Government of the People's Republic of Bangladesh

Ministry of Shipping

Bangladesh Regional Inland Water Transport Project 1

(Chittagong-Dhaka-Ashuganj Corridor)

Environmental Management Framework for Component 2: Improved Services at Priority Inland Waterway Terminals and Landing Ghats/Stations

Bangladesh Inland Water Transport Authority (BIWTA)

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List of Acronyms

BDL Below Detectable Limit
BOD Biological Oxygen Demand
BWDB Bangladesh Water Development Board
BIWTA Bangladesh Inland Water Transport Authority
BLPA Bangladesh Land Port Authority
BP Best Practice
CNG Compressed Natural Gas
CSC Construction Supervision Consultant
DEPTC Deck and Engine Personnel Training Centre
DoE Department of Environment
DoF Department of Fisheries
EA Environmental Assessment
ECA Environmental Conservation Act; Ecologically Critical Areas
ECC Environmental Clearance Certificate
ECoP Environmental Code of Practice
ECR Environment Conservation Rules
EHS Environmental Health and Safety
EIA Environmental Impact Assessment
EMF Environmental Management Framework
EMP Environmental Management Plan
ESA Environmental and Social Assessment
ESIA Environmental and Social Impact Assessment
E&S Environmental and Social
FGD Focus Group Discussions
GoB Government of Bangladesh
GRM Grievances Redress Mechanism
GRC Grievances Redress Committee
IDA International Development Association
IEE Initial Environmental Examination
IUCN International Union for Conservation of Nature
IWM Institute of Water Modeling
IWT Inland Water Transport
MOEF Ministry of Environment and Forest
MARPOL International Convention for the Prevention of Pollution from Ships
Mg/L milligram per liter
MoS Ministry of Shipping
NOC No Objection Certificate
NGO Nongovernmental Organization
NLTA Non-lending Technical Assistance
OP Operational Policy
O&M Operation and Management
OSPAR Oslo/Paris convention (for the Protection of the Marine Environment of the North-East Atlantic)
PD Project Director
PM Particulate Matter
PIU Project Implementation Unit
RCC Reinforced Cement Concrete

RPF	Resettlement Policy Framework
t	Metric ton or tonnne
TDS	Total Dissolved Solids
TCAF	Transformative Carbon Asset Facility
ToR	Terms of Reference
USD	US Dollars
UZ	Upa Zila (sub-district)
VOC	Volatile Organic Compounds
WB	World Bank
WBG	World Bank Group
WHO	World Health Organization

1. INTRODUCTION

1.1 Background

Bangladesh lies predominately within the Bengal basin, the world's largest delta formed by Ganges, Brahmaputra (Jamuna) and Meghna river system and its tributaries and distributaries. Its riverine area covers some 9,384 square kilometers and includes some 700 rivers, streams and canals with a total length of about 24,000km. Of this, approximately 5,923km have been classed and are navigable during the monsoon (wet) period, shrinking to about 3,865km in the dry periods- mainly on those parts of the rivers subjected to tidal influence. Navigation is complicated by the braided nature of the rivers, which are characterized by high sediment delivery and - due to extremely low gradients - very low sediment throughput. This makes the rivers extremely sensitive to flooding with rapid geometry (boundary and channel) changes. Problems of navigation are compounded by the growth of inland water vessel size and the Inland Water Transport (IWT) fleet now comprises dry and liquid bulk ships of up-to 3,000 deadweight tons, mainly trading on the class 1 river routes. Moreover, the size of the IWT fleet is growing and currently there are over 22,300 registered vessels which carry over 50% of all freight traffic and one quarter of all passenger traffic. In addition, there are some 750,000 country (traditional) boats, a substantial part of which have been mechanized. Approximately 65% of these are passenger boats, where demand is predominantly generated by rural communities, a substantial proportion of which only has access to river transport.

Dhaka – Chittagong and Dhaka - Ashuganj IWT Corridors are most priority routes for domestic trade and Bangladesh-India bilateral trade. About 80% of country's IWT transport is routed through these corridors and daily about 200,000 passengers use these routes. Inland river terminals (ports) at Dhaka, Narayanganj, Chandpur and Barisal along these routes play very important role in transporting and handling passenger and cargo. The annual passenger and trade volumes in these routes are given in Table 1.1. Food grains, fertilizers and consumer goods are the main commodities which are transported by cargo vessels and cargo-cum-passenger launches. The cargo terminal at Ashuganj is a key terminal for Bangladesh – India trade and it is connected by road to the north eastern states of India.

Table 1.1: Annual Passenger and Cargo Details in Major River Ports

Port	2011-2012		2012-2013		2013-2014	
	Passenger (in million)	Cargo (in million tonne)	Passenger (in million)	Cargo (in million tonne)	Passenger (in million)	Cargo (in million tonne)
Dhaka (Sadharghat)	*19.05*	*6*	21.11	6.7	*20.55*	*7.53*
Narayanganj	23.13	10.53	22.72	12.76	24.17	13.61
Chandpur	2.1	0.42	2.27	0.47	2.28	0.5
Barisal	5.75	0.6	5.81	0.66	6.47	0.68

Source: BIWTA

The facilities built at these terminals are not sufficient to meet the growing demand of IWT as they lack in adequate facilities for berthing, parking and storage areas, and passenger comfort. The port facilities at Sadharghat terminal at Dhaka and surrounding areas are highly congested with commercial and residential development leading to traffic congestion and inefficient use of port facilities, and also there is no space around the current terminal for further expansion. The Government of Bangladesh (GoB) would like to augment and facilities at Sadharghat terminal in Dhaka by building a new passenger terminal at Shasanghat, develop a cargo terminal at

Pangaon, and augment and modernize the existing facilities at Ashuganj, Narayanganj, Chandpur and Barisal river terminals.

In addition to river terminals, there are a number of landing stations along Dhaka-Chittagong – Ashuganj corridor which are very important for people leaving in the rural and remote areas. The landing stations (also known as launch ghats) are berthing points of high importance for the local communities that they serve, yet lack proper infrastructure and other essential facilities such as toilets and drinking water, as well as basic safety features for users, and many are in a highly dilapidated state. They usually consist of one pontoon with shore connection for embark and debark passenger and cargo. They play an important role in the lives of the rural people, as without them vessels would not berth and they would not receive much needed food, medicines, fuel and other consumer essentials.

1.2 The Proposed Project

The proposed 'Bangladesh Regional Inland Water Transport Project 1 (Chittagong-Dhaka-Ashuganj Corridor)' (the Project) aims to develop the IWT routes and infrastructure between Dhaka – Chittagong – Ashuganj IWT Corridor, including branches to Ghorashal (via Narayanganj) and Barisal. The World Bank is considering financing of this Project. The implementing agency for this project is Bangladesh Inland Water Transport Authority (BIWTA). The key components of this project with potential environmental impacts are the following:

- **Component 1: Improved Inland Waterway Navigation (USD 215 million)**. This component shall include work to maintain and increase advertised depths and to delineate channel routes through provision of long-term navigation Performance-Based Contracts (PBCs). The 6 or 7-year Performance-Based Contracts will depart from the current practice of payments based on dredging volume which is unreliable and does not assure depth, and instead commits the contractors to guarantee Year-Round Least Available Depth. A Supervision/Performance Monitoring Consultant will be contracted to monitor the performance of the contractors for the PBCs. Only selective and limited dredging of problem areas such as on chars and sand bars is expected to maintain navigability as most of the river route has the required depth. In addition, six vessel shelters will be developed within remote cyclone areas on the Project Corridor route allowing vessels to seek shelter from inclement weather.
- **Component 2 Improved Services at Priority Inland Waterway Terminals and Landing Ghats/Stations (USD 75 million)**. This component supports the development of two cargo terminals, four passenger terminals and 14 landing ghats and a general terminal. The facilities shall specifically incorporate the needs of women users (such as toilet facilities for women, women-only waiting rooms) and less abled users, and address safety-related issues for all users. BIWTA will also make suggested changes to operational guidelines to improve safety and experiences using inland water transport services. All investments under this component will also aim to enhance the climate change resiliency of terminals and landing stations, such as through design adaptations to account for the expected increased variation in river flows, more intense or frequent extreme storm events, etc. The cargo terminals include: (i) development of a new common user general cargo terminal with access infrastructure at on the Buriganga river adjacent to the existing Pangaon container terminal; and, (ii) Rehabilitation and modernization of the existing general cargo terminal at Ashuganj. The passenger terminals include: (i) the development of a new passenger terminal at Shasanghat in Dhaka District; (ii) rehabilitation of the passenger terminal at Narayanganj; (iii) reconstruction/new construction of the passenger terminal at Chandpur; and, (iv) extension of the existing passenger terminal at Barisal. Locations of the terminals and landing stations are shown in Figure 1.1.

- **Component 3: Institutional Capacity Development and Sustainability (US$70 million).** A series of activities are proposed that will support BIWTA's overall enhancement of its management systems and human resources capacity for modern, efficient, and high quality management of the IWT sector in line with international standards. This in turn is critical for the long-term sustainability of the investments supported through the project, as well as the sector's ongoing attractiveness to users, its potential for green innovations in support of national climate mitigation targets, and its resilience to changing conditions including those posed by climate change. Activities to be supported include: (i) the development of River Information Systems to help BIWTA improve data collection for the planning, maintenance and development of IWT, as well as enhance climate resiliency of the IWT sector in Bangladesh by creating a more systematized baseline understanding of river hydrology and navigational implications, and provision of a Traffic Monitoring System for passengers and cargo; (ii) improvement of Human Resources capacity for better management of the IWT sector through upgrading and modernizing the IWT Deck and Engine Personnel Training Centre (DEPTC)) into a regional IWT Training Center with open access to all users in the Region and the world; (iii) commissioning of a study to propose an institutional structure and reforms needed to develop an effective Search and Rescue organization; (iv) support for environmental and social sustainability, climate change resiliency, and "greening" of IWT; (v) a project preparation facility to finance feasibility, surveys, design and safeguards studies for continuous sector development; and, (vi) support for the Project Management Unit including the hiring of key staff and procurement of selected systems needed for implementation of the Project.

1.3 Environmental Assessment of the Project

For Component 1 on improvement of inland water ways, a detailed Environmental and Social Impact Assessment (ESIA) has been prepared and presented in separate cover. For other project activities with potential safeguards implications – including improvement of river terminals and landing stations (Component 2), minor civil works associated with modernization of the DEPTC and the water hyacinth biogas pilot, river training pilots, vessel fleet greening pilots, and future project preparation studies (Component 3) -- given that these interventions will be designed in detail only during project implementation, the environmental assessment has been carried out using a framework approach. An Environmental Management Framework (EMF) and Resettlement Policy Framework (RPF, which is presented under a separate cover for all components of the project) have been developed to:

(i) ensure all relevant environmental and social issues are mainstreamed into the design and implementation of the proposed subcomponents or subprojects in Component 2 (terminals and landing stations) and Component 3 (DEPTC training center modernization, various IWT sustainability pilot schemes and future project preparation),
(ii) consider in an integrated manner the potential environmental and social risks, benefits and impacts of the proposed subprojects and identify measures to avoid, minimize and manage risks and impacts while enhancing benefits,
(iii) ensure compliance with national and World Bank requirements, and
(iv) guide conducting the detailed EIAs of the subprojects where required.

