be taken in advance are well mentioned and provisions of fire exit to be established in buildings are strictly directed.

2.7 LEGISLATION RELATING TO OCCUPATIONAL HEALTH AND SAFETY

During construction, the project will conform to the Labour laws and occupational and health related rules as outlined in Table-2.6.

Table-2.6: Relevant Occupational Health and Safety Laws and Rules

Sl. No.	Title	Overview
1.	Bangladesh Labour Act, 2006	Provides for safety of work force during construction period. The act provides guidance of employer's extent of responsibility and the workman's right to compensation in case of injury caused by accident while working.
2.	Labour Relations under Labour Laws, 1996	General concerns during the project implementation state that the project manager must recognize Labour unions.
3.	Public Health (Emergency Provisions) Ordinance, 1994	Calls for special provisions with regard to public health. In case of emergency, it is necessary to make special provisions for preventing the spread of disease, safeguarding the public health, and providing adequate medical service, and other services essential to the health of respective communities and workers during construction-related work.
4.	The Employees State Insurance Act, 1948	Health, injury and sickness benefit should be paid.
5.	The Employer's Liability Act, 1938	Covers accidents, risks, and damages with respect to employment injuries
6.	Maternity Benefit Act, 1950	Framed rules for female employees, who are entitled to various benefits for maternity
7.	Bangladesh Factory Act, 1979	Workplaces provisions: these Act and Labour Laws require medical facilities, first aid, accident and emergency arrangements, and childcare services to be provided to the workers at workplace.

2.8 LEGISLATION RELATING TO STAKEHOLDER ENGAGEMENT AND INFORMATION DISCLOSURE

The DoE guidelines for IEE/ESIA preparation encourages the implementing agency to conduct public consultations of orange-B and red category projects. The current environmental and social framework in Bangladesh does not recognize public consultation as a means for environmental decision making. Implementing agencies present the outcome of their assessment in the IEE/ESIA reports which they submit to the DoE for clearance. However, opportunities for the public to review the final/completed IEE/ESIA report are under the discretion of the Director-General of the DoE. The DoE does not officially disclose ESIA report findings publicly on their website. However, when carrying out donor projects public consultation of reports are a standard practice and DoE is cognizant of this.

Project Relevancy- Stakeholder engagement is an important instrument of public policy and these regulations/laws aim to make the development project inclusive by giving voice to the communities. The anticipated civil work makes it necessary to implement stakeholder engagement. The current ESIA system in the country does not have the scope for public consultation and disclosure. Therefore, guidance from AIIB ESF will reinforce the stakeholder engagement and information disclosure requirements of the project.

2.9 HARMONISATION OF POLICIES OF AIIB AND GOB

2.9.1 Harmonisation of Environmental Policies of AIIB and GoB

In Bangladesh, there are more than 200 laws and by-laws exist to tackle the challenges related to environmental issues/aspects. Strategies and policies are in place. The Government of Bangladesh (GoB) realizes that good public policy needs to be matched by investments to ensure implementation. Some comparative analysis has been drawn between AIIB policy and GoB policies, then Harmonised framework has been provided in Table-2.7

Table-2.7: Harmonised environmental policies of AIIB and GoB

Sl. No.	Aspect	AIIB Regulation	National Bangladesh Regulation	Identified gaps and Harmonised Framework
7.	Environmental Policy and Regulations	There are AIIB Environmental and Social Framework, Environmental and Social Policy and	Environment Conservation Act 1995 is currently the main act governing environmental protection in Bangladesh, which replaced the earlier environment	In most of the cases national requirements and standards for environment quality are in match with AIIB Policy and Standards

Sl. No.	Aspect	AIIB Regulation	National Bangladesh Regulation	Identified gaps and Harmonised Framework
		Environmental and Social Standards	pollution control ordinance of 1992 and provides the legal basis for Environment Conservation Rules, 1997 (ECR'97). The main objectives of ECA'95 are conservation of the natural environment and improvement of environmental standards, and control and mitigation of environmental pollution. According to Article-12 of Environment Conservation Act 1995, "No industrial unit or project shall be established or undertaken without obtaining, in the manner prescribed by rules, an Environmental Clearance Certificate from the Director General". The Ecologically Critical Area (ECA) is an environmentally protected zone where the ecosystem is considered to be endangered to reach a critical condition by the changes brought through various human activities. Section 2 of the Bangladesh Environment Conservation (Amendment) Act (2010) provides that "Ecologically critical Area" means such area which is rich in unique biodiversity or due to the importance of environmental perspective necessary to protect or conserve from destructive activities. ECA also falls within the category of natural and cultural heritage.	(For example, Environmental Assessment is compulsory for both requirements). However, there are some parameters when national and AIIB requirements and standards are different (For example, National legislation does not require a preparation of separate EMP/ESMP or any other environmental documents/plans/checklists for project). In such cases more stringent provisions will be applied for the project.
8.	Screening and categorization	AIIB carries out project screening and categorization at the earliest stage of project preparation when sufficient information is available for this purpose	It is mandatory to obtain Environmental Clearance for each and every type of industry and project as per Bangladesh Environment Conservation Act, 1995 (Amended 2010). For the purpose of issuance of Environmental Clearance Certificate, the industrial units and projects shall, in consideration of their site and impact on the environment, be classified into the following four categories: • Green • Orange-A • Orange-B • Red.	AIIB and Bangladesh project categorization could be Harmonised by accepting the following principle: AIIB category: DoE categ ory Category A: Category Red Category B: Orange B (mostly) Category B: Orange A Category C: Green The proposed subprojects can be Category A or B in accordance with AIIB ESS. In the case where AIIB and national categorization requirements differ, the

Sl. No.	Aspect	AIIB Regulation	National Bangladesh Regulation	Identified gaps and Harmonised Framework
				more stringent requirement will apply.
9.	Environmental and Social Impact Assessment Report	In accordance with Environmental and Social Policy (ESP of ESF 2016), ESIA processes report for category A projects includes the following chapters: (a) description of the Project; (b) policy, legal and administrative framework, including the international and national legal framework applicable to the Project; (c) scoping, including stakeholder identification and consultation plan; (d) analysis of alternatives, including the "without Project" situation; (e) baseline environmental and social data; (f) evaluation of environmental and social risks and impacts; (g) public consultation and information	The EIA report has to include: (i) baseline data, (ii) project description, (iii) anticipated environmental impacts, (iv) waste management, (v) analysis of emergency situation, and (vi) and anticipated changes due to project implementation. Information on applicable laws and regulation usually is presented in "Introduction" part. For the projects of category Orange B, the EIA report is more simplified. For Green and Orange-A an EIA report is not required	The present ESMPF has been prepared in fulfilling the national as well as AIIB requirements.
10.	ESMP	ESMP should be prepared and should specify, along with the proposed mitigation activities, a monitoring plan and reporting requirements, institutional arrangements for ESMP implementation. For sub-projects category B with	National legislation on EIA requires to identify possible impacts, but it does not require a preparation of separate EMP or any other environmental documents/plans/checklists. There is no requirement on environmental monitoring with specification of monitoring parameters and location.	An ESMP has been prepared and included in the present EIA.

Sl. No.	Aspect	AIIB Regulation	National Bangladesh Regulation	Identified gaps and Harmonised Framework
		low impact ESMP checklist has to be filled.		
11.	Public Consultations and Disclosure	The Borrower is responsible for conducting at least one meaningful consultation for all Categories A, B and C projects to discuss the issues to be addressed in the EMP or to discuss the draft EMP itself	Conducting of public consultation is not mandatory. It may be conducted, if required at the time of the EIA (second stage of EIA). Notice to relevant agencies and no object clearance from the local Government authority must be obtained	Public consultations have been carried out with the stakeholders, affected people, NGOs as part of the present EIA, in line with the AIIB requirements. The feedback received from the Public Consultations has been used to finalize the present EIA.
12.	Requirements on Cultural Heritages	AIIB ESS 1 requires development of Cultural Recourses field-based survey to conserve cultural resources and avoid destroying or damaging them under the Project	Ecologically critical Area" means such area which is rich in unique biodiversity or due to the importance of environmental perspective necessary to protect or conserve from destructive activities. ECA also falls within the category of natural and cultural heritage. Department of Archeology is the concerned authority for the preservation, presentation and promotion of our glorious cultural heritage. At present the department owns 448 heritage sites Article 24 of the constitution of Bangladesh says that the state shall adopt measures for the protection against disfigurement, damage or removal of all monuments, objects or places of special artistic or historic importance or interest. Bangladesh also have the Antiquities Act, 1968 that provides the modes of protection and preservation of things which are part of our national history and heritage.	Chance Find procedures have been included in the ESIA

2.9.2 Harmonization of Social Policies of AIIB and GoB

Table-2.8: Harmonised Social Policies of AIIB and GoB

Sl. No.	AIIB Social Policies	National Policies	Gaps with GoB
A	ESS-1: Environmental and Social Assessment and Management		
1.	Identify any potentially adverse gender-specific risks and impacts.	Not defined in EIA guidelines of DoE or even in the policies.	Annex-B of EIA Guideline only mentioned the "gender discrimination issue" in the "Labor and employment issues" Sections.
2.	Use gender-disaggregated baseline data and analysis	There is no guidance for the use of gender-disaggregated baseline data and analysis, and	Only Socioeconomic survey conducted following the EIA guideline.

Sl. No.	AIIB Social Policies	National Policies	Gaps with GoB
		consider enhancing the design of the Project to promote equality of opportunity and women's socioeconomic empowerment, particularly with respect to access to finance, services, and employment.	
3.	Monitoring of gender-disaggregated data in the implementation period.	No gender-disaggregated data advised for monitoring and evaluation purposes for the implementation period.	Only Socioeconomic survey conducted following the EIA guideline.
4.	Manage risks of Project-related Gender-based Violence (GBV)	Not defined the management of risks of Project-related Gender-based Violence (GBV) to Project-affected persons and communities and Project workers.	There is a section-14 in the Environmental Conservation Act 1995 about allowing appeal against the grievances to the appellate Authority. But no specific GBV mentioned in the ECA.
5.	Health and Safety of Workers and Communities	No Specific EHSGs and, as appropriate, industry-specific EHSGs, to the Project.	Labor laws 2006 (as amended in 2013) are followed for the HS of Workers but no community issues are addressed in the laws.
6.	Occupation Health and Safety	National Occupational Safety and Health Policy in 2013 and working towards implementation of the policy in every industrial sector but not for general HS guidelines.	It is Industry specific only. However, the government uses this approach as a standard practice.
7.	Project induced Labor Influx	No assessment and appropriately management of risks of adverse impacts on communities that may result from temporary Project-induced labor influx addressed in national policies/EIA guidelines.	Annex-B of EIA Guideline only mentioned the "spread of diseases due to influx of migrant labor" but no assessment/management addressed.
B	ESS-2: Land Acquisition and Involuntary Resettlement (Acquisition and Requisition of Immovable Property Act, 2017)		
8.	Involuntary resettlement should be avoided wherever possible.	Not defined in the Act	Act 2017 does not deal with the minimization of involuntary resettlement. However, the government uses this approach as a standard practice.
9.	Minimize involuntary resettlement by exploring project and design alternatives.	Not so clearly defined in the Act. Places of worship, graveyard and cremation grounds are not to be acquired for any purpose, unless the acquisition of these places is deemed unavoidable for the best of interest of the people.	Act 2017 does not deal with these issues and does not comply with AIIB ESS2, as the Act 2017 has no strong provision for minimizing adverse impacts on private property or common resources, and does not deal with alternate design. The RPF clearly mentions how to minimize the involuntary resettlement through proper alternate engineering design and adequate consultation with stakeholders.
10.	Conducting census of displaced persons and resettlement planning	The Act 2017 spells out that upon approval of the request for land by the office of the deputy commissioner, the acquiring and Requiring body	The Act 2017 does not require the coverage of the census survey. It only reflects the inventory of losses which is more in physical terms and only includes the names of the

Sl. No.	AIIB Social Policies	National Policies	Gaps with GoB
		staff will conduct the physical inventory of assets and properties found in the land. The inventory form consists of the name of person, quantity and quality of land, asset assets affected, and the materials used in the construction of house. The cut-off date is the date of publication of notice that land is subject to acquisition, and that any alteration or improvement thereon will not be considered for compensation.	owners, etc. The AIIB policy spells out a detailed census through household surveys of displaced persons in order to assess the loss of income and vulnerability of the persons going to be affected by land acquisition but also population displacement and other entitlements as per the entitlement matrix. The RPF fills this gap by incorporating the need for a census survey for the displaced persons.
11.	Carry out meaningful consultation with displaced persons and ensure their participation in planning, implementation, and monitoring of resettlement program.	Section 3 of the ordinance provides that whenever it appears to the DC that any property is needed or is likely to be needed for any public purpose or in the public interest, he shall publish a notice at convenient places on or near the property in the prescribed form and manner stating that the property is proposed for acquisition.	The Act 2017 does not directly meet AIIB ESS2. This section of the ordinance establishes an indirect form of information disclosure/public consultation. However, it does not provide for public meetings and project disclosure, so stakeholders are not informed about the purpose of land acquisition, its proposed use, or compensation, entitlements, and special assistance measures. The RPF deals with the proper consultation process, which involves all stakeholders (DPs, government department/line agencies, local community, NGO, etc.), and the consultation will be a continuous process at all stages of the project development, such as project formulation, feasibility study, design, implementation, and post-implementation, including the monitoring phase.
12.	Establish grievance redress mechanism.	Section 4 allows the occupant of the land to raise objections in writing. These should be filed to the DC within 15 days of the publication. The DC will then hear the complaints and prepare a report and record of proceedings within 30 days following expiry of the 15-day period given to DPs to file their objections.	The section 4 provision is consistent with AIIB's grievance and redress policy. The RPF has a special provision for grievance procedures, which includes formation of a grievance redress committee, appointment of an arbitrator, and publication of the notice of hearings and the scope of proceedings. The APs can raise any grievances relating to LA&R issues.
13.	Improve or at least restore the livelihoods of all displaced persons.	The Act 2017 does not address the issues related to income loss, livelihood, or loss of the non-titleholders. This only deals with the compensation for loss of land, structures, crops and trees, etc. for the legal titleholders.	Act 2007 does not comply with AIIB ESS2 as there is no provision to assess the impacts on incomes and livelihood from the loss of employment and business, or to restore lost incomes and livelihoods. The RPF keeps the provision for a census survey that will have the data on the loss of income and livelihood, and the same will be compensated as per the entitlement matrix for both

Sl. No.	AIIB Social Policies	National Policies	Gaps with GoB
			physically and economically displaced persons.
14.	Land-based resettlement strategy	The Act 2017 does not address these issues.	The Act 2017 does not meet the requirement of AIIB ESS2. The RPF proposes the land-for-land compensation as its priority if feasible. Attempt will be made to find alternative land for the loss of land in case it is available and if it is feasible, looking at the concurrence of host community and land value. However, this option may be a difficult proposition, considering the urban development projects in Bangladesh.
15.	All compensation should be based on the principle of replacement cost.	The Act 2017 states that the deputy commissioner (DC) determines the amount of compensation by considering: (i) the replacement cost of the property based on the average sale value of last 12 months preceding the publication of 1st notice of acquisition; (ii) the damage to standing crops and trees; (iii) damage by severing such property from the other properties of the person occupying the land; (iv) adverse effects on other properties, immovable or movable, and/or earnings; and (v) the cost of change of place of residence or place of business. The DC also awards a sum of 50% on the replacement cost of the property to be acquired.	Act 2017 is largely consistent with AIIB ESS2. However, there are differences in the valuation of land and prices of affected assets, where AIIB prescribes the use of current market rates in the project area. Act 2017 does not ensure replacement cost or restoration of pre-project incomes of the displaced persons. The RPF addresses all these issues and spells out a mechanism to fix the replacement cost by putting in an independent evaluator who will be responsible for deciding the replacement cost, taking into consideration the Current Market Price and titling cost of the land.
16.	Provide relocation assistance to displaced persons.	If DC considers that the structure can easily be transferred, he/she will give relocation cost but not cash compensation under law.	The Act 2017 does not define the additional relocation assistance to displaced persons, other than the compensation for the direct loss of land and property. Hence, Act 2017 does not comply with AIIB ESS2. The RPF provides the eligibility and entitlement for the relocation of the displaced persons in the form of relocation assistance, which includes shifting allowances, right to salvage materials, and additional transitional assistance for the loss of business and employment.
17.	Ensure that displaced persons without titles to land or any recognizable legal rights to land are eligible for resettlement assistance and compensation for loss of non-land assets.	The Act 2017 does not have this provision.	The Act 2017 is not consistent with the requirements of AIIB's ESS2. This is a major difference in the national law/policy compared to that of AIIB. The Act 2017 only takes into consideration the legal titleholders and ignores the non-titleholders. The objective of the RPF is to ensure that compensation and assistance is provided to all displaced persons,

Sl. No.	AIIB Social Policies	National Policies	Gaps with GoB
			whether physically displaced or economically displaced, irrespective of their legal status of land on which the structure is built. The end of the census survey will be considered to be the cut-off date, and displaced persons listed before the cut-off-date will be eligible for assistance.
18.	Disclose the resettlement plan, including documentation of the consultation in an accessible place and a form and languages understandable to affected persons and other stakeholders.	The ordinance only ensures the initial notification for the acquisition of a particular property.	There is no requirement under the Act, of disclosure of the RPF, whereas the AIIB's ESS2 requires disclosure. This RPF will ensure that the resettlement plan for each project, along with the necessary eligibility and entitlement will be disclosed to the DPs in the local language (Bangla), in the project location and concerned government offices, and the same resettlement plan will also be disclosed on the executing agency's website and on the website of AIIB.
19.	Conceive and execute involuntary resettlement as part of a development project or program. Include the full costs of resettlement in the presentation of project's costs and benefits.	The Act 2017 has a provision to include all the costs related to land acquisition and compensation of legal property and assets. However, it does not take into account the costs related to other assistance and involuntary resettlement.	The Act 2017 partially meets the requirement of AIIB ESS2 as it only deals with the compensation pertaining to land acquisition. The resettlement framework provides the eligibility to both titleholders and non- titleholders with compensation and various kinds of assistance as part of the resettlement packages, and the entire cost will be the part of the project cost.
20.	Pay compensation and provide other resettlement entitlements before physical or economic displacement.	The Act 2017 has the provision that all the compensation will be paid prior to possession of the acquired land by EA.	The Act 2017 meets the requirement of AIIB ESS2.
21.	Monitor and assess resettlement outcomes, and their impacts on the standards of living of displaced persons.	This is not so clearly defined in the Act 2017.	The Act 2017 does not comply with AIIB ESS2 The RPF has a detailed provision for a monitoring system within the executing agency. The executing agency will be responsible for proper monitoring of the resettlement plan implementation, and the internal monitoring will also be verified by an external monitoring expert.
C. ESS-3: Indigenous Peoples			
22.	Preparation of an Indigenous Peoples Plan (IPP)	No IPP is addressed in ECA/ECR	Annex-B of EIA Guideline only mentioned the "Indigenous people rights and/or minority rights issues".
23.	Special Considerations in Consultations	For IP nothing specifically addressed in the EIA national guidelines	A broader perspective of Stakeholder engagement processes/Public consultation and participation has addressed in the EIA guidelines of DoE.

Sl. No.	AIIB Social Policies	National Policies	Gaps with GoB
24.	Project-level Grievance Redress Mechanism (GRM)	Not clearly defined the GRM in the ECA/ECR.	There is a section-14 in the Environmental Conservation Act 1995 about allowing appeal against the grievances to the appellate Authority. But no specific GRM process/method mentioned in the ECA.

No Objection Certificate (NOC): This is a mandatory requirement to obtain environmental clearance from the Department of Environment (DoE). Usually, DoE indicates the name of the agencies from whom NOC would be required. DoE requires that proponent obtain NOCs from affected agencies or local/regional administrations, which essentially sign off on the project. It is only after these NOCs are provided that DoE gives the Environmental Clearance Certificate, or green light to proceed to construction.

SECTION-3: ENVIRONMENTAL AND SOCIAL BASELINE INFORMATION AND DATA

3.1 SUB-PROJECT INFLUENCE AREA

For properly carrying out IEE and EIA, it is important to have a clear understanding about the "sub-project influence area" and "baseline environment". The ESMPF provides guidelines for identification of sub-project specific influence area and defining environmental baseline. In order to establish a sub-project influence area, the activities to be carried out and processes that would take place during both construction phase and operational phase of the sub-project need to be carefully evaluated. Based on the field visits to sub-project sites, it is apparent that the sub-project influence area would depend not only on the type of sub-project (i.e., Waste Collection and Transportation, Waste Processing and Disposal), but also on the nature of site/ area where it will be implemented. Table-3.1 provides general guidelines for identification of influence area for different types of sub-projects to be implemented under the proposed project.

Table-3.1: Guidelines for identifying influence area for different types of sub-project

Sub-project	Influence Area
Waste Collection and Transportation, Waste Processing and Disposal	The landfill site shall be large enough to last for at least 20-25 years and shall develop 'landfill cells' in a phased manner to avoid water logging and misuse. The landfill site shall be away from habitation clusters, forest areas, water bodies, monuments, National Parks, Wetlands, and places of important cultural, historical or religious interest and the distance to be maintained, as prescribed by the Department of Environment (DOE) on the case to case basis for management of solid waste management plan or 200 meter away from rivers/wetlands/ponds, 250 meter form residential development, 500 meter from National Highways, Habitations, Public Parks and water supply wells and 3 km away from Airports or Airbase. The Landfill site shall not be permitted within wetlands, ECA, sensitive eco-fragile are-as, and flood plains. A 'no development' buffer zone shall be maintained around landfill sites and sites for processing and disposal of solid waste capacity greater than 5tones. The sites for landfills and processing and disposal of solid waste shall be incorporated in the master plan of the city/town prepared by the Development Authorities, UDD or LGED. The buffer zone shall be prescribed by the Department of Environment in the Environmental Clearance Certificate. No fault lines or significant fractured geological structures shall be present within 500 meters of the perimeter of the proposed landfill. The site must not be within a flood plain subject to 10 years flood. There should be no private or public drinking water well 500 meters down gradient of the landfill boundaries. Ground water's seasonal high level should be at least 1 meter below the pro-posed base of any cell excavation.

3.2 ENVIRONMENTAL BASELINE

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

- Nature of the sub-project location,
- Nature/ extent of a sub-project and its likely impact,
- Level of environmental assessment (e.g., screening versus full scale EIA)

For example, ambient air quality and noise level are important parameters for describing baseline scenario for a disposal site, because these parameters are likely to be impacted by the project works. Similarly, ecological parameters (e.g., diversity of flora and fauna) are likely to be critical for a waste disposal site to be constructed close to the pond/river or marshy land, where aquatic floral and faunal habitat could be impacted by the project activities. Obviously, the depth of baseline information required for IEE/EIA of a "red" sub-project would be different from those required for an "orange B" category sub-project.

For systematic recording of data, baseline environment is usually classified into Physico-chemical environment, biological environment, and socio-economic environment; and important features/parameters under each category are identified and measured/ recorded during baseline survey. The important features/ parameters would depend on the nature of sub-project location, category of sub-project, and level of environmental

assessment. The following sections provide guideline on identification of important features/parameters and collection of sub-project specific environmental baseline data.

3.2.1 Physico-chemical Environment

The important Physico-chemical parameters for defining baseline include:

- Important Environmental Features (IEFs),
- Climate,
- Topography and drainage,
- Geology and soil,
- Hydrology and water resources,
- Air quality,
- Noise level,
- Water quality, and
- Traffic

IEFs and Maps:

Typical Important Environmental Features (IEFs) include human settlements, educational institutions (school, college, madrassa, university), health care facilities (hospitals, clinics), commercial/ recreational establishments (markets, restaurants, parks, offices), religious establishments (mosques, temples, churches), major utility infrastructure (water/ wastewater treatment plants, water mains, sewers, power plants, sub-station, gas/ electricity transmission/ distribution lines), landfills, major ponds/ khals and rivers, and historical archaeological establishments, ecologically critical area (ECA), wildlife sanctuary, game reserve, protected area, and national park.

Under most circumstances, it is sufficient to identify IEFs based on a survey covering the sub-project influence area (see Table 3.2). Thus, a rapid physical survey of each sub-project will be required to identify the IEFs within the sub-project influence area. It should be noted that many of the IEFs (e.g., historical/ archaeological sites, wildlife sanctuary, and national park) should already be identified and recorded in available maps of the relevant areas. These maps could be utilized during identification of IEFs.

The sub-project layout and the identified IEFs within the sub-project influence area should be presented in a suitable map. For this purpose, the sub-project layout and IEF locations should be superimposed on the GIS maps (e.g., land-use maps) or Google images of project area and their surroundings.

Climate:

It is important to have a general idea about the climate of the area where the sub-project would be implemented. Important climatic parameters include precipitation, temperature, relative humidity, wind speed and direction. These data should be collected from secondary sources (e.g., from the nearest station of Bangladesh Meteorological Department, BMD); the climatic data of the BMD station closest to the sub-project site should be used. These climatic data could be readily used for environmental assessment of any sub-project, as required.

Topography and drainage:

Data and information on topography are important for the design of the sub-projects to be implemented by LGED. Information on the topography is essential in fixing the Landfill Sites. Similarly, construction of WtE plant site is dependent on the topography of the site and the surrounding area. For example, it is important to know whether the area where the Landfill Site/WtE plant sites would be constructed suffers from water logging or inundation problems, which could endanger the operation. For the design of these sub-projects, it may be necessary to carry out topographic survey in the sub-project area. However, for environmental assessment (IEE with EMP), secondary information on topography and drainage should be sufficient.

Geology and soil:

Characteristics of soil could be important if a particular sub-project involves significant excavation/ earthworks, because wind-blown dust from these activities could contribute to air pollution. In such cases, characteristics of soils (particularly heavy metal content) are often determined as a part of baseline survey. However, considering the nature and scale of the structures to be constructed in the sub-projects to be implemented under LGED, geology and soil characteristics do not appear to be critical for environmental assessment.

Hydrology and water resources:

For the design of the sub-project information such as water level/ highest flood level are important. For environmental assessment (IEE and EIA), information on hydrology (e.g., river network, flow, highest water level) and water resources (e.g., discharge, surface and groundwater levels) may be collected from secondary sources (e.g., from Bangladesh Water Development Board, BWDB).

Air quality:

Data on ambient air quality is not likely to be available in the areas where the sub-projects will be implemented. Particulate matter (particularly PM_{10} and $PM_{2.5}$) is the most important air quality parameter from health perspective. In this project, open dumping practices exacerbated the increase of greenhouse gases emissions as well as dioxin and furan emissions would be hazardous from the Waste-to-Energy plants if no air pollution control system is adopted. However, measurement of air quality is relatively expensive and facilities for air quality measurement are not widely available. Therefore, baseline air quality data (PM) from secondary sources may be collected for carrying out environmental assessment (EA). The Clean Air and Sustainable Environment (CASE) Project, under the Ministry of Environment and Forest, Government of the People's Republic of Bangladesh, monitors different ambient air quality parameters from 11 fixed continuous air monitoring stations (CAMS) located in different parts of the country. The air quality data obtained from these CAMS can be used for carrying out detailed environmental assessment.

Noise level:

Noise is typically generated from operation of machines and equipment (e.g., excavator, bulldozer, waste collection truck etc.), and movement of vehicles. Noise is of particular importance if the sub-project components (e.g., waste collection, transportation, disposal process) are located close to sensitive installations such as educational institutions, health care facilities, religious establishments, and human settlements. Activities to be carried out during construction phase of the sub-projects would generate noise. For these sub-projects, baseline noise level should be measured and recorded, so that these could be compared with those generated during construction/operation phase of the sub-projects. The location and frequency of baseline noise level measurements would depend on physical extent of project, and presence of sensitive installations within sub-project influence area, as noted above. The consultant engaged for carrying out IEE/EIA should be responsible for measurement of baseline noise level at location(s) within the sub-project influence area. Both day-time and night-time noise levels should be measured, using a calibrated noise level meter.

Water quality:

A number of activities during the implementation of sub-projects could have impacts on water quality. These include construction of disposal sites near the water bodies. Accidental spillage of gasoline from construction equipment/trucks may contaminate surface and/or ground water-bodies. Stagnation resulting from obstruction of cross drainage pattern in rural areas may result in deterioration of water quality in the areas surrounding these sites. For these sub-project activities, baseline water quality of the relevant water body should be measured, as a part of baseline survey (by the consultant engaged for carrying out IEE/EIA).

Traffic:

Storage of construction materials on the adjacent roads are likely to cause traffic congestion. Similarly, movements of additional vehicles carrying construction materials and deployment equipment along public roads are likely to increase traffic congestion. During the operation phase waste collection & transportation etc. will increase the traffic volume in the sub-project area. For all the sub-projects, it would be necessary to collect traffic data from primary survey, as a part of carrying out IEE/EIA (by the consultant engaged for this purpose); both number and composition of traffic are important.
Table-3.2 presents guidelines for collection of primary and secondary data on Physico-chemical environmental parameters for different types of sub-projects to be implemented under the proposed project.

Table-3.2: Guidelines for collection of sub-project specific Physico-chemical data/ information

Sub-project works	Data/ information from secondary source	Data from primary survey/ measurement
▪ Transfer stations ▪ Landfill improvement/establishment	IEFs; Climate; Geology and soil; Hydrology and water resources;	Noise level, [1]Surface water quality; air quality[2]

▪ Manual/mechanized Material Recovery Facilities ▪ Waste-to-Energy plants	site topography; air quality; and drainage	
[1]If water body is located close to the sub-project site(s) [2]If BMD station data are not available for the proposed location		

3.2.2 Biological Environment

Important parameters for description of biological environment include:

- General bio-ecological features of the sub-project area and its surroundings (e.g., bio-ecological zone, rivers, wetlands, hills, agricultural lands)
- Wildlife sanctuary, protected area, park, ecologically critical area (ECA)
- Floral habitat and diversity (terrestrial and aquatic)
- Faunal (including fish) habitat and diversity (terrestrial and aquatic)
- Threatened flora and fauna

It should be noted that all the sub-projects to be carried out by LGED are likely to have moderate ecological impacts. In most cases, the most significant direct impact would result from felling/cutting of trees/vegetation within the landfill improvement/establishment sites and Waste to Energy Plants. If the sub-project sites are close to the Pond/river/wetland, then landfill improvement/establishment sites or waste to energy plants sites could generate some adverse impact on water quality and aquatic ecology. Following the influence area of the sub-project described in Table-3.1 significant ecological impacts should be addressed at the screening stages for this project for description of baseline biological environment. Table-3.3 provides guidelines for collection and presentation of data for biological environment for the sub-projects to be implemented by LGED.

Table-3.3: Guidelines for collection of sub-project specific data/information for describing biological environment

Sub-project works	Data/ information from secondary source	Data from primary survey/ measurement
▪ Transfer stations ▪ Landfill improvement/establishment ▪ Manual/mechanized Material Recovery Facilities ▪ Waste-to-Energy plants	Bio-ecological features, Wildlife sanctuary, Floral and faunal diversity; ECA	Number of trees to be felled or trimmed; Area to be cleared of vegetation; Aquatic flora and fauna diversity[1]; Filling up of seasonal wetland (if required)
[1]1If the proposed sub-project is close to the pond/river/wetland		

3.3 SOCIOECONOMIC ENVIRONMENT

The rapid economic and population growth of Bangladesh, coupled with rapid urbanization, have seen the country progress greatly since its independence in 1971. Despite leaps forward in health, education, and quality of life, the people of Bangladesh are still facing immense development challenges in other areas, such as waste management and sanitation. An increasingly urban population means that Bangladesh is now generating more municipal solid waste in its urban areas than ever before. A study conducted by Waste Concern in 2014 discovered that waste generation in the urban areas of Bangladesh was 23,688 tons per day and was expected to reach 47,000 tons per day by 2025[2]. Using the past data, the consultant's team has projected the waste generation scenarios for the years 2021, 2030, and 2040. The following Table-3.4 shows the increase in the waste generation since 1991.

Table-3.4: Growth in Solid Waste Generation in Bangladesh Since 1991

Year	Total Urban Population	GDP (in per USD)	Total Waste Generation (tons/day)
1991	20872204	220	6,493
2005	32765516	485	13,330
2014	41940000	1093	23,688
2021(Projected)	65426217	2227	38,000
2025 (Projected)	70559208	2985	47,000
2030 (Projected)	78778761	3950	57,087
2040 (Projected)	95217867	8660	118,199

[2] Waste Concern (2014). "Waste Data Base 2014" Waste Concern, Dhaka. Bangladesh

Source: Waste Concern "Bangladesh Waste Database 2014"

It is evident from Table-3.4 that during the thirty-year period between 1991-2021, the urban population increased by three times, and the per capita GDP and total waste generation increased by 3.68 and 3 times, respectively. Projections for the next 20 years, i.e., 2021 to 2040, reveal that the urban population will increase by 1.46 times, and the income and total waste generation will increase by 3.8 and 3 times, respectively. The following Figure-3.1 shows the increase of waste generation over time along with the increases in urban population and per capita GDP.

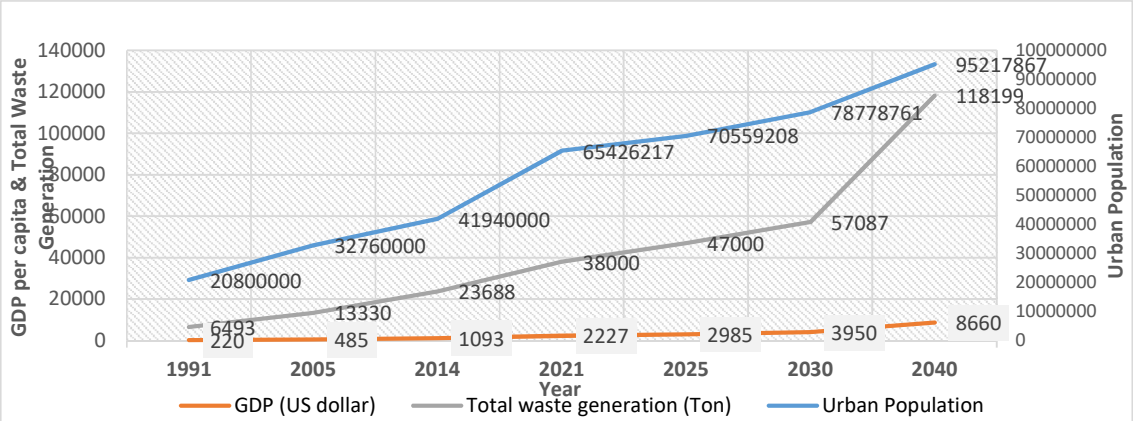


Figure-3.1: Solid Waste Generation, GDP and Urban Population in Bangladesh 1991-2041 in City and Municipalities

There are 12 City Corporations and 328 Municipalities in the country. The following Table-3.5 shows the hierarchy of urban local governments in the country.

Table-3.5: Hierarchy of Urban Local Governments

City Corporations at Divisional Headquarters and larger cities	Dhaka North, Dhaka South, Chattogram, Khulna, Rajshahi, Sylhet, Barishal, Rangpur, Mymensingh, Narayanganj, Gazipur and Cumilla. Total: 12 at present
Municipalities	Number of Municipalities: 328 at present
Category determined on income level	Annual income level
Class A *Municipalities*	At least Tk. 8 Million
Class B *Municipalities*	Between Tk. 4 Million and 8 Million
Class C *Municipalities*	Between Taka 2 Million and Tk. 4 Million

Apart from 340 city corporations and municipalities in Bangladesh, there are 166 Thana headquarters known as urban centers. As per Bangladesh Bureau of Statistics (2011), there are 506 urban areas in Bangladesh comprising city corporations, municipalities, and urban centers. The following Table-3.6 shows the distribution of waste generation in city corporations and municipalities throughout Bangladesh.

Table-3.6: Solid Waste Generation in City Corporations and Municipalities in 2021

Waste Generation Tons/day	Number of City Corporations/ Municipalities	Percentage
Up to 20	224	65.88
21-60	66	19.41
61-100	21	6.18
101-500	24	7.06
501-1000	2	0.59
Greater than 1000	3	0.88

Source: Waste Concern (2021), "Waste Data Base 2021 unpublished report."

It is evident from the above Table-3.6 that, in 66% of the urban local bodies, solid waste generation is up to 20 tons per day. In 19% of municipalities, solid waste generation is between 21-60 tons per day, while in 6% of the urban local bodies, solid waste generation is between 61-100 tons per day. Only 7% of the urban local bodies generate about 100 tons per day. Most of the small and medium-sized towns in Bangladesh do not have any landfill sites or waste treatment facilities. Consequently, most solid wastes collected in these towns are disposed of in low-lying areas and in water bodies in an uncontrolled manner. This causes land and water pollution and

localized flooding during the monsoon season. Furthermore, most small and medium-sized towns lack technical and financial resources to manage landfills or treatment facilities. However, the amount of waste generated in 2021 is expected to increase threefold within the next twenty years.

Since 66% of the municipalities in Bangladesh generate up to 20 MT of solid waste per day, it would be an extremely challenging feat to operate and manage more than 224 waste treatment and disposal facilities. As such, there are benefits to considering a regional approach for solid waste management facilities.

A 'regional solid waste facility' means a waste management facility or system of any kind (*whether in relation to the collection, transportation, treatment or disposal of MSW or a combination of any or all of them*), which collects, manages or receives or disposes of (as the case may be) solid from more than one municipality (e.g., 2 or more municipalities). The advantages of adopting a regional approach are as follows:

- Municipalities to aggregate the waste quantities generated across their respective jurisdictions to take advantage of economies of scale in transportation, processing, and disposal of MSW;
- Reduce the financial and technical burden on each individual municipality and help the municipalities discharge their obligation for MSW management in a cost-effective manner with better technologies;
- Result in more efficient use of land and other scarce natural resources within the region; and
- Enable better management and easier monitoring with an optimal number of MSW management projects.

Currently, the LGED or Urban Development Directorate lacks any data or information regarding potential locations for a regional waste treatment facility for 340 small and medium-sized municipalities to achieve economy of scale. The proper location of the regional facility is very important for the maximum usage of such a facility. Therefore, there is an urgent need for a study regarding the potential for a regional landfill and treatment facility for small and medium-sized towns of Bangladesh.

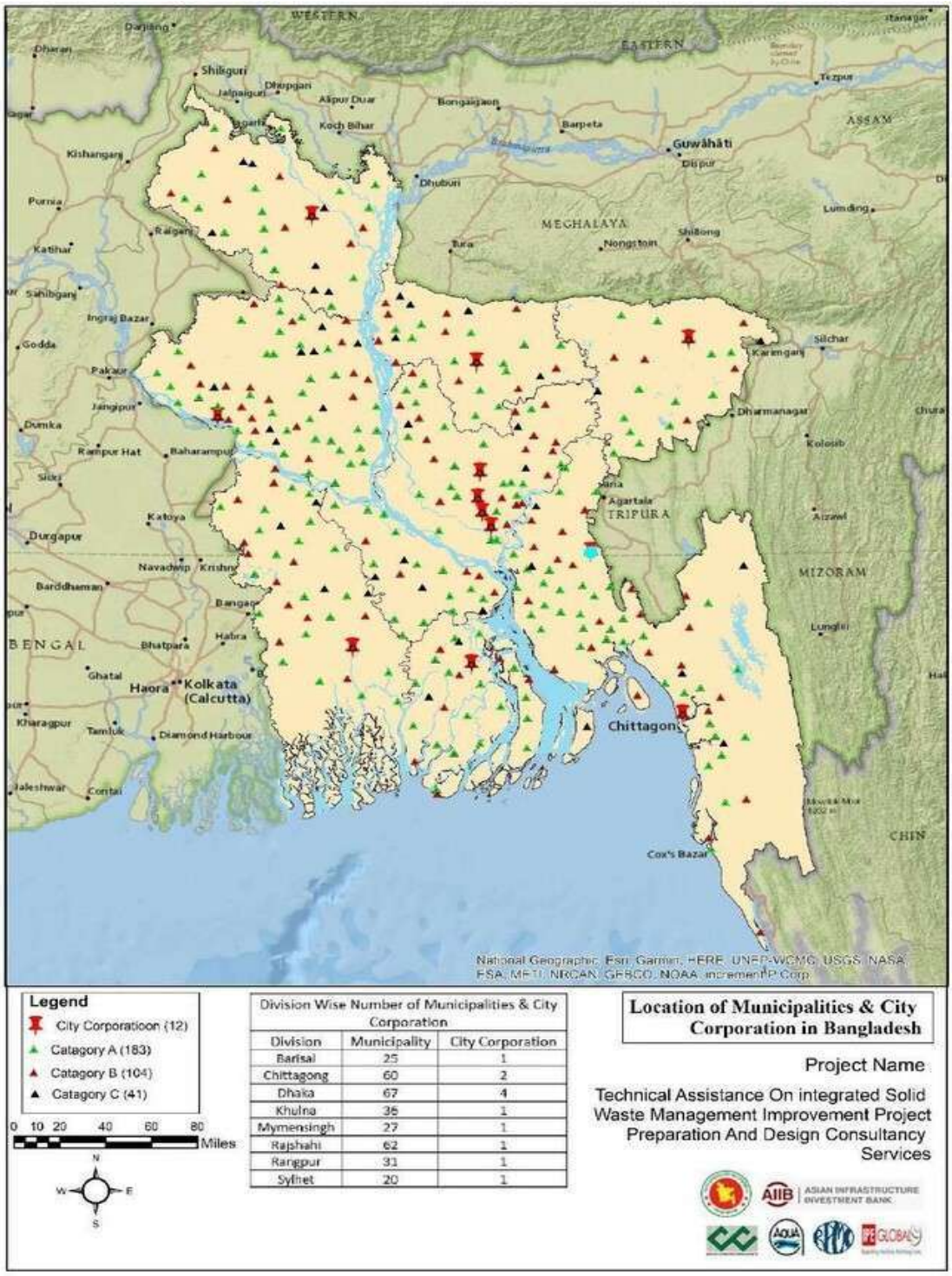


Figure-3.2: Map Showing Locations of Municipalities and City Corporations in Bangladesh

For the sub-projects, it is important to have a clear understanding to the baseline socioeconomic condition of people, especially those living within the sub-project influence areas. A common approach for quick assessment of baseline socio-economic condition is questionnaire survey. The primary objectives of a questionnaire survey are:

(a) to understand people's socio-economic condition;
(b) to understand extent of people's access to basic services; and
(c) to understand people's perception regarding the sub-project.

SECTION 4 ENVIRONMENTAL AND SOCIAL RISK AND IMPACT

4.1 POTENTIAL SIGNIFICANT ENVIRONMENTAL AND SOCIAL IMPACTS DURING CONSTRUCTION PHASE

After identification of the major sub-project activities including its associated facilities (i.e. office building embankment leachate treatment plant vehicle washing facility and approach road) during construction phase, the next step in the IEE/EIA involves assessment/prediction of the impacts of these activities on the baseline environment. The potential environmental impacts during construction phase of sub-projects could be categorized into: (a) ecological impacts; (b) physic-chemical impacts; and (c) socio-economic impacts.

4.1.1 Ecological Impacts

Based on primary assessment of the nature and scale of the proposed sub-projects and assessment of sub-project locations (based on field visits), it appears that ecological impacts of most sub-projects would be limited to loss of trees/vegetation, and possible adverse impact on aquatic habitat located close to the project location. Assessment of ecological impacts of the sub-projects should therefore focus on loss of vegetation/trees and aquatic habitat. In general, the ecological impact should focus on:

- Impact on flora (aquatic and terrestrial);
- Impact on fauna (aquatic and terrestrial) including fish.

Commonly, the significance of an ecological impact is determined by: (i) Ecological "consequence" of the activity, (ii) "Likelihood of occurrence" of the activity, and (iii) Calculating the product of these two parameters. Consequence and likelihood of ecological impacts resulting from project activities are discussed below.

Table-4.1 (Criteria for assessment of ecological impacts) presents the criteria for estimating "consequence" of any particular "sub-project" activity. As shown in Table-4.1, for adverse/ negative ecological impacts, the "consequence" has been divided into six categories (critical, major, moderate, minor, low, and none), with corresponding numerical ranking ranging from 5 (for "critical") to 0 (for "none"). If a sub-project activity falls into multiple categories, it is assigned the highest-ranking category for assessment of ecological impact.

Table-4.2 presents criteria for "likelihood of occurrence" of an activity/ impact. The likelihood of each identified impact is determined by estimating the probability of the activity occurring. The likelihood is divided into five categories (almost certain, very likely, likely, unlikely, and very unlikely), with corresponding ranking ranging from 5 (for "almost certain") to 1 (for "very unlikely").

The "significance" of ecological impact for a particular sub-project activity is determined by multiplying the "consequence ranking" and the "likelihood ranking" of the sub-project activity, as follows: Significance = Consequence × Likelihood.