This EMF presents detailed guidelines for the major activities to be carried out for IEE/EA (including EMP) of specific subprojects that have not yet been fully designed and planned during the project preparation stage, and for which construction will only get underway in year 2 or beyond of project implementation. These guidelines include: (i) Environment Screening (identification of possible impacts) (ii) Description of Surrounding Environment (establishment of "baseline environment" against which impacts of the proposed sub-project would be evaluated) after identifying influence area for different sub-projects; (iii) analysis of alternatives; (iv)

identification of major sub-project activities during both construction and operational phases; (v) assessment, prediction and evaluation of impacts of project activities on the baseline environment; (vi) carrying out public consultations; (vii) preparation of environmental codes of practice (ECoPs); and (viii) identification of mitigation measures and preparation of impact specific environmental management plans (EMP) including monitoring requirements.

More specifically, the present EMF includes the following coverage for Components 2 and 3 of the proposed project:

- For **Component 2** activities, consultants (independent from design consultants) will be hired by BIWTA to carry out the detailed EIAs of river terminals and landing stations. Terms of reference for carrying out these EIA studies are given in Annex 1. The detailed scope of work for river terminal and landing works EIA studies are given in Annex 2.
- For additional activities under **Component 3** with potential safeguards implications, this EMF outlines basic screening criteria, assessment process, and institutional responsibilities and budget to ensure that appropriate EHS management measures are defined, incorporated into civil works packages, implemented and monitored as applicable. Expected issues for these components are as follows:
    - For the potential minor civil works under Component 3 related to upgrading/retrofitting and modernizing the existing DEPTC, specific scope of activities is not yet defined, but is expected to entail only minor interior renovations and installation of equipment within existing building footprints. As such, a full EIA is not expected to be necessary. Nonetheless, basic construction management practices should be observed. Annex 3 outlines basic generic construction management Environmental Codes of Practice (ECoPs) which are expected to be broadly applicable to the proposed works, and would be reviewed and adapted/enhanced if needed once the details of expected renovation work is more fully defined.
    - For **Component 3** investment activities– including the water hyacinth biogas pilot, river training pilots, and vessel fleet greening pilots – potential negative impacts are expected to be minor given the small pilot scale of the investments. Nonetheless, this EMF lays out (in Chapter 7 and Annex 2) the requirements to ensure that appropriate screening, and implementation of relevant EHS management and mitigation measures as necessary, will be carried out.
    - Future project preparation studies under **Component 3** will meanwhile not themselves cause environmental or social impacts; however, the future investment activities which may follow from the studies – including river maintenance dredging or other investments on additional IWT corridors in Bangladesh -- would likely entail impacts. Therefore, in parallel to detailed feasibility and design studies, independently commissioned ESIA studies in line with applicable World Bank safeguard policy and national requirements on environmental and social assessment and mitigation will be carried out through this project. This EMF specifies the institutional mechanisms to ensure this.

1.4 EMF Study Methodology

This EMF has been prepared by the BIWTA[1] and submitted to the World Bank for the project.

The methodology followed in preparing the EMF for Component 2 activities (river terminals and landings) consists of the following steps:

[1] BIWTA engaged services of Dr. Venkata Nukala, an individual environmental consultant of Ministry of Shipping of GoB.

- Review of the project details and meeting/discussions with various stakeholders including local communities
- Review of the policy and regulatory requirements
- Reconnaissance field visit and initial scoping and screening of the identified proposed investment sites to determine the key environmental parameters and aspects that are likely to be impacted by the project activities. Environmental screening has been carried out for all the proposed terminals and landing stations. The purpose of such screening is to get a preliminary idea about the degree and extent potential environmental impacts of a particular sub-project, which would subsequently be used to assess the need for and scope of further detailed environmental assessment. Screening details and photographs are provided in Annexes 5-8.
- Collecting and analysis of baseline environmental data with the help of secondary literature review and field data collected under Component 1
- Consultations with the stakeholders including beneficiary/affected communities and developing the consultation process
- An initial assessment of the potential and likely impacts of the project activities
- Prepare an outline environmental management plan
- Compilation of the present EMF.

Since the details of the scope of proposed activities under Components 3 and 4 are mostly not specified at this stage, the methodology for developing EMF sections on these components is proportionally more simplified, with primary focus on the concepts of environmental assessment and management to be followed.

1.5 Contents of the EMF Report

Chapter 2 reviews the prevailing WB policies and national regulatory requirements relevant to environmental assessment. Chapter 3 presents a simplified description of the project, its various components and other salient information relevant for environmental assessment. Description of the baseline environmental conditions is presented in Chapter 4. Screening and assessment of potentially environmental issues as well as the appropriate mitigation measures to address these negative impacts have been discussed in Chapter 5. Chapter 6 presents the outline of the environmental management plan (EMP). Finally, Chapter 7 describes the consultations that have been carried out with the stakeholders and also the requirements of similar consultations to be carried out while conducting the EIAs of the subprojects in Component 2, 3 and 4 of the Project.

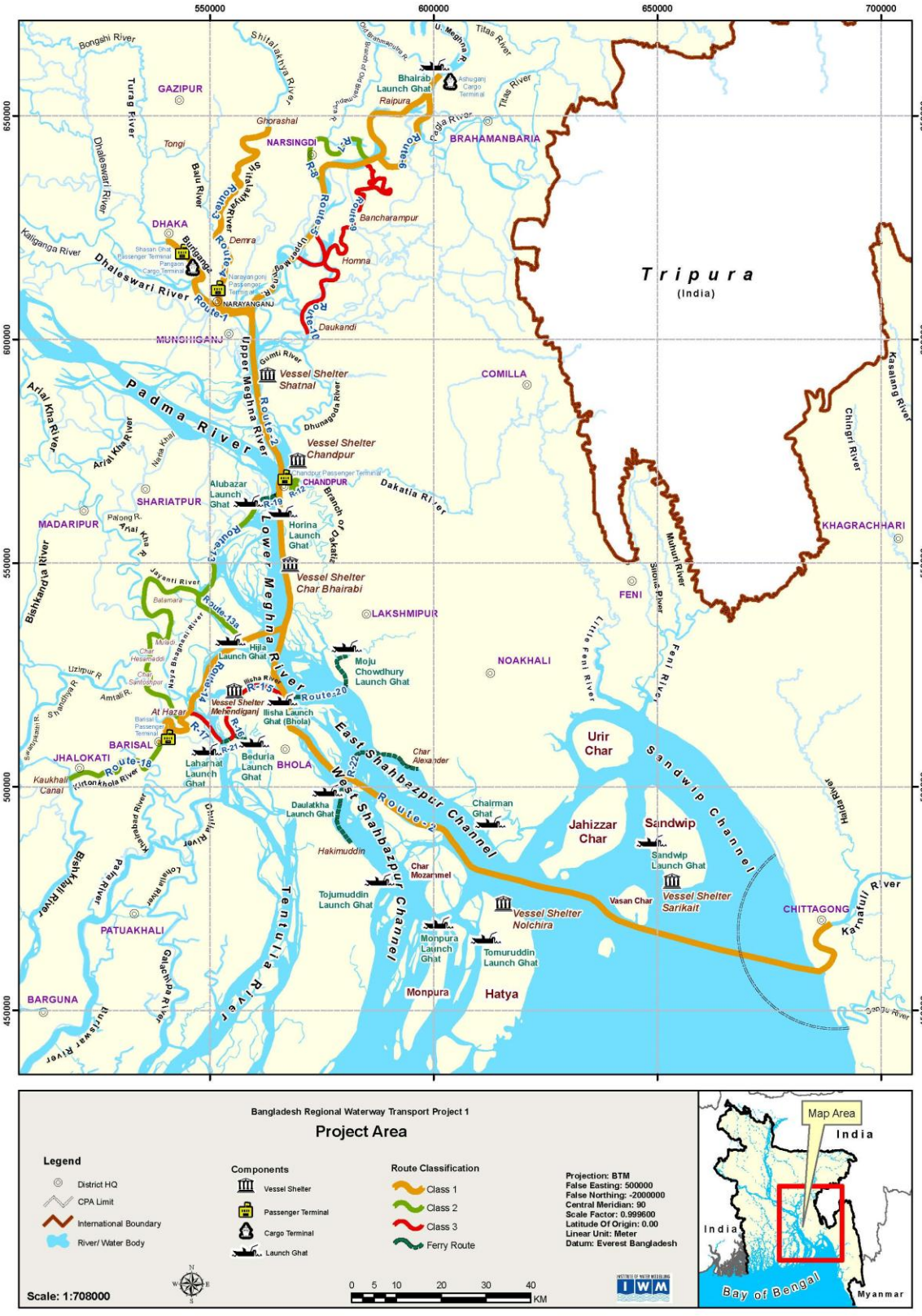


Figure 1.1: Locations of Proposed Terminals and Landing Stations in Component 2

2 Policy and Regulatory Framework

2.1 Applicable Legislation and Policies in Bangladesh

Bangladesh Environmental Conservation Act, 1995 and amended in 2010: The Environmental Conservation Act (ECA) of 1995 is the main legislative framework related to environmental protection in Bangladesh. This umbrella Act includes laws for conservation of the environment, improvement of environmental standards, and control and mitigation of environmental pollution. This Act has established the Department of Environment (DoE), and empowers its Director General to take measures as he considers necessary which includes conducting inquiries, preventing probable accidents, advising the Government, coordinating with other authorities or agencies, and collecting and publishing information about 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. In accordance with this Act, the proposed Project will need to be cleared by DoE before commencing the project following procedures given in the Environment Conservation Rules (ECR) 1997 (discussed below).

Other Relevant Acts, Laws and Rules in Bangladesh: Other legislation relevant to the proposed project are listed below and their applicability of the Project is given in Section 2.1.1.

- **Bangladesh Environment Conservation Rules (ECR), 1997** empowers the GoB to declare ecologically critical areas, classification of industries and projects into various categories, procedures for issuing the environmental clearance certificate, and determination of environmental standards. According to the Rule 7 (1) of the Environmental Conservation Rules 1997; for the purpose of issuance of Environmental Clearance Certificate (ECC), every industrial units or projects, in consideration of their site and impact on the environment, will be classified into the four categories and they are: Category I (green), Category II (Orange-A), Category III (Orange B) and Category IV (Red). Construction of river ports and landing stations are not included in any of these categories. However considering the scope of works involved in the subprojects in Component 2, it can be considered that the subcomponent on improvement of terminals will fall in to '**Red**' category and other subcomponent on improvement of landing stations will fall in to '**Orange B**' category;
- **Water Act 2013** is based on the National Water Policy, and designed for integrated development, management, extraction, distribution, usage, protection and conservation of water resources in Bangladesh. The project activities will influence the water quality. Mitigation measures to address water quality impacts are covered in EMF.
- **Bangladesh Wildlife (Protection and Safety) Act 2012** protects 1,307 species of plants and animals; and mandates imprisonment and fines for wildlife poaching, capturing, trapping, and trading. There is a risk that construction workers will kill the wildlife. Mitigation measures to address these risks are covered in EMF.
- **Bangladesh Wildlife (Preservation) Order (1973) and Act (1974)** regulates the hunting, killing, capture, trade and export of wild life and wild life products. It designates a list of protected species and game animals. It empowers the Government to declare areas as game reserves, wildlife sanctuaries, and national parks to protect the country's wildlife. Mitigation measures to address impacts on wildlife are covered in EMF.
- **Protection and Conservation of Fish Act (1950)** 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. The Act prohibits destruction of fish by explosives, guns, and bows in inland or coastal areas; and destruction of fish by poisoning, pollution,

or effluents. The Act prescribes the seasons during which fishing is allowed, prohibits fishing during spawning periods, and specifies officials having authority to detect breaches of this Act. There are hilsa sanctuaries in the project area and mitigation measures to avoid impacts on the sanctuaries are covered in the EMF.

- **The East-Bengal Protection and Fish Conservation Act (1950),** as amended by the Protection and Conservation of Fish (Amendment) Ordinance (1982) and the Protection and Conservation of Fish (Amendment) Act (1995), provides for the protection and conservation of fish in inland waters of Bangladesh. Mitigation measures to address impacts on fish are included in the EMF.
- **The Private Forest Act of 1959** allows the Government to take over management of improperly managed private forest lands, any private lands that can be afforested, and any land lying fallow for more than three years. Mitigation measures to address on vegetation are included in EMF.
- **Embankment and Drainage Act, 1952** consolidates the laws relating to embankments and drainage providing provision for the construction, maintenance, management, removal and control of embankments and water courses for the better drainage of lands and for their protection from floods, erosion or other damage by water. Mitigation measures to address impacts associated with disposal of dredged material are included in the EMF.
- **The Bangladesh Labor Act, 2006** 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. Mitigation measures to address workers' health and safety are included in the EMF.

Relevant National Policies and Plans: The national policies relevant to the proposed project and its environmental and social assessment are briefly described below.

- **Dredging and Dredged Material Management Draft Policy 2013**. This policy is in draft form as has not yet been formally adopted by Government of Bangladesh. Therefore, it is not formally applicable to the project. Nonetheless, salient features of the draft policy with respect to dredging are: Project has to be formulated after identifying location of dredging and location for projecting/dumping of dredged materials; in dry season, in no way dredged material shall be projected into flowing water. However, in south and southeast region, where tidal influence is very strong, material can be thrown into the river based upon recommendations from proper study; and In rainy season, material might be disposed into river flow based upon recommendations from proper study with hydro-morphological considerations. With respect to dredged material management, the policy says no agricultural land is hampered/damaged, might be dumped plan-wise in shallow places in river upon technical considerations, connection channels (khals) are not disconnected etc.; and best way of management to fill-in up low land (following Conservation Act 2000) or pile in government owned khas (waste) land. In consistence with this policy, no agricultural land will be acquired for the project for disposal of dredged material. During preparation of the project it was clarified with Department of Environment that, given that the entire Meghna river system up to Ashuganj is subject to tidal influence, the draft policy would not limit the option of in-river disposal of dredge material during dry season for the project. Dredge material management for the Project is therefore consistent with this draft policy;
- **National Water Policy (1969**) aims to provide guidance to the major players in water sector for ensuring optimal development and management of water;
- **National Water Management Plan, 2001** (Approved in 2004) envisions to establish an integrated development, use and management plan for water resources in Bangladesh over a period of 25 years;

- **The National Land Use Policy, enacted in 2001**, aims at managing land use effectively to support trends in accelerated urbanization, industrialization and diversification of development activities;
- **National Fisheries Policy, 1996** focuses on aquaculture and marine fisheries development and includes the following mandates: (i) Maintaining biodiversity in all natural water bodies and in marine environment, (ii) Ensuring that chemicals harmful to the environment will not be used in fish shrimp farms; (iii) Using environment friendly fish shrimp culture technology; (iv) Expanding fisheries areas and integrating rice, fish and shrimp cultivation; (v) Undertaking control measures against activities that have a negative impact on fisheries resources and vice-versa; and (v) Formulating laws to ban the disposal of any untreated industrial effluents into the water bodies.

2.1.1 Implication of GoB legal and regulations on the Proposed Project

The legislations relevant for environmental assessment for subprojects in Component 2 are the Environmental Conservation Act 1995 (ECA'95) and the Environmental Conservation Rules 1997 (ECR'97). Department of Environment (DoE), under the Ministry of Environment and Forest (MoEF), is the regulatory body responsible for enforcing the ECA'95 and ECR'97.

It is the responsibility of the BIWTA as a proponent to conduct an EIA of development proposal, the responsibility to review EIAs for the purpose of issuing Environmental Clearance Certificate rests on DoE. The procedures for “Red” Category include submission of:

- An Initial Environmental Examination (IEE)
- An Environmental Impact Assessment (EIA)
- An Environmental Management Plan (EMP)

For Orange B Projects an IEE with an EMP are to be submitted. Environment clearance has to be obtained by the respective implementing agency or project proponent (private sector) from Department of Environment (DoE). The environmental clearance procedure for Red Category projects can be summarized the Figure 2.1.

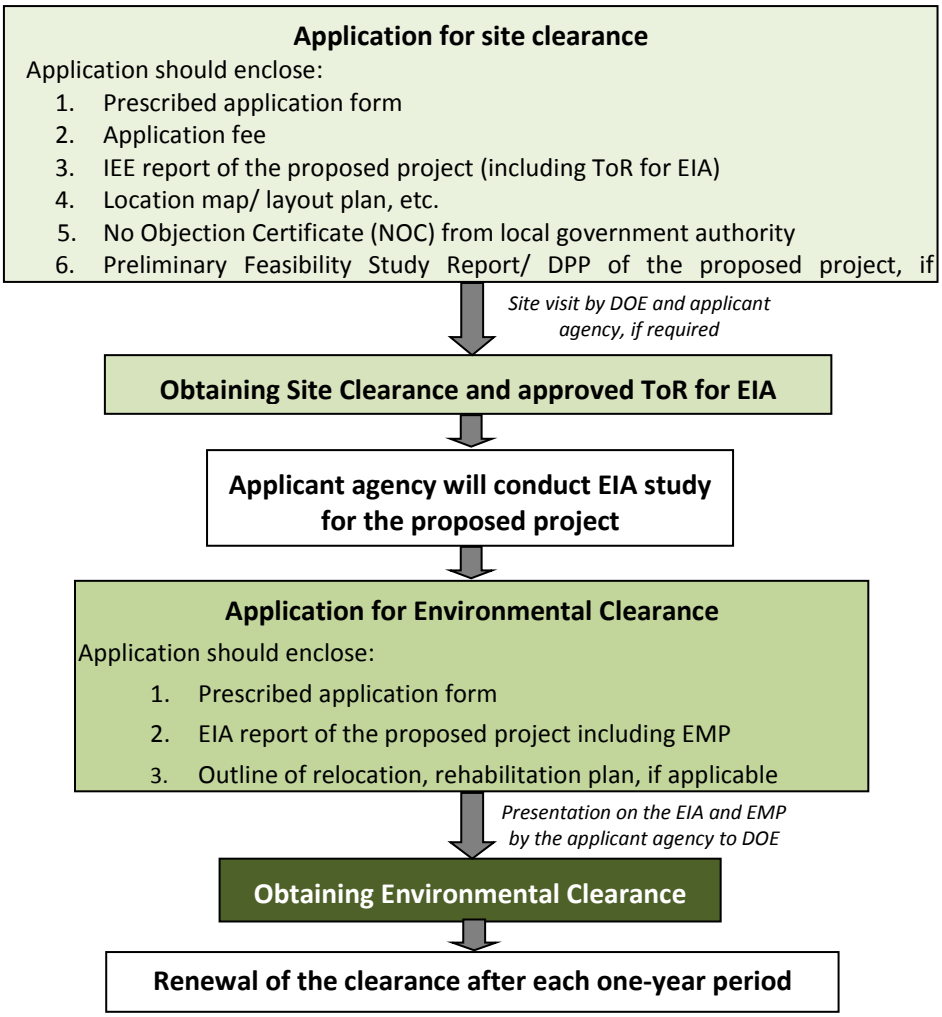


Figure 2.1: Process of obtaining Clearance certificate from DoE

2.2 International Treaties signed by Bangladesh

Bangladesh is a signatory to a number of international environment-related treaties, conventions, declarations and protocols. The following are the relevant international treaties and conventions to which Bangladesh is a party:

- **London Convention on the Prevention of Marine Pollution by Dumping of Waste and other Matters, 1972 (London Convention)**. The main objective of the Convention is to take all practical steps to prevent pollution of the sea by dumping of waste and other matter (oil, noxious liquid, harmful substances, sewage, garbage, air) that is liable to create hazards to human health, to harm living resources and marine life, to damage amenities to intervene with other legitimate users of sea. These guidelines will be applicable to dredged material management of the Project.
- **International Convention for the Prevention of Pollution from Ships (MARPOL) 1973/1978**. The main objectives of the Convention are to prevent the pollution of the marine environment by the operational discharges of oil and other harmful substances and the minimization of accidental discharges of such substances. These guidelines will be applicable for development of waste reception facilities at the river terminals from the ships.
- **Convention of Biological Diversity, 1992** (Biodiversity convention – Rio de Janeiro). The Convention has three objectives: the 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 generic resources. All parties are required to cooperate for the conservation of biodiversity, in respect of areas beyond national jurisdiction and other matters of regional interests, and must develop national strategies for the conservation and sustainable use of biodiversity and integrate this into sectoral or cross-sectoral guidelines.

- **1974 Convention on Wetlands of International Importance especially as Waterfowl Habitat (RAMSAR**). The Convention requires states to designate at least one wetland site on the basis of its ecology, biology, zoology, limnology or hydrology and requires the conservation of wetlands by establishing nature reserves. There is also a requirement that any loss of wetland should be compensated for by creation of new habitat.
- United Nations Framework Convention on Climate Change, Rio de Janeiro (1992). The convention is broadly applicable due to project construction and operation activities. Mitigation measures to address greenhouse gases emissions are covered in the EMF;
- Vienna Convention for the Protection of the Ozone Layer, Montreal (1987). Mitigation measures to address greenhouse gases emissions are covered in the EMF;
- Convention on Conservation of Migratory Species of Wild Animals (1979). Migratory birds visit the project areas and mitigation measures to address impacts on migratory birds are included in the EMF;
- Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), Washington (1973). This is not directly relevant to the project since the project does not involve in any international trade of endangered species of wild fauna and flora. General restrictions have however been included in the Environmental Code of Practice;
- Convention concerning the Protection of World Culture and Natural Heritage (World Heritage Convention) (1972). Though directly not applicable to the project since there are no known such sites are located in the project area – measures to address chance finds are included in the EMF; and
- Kyoto Protocol (1997) and Copenhagen Accord (2009) on climate change. Mitigation measures to address greenhouse gases emissions from the project activities are included in the EMF.

2.3 World Bank Safeguard Policies

The World Bank has developed a number of Safeguard Policies to ensure that all possible impacts are considered and mitigation measures are spelled out prior to the implementation of any proposed project. These policies ensure that the quality of operations is uniform across different settings worldwide. If the decision is taken that a Safeguard Policy should be applied, mitigation measures and plans must be developed and in place before the implementation of a proposed project.