Table-4.1: Categories and definition of "Consequence" levels for ecological impacts

Category	Ranking	Definition
Critical	5	▪ Very serious environmental effects with impairment of ecosystem function. ▪ Long-term, widespread effects on significant environment (e.g. habitat, national park) ▪ Habitat restitution time >100 years and requiring extreme substantial intervention.
Major	4	▪ Serious environmental effects with some impairment of ecosystem function (e.g. displacement of species). ▪ Relative widespread medium–long term impacts. ▪ Habitat restitution time >10 years and requiring substantial intervention. ▪ Potential for continuous non-compliance with environmental regulations
Moderate	3	▪ Moderate effects on biological environment but not affecting ecosystem function. ▪ Moderate short-medium term widespread impacts ▪ Habitat restitution time 1-5 years (possible limited and local areas up to 10 years) with potential for full recovery and limited or no intervention required. ▪ Potential for short to medium term noncompliance with environmental regulations and/or company policy.
Minor	2	▪ Minor effects on biological environment. ▪ Minor short-medium term damage to small area of limited significant ▪ Full recovery in < 1 year without intervention required. ▪ Any potential non-compliance with environmental regulations and/or company policy would be minor and short-term.
Low	1	▪ No lasting effect.

Category	Ranking	Definition
		▪ Low-level impacts on biological environment. ▪ Limited damage to minimal area of low significant. ▪ Compliance with environmental regulations and/or company policy at all times. ▪ Possible beneficial effect or ecosystem improvement.
None	0	▪ No impact on ecosystem damage. ▪ No compliance required for environmental regulations and/or company policy at all times. ▪ Possible beneficial effect or ecosystem improvement
Limited Positive	+	▪ Some beneficial improvement to ecosystem. ▪ Benefits to specific flora and / or fauna.
Modest Positive	++	▪ Moderate beneficial improvement to ecosystem. ▪ Medium benefits to specific flora and / or fauna.
Significant Positive	+++	▪ Major beneficial improvement to ecosystem. ▪ Large scale benefits to specific flora and / fauna.

Table-4.2: "Likelihood of occurrence" and corresponding rankings

Impact Likelihood	Ranking	Definition
Almost Certain (80 – 100%)	5	The activity will occur under normal operating conditions.
Very Likely (60 - 80%)	4	The activity is very likely to occur under normal operational conditions.
Likely (40 - 60%)	3	The activity is likely to occur at some time under normal operating conditions.
Unlikely (20 - 40%	2	The activity is unlikely to occur, but may occur at some time under normal operating conditions.
Very Unlikely (0 - 20%)	1	The activity is very unlikely to occur under normal operating conditions but may occur in exceptional circumstances.

Table-4. 3: Ecological impact significance rankings

Significance (Consequence × Likelihood)	Significance Level
>16	Critical
9-16	High
6-8	Medium
2-5	Low
<2	Negligible

Table-4. 3 shows "significance" ranking of ecological impacts and Table-4. 4Table-4. 4 shows a risk assessment matrix that could be used for estimating "significance" and "risk", respectively of ecological impacts for a particular sub-project activity. Table-4.5 presents examples of estimating ecological impacts of some typical sub-project activities.

Table-4. 4: Risk assessment matrix

Likelihood / Frequency	Consequence Severity				
	Low	Minor	Moderate	Major	Critical
Almost Certain	High	High	Extreme	Extreme	Extreme
Very Likely	Moderate	High	High	Extreme	Extreme
Likely	Low	Moderate	High	Extreme	Extreme
Unlikely	Low	Low	Moderate	High	Extreme
Very unlikely	Low	Low	Moderate	High	High

Table-4.5: Example of estimating ecological impacts of typical sub-project activities

Potential Impacts Source / Project Activities	Impact	Ecological Receptor Type	Description	Likelihood	Consequence	Risk Rating
Material storage or placement	Habitat destruction of terrestrial flora (herb, shrub) and borrowing fauna; and disturbance in movement of terrestrial fauna (amphibian, reptile and mammal)	Flora and Fauna	▪ Direct, Negative ▪ Short term, Local ▪ Reversible	Likely	Low	Low
Air Quality	Moving wastes, by-and end-products (such as composts) may create dusts during dry season. Landfill gas generation.	Flora and Fauna	▪ Direct, Negative ▪ Short term, Local ▪ Reversible	Likely	Minor	Moderate
Water Quality	Run-off from stockpiled wastes and end-products of composting which may cause siltation and reduction in the quality of adjacent bodies of water.	Flora and Fauna	▪ Direct, Negative ▪ Short term, Local ▪ Reversible	Likely	Minor	Moderate
Vehicle movement	Impairment of terrestrial flora (herb and shrub), terrestrial fauna (amphibian, reptile & mammal)	Flora and Fauna	▪ Direct, Negative ▪ Short term, Local ▪ Reversible	Likely	Low	Low
Soil excavation	Habitat destruction of aquatic flora (herb, shrub) and movement disturbance / habitat destruction of terrestrial (burrow) fauna (amphibian, reptile, bird and mammal)	Flora and Fauna	▪ Direct, Negative ▪ Short term, Local ▪ Reversible	Unlikely	Minor	Low
Noise disturbance	Disturbance of terrestrial faunal livelihood (movement, foraging, breeding) (amphibian, reptile, bird and mammal)	Fauna	▪ Direct, Negative ▪ Short term, Local ▪ Reversible	Unlikely	Minor	Low
Exhaust from generators	Disturbance in movement of terrestrial fauna (e.g. aves)	Fauna	▪ Direct, Negative ▪ Short term, Local ▪ Reversible	Unlikely	Minor	Low
Existing provisions for pedestrians And other Forms of transport	Increase of traffic in the subproject Area during collection, loading and unloading of wastes.	Fauna	▪ Direct, Negative ▪ Short term, Local ▪ Reversible	Likely	Minor	Moderate
Ash disposal	Environmental hazard and health risk to workers and other people.	Flora and Fauna	▪ Direct, Negative ▪ Short term, Local ▪ Reversible	Likely	Minor	Moderate

4.1.2 Physico-chemical Impacts

Possible Physico-chemical impacts from the sub-project activities to be carried out in different locations may include the following:

- Drainage congestion,
- Noise pollution,
- Air pollution,
- Water pollution,
- Environmental pollution from solid/construction waste

Drainage congestion:
During execution of civil engineering projects, temporary drainage congestion often results from obstruction to natural flow of drainage water due to the storage of materials, piled up excavated material/ soil, and temporary embankments constructed to keep the work area dry. Such congestion is particularly important at the project sites adjacent to low-lying areas. Drainage congestions could create significant discomfort to people living in project-surrounding areas.

Noise pollution:
For the proposed sub-projects construction there will be short-term impacts on noise levels. During construction, minor short-term noise impacts will be incurred. The traffic-related noise at the area of construction is expected to exceed the prevailing baseline noise levels. In summary, short-term direct impacts on noise levels will occur as a result of the traffic movement, landfill development/improvement and Waste to Energy plants installations.

Air pollution:
Impacts to air quality associated with the proposed landfill development/improvement and Waste to Energy plants installations are limited to temporary and incidental increases in particulate matter (fugitive dust) during construction. Temporary traffic disruption may cause increased motor vehicle exhaust. Construction equipment, which uses fossil fuel, will cause a short-term increase in GHG emissions into the air and potentially create additional dust. With typical mitigation measures and BMPs, construction will have no long-term impacts to air quality and short-term impacts will be minimized.

Water pollution:
Water pollution may result from discharge of water containing eroded soil (high suspended solids), spills and leaks of oils/ chemical into nearby water bodies (e.g., drain, pond, khal, drain, river). The presence and existing use of water bodies surrounding the sub-project site would determine the level of impact. For example, if a pond located close to a sub-project site is being used for washing/ bathing or for fish culture, pollution of the pond from sub-project activities would generate significant adverse impacts.

Environmental pollution from solid/ construction waste:
In the sub-projects, construction debris is likely to be generated from different sub-project activities. Improper management of construction debris and solid waste could cause blockage of drainage line/ path and environmental pollution.

4.1.3 Socioeconomic Impacts

The most significant potential socio-economic impact from the proposed project would be loss of land due to the resettlement of the HH within 250m buffered residential developed area and waterbodies (rivers/wetlands/ponds) within 200m buffered area engaged for the local peoples for their fishing and livelihood centering the Landfill development/improvement site. Other possible socio-economic impacts, which include the following:

- traffic congestion,
- health and safety,
- employment and commercial activities,
- Aesthetic and Visual Resources,
- impacts on land,
- resettlement,
- gender,
- GBV,

- stakeholders engagement,
- exclusion of vulnerable HHs,
- OHS,
- accidents,
- COVID 19
- impact on archaeological and historical sites, and
- safeguarding physical cultural resources (PCR),

Traffic congestion: During construction phase of sub-projects, traffic congestion may result from stock piling of material by the sides of roads, increased movement of people and vehicles carrying material and equipment. Construction works in densely populated areas as well as close to busy highway could aggravate the existing traffic problem during construction phase. This should be addressed with proper traffic management and avoiding stockpiling of materials in a way that could hamper traffic movement.

Impact on Land: During the Construction period the local land may be impacted due to the construction materials storage/increase of transport vehicles/discharge of waste water from the construction work area/solid or hazardous waste dumping etc.

Resettlement: Land acquisition in and around the project site area may require resettlement of the project affected peoples. A comprehensive land acquisition plan and resettlement plan shall be prepared as per RPF document.

Gender: During the construction period lot of worker will work at the site. There is the risks of sexual exploitation and abuse (SEA), sexual harassment (SH), and GBV, including intimidation, in the Projects.

Gender based violence (GBV): There is the risks of Project-related GBV to Project-affected persons and communities, and Project workers. During the construction period GBV and harassment, bullying, intimidation, and/or exploitation under the Project may happen.

Stakeholders Engagement: Stakeholder engagement would be conducted in a manner commensurate with the risks to, and impacts on, those affected by the Project.
Accidents: Unsafe and unhealthy working conditions in the working site will invite accidents, injuries and diseases.

COVID 19 perspectives: During the construction period construction workers are exposed to the Health risk of COVID-19.

Exclusion of Vulnerable HHs: It also embraces action to remove barriers against vulnerable groups, who are often excluded from the development process, so that their voices can be heard.

Health and safety: Construction activities in densely populated areas and along narrow roads (e.g. during landfill development/improvement and construction of Waste to Energy plants) could increase risks to pedestrian and vehicular movement. Safety/ stability of road structures should be taken in to account before any traffic movement. Besides this, workers involved in construction works may be at health risk during the construction activities.
Safety is an important issue during construction phase. General construction activities pose safety risks, which should be addressed as part of occupational health and safety plan. Section 6.5 provides guideline on occupational health and safety issues.

Employment and Commercial Activities
Construction activities related to this project would provide some relatively small, temporary increases in income and employment in the sub-project area. For example, Labour-intensive sub-project works (e.g., manual excavation) could generate employment for considerable number of semi-skilled workforce. These job opportunities would be located in different areas as the work progresses. However, given the size of the Labour force in the project area and in surrounding areas, most jobs could be filled by residents of the general area where the work is located except perhaps for a few specialized tasks. Additional facilities for workers (camps, water supply and sanitation, solid waste management) will be required. Therefore, there likely would be some adverse impacts on community services, schools, housing, or other local services and facilities.

Impact on archeological and historical sites:

Archeological and historical sites are protected resources. Damage of such sites by digging, crushing by heavy equipment, uprooting trees, exposing sites to erosion, or by making the sites more accessible to vandals are of particular concern. A guideline for archaeological impact assessment is presented in Appendix-4.

Safeguarding Physical Cultural Resources (PCR):
The sub-project sites are to be selected by avoiding the physical cultural resources (PCR) following the site selection criteria of Solid Waste Management Rules 2021.
For convenience, the potential significant impacts during construction phase of the proposed sub-projects may a presented in a tabular form; the format is presented in Table-4.6.

Table-4.6: Format to be used for presenting assessment of potential impacts during construction phase of the sub-projects

Environmental Parameter	Positive Impact	No Impact	Adverse Impact			Comment
			Low	Moderate	Significant	
Ecological parameters						
Loss/cutting of tree/ vegetation						
Impact on wetland/aquatic habitat Physico-chemical Parameters						
Drainage congestion						
Noise pollution						
Air pollution						
Water Pollution						
Environmental Pollution						
Socio-economic Parameters						
Loss of income1						
Impact on indigenous population1						
Traffic congestion						
Health and safety						
Employment						
Aesthetic and Visual Resources						
Archaeological/historical sites						
Physical cultural resources						

Solid waste impacted all members of a population, but those that bear the negative aspects of waste are commonly the waste pickers, whose health and safety may be adversely affected by waste, people who live near the waste facilities (e.g., transfer stations, dumps, landfills), and low-income populations who often lack basic services. Some other dimensions that are also important for designing an effective solid waste management project include identification of stakeholders, maximizing community participation before, during, and after project implementation, and an understanding of the sources of waste generation, as well as practices relating to waste storage, separation and recycling at the household level.

Key Social Issues in the Solid Waste Sector

Waste Pickers:

Waste pickers are people who informally collect recyclable wastes or organic wastes on roads, at final disposal sites, and other places, to earn income or livelihoods. While they are key actors in the informal economy and provide a valuable service to the cities they live in, they are often marginalized. They are often comprised of the socially vulnerable groups, including low-income families, women, children, and migrant workers. When designing a solid waste project, the social assessment should look at the following issues related to waste pickers:

- Demographic information, such as number of waste pickers and their composition, such as children, women, elderly
- Past experience of waste pickers, skills, constraints and desires with regard to their work
- Working conditions and locations, such as dumpsites, streets
- Earnings, income and livelihood
- Risks and hazards to health

- Access to social services
- Organizational structures
- Potential measures and prospects to address the issues of waste pickers in the project design (See Box 1 & 2)
- Identifying alternative long-term work opportunities
- Economic, ecological and social contributions waste pickers are providing the municipality/city corporation – cost/benefit analysis to evaluate ways in which to address informality
- Identification of the social risks (marginalization, exploitation, etc.)
- Level and potential for organization of waste pickers to increase political voice

Gender:

Women and men play different roles in SWM activities, and often have different needs and preferences for SWM services. A SWM project may therefore affect women and men differently. Depending on the specific objectives and contents of the SWM project, the following gender issues need to be considered:

- Proportion of female workers in solid waste sectors (both formal and informal)
- Differentiated roles and participation of women and men in different solid waste management activities, such as separation of waste at source, reuse of waste materials, street sweeping, collection, sorting, and transportation
- Differentiated views of women and men on the waste collection sites in the community and collection schedules, and other solid waste management services
- Differentiated impacts on women and men in other regards, such as livelihood, work load, employment opportunities, and health
- Level of knowledge of solid waste management among women and men
- Scheduling (night time vs. day time) collection
- Evaluating for each case whether there is a gender imbalance in the waste picker community (more women vs. more men) and if so, why?
- Differences in earnings between female and male waste pickers

Access to Services and Opportunities of Poor People:

Some areas where poor people live in a Municipality/City corporation, such as slums and squatter districts, may not be covered in the Municipality/city's solid waste collection system. A SWM project, if it is not well designed, can inadvertently contribute to factors of exclusion already present in a society. The social assessment may look at the following areas:

- **Disproportionate Access:** Certain social groups or neighborhoods may be consistently excluded from formal SWM services, because they lack the organizational capacity or political voice, or because other groups hinder the equitable participation of these groups in decision-making and resource allocation.
- **Disproportionate Access to Opportunities:** When formal employment opportunities rise out of SWM projects, these employment opportunities may exclude already vulnerable groups.
- **Demands of poor and vulnerable groups:** Poor and vulnerable groups may have different demands for SWM services. Special attention needs to be paid to vulnerable populations such as low-income households, women and peripheral residents in designing the SWM system, including collection, storage, transport and disposal.
- **Disproportionate Adverse Impacts:** Low-income, low caste, minority or new immigrant communities are often more likely to live or work near transport and disposal sites, and as a consequence they face a greater risk of hazards to their health. Women and children may be more likely than men to work as waste pickers, so that they too face greater health risks. The impact and potential exposure to toxins encountered associated with living near or working with solid waste may increase the risk of disability, morbidity and mortality.

4.2 POTENTIAL SIGNIFICANT ENVIRONMENTAL AND SOCIAL IMPACTS DURING OPERATIONAL PHASE

After identification of the major activities/processes including its associated facilities (i.e. office building embankment leachate treatment plant vehicle washing facility and approach road) that would take place during operational phase, the potential impacts of these activities/processes on the baseline environment need to be

assessed. The potential environmental impacts could also be categorized into: (a) ecological impacts; (b) Physico-chemical impacts; and (c) socioeconomic impacts. In general, the potential adverse impacts of the sub-projects during operational phase are not likely to be significant.

Land contamination. The composting plant, sorting room/staging area, and controlled disposal site will not contaminate the lands the way other industrial operations can. The main reason for this is that all facilities will have cemented flooring except the controlled disposal site which will have special impermeable layers underneath (1 m compacted clay (permeability of 1×10^{-9} m/sec) liner has been provided in the detailed design to comply with the Solid Waste Management Rules 2021 guidelines. On top of the clay liner, a 1.5 mm HDPE liner is also provided. Clay liner, along with 1.5 mm HDPE will be provided).

Generation of waste materials and by-products. In general, pollutants generated from the facilities include: wastewater from toilet and cleaning of premises, improper storage of delivered wastes and end-products, and leachate from the solid waste. The contractor will be required to keep the ancillary sites of the transfer composting plants, and controlled disposal site clean, tidy and orderly condition free of litter, waste material (whether solid or liquid) and debris. The contractor will also be responsible for the maintenance of the approach road in consultation with the authority of the subproject area to the controlled landfill (if damaged by his/her works) and to keep it free from litter.

Generation of waste water and water contamination. The liquid wastes from the facilities are high in biological oxygen demand. The quantity of leachate may also be huge during especially in the rainy seasons. The wastes from the facilities can end up in water bodies, polluting water resources. Although the contaminants are non-toxic in nature, they can introduce bacterial contamination and increase nitrates, phosphates and sulfates concentration in water, leading to health problems. Special drains will be constructed to allow waste water from the transfer stations and composting plants to be diverted away from water wells and adjacent properties. Leachate generated from the controlled landfill will be channeled to a leachate collection pond and will be treated prior to the natural water bodies. The treatment of leachate must conform environmental quality standards of DOE prior to discharge.

Odor. The facilities will always give a particular stink due to decomposition of wastes. Excessive odor is a nuisance to locals and attracts pests and vermin.

Noise. Major sources of noise are the chaos created by the laborers working in the facilities and heavy vehicular movement to during collection and transport of wastes.

Impact on Land: During the operation period the local land may be impacted due to the Waste transportation.
Gender: During the operation period good number of landfill workers will work at the site. There is the risks of sexual exploitation and abuse (SEA), sexual harassment (SH), and GBV, including intimidation, in the Projects.

Gender based violence (GBV): There is the risks of Project-related GBV to Project-affected persons and communities, and Project workers. During the operation period GBV and harassment, bullying, intimidation, and/or exploitation under the Project may happen.

Stakeholders Engagement: During the operation period Stakeholder engagement would be conducted in a manner commensurate with the risks to, and impacts on, those affected by the Project.

Accidents: Unsafe and unhealthy working conditions in the working site will invite accidents, injuries and diseases.

COVID 19 perspectives: During the operation period waste management workers are exposed to the Health risk of COVID-19.

Exclusion of Vulnerable HHs: It also embraces action to remove barriers against vulnerable groups, who are often excluded from the development process, so that their voices can be heard.
Health, hygiene, and safety. Spread of diseases to workers and their families may occur due to inadequate provision of safety equipment and lack of practice of safety rules and precautions. Sufficient, safe, potable and constant supply of fresh water will be made available at adequate pressure throughout the premises of the composting plant and controlled landfill. Suitable facilities for washing of hands and nail brushes should be there, soap or detergent will be provided for the workers. All sanitary facilities will be equipped with suitable flushing appliance.

When the controlled landfill begins to function, it is expected to provide a modern sanitary facility for the workers and staff as well as systematic handling, transportation and disposal of solid waste without causing environmental pollution. Providing this occurs there should be few negative environmental impacts and there are several fields that should be unaffected. These factors are thus screened out of the impact assessment and will not be mentioned further.

Integrated Solid Waste Management Improvement subprojects will help the key social issues in particular the Waste Pickers to:

- improve health and safety conditions,
- increase productivity and incomes (through new investments and technical assistance),
- formalize their work,
- increase their access to credit and government services, and
- develop work alternatives through training, job placement and support to cooperatives

The potential adverse impacts that are associated with O&M activities can be mitigated to acceptable levels with the following mitigation measures (Error! Reference source not found.).

Field	Impacts	Mitigation Measures
A. Physical Characteristics		
Water quality	Run-off from stockpiled wastes and end-products of composting which may cause siltation and reduction in the quality of adjacent bodies of water.	• Take all precautions to prevent entering of run-off into streams, water courses, or irrigation system. Install temporary silt traps or sedimentation basins along the channels leading to the water bodies. • Remove all wastes, by- and end-products immediately. • Monitor discharge of leachate including review of ECC conditions. Parameters to be monitored include suspended solids, dissolved solids (inorganic), pH, ammoniac nitrogen (asN), total nitrogen (asN), biochemical and chemical oxygen demand, arsenic mercury, lead, cadmium, total chromium, copper, zinc, nickel, cyanide, chloride, fluoride, phonemic compounds and others as per ECR,1997. • Monitor compost quality. Visual inspection to ensure that glass, plastic and other physical inerts and fragments are absent in compost and it has no offensive smell. Also testing of compost to meet standards for arsenic, cadmium, chromium, copper, lead, mercury, nickel, zinc, pH and other parameters as prescribed by the relevant National policy of the Government. • Monitor treated wastes quality as per Medical Wastes Rules and conditions of the ECC. Tests at the minimum includes measurement of temperature, pressure, contact time, spore tests, and other routine tests (visual).
Air quality	Moving wastes, by-and end-products (such as composts) may create dusts during dry season. Landfill gas generation. The impacts are negative but short-term, site- specific within a relatively small area and reversible by Mitigation measures.	• Use bin covers and/or tarpaulins during transport of wastes, by-, and end products (compost) • Use tarpaulin to cover soils, sand and other loose material that will be used in the controlled landfill. • Green belt will be developed around the facilities to act as a barrier for dust pollution. • Only inert waste will be sent to controlled landfill so that landfill gas formation is minimum.
Acoustic environment	Increase in noise level due to presence of workers and movement of vehicles. The impacts are negative but short-term, site-specific within a relatively small area and reversible by mitigation measures.	• Plan activities in consultation with the authority of the subproject area that activities with the greatest potential to generate noise are conducted during periods of the day which will result in least disturbance.
Ash disposal	Environmental hazard and health risk to workers and other people.	Ash quality control should be ensured. It can be brought to a designated area at the landfill for the disposal.
B. Biological Characteristics		
Biodiversity	Activities in the built-up area of the subproject Area. There will be no protected areas in or around the subproject sites, and will be no known areas of ecological interest.	• No trees, shrubs, or ground cover maybe removed or vegetation stripped without the prior permission. • Prevent workers or any other person from removing and damaging any flora (plant/vegetation) and fauna (animal). • Monitor survival rate of vegetation (plants and trees) in the green belt of the facilities.
C. Socioeconomic Characteristics		

Existing provisions for pedestrians And other Forms of transport	Increase in traffic in the subproject area during collection, loading and unloading of wastes. The impacts are negative but short-term, site- specific within a relatively small area and reversible by mitigation measures. .	• Early hour collection will been forced before the peak traffic hours. • Maintain safe passage for vehicles and pedestrians. • Erect and maintain barricades, including signs, markings, flags and flagmen informing diversions and alternative routes when required. • Notify affected sensitive receptors by providing sign boards and contact numbers for concerns/complaints. • Increase workforce in front of critical areas such as institutions, place of worship, business establishment, hospitals, and schools. • Consult businesses and institutions regarding operating hours and factoring this in work schedules. • Ensure any damage to properties and utilities will be restored or compensated to pre-work conditions. • Project vehicles should have specific sign or mark with bright color so as to distinguish them from other vehicles.
Workers health and safety	Workers need to be mindful of the occupational hazards working in waste management facilities. Potential impacts are negative and long-term but reversible by mitigation measures.	• Comply with requirements of Government of Bangladesh Labor Law of 2006 and all applicable laws and standards on workers H&S. • Ensure that all site personnel have a basic level of H&S training. • Produce and implement a O&M health and safety (H&S) plan which include measures as: (i) excluding the public from worksites; (ii) ensuring all workers are provided with and required to use personal protective equipment (reflectorized vests, footwear, gloves, goggles and masks) at all times; (iii) providing (H&S) training for all site personnel; (iv) documenting procedures to be followed for all site activities; and (v) maintaining accident reports and records. • Arrange for readily available first aid unit including an adequate supply of sterilized dressing materials and appliances • Provide H&S orientation training to all new workers to ensure that they are apprised of the basic site rules of work at the site, personal protective protection, and preventing injuring to fellow workers; • Ensure the visibility of workers through their use of high visibility vests when working in or walking through heavy equipment operating areas; • Mark and provide sign boards. Signage shall be in accordance with international standards and be well known to, and easily understood by workers, visitors, and the general public as appropriate. • Disallow worker exposure to noise level greater than 85 dBA for a duration of more than 8 hours per day without hearing protection. The use of hearing protection shall be enforced actively.

Community health and safety	Possible accumulation of waste causing health problems for community. Pests and vermin. Potential impacts are negative and long-term but reversible by mitigation measures.	• Wet/biodegradable wastes will be emptied directly from the bins to primary collection vehicles daily and dry/non-biodegradable wastes once in a week. The number and type of bins and vehicles to be procured under the project is sufficient to ensure no accumulation of wastes in the community. • Wastes will be collected regularly to prevent pests and vermin.
Efficient working of Sanitary Landfill Facility	Inefficient working of the Sanitary Landfill may cause environment, health and safety risk to workers and environment.	Procedure for each step of operation shall be documented and all workers/operators shall be trained on the proper operation of each component of the facility.
Reuse and disposal of compost	Environmental hazard and health risk to workers and other people.	• Compost shall be used as soil conditioner to enhance soil fertility in nearby farms. • Quality of compost shall be regularly monitored to ensure that compost quality complies with the standards.

4.3 ENVIRONMENTAL & SOCIAL AUDIT (ESA)

An environmental audit provides advice on risks of harm to human health or the environment and may consider the suitability of site uses. The purpose of an environmental audit is to:

- assess the nature and extent of the risk of harm to human health or the environment. This may be from contaminated land, waste, pollution or any activity;
- recommend measures to manage the risk of harm to human health or the environment;
- make recommendations to manage the contaminated land, waste, pollution or activity.

Experienced Consulting Firm's environmental auditors perform audits. The auditors give an independent assessment of site conditions and risks. For a non-greenfield subproject, Environmental and Social Audit would be required to assess the required mitigation measures.

4.4 CUMULATIVE IMPACT ASSESSMENT (CIA)

The cumulative impact assessment examined the interaction between the subproject's residual effects (i.e., those effects that remain after mitigation measures have been applied) and those associated with other past, existing, and reasonably foreseeable future projects or activities. The interaction of residual effects associated with multiple projects and/or activities can result in cumulative impacts, both positive and negative. The project's potential cumulative effects were considered with respect to valued components in environmental and socioeconomic categories, in four areas:

- Of any potential residual project effects that may occur incrementally overtime;
- Consideration of other known relevant projects or activities within the specified study area boundaries, even if not directly related to the project;
- Potential overlapping impacts that may occur due to other developments, even if not directly related to the proposed subproject; and
- Future developments that are reasonably foreseeable and sufficiently certain to proceed

The project has identified the valued components as water quality, air quality, acoustic environment, socioeconomic and socio-community components, and human health and safety. There are no foreseeable projects that will overlap with the subproject. The spatial boundary of the subproject are the areas where the facilities (transfer stations, composting plant, and controlled landfill) is located. The temporal boundary can be considered as the whole subproject areas.

The infrastructures will be (i) designed to the current best practice standard and in line with the current LGED guidelines[3] for a 20-year design period;(ii) built that the floods do not damage them; and (iii) drains of the facilities are to be kept free from wastes and siltation.

[3] UrbanSolidWasteManagementManual,May1998

Water quality. Due to nature of the subproject there is risk of contaminating ground water and nearby bodies of water during O&M phase. However the infrastructures have been designed ensuring impermeability of surfaces by having concrete surfaces for the transfer stations and composting plant while HDPE/clay liners for the controlled landfill. Drains within the facilities will also ensure waste water generated during operations will be treated and diverted away from any channel leading to agricultural lands, water bodies, and water sources/tube wells. Short-term negative impacts are possible but can be mitigated through design and implementation of EMP. Potential residual effects is considered to be negligible.

Air quality. Emissions of common air contaminants and fugitive dust may be elevated in proximity to active work sites during construction and O&M phases; these impacts will be short-term and localized to the immediate vicinity of controlled landfill site. Greenhouse gas (GHG)emissions may increase as a result of the subproject activities (i.e., vehicle and equipment operation, concrete production, disposal of excavated material, land filling of residual wastes).Given the subproject's relatively minor contribution to common air contaminants and GHG emissions during construction, the overall significance rating of both these potential residual effects is considered to be negligible.

Acoustic environment. Noise levels during construction and O&M activities in immediate proximity of work sites are expected to increase. The duration of exposure will be relatively brief and imperceptible. The exposure represents a temporary, localized, adverse residual effect of low significance for affected receptors. While building damage due to ground vibrations is unlikely, there may be annoyance to spatially located receptors during construction and O&M activities. The overall significance rating of potential residual effects is considered to be negligible.

Socioeconomic and socio-community. Concerns on existing provisions for pedestrians, other forms of transport, and over-all impact on livability particularly nearby the transfer stations and composting plant will occur spatially during construction and O&M activities. Traffic movement will be improved once the construction activities are completed. Since the subproject involves small-scale facilities, it will not conflict with existing or planned land use. O&M manuals for the facilities, comprehensive capacity building, and community involvement to be provided under this project will ensure efficient operation of the facilities and acceptability by the stakeholders. However, following improvement in infrastructures and services, added residential developments, commercial, and business facilities and increased densities are expected to develop and enhance the subproject area. This can be considered a long-term cumulative benefit of the subproject.
Given the scale of the project it is likely that a number of local people will obtain at least temporary socio-economic benefits, by gaining employment in the construction workforce, and thus raising their levels of income. In addition, a significant amount of employments will be generated associated with the O&M of the facilities to be developed under the subprojects. These benefits can bring wider social gains if they are directed at vulnerable[4]groups.

Community and workers health and safety. No adverse residual effects to human health will occur as a result of construction or O&M activities, and mitigation measures are in place to ensure public and worker safety, and will be closely monitored. While exposure to elevated noise levels, fugitive dust and common air pollutants will occur in proximity to worksites, due to their short-term and localized nature, these effects are expected to be minor and insignificant with no measurable effects on human health.
Upon completion of the subproject, the socio-community will be the major beneficiaries of this subproject. With the improved solid waste management facilities, additional vehicles and workers PPE, they will be provided with reliable and climate-resilient municipal services. In addition to improved environmental conditions, the subproject will reduce occurrence of diseases and people would spend less on healthcare and lose fewer working days due to illness, so their economic status should also improve, as well as their overall health. These are considered a long- term cumulative benefit.
Therefore, the project will benefit the public by contributing to the long-term improvement of municipal services and community livability in the subproject area.

IFC Guidance for CIA:
Rapid cumulative impact assessment (RCIA) can be an integral component of an ESIA or a separate process. It entails a desk review that, in consultation with the affected communities and other stakeholders, enables the developer to determine whether its activities are likely to significantly affect the viability or sustainability of

[4]Vulnerablegroupsasthosewithoutlegaltitletolandandotherassets;householdsheadedbysingleearnerfemales,the elderly or disabled; indigenous peoples (based on ADB OM); and households with incomes that are below the poverty line

selected VECs. The proposed approach recognizes that, especially in emerging markets, the many challenges associated with managing a good CIA process include lack of basic baseline data, uncertainty associated with anticipated developments, limited government capacity, and absence of strategic regional, sectoral, or integrated resource planning schemes. Given the many challenges, this handbook recommends that developers:

- follow a six-step RCIA process,
- engage stakeholders as early as possible and throughout the decision-making process, and
- clearly record the fundamental reasoning behind each important decision made, supporting it with as much technical evidence as possible.

Figure-4.1 illustrates the RCIA logical framework, which is an iterative six-step process: scoping (Steps 1 and 2), VEC baseline determination (Step 3), assessment of the contribution of the development under evaluation to the predicted cumulative impacts (Step 4), evaluation of the significance of predicted cumulative impacts to the viability or sustainability of the affected VECs (Step 5), and design and implementation of mitigation measures to manage the development's contribution to the cumulative impacts and risks (Step 6).

Depending on the scenario, the RCIA may evolve into a more robust and comprehensive CIA, which requires the participation of many parties and is best led by local governments or regional planners. CIA processes involve continuous engagement with affected communities, developers, and other stakeholders. In practice, effective design and implementation of complete CIA processes is often beyond the technical and financial capacity of a single developer. CIA thus transcends the responsibility of a single project developer. On occasion, it may be in the best interest of a private sector developer to lead the CIA process, but the management measures that will be recommended as a result of the process may ultimately be effective only if the government is involved. CIAs are multi stakeholder, iterative processes that (a) require the involvement of multiple multidisciplinary teams and an effective, efficient governance structure and (b) tend to be time and data intensive.

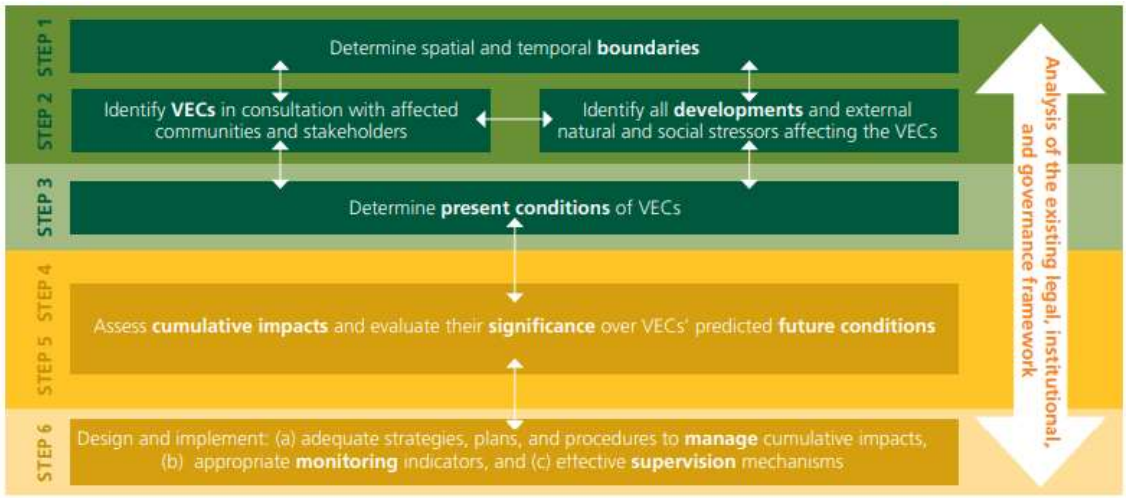


Figure-4.1: RCIA: Six Step Approach

SECTION-5: ENVIRONMENTAL AND SOCIAL PROCEDURES

5.1 INTRODUCTION

This section describes the safeguard management procedures of the project. ISWMI sub-projects will use a structured approach to environmental and social management to allow the project development process following the AIIB's 3 ESSs, follow the mitigation hierarchy of avoidance, minimization, mitigation and compensation/offset for negative impacts and enhancement of positive impacts where practically feasible. Following sections describe what needs to be done at each stage of the overall project life of all sub-projects implementation, implementation of the project activities, and reporting on progress.

5.2 ENVIRONMENTAL & SOCIAL ASSESSMENT AND MANAGEMENT PROCESS

The environment consultant of the Project Implementation Unit (PIU) will perform the environmental and social screening. The environmental consultant will start the task during the preparation stage of sub-projects:

- PIU with the support of the consultant will update the EIA, SIA and RPF;
- LGED will share the EIA report with DoE for Clearance;
- LGED environmental and social consultant's will conduct IEEs/ESIAs for the sub-project's different activities those are have similarity and likely to have same environmental impacts at different locations, hence multiple IEEs/ESIAs should be carried out prior to the project activities;
- PIU will review and clear screening and environmental assessment reports made by Environmental consultant;
- LGED will conduct verification of some screening and assessment through field visit;
- Main consultant/PIU will ensure that environmental and social considerations are given sufficient attention, weight and influence over selection of sub-project site's land acquisition and resettlement.
- Bid documents will be prepared by the PIU and the environmental and social consultants will include the necessary environmental and social clauses in the bidding documents and ESMP implementation would be conducted by the Contractor.
- Project's works will be supervised by PIU/main consultant and LGED.
- All the activities of ISWMI project will follow existing Environmental Code of Practices (ECoP) prepared under ESMPF.
- The project will ensure that environmental and social impact assessment addresses all potential environmental and social direct and indirect impacts of the project and program throughout its life: pre-project, during project and operation stages and mitigation measures have been taken for it. If any additional impacts are identified, ESIAs/ESMPs would be reviewed and updated.

5.2.1 Specific Activities and Responsibilities in the Environmental and Social Assessment process

In Bangladesh, the environmental and social assessment procedure will pass through three major tiers in order to optimize the resources required for conduction of environmental assessment studies, these three tiers are: A) Screening, B) Initial Environmental Examination (IEE), and C) Detailed Environmental and Social Impact Assessment (ESIA). Screening decides whether the ESIA process should be applied to a development project and if it is required, its type, that is, IEE or ESIA

5.2.1.1 Screening

Environmental and Social screening is essential to gather information on existing baseline status and to assess potential environmental impacts of the project activities. Screening identifies the consequence of the proposed project in broader sense based on similar project experiences, stakeholder's perceptions and expert judgment, without having very much detailed investigation. Critical issues are also identified through the screening which needs detailed investigation. Based on the extent of environmental and social impacts obtained from the screening, the decision for further environment and social impact assessment will be taken.
Screening is usually carried out with the help of simple matrix that includes a set of check list to identify the baseline status and proposed potential impacts of the project intervention. Based on an extensive literature review and expert consultation, a screening matrix should be developed for ISWMIP sub-projects, which will be attached to the Impact Assessment report of each sub-projects. Members of environmental assessment team will update and use this matrix for collecting information through site visit, interview/ consultation with stakeholders, focus group discussion in the sub-project sites at the later stages.

The screening matrix will help to decide whether the project activities can be implemented or not, and the level of Impact Assessment required. During screening, if it is found that the project may create major irreversible damage or may violate an existing rules or regulations, the sub-components/activities under sub-projects will be rejected. For instance, any activities that may encroach into an ecologically critical area or a national/ global heritage site will be rejected. LGED must confirm the findings of the screening carried out by the consultants. Moreover, alternative project activities/methods and/or operation will be considered and the impacts will be assessed to make the sub-projects more environment friendly and socially acceptable. A sample screening form has been attached at Annex-1, which will be further developed at the implementation stage.

5.2.1.2 Initial Environmental Examination (IEE)

The IEE study will be conducted under LGED. However, according to the project planning, the activities those need IEE will be implemented at different periods and hence, multiple IEEs will be required clustering the similar activities prior to the actual intervention start. The purpose of the IEE is three folds:

(i) to obtain Clearance from DoE and obtaining decision from DoE whether the particular project activities need further assessment such as detail ESIA or not;
(ii) provide/finalize the ToR for the ESIA study, if required; and
(iii) continue consultations with project stakeholders.

The Process of IEE is briefly outlined below:

Analysis of the Project Components: All the components of the sub-projects, like construction works and resettlements, will be examined thoroughly which will in fact guide the development of checklist for reconnaissance survey.

Preparation of Checklist: A comprehensive checklist of potential environmental components likely to be impacted need to be prepared based on the guidelines of different agencies such as DoE and AIIB.

Initial Screening/ Survey: Not all the parameters selected in previous step may be significant for the project; hence the first activity will be to shorten this list to concentrate on significant effects. Data should be collected from all possible secondary sources, if available, and conduct an environmental reconnaissance with the relevant checklist in hand to identify and delineate the significant effects of the project and eliminate the others from further considerations. A Screening form for Potential Environmental & Social Safeguards Issues Checklist of this project is appended in **Appendix-2** of this ESMPF document. This screening form will identify the potential environmental & social safeguard issues triggered due to the subproject interventions to define the requirements of the E&S safeguard documents preparation following the AIIB policies. After determining the Bank policies triggered and the instrument to be prepared for the subprojects through the form of Potential Environmental & Social Safeguards Issues Checklist, the Environmental and Social expert team will complete a Rapid Environmental Assessment (REA) checklist **(Appendix-3)** for solid waste management to support the environmental classification of a subproject. It is to be attached to the environmental categorization form and submitted to the Environmental and Social Unit (ESU) for endorsement by the ESU Focal Person. Public consultation will play an important role in initial screening.

Analysis of alternatives: Alternative site and technological design should be analyzed for the proposed project interventions considering environmental, social, and technological criteria.
The purpose of the analysis of alternatives as part of the ESIA process is to select the best among all possible project options.
The critical and attentive issues for selection of the subproject site would be:

- Avoiding the following twelve (12) Ecologically Critical Areas: Human Settlements, Forest Sanctuaries, National Parks, Game Reserves, Mangroves, Forest Areas, Wetlands, Wildlife Habitats, Archaeological Sites, Ancient Monument Sites, Biodiversity Areas and Similar Other Areas.
- Preference of Non-productive Land: The non-productive land as an alternative just near the proposed agriculture land is preferable for environmental soundness.
- Overall follow the Landfill Site Selection Criteria of Solid Waste Management Rules 2021.
-

Identification and Scaling of Impacts: All the potential short- and long-term environmental and social impacts should be identified. The impacts can be graded in order to identify major impacts and relevant components. In addition, cumulative and residual impacts of the project interventions need to be clearly addressed.

Identification of Enhancement and Mitigating Measures: From literature survey and applying expert judgment and based on assessed impacts, a list of possible enhancement and mitigating measures for beneficial and adverse effects respectively should be prepared.

Preparation Environmental Management and Monitoring Plan: Environmental and Management Plan for the proposed project should be prepared mentioning the impact mitigation/ enhancement measures with institutional responsibilities. Also, environmental monitoring plan should be prepared that will include monitoring parameters, frequency, method and responsible agencies.

Recommendations on the need of ESIA study: The IEE study should recommend the activities and sub-projects as to whether a full-scale ESIA study is needed or not.

5.2.1.3 Environmental and Social Impact Assessment (ESIA)

The purpose of ESIA is to give the environment and people its due importance in the decision-making process by clearly evaluating the environmental and social consequences of the proposed study before action is taken. Early identification and characterization of critical environmental and social impacts allows the public and the government to form a view about the environmental viability and social acceptability of a proposed development project and what conditions should apply to mitigate or minimize those risks and impacts.
The ESIAs will utilize a well-planned and all-inclusive communication and consultation strategy and include a baseline survey covering the prevailing status of income, employment, education, age, skills and other socio-economic aspects along with cultural and community aspects in the areas. The assessment will feed into the individual Resettlement Plans prepared for each sub-project site and will be incorporated, along with consultation feedback from those identified in the PAP census and all other relevant stakeholders, in the development of mitigation measures, especially livelihood strategies.

Table-5.1: Major activities and responsibilities during different project stages for conducting infrastructure environmental and social assessment studies in Bangladesh

Project Stage	Steps/ Activities	Description	Responsibility
Step-1: Screening			
Planning and Pre-feasibility	Undertake Screening	Prepare a document containing environmental information covering potential environmental impacts, mitigation measures, evidence of public consultation etc. Take no further action for projects, which do not require environmental assessment.	LGED as proponent or qualified professionals/ Consultants
Step-2: Scoping to identify types of environmental and social assessment study			
Pre-feasibility/ planning	Scoping Exercise	Identify, by using checklists and based on preliminary field examination the necessity to conduct an IEE or an ESIA, as per ECR, 1997.	LGED as proponent assisted by qualified professionals/ Consultants
		Produce environment related document to competent authority for approval.	
Step-3: Terms of Reference (ToR) for environmental and social assessment study			
Pre-feasibility/ planning	Preparation of ToR	Define the main environmental concerns and issues related to any infrastructure program, which must be addressed by environmental assessment.	LGED assisted by professional environmental assessment team/consultant
	Approval of ToR	Review, comment and approve ToR	DoE, Bangladesh
Step-4: Preparatory work for environmental and social assessment study			
Pre-feasibility and planning	Assigning the work	Determine whether to conduct environment assessment using in-house staff or whether to outsource it.	LGED assisted by professional environmental assessment team/ consultant
	Environmental Assessment team formation	Form team as per approved ToR.	Environmental Assessment Team

Project Stage	Steps/ Activities	Description	Responsibility
	Prepare Work Plan	Establish a work plan that gives appropriate weight to all activities.	
Step-5: Undertake environmental and social assessment study			
Step-5.1: Desk Studies			
Planning and design	Secondary data	Collect and review relevant and appropriate published data, such as maps, reports etc.	Environmental Assessment Team
	Initiation, interaction and consultation	Discuss the proposed infrastructure and its potential environmental impacts with knowledgeable persons and concerned stakeholders.	
	Preparation of Information summary	Draft a summary of the information that is relevant to the project and its possible environmental effects.	
	Methods and Techniques	Determine the methods by which the field work for Environmental Assessment will be conducted.	
	Work Plan	Revise the work plan on the basis of desk studies	
Step-5.2: Field Work			
Planning and design	Field equipment	Collect and arrange field equipment required for Environmental Assessment Studies	Environmental Assessment Team
	Field survey for collection of baseline information	Survey at project location, interaction with the local community and investigate the issues identified during desk study; collect baseline (physical, biological and socioeconomic aspects) information	
Step-5.3: Data Analysis and Interpretation			
Planning and design	Impacts Identification	Establish what environmental impacts will be taken place as result of interaction of environmental settings and infrastructure construction, rehabilitation and maintenance activities.	Environmental Assessment Team
	Impact Prediction	Establish the extent of environmental consequences of the proposed infrastructure construction and operation.	
	Impact assessment	Judge whether the consequences are significant enough to require action to be taken.	
	Mitigation Measures	Design mitigation measures to avoid, reduce, minimize & compensate for adverse impacts & maximize beneficial impacts.	
	Environmental Management Plan	Prepare ESMP covering monitoring and project management to ensure the implementation of mitigation measures.	
	Stakeholder/Public Consultation	Carry out at various stages in the assessment process to ensure quality, comprehensiveness and effectiveness and make sure that stakeholders' views are adequately addressed.	Environmental Assessment Team/LGED
Review and Approval	Review & approval of environmental assessment report	Check completeness, adequacy, credibility, facilitate the decision-making process; decide if project should proceed or if further alternatives must be examined.	LGED will review and forward to DoE for approval of IEE/ESIA report

Project Stage	Steps/ Activities	Description	Responsibility
		Approval of environmental assessment report or rejection.	DoE, Bangladesh
Design Implementation	Implementation of ESMP, Monitoring	Determines compliance with ESMP.	LFED or appointed professionals
Step-6: Undertake audit			
Environmental Audit	Auditing	Environmental audit: immediately after Construction and two years after project completion.	LGED or appointed professionals

5.3 ESIA ASSOCIATED ACTION/PLAN

5.3.1 Gender and Social Inclusion Action Plan (GAP)

A project specific GAP is a tool used to ensure gender mainstreaming is clearly visible in project design and implementation. The project GAP is not a separate component. It mirrors the logical framework of the project and is an integral part of project design. GAPs include clear targets, gender design features and measurable performance indicators to ensure women's participation and benefits.
The GAP presents:

- Work undertaken to address gender issues in the subproject;
- Targets and design features, included in the subproject to address gender concerns and ensures tangible benefits to women and men, especially from vulnerable communities;
- Mechanisms to ensure implementation of the gender design elements;
- Gender - sensitive monitoring and evaluation indicators.