The Bank requires environmental screening and classification for all investment projects proposed for Bank financing, to help ensure that they are environmentally and socially sound and sustainable. Screening and classification take into account the natural environment (air, water, and land); human health and safety; social aspects (including especially involuntary resettlement and presence of Indigenous Peoples); cultural property; and trans-boundary and global environmental aspects.

The objectives of environmental screening and classification are: to evaluate the environmental risks associated with a proposed operation; to determine the depth and breadth of Environmental Assessment (EA); and to recommend an appropriate choice of EA instrument(s) suitable for a given project. The Bank recognizes that environmental screening and classification is not absolute and involves professional judgment on a case by case basis. When screening, careful consideration needs to be given to potential environmental impacts and risks associated with the proposed project. Judgment is exercised with reference to the policy expectations and guidance; real impacts on the ground; and established regional and Bank-wide precedence and good practice.

The applicable WB safeguard policies are described below. In the following section, a table is provided indicating how each policy applies to the proposed investments under Component 2.

2.3.1 Environmental Assessment (OP/BP 4.01)

EA requirement. The World Bank requires environmental assessment (EA) of projects proposed for Bank support to ensure that they are environmentally sound and sustainable, and thus to improve decision making. The Bank Policy OP/BP 4.01 considers that EA is a process whose breadth, depth, and type of analysis depend on the nature, scale, and potential environmental impact of the proposed project. EA evaluates a project's potential environmental risks and impacts in its area of influence; examines project alternatives; identifies ways of improving project selection, siting, planning, design, and implementation by preventing, minimizing, mitigating, or compensating for adverse environmental impacts and enhancing positive impacts; and includes the process of mitigating and managing adverse environmental impacts throughout project implementation. EA takes into account the natural environment (air, water and land); human health and safety; social aspects (involuntary resettlement, indigenous peoples and physical cultural resources); and trans-boundary and global environmental aspects. The Bank Policy also envisages that the borrower Government is responsible for carrying out the EA and the Bank advises the borrower on the Bank's EA requirements.

The present EMF has been prepared in compliance with this OP/BP.

EA classification. The World Bank classifies the proposed project into one of the four categories, depending on the type, location, sensitivity, and scale of the project and the nature and magnitude of its potential environmental impacts. These categories are defined below.

- ***Category A:*** A proposed project is classified as Category A if it is likely to have significant adverse environmental impacts that are sensitive, diverse, or unprecedented. These impacts may affect an area broader than the sites or facilities subject to physical works.
- ***Category B:*** A proposed project is classified as Category B if its potential adverse environmental impacts on human populations or environmentally important areas--including wetlands, forests, grasslands, and other natural habitats--are less adverse than those of Category A projects.
- ***Category C:*** A proposed project is classified as Category C if it is likely to have minimal or no adverse environmental impacts. Beyond screening, no further EA action is required for a Category C project.
- ***Category FI***: A proposed project is classified as Category FI if it involves investment of Bank funds through a financial intermediary (FI), in subprojects that may result in adverse environmental impacts.

2.3.2 Natural Habitats (OP 4.04)

The Policy highlights the importance of conservation of natural habitats, like other measures that protect and enhance the environment, for long-term sustainable development. The Bank therefore supports the protection, maintenance, and rehabilitation of natural habitats and their functions in its economic and sector work, project financing, and policy dialogue. The Bank also supports, and expects borrowers to apply a precautionary approach to natural resource management to ensure opportunities for environmentally sustainable development. The Bank-promotes and supports natural habitat conservation and improved land use by financing projects designed to integrate into national and regional development the conservation of natural habitats and the maintenance of ecological functions. Furthermore, the Bank promotes the rehabilitation of degraded natural habitats. The Bank does not support projects that involve the significant conversion or degradation of critical natural habitats.

2.3.3 Physical Cultural Resources (OP 4.11)

The World Bank's This policy addresses physical cultural resources, which are defined as movable or immovable objects, sites, structures, groups of structures, and natural features and landscapes that have archaeological, paleontological, historical, architectural, religious, aesthetic, or other cultural significance. Physical cultural resources may be located in urban or rural settings, and may be above or below ground, or under water. Their cultural interest may be at the local, provincial or national level, or within the international community.

The Bank assists countries to avoid or mitigate adverse impacts on physical cultural resources from development projects that it finances. The impacts on physical cultural resources resulting from project activities, including mitigating measures, may not contravene either the borrower's national legislation, or its obligations under relevant international environmental treaties and agreements.

2.3.4 Forests (OP/BP 4.36)

This Policy recognizes the need to reduce deforestation and promote sustainable forest conservation and management in reducing poverty. The Bank believes that forests are very much essential for poverty reduction and sustainable development irrespective of their location in the world. The Bank assists borrowers with forest restoration activities that maintain or enhance biodiversity and ecosystem functionality. The Bank also assists borrowers with the establishment and sustainable management of environmentally appropriate, socially beneficial, and economically viable forest plantations to help meet growing demands for forest goods and services. The Bank does not finance projects that, in its opinion, would involve significant conversion or degradation of critical forest areas or related critical natural habitats. Furthermore, the Bank does not finance projects that contravene applicable international environmental agreements.

2.3.5 Projects on International Waterways (OP 7.50)

Projects on international waterways may affect the relations between the World Bank and its borrowers, and between riparian states. Therefore, the Bank attaches great importance to the riparian making appropriate agreements or arrangements for the entire waterway, or parts thereof, and stands ready to assist in this regard. A borrower must notify other riparian of planned projects that could affect water quality or quantity, sufficiently far in advance to allow them to review the plans and raise any concerns or objections.

3.1.1 Involuntary Resettlement (OP/BP 4.12)

The WB's experience indicates that involuntary resettlement under development projects, if unmitigated, often gives rise to severe economic, social, and environmental risks: production systems are dismantled; people face impoverishment when their productive assets or income sources are lost; people are relocated to environments where their productive skills may be less applicable and the competition for resources greater; community institutions and social networks are weakened; kin groups are dispersed; and cultural identity, traditional authority, and the potential for mutual help are diminished or lost. This policy includes safeguards to address and mitigate these impoverishment risks.[2]

The overall objectives of the Policy are given below.

- Involuntary resettlement should be avoided where feasible, or minimized, exploring all viable alternative project designs.
- Where it is not feasible to avoid resettlement, resettlement activities should be conceived and executed as sustainable development programs, providing sufficient

[2] Excerpts from WB OP 4.12.WB Operational Manual. December 2001.

investment resources to enable the persons displaced by the project to share in project benefits. Displaced persons should be meaningfully consulted and should have opportunities to participate in planning and implementing resettlement programs.

- Displaced persons should be assisted in their efforts to improve their livelihoods and standards of living or at least to restore them, in real terms, to pre-displacement levels or to levels prevailing prior to the beginning of project implementation, whichever is higher.

2.3.6 Projects in Disputed Areas (OP 7.60)

Projects in disputed areas may raise a number of delicate problems affecting relations not only between the Bank and its member countries, but also between the borrower and one or more neighboring countries. In order not to prejudice the position of either the Bank or the countries concerned, any dispute over an area in which a proposed project is located is dealt with at the earliest possible stage.

The Bank may proceed with a project in a disputed area if the governments concerned agree that, pending the settlement of the dispute, the project proposed for country A should go forward without prejudice to the claims of country B.

2.3.7 Environment, Health and Safety Guidelines

The Environment, Health, and Safety (EHS) Guidelines[3]contain the performance levels and measures that are generally considered to be achievable in new facilities or project by existing technology at reasonable costs. In addition, there are also industry specific EHS guidelines. The guidelines that are relevant to the Project are: EHS Guidelines for Ports, Harbors, and Terminals[4], and EHS Guidelines for Shipping[5].

2.3.8 Applicable World Bank Policies to Component 2 investments

The applicable World Bank policies for subprojects under Component 2 of the Project are given in Table 2.1.

Table 2.1: Triggering the World Bank Policies for Component 2 Subprojects

Directive	Policy	Applicability for the overall Project	Relevance to subprojects in Component 2
Environmental Assessment	OP/BP 4.01	Triggered. This Project falls into Category A.	The full ESIA to be carried out for terminals will also cover landing stations, in accordance with EMF document
Natural Habitats	OP/BP 4.04	Triggered.	For terminals, dredging works and bank protection works at several terminal locations have potential to alter the natural river habitats. Greenfield construction in Pangaon will also affect the floodplain habitat. Appropriate mitigation and

[3] EHS Guidelines available at: http://www.ifc.org/wps/wcm/connect/554e8d80488658e4b76af76a6515bb18/Final%2B-%2BGeneral%2BEHS%2BGuidelines.pdf?MOD=AJPERES

[4] http://www.ifc.org/wps/wcm/connect/d52b768048855520b58cf76a6515bb18/Final%2B-%2BShipping.pdf?MOD=AJPERES&id=1323152475418

[5] http://www.ifc.org/wps/wcm/connect/d52b768048855520b58cf76a6515bb18/Final%2B-%2BShipping.pdf?MOD=AJPERES&id=1323152475418

Directive	Policy	Applicability for the overall Project	Relevance to subprojects in Component 2
			control measures will be included in the design and ESIA to address these potential impacts. For landing stations, though the impacts on the river and floodplain are limited, appropriate mitigation measures will be considered in design and EIA studies.
Physical Cultural Resources (PCR)	OP 4.11	Triggered.	Though there are no identified PCRs located in the subproject sites which would likely be directly affected or displaced by proposed works, the development of ports at Shasanghat and Pangaon will affect the access to a Muslim graveyard and a Hindu ashes immersion point. Alternative access will need to be provided to these locations. In addition, 'chance find' procedures (Annex 4) will be included in the EMPs
Forests	OP/BP 4.36	Not triggered. None of the proposed terminal or landing station locations are near forested areas.	
Pest Management	OP 4.09	Not triggered.	The subprojects will not procure any pesticides, nor will they induce an increased use of pesticides.
Safety of Dams	OP/BP 4.37	Not triggered	
Projects in International Waterways	OP/BP/ GP 7.50	Triggered.	All activities of the project are located on international waterways. A riparian notification has already been carried out, covering all project activities, consistent with the policy.
Projects in Disputed Areas	OP/BP 7.60	Not triggered	Not triggered.
Access to Information		Applicable to the project. Disclosure of all project safeguards documents in-counry and on the WB Infoshop website is required. .	The ESIA Executive Summary and RPF of overall Project, ESIA for Component 1, EMF have been disclosed in country (on BIWTA website and will be made available in hard copy in locally accessible locations in the project area, including BIWTA offices at the existing terminals) and also sent to WB InfoShop

The proposed civil works under Component 3 related to upgrading/retrofitting and modernizing the existing DEPTC, as well as potentially some activities related to the water hyacinth biogas pilot and initiatives on greening the vessel fleet, may entail minor impacts that would trigger OP 4.01. However, because of limited nature of the works, a full EIA is not expected to be necessary for Component 3. It is expected that potential negative impacts related to Component 3 activities will be effectively managed by including the generic Environmental Codes of Practice (ECoPs) presented in Annexure within contractor bid documents. Nonetheless, all Component 3 activities will be screened as they are more fully defined, and if required, necessary safeguards assessments will be undertaken.

2.4 Public consultation and disclosure requirements by World Bank

The Bank reaffirms its recognition and endorsement of the fundamental importance of transparency and accountability to the development process. Accordingly, it is Bank's policy to be open about its activities and to welcome and seek out opportunities to explain its work to the widest possible audience. According to 'OP 4.01: Environmental Assessment' of World Bank, the following conditions applies to the proposed subprojects.

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

Disclosure. For a Category A project, the borrower should provide relevant information on project interventions in a timely manner prior to consultation and in a form and language that are understandable and accessible to the groups being consulted. The borrower should provide a summary of the proposed project's objectives, description, and potential impacts for the initial consultation. For consultation after the draft EA report is prepared, the borrower should provide a summary of the EA's conclusions. In addition, for a Category A project, the borrower makes the draft EA report available at a public place accessible to project-affected groups and local NGOs. The borrower also ensures that EA reports for Category A subprojects are made available in a public place accessible to affected groups and local NGOs. The document needs to be translated into Bengali. Public availability of the EA report for Category A project in the borrowing country and official receipt by the Bank are prerequisites to Bank appraisal of these projects.

In addition, consultations have been held while preparing EMF as well as RPF. Public consultations were held in Ashuganj and Barisal on 17th and 18th November 2015. A national workshop was held on 14th October 2015. Community-level focus group discussions and meetings were also held at various terminal and landing station locations. A summary of consultations held and key issues raised is presented in Chapter 7.

The EMF and RPF have been disclosed in country on BIWTA website and hard copies have been made available in locally accessible locations in the project area, including BIWTA offices at the existing terminals. These documents have also been disclosed on WB InfoShop.

3 PROJECT DESCRIPTION

3.1 Description of Overall Project and Its Components

Bangladesh Regional Inland Water Transport Project 1 (Chittagong-Dhaka-Ashuganj Corridor) (the Project) will provide US$360 million in IDA funds to finance interventions aimed at improving IWT for cargo and passengers along the heavily trafficked Chittagong-Dhaka-Ashuganj Regional Corridor. Main interventions include: navigation channel maintenance and improvement; navigation safety improvements; the construction and modernization of select river terminals; development of River Information Systems (RIS); institutional capacity development; and, funding for research and development and feasibility studies for continuing sector improvement to ensure future IWT sustainability. This includes work on sector policies and strategies needed to: improve revenue collection and management; incentivize public and private sector investments especially related to container transport; and, mitigate and improve IWT's impact on the social and physical environment. The Project consists of three components as follows:

Component 1: Improved Inland Waterway Navigation (US$235 million). This component shall include work to guarantee advertised depths and widths of navigation channels on select river routes. The work also includes provision of aids to navigation. The work is to be done on an Output- and Performance-based Contracting method designed to increase the efficiency and effectiveness of river asset management and maintenance. It is designed to ensure that the physical condition of the rivers under contract are adequate for the need of river users, over the entire period of the contract which is six to seven years. This type of contract significantly expands the role of the private sector, from the simple execution of works to the management and conservation of river assets. This is a departure from the traditional river maintenance contracts used in Bangladesh which have been less-than-optimal. Even where works have been carried out according to plan, the nature of the rivers has meant that advertised depths, aids to navigation and other river infrastructure do not last as long as they should because of deficiencies in the original design, aggravated by inadequate maintenance. The beneficiaries of the new concept are expected to be the river users. In a wider sense, future generations will be able to benefit from a better maintenance of past investments. River users will be able to know the Service Level they can expect in return for the payments they make for the use of the infrastructure (tolls, tariffs, user fees, taxes, etc.). The River Administration shall also benefit by obtaining better overall river conditions with reduced levels of expenditure.

Component 2: Improved Services at Priority Inland Waterway Terminals and Landing Ghats/Stations (US$75 million). This component supports the development of two cargo terminals, four passenger terminals and 14 landing ghats. The development of passenger and cargo terminals are within existing inland waterway port areas under the jurisdiction of BIWTA. It includes the modernization and extension of existing facilities to cater for increased demand. Terminals and landing stations are part of the network of about 448 river terminals, 374 landing stations, 23 coastal terminals and 25 pilot stations already provided by BIWTA. The passenger terminals and landing stations will specifically incorporate the needs of women users and less abled users, and all investments will address safety-related issues for all users. Locations of the terminals and landing stations are shown in Figure 1.1.

- The cargo terminals include: (i) extension of the existing Pangaon Container Terminal with new general cargo vessel berths and land access infrastructure on the Buriganga river; and, (ii) rehabilitation and modernization of the existing general cargo terminal at Ashuganj including river bank erosion prevention, the replacement of pontoons, gangways and other dilapidated marine structures, the extension of berthing space
- The passenger terminals include: (i) construction of a new passenger terminal at Shashanghat, downstream of the existing terminal at Sadarghat where landside congestion preclude the development of additional berths; (ii) rehabilitation works for the passenger terminal at

Narayanganj; (iii) rehabilitation of works for the passenger terminal at Chandpur; and, (iv) extension of the existing passenger terminal at Barisal

- Rehabilitation works or new construction of 14 landing stations or launch ghats under this Project are designed to provide access for rural communities, some of which in the lower Meghna delta have no alternative means of transport.

Component 3: Institutional Capacity Development and Sustainability (US$50 million). A series of activities are proposed that will support BIWTA's overall enhancement of its management systems and human resources capacity for modern, efficient, and high quality management of the IWT sector in line with international standards, and to help BIWTA to achieve long-term operational and financial sustainability Activities to be supported include: (i) the development of River Information Systems to help BIWTA improve data collection for the planning, maintenance and development of IWT, as well as enhance climate resiliency of the IWT sector in Bangladesh by creating a more systematized baseline understanding of river hydrology and navigational implications, and provision of a Traffic Monitoring System for passengers and cargo; (ii) improvement of Human Resources capacity for better management of the IWT sector through upgrading and modernizing the IWT Deck and Engine Personnel Training Centre (DEPTC)) into a regional IWT Training Center with open access to all users in the Region and the world; (iii) commissioning of a study to propose an institutional structure and reforms needed to develop an effective Search and Rescue organization; (iv) a project preparation facility to finance feasibility, surveys, design and safeguards studies for continuous sector development; and, (vi) support for the Project Management Unit including the hiring of key staff and procurement of selected systems needed for implementation of the Project.

3.2 Locations of Component 2

Locations of the proposed terminals and landing stations, in terms of their geographical coordinates, under Component 2 of the Project are given in Table 3.1 and are shown in Figure 1.1. Photographs of the terminals and landing stations are given in Annex 5 and Annex 6, respectively.

Table 3.1: Locations of Terminals and Landing Stations under Component 2 of the Project

Item	Name	Position	
		Latitude	Longitude
1 Passenger Terminals			
1.1	Shasanghat	23°41'24.55"N	90°25'34.72"E
1.2	Narayanganj	23°36'58.86"N	90°30'20.53"E
1.3	Chandpur	23°13'59.61"N	90°38'54.65"E
1.4	Barisal	22°41''59.30"N	90°22'30.98"E
2 General Cargo Terminals			
2.1	Ashuganj	24°02'34.42"N	91°00'04.58"E
2.2	Pangaon	23°39'30.79"N	90°27'14.68"E
3 Launch Ghats (Landing Stations)			

Item	Name	Position	
		Latitude	Longitude
3.1	Bhairab	24°02'35.76"N	90°59'20.62"E
3.2	Alubazar	23°10'58.57"N	90°34'50.32"E
3.3	Horina	23°09'51.20"N	90°38'32.33"E
3.4	Hijla	22°54'18.07"N	90°31'48.32"E
3.5	Moju Chowdhury	22°52'23.10"N	90°46'56.25"E
3.6	Ilisha (Bhola)	22°47'31.72"N	90°38'33.30"E
3.7	Beduria	22°42'17.22"N	90°33'52.70"E
3.8	Laharhat	22°41'18.11"N	90°29'22.62"E
3.9	Boddarhat	22°39'16.72"N	90°53'57.36"E
3.10	Daulatkha	22°36'11.99"N	90°45'06.14"E
3.11	ChairmanGhat (CharBata)	22°31'19.37"N	91°05'22.23"E
3.12	Sandwip	22°29'03.26"N	91°26'01.06"E
3.13	Tojumuddin	22°24'31.93"N	90°51'36.21"E
3.14	Monpura	22°19'35.89"N	90°58'28.40"E

3.3 Proposed Developments in Passenger Terminals

Details of existing facilities and the proposed facilities to be built in the three passenger terminals are given in Table 3.2. Typical facilities to be built at these terminals on the water side will include bank protection works, jetties and pontoons; and on the landside will include office buildings, passenger facilities, parking areas and widening of access roads. All terminals will be provided with separate ticket counters, waiting rooms and toilets for women passengers, and ramps for movement of disabled peoples. All terminals will incorporate relevant features to reduce specific barriers that women, men and disabled people may face in using the facilities (reflecting in particular issues of safety, lighting, access ramps, separate toilets and waiting areas as appropriate.

Table 3.2: Existing and Proposed Facilities in Passenger Terminals

Passenger Terminal	Existing Facilities	Proposed Facilities
Shasanghat Passenger Terminal Located 2.5 km downstream of the Sadharghat terminal at Dhaka on the Buriganga River	Greenfield site. There are no existing facilities.	Based on existing concept design drawings (which will be reviewed and potentially adapted / modified during the detailed design phase), proposed facilities to be developed include: • A Six storied terminal building, with a total floor are of approximately 20,000 square meters; • A quay wall (bank protection) of approximately 250 m length • Three terminal pontoons of approximately 200m length and five steel gangways • A parking yard of approximately 2,000 square meters • new landside pedestrian and vehicle access roadways • pedestrian and vehicle turn-outs, drop-off, collection and waiting facilities
Chandpur Passenger Terminal. Located on Lower Meghna	Established in 1995. Existing facilities include a walkway (167 m^2), steel jetty – 2 nos, steel spud –	This terminal needs to be completely reconstructed. Based on existing concept design drawings (which will be reviewed and potentially adapted/modified during

Passenger Terminal	Existing Facilities	Proposed Facilities
River	6 nos., pontoon – 4 nos., passenger waiting shed (74 m^2) and parking yard (8010 m^2)	the detailed design phase), the proposed facilities include: • Land development (21,669 m^3), • 3-storied terminal Building (4061 m^2), • Bank protection (253 m), • Boundary wall (231 m), • RCC Ramp- 3 nos, • Steel gangway – 3 nos, • Spud and spud ring -22 nos. Terminal pontoon -4Nos, • steel jetty (267.65m^2). • Widening of 265 m of access road
Barisal Passenger Terminal Located on Kirtonkhola River (Lower Meghna Tributary)	Established in 1964. Existing facilities included: two storied terminal building, passenger waiting space, 6nos. of pontoons, 4 nos. of gangway, cargo shed, transit shed, parking yard and access road.	According to BIWTA, the proposed facilities include: • Extension of existing terminal building (346 m^2), • construction of 4 storied multipurpose building for port facilities (5600 m^2), • RCC Ramp 2 nos., • Steel Gangway 2 nos., and • bank Protection works
Narayanganj Passenger Terminal Located on Shitalakya River	Established in 1972. Existing facilities include a single storied building, 4 pontoons, 3 gangways, an RCC jetty and an administrative office. Existing facilities also include cargo handling facilities with 4 pontoons.	According to BIWTA, the proposed facilities include • extension of existing terminal building, • RCC ramps and • 2 steel gangways.