A GAP Report should have the following contents.
1. Introduction.
1.1Background.
1.2Basis for Gender Action Plan under ISWMIP
2. Justification
3. Related issues of ISWMP
3.1Areas/ Activities: Gender Action Plan (GAP) prepared
3.2Tasks
3.3Action By
3.4Performance Indicators
3.5Time Schedule
4. Gender Action Plan of CGP
4.1Goal and Objectives of GAP
5. Relevant Organizations, Stakeholders and their role
5.1Role of City Corporations
5.2Roles/TOR of Women Development Standing Committee (Assigned for Gender Related Activities)
6. Necessary Tasks and Procedures
6.1Contents of GAP
6.2Preparation Process of GAP
6.3Women Development Standing Committee (WDSC)
6.4TOR of Gender Committee
6.5Selection process of Gender Focal Point (GFP)
6.6TOR of GAP
6.7Follow-up ensuring female representation in Ward Level Coordination Committee (WLCC) and Civil Society Coordination Committee (CSCC)
6.8Follow-up ensuring female representation in standing committees
6.9Implementation Schedule
6.10Process of GAP Preparation
6.11Development of Gender Action Plan
6.12Allocation of Budgets
6.13Preparing progress and final report

5.3.2 Occupation Health and Safety Management Plan (OHSMP)

An Occupational Health and Safety Management Plan covers all subproject activities including contractors' activities during the construction and operational phases. The implementation of this Plan by contractors is addresses in the Environmental and Social Management and Monitoring Plan (Chapter-6). This Occupational

Health and Safety Management Plan is part of the overall suite of Management Plans developed for the subproject and cross linkages to number of the other Management Plans as Environmental and Social Management and Monitoring Plan.

OHSMP ensures the work safety of the employees working at site and aims to minimize the risks on employees arising from work-related activities. The measures contained in this Plan should be applicable to all subproject personnel, including subcontractors' personnel and covers both construction and operation phases. An OHSMP Report should have the following contents.

1 INTRODUCTION
1.1 Background
1.2 Scope
1.3 Purpose
2 ROLES AND RESPONSIBILITIES
3 PROJECT STANDARDS
3.1 National Standards and Requirements
3.2 Applicable International Standards
4 OCCUPATIONAL HEALTH AND SAFETY MANAGEMENT
4.1 OHS Management Approaches
4.2 General Facility and Operation
4.2.1 General Site Rules
4.2.2 Site Entrance and Exit
4.2.3 Safe Access
4.2.4 Parking in Subproject Area
4.2.5 Smoking
4.2.6 Vehicles, Construction Machinery and Trucks
4.2.7 Industrial Hygiene
4.2.8 Working Hours
4.2.9 Office Works
4.2.10 Housekeeping
4.2.11 Storage Conditions
4.2.12 Emergency Preparedness and Response
4.2.13 Colour Codes
4.3 Management of Physical Impacts
4.3.1 Noise and Vibration
4.3.2 Electrical Works, Electrical Equipment and Hand Tools
4.3.3 Eye Hazards
4.3.4 Hot Works
4.3.5 Industrial Vehicle Driving and Site Traffic
4.3.6 Working with Construction Machinery
4.3.7 Working Environment Temperature
4.3.8 Ergonomics
4.3.9 Working at Height
4.3.10 Man Basket Applications
4.3.11 Working with Ladders
4.3.12 Excavation Works
4.3.13 Illumination
4.3.14 Lifting Operations
4.3.15 Work Permits
4.4 Management of Chemical Impacts
4.4.1 Air Quality
4.4.2 Fire and Explosions
4.4.3 Working in Flammable and Explosive Environments
4.4.4 Hazardous Materials
4.4.5 Gas Cylinders and Chemicals
4.5 Management of Biological Impacts
4.5.1 Exposure to Biological Hazards
4.5.2 Fungi (Mold) Hazards
4.5.3 Poisonous and Infectious Animals
4.6 Management of Radiological Hazards
4.7 Special Hazard Environments
4.7.1 Working in Confined Spaces

4.7.2 Working Alone
4.8 Personnel Protective Equipment (PPE)
5 IMPLEMENTATION SCHEDULE
6 MONITORING
6.1 Overview of Monitoring Requirements
6.2 Key Performance Indicators (KPI)
6.3 Key Monitoring Activities
7 TRAINING
7.1 Induction Training
7.2 Job Specific and Other Training Requirements
8 AUDIT AND REPORTING
8.1 Internal Auditing
8.2 External Auditing
8.3 Record Keeping and Reporting

5.3.3 Gender Based Violence (GBV) Prevention Plan

Violence against women (VAW) is one type of GBV which is very prevalent in Bangladesh and is often rooted in gender inequalities and harmful gender norms. Bangladesh's female labor force participation (FLFP) has risen substantially; yet FLFP and quality of jobs for females are still lagging[5]. There have been remarkable improvements in FLFP made in Bangladesh in recent decades, raising the FLFP rate from 26 percent in 2002 to 35.6 percent in 2016[6], benefiting from the expansion of garment manufacturing industries. Yet, by comparison, male labor force participation is much higher at over 80 percent[7]. Moreover, the improvement in FLFP rates has hit a plateau, remaining at 36 percent in 2017. This gender disparity can be attributed to structural barriers including women's domestic burden, sex segregation in educational subject and occupation, employer discrimination, restricted mobility, limited access to trainings, lack of female friendly facilities, sexual harassment at work, limited childcare provisions. Social norms that influence and limit women's choices as well as a lack of a supportive policy environment also stunts FLFP. Moreover, female employment tends to be more concentrated in low-paid and low-productivity occupations, which are more vulnerable to technology innovation and automation in the production process[8]. Increasing women's labor force participation and improving the quality of female employment will require more significant support for women's access to employment opportunities and high-quality skills development programs. A GBV Prevention Plan Report should have the following contents.

1. Introduction
2. Country and Sector Context
2.1 Female Labor Force Participation in Bangladesh
2.2 Gender-Based Violence in Bangladesh
2.3 Status of Gender Based Violence (GBV) in subprojects
2.4 Legal and Institutional Environment for Gender Equality and GBV Prevention in Bangladesh
3. Potential SEA/SH Risks Assessment in the subproject Areas
4. GBV Prevention Plan
4.1 Grievance Mechanism
Annex I Sample Labor Code of Conduct covering the GBV/SEA/SHA related risks
Annex II GBV service providers functioning in Bangladesh during COVID-19
Annex III Subproject Grievance Mechanism to address SEA/SH Allegations (this model will be further tailored to the subproject needs)
Annex IV Operating Procedures and Response Protocol for SEA/SH Allegations

5.3.4 Waste Management Plan (WMP)

Waste Management Plan (WMP) addresses management of all solid and liquid refuse, including hazardous and non-hazardous waste, produced as a result of all phases (Preconstruction, Construction and Operation) activities within the subproject area. A Waste Management Plan (WMP) Report should have the following contents.
List of Tables
1 Introduction

[5] Labor Force Survey, BBS 2010, 2016/17

[6] World Bank calculations based on LFS 2016 data, page xvii

[7] Share of female youths in NEET is also much higher (47%) compared to male (10%). ILO. (2020). Global Employment Trend.

[8] Raihan, S., & Bidisha, S. H. (2018). Female employment stagnation in Bangladesh. Dhaka.

2 Waste Types
2.1 Waste Categories
2.1.1 Re-use
2.1.2 Recycling
2.1.3 Residual Waste
2.1.4 Landfill
3 Waste Collection and Disposal
3.1 Dead and Diseased Stock
3.2 Biofouling
3.3 Longline Infrastructure
3.4 Chemicals
3.5 Sanitary, Grey and Black Water Wastes
3.6 Contaminated / Hazardous Wastes
4 Waste Minimization
5 Monitoring
6 Consultation
7 References

5.3.5 Contractor Management Plan (CMP)

The contractor management plan ensures a systematic approach in selecting and managing contractors to prevent or minimize potential health and safety risks.
LGED and Contractors must ensure that risks related to the conduct of contractors and works impacting facilities, are suitably managed and controlled. This includes:

- ensuring health and safety management is a key criteria in the selection of contractors;
- identifying hazards and mitigating risk at the design stage to ensure safe systems of work;
- ensuring appropriate selection and safe use of equipment and substances;
- providing adequate information, instruction, training and supervision;
- consulting with other duty holders who have a Work Health and Safety (WHS) duty in relation to the same matter.

A Contractor Management Plan (CMP) Report should have the following contents.
1. Purpose
2. Definitions
3. Scope
4. Roles and Responsibilities
5. Procedure
5.1 Selection of Contractors
5.2. Induction
5.3 Onsite Management
5.4. Risk Management
5.5. Hazard/Incident Reporting
5.6 Site Safety Inspections and Observations
6. Record Maintenance
7. Performance Measures

5.3.6 Labor Management Plan (LMP)

Labor Management Plan ensures appropriate worker management procedures and enhances the development benefits of a project by treating workers in the subproject fairly and providing safe and healthy working conditions for subproject sustainability. During the construction period, contractors will follow this LMP to prepare a simplified labor management plan and Code of Conduct (CoC). Considering the facts, Labor and Working Conditions and Bangladesh Labour Act, 2006 (amendment in 2018), has set following specific objectives.
To promote health and safety at work.

- To promote the fair treatment, non-discrimination and equal opportunity of project workers;
- To protect subproject workers, including vulnerable workers such as women, persons with disabilities, children and migrant workers, contracted workers, and primary supply workers, as appropriate;
- To prevent the use of all forms of forced labour and child labour;
- To support the principles of freedom of association and collective bargaining of project workers in a manner consistent with national law; and

- To provide project workers with accessible means to raise workplace concerns.

A Labor Management Plan (LMP) Report should have the following contents.
1. Overview of Labor use on the Project
1.1 Project's construction related activities
1.2. Potential labors to be used in the project
1.3 Objectives of LMP
2 2. Assessment of the Potential Labor Risk
2.1 Labour Influx
2.2 Gender-Based Violence
2.3 Occupational Health and Safety
2.4 Spread of Infections in the Community
2.5 Risk of engaging child labor and forced labor
3. Brief Overview of Labor and OHS Legislation: Terms and Conditions
3.1 Child and Forced Labor
3.2 Health and Safety Offenses in Bangladesh
3.3 COVID 19 Considerations
3.4 AIIB Environmental and Social Framework 2016 (amended February 2019)
3.5 Overview of the OHS Legislation
4. Mitigation Measures to be followed
4.1 Labour Influx and Gender Based Violence
4.2 Terms and Conditions
4.3 Grievance Mechanism
4.4 Contractor Management
4.5 COVID Management by the contractors
6. Provision of LMP in bidding document
7. Monitoring and evaluation
Annex I Sample Labor Code of Conduct covering the GBV/SEA/SHA related risks
Annex 2 Suggested Due Diligence for Social and Environmental Mitigation Measures in Contracts
Annex 3 Certificate of Age and Fitness
Annex 4 Record Book on the Training of Fire Extinguishment
Annex 5 Register of Worker working on or near Machinery in motion, and provided with Personal Safety Materials
Annex 6 Final Report of Accident and Professional Injury
Annex 7 Report on Toxic and Infectious Disease

5.3.7 Stakeholder Engagement Plan (SEP)

Stakeholder Engagement Plan (SEP) ensures that a consistent, comprehensive and coordinated approach is taken to stakeholder engagement and subprojects disclosure throughout the project. It is further intended to demonstrate the commitment of the LGED, as a subproject developer and the main implementing party, to an 'international best practice' approach to engagement. The LGED is committed to full compliance with all National EIA Regulations, as well as aligning to the international standards namely the AIIB Principles on Stakeholder Engagement.
In line with current international best practice, SEP aims to ensure that stakeholder engagement is conducted on the basis of timely, relevant, and accessible information. In this way, the SEP seeks to ensure that stakeholders are given sufficient opportunity to voice their opinions and concerns, and that these concerns influence project decisions.
The SEP:

- Provides the approach to stakeholder engagement, showing how this will be integrated into the rest of the ESIA process and also throughout the project;
- Identifies the main categories of stakeholders and how they will be included in the ESIA process; and
- Identifies the ways to document engagement undertaken throughout the project.

A Stakeholder Engagement Plan (SEP) Report should have the following contents.

1 INTRODUCTION
1.1 PURPOSE OF THE STAKEHOLDER ENGAGEMENT PLAN
1.2 OBJECTIVES OF STAKEHOLDER ENGAGEMENT

1.3 STRUCTURE OF THE SEP
2 KEY STANDARDS AND LEGISLATION GUIDING STAKEHOLDER ENGAGEMENT
2.1 ETHIOPIAN LEGISLATIVE REQUIREMENTS
2.2 INTERNATIONAL REQUIREMENTS
2.3 STAKEHOLDERS
3 APPROACH TO STAKEHOLDER ENGAGEMENT
4 STAKEHOLDER ENGAGEMENT ACTIVITIES UNDERTAKEN TO DATE
4.1 INITIAL ENGAGEMENT
4.2 SCOPING ENGAGEMENT AND BASELINE DATA GATHERING ENGAGEMENT
4.3 ESIA DISCLOSURE ENGAGEMENT
5 GRIEVANCE MECHANISM
6 MONITORING AND REPORTING

5.3.8 Traffic Management Plan (TMP)

The principal role of this document is to provide framework guidance on traffic management measures, to be further developed and detailed prior to construction commencing. The specific objectives of this TMP are to:

- Provide for a safe environment for all road users;
- Provide protection to pedestrians and workers from traffic hazards that may arise as a result of vehicle movements;
- Provide adequate parking areas for vehicles.

In relation to community traffic management, this TMP's aim is to ensure that:

- The community traffic management goals are explicit and understood by all individuals involved within the control of the company, including employees, suppliers, contractors, visitors and to the extent possible local communities and road users among the general public;
- The community traffic management goals are communicated with reasonable efforts to effectively engage with public road users and relevant authorities;
- The potential for traffic related hazards is avoided where possible or otherwise reduced to as low as reasonably possible;
- The potential for traffic incidents associated with ISWMIP vehicle activity in the vicinity of and on the subproject sites, as well as along the access road, is avoided where possible or otherwise minimized as low as reasonably possible;
- Vehicle activity associated with the preconstruction, construction and operation activities does not contribute to pollution (air, water, nuisance), and / or damage to the physical conditions of the local transportation routes.

A Traffic Management Plan (TMP) Report should have the following contents.

1. INTRODUCTION
1.1 PURPOSE
1.2 APPLICATION
1.3 COMMENCEMENT
1.4 AUTHORITY AND MANAGEMENT
2 SCOPE
2.1 SCOPE OF THIS MANAGEMENT PLAN
2.2 OVERLAPS WITH OTHER MANAGEMENT PLANS
3 ROLES AND RESPONSIBILITIES
3.1 KEY ROLES AND RESPONSIBILITIES FOR MANAGEMENT PLAN IMPLEMENTATION
3.2 KEY INTERFACES
4 PROJECT STANDARDS
4.1 APPLICABLE MONGOLIAN LEGISLATION
4.2 APPLICABLE MONGOLIAN NATIONAL STANDARDS
4.3 DEIA REQUIREMENTS
4.4 APPLICABLE INTERNATIONAL STANDARDS AND GUIDELINES
4.5 APPLICABLE CENTERRA STANDARDS
5. MITIGATION MEASURES AND MANAGEMENT CONTROLS

SECTION-6: ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP)

6.1 INTRODUCTION

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

The EMP should clearly lay out: (a) the measures to be taken during preconstruction, construction and operation phases of a sub-project to eliminate or offset adverse environmental impacts, or reduce them to acceptable levels; (b) the actions needed to implement these measures; and (c) a monitoring plan to assess the effectiveness of the mitigation measures employed.

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

The major components of the EMP include:

- Mitigation and enhancement measures
- Monitoring plan
- Estimation of Cost of EMP
- Institutional arrangement for implementation of EMP

In addition, third party monitoring of environmental management, Special Environmental Clauses (SECs) for inclusion in the bidding document, and training requirements for institutional strengthening have been presented separately in the ESMF.

This section presents the outline of environmental and social management plan (ESMP) of the project. The sub-project specific ESMP will be included in the IEE/ESIA report. The basic objective of the ESMP is to manage adverse impacts of program interventions in a way that minimizes the possible adverse impact on the environment and people of the program influence area. The specific objectives of the ESMP are to:

- Identify the mitigation measures during ESMPF and ESIA; and facilitate implementation of those during implementation of ISWMIP;
- Maximize and sustain potential program benefits and control negative impacts;
- Draw responsibilities for program proponent, contractors, consultants, and other members of the program team for the environmental and social management of the program;
- Define a monitoring mechanism and identify monitoring parameters in order to:
  - Ensure the complete implementation of all mitigation measures,
  - Ensure the effectiveness of the mitigation measures,
  - Maintain essential ecological process, preserving biodiversity and where possible restoring degraded natural resources and habitats; and
  - Assess environmental training requirements for different stakeholders at various levels.

The ESMP will be managed through a number of tasks and activities and site-specific management plans. One purpose of the ESMP is to record the procedure and methodology for management of mitigation identified for each negative impacts of the program. The management will clearly delineate the responsibility of various participants and stakeholders involved in planning, implementation and operation of the program.

6.2 INCLUSION OF RELEVANT COMPONENTS OF ESMP IN CONTRACT DOCUMENTS

The specific IEE/ESIA/RP should include a section on special environmental clauses (SECs) to be incorporated in the Tender Document under General/Particular Specification. These clauses are aimed at ensuring that the Contractor carries out his responsibility of implementing the environmental and social management plan (ESMP), monitoring plan as well as other environmental and safety measures. Such clauses may specify, for example, penalties for non-compliance as well as incentives to promote strong compliance. The various contractors must be made accountable to implement the plans and mitigation measures which pertain to them through contract documents and/or other agreements of the obligations and importance of the environmental and social components of the program. In addition, the specific ESIA will ask to submit an Environment Management Action Plan (EMAP) to encompass all of the detailed plans, measures and management systems they are required to develop and implement, to be based on the ESMPF recommendation and ESIA findings, their work methodology, work force involvement, equipment's standard, and work scheduling.

6.3 GUIDELINE TO INCORPORATE SAFEGUARD MANAGEMENT IN BID DOCUMENTS

The consultants of LGED-PIU will be responsible to incorporate environmental management requirements in the bidding documents, with the assistance of the environmental consultants. The Special environmental clauses for tender documents is annexed in Appendix-5. The generic guidelines to incorporate environmental aspects in the bidding documents are listed below. These are examples only and shall be further elaborated and expanded upon based on the findings and recommendations of the phase-specific ESIAs.

- Prepare cost estimates, to be incorporated in Bid Documents.
- Contractor version of the Environmental Management Plan along with the ECoPs to be incorporated in the bid a document's work requirements.
- Penalty clauses for not complying with ESMP requirements to be incorporated.
- Indicative penalty clauses are presented below (Addendum to Clause 17.2 Contractor's Care of the Works of FIDIC).
  - ✓ The contractor has to follow all traffic safety measures as defined in the technical specification. Damage shall be levied at the rate of up to BDT 10,000 per day per location for nonconformity of traffic safety measures as per the decision of the LGED officials.
  - ✓ The contractor has to follow all environmental mitigation and management measures as defined in the technical specification read along with the Environmental Management Plan for the specific ISWMIP activities. Damage shall be levied at the rate of up to BDT 10,000 per day per location for nonconformity of ESMP measures as per the decision of the LGED officials.
  - ✓ The contractor has to ensure that prior to every monsoon season, during the construction period; all the temporary and permanent cross drainage structures are free from debris as defined in the Technical Specifications read along with the ESMP. Damage shall be levied at the rate of BDT 3,000 per day per location for non-conformity as per the decisionof the LGED officials.
  - ✓ The contractor has to ensure that a comprehensive Health and Safety program is in place for the duration of construction. Implementation of the program will include, among other aspects, ensuring that sufficient numbers and good quality Personnel Protective Equipment (PPE), should be provide to staff and Labour all time as defined in the Labour codes read along with the ESMP. Damage shall be levied at the rate of up to BDT 5,000 per day for non-conformity as per the decision of the LGED officials.
  - ✓ In addition, for any non-compliance causing damages or material harm to the natural environment, public or private property or resources, the contractor will be required to either remediate / rectify any such damages in a timeframe specified by and agreed with the engineer, or pay LGED for the cost (as assessed by LGED) of contracting a third party to carry out the remediation work.
  - ✓ Since many contractors do not have clear understanding the need of environmental management, some quote very low price for implementation of ESMP and eventually cannot implement ESMP as per specific requirement of ESMP and project design. To avoid this problem, fixed budget may be assigned for ESMP implementation. The contractors may need orientation on the requirement of the ESMP in the pre-bidding meeting.

6.4 ENVIRONMENTAL CODES OF PRACTICE (ECoPs)

The environmental codes of practice (ECoPs) are generic, non-site-specific guidelines. The EcoPs consist of environmental management guidelines and practices to be followed by the contractors/implementation organizations for sustainable management of all environmental issues. The contractor will be required to follow them and also use them to prepare site-specific management plans. Details of the EcoPs listed below.

Table-6. 1: Environmental Code of Practices (EcoPs)

• EcoP 1: Waste Management	• EcoP 6: Erosion and Sediment Control	• EcoP 11: Noise and Vibration Management
• EcoP 2: Fuels and Hazardous Substances Management	• EcoP 7: Top Soil Management	• EcoP 12: Protection of Flora
• EcoP 3: Water Resources Management	• EcoP 8: Topography and Landscaping	• EcoP 13: Protection of Fauna
• EcoP 4: Drainage Management	• EcoP 9: Borrow Areas Management	• EcoP 14: Protection of Fisheries

• EcoP 5: Soil Quality Management	• EcoP 10: Air Quality Management	• EcoP 15: Road Transport and Road Traffic Management
• EcoP 16: River Transport management	• EcoP 16: River Transport management	• EcoP 16: River Transport management
• EcoP 19: Workers Health and Safety.		

6.5 OCCUPATIONAL HEALTH AND SAFETY GUIDELINES

In general, the objectives of occupational health and safety (OHS) plan are: (a) To develop, in the workplace, a collaborative approach to managing Occupational health and Safety between management and workers; (b) To provide and maintain safe working procedures and operations; (c) To ensure awareness of all potential work related risks and hazards and to develop preventive strategies against these risks and hazard; (d) To provide appropriate training to all concerned to work safely and effectively; (e) To maintain a constant and continuing interest in the improvement of occupational health and safety performance and to provide the required resources necessary for the implementation and maintenance of the OHS plan.
For the sub-projects to be implemented by LGED, the occupational health and safety primarily focuses on work equipment and protective gear. The following section provides guidelines/ directives for: (a) work equipment, (b) protective gear, and (c) safety and health signs.

6.5.1 Suggested Safety Directives for Work Equipment

It is employer's (contractor) obligation that every possible measure is taken to ensure the safety of the work equipment made available to workers. During the selection of the work equipment the employer shall pay attention to the specific working conditions, which exist at the workplace, especially in relation of safety and health of the workers. A brief list of work equipment safety issues is given below:

- Work equipment control devices which affect safety must be clearly visible and identifiable and appropriately marked where necessary.
- Where there is a risk of mechanical contact with moving parts of work equipment, which could lead to accidents, those parts must be provided with guards or devices to prevent access to danger zones or to halt movements of dangerous parts before the danger zones are reached.
- Work equipment may be used only for operations and under conditions for which it is appropriate.
- Work equipment must bear the warnings and markings essential to ensure the safety of workers.
- All work equipment must be appropriate for protecting workers against the risk of the work equipment catching fire or overheating, or of discharges of gas, dust, liquid, vapor or other substances produced, used or stored in the work equipment.
- Work equipment must be erected or dismantled under safe conditions, in particular observing any instructions, which may have been furnished by the manufacturer.

6.5.2 Safety Directives for Protective Gears

Personal protective equipment is suggested for use when the risks cannot be avoided or sufficiently limited by technical means. All personal protective equipment must

- be appropriate for the risks involved, without itself leading to any increased risk
- correspond to existing conditions at the workplace
- fit the wearer correctly after any necessary adjustment.

The Contractor shall organize orientation to use of personal protective equipment. Workers shall be informed of all measures to be taken. Consultation and participation shall take place on the matters related to the use of the protective equipment. A partial list of protective gears to be worn by the workers at designated work areas is given below; Table-6. 2 presents the list in tabular form.
Head Protection: Protective helmets will be put on at all times mainly at the control center construction sites, under scaffolds, erection and stripping of formworks, etc., where there are possibilities of head injuries from falling/flying objects.
Eye and Face Protection: Spectacles, Goggles, Face Shield or Arc-welding Mask with Hand Masks, whichever is appropriate

6.5.3 Safety and Health Signs

Safety signs, health signs, prohibition sign, warning sign, mandatory sign, emergency escape sign, first-aid sign,

information sign, signboard, supplementary signboard, safety color, symbol, pictogram, illuminated sign, acoustic signal, verbal communication and hand signal are essential tools for preventing accidents by providing information in advance.
The Contractor will provide or ensure that appropriate safety and/or health signs are in place at their work sites where hazards cannot be avoided or reduced. The Contractor should comply with the relevant IFC guidelines of occupational health and safety (*Final - General EHS Guidelines_APRIL 29.doc (ifc.org)) Workers and their representatives must be informed of all the measures taken concerning health and safety signs at work and must be given suitable instruction about these signs.

Table-6. 2: Brief list of protective gears to be worn during the use of some equipment

Works/ Equipment Use	Safety Measures for Workers and/or Work Areas
Common Construction Works	HH, STB, HG
Earth-works	HH, STB, HG
Auger Drill	HH, STB, HG, WB
Concrete Mixer	HH, STB, HG, WB
Fork Lift	HH, HG, STB, WB
Elbow Jack	HH, STB, HG
Sledge/Pick Hammer	HH, STB, HG, WB
Vibrator	HH, STB, HG, WB
Pick Axe	HH, STB, HG, WB
Electric Saw	HG, EG, EM
Note: HH = Hard Hat, STB = Steel-tipped Boot, HG = Hand Gloves, BH = Body Harness, WB = Waist Belt, EM = Ear Muff, EP = Ear Plug, WV = Welding Visor, FM = Face Mask, BP= Body Protective Apron, IB = Insulating Boots, EG = Eye protection Glasses	

6.6 MITIGATION MEASURES TO ADDRESS ENVIRONMENTAL AND SOCIAL IMPACTS

6.6.1 Pre-construction Phase

Possible impacts during pre-construction phase from construction, rehabilitation and maintenance activities should be identified beforehand. Detail activities need to be identified first and thereafter set of actions or interventions are to be demarcated and any possible effect due to an action is to be determined. Best practice of mitigation or enhancement measures should be explored accordingly and deployed in the field. For giving an instance, a set of mitigation measures against possible environmental and social impacts due to an improvement project at its pre-construction phase is proposed in the following Table-6.3.

Table-6.3: Mitigation/Enhancement measures during pre-construction phase of construction, rehabilitation and maintenance of infrastructure project under LGED

Issues/ Activities	Potential Environmental Impacts	Proposed Mitigation Measures	Responsibility	
			Implementation	Supervision
Land acquisition/ Requisition	• Encroachment of agricultural land, cultural sites, fish habitat etc. • Loss of agricultural production, fish resources; • Loss of income and livelihoods; • Social conflict.	– Prepare RP and LAP – Avoid agricultural land, social/religious institutes, fish habitat during finalization of the alignment of the approach road and location of the bridge; – Prior to start construction adequate compensation should be given to the PAPs in-time according to RP. – Adequate compensation should be given for standing crops; – Avoid agricultural land, if possible; – Create job opportunities for the PAPs.	LGED	LGED
Housing and Commercial Structures	• Loss of housing and commercial structures; • Dust pollution; • Loss of income and livelihoods.	– Avoid the housing and commercial structure during the finalization of the alignment and location of the bridge; – Proper compensation should be given before starting the removal or dismantling works; – Create job opportunities for the PAPs. – Water spraying on the bear surface or dust pollution source;	Contractor	LGED
Loss of vegetation/ tree	• Accident risk during removal of trees/vegetation's in the project sites; • Birds and others species can migrate from the • trees/vegetation's; • Impacts on the local climatic condition.	– Prior to start construction, all vegetation should be removed from the proposed construction sites with the c consultationof the local relevant authorities; – Avoid disturbance and careful during construction vehicle and equipment movement; – Proper H&S measures (use of appropriate PPE such as hand gloves, safety shoes and helmet) for the workers should be taken during removal of trees, bushes & crops; – To mitigate the ecological impact, tree plantation plan can be considered in the design & accordingly tree plantation will bedone in an appropriate location to be determined by the LGED after consultation with the concerned authority; – Proper H&S measures (use of appropriate PPE such as hand gloves, safety shoes and helmet) for the workers should be taken during removal of trees, bushes & crops; – To mitigate the ecological impact, tree plantation plan can be considered in the design & accordingly tree plantation will be done in an appropriate location to be determined by the LGED after consultation with the concerned authority; – The engineer shall approve such felling; only when the proponent secures receive a "clearance" for such felling from the LGED, as	Contractor	LGED

Issues/ Activities	Potential Environmental Impacts	Proposed Mitigation Measures	Responsibility	
			Implementation	Supervision
		applicable; – Tree felling, if unavoidable, shall be done only after compensatory plantation of at least two saplings for every tree cut is done; – During the tree removal from the proposed construction sites diameter at best height (DBH) of the trees is 6 inches, only such trees should be considered by the contractor for compensation and plantation; – Tree plantation at the suitable locations after completion of the construction activities.		
Removal of Utilities	• Vulnerable for workers health and safety; • During movement of heavy Construction machineries equipment's can damage the utility services if not previously removed; • Due to carelessness or incautiousness death from sudden electric shocks may occur.	– Prior to start construction, the utility services (electrical cables, telephone line, water supply pipeline, gas supply pipeline and internet line) if applicable should be shifted with the consultation of the relevant organizations; – Inform the local community before starting removal or demolishing work; – Carefully remove the utilities that are connected to any structures; – Proper Health and safety measures for the workers should be taken during shifting of these lines to avoid any incidents.	Contractor	LGED
Dismantling	• Dust pollution in the construction site; • Health hazard for the workers and community during dismantling works; • Noise level increase; • Vibration effects on the structures on the surrounding of the project area; • Surface water contamination, blockage of navigation and drainage, impacts on aquatic animal; • A detail of the dismantling plan is also given in the Annex-C.	– Notify the adjacent community before starting the demolishing work; – During the removal or demolition of existing structures if required will be fully removed by the contractor; – Spraying of water in the dry land or from where there is a possibility to generate dust; – Banned fishing, swimming, boat movement activities in the construction sites, if applicable; – Proper H&S measures for the workers such as using of appropriate PPE (helmet, Earplug, musk, safety shoes, hand gloves etc.) should be taken to avoid any accidents; – Construct noise barrier around the dismantling site; – Stop the engine when it is not required; – Monitor Noise level as per DoE guidelines; – Impact wise mitigation measures are given.	Contractor	LGED
Archaeological / Historical/	• Encroachment of Archaeological/ Historical/ Social/ Cultural/	– Avoid Archaeological/Historical/Social/Cultural/ Religious sites during the site selection and improvement works;	Contractor	LGED

Issues/ Activities	Potential Environmental Impacts	Proposed Mitigation Measures	Responsibility	
			Implementation	Supervision
Social/ Cultural/ Religious Sites	Religious sites • Air and dust pollution; • Noise level may create uncomforting for the local community; • Vibration can effect on social/ cultural/ religious site.	– Spraying water on the dry surface to reduce dust pollution; – Vehicles transporting construction material to be covered; – Create noise barrier around the construction sites; – Limit the speed of vehicles; – Stop the demolish work for short time like prayer time. – Realignment of bridge approach road (in case of bridge) if required.		
Setting up labour camps	• Land encroachment; • Solid and liquid waste from the labour camp	– Labour camp should be constructed at a distance from the water bodies; – Avoid productive land and away from the settlement during the selection of land for the setup of labour camp; – No solid and liquid waste discharge into the water bodies; – Instruct workers to maintain clean environment in the camps.	Contractor	LGED

Note: Mitigation/enhancement measures cost will be determined during the environmental assessment of individual project based on its location, types of construction, implementation schedule, and cost for project implementation and requirement of mitigation/enhancement activities.

6.6.2 Construction Phase

Possible environmental impacts during construction phase from the project construction, rehabilitation and maintenance activities should be identified. For mitigating the possible environmental impacts during construction phase mitigation measures are given in the followingTable-6.4Table-6.4.

Table-6.4: Mitigation/Enhancement measures during Construction phase of project construction, rehabilitation and maintenance program under LGED

Issues/ Activities	Potential Environmental Impacts	Proposed Mitigate Measures	Responsibility	
			Implementation	Supervision
Air Pollution	• Construction vehicular traffic: Air quality can beaffected by vehicle exhaust emissions and combustion of fuels • Construction equipment: Air quality can be adversely affected by emissions from construction machineries and combustion of fuels; • Construction activities: Dust generation from earth excavation, earth & sand stockpiles during dry period.	– Fit vehicles with appropriate exhaust systems and emission control devices; – Maintain vehicles and construction equipment in good working condition including regular servicing; – Operate the vehicles in a fuel-efficient manner; – Impose speed limits at 30 km/hour on vehicle movement at the worksite to reduce dust emissions; – Control the movement of construction traffic in the access road; – Focus special attention on containing the emissions from generators; – Construction equipment causing excess pollution (e.g. visible smoke) will be banned from construction sites immediately prior to usage; – Water spray to the dry earth/material stockpiles, access roads and bare soils as and when required to minimize the potential for environmental nuisance due to dust; – Increase the watering frequency during periods of high risk (e.g. high winds); – Stored materials such as: excavated earth, dredged soil, gravel and sand shall be covered and confined to avoid their wind drifted; – Restore disturbed areas as soon as possible by vegetation; – Establish adequate locations for storage, mixing and loading of construction materials, in a way that dust dispersion is prevented because of such operations; – The Air quality monitoring should be carried out by the contractor following the National Air Quality Standard – (Schedule-2: Standards for Air Quality, ECR, 1997 and Amendment in 2005).	Contractor	LGED

Noise Pollution	• Construction vehicular traffic: Vibration and Noise quality will be deteriorated due to vehicular traffic. • Construction equipment: Noise and vibration will have an impact on adjacent surrounding residents. • Construction activity: Noise will have an impact on adjacent residents.	– Strict measures for noise pollution control need to be undertaken during construction activities; – Create noise barrier and consider the minimum noise levels at sensitive receptor sites (e.g. dense residential area, schools, mosques, health centers etc.); – Stone breaking machine should be confined within a temporary shed so that noise pollution could be kept minimum; – Protection devices (ear plugs or ear muffs) shall be provided to the workers operating in the vicinity of high noise generating machines during construction; – Construction equipment and vehicles shall be fitted with silencers and maintained properly; – Instruction to the drivers to avoid unnecessary horn; – The Noise level monitoring should be carried out by the contractor following the National Noise Quality Standard (Schedule-4: Standards for Sound, ECR, 1997 and Noise Pollution (control) rules 2006). – Vibration monitoring should be carried out by the contractor.	Contractor	LGED
Ground Water Pollution	• Contamination of groundwater due to Pollution lack of septic tanks or mobile toilets; • Accidental spillage of hazardous liquid from the construction camps.	– The contractor will make arrangement for water required for construction in such a way that the water availability and supply to nearby communities remain unaffected; – Handling and storage of the potential contaminants has to be organized under strict condition to avoid water pollution during construction; – Handling of hazardous liquid should be done carefully by the designated experienced person; – Handling and storage of the potential contaminants should be done by the experienced workers. Proper monitoring should be done by the experienced person; – The Ground water quality monitoring should be carried out by the contractor following the National Water Quality Standard (Schedule-3: Standards for Water, ECR, 1997).	Contractor	LGED

Surface Water Pollution	• Construction & general wastes from the construction sites; • Oil spill from the construction vehicles and construction camp can affect on fishes and aquatic wildlife (such as snakes, frogs etc.)	– Contractor should prepare Waste Management Plan and follow it properly during the construction period; – Any wastes should not be throwing into the river/khal/canal other than dump into the designated waste dumping area; – Store the oil and petroleum product in a separate location cover by a concrete structure; – Handling of hazardous liquid should be done carefully by the designated experienced person; – Monitor the surface water by testing in designated Labouratory should be done by the Contractor following the National Water – Quality Standard (Schedule-3: Standards for Water, ECR, 1997).	Contractor	LGED
Land/ Soil Pollution	• Decrease the production capacity of agricultural land; • Land or soil erosion from water or wind; • Sediment pollution and increase the turbidity; • Reduction the microorganism.	– Avoid the productive land, agricultural land, archaeological sites, protected area, forest area, natural habitat etc.; – Land/soil quality should be ensured by the contractor to fill the abutment area and approach road; – Soil from fallow land should be used in earthwork in approach road; – Re-vegetation the exposed area as early as possible to reduce the soil erosion; – Create barrier for reducing the sedimentation into the water bodies; – The Land or soil quality test should be carried out by the contractor.	Contractor	LGED

Waste (Solid, Liquid and Hazardous) Pollution Organic waste: remaining foods, leafs, papers, straw, fruit cover etc. Inorganic waste: Polythene, Glasses, Synthetic paper, plastic etc. Hazardous waste: Paint, fuel, chemicals, oil, petroleum products, bitumen etc.	• Improper storage and handling of construction & general liquid waste such as fuels, lubricants, chemicals and hazardous liquid onsite, and potential spills from these liquid materials may harm the environment and health of construction workers. • Improper storage and handling of construction & general solid wastes.	– The contractor will minimize the generation of sediment, oil and grease, excess nutrients, organic matter, litter, debris and any form of waste (particularly petroleum and chemical wastes); – Any wastes should not be throwing into the river/khal/canal other than dump in to the designated waste dumping area; – Handling of hazardous liquid should be done carefully by the designated experienced person; – Organic waste should be managed by composting method. A concrete chamber with 3 rooms is needed to be provided. In one room organic waste should be dumped and another room inorganic waste will be dumped. When the room will be filled then covered by earth. Then dump to the third room. After 6- month organic waste will be converted into fertilizer and will be used by the farmers; – Inorganic waste should be given to the authorized vendor for free of cost for recycling; – Accidental spillage of hazardous waste should be managed by spreading wood powder on the surface of the oil and this powder mixed with oil must store in a designated concrete room; – Provide appropriate PPE to the construction personnel for handle construction materials; – Make sure all containers, drums and tanks that are used for storage are in good condition; – Take all precautionary measures when handling and storing fuels and lubricants, avoiding environmental pollution; – Waste water monitoring should be carried out by the contractor, following the national standard (Schedule-10: Standard for waste from Industrial units or Projects waste).	Contractor	LGED
Hydrological Regime	• Drainage congestion and flood at the site.	– A detailed hydrological and morphological study of the site (in case of landfill and waste to energy plant) should be conducted; – Proper design and construction accordingly to accommodate flood level; – Wastes should not be disposed near any water body. All waste depending on its characteristics, should be disposed of in a controlled manner.	Contractor	LGED

Drainage Congestion	• Construction of diversion road on the river/ Khal/canal create drainage congestion; • Stockpiling of construction materials in the river/khal/canal also create drainage congestion.	– Immediately remove all the construction debris from the construction site as well as from the water bodies in a planned way; – Duration of stockpiling should be minimized as much as possible; – Avoid the encroachment of the water bodies; – Protect water bodies from sediment loads by silt screen or bubble curtains or another barrier; – Construction activity should be recommended during the dry season; – Construction workers shall be instructed to protect water resources;	Contractor	LGED
Erosion and Siltation	• Bank erosion at the project site will loss of lands; • Vulnerable for the structures; • Increase turbidity and impact on aquatic life; • Loss of productive land, structures, resources.	– Introduce bank protection activities; – Use of geo-bag, stone and concrete to construct the protection wall; – Plantation more vegetation to reduce surface soil erosion and enhancement of the soil compactness and stability.	Contractor	LGED
Road Traffic and Accidents	• Increased traffic use of narrow access road by construction vehicle will affect the movement of normal road traffics and the safety of the road users specially the students	– Proper Traffic Management Plan (TMP) should be prepared by the contractor during starting of construction & follow it strictly; – In this TMP, the road safety measures such as speed breakers, warning signs/lights, road safety signs, flagman etc. should be included to ensure uninterrupted traffic; – Movement specially at nearby the educational (Schools, colleges, Madrasha etc.), community infrastructure (mosques, graveyards, Prayer Ground etc.) and health complex; – In addition, BRTA traffic rules and regulations should be strictly followed; – Divert traffic to follow alternative routes to avoid traffic jams; – Avoid talking with mobile during driving.	Contractor	LGED

Quarries and Borrow Pits	• Increased noise level caused by blasting, movement of construction vehicles; • Increased noise level will be impacted on the local community; • Air pollution due to diesel fumes and dust generation resulting from the presence of construction machinery and site cleaning activities.	– Create noise barrier around the construction site; – Stop unnecessary engine operation in the construction site; – Maintain vehicles and construction equipment in good working condition including regular servicing; – Control the movement of construction traffic in the access road; – Construction equipment causing excess pollution (e.g. visible smoke) will be banned from construction sites immediately prior to usage; – Water spray to the dry earth/material stockpiles, access roads and bare soils as and when required to minimize the potential for environmental nuisance due to dust; – Stored materials such as: excavated earth, dredged soil, gravel and sand shall be covered and confined to avoid their wind drifted; – Restore disturbed areas as soon as possible by vegetation.	Contractor	LGED
Landscape and Aesthetics	• Excavation of borrow pits, stock piling of construction materials, placing of construction equipment and parking of construction vehicles; • Presence of construction camps, equipment and their activities; • Movement of construction vehicles on the existing road network and temporary haul roads;	– Parking of construction vehicles and stockpiling of construction materials/excavated earth should be done in systematic way to avoid the damaging of aesthetics of the site; – Duration of stockpiling should be minimized as much as possible; – Vegetation plantation after complete of the construction work; – Completely remove the construction on camp facilities, equipment's and their activities; – Limit the speed of the vehicles and cover the vehicles during the movement or transportation of materials on the existing road network and temporary haul road; – Plantation of trees at the construction site after completion of the construction activities immediately.	Contractor	LGED
Occupational Health and Safety	• Campsites for construction workers and Safety are the important locations that have significant impacts such as health and safety hazards on local resources and infrastructure of nearby communities.	– Construction workers camp shall be located at least 500 m away from the nearest habitation; – Consider the location of construction camps away from communities in order to avoid social conflicts; – Create awareness among the camp users on health and safety requirements to be maintained and code of conduct.	Contractor	LGED
	• Lack of proper infrastructure facilities, such as housing, water supply and sanitation facilities will increase pressure on the local services and generate substandard living standards and health hazards	– Adequate housing for all workers should be provided avoiding over crowing; – Safe and reliable water supply; – Hygienic sanitary facilities and sewerage system.	Contractor	LGED