3.4 Proposed Developments in Cargo Terminals

Details of existing facilities and the proposed facilities to be built in the two cargo terminals at Pangaon and Ashuganj are given in Table 3.3. Typical facilities to be built at these terminals on the water side will include bank protection works and jetties; and on the landside will include office buildings, passenger facilities, parking areas and widening of access roads. All terminals will incorporate relevant features to reduce specific barriers that women, men and disabled people may face in using the facilities (reflecting in particular issues of safety, lighting, access ramps, separate toilets and waiting areas as appropriate.

Table 3.3: Existing and Proposed Facilities in Cargo Terminals

Cargo Terminal	Existing Facilities	Proposed Facilities

Cargo Terminal	Existing Facilities	Proposed Facilities
Pangaon Cargo Terminal Located next to existing Pangaon Container terminal on Buriganga River.	Greenfield site. No existing facilities.	Based on existing concept design drawings (which will be reviewed and potentially adapted / modified during the detailed design phase), The proposed facilities include: • Two berths, constructed on RCC piles with a suspended deck – total length 190m; • An apron area of approximately 2,750 square meters • An open storage area of 2,220 square meters; • A transit Shed of 1,500 square meters; • Vehicle parking areas of 500 square meters; and • A new port road of 400m length together with a gate house.
Ashuganj Cargo Terminal Located on Upper Meghan River	Established in 2004 primarily for use by. Existing facilities include: office (150 m^2), RCC Jetty (425 m^2), steel jetty (90 m^2), pontoons – 2nos., gangway, warehouse (225 m^2), parking area (1000 m^2)	According to BIWTA, the proposed facilities include: • office building, RCC Jetty (425 m^2), • steel jetty – (2x45m), • pontoon- 2nos., • gangway – 2nos., • bank protection, • warehouse (225 m^2), and • parking area (2000 m^2)

3.5 Proposed Developments in Landing Stations

Details of existing facilities and the proposed facilities to be built in the 14 landing stations are given in Table 3.4. All the landing stations will be provided with drinking water facilities, and separate waiting rooms and toilets for women passengers.

Table 3.4: Existing and Proposed Facilities in Landing Stations

Landing Station/ Launch Ghat	Existing Facilities	Proposed Facilities
Bhairab Bazar	Established in 2004. Daily about 300 to 400 passengers use this launch ghat. Existing facilities include two pontoons and one gangway.	The proposed facilities include two pontoons and one gangway.
Alubazar	This is a ferry terminal established in 2001. Daily traffic include 3 launches, 4 ferries and 15 local boats. Daly weight of goods transported is 20 t. Existing facilities include: shore connection seri -1, pontoon -1, steel jetty, ferry ghat with pontoon.	0.18 ha of addition land acquisition required for proposed facilities, which include: • Shore connection seri-4 • Steel jetty -45m² • Steel spud – 4nos • Approach Road -372m² • Passenger waiting sheed-75m² • Parking yard – 1860m² • Toilet complex – 42m² • Bank protection -200m²

Landing Station/ Launch Ghat	Existing Facilities	Proposed Facilities
Horina	This is a ferry terminal established in 2001. Daily traffic includes 2 launches and 4 ferries. Approximate daily weight of goods transported is 15 t. Existing facilities include a ferry ghat with a pontoon	0.093 ha of addition land acquisition required for proposed facilities, which include: • Shore connection seri-4 • Steel jetty -45.00m² • Steel spud – 4nos • Approach Road -372m² • Bank protection -200m²
Hijla	The average daily traffic at this launch ghat is 150 passengers and 10 boats. Approximate daily weight of goods transported is 3t. Existing facilities include a shore connection seri and a pontoon	0.12 ha of addition land acquisition required for proposed facilities, which include: • Passenger waiting shed:125 m^2 • Parking yard: 2500 m^2 • Toilet complex: 75 m^2 • Access road: 1000 m^2 • Deep tube-well: 01 No
Ilisha (Bhola)	The average daily traffic at this launch ghat is 251 passengers and 12 vessels. Approximate daily weight of goods transported is 19t. Existing facilities include 2 shore connection seris and a pontoon	0.30 ha of addition land acquisition required for proposed facilities, which include: • Passenger waiting shed:125 m^2 • Parking yard : 2000 m^2 • Toilet complex: 75 m^2 • Access road: 2000 m^2 • Deep tube-well: 01 No
Moju Chowdhury	A ferry ghat established in 2008. Daily traffic is 2 ferries, 2 sea trucks and a launch. Approximate daily weight of goods transported is 20t. Existing facilities include a shore connection seris, a pontoon, and a passenger waiting shed (55 m^2)	Area required proposed facilities in 0.5 ha but land acquisition is not required. The proposed facilities include: • Shore connection seri-4 • Steel jetty -45 m² • Steel spud – 4nos • Approach road • Passenger shed • Parking yard • Bank protection
Laharhat	The average daily traffic at this launch ghat is 277 passengers and 13 vessels. Approximate daily weight of goods transported is 21 t. Existing facilities include: • Passenger waiting shed : 125 m^2 • Parking yard : 3375.00 m^2 • Toilet complex: 75.00 m^2 • Access road: 2000.00 m^2 • Deep tube-well: 01 No • Shore connection sheri-01 • Pontoons- 01	Area required proposed facilities in 0.28 ha but land acquisition is not required. The proposed facilities include: • Passenger waiting shed: 125 m^2 • Parking yard : 1500 m^2 • Toilet complex: 75 m^2 • Access road: 2000 m^2 • Shore connection sheri-01 • Pontoons- 01
Beduria	The average daily traffic at this launch ghat is 81 passengers and 13 vessels. Approximate daily weight of goods transported is 6 t. Existing facilities	Area required proposed facilities in 0.047 ha but land acquisition is not required. The proposed facilities include: • Passenger waiting shed:125 m^2

Landing Station/ Launch Ghat	Existing Facilities	Proposed Facilities
	include a shore connection seri and a pontoon	• Parking yard: 2000 m^2 • Toilet complex: 75 m^2 • Access road: 2000 m^2 • Deep tube-well: 01 No
Daulatkha	The average daily traffic at this launch ghat is 1000 passengers and 4 vessels. Approximate daily weight of goods transported is 730 t. Existing facilities include a 22 m jetty and 1 pontoon	Area required proposed facilities in 0.12 ha but land acquisition is not required. The proposed facilities include: • Passenger waiting shed:125 m^2 • Parking yard: 2000.00 m^2 • Toilet complex: 75.00 m^2 • Access road: 2000.00 m^2 • Deep tube-well: 01
Tojumuddin	The average daily traffic at this launch ghat is 307 passengers and 4 vessels. Approximate daily weight of goods transported is 23 t. Existing facilities include 2 shore connection seris and a pontoon	Area required proposed facilities in 0.12 ha but land acquisition is not required. The proposed facilities include: • Passenger waiting shed:125 m^2 • Parking yard: 2000.00 m^2 • Toilet complex: 75.00 m^2 • Access road: 2000.00 m^2 • Deep tube-well: 01 No • Pontoons- 01
Monpura	The average daily traffic at this launch ghat is 207 passengers and 2 vessels. Approximate daily weight of goods transported is 9.5 t. Existing facilities include: • Pontoons-1 • Sheri - 02 • Transit shed • RCC Jetty 625.00 M	Area required proposed facilities in 0.12 ha but land acquisition is not required. The proposed facilities include: • Passenger waiting shed:125 m^2 • Parking yard: 2000.00 m^2 • Toilet complex: 75.00 m^2 • Access road: 2000.00 m^2 • Deep tube-well: 01 No • Shore connection
Chairman Ghat (Char Bata)	The average daily traffic at this launch ghat is 620 passengers 2 launches, 6 local boats and 12 speed boats. Approximate daily weight of goods transported is 18 t. Existing facilities include: • Steel Jetty (12m) 1Nos • Spud 2 Nos • Pontoon 1Nos • Waiting Shed 45 m^2	0.5 ha of addition land acquisition required for proposed facilities, which include: • Passenger Terminal: 120 m^2 • Parking Yard: 550 m^2 • Deep tube well: -1nos • Approach Road 450 m^2 • Bank Protection 290 m^2
Sandwip RCC Jetty	The average daily traffic at this RCC Jetty is 200 passengers 2 steamer, 10 local boats and 30 speed boats. Approximate daily weight of goods transported is 30 t. Existing facilities include: • RCC Jetty 750m	Area required proposed facilities in 1 ha but land acquisition is not required. The proposed facilities include: • RCC Jetty 30m • Harbour Basin • Passenger Terminal 125 m^2 • Parking Yard 550 m^2

Landing Station/ Launch Ghat	Existing Facilities	Proposed Facilities
	• Waiting shed 60 m^2 • Parking yard 200 m^2	• Deep tube well 1nos • Approach Road 450 m^2 • Bank Protection 2000 m^2
Boddarhat Launch ghat	The average daily traffic at this RCC Jetty is 150 passengers 2 launch and 10 local boats. Approximate daily weight of goods transported is 30 t. Existing facilities include: • RCC Jetty 750m • Waiting shed 60 m^2 • Parking yard 200 m^2	0.4 ha of addition land acquisition required for proposed facilities, which include: • Shore connection seri-4 • Steel jetty -185.00m² • Steel spud – 4nos • Approach Road -150m² • Passenger waiting sheed-100m² • Parking yard – 4048m² • Toilet complex – 42m² • Bank protection -200m²
Tomuruddin	The average daily traffic at this launch ghat is 600 passengers 2 launches, a sea truck and 6 local boats. Approximate daily weight of goods transported is 18 t. Existing facilities include: Steel Jetty (28m) 1Nos Spud 2 Nos Pontoon 1Nos	0.5 ha of addition land acquisition required for proposed facilities, which include: Passenger Terminal 120 m^2 Parking Yard 550 m^2 Deep tube well 1nos Approach Road 450 m^2

3.6 Description of Typical Construction Works Under Component 2

3.6.1 Landslide Construction

Landside or onshore construction typically includes site preparation and development, the removal of any existing vegetation, filling of the land above the flood levels, and the grading and excavation of soils for the installation of structural foundations and site utilities that are typical of industrial development projects. Port development may include construction of new infrastructure and / or rehabilitation of existing infrastructure, such as piers and buildings. Landside facilities typically include:

- Cargo storage and handling facilities (e.g. crane tracks and bridges for loading / unloading cargo, pipelines, roads, and other areas for cargo distribution, storage and stacking areas, and warehouses;
- Facilities for embarking/disembarking of passengers (e.g. parking areas and administration buildings);
- Vessel support facilities (e.g. to store and supply water, power, food and oil / used oil);
- Drainage networks;
- Waste collection facilities;
- Terminal administration buildings with water supply facilities, toilets and watering rooms (separately for women passengers and traders), and ramps for disabled people;
- Equipment maintenance and repair facilities (e.g. vehicle maintenance bays); and
- Widening of access roads.