	• Management of wastes is crucial to minimize impacts on the environment.	– Ensure proper collection and disposal of solid wastes within the construction camps; – Insist waste separation by source; organic wastes in one container and inorganic wastes in another container at sources; – Dispose organic wastes in a designated safe place on daily basis; – The organic wastes should be always covered with a thin layer of sand so that flies, mosquitoes, dogs, cats, rats, etc. are not attracted; – Locate the garbage pit/waste disposal site minimum 500m away from the resident area so that people are not disturbed with the odor likely to be produced from anaerobic decomposition of wastes at the waste dumping places.	Contractor	LGED
	• There will be a potential for diseases to be transmitted including malaria, exacerbated by inadequate health and safety practices.	– Provide adequate health care and sanitation facilities within the construction sites;	Contractor	LGED
	• There will be an increased risk of work crews spreading sexually transmitted infections and HIV/ AIDS.	– Train all construction workers in basic sanitation and health care issues and safety matters and on the specific hazards of their work; – Provide HIV awareness programming, including STI (sexually transmitted infections) and HIV information, education and communication for all workers on regular basis; – Regular mosquito repellant spraying during monsoon periods.	Contractor	LGED

	• Health risk of construction workers due to COVID-19	– Prepare the health and safety guidance for COVID-19 at work sites and get approval from MWMU; – Strictly follow and implement the H&S guidance for COVID-19 at worksite; – Everyone entering the worksite must wear a mask, gloves and hard shoes. – At the entrance of the worksite/camp site every personnel must wash their hands for 20 second with maintaining a distance of at least 1m (3 ft) from each other; – Discourage site personnel to gather and gossip at any time, rather encourage physical distance while chatting/discussing. – Ensure sufficient stock of soap, sanitizer, washing facility and safe water at the workers' dwelling (both camp site and home). – Encourage frequent hand washing and social distancing at campsite. – Ensure personal distance at least 1 meter (3 feet), preferably 2m (6ft) during lunch, dinner and prayer. – Train workers on how to properly put on, use/wear, and take off protective clothing and equipment. Make these trainings mandatory at worksites and provide 10-15 minutes of a workday for such 'training and encouragement' activities.	Contractor	LGED
	• Construction work may pose health and safety risks to the construction workers and site visitors leading to severe injuries and deaths.	– Provide the workers a safe and healthy work environment; – Provide appropriate PPE for workers, such as safety boots, helmets, masks, gloves, protective clothing, goggles, full-face eye shields and ear protection; – Maintain the PPE properly by cleaning dirty ones and replacing them with the damaged ones; – Appoint an environment, health and safety manager to look after the health and safety of the workers; – Inform the local authorities responsible for health, religious and security before commencement of civil works and establishment of construction camps so as to maintain effective surveillance over public health, social and security matters.	Contractor	LGED

	• Lack of first aid facilities and health care facilities in the immediate vicinity will aggravate the health conditions of the victim.	– Provide health care facilities and first aid facilities are readily available; – Document and report occupational accidents, diseases, and incidents and actions taken; – Identify potential hazards to workers, particularly those that may be life threatening and provide necessary preventive and protective measures; – Provide awareness to the construction drivers to strictly follow the driving rules; – Provide adequate lighting in the construction area and along the roads in the construction site.	Contractor	LGED
Community Health and Safety	• Accidents on the approach road and construction site; • Noise and dust pollution; • Communicable diseases can spread among the local community.	– Prior to start the construction activities contractor will be informed the local community; – Instruct the drivers and limit the speed of the vehicles; – Regular health checkup of the workers and awareness training about the communicable diseases; – Proper lighting at the project site during the night time; – Avoid unnecessary noise pollution; – Spraying water in the dry surface to reduce the dust pollution – Provide proper access control to the project site and unauthorized entry to the project site will be controlled.	Contractor	LGED
Impacts on Archaeological/ Historical/ Social/ Cultural/ Religious Sites	• Air and dust pollution; • Noise level may create uncomforted; • Vibration can affect social/ cultural/ religious sites.	– Create temporary barrier around the project site; – Regular spraying of water in the construction site and approach road to reduce the dust emission; – Control the speed limit about 30 km/hour in the construction site and approach road; – Construction activities should be continued during day time only; – Carefully handling of construction machineries and equipment's near the sensitive receptors near the project site.	Contractor	LGED
Housing and Commercial Structures	• Air and dust pollution; • Noise level may create uncomforted; • Loss of income and employment; • Mental stress; • Resettlement or removal due to realignment of approach road; • Vibration can affect on structures.	– Spraying water on the dry surface to reduce dust pollution; – Create noise barrier around the construction sites; – Limit the speed of vehicles in the construction site; – Prior notice to the local inhabitants for resettlement issues if required; – Compensation should be given to the PAPs in-time according to RP; – Realignment of approach road if required; – Job opportunities for the PAPS and priority should be given; – Plantation of trees in an appropriate location will be determined by the LGED after consultation with the concern authority (Forest Department).	Contractor	LGED

Flora and Fauna	• Dust will be generated during earthwork and deposited on the leaves of nearby trees; this will abduct the growth of trees. • Construction activities will increase sediment loading of streams and changes in turbidity will impact adversely upon fishes and aquatic animals. • Diversion at bridge site will act as barriers to the migration of fishes and aquatic animals. • Noise generation from the construction vehicles and equipment's can create disturbance for the birds and wildlife;	– Proper construction management plan should be introduce in the Contractor LGED construction sites; – Regular water spraying in the dry area from where there is a possibility to dust pollution; – Proper management plan for the waste management in the construction sites; – Construction work should be preferred during dry season; – No disturbance for aquatic animal and keep provision for the fish movement; – Diversion road should be removed properly as soon as possible; – Construction activities should be continued during day time only; – Create noise barrier and avoid unnecessary machineries and equipment's operation; – Vegetation plantation after compilation of the construction work; – Construction workers shall be instructed to protect natural resources, flora and fauna, including wild animals and aquatic life, hunting and unauthorized fishing are prohibited; – Natural river/khal/canal will be reinstated after completion of construction works; – Fingerling (fish) can be released to the river/khal/canal near the bridge site to boost up the fish resources.	Contractor	LGED
Disturbance to Wildlife Movement	• Noise from construction machineries and vehicles, movement of workers likely to be disturb the movement of wildlife; • Permanent migration may occur from the area; • Increase of mortality due to collision with vehicles;	– Instruct workers and contractors to avoid harassment and Contractor LGED disturbance of wildlife; – Schedule activities to avoid disturbance of wildlife during critical periods of the day (e.g., night) or year (e.g., periods of breeding, nesting); – Turn off all unnecessary lighting at night; – Maintain noise-reduction devices (e.g., mufflers) in good working order on vehicles and construction equipment; – Temporary fencing around the construction site during construction period; – Educate workers regarding the occurrence of important resources in the area and the importance of their protection, including the appropriate regulatory requirements; – Regular monitoring of the death and disturbance of wildlife in the construction site.	Contractor	LGED

Fisheries and other Aquatic Animals	• Increase turbidity and siltation can spawning beds for fish; • Noise from pile driving activities, aquatic animals including fishes will be affected; • Turbid water can reduce the infiltration of sunlight into deep water.	– Construction activities is preferred during the dry season; – Careful handling of construction waste in the construction site; – Introduction of land/soil erosion and dust control practices in the construction site; – Provide adequate space for movement and safe passage of fishes and other aquatic animals; – Schedule activities to avoid disturbance of fish and aquatic anima during critical periods of the day (e.g., night) or year (e.g., periods of breeding); – Turn off all unnecessary lighting at night to avoid attracting and disturbance of fishes; – Maintain noise-reduction devices (e.g., mufflers) in good working order on vehicles and construction equipment; – Regular monitoring the fish death and disturbance of fish and aquatic animals in the construction site; – Fingerling (fish) can be released to the river/khal near the bridge site to boost up the fish resources	Contractor	LGED
Influx of construction workers	• Availability on the resources like food, housing, water resources; • Communicable diseases may also spread; • Social Conflict.	– Contractor should be ensured the availability of water for the construction activities; – Provision of clean drinking water in the construction camp in accordance with Schedule 3(b) of ECR, 1997; – Trained the workers by providing health and safety training on communicable diseases; – Educating project personnel, and area residents on risks, prevention, and available treatment for vector-borne diseases; – No child and/or forced labour will be employed by the EPC contractor; – Working conditions and terms of employment will be fully compliant to the Bangladesh labour laws.	Contractor	LGED

6.6.3 Operation Phase

For mitigating the possible environmental impacts during operational phase mitigation measures will be taken care of by the Municipality/the City Corporation are proposed in the following Table-6. 4.

Table-6. 4: Mitigation/Enhancement measures during Operation phase of the project construction, rehabilitation and maintenance program under Municipality/City Corporation

Issues/ Activities	Potential Environmental Impacts	Proposed Mitigation Measures	Responsibility	
			Implementation	Supervision
Air Pollution	• Dust emission from the increasing number of vehicles in the site area; • Vehicular emission from burning fuels. • GHG emission from the landfill sites • Stack emission from the Waste to Energy Plants • Moving wastes, by-and end-products (such as composts) may create dusts during dry season.	– Establish the speed breaker to limit the speed of the vehicle near the site; – Increase number of plantations by adding new species of trees on the appropriate locations after consultation with the concern authority. – Use bin covers and/or tarpaulins during transport of wastes, by-, and end products (compost) – Use tarpaulin to cover soils, sand and other loose material that will be used in the controlled landfill. – Green belt will be developed around the facilities to act as a barrier for dust pollution. – Only inert waste will be sent to controlled landfill so that landfill gas formation is minimum. – Use the gas vent pipe for the extraction of GHG emission; – In the design of the WtE plant it must ensure the exhaust treatment. – Maintain stack height and emission standard as per Waste Management Rules 2021.	Municipality/City Corporation	Municipality/City Corporation
Surface Water Pollution	• Remaining construction materials may be washedby the rainfall into the water sources and lead to sedimentation and increase turbidity; • Hazardous materialsspilled by accidents; • Soil erosion during rainyseason can contaminate nearby surface water. • Unmanaged leachate can contaminate the surface water • Run-off from stockpiled wastes and end-products of composting which may cause siltation and reduction in the quality of adjacent bodies of water.	– Remaining construction materials will be completely removed from the proposed project site after completing of the construction activities; – Cover the bare surface by plantation of trees/vegetation to reduce the surface soil erosion; – Speed control measures close to the site to reduce the occurrence of accidents; – Bank protection work can be done at the site; – Avoid rainy season for continuing any development activities. – Take all precautions to prevent entering of run-off into streams, water courses, or irrigation system. Install temporary silt traps or sedimentation basins along the channels leading to the water bodies. – Remove all wastes, by-,and end-products immediately. – Monitor discharge of leachate including review of ECC conditions. Parameters to be monitored include suspended solids, dissolved solids (inorganic), pH, ammoniac nitrogen (asN), total nitrogen (asN), biochemical and chemical oxygen demand, arsenic mercury, lead, cadmium, total chromium, copper, zinc, nickel, cyanide, chloride, fluoride, phonemic compounds and othersasperECR,1997. – Monitor compost quality. Visual inspection to ensure that glass, plastic and other physical inerts and fragments are absent in compost and it has no	Municipality/City Corporation	Municipality/City Corporation

Issues/ Activities	Potential Environmental Impacts	Proposed Mitigation Measures	Responsibility	
			Implementation	Supervision
		offensive smell. Also testing of compost to meet standards for arsenic, cadmium, chromium, copper, lead, mercury, nickel, zinc, pH and other parameters as prescribed by the relevant National policy of the Government. – Monitor treated wastes quality as per Medical Wastes Rules and conditions of the ECC. Tests at the minimum includes measurement of temperature, pressure, contact time, spore tests, and other routine tests (visual).		
Acoustic environment	• Increase in noise level due to presence of workers and movement of vehicles.	– Plan activities in consultation with the LGED so that activities with the greatest potential to generate noise are conducted during periods of the day which will resulting least disturbance.	Municipality/City Corporation	Municipality/City Corporation
Health and safety risk of workers	• Risk of health of workers working in plant operation and maintenance, workers may suffer infectious diseases due to feedstock handling. • Workers/plant operators may have accident risk of operation and maintenance of Incinerator Plant.	– Provide all the personal protective equipment like gum boots, nose mask, gloves etc. for the protection of workers. – The workplace will be equipped with fire detectors, alarm systems and fire-fighting equipment. The equipment will be periodically inspected and maintained in good working condition. – Providing adequate personnel facilities, including washing areas and areas to change clothes before and after work. – Medical check-up will be conducted on regular basis and the health conditions will be monitored. – First aid facilities required to attend immediately for meeting emergency situations will be made available at the facility. – Maintaining good housekeeping in waste processing and storage areas. – Fire extinguisher and firefighting facilities should be established during operation	Municipality/City Corporation	Municipality/City Corporation
Efficient working of the WtE plant/landfill sites	• Inefficient working of plant may cause poor quality of treatment and resulting under treatment of medical waste may cause environment, health and safety risk to workers and environment.	– Procedure for each step of operation shall be documented and all workers/operators shall be trained on the proper operation of each component of the plant. – Although impact is likely to be minimal due to new and well-designed efficient system, it must be ensured that the facility is operating properly at all times.	Municipality/City Corporation	Municipality/City Corporation
Efficient working of Sanitary Landfill Facility	• Inefficient working of the Sanitary Landfill may cause environment, health and safety risk to workers and environment.	– Procedure for each step of operation shall be documented and all workers/operators shall be trained on the proper operation of each component of the facility.	Municipality/City Corporation	Municipality/City Corporation

Issues/ Activities	Potential Environmental Impacts	Proposed Mitigation Measures	Responsibility	
			Implementation	Supervision
Traffic management	• Random parking of vehicles and unplanned loading / unloading of wastes in the subproject areas can lead to traffic congestion	– A well-defined schedule and route will be followed by the waste carrying trucks; – Proper signage will put up near the proposed facility giving route directions; – Vehicles will be parked inside the facility premises in the designated slots; – Entry and exit routes from the premises will be clearly marked; – Adequate lighting and reflective boards will be put up for night time safety; – A proper traffic management plan will be implemented to mitigate adverse impacts; – All routes will be planned to cause minimal disturbance to local community; – The vehicles will be allowed to move in the site only through dedicated entry and exit points within the site; – Dedicated parking area will be provided in the facility for parking of vehicles; – The speed limit of vehicles will be restricted to 20 km/hr.	Municipality/City Corporation	Municipality/City Corporation
Community health and safety	• Possible accumulation of waste causing health problems for community. Pests and vermin.	– Wet/biodegradable wastes will be emptied directly from the bins to primary collection vehicles daily and dry/non-biodegradable wastes once in a week. The number and type of bins and vehicles to be procured under the project is sufficient to ensure no accumulation of wastes in the community. – Wastes will be collected regularly to prevent pests and vermin.	Municipality/City Corporation	Municipality/City Corporation
Socio-economic aspect	• Visual impacts. • Impacts on community health. • Employment.	– Good Solid Waste handling practices will be implemented which will greatly reduce foul smell and reduce impact from odors; – Vehicles moving through community roads will be covered and the operations will be restricted to day time; – Maximum efforts will be made to provide job opportunities to local residents during construction and operation phase. – Awareness campaigns should be organized emphasizing the need of sorting at source, waste collection and participatory role of Citizens in Solid waste management in the Municipality/City Corporation Area.	Municipality/City Corporation	Municipality/City Corporation

Note: Mitigation/enhancement measures cost will be determined during the environmental assessment of individual projects based on its location, types of construction, implementation schedule, cost for project implementation and requirement of mitigation/enhancement activities.

SECTION-7: BIODIVERSITY ASSESSMENT PLAN

7.1 INTRODUCTION

To develop an effective management plan requires an initial assessment of the status of biodiversity, to set the priorities and objectives for management, and then ongoing monitoring, to establish whether or not management actions are achieving their objectives. Biodiversity assessments, therefore, normally four key components of protected area management plans, from which monitoring strategies and programmes are identified and implemented as depicted in Figure-7.1. The process is essentially a circular one, with periodic evaluations being earned out to assess progress in the implementation of actions and the achievement of objectives. Over the long-tem the monitoring data need to be used to re-evaluate the most recent biodiversity assessment to ensure that decisions are based on the best and most up-to-date information.

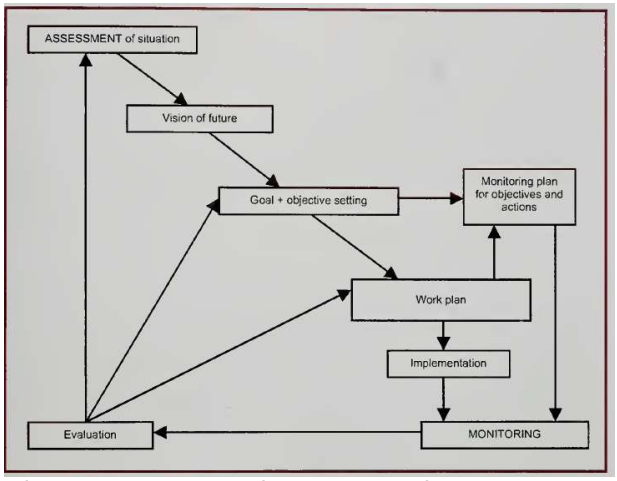


Figure-7. 1: Biodiversity assessment and monitoring within a management planning cycle

7.2 BIODIVERSITY ASSESSMENT

Biodiversity assessment is the first stage in the process of defining the biodiversity management objectives for an area. Its purpose is to gather and assess the information required to make decisions and recommendations for the future.

In the context of management planning for a protected area, a biodiversity assessment involves measuring or surveying what exists in the area and what is known about it, judging its value and identifying the most important features e.g.

(i) human habitat
(ii) ancient monument;
(iii) archaeological site;
(iv) forest sanctuary;
(v) national park;
(vi) game reserve;
(vii) wild animals habitat;
(viii) wetland;
(ix) mangrove;
(x) forest area;
(xi) bio-diversity of the relevant area; and
(xii) other relevant factors.

Assessments therefore need to involve a social component that identifies biodiversity features of high socio-economic value, as well as features of high aesthetic, cultural or intrinsic value. Assessments also typically include identification of the principal factors affecting the important biodiversity features within the protected area.

7.3 PRINCIPLES OF BIODIVERSITY MANAGEMENT PLAN

Four key principles for effective management planning are listed below:

1. The plan should have conceptual rigour as a decision-making framework. This framework should provide:

(a) a clear sense of a desired future for the subproject area;
(b) a set of strategies and actions for achieving this future;
(c) clear guidance that can assist managers dealing with opportunities and eventualities that arise during the life of the plan;
(d) a basis for monitoring of plan implementation and progress towards the desired future and adjustment of planning strategies and actions as required.

2. The plan should place the management of the area into a relevant environmental, social and economic planning context. Where possible, planning decisions should be integrated into this broader planning framework.
3. The content of the plan should be formulated within an adequate and relevant information base and should place management issues within a broader context and in relation to the desired future for the area: the needs and interests of any local and indigenous communities and other stakeholders should have been considered within the plan.
4. The plan should provide a programme and prioritised set of actions for achieving the desired future for the area.

Protected areas cannot remain in isolation from the communities and the economic activities in and around protected area. As noted in principle 3, plans should address the needs of local communities and other stakeholders. The Vth IUCN World Park Congress held in Durban, South Africa has also emphasised on the rights of local communities in relation to natural resources and biodiversity conservation. Participatory management approaches, such as where two or more social actors negotiate, define and guarantee amongst themselves a fair sharing of the management functions, entitlements and responsibilities for a given territory area or set of natural resources should therefore be used wherever appropriate. At the very least management, planning should involve adequate consultations with all stakeholders.

7.4 CARRYING OUT A BIODIVERSITY ASSESSMENT FOR A PROTECTED AREA

A biodiversity assessment typically involves a number of key steps as outlined in Figure-7.1. The assessment may then lead on to the setting of broad goals, aims and objectives for the protected area. These key steps are further described in the following sections.

(i) Step-1: Create enabling environment for participation, if necessary
(ii) Step-2: Gather and review required data
    a. Step-2.1: Carry out new baseline surveys if necessary
(iii) Step-3: Identify constraints, opportunities and pressures
(iv) Step-4: Biodiversity Evaluation
    a. Step-4.1: Carry out overall biodiversity evaluation of the protected area
    b. Step-4.2: Identify key biodiversity features (See section 7.2) including threatened species (e g Spoon billed sandpiper), key habitats, ecological functions (e.g. grazing land) and important resources (e g medicinal plants)
(v) Step-5: Set biodiversity objectives
    a. Step-5.1: Identify overall vision and broad goals
    b. Step-5.2: Select biodiversity features and attributes of each to be monitored (e g. Spoon billed sandpiper population size, forest area, forest tree diversity)
    c. Step-5.3: Set Specific, Measurable, Attainable, Realistic and Time specific (SMART) objectives for each feature and attribute (e g maintenance of > 50 Spoon billed sandpiper)
(vi) Step-6: Assess available monitoring resources (manpower, equipment, expertise, time)
(vii) Step-7 Set SMART Objectives for pressures and responses (e.g. <2% timber extraction per year)
(viii) Step-8: Develop monitoring programme

7.5 BIOLOGICAL DIVERSITY IN BANGLADESH

Bangladesh supports a diverse set of ecosystems, notwithstanding its relatively small geographical area. It is bounded in the north and the east by the eastern Himalayan and western Myanmar hills, which are centres of plant diversity as well as locations of many biodiversity hotspots (WWF and IUCN 1994-1995). The entire country is biogeographically a transition between the Indo-Gangetic plains and the eastern Himalayas and, in turn, part of the Indo-Chinese sub-region of the Oriental realm.

7.5.1 Ecosystem Diversity

A broad range of ecosystem types are found in Bangladesh, including tropical rain forests, mangrove forests, floodplains and charlands, freshwater and coastal wetlands, littoral, sub-littoral and benthic communities of the Bay of Bengal.

As in many parts of the world, very few ecosystems in Bangladesh are really free of human interference. Nishat et al. (2002) divided Bangladesh into 12 broad bio-ecological zones, shown in Figure 7.2. The ecosystems of Bangladesh can be placed under 4 broad types' viz., coastal and marine ecosystem, inland freshwater ecosystem, terrestrial forest ecosystem and man-made ecosystem (Daniels, 2003).

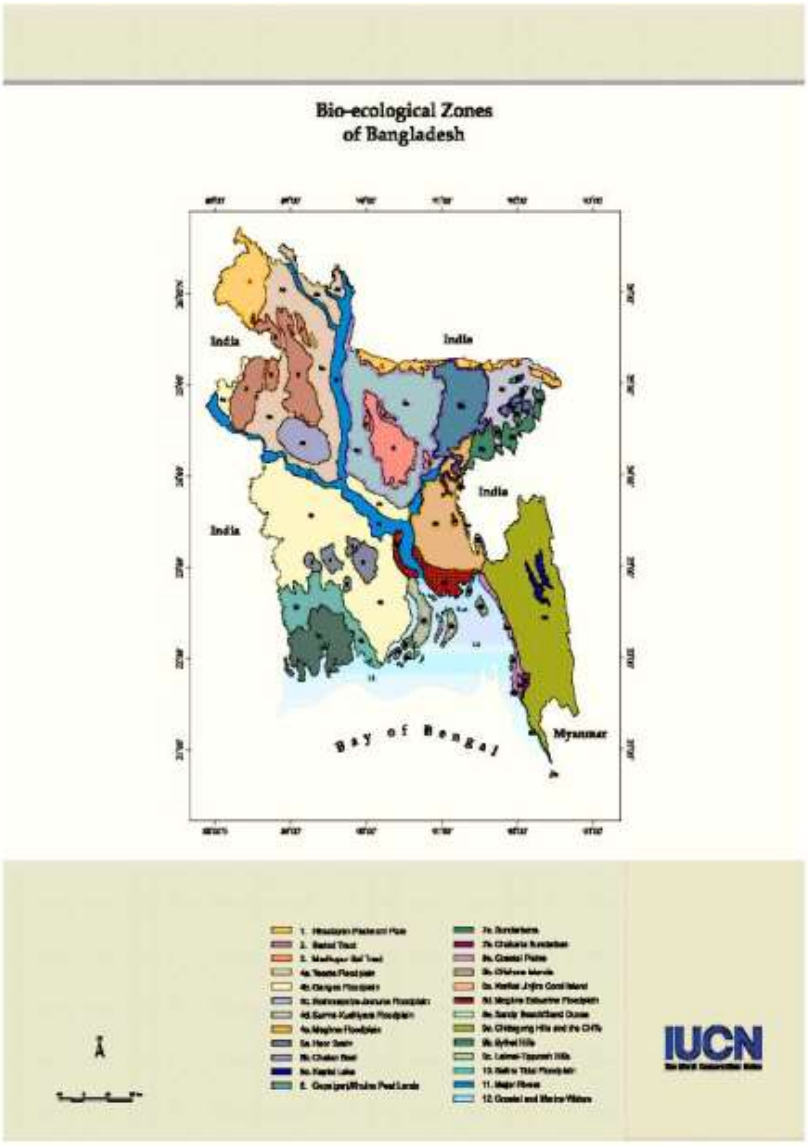


Figure-7.2: Bio-ecological Zones of Bangladesh

7.5.2 Ecosystem Conservation

There are 18 Protected Areas in Bangladesh of which two are proposed, covering about 2444 sq km and representing 1.63% of the country's surface area, and 9.14% of its forest area (Gani, 2003) (Table 7.1; Figure 7.3 – showing 16 Pas). The Forest Department has the mandate for management of these protected areas. The Bangladesh Wildlife Preservation (Amendment) Act, 1974, recognises three categories of Protected Areas (Table 7.1), viz. national parks, wildlife sanctuaries and game reserves. These are defined in the Act as:

- "Game Reserve means an area declared by the Government as such for the protection of wildlife and increase in population of important species where capturing of wild animals shall be unlawful".

- "National Park means comparatively larger areas of outstanding scenic and natural beauty with the primary objective of protection and preservation of scenic attributes, flora and fauna in natural state to which access for public recreation, education and research may be allowed".
- "Wildlife Sanctuary means an area closed to hunting, shooting or trapping of wild animals and declared as such under Article 23 by the government as undisturbed breeding ground primarily for the protection of wildlife inclusive of all natural resources, such as vegetation, soil and water".

The Bangladesh Environment Conservation Act, 1995 (Act I of 1995) deals exclusively with environmental issues. When the ecosystem of any area has reached a critical state due to the degradation of environment, the Government, by notification, may declare the same as "ecologically critical area" under the provision of this act, where restrictions on economic activities are imposed. There are thirteen Ecologically Critical Areas (ECA) in the country (Table 7.2).

The middle grounds and the southern patches of the Bay of Bengal, comprising 698 sq km area have been earmarked as to constitute a Marine Park in the year 2000 under the Marine Fisheries Act, 1985.

Table-7. 1: Protected Area of Bangladesh

Sl. No	Name	Forest Type	Area in Ha	Established in year
National Parks				
1	Modhupur National Park	Sal forest	8,436	1962/1982
2	Bhawal National Park	Sal forest	5,022	1974/1982
3	Himchari National Park	Hill forest	1,729	1980
4	Lawachara National Park	Hill foret	1,250	1996
5	Kaptai National Park	Hill forest	5,464	1999
6	Ramsagar National Park	Sal forest	28	2001
7	Nijhum Dwip National Park	Coastal Mangroves	16,352	2001
8	Meda Kochchapia National Park	Hill forest	395	2004
9	Satchari National Park	Hill forest	240	Proposed
Wild Life Sanctuaries				
10	Sundarban East WS	Natural mangroves	31,227	1960/1996
11	Pablakhali WS	Hill forest	42,087	1962/1983
12	Char Kukri Mukri WS	Coastal mangroves	40	1981
13	Chunati WS	Hill forest	7,761	1986
14	Rema Kalenga WS	Hill forest	1,796	1996
15	Sundarban West WS	Natural mangroves	71,502	1996
16	Sundarban South WS	Natural mangroves	36,970	1996
17	Hazarikhil WS	Hill forest	2,443	Proposed in 1974
Game Reserves				
18	Teknaf GR	Hill forest	11,615	1983

Source FD June 2005

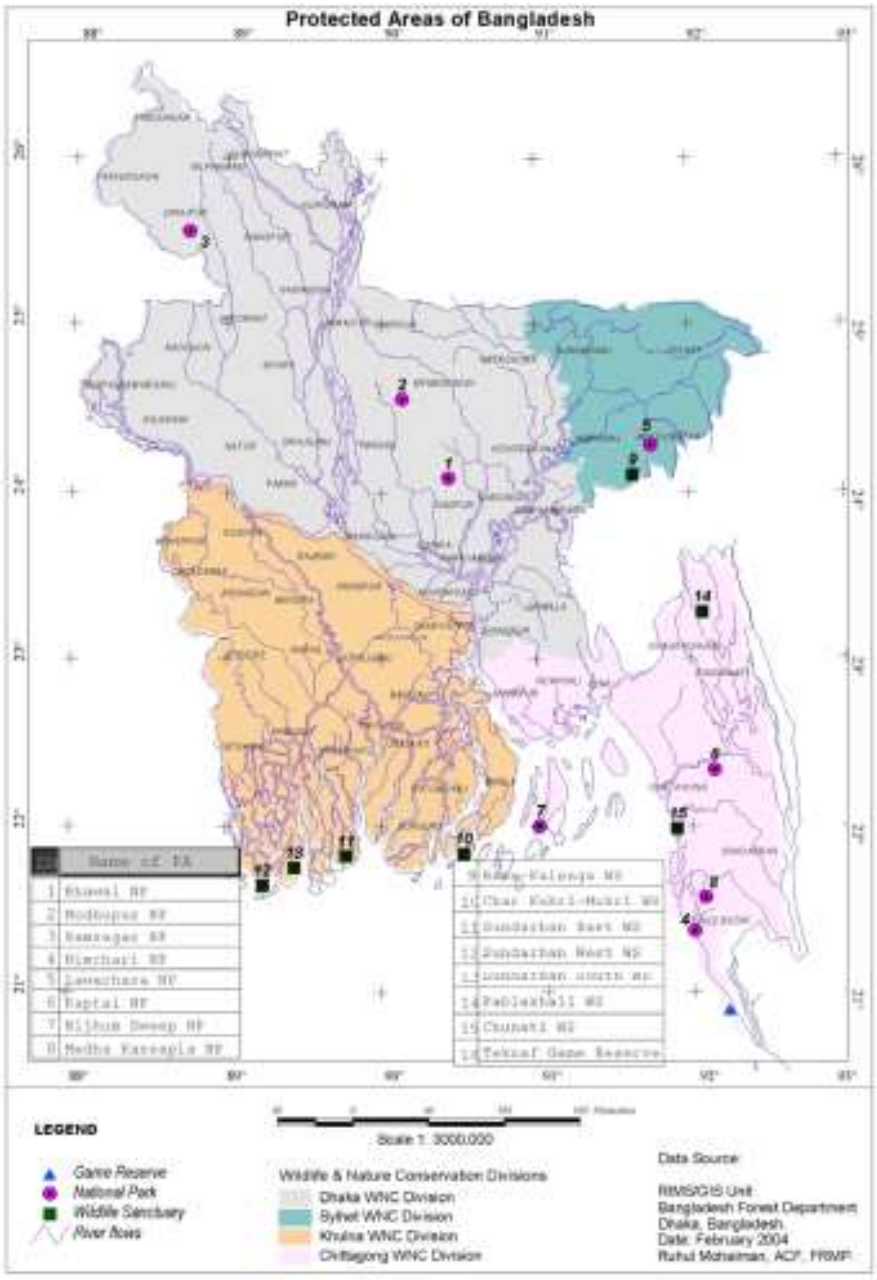


Figure-7.3: Protected Area Map of Bangladesh

Table-7. 2: List of Ecologically Critical Areas of Bangladesh

Sl. No.	Ecologically Critical Areas (ECAs)	Total Area (in Hectare)	Name of the District	Name of the Upazila
1	Sundarban	7,62,034	Bagerhat, Khulna, Shatkhira	Upazilas within 10 km peripheral distance of the identified reserve forest area
2	Cox's Bazar, Teknaf sea-beach	10,465	Cox's Bazar	Cox's Bazar
				Ramu
				Ukhia
				Teknaf
3	Saint Martin Dweep (Island)	590	Cox's Bazar	Teknaf
4	Sonadia Dweep (Island)	4,916	Cox's Bazar	Moheshkhali

Sl. No.	Ecologically Critical Areas (ECAs)	Total Area (in Hectare)	Name of the District	Name of the Upazila
5	Hakaluki Haor	18,383	Moulvibazar and Sylhet	Borolekha Kulaura, Fenchuganj and Golapganj
6	Tanguar Haor	9,727	Sunamganj	Taherpur and Dharmopasa
7	Marjat Baor	200	Jhenaidah	Kaliganj
8	Gulshan-Baridarha Lake	-	Dhaka	Gulshan- Baridhara
9	Buriganga River	-	Dhaka	-
10	Turag River	-	Dhaka	-
11	Balu River	-	Dhaka	-
12	Sitalakhya River	-	Dhaka-Narayanganj	-
13	Jaflong-Dawki River	-	Sylhet	Gowainghat

7.5.3 Species Diversity

Wild plant diversity

The number of species of non-flowering plants excluding algae (bryophytes and pteridophytes) is still not completely known. Many species are disappearing even before they are identified and registered. Table-7.3 shows estimated numbers of species of wild plants in Bangladesh.

Box-1: Threatened Plants

Khan et al. (2001) have listed 106 species of plants as endangered including 2-3 species of ferns, 4 species of gymnosperms and the rest, angiosperms. Of these, the palm Corypha taliera has been considered as 'critically endangered'; the last surviving individuals of the species in the whole world are limited to Bangladesh

Table-7. 3: Recorded and Estimated Number of Wild Plant Species of Different Plant Groups

Categories	Recorded	Estimated
Algae	3,600	6,000
Bryophytes	290	400
Pteridophytes	200	250
Gymnosperms	5	5
Angiosperms	3,000	5,000

Source: Hassan (2003)

Wild animal diversity

Though least known, the invertebrates form a major bulk of the faunal diversity, particularly aquatic invertebrates. Scanty information is available, mostly in scattered literature. A tentative number of taxa under invertebrates including zooplankton and protozoa, and vertebrates are provided in Table-7.4 Monera and Protista have also been included.

Table-7. 4: Number of Animal Species Belonging to the Major Taxonomic Groups

Major Taxonomic Group		Number of species mentioned in this document
Monera (Eubacteria, etc.)		166
Protista (Protozoan, Viruses, etc.)		341
Animalia: Invertebrates	Poriferans	7
	Cnidarians	68
	Platyhelmiths	23
	Nematodes	105
	Annelids	62
	Arthropods	1547
	Molluscs	347
	Echinoderms	6
Animalia: Vertebrates	Fishes	735
	Amphibians	23
	Reptiles	136
	Birds	778
	Mammals	125
Total Species		**4,469**

The status of the various groups of vertebrates determined based on the numbers of threatened species and modified IUCN categories (IUCN-Bangladesh, 2000) are shown in Fig.7.4 below.

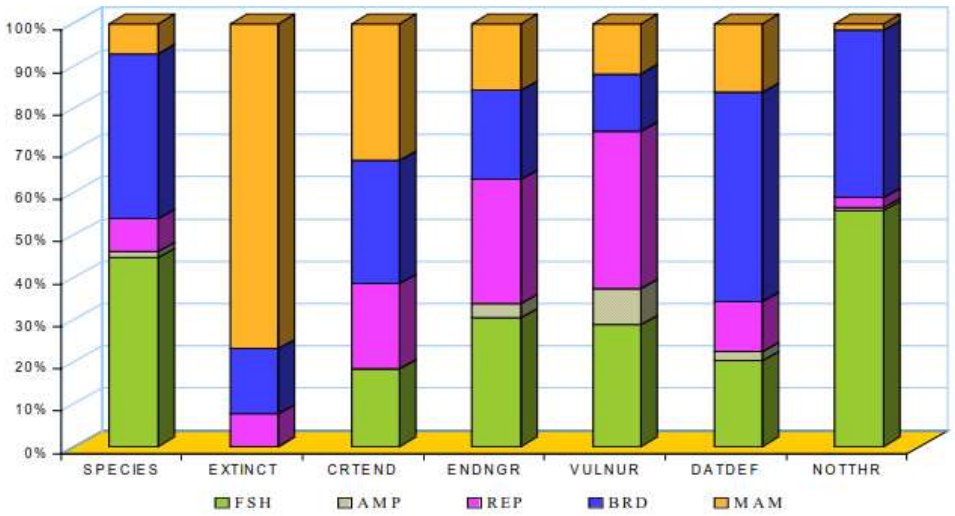


Figure-7. 4: Status of the various groups of vertebrates determined based on the numbers of threatened species and modified IUCN categories (IUCN-Bangladesh Red Data Book, 2000).
(MAM-Mammal, BRD-Bird, REP-Reptile, AMP-Amphibia, FSH-Fish, CRTEND-Critically Endangered, ENDNGR-Endangered, VULNER-Vulnerable, DATDEF-Data Deficient, NOTTHR-Not Threatened).

Invasive alien species

Decision VI/23 of the Sixth Conference of the Parties (COP-6) of the CBD, defines "Invasive Alien Species" as alien species whose introduction and/ or proliferation threatens biological diversity.

Box-2: Invasive Alien Plant Species in Bangladesh

Invasive alien species (IAS) compete and suppress the survival of native species, rendering habitats vulnerable to fire and deterioration. Important IAS in Bangladesh are the following:

Eichhornia crassipes (Kachuri pana), Eupatorium odoratum(Ayapan) , Mikania cordata (Assam lota), Croton bonplandianum(Bon khira), Lantana camara (Nak phul) , Leucaena leucocephala (Teli kadam), Acanthospermun hispidum (Katahara), Cassia occidentalis (Kasundi), Ageratum conyzoides (Goat weed,ghag), Alternanthera flocoidea (Hechi), Atylosia scarabaeoides, Commelina obliqua (Jotakansira), Convolvulus arvensis, Evolvulus nummularius (Bhuiokra), Hyptis suaveolens (Bon tokma), Ipomea carnea (Dholkalmi), Ludwigia adscendens (Keshordham) and Mimosa pudica (Lajjaboti) . Source: Hossain and Pasha (2001).

Plants: Hassan (2003) and Hossain (2004) provide a long list of alien and invasive alien plant species from Bangladesh, some of which are listed in Box 2.6. Eichhornia crassipes (Kachuri pana) is a notorious weed of fresh water ecosystems; Eupatorium odoratum (Ayapan) and Mikania cordata (Assam lota) are two invaders of terrestrial ecosystems that overtop the canopy of shrubs and young tree saplings. Croton bonplandianum (Bon khira) and Lantana camara (Nak phul) grow along the edges of forest and wastelands and invade local vegetations

Animals: Little information is available on invasive alien animal species in Bangladesh, although Rashid (2004) has provided a brief review on the subject. The introduction of alien species of fauna, particularly fish, started in the early 1950s. The decision to introduce the alien species was primarily to increase productivity. Rashid (2004) reports that so far at least 32 fish species have been introduced in the country. The impact of alien species on indigenous species has not yet been thoroughly studied. Among the exotics, tilapia of two species, viz. Oreochromis mosambicus and O. niloticus has caused grievous concerns because these species have invaded all available habitats, including the estuaries (Rashid 2004).

Genetic Diversity

Wide genetic variations occur in plants and animals both in the wild as well as cultivated/ domesticated states, and the diverse agro-ecosystems of Bangladesh are rich in genetic resources of plants and animals. Local communities have selected and conserved genetic variations in plants and animals in the various agro-ecological zones for centuries. More recently, there have been organized efforts in preserving the domesticated biodiversity by both governmental and non-governmental agencies, which have built up large germplasm collections.

Box-3: "Nayakrishi Andolon" and the Local Varieties of Rice

UBINIG, an NGO through its "Nayakrishi Andolon" collected 110 local varieties of aman and aus rice from Tangail, Noakhali and Sherpur areas of which some varieties are popular among the nayakrishi farmers. The varieties have very fascinating names that reflect the local culture/heritage of the area, e.g. Jamaiaduri,

Tulsimala, Modhumaloti, Chinigura, Kalobinni, Moinaguri etc. Invasion of HYV rapidly eroded these local varieties in the recent past. Efforts to conserve these resources are needed immediately.

Plants: Domesticated plants in Bangladesh range from rice and millets to tubers such as Dioscorea (yam), Colocasia (taro), Ipomoea batatus (sweet potato), legumes, oil seeds, vegetables, fruits, spices and fiber (cotton and jute) (Haque, Mamtazul 2003). The greatest diversity in any crop is that which is known in rice (Oryza sativa). Six thousand varieties of rice are known to have existed in the country (Khan.,1997). (Also see NBSAP background materials by Hassan, 2003; Haque, 2003; Hossain, 2004; Yusuf, 2003).

Box 2.7: Domesticated Animals of Bangladesh
Livestock population in Bangladesh is around 164 million comprising chicken 60%, ducks 18%, cattle 13%, goats 8%, sheep 1% and buffalo 0.4%. Essentially, poultry dominates the livestock scene (78%).
Source: Kamaruddin (2003).

Animals: Domesticated animal biodiversity in Bangladesh is largely limited to livestock. To a very small extent, dogs, cats and ornamental fish contribute to the diversity. Other than these, there are domesticated pigs in the tribal settlements in the hills. A number of fish species are cultured throughout the country.

7.6 THREATS TO BIODIVERSITY IN BANGLADESH

The following table summarizes various threats to the biodiversity in Bangladesh along with their underlying causes. These emerged from the consultation meetings, focus group discussions, people's responses to the nationally publicised issue based queries, and regional and national workshops. The examples of threats and their underlying causes provided in Table 7.5 incorporate many more specific instances that were highlighted during the consultations. Among the threats, habitat loss is considered as the single most crucial one. Among the underlying causes, the land tenure and user rights issues emerged as the most significant ones.

Table-7. 5: Threats to Biodiversity

Nature of threat/ underlying cause	Examples of specific threats/underlying causes
Threats	
Loss of habitat	Deforestation (for agricultural expansion, human settlements) Urbanization Draining/filling water bodies Destruction of fish breeding areas Hill slope cultivation and associated silting of water bodies Clear felling for plantation Jhum (slash and burn) cultivation Forest fire Alien and invasive species Upstream withdrawal of water /salinity intrustion downstream
Over harvesting of resources	Unregulated/unscientific logging Indiscriminate collection of medicinal plants Hunting/trafficking in wildlife Harmful fishing gear/trap
Increasing productivity	Indiscriminate breeding of livestock Indiscriminate introduction of HYVs Introduction of hybrid fishes
Natural calamities	Floods Droughts Earthquakes Others
Underlying causes of threats	
Pollution	1. Disposal of untreated industrial wastes/oil spillage from ships 2. Indiscriminate use of pesticides/fertilizers
Awareness	1. Major focus of policy makers is on development 2. Sole priority of poor stakeholders is economic uplift
Land tenure and user rights issues	1. Conflictive and incomplete legislative measures 2. Conflictive sectoral policies 3. Legal instruments and policies do not conform with conservation science

Nature of threat/ underlying cause	Examples of specific threats/underlying causes
	4. Traditional land management systems disappearing
Institutional capacity constraints	1. Conflictive institutional mandates and responsibilities 2. Many of the protected areas are essentially "parks on paper" 3. Expertise in many government agencies dedicated to production rather than conservation
Human population growth	1. Increasing demand for space/resources 2. Change in agricultural practices and local culture 3. Land use change/conflict 4. Poverty

7.7 STRUCTURE OF BIODIVERSITY ASSESSMENT PLAN

The biodiversity Assessment Plan report should have the following sections.

- Executive summary.
- Introduction (e.g. purpose and scope of plan, reason for designation of protected area and authority for plan).
- Description of the protected area.
- Evaluation of the protected area.
- Analysis of issues and problems.
- Vision and objectives.
- Zoning plan (if appropriate).
- Management actions (list of agreed actions, identifying schedule of work, responsibilities, priorities, costs and other required resources).
- Monitoring and review.

SECTION-8: CLIMATE CHANGE

8.1 INTRODUCTION

Building resilience to climate and geophysical hazards is a vital step in the fight against poverty and for sustainable development. Screening for risks from these hazards improves the likelihood and longevity of a project's success. The project level Climate and Disaster Risks Screening Tool provides early stage due diligence on climate and disaster risks at the concept stage of project development. The tool uses an exposure - sensitivity - adaptive capacity framework to consider and characterize risks from climate and geophysical hazards, based on key components of a project and its broader development context. This chapter summarizes the results of the screening process for the development of Integrated Solid Waste Management Improvement Project under AIIB funding.

The potential risks flagged in this report were identified through the four screening stages by connecting information on climate and geophysical hazards exposure with the user's subject matter expertise and understanding of the project components and sensitivity to rate the impacts. The tool does not provide detailed risk assessments, rather it flags risks to inform consultations, enhance dialogue with local and other experts, and define further analytical work at the project location. This early stage due diligence can be used to strengthen the consideration of climate and disaster considerations in key components of the project design, including the physical and non-physical aspects. The broader sectoral and development context conditions could help modulate the risks to the delivery of the outcome/service level. The results of the screening are presented below, with supporting narrative to guide their interpretation.

8.2 CLIMATE CHANGE IMPACTS OF SUB-PROJECTS ON GHG EMISSIONS

Landfill gas contains many different gases. Methane and carbon dioxide make up 90 to 98% of landfill gas. The remaining 2 to 10% includes nitrogen, oxygen, ammonia, sulfides, hydrogen and various other gases. Landfill gases are produced when bacteria break down organic waste. The amount of these gases depends on the type of waste present in the landfill, the age of the landfill, oxygen content, the amount of moisture, and temperature. For example, gas production will increase if the temperature or moisture content increases. Though production of these gases generally reaches a peak in five to seven years, a landfill can continue to produce gases for more than 50 years.

Greenhouse gases, or GHGs, are gases that trap heat or longwave radiation in the atmosphere. Their presence in the atmosphere makes the Earth's surface warmer. Sunlight or shortwave radiation easily passes through these gases and the atmosphere, is absorbed by the surface of the earth and is released again as heat or longwave radiation. The molecular structure of GHGs allows them to absorb this released heat and re-emit it back to the earth. This heat-trapping phenomenon is known as the greenhouse effect.

Climate change could have an impact on the future development and operation of waste management facilities and infrastructure as it could result in changes to a number of factors that affect waste management processes including changes in temperature, cloud cover, rainfall patterns, wind speeds and storms. The timescales for climate change and waste management are similar.

Many of the projected impacts of climate change will reinforce the baseline environmental, socio-economic and demographic stresses. Climate change is likely to result in:

(vi) Increased flooding, both in terms of extent and frequency, associated with sea level rise, greater monsoon precipitation and increased glacial melt
(vii) Increased vulnerability to cyclone and storm surges
(viii) Increased moisture stress during dry periods leading to increased drought
(ix) Increased salinity intrusion
(x) Greater temperature extremes

a) Increased flooding

Precipitation extremes will result in increased rainwater flooding, both because of the increase in monsoon rains, and also because of the increased incidences of flash floods associated with increased intensity of precipitation interrupted by sustained dry spells, increasing the surface runoff when the rains do come.

Sea level rise will directly result in increased coastal flooding, which will increase in the event of storm surges. Sea level rise in Bangladesh is higher than the mean average rate of global sea level rise over the past century, because of the effects of GHG.

Higher temperatures will result in increased glacier melt, increasing runoff from the neighbouring Himalayas into the Ganges and Brahmaputra rivers.

b) Increased intensity of cyclone winds and precipitation

The IPCC conclude that there is evidence of a 5-10 per cent increase in intensity (wind speed) that would contribute to enhanced storm surges and coastal flooding, and also project a 20 per cent increase in intensity of associated precipitation that would contribute to flooding. Cyclone winds are likely to increase in intensity because of the positive correlation with sea surface temperature.

c) Increased moisture stress during dry periods

Climate change will exacerbate drought in Bangladesh both in terms of intensity and frequency linked to higher mean temperatures and potentially reduced dry season precipitation. Monsoon rains produce 80% of Bangladesh's annual precipitation, and when this is reduced, drought is a significant problem. The Southwest and Northwest regions are particularly susceptible to drought. Greater precipitation extremes associated with climate change also mean less rainfall in the dry season, which will increase water stress on those areas that already experience water shortages, particularly in the winter months. This will be worse for those areas that depend on glacial melt water for their main dry-season water supply, as glaciers recede with rising temperatures.

d) Increased salinity

The availability of freshwater will be reduced by increased salinity intrusion into fresh water sources during the low flow conditions. In the coastal regions this is brought about by sea level rise resulting in saline water intrusion in the estuaries and into the groundwater. The effects are exacerbated by greater evaporation and evapotranspiration of freshwater as temperatures increase, coupled with a greater demand for fresh water in times of water stress.

e) Greater temperature extremes

Climate change is associated with hotter summers and colder winters. Temperatures in Bangladesh have increased, and further temperature increases are expected. However, although the overall climate is warming, temperature extremes are increasing.

This highlights the interaction between climate change and the existing stresses already experienced by Bangladesh with regards to water management.

Climate change will also affect the distribution of climate sensitive diseases. Malaria is a frequently cited example, because its prevalence increases in line with the warmer, wetter climates that are anticipated with climate change.

8.2.1 Waste Management Activities

a) Waste Collection

Higher Temperatures

- Result in need for increased level of collections for mixed waste containing putrescible and segregated biodegradable waste collections due to increased rate of decomposition with results odour and insect infestation potential and bioaerosol releases.
- Reduce outdoor workers' productivity. In some cases, extreme temperatures could adversely affect outdoors workers at risk from heat stress.
- Give rise to situations where there is a greater risk of disease being transmitted where putrescible waste is handled.
- Impact on the selection of waste collection containers if adverse impact are to be avoided.

Increased precipitation in winter

- Lead to disruption to transport infrastructure from increased flooding and hence collection and delivery of waste
- Require provision of containers designed to keep waste dry.

Any Increased storminess

- Lead to increased incidences of windblown litter and debris. In severe cases this could increase risk of injury from flying objects for collection workers.

Rising sea level

- Lead to disruption of collection rounds on the coast

b) Waste Transfer

Higher Temperatures

- Reduce outdoor and indoor workers' productivity. In some cases, extreme temperatures could adversely affect outdoors workers at risk from heat stress.

- Give rise to situations where there is a greater risk of disease being transmitted where putrescible waste is handled.
- Lead to odour impacts due to increased rate of decomposition requiring sophisticated odour and bioaerosol control measures at the transfer station and a reduction in the volume of waste that may be stored on site for a reduced time.

Reduced precipitation in summer

- Reduce water availability for site management e.g. dust suppression.

Increased precipitation in winter

- Increase flooding occurrences on site due to inundation of site facilities e.g. weighbridge, roads and offices depending on site location.
- Lead to disruption to transport infrastructure due to floods and hence delivery of waste to site and transport off site.

Reduced cloud cover and Increased UV radiation

- Require the provision of shaded areas over skips and waste reception containers.

Any Increased storminess

- Lead to increased incidences of windblown litter and debris. In severe cases this could increase risk of injury from flying objects, mainly for site workers.
- Lead to damage to buildings and site closure. Procedures exist for addressing these problems but they may become more frequent.
- Require more sophisticated buildings than currently provided.

Rising sea level

- Lead to inundation of sites near to the coast
- Lead to increased damage from storm surge for sites near to the coast

c) Disposal/Landfill

Higher Temperatures

- Alter waste decomposition rate. This would have implications for the amount of landfill gas generated, length of active gassing phase, site settlement, closure and completion etc.
- Lead to reduce water availability, alter site hydrology and hence leachate production
- Lead to reduced water availability and hence increased strength of leachate due to reduction in dilution
- Reduce outdoor workers' productivity. In some cases, extreme temperatures could adversely affect outdoors workers at risk from heat stress.
- Give rise to situations where there is a greater risk of disease being transmitted e.g. water borne and food poisoning types ailments due to increased pathogen activity, bioaerosol releases
- Give rise to increased vermin e.g. flies
- Give rise to increased risk of odour nuisance
- Increased stress to vegetation and planting in landscaping and screening areas

Reduced precipitation in summer

- Alter the waste decomposition rate (higher temperatures and less moistures could reduce decomposition rate. Higher temperatures and adequate moisture could increase decomposition rate.)
- Alter site hydrology
- Increase leachate strength
- Reduce water availability for site management e.g. dust suppression
- Increase the risk of shrinkage in clay lining and capping layers

Increased precipitation in winter

- Increase flooding occurrences on site due to saturated waste and raising ground water. This could result in increased risk of offsite pollution from leachate and gas migration (depending on nature of site) and inundation of site facilities e.g. weighbridge, roads, offices, leachate treatment equipment, gas extraction equipment, offices etc. depending on site location. This could have periodic implications for environmental protection.
- Alter waste decomposition rate
- Increase leachate production in winter months (increased treatment and disposal costs)
- Lead to disruption to transport infrastructure (road and rail) due to flooding and hence delivery of waste
- Increase slope stability risks
- Increase risk of erosion of bunds and capping layers

Reduced cloud cover and Increased UV radiation

- Increase the risk to outdoor workers from sunburn and other skin conditions associated with over exposure.
- Have an adverse impact on the life of exposed materials e.g. High-Density Polyethylene liner, plastic pipework and drainage ducts etc.
- Increase the risk of damage to the High-Density Polyethylene liner due to solar gain requiring additional protection measures during installation

Any Increased storminess

- Lead to disruption of water based waste transport
- Lead to increased incidences of windblown litter and debris. In severe cases this could increase risk of injury from flying objects, mainly for site workers
- Lead to damage to buildings and site closure.

Rising sea level

- Lead to inundation of sites near to the coast
- Lead to increased damage from storm surge for sites near to the coast

8.3 METHOD OF GHG ESTIMATION OF SUBPROJECTS

The GHG emissions and savings will be calculated for the entire waste management system. For this, transportation operations and activities at intermediate and final treatment facilities were considered. After collection, the waste is sent to intermediate facilities where it is prepared for further treatments and final disposal destinations. The intermediate facilities to be considered are: bulking stations, material recovery facilities (MRF), and transfer stations. In addition, the following waste treatments will be considered: landfilling, incineration, anaerobic digestion (AD), composting, and recycling.

Data collection

The waste data to be considered will be entirely the household MSW, which included recyclables, organic waste, and residual quantities for this project. The residual category corresponds to all waste that is not treated, either by recycling, composting, or AD. It should be noted that some recyclable and compostable waste has to be sacrificed to residual treatments (incineration and land-filling) owing to them being contaminated or mixed up with waste destined as residual (Table-8.1).

Table-8.1: Waste types and their tonnages will be use in the GHG calculator. The calculator considers the various waste categories for the emission estimates, using waste, operation and treatment-specific emission factors (Greater London Authority, 2014a)

Municipality Solid Waste (MSW)	Recycling	Organic	Residual	Tones
Paper and card (paper, card, cardboard)	√		√	
Non-recyclable paper (books)			√	
Dense plastic (plastic rigid, bottles, video tapes)	√		√	
Textile and shoes	√		√	
Miscellaneous combustible (carpet, mattresses, tyres, wood)	√		√	
Miscellaneous non-combustible (bikes, plasterboard, rubble)	√		√	
Glass (glass and glass mixed)	√		√	
Ferrous metal	√		√	
Non-ferrous metal and cans	√		√	
Kitchen organic waste		√	√	
Garden organic/green waste		√	√	
Electrical (all waste electrical and electronic equipment)			√	
Construction and demolition	√		√	
Fines (miscellaneous small particles/fragments/objects)			√	

Waste treatment: The waste treatments to be considered are intermediate operations, recycling, organic, and residual treatments. The waste quantities to be treated will be inputted in the GHG calculator in tonnes in respective categories. The processes actually involved in each waste treatment will be considered. These

will be intermediate operations, recycling reprocessing operations, organic treatments of composting and anaerobic digestion (AD), and residual treatments such as landfill and incineration, with their specific emission factors (Greater London Authority, 2014a). The GHG calculator has modules specific to each waste management operation and treatment, with respective emission factors.

Waste transport: Information about the types of vehicles will be used in the source segregation waste collection method and further transportation will be obtained from Pourashava. This information will be included the distances to be travelled by each vehicle from the transfer stations to further treatment locations. However, it may not be included the distance to be travelled for waste collection purposes. The transport vehicles to be used for collection are refuse collection vehicles (RCV) (diesel) and sort vehicles, and the vehicles to be used for transportation from the transfer stations are roll on–off and articulated vehicles.
Data for the waste collection distance to be travelled will be obtained from ULBs. This information will include the total kilometres to be travelled for collection purposes. Although the total kilometres to be travelled for waste collection purposes may be available, the breakdown of how many kilometres each vehicle type will travel may not be available. Without a vehicle-specific distance breakdown, it will not be possible to estimate the CO2e emissions with the GHG calculator, as it requires distance input for different vehicle types. Thus, the emissions associated with waste collection will be calculated separately with the emission tool, which allows estimation of the transportation emissions by calculating the carbon factor of each type of vehicle or the use of an average vehicle emission factor (kg CO2e km−1).

8.3.1 Estimate of Subprojects GHG Emissions

For an overall emission estimation, the entire waste management stream will be considered, i.e. the emissions arising from waste transportation, intermediate facilities, residual treatments, and direct land- filling, and the emission savings owing to recycling and organic treatments. The waste and its transportation data from transfer stations will be analyzed with the GHG calculator and the collection distance data will be analysed with the emissions.
The GHG calculator, an Excel-based tool, will be used to estimate emissions arising from municipal waste management operations (Greater London Authority, 2014a, 2014b). The GHG calculator measures environmental benefits and impacts of waste management activities (Greater London Authority, 2014b); it considers carbon dioxide, methane, and nitrous oxide emissions, expressing them as CO2e emissions or savings, depending upon how the waste is managed (Greater London Authority, 2014a). There are different carbon modules in the GHG calculator; each contains information about the CO2e performance of each waste management operation/activity. Equation outlines the factors the GHG calculator considers to calculate the net GHG emissions:
Net GHG (tonnes CO2e) = [vehicles × carbon factor] × tonnes × km + [intermediate facilities × carbon factor] × tonnes – [(recycling × carbon factor) × tonnes + (organic treatments × carbon factor) × tonnes] + [landfilled waste × carbon factor] × tonnes + [incinerated waste × carbon factor × tonnes]
The computation considers that each of the different categories (vehicles, treatments, etc.) have different emission factors for each subcategory, and different vehicles have different emission factors, and so do different treatments.
It considers the vehicles types, operations at intermediate facilities, savings owing to recycling, AD and composting, emissions owing to landfilling for each waste type, and emission arising from waste incineration; thus, it allows the estimation of net GHG emissions from the entire waste management system. The emission factors will be used in GHG computation are derived from the Waste and Resources Assessment Tool (WRATE) version 2 and the Department of Energy and Climate Change data (Greater London Authority, 2014a).

Table-8. 2: Carbon factors will be used in the estimation of GHG emissions from transportation associated with local waste collection

Vehicle type/capacity	Kg CO_2e km^{-1}
HGV rigid >3.5-7.5t	0.56
HGV rigid >7.5-17t	0.75
HGV rigid >17t	0.97

HGV: Heavy Goods Vehicle.

Table-8.3: GHG emission factors according to the waste management method

Sector	Type	Emission factor	Unit
Transportation	CO_2	0.0191	Kg CO_2/km/ton MSW

Sector	Type	Emission factor	Unit
	N_2O	0.0497	Kg CO_2-eq/km/ton MSW
Incineration	CO_2	1381.4	Kg CO_2/ton MSW
	N_2O	14.9	Kg CO_2-eq/ton MSW
	CH_4	0.15	Kg CO_2-eq/ton MSW
Anaerobic digestion	CH_4	125	Kg CO_2-eq/ton MSW
Composting	CH_4	100	Kg CO_2-eq/ton MSW
	N_2O	71.52	Kg CO_2-eq/ton MSW
WTUs	CO_2	0.05	Kg CO_2/ton MSW
Open burning	CO_2	801.2	Kg CO_2/ton MSW
	CH_4	162.5	Kg CO_2-eq/ton MSW
	N_2O	44.7	Kg CO_2-eq/ton MSW
Controlled landfill	CH_4	300	Kg CO_2-eq/ton MSW

8.4 POTENTIAL REDUCTIONS OF GHG

Waste prevention and recycling-jointly referred to as waste reduction-help us better manage the solid waste that generates from the subproject areas. But preventing waste and recycling also are potent strategies for reducing greenhouse gases. Potential strategies for GHG emission reductions are described below-

a) **Reduce emissions from energy consumption**

Recycling saves energy. That's because making goods from recycled materials typically requires less energy than making goods from virgin materials. And waste prevention is even more effective. Less energy is needed to extract, transport, and process raw materials and to manufacture products when people reuse things or when products are made with less material. The payoff? When energy demand decreases, fewer fossil fuels are burned and less carbon dioxide is emitted to the atmosphere.

b) **Reduce emissions from incinerators.**

Diverting certain materials from incinerators through waste prevention and recycling reduces greenhouse gas emissions to the atmosphere.

c) **Reduce methane emissions from landfills.**

Waste prevention and recycling (including composting) divert organic wastes from landfills, reducing the methane released when these materials decompose.

d) **Increase storage of carbon in trees.**

Forests take large amounts of carbon dioxide out of the atmosphere and store it in wood, in a process called carbon sequestration. Waste prevention and recycling of paper products can leave more trees standing in the forest, continuing to absorb carbon dioxide from the atmosphere.

e) Reducing carbon emission through construction base on project life cycle

There are four stages in the construction project life cycle including project initiation or conceptualization, project planning or design, construction and termination phase, which covers operation and maintenance.

Initiation and planning phases are the preliminary determinants of construction activities, where the concept of environmentally friendly and sustainable construction can be implemented.

The way in which the green concept of the life cycle of a construction project is different compared to the conventional concept in which each stage of the project life cycle is not related to each other. In the concept of green construction, every stage in project life cycle must create green value which then transferred to the next stage.

In the end, the last green value in the project life cycle is an accumulation of the green values of the previous stages. This concept influences the management of a green project starting from planning to the operational phase of the subproject using integrated project delivery system to get maximum benefit.

f) **Project initiation / Initiation phase**

The Project Initiation is the initial phase of initiation or concept of the project. At this stage the owner must choose the process for design and construction. There are many process options, each with advantages and disadvantages.

g) **Project planning/Phase design**

Green design consists of two main elements: life cycle assessment and eco-conscious design (ECD). These two elements play an important role in minimizing the overall negative environmental footprint caused by construction and keeping environmental considerations firmly for the execution.

h) **Construction phase / project execution**

The construction or execution stage is usually done simultaneously with the control stage. This stage is the stage of the implementation of the project, ranging from material spending, tools, and labour to the construction process that refers to the output of the planning stage.

i) **Phase operational / maintenance / project closure / hand over**

The closing stage or project completion is the final stage of a project, this stage consists of handover and maintenance period, the handover is generally divided into two stages, the first stage after is construction work is completed and ready for use and then after the end of treatment. The beginning of the project closure begins when nearing the end of the project.

j) **Steps to reducing GHG emission like embodied carbon**

The need for sustainability in the design, construction, and operation of subproject is a reality. The architects have the ability and responsibility to provide solutions that minimize the climate impact of the structures they design. And while practices to reduce operating impacts are widespread, less well understood are the carbon impacts during the construction stage of a project.

There are several steps architects can take to make significant upfront impacts in the design and construction process for reduction of embodied carbon.

k) **Measure Embodied Carbon Emissions**

Across the project area, we need to start to measure what our embodied carbon emissions are across the entire construction lifecycle.

l) **Establish a Baseline**

Once we understand the scope of our emissions, we can use this as a baseline to establish reduction targets and ultimately a pathway towards net zero. Our current contributions and reduction targets must be available to the public to ensure we are held accountable.

m) **Adopt Best Practices**

Our project will need to take actionable steps towards reduction targets. For contractors that will mean disclosure of supply chain data and material selection based on lowest embodied carbon impacts. This will require further adoption of Environmental Product Declarations (EPD) from material manufacturers to be used in the selection process.

n) **Design with a Low Carbon Approach in Mind**

Designers must take a fully integrated Life Cycle Assessment approach to all design decisions. This approach considers not only a low carbon approach to designing but also other aspects of the project's performance such as material, water and energy needs across the entire lifecycle.

o) **Lead by Example**

Asset owners will need to lead by example in requiring all projects to be net zero embodied carbon. This will require changing how we approach vender and partner selection and even fund projects to put our environmental impact at the forefront.

p) **Reuse buildings instead of constructing new ones**

Renovation and reuse projects typically save between 50 and 75 percent of the embodied carbon emissions compared to constructing a new building. This is especially true if the foundations and structure are preserved, since most embodied carbon resides there. Channeling that energy and creativity toward making poor-performing buildings into something beautiful, sustainable and energy efficient has its own rewards, and yields substantial positive benefits.

q) **Specify low-carbon concrete mixes**

Even though emissions per ton are not relatively high, its weight and prevalence usually make concrete the biggest source of embodied carbon in virtually any subproject. The solution is to design lower carbon concrete mixes by using fly ash, slag, calcined clays, or even lower-strength concrete where feasible.

r) **Limit carbon-intensive materials**

For products with high carbon footprints like aluminum, plastics, and foam insulation, thoughtful use is essential. For instance, while aluminum may complement the aesthetics of our subproject, it is still important to use it judiciously because of its significant carbon footprint. The architects have the ability and responsibility to provide solutions that minimize the climate impact of the structures they design.

s) **Choose lower carbon alternatives**

After thinking about the possibilities if we can utilize a wood structure instead of steel and concrete, or wood siding instead of vinyl, we can reduce the embodied carbon in a subproject. In most cases, it's probably not possible to avoid carbon intensive products altogether metals, plastics, aluminium but we can review Environmental Product Declarations and look for lower carbon alternatives.

t) **Choose carbon sequestering materials**

Using agricultural products that sequester carbon can make a big impact on the embodied carbon in a subproject. Wood may first come to mind, but we can also consider options like straw or hemp insulation, which unlike wood are annually renewable.

u) **Reuse materials**

Whenever possible, we look to salvage materials like brick, metals, broken concrete, or wood. Salvaged materials typically have a much lower embodied carbon footprint than newly manufactured materials, since the carbon to manufacture them has already been spent. With reclaimed wood in particular, we not only save the energy that would have been spent in cutting the tree down, transporting it to the mill, and processing it, but the tree we never cut down is still doing the work of sequestering carbon. Similar to using materials with recycled content, reusing materials that still have a service life is another way to reduce new material extraction. The impacts of dismantling those materials and making them fit for reuse can be lower than creating new materials.

v) **Use high-recycled content materials**

This is especially important with metals. Virgin steel, for example, can have an embodied carbon footprint that is five times greater than high-recycled content steel. The impact from raw material extraction is accounted only the first time that material is processed. Afterward, the recycled material includes only the impacts from its reprocessing. This strategy has the added value of keeping the material inside the economy and lowering the pressure for extracting virgin materials.

w) **Maximize structural efficiency**

Because most of the embodied carbon is in the structure, let us look for ways to achieve maximum structural efficiency. Using optimum value engineering wood framing methods, efficient structural sections, and slabs are all effective methods to maximize efficiency and minimize material use.

x) **Use fewer finish materials**

One way to do this is to use structural materials as finish. Using polished concrete slabs as finished flooring saves the embodied carbon from carpet or vinyl flooring. Unfinished ceilings are another potential source of embodied carbon savings.

y) **Minimize waste**

Particularly in wood-framed residential projects, designing in modules can minimize waste. Consider common sizes for common materials like 4x8 plywood, 12-foot gypsum boards, 2-foot increments for wood framing, and pre-cut structural members.

z) **Use block instead of bricks**

In building, blocks should be used instead of bricks. Block produce zero CHG gas emissions. The raw material and production of blocks are greener than traditional burned clay bricks. Blocks are made of dredged river sand,

stone dust and a small percentage of cement, rather than agricultural top soil, and do not need coal or wood to dry. For block preparation more, clay is extracted from river basin. This means a reduction in the consumption of topsoil use to produce traditional bricks.

***aa)* Use low carbon materials**

The most basic strategy requires to use materials that have low embodied carbon. This can be achieved by using n**atural products or those with low energy manufacturing processes**. For example, timber or materials with natural fibers come from renewal sources and can be used with low processing. However, adding finishes to protect these materials increases their overall impact. Some varnishes for wood can limit its recyclability and lead to its use as energy source.

***bb)* Use durable materials for the facade and roof**

The building envelope is critical for the energy performance of the building. The retrofit of building elements is one of the major strategies in reducing operational energy consumption. Yet, the facade and roof are under constant wear from natural elements that can lead to frequent repairs and maintenance. By using durable materials, we not only can reduce the cost and frequency of refurbishment but also reduce the use of material replacement and its associated carbon footprint.

***cc)* Design facade systems that are easy to maintain**

It is not enough that we use durable materials in our facade, we need to be able to service it, and replace elements when necessary. This can only be done when the system can easily be taken apart. In this way, we guarantee a longer life and fewer future emissions.

***dd)* Buy local materials**

Transportation of materials from the manufacturing facility to the construction site adds to the account of our subproject. By buying from local sources, we are reducing the emissions produced during transportation and support the local economy.

***ee)* Reduce waste with prefabrication and modular elements**

The embodied carbon of a construction element includes its material footprint and the waste that was generated during its construction. Prefabrication under controlled conditions allows reduction of waste and its associated carbon emissions. Similarly, modular elements permit the efficient use of materials and facilitate the prefabrication of these elements.

***ff)* Be mindful when using finishes or decorative facade elements**

Finishes have many purposes, as they can help with the acoustics and thermal conditions inside building spaces. Internal spaces are reconfigured frequently, eliminating partitions and flooring, and changing the ceiling layout. The aggregated impact of replacing these elements several times during the lifecycle of a building can have a significant overall impact. So, finishes should include low-carbon materials, and allow for the easy recovery of those materials for recycling or reuse.

***gg)* Provide flexibility in internal space distribution by concentrating mechanical, electrical and plumbing services using removable partitions**

Space planning can benefit from centralized mechanical, electrical, and plumbing services that can easily be branched out to serve the areas based on need. Also, removable partitions make it easier to reconfigure the space for new uses.

***hh)* Consideration of the life cycle cost of the materials that we use**

Cheap now can be quite expensive later as we need to replace more frequently, adding to our operational costs. Also, every time we replace a material, we add carbon emissions to our building account.

***ii)* Set performance targets to guide improvement goals**

Setting carbon performance requirements or other measures can help us to compare options. And, while the overall goal is finding solutions with lower impacts, these options most perform in a similar fashion to make the comparison valid.

***jj)* Design building elements for disassembly**

When possible, the building should be designed to be easily taken apart by sections or as a whole. This reduces the impact on other elements when extracting the building component, and avoids additional wastage. Also, it allows for more efficient recovery of the materials for disposal and this makes it easier to preserve the value of the material for future use.

***kk)* Role of a general contractor**

The path to lowering our embodied carbon footprint will place general contractors at the forefront as they interact with stakeholders across the entire value chain. Contractors have the knowledge to influence the materials that are used, the construction processes that are employed and ultimately the carbon impact caused during the build stage. Contractors are a central hub of knowledge and influence both upstream and downstream activities and decisions.

They are responsible for informing subcontractor activities and providing embodied carbon guidelines in trade selection. In addition, contractors act as a source of quality control to help drive owner and designer decisions towards carbon neutral and reduction outcomes. Following are the roles contractors can play:

Minimize the carbon impact of construction processes and activities, including:

- ✓ Sourcing local materials to reduce transportation emissions
- ✓ Maximizing the efficient planning of machinery across projects and portfolios
- ✓ Sourcing plant and equipment that operates on carbon-neutral biofuels or renewable energy
- ✓ Consider installing renewable energy on-site to be used for the construction phase and then also to be transitioned to the operational stage.
- ✓ Recycle and reuse material during renovation and demolition where possible

***ll)* Educate and enforce trade-specific procurement requirements for low or reduced carbon materials**

***mm)* Operate as the gatekeeper for the disclosure of embodied carbon data for materials used on-site (through Environmental Product Declarations etc.)**

8.5 CLIMATE CHANGE ADAPTATION

Climate adaptation is the process of adjusting to actual or expected climate change and its effects. It is about understanding, planning and acting to protect people, the planet and our prosperity. Without action today, adaptation will be costlier and more difficult for the next generations.

Responding to climate change challenges will require scientific breakthroughs in various domains ranging from technologies, solutions and services for adaptation in areas such as

- drought-resilient crops
- water saving technologies
- satellites for environmental observation
- rapid progress in adaptation science and climate analytics as a basis for state-of-the-art climate information
- scaling up of digital tools to take our adaptive capacities to the next level

This will need to go hand in hand with societal transformation and large-scale behavioral change. The world is already experiencing changes in average temperature, shifts in the seasons and an increasing frequency of extreme weather events and other climate change impacts and slow onset events. The faster the climate changes, and the longer adaptation efforts are put off, the more difficult and expensive it could be.

Adaptation refers to adjustments in ecological, social, or economic systems in response to actual or expected climatic stimuli and their effects or impacts. It refers to changes in processes, practices, and structures to moderate potential damages or to benefit from opportunities associated with climate change. In simple terms, countries and communities need to develop adaptation solution and implement action to respond to the impacts of climate change that are already happening, as well as prepare for future impacts.
Adaptation solutions take many shapes and forms, depending on the unique context of a community, business, organization, country or region. There is no 'one-size-fits-all-solution'—adaptation can range from building flood

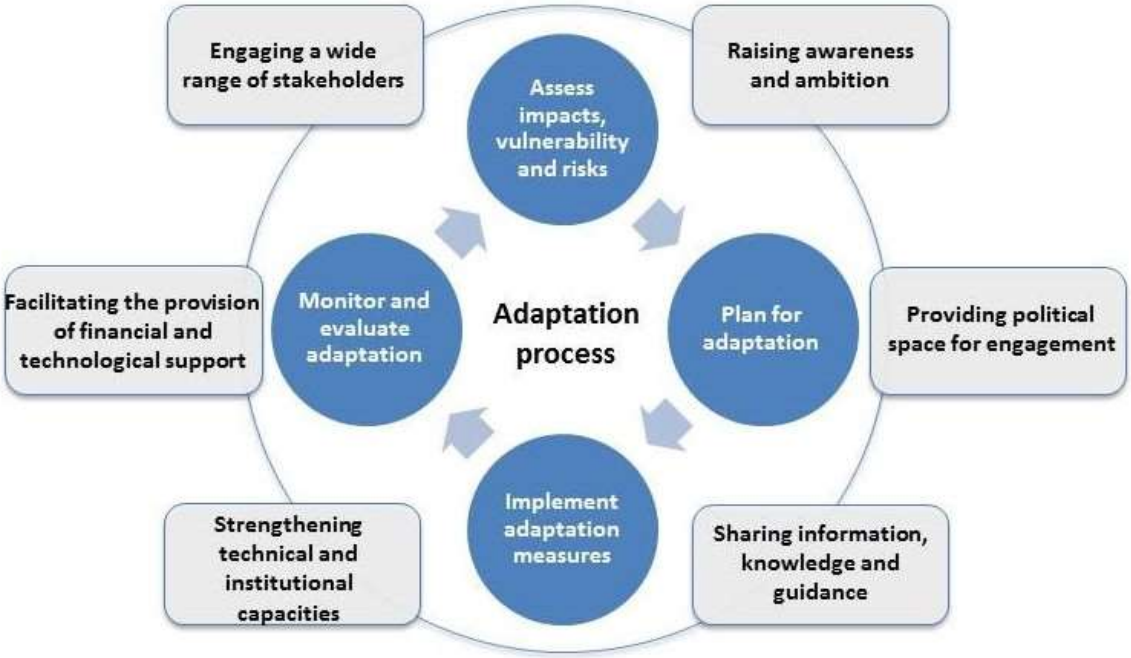
defenses, setting up early warning systems for cyclones and switching to drought-resistant crops, to redesigning communication systems, business operations and government policies. Many nations and communities are already taking steps to build resilient societies and economies, but considerably greater action and ambition will be needed to cost-effectively manage the risks, both now and in the future.

Successful adaptation not only depends on governments but also on the active and sustained engagement of stakeholders including national, regional, multilateral and international organizations, the public and private sectors, civil society and other relevant stakeholders, as well as effective management of knowledge. Adaptation to the impacts of climate change may be undertaken across various regions, and sectors, and at various levels.

Parties to the UNFCCC and its Paris Agreement recognize that adaptation is a global challenge faced by all with local, subnational, national, regional and international dimensions. It is a key component of the long-term global response to climate change to protect people, livelihoods and ecosystems. Parties acknowledge that adaptation action should follow a country-driven, gender-responsive, participatory and fully transparent approach, considering vulnerable groups, communities and ecosystems, and should be based on and guided by the best available science and, as appropriate, traditional knowledge, knowledge of indigenous peoples and local knowledge systems, with a view to integrating adaptation into relevant socioeconomic and environmental policies and actions.

The figure below shows graphically the adaptation cycle under the UN climate change regime, including four general components.

Figure-8.1: Adaptation Cycle under the UN Climate Change Regime



Technical Examination Process on Adaptation

The technical examination process on adaptation (TEP-A) was established at COP 21 (2015) as part of the enhanced action prior to 2020. The TEP-A took place during 2016-2020, featuring technical expert meetings, technical papers and other events, and its objective is to identify concrete opportunities for strengthening resilience, reducing vulnerabilities, and increasing the understanding and implementation of adaptation actions

International cooperation on adaptation also includes, of course, financial, technology, and capacity-building support for adaptation. The relevant arrangements of the UN climate change regime in this regard are explained in the sections on climate finance, technology transfer, and capacity-building.

8.6 CLIMATE RESILIENCE PRINCIPLE IN THE SUBPROJECT

Resilience means the key economic and social systems are climate-proofed for the future. It is not a question of if, but when: When the next storm hits, how prepared we will be. This issue is being addressed by communities who are seeking and finding ways to be more resilient following a major natural disaster. Nations need to become

more resilient to the effects of climate change. For example, flooding is the most costly and frequent natural disaster in many places in Bangladesh. Private and public partnerships can help mitigate some of the worst effects of natural disasters amplified by climate change by pooling resources and coming up with solutions that address what happens before, during, and after an extreme weather event. Resources can be made available to strengthen homes and other structures to better withstand extreme storms. And infrastructure for temporary evacuation and sheltering of vulnerable populations can be developed. Climate change is slow and inexorable, but the exact nature of the effects can be unpredictable. With rising temperatures around the globe comes more responsibility from the top down.

As greenhouse gas emissions continue to rise, climate change will continue to accelerate. Even if emissions were to stop today, the climate would continue to change for some time as the Earth's system responds to the warming already underway. It makes sense to anticipate changes and act now to minimize future economic and social risks.

Climate resilience is often associated with acute events like heat waves, heavy downpours, hurricanes, or wildfires that will become more frequent or intense as the climate changes. However, good resilience planning also accounts for chronic events, like rising sea levels, worsening air quality, and population migration.

Cities and local communities are responding by investing in infrastructure updates and climate-smart planning to mitigate the impacts of acute and chronic events. For example, a combination of nature-based solutions and building improvements, like planting street trees and installing green roofs, can help mitigate extreme heat.

Governments and businesses alike are planning now for the environment and economy they will face in the future.

While there is still much work to be done, there are many inspiring cases of resilience planning that can serve as models for future initiatives.

City Resilience Solutions: Cities and smaller communities face a variety of challenges including sea level rise, flooding, heat, and drought. In response, cities are to develop standalone resilience plans. It needs to incorporate resilience strategies into master plans and hazard mitigation plans. It also needs to develop a resilience strategy to implement throughout city operations, resulting in new, resilient design standards for public works, an updated zoning ordinance, and embedding resilience outcomes within the city's budgeting process.

Financing Resilience: The upfront cost of building resilience is a challenge, as is the need to set aside funds often needed for short-term projects. However, governments and businesses are obtaining capital to invest in resilience projects through innovative finance mechanisms like green bonds and climate funds. States that participate in emissions-trading systems also allocate proceeds to resilience projects.

Creating a Climate Resilience Plan for the Subproject

After the risks from climate change are quantified and calculated, priority areas are often identified by creating lists of the high-probability event types, the most affected subproject areas, and the most vulnerable assets. Risk mitigation strategies are then created on a property-by-property basis. These strategies have costs and benefits associated with them; thus, through cost/benefit analyses, the strategies that reap the highest benefits at the lowest cost are often the preferred options. Climate resilience plans include information on climate resilience design strategies, policies and incentives, and investments in infrastructure.

Coping with the Barriers to Resilience

There are often some barriers to overcome when developing a climate resilience plan. For example, political interests and viewpoints change as administrations change overtime. However, many resilience infrastructure projects are implemented over multiple administrations. Additionally, infrastructure may need to be continually retrofitted as climate conditions change. The key to effective resilience planning is ensuring that the implementation of infrastructure projects is not disrupted across policy cycles. Another barrier to resilience is that many of the benefits of infrastructure implementation are difficult to monetize, which makes the perceived risk higher for investors. Blended finance can be used to overcome this issue, as it makes the investment decision less risky for one party. Infrastructure projects can be funded by multiple parties including both public and private institutions.

The additional challenge includes the lack of financial resources of small and medium-sized organizations and local governments. These entities often have limited funds to spend on climate-related issues, and the funds that they do have are prioritized to more pressing issues. Having an effective climate resilience plan helps with this as it would identify actions that could be funded through existing programs, actions that are low cost but deliver high benefits, and how actions can be prioritized. Lack of local information about potential climate impacts is also a barrier that is faced by many. This is usually the result of a limited amount of technical expertise in a local area and can be overcome by hiring consultants to support resilience planning efforts.

As a whole, climate resilience efforts improve the economic competitiveness of a city. The city's Climate Adaptation Strategy includes a clear plan for how it will deal with more extreme rainfall, higher temperatures, stronger winds, and increased flooding due to climate-related events. This makes it more attractive for businesses and communities to settle there, increasing jobs, tax revenue, and services. In addition, it saves the local government money by reducing the damage from climate events. Planning also improves community resilience to climate change by reducing their vulnerability. This refers to improvements in their ability to "bounce back" after a climate event and "bounce forward" by preparing for a climate event. Therefore, climate resilience planning is not only beneficial for cities, communities, and businesses socially but also economically.

8.7 CLIMATE AND DISASTER RISK SCREENING RESULTS SUMMARY

8.7.1 Project Information Summary

Table-8.4 below provides key project information including the location and key project development objectives.
Table-8. 4: Project Information

Project Information	
Title	Integrated Solid Waste Management Improvement Project (ISWMIP)
Region	South Asia
Country	Bangladesh
Type of Assessment	Solid Waste Management
Purpose of Screening	Climate change risk screening
Current Project Phase	Under construction and operation
Funding Source	Asian Infrastructure Investment Bank (AIIB)
Keywords	Solid Waste Management
Brief Description of Project	***Waste collection, transportation, Processing and Disposal Systems*** prioritized waste processing and disposal infrastructure, including closure of polluted landfill sites, construction and rehabilitation of engineered sanitary landfills (standalone or regional/ clustered), and provision of facilities related to composting, resource recovery, and waste-to-energy.
Location	Nationwide
Outcome/Service Delivery	Improve the Solid Waste Management of Municipalities/City Corporations

8.8 SUMMARY OF EXPOSURE TO CLIMATE AND GEOPHYSICAL HAZARDS

Table-8.5 presents a summary description of exposure to climate and geophysical hazards for the Historical/Current and Future time frames[9]. Exposure to climate hazards is evaluated in two time frames, because past records are not necessarily indicative of future conditions. The extent of the project is nationwide, therefore, the risks described are for the whole of Bangladesh in general.

The descriptions provide a summary of the key characteristics and some indication of the trends in exposure from each hazard, drawing on global, quality-controlled data sets from the Climate Change Knowledge Portal (CCKP). It is useful, for example to understand the temperature range and the rate of annual or decadal increase in a region; or precipitation patterns for historical and future time frames and seasonality shifts. Understanding the trends of hazards is important as they act individually and collectively on components/sub-sectors of the project. Because geophysical hazards (such as earthquakes, tsunamis, landslides, and volcano eruptions) do not have associated future projections, exposure for those hazards is assessed only in the Historical/Current time frame.

[9] The Future time frame is based on changes projected to occur between the 1980-1999 average and a future average. This future average is most likely the 2040-2059 average (i.e., the default in the Climate Change Knowledge Portal - CCKP). Users can choose to select another time frame, or choose to use national/local data sets, but if so, this should be reflected in the notes section of the tool (and summarized in Annex 2). The CCKP draws on global, quality-controlled datasets and is continually updated as new data become available. In some cases, the CCKP is supplemented with other sources of information. For more detail on the data used in this step, please refer to the Data Annex. Climate Change Knowledge Portal (http://climateknowledgeportal.worldbank.org).

Table-8. 5: Summary of Exposure to Climate and Geophysical Hazards

Hazard	Time Frame	Description of hazards for your location
Extreme Temperature	Current	Average monsoon-season maximum and minimum temperatures show an increasing trend annually at the rate of 0.05°C and 0.03°C, respectively An increasing trend of about 1°C in May and 0.5°C in November during the 14 year period from 1985 to 1998 has been observed
	Future	Projected to increase with greatest warming (Dec-Feb) 1.4°C by 2050 2.4°C by 2100
Extreme Precipitation and Flooding	Current	The erratic nature of rainfall and temperature has increased in Bangladesh. The project area may be subject to River/Monsoon flooding.
	Future	As yet it is difficult to project rainfall changes, with some models projecting wetter and others projecting drier conditions. However, Runoff, Time between rainy days and Peak 5-day rainfall intensity are expected to increase.
Drought	Current	Certain regions in the northwest where subprojects construction may be are vulnerable to climatic drought.
	Future	Agricultural drought is expected to increase due to the increase of the erratic nature of rainfall.
Sea Level Rise	Current	The rise is 6 to 9mm annually in the central coastal region, which covers Noakhali, Laxmipur and their adjacent districts while 11 to 20mm rise has been observed in the coastal areas of Chittagong and Cox's Bazaar. In another study by IWM, revaeled that the annual rate of increase of average water level at Khulna, Hironpoint and Khepupara is about 6mm, 8mm and 7mm respectively. Certain locations of the project could be in coastal regions where this risk persists
	Future	Sea level rise is projected for Bangladesh, although there is disagreement on what the degree of sea level will be- one study suggests an increase of 30100 cm by 2100, while the IPCC Third Assessment gives a global average range with a slightly lower values of 9 to 88 cm. While some the project area could be directly affected by sea level rise, there could be indirect effects from migrant populations from coastal areas.
Storm Surge	Current	During the period 1960 to 2009, nineteen cyclones hit the coast of Bangladesh. Simulation result from these cyclonic events shows the eastern coast gets a chance of being inundated by 2-3 m. Some project activities could take place in the coastal area. So there is risk of the effects of storm surge and cyclone.
	Future	Storm surge height is expected to increase, but estimates are highly uncertain. The frequency of tropical cyclones in the Bay of Bengal may increase and, according to the Intergovernmental Panel on Climate Change's Third Assessment Report, there is " evidence that the peak intensity may increase by 5% to 10% and precipitation rates may increase by 20% to 30%" (IPCC 2001). Cycloneinduced storm surges are likely to be exacerbated by a potential rise in sea level of over 27 cm by 2050. An increase of 10 to 20% in tropical cyclone intensities for a rise in sea-surface temperature of 2 to 4°C relative to the current threshold temperature is likewise projected in East Asia, South-East Asia and South Asia (KnutsonandTuleya, 2004, IPCC 2007).
Strong Winds	Current	Significant increasing trends in the cyclone frequency over the Bay of Bengal during November and May, which are main months for cyclone activity in the Bay of Bengal, have been observed.

Hazard	Time Frame	Description of hazards for your location		
	Future	The maximum wind speed from tropical cyclones is expected to increase, but estimates are highly uncertain. With higher sea surface temperature, 10% increase in maximum wind speed of cyclone is expected by 2100. The Design of Water to Energy Plant need to consider a factor of safety for such occurrence.		
Earthquake	Current	Bangladesh is earthquake prone while varying degrees of hazard are prevalent in different areas. Since the location of the project is all over Bangladesh, this could be in any of the hazard regions I, II, III, IV and V. The design of stake of WtE plant is sensitive to earthquake hazards. Therefore, the project may be considered to be moderately exposed. However due to climate change, the frequency and magnitudes of earthquakes are not likely to be affected.		
Tsunami	Current	Some project activities may be carried out in the coastal regions. So the risk of tsunami is there.		
	Future	Under climate change scenario, frequency of extreme events may increase. Therefore, higher risk can be considered compared to the baseline.		
Landslide	Current	Tower installation may take place in Chittagong region. Chittagong region is prone to landslides. But landslide prone areas may be avoided through alternate site selection. So slight (low) exposure is assumed and due to climate change, the risk will remain unchanged.		
Insufficient understanding	Not Exposed No Potential Impact No Risk	Slightly Exposed Low Potential Impact Low Risk	Moderately Exposed Moderate Potential Impact Moderate Risk	Highly Exposed High Potential Impact High Risk

8.9 SUMMARY OF OVERALL PROJECT RISK

Table-8.6 highlights the impact ratings on the project's component/subsectors, and the overall risk to the outcome/service level for both Historical/Current and Future time frames. The ratings are derived on the basis of the hazard information, subject matter expertise, contextual understanding of the project, and modulated on the basis of adaptive capacity and the larger development context of the water sector and country. The results indicate what components are most at risk. The actual ratings themselves, while instructive, should inform further consultations, dialogue, and future planning processes.