3.6.2 Waterside Construction

Waterside facilities include berthing facilities (e.g. harbor basins, approaches, and access channels), cargo handling and ferry facilities (e.g. goods transfer quays and piers, shoreline protection, and landing bridges). Bank protection works and Installation of pier columns / piles and construction of harbor basins and access channels may require excavation of river bed sediment and underlying material. Dredgers will be used for excavation and vibratory pile drivers will be used for construction of pier columns. Uncontaminated dredged material will be used for raising of the land at the terminal site or used to construct breakwaters and other features, or can be disposed of in open water through submerged discharge. Contaminated material will be placed in a confined disposal facility.

3.7 Description of Typical Construction Works under Component 3

Construction works under Component 3 include minor civil works related building construction for upgradation of Deck and Engine Personnel Training Centre.

Construction works under Component 3 will also include pilot scale of different river training works (e.g. revetments, dykes, bank protection) for developing alternatives for improved water way navigation and minimization of the dredging needs. The civil works for these pilot projects include dredging works for excavation as well as fill material (for geobags), and concrete works. Construction works for water hyacinth biogas plant mainly include reinforced concrete works for construction of digesters and buried tanks

3.8 Description of Typical Operations at Terminals

3.8.1 Landslide Operations

Land-based operations at terminals include cargo handling; material and fuel storage and handling; passenger embarking/disembarking; ship support services; waste and wastewater management; vehicle and equipment maintenance; and buildings and grounds maintenance.

Cargo handling includes unloading, storage / stacking and loading of dry and liquid cargo. Cargo typically includes containers, dry bulk, liquid bulk, and general cargo. Cargo handling includes use of vehicular traffic such as harbor vessels, trucks, buses, terminal trucks, and track cranes. Bulk cargo may be transferred using cranes with grab buckets and front-end loaders, or pneumatic continuous ship loaders and unloaders, or belt conveyors.

Terminal operations generate and manage their own waste and wastewater. Solid waste may be generated from property upkeep and administrative operations while wastewater may originate from storm drainage and from domestic wastewater and sewage. However, the most significant sources of wastes and wastewater are ships and there will be receiving facilities for these and other waste streams.

3.9 Waterside Operations

Waterside operations may include maintenance dredging for routine removal of material/ sediment in harbor basins, and access channels. This activity is important to maintain or improve depths and widths and ensure safe access for the ships as well as efficient navigation depth in the neighborhoods and dock gates to ensure access to basins and dry docks. Maintenance dredging may take place annually or once every few years, depending on the terminal. The terminals at Chandpur and Barisal may require maintenance dredging annually but other terminals may require dredging once in a few years. In addition, the water side operations will include small scale maintenance and repair works for vessels, which are mostly related to engine repairs. No repainting works will be carried out these terminals.

3.10 Implementation Schedule

The engineering designs and EIA studies for the Component 2 works will be carried out during the first year of implementation of the Project and civil works will be carried out over a period of four years after completion of the engineering designs.

BIWTA will procure consulting firms for preparation of detailed engineering designs and to carry out environmental assessment of the proposed Component 2 works. The EIA consultants will be independent of Engineering Design Consultants but both consultants will coordinate each other while planning and design of the facilities.

3.11 Cost of the Project

The overall cost of the Project is USD 360 million, and cost of the Component 2 works is 75 million USD. Detailed break up of Component 2 works are given in Table 3.5.

Table 3.5: Cost of the Project (all components)

Description	**Amount in USD, million**
Component 1: Improved Inland Waterway Navigation	235
A. PBC contracts for year-round maintenance of Least Available Depth and Navigational Aids including for Night-time Navigation Independent Performance Monitor Unallocated but for activities associated with PBC contract	205 7 3
B. Six shelters-safe harbors for vessels in adverse weather conditions	10
C. Establishment of a Search and Rescue Organization	10
Component 2: Improved Services at Priority Inland Waterway Terminals and Landing Stations	75
A. Development of a new common user general cargo terminal with access infrastructure on the Buriganga River adjacent to the existing Pangaon container terminal	20
B. Rehabilitation and modernization of the existing general cargo terminals at Ashuganj	6
C. Development of a new passenger terminal at Shasanghat	10
D. Upgrade of existing passenger terminals at Narayanganj, Chandpur, and Barisal	10
E. Upgrade of 14 Existing Landing Stations/ Launch Ghats	14
F. Design, Supervision, Safeguards Services As Needed, and Other Unanticipated Activities relating to River Port Terminals	5
Component 3: Institutional Capacity Development and Sustainability	50
TOTAL	360

4 Baseline Environment

4.1 Physical Environment

4.1.1 Project Influence Area

Generally, each river terminal has a jurisdiction of about 5 km radius in the river and have to maintain access channels to the port with in their jurisdiction. Hence an influence area covering 5 km radius has been considered for each terminal on the waterside; and similar area has also been considered on the landside to accommodate impacts associated with the access roads and port related developments. For landing stations and other proposed developments in Component 3, where the expected impacts are mostly related to project footprints, an influence area covering one kilometer radius can be considered. Whilst the influence area of the overall Project is defined as areas that are likely to be directly or indirectly affected by the proposed dredging and construction activities. This includes but is not limited to what extent the project would impact floodplain areas, hydrology, morphology, and the project footprints. The influence area covers the entire river reach between the Project routes and extending one kilometer on each side of the river bank. In the estuarine areas, a wider influence area of 3 to 6 km has been considered due to large tidal zone.

4.1.2 Climate

The climate of Bangladesh is sub-tropical with three seasons; namely summer from March to May, monsoon from June to October, and winter season from November to February. The maximum temperature at Dhaka varies from 21.8°C to 42.3°C and in Sandwip from 23.3°C to 39.3°C. Maximum temperature occurs in the month of April and minimum temperature in January. Monthly minimum temperature ranges from 6.4°C to 30.3° at Dhaka and in Sandwip 7.4°C to 30.6°.

Mean annual rainfall in this region is about 2100mm at Dhaka and 3480mm at Sandwip over a period of 40 years. About 75 to 80 percent of annual rainfall occurs during June to October.

The wind regime in the Lower Meghna shows seasonal variation between the dry season (November to May) and the monsoon season (June to October). During the dry season the prevailing winds are calm. In the monsoon season the prevailing winds are from South-Southeast direction with an average speed of about 3-7.6 knot in the Meghna estuary. The maximum wind speed can be in the range of 32-99 knot.

4.2 Physiography

The proposed terminals and landing stations are located on the floodplains of the Ganges-Jamuna-Meghan River system, which is highly dynamic nature and is dominated by characteristics of the braided and meandering channels, chars (shoals) and alluvial floodplains. The flood plain areas extensively cultivated and also densely populated.

Shashangaht and Pangaon terminals are located on Buriganga River, which is fed by distributaries of the Jamuna River. Narayanganj terminal is located on Shitalakya River. Ashuganj terminal is located in Upper Meghna River. Chandpur is located on Lower Meghna River at the confluence of Padma (combined flow of Ganges and Jamuna) and Dakatia River. Barisal terminal is located on Kirtanakhola River, a distributary of the Lower Meghna River. River systems in Bangladesh exhibits high seasonality over a year i.e. abundant of water during monsoon and scarcity of water during dry season from December to May. Navigability becomes very critical during dry season in many river routes and ferry crossing because of siltation and inadequate water flow.

The Lower Meghna is characterized by high sediment flows and carries annually about 110 billion tons of sediments. Most of the sediments will come from the Ganges and Jamuna rivers. The river bed sediments in Lower Meghan are mainly silt with average median particle diameter is less ant 0.063m. The major part of bed sediment consists of a mixture of (very)

fine sand, silt and mud. The particles of silt and clay are carried by current, mainly as suspended material. While in the Upper Meghna the bed sediments are sand with average median particle diameter of about 0.14mm (sand).

The Lower Meghna also forms an estuarine with the Bay of Bengal and subjected to daily tidal fluctuations. The estuarine is highly dynamic with constant erosion and accretion process. The accretion and erosion pattern of the Lower Meghan during the period 1973 to 2000 is shown Figure 4.1 to demonstrate the dynamic behavior the estuary and changes in plan-form and channel system. About 50,800 ha of net land gain is noticed in the Meghna Estuary system as a whole during this period.

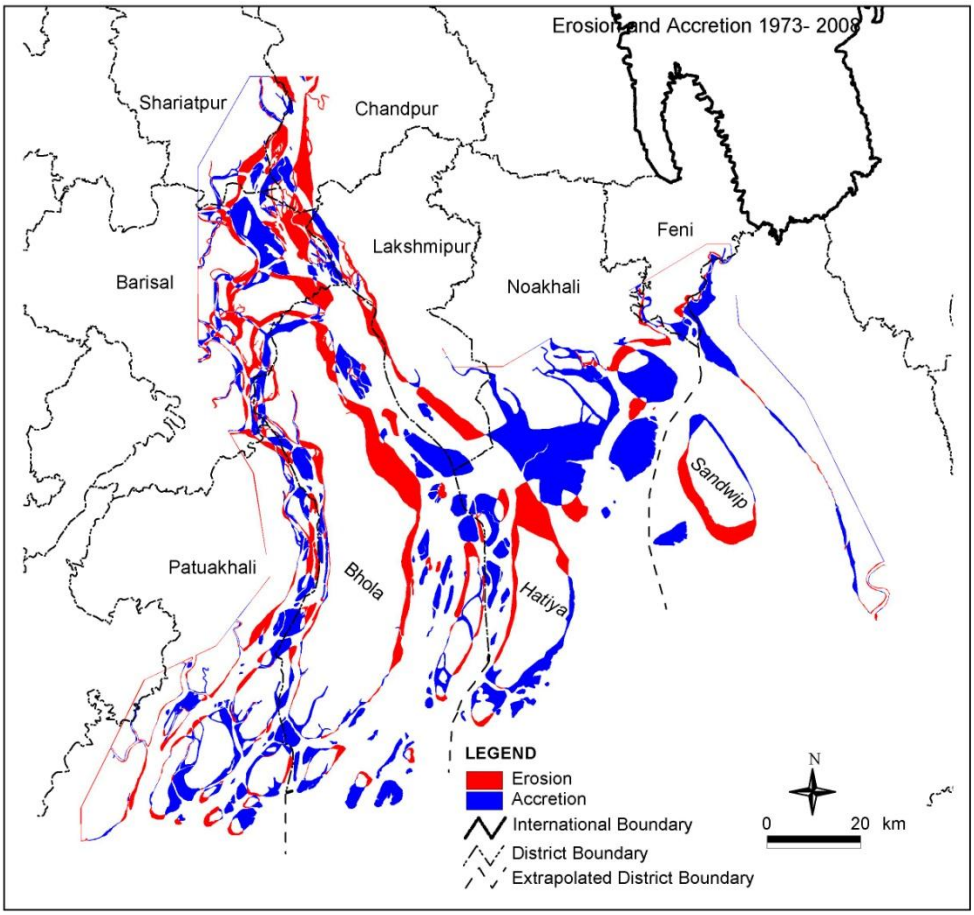


Figure 4.1: Accretion and erosion in the Meghna Estuary from 1973 to 2000

4.3 Hydrology

4.3.1 Buriganga River

Buriganga and other rivers surrounding Dhaka city receives water mainly from the Jamuna/Brahmaputra river including its floodplain flow during monsoon. The headwaters of the Buriganga river have been gradually reducing during the past few decades due to siltation and channel shifting. During dry period, the off-take is fully cut-off due to huge sedimentation and the tidal water from Meghna River enters into the river systems. This river is economically very important to Dhaka. Launches and country boats provide connection to other parts of Bangladesh.