8.9.1 Results Summary - by Component / Subsector

Table-8.3 provides a characterization of risks due to climate and geophysical hazard on project subsectors/components for both Historical/Current and Future time frames. The results indicate where risks may exist within one or multiple components and where further work may be required to reduce or manage these climate and geophysical risks. An ongoing process of monitoring risks, refining climate and other information, and regular impact assessment may also be appropriate. The potential impact on the key components/subsectors due to exposure from hazards is modulated by the project's non-physical components (enabling and capacity building activities). The right kind of capacity building measures could increase preparedness and longer-term resilience and reduced the risks. An understanding of larger sector and development context with respect to key modulating factors helps to assess the climate risks in terms of adaptive capacity. In the case of ISWIP, the overall summary of risk is as follows:

- Physical components: Impact from 'Low' to 'Moderate' in future
- the Non-physical Components : Slightly Reduces Impact
- the Broader Development Context : Slightly Increases Impact
- Physical components: Impact from 'Low' to 'Moderate' in future
- Outcome/service delivery: Impact from 'Low' to 'Moderate' in future

Table-8. 6: Results Summary - by Component / Subsector

Sub-sector	Physical Components		Non-Physical Components		Development Context		Outcome / Service Delivery	
Time Frame	Current	Future	Current	Future	Current	Future	Current	Future
Solid Waste Management (SWM)			Long- term strategic planning: Significantly Reduces Impact		Population growth and climate refugees: Significantly Increases Impact			
			Maintenance and operations: Slightly Reduces Impact		Limited SWM access in Bangladesh and inadequacy in disaster preparedness: Slightly Increases Impact			
			Data gathering, monitoring, and information management systems: Slightly Reduces Impact		Gender inequity: Slightly Increases Impact			
			Overall: Slightly Reduces Impact		Overall: Slightly Increases Impact			

Impact on Project's Physical Infrastructure

This step provides an indication of the potential impacts of climate and geophysical hazards on the project's physical infrastructure and assets as currently designed under relevant subsectors. Climate and geophysical hazards are likely to impact several aspects of the infrastructure. Strong winds, tidal surge and waves could damage existing stack structure of WtE plant and cause service disruption. Any deficiencies in design and installation of the structure can result in failure after an earthquake. Extreme temperatures can cause expansion/contraction stress in steel structures, rainfall/flooding events can cause damage to over ground power plant/landfill/composting plant leading to service disruption. Considering these factors in physical infrastructures, in future the impact would be **from 'low' to 'moderate'**.

Non-physical components and broader development context

This step provides information on how the potential impact on key components/subsectors due to exposure from hazards is modulated by the project's soft components (enabling and capacity building activities) and broader development context (including sector context and other social, economic and political factors). This step also takes into account particularly vulnerable groups including women, migrants and displaced populations. For investments with long operational lifetimes, such as physical infrastructure, considering future climate variability and change is critical to avoid "locking in" designs and features that are only suited to current climate. The project will include an emergency preparedness plan to cope with natural and man-made disasters. The project will also include support to strengthen budgeting processes to account for additional maintenance costs to address increasing damages from hazards, and increase flexibility in management protocols to allow for adaptation to changing hazards. Strategic planning that considers how climate and geophysical hazards may affect key assets, system reliability, and demand may help improve long-term climate resilience. Several strategies such as keeping redundancies (installation of solar panels, generators for back-up electricity) can increase the flexibility in disaster situations. All physical infrastructures will be designed according to the Bangladesh National Building Code which considers wind and earthquake load in structural designs. This provides security against disasters such as earthquake and strong winds. LGED management will allocate budget for operations, maintenance and

repairs of equipment and structural elements which might deteriorate as a result of extreme climate events. Combined, these features **may reduce the anticipated risk** from climate and geophysical hazards.
On the other hand huge population growth, probable migration of population from climate-affected areas will increase population density overall and may have adverse impact. Existing gender inequity in the Bangladesh may pose risks in responding to climate change effects. In the Bangladesh's SWM sector, there is a limited access to climate and disaster information monitoring networks. This, combined with a lack of emergency response systems in place to bring back connectivity to isolated communities and relief services in case of extreme weather events, **increases the risk** from climate and geophysical hazards.

Risks to Outcome/Service delivery of the project
This step provides an indication of the level of risk to the outcome/service delivery that the project is aiming to provide which is providing Improved SWM facilities to the people. The risk to the outcome/service delivery of this project is **Moderate**. This rating is derived from hazard information, subject matter expertise, contextual understanding of the project, and modulated on the basis of the project's soft components and broader development context.

8.10 NEXT STEPS

After understanding which of the project components is most at risk from climate change and other natural hazards on the basis of the screening, measures to avoid their impacts can be taken by:

- Enhancing the consideration of climate and disaster risks early in the design stage of the project.
- Using your risk screening analysis to inform follow-up feasibility studies and technical assessments.
- Encourage local stakeholder consultations and dialogues to enhance resilience measures and overall success of the project.

Table-8.7: Provides some general guidance based on the risk ratings for the Outcome/Service Delivery, and Table-8.8 lists some climate risk management measures.

Table-8. 7: General Guidance Based on Risk Ratings for Outcome/Service Delivery

Insufficient Understanding	Gather more information to improve your understanding of climate and geophysical hazards and their relationship to your project.
No Risk	If you are confident that climate and geophysical hazards pose no risk to the project, continue with project development. However, keep in mind that this is a high-level risk screening at an early stage of project development. Therefore, you are encouraged to monitor the level of climate and geophysical risks to the project as it is developed and implemented.
Low Risk	If you are confident that climate and geophysical hazards pose low risk to the project, continue with project development. However, keep in mind that this is a high-level risk screening at an early stage of project development. Therefore, you are encouraged to monitor the level of climate and geophysical risks to the project as it is developed and implemented. You may also consider gathering additional information to increase your level of confidence in your rating.
Moderate Risk	For areas of Moderate Risk, you are encouraged to build on this screening through additional studies, consultation, and dialogue. This initial screening may be supplemented with a more detailed risk assessment to better understand the nature of the risk to the project.
High Risk	For areas of High Risk, you are strongly encouraged to conduct a more detailed risk assessment and to explore measures to manage or reduce those risks.

Table-8. 8: Types of Climate Risk Management Measures for typical SWM SECTOR Projects

Objective	Examples
Increase Robustness	• Strengthen the sector's physical assets or the connection between existent assets. This includes investments in flood barriers, cooling systems and more resistant infrastructure, among others. • Review the role of governments, regulators and current market structures in addressing climate risks in the SWM sector, including issues of ownership, and roles and responsibilities in achieving the sector's resilience. • Adopt measures aimed at strengthening SWM sector structures and organizations so that they are able to continue operating amidst the impact of climatic stress.
Promote Self-organization	• Foster collaborative mechanisms among sector stakeholders in order to address sectoral vulnerabilities at the regional, national and international levels.

Objective	Examples
	• Adopt measures to facilitate access to overt resources (financial resources, skills, and technical infrastructure), embedded/social resources (trust, motivation, knowledge) and relevant raw data required for the sector to self-organize in the face of climatic stressors. • Foster collaborative efforts among the major telecommunications providers aimed at building the business case for companies to address climate risks.
Promote Learning	• Support new research and knowledge on the linkages between SWM and climate change (including projections, direct and indirect climate risks throughout the SWM supply chain) to increase the sector's awareness and develop the skills required to implement adaptive actions. • Review evidence on the impact of past weather events on SWM infrastructure and service providers, drawing best practices and lessons learned. • Foster experimentation and novelty across the sector, to ensure innovative responses to adjust to new climatic conditions.
Increase redundancy	• Promote the availability of surplus/interchangeable processes, system interoperability, capacities and response pathways that allow for partial failure of the sectors" services while avoiding complete collapse. • Implement collaborative and multi-sector approaches to foster operational overlaps and multiple sources of support/expertise that can help fill the gaps in times of need, allowing the system to continue to function amidst climatic events. • Foster the functional overlap of contingency/emergency measures to ensure the continuation of SWM services under climatic stress.
Increase flexibility and diversity	• Improve the availability of adequate financial mechanisms for rapid access to savings, credit and climate-related insurance to respond to extreme climatic events. • Ensure swift access to information for short-term decision-making and support mobilization in the event of extreme climatic events, including mechanisms for ongoing collaboration with governments, local authorities and emergency-response institutions. • Strengthen the coordination of emergency response services between local authorities and SWM authorities i.e. Municipality/City Corporation.
Foster collaboration at multiple scales	• Strengthen cross-sectoral and multilevel collaboration, including access to broader networks of support (e.g. governments, regulators, telecommunication providers, other market players), thus enabling access to resources that may not otherwise be available. • Provide mechanisms for SWM infrastructure and service providers to access assets (e.g. financial, human) at the regional, national or international levels, in order to cope with and recover from climatic disturbances. • Foster cross-government collaboration to explore interdependency issues.

SECTION-9: INSTITUTIONAL ARRANGEMENTS

9.1 FORMATION OF ESU

For sub-projects to be implemented by LGED, a Project Management Unit (PMU) headed by the Project Director (PD) of this project will be formed who will oversee the project activities. An "Environmental and Social Unit" within the PMU will oversee the environmental and social management issues associated with the project. The "Environmental and Social Unit" should be manned by personnel competent in undertaking environmental and social screening and monitoring and will report directly to the PD. The "Environmental and Social Unit" with support from relevant local authorities/Municipality/City Corporation/local communities (if necessary) will carry out "Environmental/Social Screening" and "Analysis of Alternatives" of sub-projects, following the guidelines contained in the Environmental and Social Management Framework (ESMF). For Part-B of the project, the project consultants (environmental and social specialists) will carry out these screening activities.

The 'Environment and Social Unit', as required, will carry out further environmental and social assessment of the sub-projects. The PMU of LGED will be responsible for implementation of EMP and preparation of quarterly reports, with support from "Environmental and Social Unit" (see Figure-9.1).

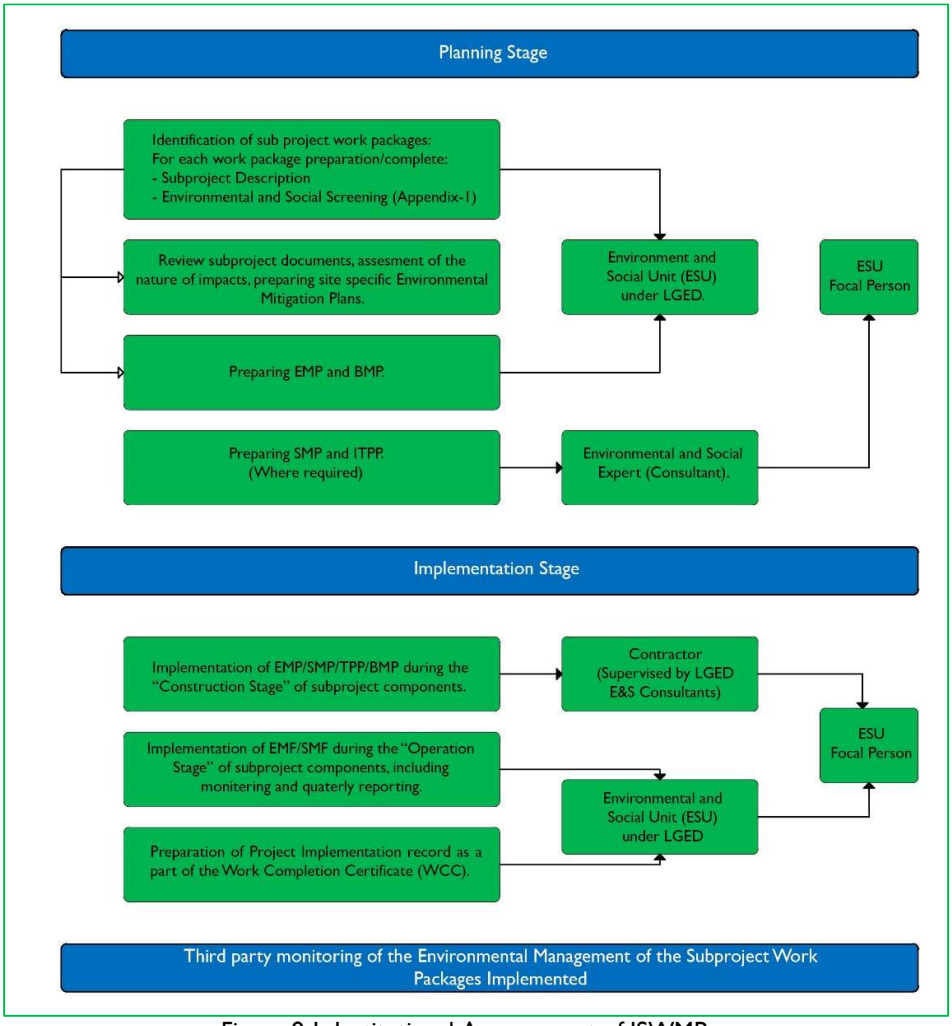


Figure-9.1: Institutional Arrangement of ISWMP

9.2 BEST MANAGEMENT PRACTICES (BMP)

The Best Management Practices (BMP) is prepared as a guideline for environment management of different parts of the project to be implemented by the LGED. The main objective of a BMP is to manage construction operations in harmony with the environment in an effort to contribute to the well-being of the community and the environment by:

- Minimizing pollution
- Sustaining eco-systems
- Conserving cultural heritage
- Enhancing amenity

The BMP is designed to be used during the construction of the Landfill Sites/Waste to Energy Plants by the LGED. The purpose of the BMP is to ensure that construction activities are conducted in a manner that minimizes impacts on the environment. It promotes awareness and use of best practice in environmental management. Responsibility lies with all the people involved in any given project to adopt environmentally responsible work practices. Best environmental management practice requires environmental awareness, and appreciation of one's environmental responsibilities. Measures taken to prevent environmental impacts are preferred to those designed to control the impact.

The BMP developed will address the following issues related to the above project components: (1) Protection of flora and fauna, (2) excavation, backfilling and topsoil restoration and re-vegetation (3) reuse of excavated soil, (4) protection of sensitive locations, (5) Waste Management, (6) public health and safety, (7) natural habitats, (8) air pollution control and (9) general maintenance and erosion control. A particular sub-project may involve all or some of these issues.

Table-9.1: Possible Application of BMP relating to different types of sub-projects to be implemented by LGED

Best Management Practices (BMPs)	Landfill Development/Improvement	Waste to Energy Plants
Protection of flora and fauna	✓	✓
Excavation, backfilling and topsoil restoration and revegetation	✓	✓
Reuse of excavated soil	✓	✓
Protection of sensitive locations	✓	✓
Waste management	✓	✓
Public health and safety	✓	✓
Natural habitats	✓	✓
Air pollution control	✓	✓
Erosion control	✓	✓

☐= BMP required; ☐ = BMP may be required depending on the site/route condition.

9.3 SPECIAL ENVIRONMENTAL CLAUSES (SECS) FOR TENDER DOCUMENT

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

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

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

Health and Safety:

- The Contractor shall observe and maintain standards of Health and Safety towards all of his employees not less than those laid down by the national standards or statutory regulations.
- The Contractor shall provide all appropriate protective clothing and equipment for the work to be done and ensure its proper use. Where required, safety nets, the contractor shall provide belts, harnesses and lines. The "safety directives for work equipment" and "safety directives for protective gears", as specified in the Occupational Health and Safety Guidelines (attached) shall be followed.
- The Contractor shall provide and maintain in prominent and well-marked positions all necessary first-aid equipment, medical supplies and other related facilities. A sufficient number of trained personnel will be required to be available at all times to render first aid.
- The Contractor must provide or ensure that appropriate safety and/or health signs are in place at their work sites where hazards cannot be avoided or reduced.
- The Contractor shall report to the Engineer promptly and in writing particulars of any accident or unusual or unforeseen occurrences on the site, whether these are likely to affect progress of the work

or not.

Disposal and Pollution:

- The Contractor shall not dispose any waste, rubbish or offensive matter in any place not approved by the Engineer or Statutory Authority having jurisdiction. The Contractor shall not discharge into any watercourse oil, solids, noxious or floating materials.
- The Contractor shall take all reasonable precautions to keep public or private roads clean of any spillage or droppings from his vehicles or equipment. Any spillage or droppings, which accrue, shall be cleaned without delay to the satisfaction of the Engineer.
- The Contractor shall provide waste bins/ cans for collection of solid waste at appropriate locations (as directed by the Engineer), and ensure proper transfer/ disposal of solid waste.

9.4 THIRD PARTY MONITORING

In order to ensure proper environmental management a third party consulting firm (to be hired separately by LGED) will be given the responsibility to independently monitor the overall performance of environmental management of the proposed project, including compliance with relevant GoB and AIIB regulations and the provision of the environmental and social management framework (ESMF) developed for the project.

9.5 CAPACITY BUILDING AND TRAINING REQUIREMENTS

It appears that the engineers at LGED have limited exposure to environmental/social assessment and management. As discussed above, LGED will be responsible for carrying out "environmental/social screening" and "analysis of alternatives", and guidelines have been provided in the ESMF for carrying out these activities. However, basic training on regulatory requirements, environmental impacts, and environmental assessment and management would greatly improve the capability of relevant LGED engineers and experts in carrying out their responsibilities under the proposed project.

LGED will employ Environmental and Social Experts, who would support the overall environmental/social management. However, since the overall responsibility of environmental management lies with LGED, they need to ensure that the consultants are carrying out their responsibilities properly. For this purpose, it is important that the LGED engineers/officials receive advanced training on environmental management and monitoring. Such training will assist them in properly overseeing the activities of the consultant engaged in environmental management of the proposed project, following the ESMF.

Table-9.2 Summarizes the Training Requirements of ISWMIP of LGED. It is also advised to provide the basic training for key personnel on regulatory requirements, environmental impacts, and environmental assessment and management in home or abroad.

Table-9.2: Training requirements for environmental management

Training Type/ Contents	Participants	Schedule
General environmental awareness, regulatory requirements, ESMF frameworks for project, environmental impacts and mitigation, analysis of alternatives, environmental management	Relevant engineers of ISWMIP of LGED	Prior to commencement of sub-project activities
Advanced training on environmental assessment, management (EMP, SMP, TPP, BMP), monitoring, including details on ESMF framework	Participants from: (a) Environment and Social Unit of ISWMIP of LGED, (b) Relevant Engineers/ officials of ISWMIP of LGED	Immediately after project commencement

SECTION-10: PUBLIC CONSULTATION AND DISCLOSURE PLAN

10.1 INTRODUCTION

This section describes the engagement procedures through the project cycle. Public consultation in other word stakeholder engagementactivities will provide stakeholder groups with relevant information and opportunities to voice their views on issues that matter to them/affect them. The mechanism of information dissemination shouldbe simple and be accessible to all. Two of the important means that have been followed until now include briefing material and organization of community consultation sessions. The briefing material (all to be prepared in local language) can be in the form of (a) brochures (including project information, details of entitlements including compensation and assistance to be given to the PAPs; grievance mechanism) that can be kept in the offices of local self-government (gram parishad office) and projectoffice; (b) posters to be displayed at prominent locations and (c) leaflets that can be distributed in theproject areas. Consultation meetings should also be organized at regular intervals by the project to acquaint the communities, target group beneficiaries and affected persons of the following:

- ✓ Timeline and progress of the project by components;
- ✓ Information on beneficiary participation;
- ✓ Information of involuntary displacement, compensation and entitlements;
- ✓ Information of participation of small ethnic communities;
- ✓ Time line for acquisition of land using voluntary donation, direct purchase and any othervoluntary approach.

Also, opinion and consensus of the community needs to be sought for livelihood transformation, relocation of any community assets and involuntary resettlement management. Information disclosure procedures are mandated to provide citizen centric information as well as alldocumentation necessary for addressing any queries. Disclosure of information will enhance governance and accountability specifically with respect to strengthening of monitoring indicators to help the AIIB monitor compliance with the agreements and assess impact on outcomes. However, it is to be noted that only digital, internet, social media etc. will be followed where face to face interaction can be avoided until COVID-19 situation improves. Other face to face interaction will be applicable for post COVID-19 period. Other online based platforms can also be used, such as web- conferencing, webinar presentations, web-based meetings, Internet surveys/polls etc. especially dueto COVID-19 related restrictions.

10.2 STRATEGY FOR PUBLIC CONSULTATION

The public consultation activities that LGED authority will undertake for their project. The activitytypes and their frequency are adapted to the three main project stages: project preparation (includingdesign, procurement of contractors and supplies), construction, and operation and maintenance. Themethods used would vary according to the target audience and would include:

- ✓ Public/community meetings, separate meetings for women and vulnerable
- ✓ Face-to-face meetings
- ✓ Focus Group Discussions/Key Informant Interviews
- ✓ Workshop with the Experts
- ✓ Surveys, polls etc.
- ✓ Interviewing stakeholders and relevant organizations
- ✓ Mass/social media communication (as needed)
- ✓ Disclosure of written information: brochures, posters, flyers, LGED website

Table-10.1: Proposed Strategy for Public Consultation

Phase	Target stakeholders	List of Information to be Disclosed	Method(s) used	Location/frequency	Responsibilities
STAGE 1: PROJECT PREPARATION (PROJECT DESIGN, SCOPING, RESETTLEMENT PLANNING, ESIA/RPF/RPDISCLOSURE)	• Project Affected People: People potentially affected by land acquisition • People residing in project area • Vulnerable households Squatters and petty businessmen in and around the sub-project areas • Local administration and local leadership • Common Property Resources Committee Leadership	• Project scope and rationale ESIA, RPF and RP disclosures • Land acquisition process and compensation • Assistance in gathering official documents for authorized land uses • Project E&S principles Resettlement and livelihood restoration options • Grievance mechanism process including GRC Composition Finalization of relocation site, design, costing and timeframe of Mosques, Temples, madrasahs, Graveyards and Cremation Places when relocated	During COVID 19 period digital/ IT based interactions/FGD in small groups through VTC/other means to be arranged Public meetings, separate meetings for women and vulnerable in post COVID 19 situations Face-to-face meetings in post COVID19 situations Mass/social media communication (as needed) Disclosure of written information: brochures, posters, flyers, Information boards at the project area in Bangla, Grievance mechanism LGED newsletter and website (in English) Discussion and public consultation, technical assessment etc. in post COVID 19 situations	Sub-project area Municipality/City Corporation and the project site's union /villages for disclosure of Drafts ESIA, RPF and RP Continuous communication through mass/social media and routine interactions Throughout SEP development as needed At a central place convenient for all stakeholders. Immediately after finalizing of ESIA RP, etc. and then as and when required As and when required- at different stages of the Property relocation and construction	PD/DPD-ISWMP, LGED, Upazila Engineer, LGED Social and Environment Specialists Supervision and RP consultants
	Other Interested Parties (External) Representatives in villages Affected persons under land acquisition of the Sub-projects	Project scope, rationale and E&S principles ESMPF, ESMP, RPF, SEP, RP disclosures Land acquisition process Identification of land plots and uses Resettlement and livelihood restoration options Grievance mechanism process	During COVID 19 period digital/IT based interactions/ FGD in small groups through VTC/other means to be arranged Face-to-face meetings in post COVID19 situations Joint public/community meetings with PAPs in post COVID 19 situations Public Disclosure through website/TV/Radio/WhatsApp/ SMS need to be arranged	Throughout SEP development as needed or as an when demanded by the affected community Disclosure meetings in nearby location	PD/DPD-ISWMP, LGED, Upazila Engineer, LGED Social and Environment Specialists Supervision and RP consultants

Phase	Target stakeholders	List of Information to be Disclosed	Method(s) used	Location/frequency	Responsibilities
	Other Interested Parties (External) Press and media NGOs Businesses and business organizations Workers' organizations Academic institutions National Government Ministries Government Departments General public, jobseekers	Project scope, rationale and E&S principles ESIA, RPF and RP disclosures Grievance mechanism	During COVID 19 period digital/IT based interactions/ FGD in small groups through VTC/other means to be arranged Public meetings, trainings/ workshops (separate meetings specifically for women and vulnerable as needed) in post COVID 19 situations Mass/social media communication Disclosure of written information: Brochures, posters, flyers, website Information boards at the Project Site Grievance mechanism Notice board for employment recruitment	Project launch meetings in District/Upazila/Union/Growth Centers Communication through mass/social media (as needed) Information desks with brochures/posters in project affected locations (Bangla and English) Public forums in Dhaka	PD/DPD-ISWMP, LGED, Upazila Engineer, LGED Social and Environment Specialists Supervision and RP consultants
	Other Interested Parties (External) Other Government Departments including DoE from which permissions/clearances are required; Other project developers, donors/Development partners	Legal compliance issues Project information scope and rationale and E&S principles Coordination activities Land acquisition process Grievance mechanism process ESMPF/ESMP/RPF/SEP disclosures	During COVID 19 period digital/IT based interactions/ FGD in small groups through VTC/other means to be arranged Face-to-face meetings, other public/community meetings in post COVID 19 situations Submission of required reports	Disclosure meetings Reports as required	PD/DPD-ISWMP, LGED, Upazila Engineer, LGED Social and Environment Specialists Supervision and RP consultants
	Other Interested Parties (Internal) Other LGED staff Supervision Consultants	Project information: scope and rationale and E&S principles	During COVID 19 period digital/IT IT based interactions/FGD in small groups through VTC/other means to be arranged	As needed	

Phase	Target stakeholders	List of Information to be Disclosed	Method(s) used	Location/frequency	Responsibilities
	Third Party Monitoring Agency, when employed Supervision contractors, sub- contractors, service providers, suppliers, and their workers	Training ESMPF requirements and other management plans Grievance mechanism process E&S requirements Feedback on consultant/ contractor reports	Face-to-face meetings Trainings/ workshops Invitations to public/community meetings in post COVID 19 situations		Supervision and RP consultants
STAGE 2: CONSTRUCTION AND MOBILIZATION ACTIVITIEs	Project Affected People People potentially affected by land acquisition People residing in project area Vulnerable households	Grievance mechanism Health and safety impacts (EMF, community H&S, community concerns) Employment opportunities Project status	During COVID 19 period digital/IT based interactions/ FGD in small groups through VTC/ other means to be arranged HH visits would demand Project's designated staff to conduct visits with a specified periodicity. However, there would be logistical challenges in reaching households in remote locations. There would also be restrictions in reaching COVID-19 affected households. Public meetings, workshops Separate meetings as needed for women and vulnerable in post COVID 19 situations Individual outreach to PAPs/VGs and minority Transgender community as needed Disclosure of written information: brochures, posters, flyers in Bangla, website (in English) Notice board(s) at construction sites (Bangla) Grievance mechanism LGED Quarterly newsletter	Quarterly meetings during construction stage Communication through mass/social media as needed Notice boards updated weekly Routine interactions Brochures in local offices	

Phase	Target stakeholders	List of Information to be Disclosed	Method(s) used	Location/frequency	Responsibilities
	Other Interested Parties (External) Governmental committees for land use and compensation (MBC) Affected community's representatives	Project scope, rationale and E&S principles Grievance mechanism Project status AIIB compensation requirements	During COVID 19 period digital/IT based interactions/ FGD in small groups through VTC/ other means to be arranged Face-to-face meetings, Joint public/community meetings with PAPs in post COVID 19 situations	As needed (monthly during construction stage)	PD/DPD-ISWMP,LGED, Upazila Engineer, LGED
	Other Interested Parties (External) Press and media NGOs Businesses and business organizations Workers' organizations Academic institutions National Government Ministries	Project information - scope and rationale and E&S principles Project status Health and safety impacts Employment opportunities Environmental concerns Grievance mechanism process	During COVID 19 period digital/IT based interactions/ FGD in small groups through VTC/ other means to be arranged Public meetings, open houses, trainings/workshops etc. in post COVID 19 situations Disclosure of written information: brochures, posters, flyers, website, Information boards in LGED Notice board(s) at construction sites Grievance mechanism	Quarterly meetings during construction stage Communication through mass/social media as needed Notice boards updated weekly Routine interactions Brochures in local offices	Social and Environment Specialists
	Other Interested Parties (Internal) Other LGED staff Supervision Consultants Contractor, sub-contractors, service providers, suppliers and their workers	Project information: scope and rationale and E&S principles Training on ESMPF/ESMP requirements and other sub- management plans Worker grievance mechanism	During COVID 19 period digital/IT based interactions/ FGD in small groups through VTC/ other means to be arranged Face-to-face meetings Trainings/workshops Invitations to public/community meetings All these can be arranged in Post COVID 19 situations	Daily, as needed	PD/DPD-ISWMP,LGED, Upazila Engineer, LGED Social and Environment Specialists Supervision and RP consultants
STAGE 3: OPERATION AND MAINTENANCE	Project Affected People: People residing in project area Vulnerable households/persons	Satisfaction with engagement activities and GRM Grievance mechanism process Damage claim process	Outreach to individual PAPs in Post COVID 19 situations LGED website Grievance mechanism LGED newsletter	Outreach as needed Meetings in affected Area (as needed/requested) Monthly (newsletter)	PD/DPD-ISWMP,LGED, Upazila Engineer, LGED Social and Environment Specialists Supervision and RP consultants
	Other Interested Parties (External)	Grievance mechanism process Issues of concern	Grievance mechanism LGED website	As needed	PD/DPD-ISWMP,LGED, Upazila Engineer, LGED

Phase	Target stakeholders	List of Information to be Disclosed	Method(s) used	Location/frequency	Responsibilities
	Press and media NGOs Businesses and business organizations Workers' organizations Academic institutions Local Government Departments, Local Leadership General public	Status and compliance reports	Face-to-face meetings in Post COVID 19 situations Submission of reports as required		Social and Environment Specialists Supervision and RP consultants

The consultation should continue throughout the project cycle to achieve highest scale of effectiveness of resettlement implementation. Several additional rounds of consultations with affected persons will be required during RP implementation. The next round of consultations will be required prior to start of compensation payment and assistance. For the benefit of the community ingeneral and affected persons in particular, the RP should be made available at LGED local offices and at local Union and Upazila parishads/ pourashova. For continued consultations, the following steps are envisaged:

- ✓ Key features of the ESIA/RP/RPF particularly the entitlements and institutional arrangements for grievance redress should be summarized in a leaflet and distributed among the DPs and their communities along the project corridor.
- ✓ LGED will conduct information dissemination sessions at major intersections and solicit thehelp of the local community leaders to encourage the participation of the affected person's in RP/ESIA implementation.
- ✓ Attempts should be made to ensure that vulnerable groups understand the process and take their specific needs are taken into account.
- ✓ Final safeguard documents will be placed in LGED and AIIB websites before implementation of the project, whose reference link has to be shown in the summarized leaflet.

10.3 INFORMATION DISCLOSURE

As a standard practice, the Project materials (ESMPF, ESIA, ESMP, ESCP, SEP, LMP, RPF or RP) releasedfor disclosure are accompanied by making available the registers of comments and suggestions from the public that are subsequently documented by the project developer in a formal manner. A link to the Project webpage should be specified on all the printed materials distributed to stakeholders.

The PD will continue applying the similar approach to disclosure for any additional E&S appraisal materials that will be prepared as part of the project development. The ESIA report (together with theESMPF and associated environmental and social management plan (ESMP)) in Bangla, and English willbe made available for public review in accordance with the international requirements. The Stakeholder Engagement Plan (SEP) will be released in the public domain and will be available for stakeholder review during the same periodof time.

Distribution of the disclosure materials will be through making them available online under the COVID-19 situation. Upon improvement of the situation, distributions of the disclosure materials will be through making them available at venues and locations frequented by the community and places to which public have unhindered access in the usual manner. Free printed copies of the SEP in Bangla and English will be made accessible for the general public at the following locations:

- LGED Headquarters, Agargaon, Dhaka and District HQs of LGED offices
- Affected District Administration office
- The Project offices;
- Affected Upazila Headquarters
- Affected Union Parisad Offices
- Local NGO offices; and
- Other designated public locations to ensure wide dissemination of the materials.
- Newspapers, posters, radio, television;
- Information centers and exhibitions or other visual displays;
- Brochures, leaflets, posters, nontechnical summary documents and reports;
- Official correspondence, meetings

Electronic copies of the ESIA, RPF and RP will be uploaded on the project web-site https://www.lged.gov.bd/. This will allow stakeholders with access to Internet to view information aboutthe planned development and to initiate their involvement in the public consultation process. The website will be equipped with an on-line feedback feature that will enable readers to leave their comments in relation to the disclosed material. Limitation of this online based communication is thatnot all parties/stakeholders have access to the internet, especially in remote areas and in communities.

The mechanisms which will be used for facilitating input from stakeholders will include further in the report and will disclose materials to local, regional and national NGOs as well as other interested parties. Proposed Information Disclosure Mechanism is given at Table-10.2.

Table-10.2: Information Disclosure

Sub Project Stage	List of Information to be disclosed	Methods proposed	Timetable: Locations/Dates	Target stakeholders	Percentage reached	Responsibilities
Sub-project Preparation Phase	RPF, RP and ESIA	LGED website, National and Local Newspaper advertisement, District and Upazila administration website and notice board, Project office at the LGED HQ	As soon as the concerned documents are uploaded in the website/published	Expert in the field of ES, Journalists, NGOS/CBOs, PAPs and Local Population including local administration and local businessmen	Majority (85%) of local peoples will be made aware of the project through the process	LGED/PD/XEN Environment Advisor, Social Safeguards Advisor
Construction	Traffic management plan Labour management Plan	LGED website, Meeting Signboard Brochures Traffic Police FGD	Two per Monthly/As per requirements	Contractors, Villagers, including Migrant Workers of the project	Majority (80%) of local peoples will be made aware through the process Poster or bulletin board reaches the rest percentage of the population	XEN/ Environment Advisor, Social Safeguards Advisor / Municipality/City Corporation's representative/Contractor in coordination with local administration and local police
Operation	Traffic Management along the Highway	Meeting Brochures FGD	Once per Monthly/As per requirements	PAPs, Youth, Women, Business Community at the Growth Centers, Transport owners and the Drivers, NGOs, local elected leadership	85% of local peoples will be made aware through the process	XEN/ Environment Advisor, Social Safeguards Advisor / Municipality/City Corporation's representative in coordination with local administration and local police

10.4 GRIEVANCE REDRESS MECHANISM

Grievance Redress Mechanism (GRM) is a valuable tool, which will allow affected people to voice concerns regarding environmental and social impacts of the proposed project. LGED/Municipality/City Corporation should be the first-line recipient of any grievance. The sub-project-affected persons can register their grievances at the complaint cell of the PMU (available online at the LGED website link: https://www.lged.gov.bd) either in writing or online. LGED would duly address their grievances within one month of the receipt of the complaint. A Grievance Redress Committee (GRC) will be considered in outstanding cases that cannot be resolved directly and require mediation by a third party.

GRC will be formed for each sub-project, headed by a local Govt. representative of relevant area (an official of the city corporation). Members will be taken to represent the communities and other stakeholders, which may include representatives from local administration, school teachers, local NGOs, and women. The local Govt. representative will nominate members of the GRC. The local Govt. representative will form the GRC and forward the composition to the PMU of the sub-project. Table-10.3 shows a possible composition of the GRC. The size of the GRC may be changed depending on the extent of the sub-project to make its operation feasible and acceptable to the project affected persons (PAPs).The GRC will ensure proper presentation of complaints and grievances, as well as impartial hearings and transparent decisions. If required, the GRCs will meet periodically to discuss the merit of outstanding cases and fix a date for hearing and notify the PAP to submit necessary documents in proof of her/his claim/case; resolve grievances within one month of receipt of complaint. LGED will try to address the grievances on their own as a first-line recipient, however, if a GRC formation becomes necessary in certain cases, the committee has to be funded by LGED.

Table-10.3: Structure of Grievance Redress Committee (GRC)

Chairman	Local Govt. Representative
Member-Secretary	Project Team Leader of the sub-project (PD-LGED for Pre construction & construction stages, Mayor for the Operation Stage)
Member*	Representative from local administration
	Teacher from a local educational institution
	Representative of a local NGO
	Representative of civil society
	Female ward councilor (relevant area)
	Representative of religious society (e.g., Imam)
	Representative of tribal society, if any
	Representative of LGED/Mayor (Municipality/City Corporation)

Having effective operational-level grievance mechanisms in place to systematically handle and resolve the grievances that arise helps to diffuse potential problems and provides channels for resolving issues that might otherwise escalate into protests, conflicts or legal disputes. Overview of good practices for effective grievance management is shown below in figure-10.1.

Figure-10. 1: Overview of Good Practices for Effective Grievance Management

Being clear about the process for resolving grievances can help build community trust. It should be evident to community members what basic steps will be followed when they submit a grievance, with defined timeframes given for each stage of the process and for the overall resolution.
It can be helpful to set out a simple flow diagram for the process, as illustrated in Figure-10.2. A commitment to resolve grievances within a defined and reasonable timeframe is also important to ensure the community see the mechanism as robust and effective. While there should always be flexibility to extend the timelines when circumstances warrant it, any unusual or unexplained delays in responding to grievances can send a negative message to the affected stakeholders about the LGED's attitude towards them and their issues.

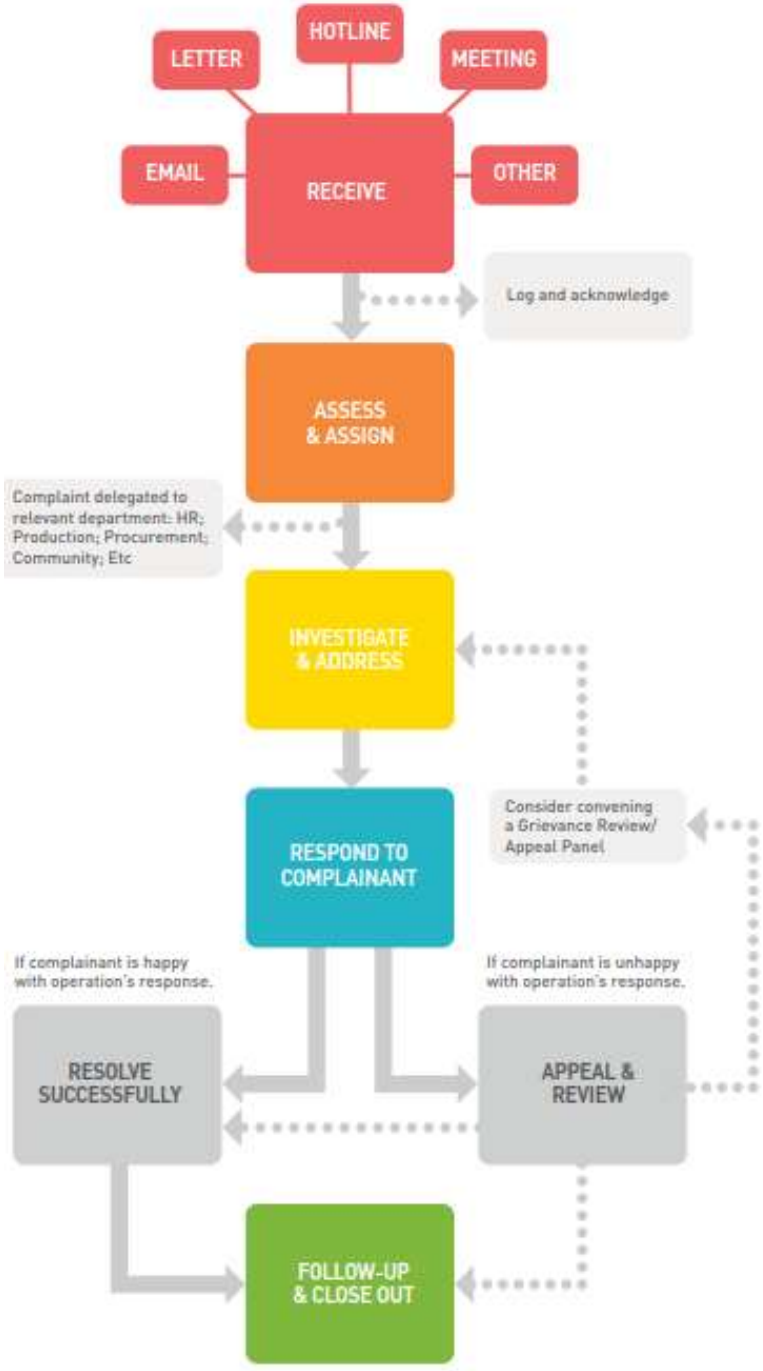


Figure-10. 2: Grievance Redress Process

SECTION 11 ENVIRONMENTAL AND SOCIAL MONITORING AND COST

11.1 GUIDELINE FOR PREPARATION OF ENVIRONMENTAL AND SOCIAL MONITORING PLAN

The monitoring plan is the key element of ESMP to be prepared on the basis of impact assessment described in earlier section. The Plan describe the potentially negative impacts of each program activity, lists mitigation and control measures to address the negative impacts, and assigns responsibilities for implementation and monitoring of these measures. The Plans for the ISWMIP will be prepared and included in the ESIA; similar plans will be prepared for the later phases and included in the associated ESIAs. Table-11. 1 presents the sample format of these plans. An overview of monitoring requirement of impact and mitigation described in in Table-11.2.

Table-11. 1: Format of Monitoring Plan-During Project Implementation Period (Sample)

Environmental Impact/Issue	Actions	Responsibility		Key Performance Indicator	Timing	Cost Allocation
		Execution	Monitoring			
1. Activity: Design / pre-construction considerations of infrastructures						
1.1 Changes in land use, loss of properties, cultivated land and grazing land, relocation of settlements and amenities	−The RP will be implemented for permanent land acquisition and loss of assets/ livelihood and other similar impacts	LGED-PIU	ESU	• Documentary evidence of RP implementation • Establishment of resettlement sites • Payment of compensation amounts • People resettling in new villages • Income levels of displaced households • Number of public grievances re resettlement and compensation	Before construction	Included in Overall program Cost
	- Contractors will lease the land for construction facilities on temporary basis. Proper documentation will be carried out for this leasing. Site selection will be carried out in consultation with the community and local officials; approval from DSM will also be required for the selected sites.	Contractor	DSM/ESU	• Documentary evidence of land leasing for temporary facilities • DSM approval for the selected site(s) • Absence of grievances regarding temporary facilities	Before contractor mobilization	Included in contractors' costs
1.2 borrowing construction material	- A material (particularly river sand and soil from agricultural land/wetlands, if required) borrowing plan will be prepared	Contractor	DSM/ESU	• Approved plan • Plan itself will outline appropriate KPIs for its implementation.	Before construction	Included in Contractors' costs

Table-11.2: Overview of Impacts and Mitigation

Impacts/Issues	Mitigation Measures	Time Frame	Cost (BDT)	Responsibility		Key Monitoring Indicators	Monitoring Frequency
				Implementation	Supervision		
Impacts due to project siting							
Land cover and land use changes	Relevant ECoPs of site selection. Integrated Pest Management Plan; Linkages with ongoing pest management programs	2022 onwards	In budget of ESMP	PIU	DSM, PIU	- to be developed under IPM	Six-monthly
Loss of natural vegetation and trees	Compensatory tree plantation along reconstructed embankment	2022-2025	In budget of ESMP	PIU	DSM, PIU	- trees cut and trees planted	Monthly
Loss of aquatic habitat	Organic shrimp firming/aquaculture expansion Fish sanctuaries/MPA in BoB	2022-2025	In budget of ESMP	PIU	DSM, PIU	- abundance of fishes and species diversity in MPA/sanctuaries	Quarterly
Drainage congestion and water logging	Installation of regulators and culverts	2022 onwards	Project design	Contractor	DSM, PIU	- User committees are formed and trained; area water logged	Quarterly (Monthly during flood season)
Impacts during implementation period							
Impacts of burrowing of material from river beds, agriculture land and wetlands (if required)	Compliance with relevant ECoPs of sand extraction, agricultural top soil management and wetland digging	2022-2025	In budget of Contractor	Contractor	DSM, PIU	Sites approved, ongoing visual inspection of sand extraction	At the beginning of works and through sand extraction
Air pollution	Pollution prevention and implementation of ECoPs	2022-2025	In budget of Contractor	Contractor	DSM, PIU	Plan approved and implemented; community complaints	Quarterly
Noise	Noise control measures andrelevant ECoPs	2022-2025	In budget of Contractor	Contractor	DSM, PIU	Plan approved and implemented; community complaints	Quarterly
Water pollution	Pollution prevention and control plan	2022-2025	In budget of Contractor	Contractor	DSM, PIU	Plan approved and implemented	Quarterly

Impacts/Issues	Mitigation Measures	Time Frame	Cost (BDT)	Responsibility		Key Monitoring Indicators	Monitoring Frequency
				Implementation	Supervision		
Soil contamination	Pollution prevention and control plan	2022-2025	In Contractors budget	Contractor	DSM, PIU	Plan approved and implemented	Quarterly
Solid wastes and hazardous wastes	Waste management and pollution control plan	2022-2025	In budget of Contractor	Contractor	DSM, PIU	Plan approved and implemented	Quarterly
Impacts on aquatichabitat	Treatment of waste effluents	2022-2025	In budget of Contractor	Contractor	DSM, PIU	Sites approved and ongoing monitoring of plan implementation	Before and during construction
Impacts on wildlife habitats	No construction related activities on sensitive wildlifehabitat, use of low wattage lights at construction sites	2022-2025	In budget of ESMP	Contractor	DSM, PIU	Biodiversity monitoring studies	Six monthly
Site clearance and restoration	Site restoration and landscaping	2022-2025	In budget of Contractor	Contractor	DSM, PIU	Sites established and cleared	After construction
Occupational health and safety	Implement health and safety, and emergency response plan	2022-2025	In budget of Contractor	Contractor	DSM, PIU	Plan prepared and implemented	Quarterly
Environmental Impacts During Post Project Period							
Changes in water courses (canal)	Long term monitoring and biodiversity conservation measures	2025 on-wards	In budget of the project	LGED	LGED	Biodiversity conservation measures	Quarterly
Generation of solid waste	Implementation of Health Safety Environment Plan	2025 on-wards	LGED annual budget	LGED	LGED	Plan prepared and implemented	Six monthly
Air and noise pollution	Air and noise quality and appropriate measures	2025 on-wards	LGED annual budget	LGED	LGED	to be developed	
Water pollution	Organic aquaculture, water treatment, etc.	2025 on-wards	LGED annual budget	LGED	LGED	Working condition ofconnected canals, Mari culture area	Annually
Ecological connectivity	Implementation of relevant ECoPs of wetland connectivity	2025 on-wards	LGED annual budget	LGED	LGED	Plan prepared and implemented	Annually
Ash disposal	Implementation of relevant ECoPs of waste disposal and treatment	2025 on wards	LGED annual budget	LGED	LGED	Plan prepared and implemented	Annually

Impacts/Issues	Mitigation Measures	Time Frame	Cost (BDT)	Responsibility		Key Monitoring Indicators	Monitoring Frequency
				Implementation	Supervision		
Loss of vegetation	Implementation of related ECoPs of plantation	2025 on-wards	LGED annual budget	LGED	LGED	Plan prepared and implemented	Annually
Impact of avifauna	Implementation of related ECoPs of wildlife management	2025 on-wards	LGED annual budget	LGED	LGED	Plan prepared and implemented	Annually

11.2 MONITORING PROGRAM

As one of the key elements of the ESMP, a three-tier monitoring program is proposed comprising compliance monitoring, effects monitoring, and external monitoring. The main purpose of this monitoring program is to ensure that the various tasks detailed in the ESMP particularly the mitigation measures are implemented in an effective manner, and also to evaluate program impacts on the key environment parameters. Various types of ESMP monitoring are discussed below.

Effects Monitoring During Project Implementation

Effects monitoring is a very important aspect of environmental management to safeguard the protection of environment. The effects monitoring plan proposed for the ISWMIP is presented in Table-11. 3; after the specific ESIA, this program will be revisited and revised. The monitoring will comprise surveillance to check whether the contractor is meeting the provisions of the contract during construction and operation of the program including the responsible agencies for implementation and supervision.

Table-11. 3: Environmental Monitoring Plan

Parameter / Activity	Location	Means of Monitoring	Frequency	Responsible Agency	
				Implemented By	Supervised By
During Project Implementation					
Sand extraction/soil collection	At all sand extraction points	Ecological inspection of the site prior to development; and extraction carried out not in long stretches	Weekly	Contractor	DSM
Sediment Quality for heavy metals	Canal/riverbed sediments at 5 locations	Laboratory analysis for analysis of metals and oil/grease (lead, cadmium, chromium, copper, manganese, mercury and zinc)	Before sand extraction	Contractor through a nationally recognized Laboratory	DSM
Soil Pollution	Canal, construction site, camp & RS	Visual inspection that filling is through several compartments	Beginning of earth filling works	Contractor	DSM
	Canal, construction, RS and material storage sites	Ensure no contaminated effluent is leaving from the filling area to the nearby agricultural lands	Weekly	Contractor	DSM
Stability of slopes	Side slopes of sluice gates, canal dyke, pond dyke, and Resettlement Sites	Compaction as per contract specifications, Visual inspection of erosion prevention measures and occurrence of erosion	Monthly	Contractor	DSM
Hydrocarbon and chemical storage	Construction camps and yards	Visual Inspection of storage facilities	Monthly	Contractor	DSM
Traffic Safety	Construction Access Roads	Visual inspection to see whether proper traffic signs are placed and flag-men for traffic management are engaged	Monthly	Contractor	DSM
Air Quality (dust, smoke)	Construction sites	Visual inspection to ensure good standard equipment is in use and dust suppression measures (e.g., spraying of waters) are in place.	Daily	Contractor	DSM
	Material storage sites	Visual inspection to ensure dust suppression work plan is being implemented	Monthly	Contractor	DSM
Air quality	Sensitive receptors along construction corridor	24 hours continuous monitoring with the help of appropriate instruments and analyzers (particulate matter, carbon dioxide, sulphur and nitrogen oxides)	Quarterly	Contractor	DSM

Parameter / Activity	Location	Means of Monitoring	Frequency	Responsible Agency	
				Implemented By	Supervised By
Noise	Construction sites	Noise measurement using noise meter; Ensure work restriction between 21:00-06:00 close to the sensitive locations	Weekly	Contractor	DSM
Surface Water Quality	At the baseline monitoring sites at five sites	Sampling and analysis of surface water quality (TDS, Turbidity, pH, dissolved oxygen, biological and chemical oxygen demand)	Quarterly	Contractor through a nationally recognized Laboratory	DSM
Groundwater quality	Locations of tube-well installation (for workers camps and RS), Shrimp firm, Other buildings, fish landing centers, markets, etc.	Depth of tube well should be more than 30m. Test water for arsenic iron and manganese before installing of casing. If the quality is found not suitable further deepening will be done.	During drilling of wells	Contractor trough a nationally recognized Laboratory	DSM
	Water wells to be used by contractors for drinking	Laboratory analysis of all drinking water parameters specified in national standards	After development of wells	Contractor trough a nationally recognized Laboratory	DSM
Plantation	Canal slopes, building construction sites, affected vegetation sites	Visual inspection to ensure plantations are taken care of.	Monthly	Contractor	DSM
Waste Management	Construction camps and construction sites, other infrastructure sites, markets, Laboratory, etc.	Visual inspection that solid waste is disposed at designated site	Monthly	Contractor	DSM
Drinking water and sanitation	Construction camps and construction sites, markets, other infrastructure sites, Laboratory, etc.	Ensure the construction workers are provided with safe water and sanitation facilities in the site	Weekly	Contractor	DSM
Flora and Fauna	Sensitive habitats in Project influence area	Survey and comparison with baseline environment Ensure use of lighting at construction sites conforms with requirements to limit impacts to wildlife	Six-monthly	Biodiversity Conservation and Monitoring Consultant	DSM, LGED
Fish migration	Regulators, canal, rivers, beels, etc.	Sample fish catch	Monthly after installation of regulators	Consultants	DSM, LGED
Restoration of Work Sites	All Work Sites	Visual Inspection	After completion of all works	Contractor	DSM, LGED

Parameter / Activity	Location	Means of Monitoring	Frequency	Responsible Agency	
				Implemented By	Supervised By
Safety of workers Monitoring and reporting accidents	At work sites	Usage of Personal Protective equipment and implementation of contractor OHS plan	Monthly	Contractor	DSM, LGED
Grievances (environmental issues)	In the project area	Number of grievances registered and addressed	Monthly	PIU	DSM, LGED
During Post Project Period					
Stability of protection works	Canal slopes, regulators sites, and Resettlement Sites	Visual inspection of erosion prevention measures and occurrence of erosion	Monthly	LGED	LGED
Plantation	Construction sites, canal slopes, pond dyke, setc.	Visual inspection to ensure plantations are taken care of.	Monthly	Contractor	DSM
Fish migration	Regulators, canal re-excavation, rivers, beels, etc.	Sample fish catch	Monthly during migration season	Consultants	DSM, LGED
Waste effluents	Construction camps and construction sites, other infrastructure sites, markets, Laboratory, research vessels, etc.	Visual inspection that solid and liquid waste effluents are properly managed during post project period	Six-monthly	Environmental Desk of LGED	LGED
Pesticide residue in soil and water	Cultivation fields, khals and beels	Laboratory analysis of pesticide related parameters	Six-monthly	LGED through a nationally recognized Laboratory	LGED
Ash disposal	At the Waste to Energy Plant	Achieve a total organic carbon (TOC) value in the ash residues of below 3 wt percent and typically between 1 and 2 wt percent	Quarterly	LGED through a nationally recognized Laboratory	LGED

APPENDIX-1 LIST OF REFERENCES

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APPENDIX-2 SCREENING FORM FOR POTENTIAL ENVIRONMENTAL & SOCIAL SAFEGUARDS ISSUES

This form is to be used by the Implementing Agency to screen potential environmental and social safeguards issues of a sub project to determine Bank policies triggered and the instrument to be prepared for the sub project.

Subproject Name	
Subproject Location	
Subproject Proponent	
Subproject Type/Sector	
Estimated Investment	
Start/Completion Date	

Questions	Answer		If Yes AIIB Policy triggered	Documents requirement if Yes
	Yes	No		
Are the subproject impacts likely to have significant adverse environmental impacts that are sensitive[10], diverse or unprecedented?[11] Please provide brief description:			*Environmental Assessment* Category A	Environmental and Social Impact Assessment (ESIA)
Do the impacts affect an area broader than the sites or facilities subject to physical works and are the significant adverse environmental impacts irreversible? Please provide brief description:			*Environmental Assessment* Category A	ESIA
Is the proposed project likely to have minimal or no adverse environmental impacts?[12] Please provide brief justification:			*Environmental Assessment* Category C	No action needed beyond screening
Is the project neither a Category A nor Category C as defined above?[13] Please provide brief justification:			*Environmental Assessment* Category B	Limited ESIA or ESMP
Are the project impacts likely to have significant adverse social impacts that are sensitive, diverse or unprecedented[14]? Please provide brief description:			*OP 4.01 Environmental Assessment* Category A	ESIA

[10] Sensitive (i.e., a potential impact is considered sensitive if it may be irreversible - e.g., lead to loss of a major natural habitat, or raise issues when a project includes the manufacture, use, or disposal of environmentally significant quantities of pest control products);

[11] Examples of projects where the impacts are likely to have significant adverse environmental impacts that are sensitive, diverse or unprecedented are large scale infrastructure such as construction of new roads, railways, power plants, major urban development, water treatment, waste water treatment plants and solid waste collection and disposal etc.

[12] Examples of projects likely to have minimal or no adverse environmental impacts are supply of goods and services, technical assistance, simple repair of damaged structures etc.,

[13] Projects that do not fall either within as a Category A or Category C can be considered as Category B. Examples of category B sub-projects include small scale *in-situ* reconstruction of infrastructure projects such as road rehabilitation and rural water supply and sanitation, small schools, rural health clinics etc.

[14] Generally, sub projects with significant resettlement-related impacts should be categorized as A. Application of judgment is necessary in assessing the potential significance of resettlement-related impacts, which vary in scope and scale from sub project to sub project. Subprojects that would require physical relocation of residents or businesses, as well as sub projects that would cause any individuals to lose more than 10 percent of their productive land area, often are categorized as A. Scale may also be a factor, even when the significance of impacts is relatively minor. Sub projects affecting whole communities or relatively large numbers of persons (for example, more than 1,000 in total) may warrant categorization as A, especially for projects in which implementation capacity is likely to be weak. Sub projects that would require relocation of Indigenous Peoples, that would restrict their access to traditional lands or resources, or that would seek to impose changes to Indigenous Peoples' traditional institutions, are always likely to be categorized as A.

Questions	Answer		If Yes AIIB Policy triggered	Documents requirement if Yes
	Yes	No		
Will the project adversely impact physical cultural resources?[15] Please provide brief justification:			*Physical Cultural Resources*	Addressed in ESIA (ESIA with PCR Management Plan and/or Chance Find Procedures)
Will the project involve the conversion or degradation of non-critical natural habitats? Please provide brief justification:			*Habitats*	Addressed in ESIA
Will the project involve the significant conversion or degradation of critical natural habitats[16]?			*Habitats*	Not eligible
Does the sub-project construct a new dam or rely on the performance of an existing dam or a dam under construction?			*Dam Safety*	Dam Safety Plan
Does the project procure pesticides (either directly through the project, or indirectly through on-lending, co-financing, or government counterpart funding), or may affect pest management in a way that harm could be done, even though the project is not envisaged to procure pesticides?			*Pest Management*	Addressed in ESIA (Pest Management Plan)
Does the sub-project involve involuntary land acquisition, loss of assets or access to assets, or loss of income sources or means of livelihood? Please provide brief justification:			*Involuntary Resettlement*	Resettlement Action Plan
Are there any ethnic minority communities present in the sub project area and are likely to be affected by the proposed sub-project negatively or positively? Please provide brief justification:			*Indigenous People*	Ethnic Minority Development Plan/Indigenous Peoples Plan
Will the project have the potential to have impacts on the health and quality of forests or the rights and welfare of people and their level of dependence upon or interaction with forests; or aims to bring about changes in the management, protection or utilization of natural forests or plantations? Please provide brief justification:			*Forestry*	Addressed in ESIA
Will the project have the potential to have significant impacts or significant conversion or degradation of critical natural forests or other natural habitats?			*Forestry*	No eligible

[15] Examples of physical cultural resources are archaeological or historical sites, including historic urban areas, religious monuments, structures and/or cemeteries particularly sites recognized by the government.

[16] Subprojects that significantly convert or degrade critical natural habitats such as legally protected, officially proposed for protection, identified by authoritative sources for their high conservation value, or recognized as protected by traditional local communities, are ineligible for Bank financing.

Conclusion and Safeguards Instruments Required:

The sub project is classified as a Category _____ project as per Asian Infrastructure Investment Bank ESMPF, and the following safeguards instruments will be prepared:

1. _____
2. _____
3. _____
4. _____
5. _____

APPENDIX-3 RAPID ENVIRONMENTAL ASSESSMENT (REA) CHECKLIST FOR SOLID WASTE MANAGEMENT

Instructions:

(i) The Environmental and Social expert team will complete this checklist to support the environmental classification of a subproject. It is to be attached to the environmental categorization form and submitted to the Environmental and Social Unit (ESU) for endorsement by the ESU Focal Person.

(ii) This checklist focuses on environmental issues and concerns. To ensure that social dimensions are adequately considered, refer also to AIIB's (a) checklists on involuntary resettlement and on tribes, minor races, ethnic sects and communities;[17] (b) poverty reduction handbook; (c) staff guide to consultation and participation; and (d) gender checklists.

(iii) Answer the questions assuming the "without mitigation" case. The purpose is to identify potential impacts. Use the "remarks" section to discuss any anticipated mitigation measures.

Country/Project Title:	
Sector Division:	
Subproject Name	

Screening Questions	Yes	No	Remarks
A. PROJECT SITING IS THE PROJECT AREA			
▪ Densely populated?			
▪ Heavy with development activities?			
▪ Adjacent to or within any environmentally sensitive areas?			
• Cultural heritage site			
• Protected area			
• Wetland			
• Mangrove			
• Estuarine			
• Buffer zone of protected area			
• Special area for protecting biodiversity			
• Bay			
B. POTENTIAL ENVIRONMENTAL IMPACTS WILL THE PROJECT CAUSE			
• impacts associated with transport of wastes to the disposal site or treatment facility?			
• impairment of historical/cultural monuments/areas and loss/damage to these sites?			
• degradation of aesthetic and property value loss?			

[17] Groups or population identified as Indigenous Peoples within the context of AIIB's ESS-3 Indigenous People will be referred to in this document as *tribes, minor races, ethnic sects and communities* (following the request of the Government of Bangladesh).

Screening Questions	Yes	No	Remarks
• nuisance to neighboring areas due to foul odor and influx of insects, rodents, etc.?			
• dislocation or involuntary resettlement of people?			
• disproportionate impacts on the poor, women and children, indigenous peoples or other vulnerable groups?			
• risks and vulnerabilities related occupational health and safety due to physical, chemical, biological, and radiological hazards during project construction and operation?			
• public health hazards from odor, smoke from fire, and diseases transmitted by flies, insects, birds and rats?			
• deterioration of water quality as a result of contamination of receiving waters by leachate from land disposal system?			
• contamination of ground and/or surface water by leachate from land disposal system?			
• land use conflicts?			
• pollution of surface and ground water from leachate coming from sanitary landfill sites or methane gas produced from decomposition of solid wastes in the absence of air, which could enter the aquifer or escape through soil fissures at places far from the landfill site?			
• inadequate buffer zone around landfill site to alleviate nuisances?			
• road blocking and/or increased traffic during construction of facilities?			
• noise and dust from construction activities?			
• temporary silt runoff due to construction?			
• hazards to public health due to inadequate management of landfill site caused by inadequate institutional and financial capabilities for the management of the landfill operation?			
• emission of potentially toxic volatile organics from land disposal site?			
• surface and ground water pollution from leachate and methane gas migration?			

Screening Questions	Yes	No	Remarks
• loss of deep-rooted vegetation (e.g. tress) from landfill site?			
• explosion of toxic response from accumulated landfill gas in buildings?			
• contamination of air quality from incineration?			
• health and safety hazards to workers from toxic gases and hazardous materials in the site?			
• Social conflicts if workers from other regions or countries are hired?			
• Waste pickers works are engaged in informally collecting recyclable wastes or organic wastes on roads, at final disposal sites, and other places, to earn income or livelihoods?			
• Are waste pickers subject to health risks?			
• Are there ways to address the waste pickers health risks?			
• Is there any organization of waste pickers to increase political voice			
• Will the subproject investment affect waste pickers?			
• Are women and children play any role in the SWM system?			
• Any political or ethnic issues associated with sharing a waste disposal site?			
• Any labor safety and health risks faced by SWM workers (formal and informal)?			
• Any most vulnerable groups (e.g. households in close proximity to existing or planned waste transfer and disposal sites, waste pickers, women) affected by current SWM practices?			
• Are waste management service users currently satisfied with their existing solid waste collection points?			
• Are service users aware of the need to manage solid waste better?			
• Does the municipality/city corporation authority provide information and respond to complaints?			
• Community safety risks due to both accidental and natural hazards, especially where the structural elements or components (e.g., landfill or incinerator) of the project			

Screening Questions	Yes	No	Remarks
are accessible to members of the affected community or where their failure could result in injury to the community throughout project construction, operation and decommissioning?			

A Checklist for Preliminary Climate Risk Screening

Screening Questions		Score	Remarks
Location and Design of project	Is siting and/or routing of the project (or its components) likely to be affected by climate conditions including extreme weather-related events such as floods, droughts, storms, landslides?		
	Would the project design (e.g. the clearance for bridges) need to consider any hydro-meteorological parameters (e.g., sea-level, peak river flow, reliable water level, peak wind speed etc.)?		
Materials and Maintenance	Would weather, current and likely future climate conditions (e.g. prevailing humidity level, temperature contrast between hot summer days and cold winter days, exposure to wind and humidity hydro-meteorological parameters likely affect the selection of project inputs over the life of project outputs (e.g. construction material)?		
	Would weather, current and likely future climate conditions, and related extreme events likely affect the maintenance (scheduling and cost) of project output(s)?		
Performance of project outputs	Would weather/climate conditions, and related extreme events likely affect the performance (e.g. annual power production) of project output(s) (e.g. hydro-power generation facilities) throughout their design life time?		

Options for answers and corresponding score are provided below:

Response	Score
Not Likely	0
Likely	1
Very Likely	2

Responses when added that provide a score of 0 will be considered low risk project. If adding all responses will result to a score of 1-4 and that no score of 2 was given to any single response, the project will be assigned a medium risk category. A total score of 5 or more (which include providing a score of 1 in all responses) or a 2 in any single response, will be categorized as high risk project.

Result of Initial Screening (Low, Medium, High):

APPENDIX-4 GUIDELINE FOR ARCHAEOLOGICAL IMPACT ASSESSMENT

Bangladesh has long cultural history right from 3rd Century BC onwards. Enormous major and minor historical records are scattered in different parts of the country. The features of these antiquities have separated values and identities. During implementation of large-scale infrastructural development work/s an archaeologist needs to be present to rescue or recover any cultural resources present at the site.

To reduce the possibility of damaging archaeological objects, in case they are found while undertaking excavation works for construction and rehabilitation of engineered Sanitary Landfill and Waste to Energy Plant, an authorized archaeological unit or at least an archaeologist should be asked to monitor the site periodically. The archaeologist, according to the Rules and Regulation of the Government of Bangladesh will study, make inventory and record it for the future.

Tasks:

i. Conduct archaeological impact assessment for development projects.

ii. Execute sampling excavation and assess the significance of the materials found, propose mitigation measures to safeguard buried archaeology or erected/surface remains and suggest future research activity.

iii. Assess risks to these archaeological materials by the proposed infrastructure and suggest changes to the infrastructural works.

iv. Identify suitable mitigation measures and prepare environmental management plan.

Investigation

Archaeological impact assessment in the project area and its vicinity to identify impacted sites/remains in relation to the infrastructural work proposed. A team of experts needs to conduct an extensive study and survey at the sub-project areas. The objective of this survey will also be to develop proposal of appropriate mitigation measures to be undertaken to safeguard the buried or surface archaeology. The other objective is to suggest for changes, if any, to the proposed infrastructure works which could better assure the safeguarding of archaeological materials of cultural and historical significance and also suggest for future archaeological research and excavation of the buried archaeology.

The team can adopt three different methods for this purpose.

a. Examination of available cartographic and other photographic records.

b. Review of available literature, reports of archaeological researches and explorations conducted at project areas.

c. Combing the city block-by-block or lane by lane through site inspection to unveil the historical facts.

d. On-site interaction with local people and to investigate clues if any in their traditions and legends.

APPENDIX-5 SPECIAL ENVIRONMENTAL CLAUSES FOR TENDER DOCUMENT

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

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

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

Health and Safety:

- The Contractor shall observe and maintain standards of Health and Safety towards all of his employees not less than those laid down by the national standards or statutory regulations.
- The Contractor shall provide all appropriate protective clothing and equipment for the work to be done and ensure its proper use. Where required, safety nets, the contractor shall provide belts, harnesses and lines. The "safety directives for work equipment" and "safety directives for protective gears", as specified in the Occupational Health and Safety Guidelines (attached) shall be followed.
- The Contractor shall provide and maintain in prominent and well-marked positions all necessary first-aid equipment, medical supplies and other related facilities. A sufficient number of trained personnel will be required to be available at all times to render first aid.
- The Contractor must provide or ensure that appropriate safety and/or health signs are in place at their work sites where hazards cannot be avoided or reduced.
- The Contractor shall report to the Engineer promptly and in writing particulars of any accident or unusual or unforeseen occurrences on the site, whether these are likely to affect progress of the work or not.

Disposal and Pollution:

- The Contractor shall not dispose any waste, rubbish or offensive matter in any place not approved by the Engineer or Statutory Authority having jurisdiction. The Contractor shall not discharge into any watercourse oil, solids, noxious or floating materials.
- The Contractor shall take all reasonable precautions to keep public or private roads clean of any spillage or droppings from his vehicles or equipment. Any spillage or droppings, which accrue, shall be cleaned without delay to the satisfaction of the Engineer.
- The Contractor shall provide waste bins/ cans for collection of solid waste at appropriate locations (as directed by the Engineer), and ensure proper transfer/ disposal of solid waste.

APPENDIX-6 TERMS OF REFERENCE (ToR)

Development of Cumulative Impact Assessment (CIA) of Integrated Solid Waste Management Improvement Project (ISWMIP)

1. SELECTED DEFINITIONS AND ABBREVIATIONS

AIIB	Asian Infrastructure Investment Bank
CIA	Cumulative Impact Assessment Study
DoE	Department of Environment
ESIA	Environmental and Social Impact Assessment
GoB	Government of Bangladesh
ISWMIP	Integrated Solid Waste Management Improvement Project
LGED	Local Government and Engineering Department
PSF	Project Preparation Special Fund
SEA	Strategic Environment Impact Assessment
SWM	Solid Waste Management
ULB	Urban Local Bodies

2. BACKGROUND OF THE PROJECT

Bangladesh is one of the fastest Urbanising and most densely populated countries in the region, putting great pressure on basic urban services and infrastructure. Solid Waste Management (SWM) has been one of the major urban challenges in the country given its rapid urban growth. Despite the Government's efforts in improving the SWM system, waste collection and disposal capacity is still limited. Less than half of total waste generated is collected, while uncollected waste is often informally burned, buried, or illegally dumped in streets, public spaces, drainage channels, and waterways. This has resulted not only in public health hazards and the contamination of the environment, including air, water, and soil, but also the blocking of major drainage channels and sewerage networks.

The current Integrated Solid Waste Management Improvement Project (ISWMIP) is prepared by the LGED and supported by the consulting firms (Waste Concern, IPE Global, Aqua & RPMC), therefore, will improve the SWM system in selected municipal areas. This will help: (i) improve public health and quality of life by reducing exposure to pollutants and disease vectors associated with solid waste; (ii) strengthen the government's capacity to plan for and implement effective waste management services; and (iii) improve SWM practices in the country, encouraging waste minimization, recycling, and segregation at source. The Project is aligned to the Government of Bangladesh (GoB)'s priorities for providing sustainable urban infrastructure. The country is, in particular, facing an immense challenge in its solid waste management. The Project would directly contribute to one of the key objectives of the 8th Five Year Plan and the long-term Perspective Plan for 2020-2025, that is to improve the urban environment and quality of life.

The ISWMIP has four components as mentioned below:

- Component 1: Waste Collection and Transportation. This will help improve and optimize solid waste collection and transport services in selected Urban Local Bodies (ULBs), including collection containers and fleet, mechanical cleaning equipment, and transfer stations etc.
- Component 2: Waste Processing and Disposal Systems. This will finance prioritized waste processing and disposal infrastructure, including closure of polluted landfill sites, construction and rehabilitation of engineered sanitary landfills (standalone or regional/ clustered), and provision of facilities related to composting, resource recovery, and waste-to-energy.

- Component 3: Project Management and Supervision Support. This will support in the areas of project management, monitoring and evaluation, procurement, financial management, and environmental and social safeguards (including public awareness campaigns and public consultation), and provision of support with respect to supervision and maintenance of infrastructure investments.
- Component 4: Policy Support and Capacity Building. This will support: (i) improvement of the SWM sector policy and legal framework; (ii) policy and guideline development related to waste minimization and recycling, private sector participation, inclusion of informal workers, and multi-jurisdictional waste management; and (iii) institutional capacity strengthening for relevant central and local agencies in SWM.

The GoB has received a Project Preparation Special Fund (PSF) from AIIB to support the preparation of proposed ISWMIP for consideration of USD500 million AIIB financing. The investment shall be undertaken in a phased manner with a likely investment size for Phase I of USD 150 million. The PSF is being implemented by the Local Government Engineering Department (LGED) under the Local Government Division (LGD), the Ministry of Local Government Rural Development and Co-operatives (MLGRDC).

The project will function under the overall guidance of a Steering Committee (SC) which will be chaired by the Secretary, Local Government Division (LGD), the Ministry of Local Government Rural Development and Co-operatives (MLGRDC). The SC will play a significant role in high-level decision making, ensure seamless coordination among the various governmental actors, and accelerate the implementation of the proposed activities under various Components. The SC will comprise representatives from various Ministries.

The LGED will adopt this ESMPF findings, which lays out the requirements for the environmental and social impact assessment, environmental management plans, best management practices, and social management plans, for the ULBs where sites for ISWM are finalized and for the ULB areas once the ISWM areas are identified. This ESMPF is intended to provide policies, guidelines and procedures to be integrated into the design and implementation of component 1, 2, 3 & 4 respectively, under the proposed project.

3. SUBPROJECT COMPONENTS TO IMPROVE THE ENVIRONMENT

The subproject components are i) Waste Collection ii) Waste Transportation iii) Landfill (closure of polluted landfill sites, construction and rehabilitation of engineered sanitary landfills (standalone or regional/ clustered), iv) Compost Plant, v) MRF (Material Recovery Facility), vi) Plastic Waste to Oil, vii) Anaerobic Digestion, and vii) Leachate Treatment Plant viii) Waste to Energy (WtE). All these shall facilitate comprehensive SWM with the development of a long-term integrated SWM infrastructure for the entire ISWMIP, and thus help reduce environmental impact from inadequately managed SWM of the country. The proposed components of the subproject are summarized here under:

Waste Collection and Transport: Studies show that nearly a fourth (24%) of global greenhouse gas emissions come from road transport, with diesel usage increasing by over 200% between 1990 and 2017. The large diesel trucks and collection vehicles that transport waste from millions of businesses across the globe doubtlessly make up a large percentage of this carbon footprint.

The heavy diesel trucks that collect our rubbish and recycling not only contribute to carbon emissions, but also release foul odours and particulate emissions into the air, presenting health hazards to the public and polluting the neighbourhood's air. Large amounts of waste require additional waste collection, increasing road traffic and in turn, air pollution. This project will help in reducing the carbon footprint by implementing a best waste management system for the Municipalities and City Corporations under this project.

Landfill: The landfill will be designed to provide safe disposal of waste with minimal effect on the environmental components such as soil, groundwater, surface water, air and people. The cells will maximize waste disposal quantity within the available space of the selected site.

Compost Plant: The compost plant will divert significant portion of the incoming waste for land filling. The facility can utilize significant portion of organic waste in a cost-effective way. This compost plant is designed mainly to focus on `organic waste' (fresh organic waste coming mainly from kitchens, restaurants, vegetable wholesale markets, parks and lawns). Three major activities are carried out in compost plant; they are `collection' of segregated waste from the source, `processing' of waste using aerobic compost technology, `marketing' of resources produced from waste.

MRF (Material Recovery Facility): This facility will accommodate secondary sorting, baling and storage of recyclable in an environment friendly way. Selected registered by the landfill operator, informal waste recyclers can be engaged in this facility to properly sort the valuables from waste instead to carrying out their work in un-hygienic matter.

Plastic Waste to Oil: Waste Plastic Recycle to Fuel Oil. By using of the pyrolysis technology, this component shall mainly work on collecting and recycling MSW into highly value energy to help get the fuel oil from landfill garbage sorting.

Anaerobic Digestion: Biogas is produced from organic waste under the action of anaerobic decomposition. The biogas produced from the biogas plant will able to supply enough gas for cooking purpose for the staffs of compost plant and the rest biogas can be utilized for production of electricity for the internal lighting of the integrated landfill and resource recovery facility.

Leachate Treatment Plant: The Plant shall contain leachate collection ponds to treat the leachate coming from the landfill cells. The stared leachate will be aerated, and later filtered using trickling filters. The treated leachate will be sprayed back to the landfill cells, and are used in the biogas digester.

Waste to Energy: Waste-to-Energy plants covering site layouts, civil and structural drawings for all buildings (administrative, bunker, delivery hall etc.), access and internal service roads, all drawings for MEP and telecommunications systems, power supply (own power production and generator set),combustion system, process control systems, fire safety measures, air pollution control systems (dioxin and furan emissions), waste water treatment, fly-ash management, prevention of chemical leakage, arrangements for cooling water supply, monitoring and control systems.

In dealing with the implementation process of the solid waste management project, a substantial amount of land area is required for each subproject to implement the following components: Materials Recovery Facility (MRF), Composting, Anaerobic Digestion (AD), RDF, Incineration, Controlled Landfill, Integrated Landfill & Resource Recovery Facility (controlled, landfill, MRF, composting plant and AD, etc.).

4. ENVIRONMENTAL SAFEGUARD IN ISWMIP

Environmental Safeguard in the ISWMIP will cover environmental aspects in carrying out pre-feasibility studies, detailed feasibility studies. It will prepare environment safeguard instruments for the sub-projects.

Under Part A: Sector Review, Policy Briefs, ISWMIP Framework Documents, the environmental consultant will produce Policy Brief as a guidance document for ULBs/ULB clusters to identify Best Practicable Options (BPOs) in SWM for collection, transportation, processing and disposal, building on a system for scoring, and applying appropriate weightages, to technologies or non-technological approaches which best respond to:

any technology restrictions (waste streams accepted, rate and quality of materials recovered, type of outputs, environmental impacts on and by the technology option);

other likely environmental and social impacts;

Sub-project identification, screening (including likely environmental and social impacts), phasing (with Phase I investment size around USD150 million) and pre-feasibility reports for entire ISWMIP

preparation of ISWMIP framework document i.e. Environmental and Social Management Planning Framework (EMSPF)

Once participating UdLBs/ULB clusters are identified under Part B: Phase-I Sub-project Preparation of the project the Environmental Consultant shall prepare detailed sub-projects focusing on their Environment and Social Impact Assessments and Management Plans by:

producing, for all Phase I sub-projects, sub-project specific Environmental and Social Impact Assessments (ESIAs)

producing, for all Phase I sub-projects, sub-project specific Environmental and Social Management Plans (ESMPs) including applicable social instruments (e.g. Indigenous Peoples Plan (IPP) and Resettlement Action Plan (RAP)/Livelihood Restoration Plan).

5. PURPOSE OF THE CIA ToR

The purpose of this ToR is to guide the sub-projects of ISWMIP in preparing their Cumulative Impact Assessment (CIA) study complying the AIIB Environmental and Social Standards (ESSs) and GOB requirements.

4. DESCRIPTION OF THE ASSIGNMENT

4.1 Objectives

The Objective of the assignment is to provide guidance to the LGED, developers as well as investors (including Lenders) on environmental and social impacts associated with ISWMIP development and constraints to consider when developing subprojects. The assignments will include:

- Describe, identify and assess the likely significant effects on the environment of implementing the solid waste management plan, as well as the most important environmental and natural resource-related constraints bearing on the implementation of any related activity.
- Provide decision-makers of the LGED, DoE and other stakeholders in Bangladesh with relevant information (quantitative and qualitative) to assess the adequacy of environmental and social considerations when supporting the implementation of the strategic plan/policy with regards to Solid Waste Management sector. This should include a guide and check list. This information should help ensure that environmental and social concerns are appropriately integrated in the decision-making processes at the stages of programming, planning and implementation.
- Assess the global best practices how the major environmental sustainability challenges in the Solid Waste Management (SWM) sector are managed and provide recommendations at strategic level on how potential negative effects can be minimized and how positive effects can be optimized. Particular focus will be given to the Landfill, Waste to Energy, Composting Plant, Plastic Waste to Oil and Anaerobic digestion in order to address these key environmental concerns associated to the SWM sector.
- Provide practical guidance to LGED, local authorities, developers and lenders on how to develop subproject and what mitigation measures to consider. Include clear guidance on project development and subsequent monitoring. This will include a brochure that can be downloaded as PDF or provided in hard copy in English and Bengali.

4.2 Requested Services

Cumulative Impact Assessment (CIA) is composed of two parts: a scoping study in Phase I and a CIA study in Phase II. The scoping study will define the issues that need to be addressed in the CIA study, considering the specific context in which the sector is being developed and is likely to be implemented. Precise activities and calendar for the CIA study will be determined on the basis of the conclusions of the scoping study.

In Phase I, the scoping study will provide:

- a description of the SWM sector concerned;
- a brief description of the environmental requirements of DoE, AIIB and other donner agencies with Solid Waste Management Improvement potential;
- a brief description of the institutional and legislative framework of the Solid Waste Management sector in Bangladesh;
- a brief presentation of the relevant environmental policy and objectives in the country;
- an identification of the key stakeholders and relevant authorities for the CIA and their concerns, as this is critical to ensure buy-in and ownership;
- an identification of the key sector environmental and environmentally-linked social impacts of its implementation;
- a description of the scope of the environmental and social baseline to be prepared during the CIA study and the main sources from which the baseline will be compiled;
- an identification of the impact identification and evaluation methodologies to be used in the CIA study;
- a description of the stakeholder engagement mechanisms proposed for the CIA study including the development of a website and public meeting to be organized;
- an indication of the time frames (person-days), costs and resources needed to carry out the CIA study;
- a proposal of the methodology for the CIA (see Annex).

In Phase, the CIA study will deliver the following results:

- an environmental and social assessment of the Subprojects, taking into account the potential environmental and social impacts of SWMP implementations and their consistency with the National's and AIIB's environmental and social policies and objectives.
- presenting clear recommendations on policies and plans to achieve agreed sustainable SWM development over the medium to long term, and providing justification for the recommendations. Gaps in the existing decision-making process and policies and plans in terms of creating the stated sustainable development will be identified. Recommended actions shall be presented in an action plan that is likely to include further consultation, identified knowledge gaps, baseline surveys and detailed assessments needed to finalize policy, plans, programs, implementation arrangements and a monitoring framework.
- development of a best practice guide for developing and operating waste to energy pants inclusive of permitting and monitoring requirements.
- stakeholder engagement inclusive if presentation on impacts in the standalone subprojects of the ISWMIP.
- recommendations to the DoE which may include possible adjustments of environmental and socio-economic performance indicators, accompanying measures to deal with identified challenges, as well as priority issues for policy dialogue and coordination with DoE and other stakeholders.

4.3 Required Outputs

4.3.1. Phase I: Scoping Study

Overview of the sector and its institutional and legislative framework

The policy-making and/or planning process relating to the sector under assessment should be presented, including alternative options that may be under discussion. If deemed necessary and with adequate justification, additional options should be suggested for consideration in the CIA study. Where a sector policy already exists, its main features should be described.

The links between the policy-making/planning process and the CIA must be described, i.e. which outputs of the policy-making/planning process should feed into the CIA process and vice-versa. The specific policy-making/planning decisions and processes that should be influenced by the CIA must be identified.

Description of key stakeholders and their concerns

The involvement and active participation of stakeholders in the CIA process is a key success factor. Key stakeholders should be identified: key groups and institutions, environmental agencies, non-governmental organisations, representatives of the public and others, including those groups potentially affected by the likely environmental impacts of implementing the sector. Stakeholder consultation meetings should be organized at scoping stage and final stage.

The Consultants must review records of any national public consultation processes that may have taken place as part of the sector development. Based on this review and on additional consultations, they should identify key stakeholders' concerns and values with respect to the sector and propose a stakeholder engagement strategy. The stakeholder engagement strategy to be employed has to be agreed with the LGED and DoE before being implemented, in order to avoid unnecessary conflicts or raising of expectations. This strategy should provide stakeholders with an opportunity to influence decisions. If some of the identified stakeholders are not used to being engaged, particularly at the strategic level, and if there are no precedents, it would be important to include an education component in the stakeholder engagement process.

Appropriate disclosure material will be provided to stakeholder include draft of the guide to enable this to be consulted on and amended based on comments received from stakeholders.

The Consultants must keep records of all consultation held and comments received. The outcome of these consultations will have important implications for the direction and focus of the CIA study. Consequently, a structured analysis of the available material will be needed to determine the key conclusions and areas of concern.

The Consultant will summarize the results of the consultation and issues being raised and provide this to the DoE and LGED as a standalone summary.

Description of key environmental and social aspects to be addressed in the CIA

On the basis of the policy, institutional and legislative framework analysis, as well as the participation of stakeholders, the key environmental and social aspects that should be addressed in the CIA study should be identified – that is, the key sector environment and social interactions that need to be given special consideration and emphasis.

Description of the scope of the environmental and social baseline to be prepared in the CIA study

The Consultants must provide indications on the scope of the environmental and social baseline needed for the CIA study, ensuring that it will be adequate to examine in more detail the key environmental and social aspects identified above. This will include a proposal of the geographical units that will need to be addressed, if relevant.

In an overall sense, the baseline should contribute effectively to assess positive and/or negative environmental and social impacts; as well as determining the magnitude and sensitivity of those impacts at a level of confidence that can be used in policy and management decisions.

Recommendations on specific impact identification and evaluation methodologies to be used in the CIA study

The Consultants should provide an indication of the impact identification and evaluation methodologies that will be used in the CIA study, with regards to both the sector's expected impacts on the environment and the impacts that environmental conditions and natural resource availability.

Methodologies proposed should be drawn from best international practice and should be rigorous enough to ensure an adequate assessment and a sector-targeted analysis of issues at a strategic level.

Indication of the time frames needed to carry out the CIA study

The Consultants must assess the time that needs to be allowed for the completion of the CIA study, based on the initial indicative assessment. A description and estimation of the resources required (in terms of budget, person-days) must be provided, including a breakdown of costs.

The Team Leader, in coordination with the rest of the team, may review and adapt the initial timing and expertise to complete the CIA study, and develop a schedule of resources needed, including

- person-days of technical input for each of the experts;
- operational support costs, including participatory processes and special technical inputs (workshops, group participation training);
- any special mapping or data collection costs; and
- the Consultant team's operating cost (out-of-town transport, accommodation, etc).

4.3.2. Phase II: CIA Study

The scope of the CIA study will be agreed with the LGED and DoE on the basis of the results of the scoping study. The CIA study will include an environmental and social baseline study, an identification of environmental and social constraints and opportunities, an identification and assessment of the potential environmental and social impacts, an analysis of performance indicators, an assessment of the institutional capacities to address environmental and social challenges, and conclusions and recommendations.

Environmental and social baseline study

A description and appraisal must be made of the current state of the environment, focusing on those key environmental and social components identified by the scoping study. The trends for, and pressures on, the various environmental and social components must be identified and a projection must be made of the state of the environment on the short-, medium- and long term under the assumption of no implementation of the sector, taking into account the expected effects of climate change (to the extent they can be predicted with some reliability). External factors must be taken into account, including the influence of other sectoral policies. If the 'no implementation' scenario is unrealistic, the most probable 'business-as-usual' scenario should be selected. The geographical (or mapping) units to be addressed should be described, if relevant.

Identification and evaluation of environment and social-related risks, constraints and opportunities

The environmental and social factors that can affect (positively or negatively) the relevance, effectiveness, efficiency and sustainability of the sector, including climate- and natural resource-related aspects, should be identified, described and assessed. These factors may include natural resource availability as well as the current and projected effects of climate change. This part of the study should

also consider whether the sector provides an adequate response to these constraints and opportunities.

An analysis must be made of addressing environmental and social issues that affect sector performance in a negative manner, and making optimal use of opportunities offered by the environment to enhance sector performance. A matrix approach is suggested to illustrate the findings, indicating the environmental factors and resources; the positive and negative impacts and degrees of significance.

Identification and evaluation of impacts

The potential environmental and social impacts and risks from implementing the sector must be identified and described, taking into account the views and concerns of stakeholders. Their significance should be determined according to their characteristics (e.g. duration, probability, magnitude, mitigability, reversibility) and the sensitivity of the environment. The potential *cumulative* impacts of the envisaged sector activities should be identified, since they may differ from the sum of individual subproject impacts. Those impacts which are significant should be assessed in detail taking into account:

- the views and concerns of stakeholders;
- the consistency with international commitments (Multilateral Environmental Agreements);
- compliance with environmental regulations and standards;
- consistency with environmental objectives and policies; and
- their implications for sustainable development.

It is suggested that matrices, flow charts, etc. are used to illustrate the findings, showing which components of the sector have an effect on which environmental aspects, and the significance of such impacts, as well as to show the consistency with environmental objectives and international commitments.

Assessment of the capacities to address environmental and climate-related challenges

The capacity of implementing institutions in carrying out identified environmental and climate-related interventions, both in terms of adaptation and mitigation, should be assessed.

The Consultants will address the adequacy of institutional structure and capacities of the regulatory framework and human resources of the Energy sector and national environmental institutions to address the key environmental concerns associated to the geothermal sector. As noted earlier, this assessment should focus at the policy/sector level and take adequate cognizance of realistic present and future capacities.

Stakeholder engagement

Stakeholders should be engaged throughout the CIA study according to the stakeholder engagement strategy agreed at the scoping stage. Stakeholder engagement could include a mix of different mechanisms, such as questionnaires, focused semi-structure interviews and workshops with key stakeholders in accordance with AIIB ESS-1.

Conclusions and recommendations

This chapter will summarise the key environmental and social issues for the sector involved, including policy and institutional constraints, challenges and main recommendations. Recommendations should be made on how to optimise positive impacts and make the best out of environment- and natural resource-related opportunities, as well as on how to mitigate negative effects, adapt to environmental and social constraints and manage risks. It should suggest the selection of an alternative (if more than one alternative is envisaged), potential changes in the sector design (e.g. adoption of measures to

increase adaptive capacity with regard to climate variability and the expected effects of climate change), implementation and monitoring modalities, or cooperation actions.

The Consultants will pay specific attention to providing realistic, targeted and workable operational recommendations. General statements should be avoided.

The limitations of the CIA and its assumptions should be presented. The recommendations should consider the views presented by the stakeholders and explain how these were integrated. In the case of concerns that were not integrated in the final recommendations, the reasons thereof should be given.

In addition, a standalone guide for developing and operating Waste to Energy Plants, Plastic Waste to Oil plants, composting plant etc.

5. EXPERTISE REQUIRED

The following is the minimum experience and expertise required for this assignment:

- A senior environmental expert/team leader with at least 15 years international experience in leading and supporting environmental projects, including expertise and experience with cumulative impact assessment in Bangladesh, environmental impact assessment, in particular with assessing impacts of Solid Waste Management Sector projects.
- Social and environmental scientists/analysts with local and international experience in characterizing baseline conditions and assessing impacts of programs and policies on people and the environment in Bangladesh.
- Stakeholder Engagement expert with experience in designing and implementing programs to identify and involve local and public stakeholders in decision-making for environmental and SWM sector cumulative impact assessment projects.
- Social assessment expert(s), with local and international experience of working with rural communities and good understating of IFI (such as AIIB, World Bank, IFC etc.) social requirements.
- WtE Expert with at least 15years of local and international experience in Waste to Energy engineering.
- GIS specialist with at least 5 years of local and international experience in GIS/CAD mapping.
- Local experts with at least 10 years of experience in environmental assessment, public consultations and environmental legislation. Strong understanding of environmental and social challenges in Bangladesh especially with regards to SWM sector. These may include any or all of the experts above.

6. IMPLEMENTATION ARRANGEMENTS

Starting Period

It is expected that the assignment shall commence as soon as possible after the signature of the specific contract, preferably in early November,2022.

Location of assignment

Different Municipalities/City Corporations in Bangladesh. Working days in the field will be determined by Consultants during scoping stage.

Work Plan

The work plan should include but not necessarily be limited to the following activities:

Phase I: Scoping study

- Fact finding / data collection
- Review of prior public consultations, identification of key stakeholders
- Engagement of stakeholders
- Analysis/preparation of recommendations and scoping report.

Phase II: CIA study

- Fact finding / data collection – extensive quantitative data
- Technical Field trips
- Development of best practice guides
- Engagement of stakeholders
- Identification and detailed analysis of the potential environmental and social impacts and constraints
- Preparation of recommendations to mitigate negative environmental and social effects, adapt to constraints, optimise positive effects, exploit opportunities, and generally manage and control environmental and climate-related risks
- Preparation of recommendations and draft CIA report
- Preparation of the final CIA report.

On the basis of this draft proposal and the time schedule outlined in these Terms of Reference (ToR), the Consultants must provide their detailed work plan.

Time Schedule

The Consultant shall commence work no later than 5 days after conclusion of the Contract (kick-off date). The Assignment is to be completed within 3 months. Key time milestones are as follows:

Phase I:

- End of week from the kick-off meeting provide an inception report. This will in essence act as a gap analysis and definition of the project and will include key elements of the scoping study;
- Formal scoping study and Stakeholder Engagement Plan by week 2, to enable agreement of both by week 3 and allow for public consultation in month 1;

Phase II:

- End of month 1.5: submission of a draft CIA Report to the Bank, who will provide comments, following which the Consultant will have 1 week to provide an amended version; submission of the draft report on the project due diligence, benefits and obstacles;
- End of month 2: draft CIA Report ready for 15 days public consultation; public consultation commences; submission of the final report on the project due diligence, benefits and obstacles;
- End of month 2.5: end of public consultation; Consultant will amend the draft CIA Report following the public consultations as required by the Bank and DoE comments 1 weeks after the end of the public consultation period);
- End of month 3: submission of the agreed final CIA Report and the Report on Public Consultation.

Liaison with Stakeholders

The Consultant will liaise closely with the Bank and the DoE, among others, and points of contact/responsibility as nominated by the Bank and DoE.

The Consultant is requested to attend a minimum of five meetings with the Bank/DoE at the LGED Office in Dhaka or at an in-country venue nominated by DoE:

- at the beginning of the CIA process – kick off meeting;
- on submission of the draft inception report and scoping study (see Section 7 below);
- Prior to beginning the scoping meetings;
- on completion of the final report (for a formal presentation to the Bank);
- Prior to beginning the public consultation process.

Facilities, Equipment, Staff

As part of this Assignment, and within the budget assigned, the Consultant will:

- provide all equipment required for the project (e.g. laptops, PCs, photocopiers, etc.) that will remain its property at the end of the assignment;
- arrange any office facilities, etc. which may be required for its own use;
- arrange any facilities required for public meetings (as part of public information/disclosure); this should be based on one meeting in the study area;
- arrange for translation facilities at the Consultant's expense as provided in the agreed budget.

The consultant will cover his own expense during the public consultation process and stakeholder engagement meetings; including covering all costs of facilities, refreshments, adverts, handouts, Bengali-English simultaneous translation etc.

Travel

The Consultant is responsible for all necessary travel arrangements to and within Bangladesh.

7. DELIVERABLES AND REPORTING REQUIREMENTS

7.1 Reports to be Delivered

Deliverable No. 1: Inception Report

The Consultant will provide an Inception Report not later than 2 weeks after commencement of the Assignment to LGED and the Bank. This report should include (but not necessarily be limited to) the following:

- identify relevant regulations, guidelines, industry standards, etc.;
- identify relevant existing information;
- identify information gaps which are likely to have a significant impact on the assignment and the quality and usefulness of the final report;
- provide all details or any necessary material amendments to the work plan initially proposed;
- identify key stakeholders (e.g. local, national and international institutions and CSOs);
- provide an outline SEP;
- describe how the Consultant intends to manage interactions with the Bank, Geothermal Associations and the Ministry of Environment and Urbanization.

Deliverable No. 2: Scoping Study

The Scoping Study is to be presented in the format given in Appendix 1, although this is to be used as a guide as the inception report needs to be tailored to meet the requirements of the Project.

Following the issue of an inception report and meeting to be held in the subproject areas, the Consultant will prepare in week 3 a draft Stakeholder Engagement Plan (SEP) and scoping study; copies are to be presented to the Bank for comments in English and Bengali. Following the approval of the scoping study (assumed in week 4), scoping meetings will be undertaken in week 5 in line with a

program outlined in the SEP. The invitation to the scoping meetings will be issued at least 1 full week before they are due to take place, in national and local papers, and other media as required.

Consultant will cover all costs of the meeting and preparation for the meetings (including venues, refreshments etc). The consultant will cover his direct costs

Deliverable No. 3: CIA Report

Draft CIA Report

The CIA Report should, in structure, content, detail and presentation, take account of the requirements of the IFC-CIA Directives and best international practice such as the CIA Protocol as well as the DoE requirements associated with the implementation of the CIA Protocol. The report will include Annexes relating to each region under consideration as well as Stand along guidance documents for developing projects and subsequent monitoring. The Consultant is encouraged to discuss the report structure and presentation with the Bank and LGED at an early stage.

The Consultant will provide the Bank and LGED with an CIA Report w in draft form not later than 2.25 months after commencement of the assignment. The Bank and LGED will provide comments. The Consultant will then (if required) have 1 weeks to amend the draft as necessary.

Final CIA Report

Following acceptance of the amended draft by the Bank and LGED, the reports will be made available for public comment. Following completion of the public consultation in accordance with Bank procedures (60 days), and taking account of any comment from the public, the Consultant will prepare the final CIA Report within 1 months of completion of the 60 days period (final comments from the Bank and LGED to be provided to the Consultant not later than one month after completion of the 60-day consultation period).

Deliverable No. 4: Report on Public Consultation

The Consultant will provide the Bank and LGED with a concise report summarising:

- liaison with interested parties during the development of the CIA (e.g. at scoping stage) with the development of a scoping report and SEP; and
- the formal 60 days public consultation process of the CIA document with meetings held in Aydın region.

Deliverables No. 5: Monthly Progress Reports

The Consultant will present brief monthly progress reports to LGED (copy to the Bank) providing a summary of progress made (against the initial work plan) and will flag up any problem which could materially affect the CIA implementation. The inception report will count as the first progress report.

General Reporting Requirements, Reporting Language and Number of Copies

The Consultant shall send copies of all reports/deliverables to the LGED.

The Inception Report, the Monthly Progress Reports and all correspondence with the Bank and LGED will be in English and Bengali. The Final CIA Report, the Report on Public Consultation and all materials prepared for public information and disclosure will be in English and in Bengali.

All reports are to be submitted in hard copy (5 copies to each to LGED and the Bank) and in electronic format.

ANNEX 1 – Standard report formats

Standard format for the CIA scoping report

Maximum length of the main report (without appendices): 25 pages.

The following text appears on the inside front cover of the report:

This report is financed by AIIB and is presented by the [*name of consultant*] for the … It does not necessarily reflect the opinion of the … or the AIIB

1. Executive summary
2. Description of the Sector and areas
3. Overview of institutional and legislation documents
4. Description of key stakeholders and their concerns
5. Description of key environmental and social aspects to be addressed in the CIA study
6. Description of the scope of the environmental and social baseline to be prepared in the CIA study
7. Recommendations on specific impact identification and evaluation methodologies to be used in the CIA study
8. Proposal of time frames and resources needed for the CIA study
9. Technical appendices
    - I. Stakeholder engagement methodology
    - II. List of stakeholders engaged or consulted
    - III. Records of stakeholder participation.
    - IV. List of documents consulted

Standard format report

The following text appears on the inside front cover of the report:

This report is financed by AIIB and is presented by the [*name of consultant*] for the … It does not necessarily reflect the opinion of the … or the AIIB and ….

1. Executive summary
2. Scope
3. Background
    - 3.1 Upgrade Program justification and purpose
    - 3.2 Alternatives
    - 3.3 Environmental and Social policy, legislative and planning framework
4. Approach and methodology
    - 4.1 General approach
    - 4.2 Geographical or environmental and mapping
    - 4.3 Assumptions, uncertainties and constraints
5. Environmental and social baseline study
6. Impact identification and evaluation
7. Analysis of alternatives
8. Mitigation or optimising measures
9. Indicators and institutional capacities
10. Conclusions and recommendations
    - 10.1. General conclusions

10.2. Recommendations for developing Projects

10.3. Recommendations for enhancement

11. Technical appendices

- Maps and other illustrative information not incorporated into the main report
- Other technical information and data, as required
- List of stakeholders consulted/engaged
- Records of stakeholders' participation
- Questions and answers book

12. Other appendices

- Study methodology/work plan (2–4 pages)
- Consultants' itinerary (1–2 pages)
- List of documentation consulted (1–2 pages)
- *Curricula vitae* of the consultants (1 page per person)
- Terms of Reference for the CIA

In additional separate chapters, or annexes will be provided for specific subproject regions.

APPENDIX-7 TERMS OF REFERENCE (ToR)

Development of Environmental and Social Impact Assessment (ESIA) of Integrated Solid Waste Management Improvement Project (ISWMIP)

1. SELECTED DEFINITIONS AND ABBREVIATIONS

AD	Anaerobic Digestion
AIIB	Asian Infrastructure Investment Bank
BPOs	Best Practicable Options
DoE	Department of Environment
ESIA	Environmental and Social Impact Assessment
ESMPs	Environmental and Social Management Plans
EMSPF	Environmental and Social Management Planning Framework
ESSs	Environmental and Social Standards
GoB	Government of Bangladesh
IPP	Indigenous Peoples Plan
ISWMIP	Integrated Solid Waste Management Improvement Project
LGED	Local Government and Engineering Department
LRP	Livelihood Restoration Plan
MLGRDC	Ministry of Local Government Rural Development and Co-operatives
MRF	Materials Recovery Facility
MSW	Municipal Solid Waste
PSF	Project Preparation Special Fund
RAP	Resettlement Action Plan
RDF	Refuse Derived Fuel
SC	Steering Committee
SEA	Strategic Environment Impact Assessment
SWM	Solid Waste Management
ULB	Urban Local Bodies
WtE	Waste to Energy

2. BACKGROUND OF THE PROJECT

Bangladesh is one of the fastest Urbanising and most densely populated countries in the region, putting great pressure on basic urban services and infrastructure. Solid Waste Management (SWM) has been one of the major urban challenges in the country given its rapid urban growth. Despite the Government's efforts in improving the SWM system, waste collection and disposal capacity is still limited. Less than half of total waste generated is collected, while uncollected waste is often informally burned, buried, or illegally dumped in streets, public spaces, drainage channels, and waterways. This has resulted not only in public health hazards and the contamination of the environment, including air, water, and soil, but also the blocking of major drainage channels and sewerage networks.

The current Integrated Solid Waste Management Improvement Project (ISWMIP) is prepared by the LGED and supported by the consulting firms (Waste Concern, IPE Global, Aqua & RPMC), therefore, will improve the SWM system in selected municipal areas. This will help: (i) improve public health and quality of life by reducing exposure to pollutants and disease vectors associated with solid waste; (ii) strengthen the government's capacity to plan for and implement effective waste management services; and (iii) improve SWM practices in the country, encouraging waste minimization, recycling, and segregation at source. The Project is aligned to the Government of Bangladesh (GoB)'s priorities for providing sustainable urban infrastructure. The country is, in particular, facing an immense challenge in its solid waste management. The Project would directly contribute to one of the key objectives of the 8th Five Year Plan and the long-term Perspective Plan for 2020-2025, that is to improve the urban environment and quality of life.

The ISWMIP has four components as mentioned below:

- Component 1: Waste Collection and Transportation. This will help improve and optimize solid waste collection and transport services in selected Urban Local Bodies (ULBs), including collection containers and fleet, mechanical cleaning equipment, and transfer stations etc.
- Component 2: Waste Processing and Disposal Systems. This will finance prioritized waste processing and disposal infrastructure, including closure of polluted landfill sites, construction and rehabilitation of engineered sanitary landfills (standalone or regional/ clustered), and provision of facilities related to composting, resource recovery, and waste-to-energy.
- Component 3: Project Management and Supervision Support. This will support in the areas of project management, monitoring and evaluation, procurement, financial management, and environmental and social safeguards (including public awareness campaigns and public consultation), and provision of support with respect to supervision and maintenance of infrastructure investments.
- Component 4: Policy Support and Capacity Building. This will support: (i) improvement of the SWM sector policy and legal framework; (ii) policy and guideline development related to waste minimization and recycling, private sector participation, inclusion of informal workers, and multi-jurisdictional waste management; and (iii) institutional capacity strengthening for relevant central and local agencies in SWM.

The GoB has received a Project Preparation Special Fund (PSF) from AIIB to support the preparation of proposed ISWMIP for consideration of USD500 million AIIB financing. The investment shall be undertaken in a phased manner with a likely investment size for Phase I of USD 150 million. The PSF is being implemented by the Local Government Engineering Department (LGED) under the Local Government Division (LGD), the Ministry of Local Government Rural Development and Co-operatives (MLGRDC).

The project will function under the overall guidance of a Steering Committee (SC) which will be chaired by the Secretary, Local Government Division (LGD), the Ministry of Local Government Rural Development and Co-operatives (MLGRDC). The SC will play a significant role in high-level decision making, ensure seamless coordination among the various governmental actors, and accelerate the implementation of the proposed activities under various Components. The SC will comprise representatives from various Ministries.

The LGED will adopt this ESMPF findings, which lays out the requirements for the environmental and social impact assessment, environmental management plans, best management practices, and social management plans, for the ULBs where sites for ISWM are finalized and for the ULB areas once the ISWM areas are identified. This ESMPF is intended to provide policies, guidelines and procedures to be integrated into the design and implementation of component 1, 2, 3 & 4 respectively, under the proposed project.

3. SUBPROJECT COMPONENTS TO IMPROVE THE ENVIRONMENT

The subproject components are i) Waste Collection ii) Waste Transportation iii) Landfill (closure of polluted landfill sites, construction and rehabilitation of engineered sanitary landfills (standalone or regional/ clustered), iv) Compost Plant, v) MRF (Material Recovery Facility), vi) Plastic Waste to Oil, vii) Anaerobic Digestion, and vii) Leachate Treatment Plant viii) Waste to Energy (WtE). All these shall facilitate comprehensive SWM with the development of a long-term integrated SWM infrastructure for the entire ISWMIP, and thus help reduce environmental impact from inadequately managed SWM of the country. The proposed components of the subproject are summarized here under:

Waste Collection and Transport: Studies show that nearly a fourth (24%) of global greenhouse gas emissions come from road transport, with diesel usage increasing by over 200% between 1990 and

2017. The large diesel trucks and collection vehicles that transport waste from millions of businesses across the globe doubtlessly make up a large percentage of this carbon footprint.

The heavy diesel trucks that collect our rubbish and recycling not only contribute to carbon emissions, but also release foul odours and particulate emissions into the air, presenting health hazards to the public and polluting the neighbourhood's air. Large amounts of waste require additional waste collection, increasing road traffic and in turn, air pollution. This project will help in reducing the carbon footprint by implementing a best waste management system for the Municipalities and City Corporations under this project.

Landfill: The landfill will be designed to provide safe disposal of waste with minimal effect on the environmental components such as soil, groundwater, surface water, air and people. The cells will maximize waste disposal quantity within the available space of the selected site.

Compost Plant: The compost plant will divert significant portion of the incoming waste for land filling. The facility can utilize significant portion of organic waste in a cost-effective way. This compost plant is designed mainly to focus on `organic waste' (fresh organic waste coming mainly from kitchens, restaurants, vegetable wholesale markets, parks and lawns). Three major activities are carried out in compost plant; they are `collection' of segregated waste from the source, `processing' of waste using aerobic compost technology, `marketing' of resources produced from waste.

MRF (Material Recovery Facility): This facility will accommodate secondary sorting, baling and storage of recyclable in an environment friendly way. Selected registered by the landfill operator, informal waste recyclers can be engaged in this facility to properly sort the valuables from waste instead to carrying out their work in un-hygienic matter.

Plastic Waste to Oil: Waste Plastic Recycle to Fuel Oil. By using of the pyrolysis technology, this component shall mainly work on collecting and recycling MSW into highly value energy to help get the fuel oil from landfill garbage sorting.

Anaerobic Digestion: Biogas is produced from organic waste under the action of anaerobic decomposition. The biogas produced from the biogas plant will able to supply enough gas for cooking purpose for the staffs of compost plant and the rest biogas can be utilized for production of electricity for the internal lighting of the integrated landfill and resource recovery facility.

Leachate Treatment Plant: The Plant shall contain leachate collection ponds to treat the leachate coming from the landfill cells. The stared leachate will be aerated, and later filtered using trickling filters. The treated leachate will be sprayed back to the landfill cells, and are used in the biogas digester.

Waste to Energy: Waste-to-Energy plants covering site layouts, civil and structural drawings for all buildings (administrative, bunker, delivery hall etc.), access and internal service roads, all drawings for MEP and telecommunications systems, power supply (own power production and generator set),combustion system, process control systems, fire safety measures, air pollution control systems (dioxin and furan emissions), waste water treatment, fly-ash management, prevention of chemical leakage, arrangements for cooling water supply, monitoring and control systems.

In dealing with the implementation process of the solid waste management project, a substantial amount of land area is required for each subproject to implement the following components: Materials Recovery Facility (MRF), Composting, Anaerobic Digestion (AD), RDF, Incineration, Controlled Landfill, Integrated Landfill & Resource Recovery Facility (controlled, landfill, MRF, composting plant and AD, etc.).

4. ENVIRONMENTAL SAFEGUARD IN ISWMIP

Environmental Safeguard in the ISWMIP will cover environmental aspects in carrying out pre-feasibility studies, detailed feasibility studies. It will prepare environment safeguard instruments for the sub-projects.

Under Part A: Sector Review, Policy Briefs, ISWMIP Framework Documents, the environmental consultant will produce Policy Brief as a guidance document for ULBs/ULB clusters to identify Best

Practicable Options (BPOs) in SWM for collection, transportation, processing and disposal, building on a system for scoring, and applying appropriate weightages, to technologies or non-technological approaches which best respond to:

- any technology restrictions (waste streams accepted, rate and quality of materials recovered, type of outputs, environmental impacts on and by the technology option);
- other likely environmental and social impacts;
- Sub-project identification, screening (including likely environmental and social impacts), phasing (with Phase I investment size around USD150 million) and pre-feasibility reports for entire ISWMIP
- preparation of ISWMIP framework document i.e. Environmental and Social Management Planning Framework (EMSPF)
- Once participating UdLBs/ULB clusters are identified under Part B: Phase-I Sub-project Preparation of the project the Environmental Consultant shall prepare detailed sub-projects focusing on their Environment and Social Impact Assessments and Management Plans by:
- producing, for all Phase I sub-projects, sub-project specific Environmental and Social Impact Assessments (ESIAs)
- producing, for all Phase I sub-projects, sub-project specific Environmental and Social Management Plans (ESMPs) including applicable social instruments (e.g. Indigenous Peoples Plan (IPP) and Resettlement Action Plan (RAP)/Livelihood Restoration Plan).

5. PURPOSE OF THE ESIA ToR

The purpose of this ToR is to guide the sub-projects of ISWMIP in preparing their Environmental and Social Impact Assessment (ESIA) study complying the AIIB Environmental and Social Standards (ESSs) and GOB requirements.

4. DESCRIPTION OF THE ASSIGNMENT

4.1 Objectives

The Objective of the assignment is to provide guidance to the LGED, developers as well as investors (including Lenders) on environmental and social impacts associated with ISWMIP development and constraints to consider when developing subprojects. The assignments will include:

- Describe, identify and assess the likely significant effects on the environment of implementing the solid waste management plan, as well as the most important environmental and natural resource-related constraints bearing on the implementation of any related activity.
- Provide decision-makers of the LGED, DoE and other stakeholders in Bangladesh with relevant information (quantitative and qualitative) to assess the adequacy of environmental and social considerations when supporting the implementation of the strategic plan/policy with regards to Solid Waste Management sector. This should include a guide and check list. This information should help ensure that environmental and social concerns are appropriately integrated in the decision-making processes at the stages of programming, planning and implementation.
- Assess the global best practices how the major environmental sustainability challenges in the Solid Waste Management (SWM) sector are managed and provide recommendations at strategic level on how potential negative effects can be minimized and how positive effects can be optimized. Particular focus will be given to the Landfill, Waste to Energy, Composting Plant, Plastic Waste to Oil and Anaerobic digestion in order to address these key environmental concerns associated to the SWM sector.

- Provide practical guidance to LGED, local authorities, developers and lenders on how to develop ESIA document of subprojects and what mitigation measures to consider. Include clear guidance on project development and subsequent monitoring. This will be disclosed in the LGED website downloaded as PDF or provided in hard copy in English and Bengali.

4.2 Requested Services

Environmental and Social Impact Assessment (ESIA) is composed of two parts: a scoping study in Phase I and an ESIA study in Phase II. The scoping study will define the issues that need to be addressed in the ESIA study, considering the specific context in which the sector is being developed and is likely to be implemented. Precise activities and calendar for the ESIA study will be determined on the basis of the conclusions of the scoping study.

In Phase I, the scoping study will provide:

- a description of the SWM sector concerned;
- a brief description of the environmental requirements of DoE, AIIB and other donner agencies with Solid Waste Management Improvement potential;
- a brief description of the institutional and legislative framework of the Solid Waste Management sector in Bangladesh;
- a brief presentation of the relevant environmental policy and objectives in the country;
- an identification of the key stakeholders and relevant authorities for the ESIA and their concerns, as this is critical to ensure buy-in and ownership;
- an identification of the key sector environmental and environmentally-linked social impacts of its implementation;
- a description of the scope of the environmental and social baseline to be prepared during the ESIA study and the main sources from which the baseline will be compiled;
- an identification of the impact identification and evaluation methodologies to be used in the ESIA study;
- a description of the stakeholder engagement mechanisms proposed for the ESIA study including the development of a website and public meeting to be organized;
- an indication of the time frames (person-days), costs and resources needed to carry out the ESIA study;
- a proposal of the methodology for the ESIA.

In Phase, the ESIA study will deliver the following results:

- an environmental and social assessment of the Subprojects, taking into account the potential environmental and social impacts of SWMP implementations and their consistency with the National's and AIIB's environmental and social policies and objectives.
- presenting clear recommendations on policies and plans to achieve agreed sustainable SWM development over the medium to long term, and providing justification for the recommendations. Gaps in the existing decision-making process and policies and plans in terms of creating the stated sustainable development will be identified. Recommended actions shall be presented in an action plan that is likely to include further consultation, identified knowledge gaps, baseline surveys and detailed assessments needed to finalize policy, plans, programs, implementation arrangements and a monitoring framework.

- development of a best practice guide for developing and operating waste to energy plants/composting plants/new landfill development/plastic to oil plant/Waste transportation/waste water treatment etc. inclusive of permitting and monitoring requirements.
- stakeholder engagement, grievance redress mechanism, inclusive if presentation on impacts in the standalone subprojects of the ISWMIP.
- recommendations to the DoE which may include possible adjustments of environmental and socio-economic performance indicators, accompanying measures to deal with identified challenges, as well as priority issues for policy dialogue and coordination with DoE and other stakeholders.

4.3 Required Outputs

4.3.1. Phase I: Scoping Study

Overview of the sector and its institutional and legislative framework

The policy-making and/or planning process relating to the sector under assessment should be presented, including alternative options that may be under discussion. If deemed necessary and with adequate justification, additional options should be suggested for consideration in the ESIA study. Where a sector policy already exists, its main features should be described.

The links between the policy-making/planning process and the ESIA must be described, i.e. which outputs of the policy-making/planning process should feed into the ESIA process and vice-versa. The specific policy-making/planning decisions and processes that should be influenced by the ESIA must be identified.

Description of key stakeholders and their concerns

The involvement and active participation of stakeholders in the ESIA process is a key success factor. Key stakeholders should be identified: key groups and institutions, environmental agencies, non-governmental organisations, representatives of the public and others, including those groups potentially affected by the likely environmental impacts of implementing the sector. Stakeholder consultation meetings should be organized at scoping stage and final stage.

The Consultants must review records of any national public consultation processes that may have taken place as part of the sector development. Based on this review and on additional consultations, they should identify key stakeholders' concerns and values with respect to the sector and propose a stakeholder engagement strategy. The stakeholder engagement strategy to be employed has to be agreed with the LGED and DoE before being implemented, in order to avoid unnecessary conflicts or raising of expectations. This strategy should provide stakeholders with an opportunity to influence decisions. If some of the identified stakeholders are not used to being engaged, particularly at the strategic level, and if there are no precedents, it would be important to include an education component in the stakeholder engagement process.

Appropriate disclosure material will be provided to stakeholder include draft of the guide to enable this to be consulted on and amended based on comments received from stakeholders.

The Consultants must keep records of all consultation held and comments received. The outcome of these consultations will have important implications for the direction and focus of the ESIA study. Consequently, a structured analysis of the available material will be needed to determine the key conclusions and areas of concern.

The Consultant will summarize the results of the consultation and issues being raised and provide this to the DoE and LGED as a standalone summary.

Description of key environmental and social aspects to be addressed in the ESIA

On the basis of the policy, institutional and legislative framework analysis, as well as the participation of stakeholders, the key environmental and social aspects that should be addressed in the ESIA study should be identified – that is, the key sector environment and social interactions that need to be given special consideration and emphasis.

Description of the scope of the environmental and social baseline to be prepared in the ESIA study

The Consultants must provide indications on the scope of the environmental and social baseline needed for the ESIA study, ensuring that it will be adequate to examine in more detail the key environmental and social aspects identified above. This will include a proposal of the geographical units that will need to be addressed, if relevant.

In an overall sense, the baseline should contribute effectively to assess positive and/or negative environmental and social impacts; as well as determining the magnitude and sensitivity of those impacts at a level of confidence that can be used in policy and management decisions.

Recommendations on specific impact identification and evaluation methodologies to be used in the ESIA study

The Consultants should provide an indication of the impact identification and evaluation methodologies that will be used in the ESIA study, with regards to both the sector's expected impacts on the environment and the impacts that environmental conditions and natural resource availability.

Methodologies proposed should be drawn from best international practice and should be rigorous enough to ensure an adequate assessment and a sector-targeted analysis of issues at a strategic level.

Indication of the time frames needed to carry out the ESIA study

The Consultants must assess the time that needs to be allowed for the completion of the ESIA study, based on the initial indicative assessment. A description and estimation of the resources required (in terms of budget, person-days) must be provided, including a breakdown of costs.

The Team Leader, in coordination with the rest of the team, may review and adapt the initial timing and expertise to complete the ESIA study, and develop a schedule of resources needed, including

- person-days of technical input for each of the experts;
- operational support costs, including participatory processes and special technical inputs (workshops, group participation training);
- any special mapping or data collection costs; and
- the Consultant team's operating cost (out-of-town transport, accommodation, etc).

4.3.2. Phase II: ESIA Study

The scope of the ESIA study will be agreed with the LGED and DoE on the basis of the results of the scoping study. The ESIA study will include an environmental and social baseline study, an identification of environmental and social constraints and opportunities, an identification and assessment of the potential environmental and social impacts, an analysis of performance indicators, an assessment of the institutional capacities to address environmental and social challenges, and conclusions and recommendations.

Environmental and social baseline study

A description and appraisal must be made of the current state of the environment, focusing on those key environmental and social components identified by the scoping study. The trends for, and pressures on, the various environmental and social components must be identified and a projection must be made of the state of the environment on the short-, medium- and long term under the assumption of no implementation of the sector, taking into account the expected effects of climate change (to the extent they can be predicted with some reliability). External factors must be taken into account, including the influence of other sectoral policies. If the 'no implementation' scenario is unrealistic, the most probable 'business-as-usual' scenario should be selected. The geographical (or mapping) units to be addressed should be described, if relevant.

Identification and evaluation of environment and social-related risks, constraints and opportunities

The environmental and social factors that can affect (positively or negatively) the relevance, effectiveness, efficiency and sustainability of the sector, including climate- and natural resource-related aspects, should be identified, described and assessed. These factors may include natural resource availability as well as the current and projected effects of climate change. This part of the study should also consider whether the sector provides an adequate response to these constraints and opportunities.

An analysis must be made of addressing environmental and social issues that affect sector performance in a negative manner, and making optimal use of opportunities offered by the environment to enhance sector performance. A matrix approach is suggested to illustrate the findings, indicating the environmental factors and resources; the positive and negative impacts and degrees of significance.

Identification and evaluation of impacts

The potential environmental and social impacts and risks from implementing the sector must be identified and described, taking into account the views and concerns of stakeholders. Their significance should be determined according to their characteristics (e.g. duration, probability, magnitude, mitigability, reversibility) and the sensitivity of the environment. The potential *cumulative* impacts of the envisaged sector activities should be identified, since they may differ from the sum of individual subproject impacts. Those impacts which are significant should be assessed in detail taking into account:

- the views and concerns of stakeholders;
- the consistency with international commitments (Multilateral Environmental Agreements);
- compliance with environmental regulations and standards;
- consistency with environmental objectives and policies; and
- their implications for sustainable development.

It is suggested that matrices, flow charts, etc. are used to illustrate the findings, showing which components of the sector have an effect on which environmental aspects, and the significance of such impacts, as well as to show the consistency with environmental objectives and international commitments.

Assessment of the capacities to address environmental and climate-related challenges

The capacity of implementing institutions in carrying out identified environmental and climate-related interventions, both in terms of adaptation and mitigation, should be assessed.

The Consultants will address the adequacy of institutional structure and capacities of the regulatory framework and human resources of the Energy sector and national environmental institutions to address the key environmental concerns associated to the geothermal sector. As noted earlier, this

assessment should focus at the policy/sector level and take adequate cognizance of realistic present and future capacities.

Gender and Social Inclusion Action Plan (GAP)

A project specific GAP is a tool used to ensure gender mainstreaming is clearly visible in project design and implementation. The project GAP is not a separate component. It mirrors the logical framework of the project and is an integral part of project design. GAPs include clear targets, gender design features and measurable performance indicators to ensure women's participation and benefits.

The consultant will ensure the following in the GAP:

- Work undertaken to address gender issues in the subproject;
- Targets and design features, included in the subproject to address gender concerns and ensures tangible benefits to women and men, especially from vulnerable communities;
- Mechanisms to ensure implementation of the gender design elements;
- Gender - sensitive monitoring and evaluation indicators.

Occupation Health and Safety Management Plan (OHSMP)

An Occupational Health and Safety Management Plan will be prepared by the consultant which will cover all subproject activities including contractors' activities during the construction and operational phases. The implementation of this Plan by contractors is addresses in the Environmental and Social Management and Monitoring Plan. This Occupational Health and Safety Management Plan is part of the overall suite of Management Plans developed for the subproject and cross linkages to number of the other Management Plans as Environmental and Social Management and Monitoring Plan.

OHSMP will ensure the work safety of the employees working at site and aims to minimize the risks on employees arising from work-related activities. The measures contained in this Plan should be applicable to all subproject personnel, including subcontractors' personnel and covers both construction and operation phases.

Gender Based Violence (GBV) Prevention Plan

Violence against women (VAW) is one type of GBV which is very prevalent in Bangladesh and is often rooted in gender inequalities and harmful gender norms. Bangladesh's female labor force participation (FLFP) has risen substantially; yet, FLFP and quality of jobs for females are still lagging[18]. There have been remarkable improvements in FLFP made in Bangladesh in recent decades, raising the FLFP rate from 26 percent in 2002 to 35.6 percent in 2016[19], benefiting from the expansion of garment manufacturing industries. Yet, by comparison, male labor force participation is much higher at over 80 percent[20]. Moreover, the improvement in FLFP rates has hit a plateau, remaining at 36 percent in 2017. This gender disparity can be attributed to structural barriers including women's domestic burden, sex segregation in educational subject and occupation, employer discrimination, restricted mobility, limited access to trainings, lack of female friendly facilities, sexual harassment at work, limited childcare provisions. Social norms that influence and limit women's choices as well as a lack of a supportive policy environment also stunts FLFP. Moreover, female employment tends to be more concentrated in low-paid and low-productivity occupations, which are more vulnerable to technology innovation and automation in the production process[21]. Increasing women's labor force participation and improving the quality of female employment will require more significant support for women's access to employment opportunities and high-quality skills development programs. Consultant will prepare the GBV prevention plan as per the subprojects requirements.

[18] Labor Force Survey, BBS 2010, 2016/17

[19] World Bank calculations based on LFS 2016 data, page xvii

[20] Share of female youths in NEET is also much higher (47%) compared to male (10%). ILO. (2020). Global Employment Trend.

[21] Raihan, S., & Bidisha, S. H. (2018). Female employment stagnation in Bangladesh. Dhaka.

Waste Management Plan (WMP)

Consultant will prepare the Waste Management Plan (WMP) addressing the management of all solid and liquid refuse, including hazardous and non-hazardous waste, produced as a result of all phases (Preconstruction, Construction and Operation) activities within the subproject area

Contractor Management Plan (CMP)

The contractor management plan ensures a systematic approach in selecting and managing contractors to prevent or minimize potential health and safety risks.

Consultant will prepare the CMP to ensure the risks related to the conduct of contractors and works impacting facilities, are suitably managed and controlled. This includes:

- ensuring health and safety management is a key criterion in the selection of contractors;
- identifying hazards and mitigating risk at the design stage to ensure safe systems of work;
- ensuring appropriate selection and safe use of equipment and substances;
- providing adequate information, instruction, training and supervision;
- consulting with other duty holders who have a Work Health and Safety (WHS) duty in relation to the same matter.

Labor Management Plan (LMP)

Labor Management Plan ensures appropriate worker management procedures and enhances the development benefits of a project by treating workers in the subproject fairly and providing safe and healthy working conditions for subproject sustainability. During the construction period, contractors will follow this LMP to prepare a simplified labor management plan and Code of Conduct (CoC). Considering the facts, Labor and Working Conditions and Bangladesh Labour Act, 2006 (amendment in 2018), has set following specific objectives.

To promote health and safety at work consultant will prepare the plan considering.

- the fair treatment, non-discrimination and equal opportunity of project workers;
- subproject workers, including vulnerable workers such as women, persons with disabilities, children and migrant workers, contracted workers, and primary supply workers, as appropriate;
- to prevent the use of all forms of forced labour and child labour;
- to support the principles of freedom of association and collective bargaining of project workers in a manner consistent with national law; and
- To provide project workers with accessible means to raise workplace concerns.

Stakeholder Engagement Plan (SEP)

Stakeholder Engagement Plan (SEP) ensures that a consistent, comprehensive and coordinated approach is taken to stakeholder engagement and subprojects disclosure throughout the project. It is further intended to demonstrate the commitment of the LGED, as a subproject developer and the main implementing party, to an 'international best practice' approach to engagement. The LGED is committed to full compliance with all National EIA Regulations, as well as aligning to the international standards namely the AIIB Principles on Stakeholder Engagement.

In line with current international best practice, SEP aims to ensure that stakeholder engagement is conducted on the basis of timely, relevant, and accessible information. In this way, the SEP seeks to ensure that stakeholders are given sufficient opportunity to voice their opinions and concerns, and that these concerns influence project decisions.

The consultant will prepare the SEP:

- Provides the approach to stakeholder engagement, showing how this will be integrated into the rest of the ESIA process and also thrughout the project;
- Identifies the main categories of stakeholders and how they will be included in the ESIA process; and
- Identifies the ways to document engagement undertaken throughout the project.

Traffic Management Plan (TMP)

The principal role of this document is to provide framework guidance on traffic management measures, to be further developed and detailed prior to construction commencing. The specific objectives of this TMP are to:

- Provide for a safe environment for all road users;
- Provide protection to pedestrians and workers from traffic hazards that may arise as a result of vehicle movements;
- Provide adequate parking areas for vehicles.

In relation to community traffic management, this the consultant will prepare the TMP's aiming to ensure that:

- The community traffic management goals are explicit and understood by all individuals involved within the control of the company, including employees, suppliers, contractors, visitors and to the extent possible local communities and road users among the general public;
- The community traffic management goals are communicated with reasonable efforts to effectively engage with public road users and relevant authorities;
- The potential for traffic related hazards is avoided where possible or otherwise reduced to as low as reasonably possible;
- The potential for traffic incidents associated with ISWMIP vehicle activity in the vicinity of and on the subproject sites, as well as along the access road, is avoided where possible or otherwise minimized as low as reasonably possible;
- Vehicle activity associated with the preconstruction, construction and operation activities does not contribute to pollution (air, water, nuisance), and / or damage to the physical conditions of the local transportation routes.

Stakeholder engagement

Stakeholders should be engaged throughout the ESIA study according to the stakeholder engagement strategy agreed at the scoping stage. Stakeholder engagement could include a mix of different mechanisms, such as questionnaires, focused semi-structure interviews and workshops with key stakeholders in accordance with AIIB ESS-1.

Conclusions and recommendations

This chapter will summarise the key environmental and social issues for the sector involved, including policy and institutional constraints, challenges and main recommendations. Recommendations should be made on how to optimise positive impacts and make the best out of environment- and natural resource-related opportunities, as well as on how to mitigate negative effects, adapt to environmental and social constraints and manage risks. It should suggest the selection of an alternative (if more than one alternative is envisaged), potential changes in the sector design (e.g. adoption of measures to

increase adaptive capacity with regard to climate variability and the expected effects of climate change), implementation and monitoring modalities, or cooperation actions.

The Consultants will pay specific attention to providing realistic, targeted and workable operational recommendations. General statements should be avoided.

The limitations of the ESIA and its assumptions should be presented. The recommendations should consider the views presented by the stakeholders and explain how these were integrated. In the case of concerns that were not integrated in the final recommendations, the reasons thereof should be given.

In addition, a standalone guide for developing and operating Waste to Energy Plants, Plastic Waste to Oil plants, composting plant etc.

5. EXPERTISE REQUIRED

The following is the minimum experience and expertise required for this assignment:

- A senior environmental expert/team leader with at least 15 years local/international experience in leading and supporting environmental projects, including expertise and experience with Environmental and Social Impact Assessment Studies in Bangladesh's/international project's environmental impact assessment, in particular with assessing impacts of Solid Waste Management Sector projects.
- Social and environmental scientists/analysts with local experience in characterizing baseline conditions and assessing impacts of programs and policies on people and the environment in Bangladesh.
- Stakeholder Engagement expert with experience in designing and implementing programs to identify and involve local and public stakeholders in decision-making for environmental and SWM sector ESIA projects.
- Social assessment expert(s), with local and international experience of working with rural communities and good understating of IFI (such as AIIB, World Bank, IFC etc.) social requirements.
- WtE Expert with at least 15years of local experience in Waste to Energy engineering.
- Solid Waste Management Expert, with at least 10 years of local experience of working with SWM sectors of Bangladesh.
- Gender Expert will be responsible for analysing and integrating the gender related issues in the ESIA and to prepare the Gender Action Plan for project. Based on the GBV risk rating of the project, the expert will prepare a project specific GBV Management Plan. He/she should have at least 10 years of experience in similar assignments. A Master's in Gender Studies/ Sociology or related field.
- GIS specialist with at least 5 years of local and international experience in GIS/CAD mapping.

6. IMPLEMENTATION ARRANGEMENTS

Starting Period

It is expected that the assignment shall commence as soon as possible after the signature of the specific contract, preferably in early November,2022.

Location of assignment

Different Municipalities/City Corporations in Bangladesh. Working days in the field will be determined by Consultants during scoping stage.

Work Plan

The work plan should include but not necessarily be limited to the following activities:

Phase I: Scoping study

- Fact finding / data collection
- Review of prior public consultations, identification of key stakeholders
- Engagement of stakeholders
- Analysis/preparation of recommendations and scoping report.

Phase II: ESIA study

- Fact finding / data collection – extensive quantitative data
- Technical Field trips
- Development of best practice guides
- Engagement of stakeholders
- Identification and detailed analysis of the potential environmental and social impacts and constraints
- Preparation of recommendations to mitigate negative environmental and social effects, adapt to constraints, optimise positive effects, exploit opportunities, and generally manage and control environmental and climate-related risks
- Preparation of recommendations and draft ESIA report
- Preparation of the final ESIA report.

On the basis of this draft proposal and the time schedule outlined in these Terms of Reference (ToR), the Consultants must provide their detailed work plan.

Time Schedule

The Consultant shall commence work no later than 5 days after conclusion of the Contract (kick-off date). The Assignment is to be completed within 3 months. Key time milestones are as follows:

Phase I:

- End of week from the kick-off meeting provide an inception report. This will in essence act as a gap analysis and definition of the project and will include key elements of the scoping study;
- Formal scoping study and Stakeholder Engagement Plan by week 2, to enable agreement of both by week 3 and allow for public consultation in month 1;

Phase II:

- End of month 1.5: submission of a draft ESIA Report to the Bank, who will provide comments, following which the Consultant will have 1 week to provide an amended version; submission of the draft report on the project due diligence, benefits and obstacles;
- End of month 2: draft ESIA Report ready for 15 days public consultation; public consultation commences; submission of the final report on the project due diligence, benefits and obstacles;
- End of month 2.5: end of public consultation; Consultant will amend the draft ESIA Report following the public consultations as required by the Bank and DoE comments 1 weeks after the end of the public consultation period);
- End of month 3: submission of the agreed final ESIA Report and the Report on Public Consultation.

Liaison with Stakeholders

The Consultant will liaise closely with the Bank and the DoE, among others, and points of contact/responsibility as nominated by the Bank and DoE.

The Consultant is requested to attend a minimum of five meetings with the Bank/DoE at the LGED Office in Dhaka or at an in-country venue nominated by DoE:

- at the beginning of the ESIA process – kick off meeting;
- on submission of the draft inception report and scoping study (see Section 7 below);
- Prior to beginning the scoping meetings;
- on completion of the final report (for a formal presentation to the Bank);
- Prior to beginning the public consultation process.

Facilities, Equipment, Staff

As part of this Assignment, and within the budget assigned, the Consultant will:

- provide all equipment required for the project (e.g. laptops, PCs, photocopiers, etc.) that will remain its property at the end of the assignment;
- arrange any office facilities, etc. which may be required for its own use;
- arrange any facilities required for public meetings (as part of public information/disclosure); this should be based on one meeting in the study area;
- arrange for translation facilities at the Consultant's expense as provided in the agreed budget.

The consultant will cover his own expense during the public consultation process and stakeholder engagement meetings; including covering all costs of facilities, refreshments, adverts, handouts, Bengali-English simultaneous translation etc.

Travel

The Consultant is responsible for all necessary travel arrangements to and within Bangladesh.

7. DELIVERABLES AND REPORTING REQUIREMENTS

7.1 Reports to be Delivered

Deliverable No. 1: Inception Report

The Consultant will provide an Inception Report not later than 2 weeks after commencement of the Assignment to LGED and the Bank. This report should include (but not necessarily be limited to) the following:

- identify relevant regulations, guidelines, industry standards, etc.;
- identify relevant existing information;
- identify information gaps which are likely to have a significant impact on the assignment and the quality and usefulness of the final report;
- provide all details or any necessary material amendments to the work plan initially proposed;
- identify key stakeholders (e.g. local, national and international institutions and CSOs);
- provide an outline SEP;
- describe how the Consultant intends to manage interactions with the Bank, Geothermal Associations and the Ministry of Environment and Urbanization.

Deliverable No. 2: Scoping Study

The Scoping Study is to be presented in the format given in Appendix 1, although this is to be used as a guide as the inception report needs to be tailored to meet the requirements of the Project.

Following the issue of an inception report and meeting to be held in the subproject areas, the Consultant will prepare in week 3 a draft Stakeholder Engagement Plan (SEP) and scoping study; copies are to be presented to the Bank for comments in English and Bengali. Following the approval of the scoping study (assumed in week 4), scoping meetings will be undertaken in week 5 in line with a program outlined in the SEP. The invitation to the scoping meetings will be issued at least 1 full week before they are due to take place, in national and local papers, and other media as required.

Consultant will cover all costs of the meeting and preparation for the meetings (including venues, refreshments etc). The consultant will cover his direct costs

Deliverable No. 3: ESIA Report

Draft ESIA Report

The ESIA Report should, in structure, content, detail and presentation, take account of the requirements of the IFC-EHS Directives and best international practice such as the ESIA Protocol as well as the DoE requirements associated with the implementation of the ESIA Protocol. The report will include Annexes relating to each region under consideration as well as Stand along guidance documents for developing projects and subsequent monitoring. The Consultant is encouraged to discuss the report structure and presentation with the Bank and LGED at an early stage.

The Consultant will provide the Bank and LGED with an ESIA Report w in draft form not later than 2.25 months after commencement of the assignment. The Bank and LGED will provide comments. The Consultant will then (if required) have 1 weeks to amend the draft as necessary.

Final ESIA Report

Following acceptance of the amended draft by the Bank and LGED, the reports will be made available for public comment. Following completion of the public consultation in accordance with Bank procedures (60 days), and taking account of any comment from the public, the Consultant will prepare the final ESIA Report within 1 months of completion of the 60 days period (final comments from the Bank and LGED to be provided to the Consultant not later than one month after completion of the 60-day consultation period).

Deliverable No. 4: Report on Public Consultation

The Consultant will provide the Bank and LGED with a concise report summarising:

- liaison with interested parties during the development of the ESIA (e.g. at scoping stage) with the development of a scoping report and SEP; and
- the formal 60 days public consultation process of the ESIA document with meetings held in Aydın region.

Deliverables No. 5: Monthly Progress Reports

The Consultant will present brief monthly progress reports to LGED (copy to the Bank) providing a summary of progress made (against the initial work plan) and will flag up any problem which could materially affect the ESIA implementation. The inception report will count as the first progress report.

General Reporting Requirements, Reporting Language and Number of Copies

The Consultant shall send copies of all reports/deliverables to the LGED.

The Inception Report, the Monthly Progress Reports and all correspondence with the Bank and LGED will be in English and Bengali. The Final ESIA Report, the Report on Public Consultation and all materials prepared for public information and disclosure will be in English and in Bengali.

All reports are to be submitted in hard copy (5 copies to each to LGED and the Bank) and in electronic format.

ANNEX 1 – Standard Report Formats of ESIA Report

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