The mean monthly flows of Buriganga during the period 1996 to 2012 is shown in Figure 4.2. The maximum flow is 2630 m^3/s and the minimum flow is 110 m^3/s. The average depth of the river 7.6 m and its maximum depth is 18 m.

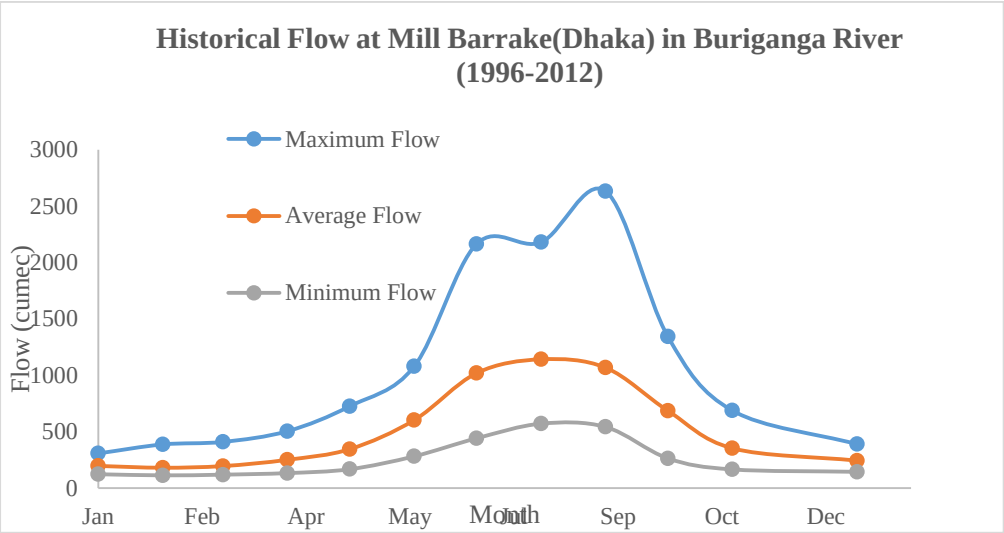


Figure 4.2: Monthly flow hydrograph of Buriganga river at Mill Barrake

4.3.2 Shitalakhya River

The Shitalakya River is a distributary of the Jamuna/Brahmaputra River. The Shitalakhya flows along the eastern side of Dhaka and Narayanganj districts and falls into the river Dhaleswari near Madanganj of Narayanganj.

The water flow varies from 40m^3/s to 540m^3/s over a year. During dry season the water flow/discharge is very low. The monthly average flow varies from 65m^3/s to 75 m^3/s during the period from January to March causing low river water level that results in inadequate navigation depth. The monthly maximum, minimum and average flows of Shitalakhya are presented in the Figure 4.3.

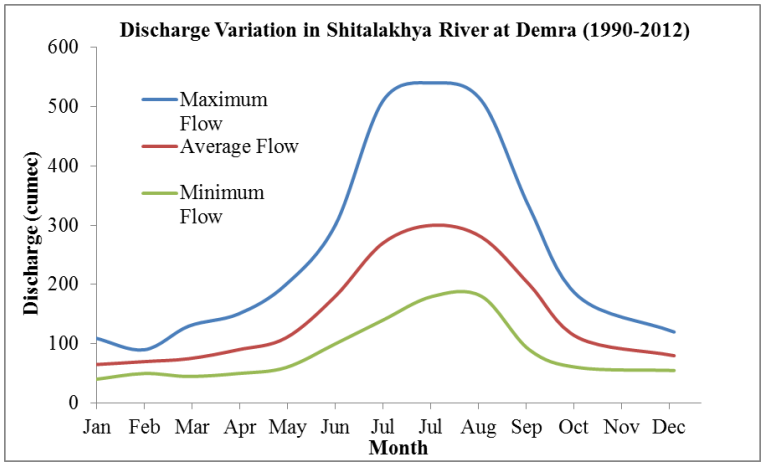


Figure 4.3: Monthly flow hydrographs of Shitalakhya river at Demra

4.3.3 Upper Meghna River

The Upper Meghna carries the combined flow of the Surma and the Kusiyara Rivers which originate in the Indian hills northeast of Bangladesh. The Upper Meghna River is joined by the Old Brahmaputra at Bhairab Bazar and by the Dhaleswari (and another distributary from the Jamuna system) at Munshiganj.

The monthly maximum, minimum and average flows of Upper Meghan are presented in the Figure 4.4 The maximum flow is about 16203m3/s and occurs during July to August. The river discharge

falls significantly during dry season and becomes about 800m3/s resulting in very low water level as well as navigation depth.

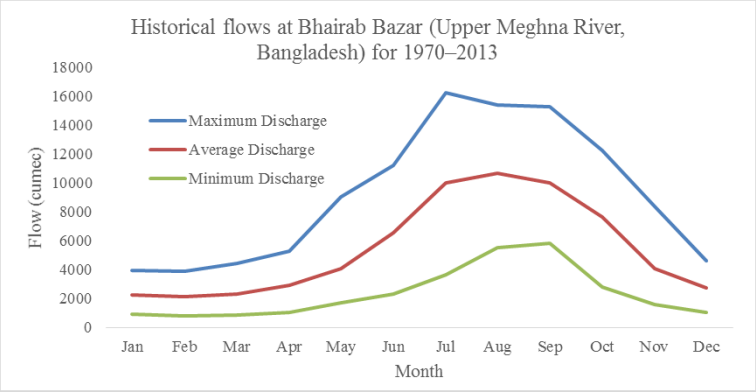


Figure 4.4: Monthly flow hydrograph of Upper Meghna river at Bhairab Bazar

4.3.4 Lower Meghna River

The Lower Meghna River conveys the combined flow of Ganges, Brahmaputra and Upper Meghna rivers. Again the combined flow of Ganges and Brahmaputra is known as the Padma river flow, which meets at Lower Meghna river at Chandpur. The discharge of the Padma and Upper Meghna rivers characterize the water flow of the Lower Meghna river. Long-term record of discharge is not available at Chandpur since it is not a routine discharge gauging station of BIWTA. Hence, discharge characteristics of the Padma river is used to characterize the water flow Lower Meghna river. The monthly mean discharge of the Padma river varies from 5800m3/s in the month of February to 72,000m3/s in August (Source: BWDB time series discharge data) at Baruria. The average monthly minimum flow in the Padma river is 3700m3/s in February and 33400 m3/s in August (Figure 4.5).

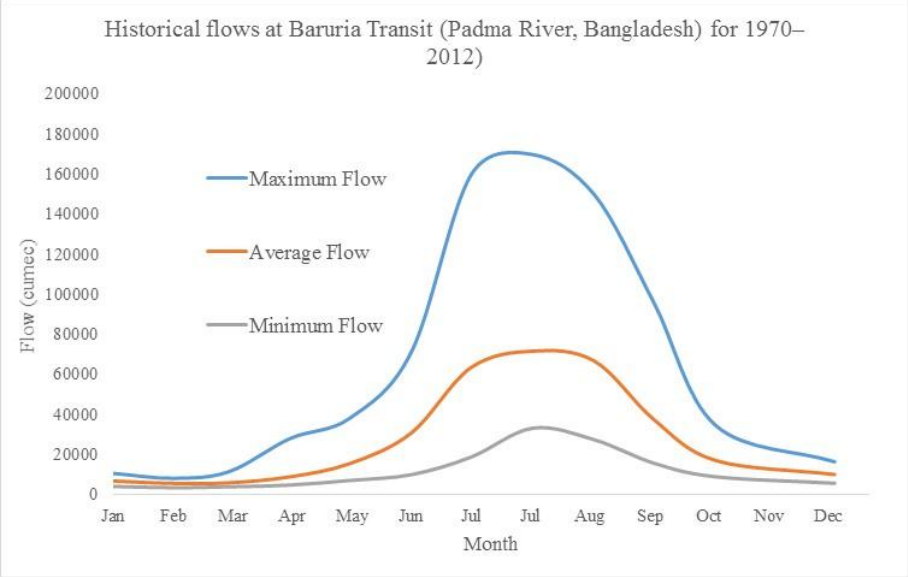


Figure 4.5: Monthly flow hydrograph of Lower Meghna (measured at Padma near Baruria)

4.3.5 Tide

Tides in the Bay of Bengal are semi-diurnal in nature, exhibiting two high waters and two low waters per day. In the western part of the coastal area of Bangladesh the average tidal range is approximately 1.5 m. In the coastal area around Sandwip, the tidal range is about 6.6 m. The tidal range is less than 1 m near Chandpur.

4.3.6 Wave

The influence of the wind induced waves in the Lower Meghna estuary is limited to the shallow nearshore zone and inter tidal area. Wave climate in the Meghna estuary is rather mild due to limited depth. Wave model indicates that under the South-southeast wind, the average significant wave height varies between 0.6-1.5m in the nearshore zone to 0.1-0.6m in the landward part. In the dry season the wave is generally less than 0.6m with peak wave period of 3-4seconds. During monsoon season wave heights exceed greater 2m with periods more than 6 seconds.

4.3.7 Cyclones

Cyclones pose a threat to inland water transport, lives and property in low-lying coastal regions in Bangladesh. Cyclonic storms, occasionally of severe intensity, can occur in the months of March-May and October-November, accompanied by storm surges, high winds and intense rainfall. While the loss of life during these cyclones is being progressively reduced by means of improved storm warnings and continuing construction of cyclone shelters, the damages to property, livestock, crops and livelihoods continue to take their toll. Major tropical cyclonic disasters in 1970 and 1991 were estimated to have killed an estimated 300,000and 140,000 people respectively. The other major cyclones were recorded in May 1985, November 1988, April 1991 in May 1997, November, 2007 and in May, 2009. During cyclones about 1.5 to 9 m height of storm surges were noticed.

4.3.8 Geology

Geologically the proposed terminals and landing stations are underlain by alluvial and deltaic deposits borne by the river systems of the Ganges, the Brahmaputra and the Meghna. Coastal deposits are limited to narrow-strip zone along the western age of Chittagong and Cox Bazar districts.

Bangladesh is situated in a seismically active region of the world. The seismic zoning map of Bangladesh proposed by Geological Survey of Bangladesh and incorporated in the Bangladesh National Building Code the project influence area lies within Zone I which corresponds to high risk to earthquakes.

4.4 Chemical Environment

4.4.1 Water Quality

Water quality data of the Project Rivers (sampling was carried out during September and October of 2015) are given in Table 4.1. Locations of sampling sites are given in Figure 4.6.. The total dissolved solids in all the rivers vary from 50 to 140 mg/l. Close to the coastal area of Sandwip, the total dissolved solids are 646 mg/l. Turbidity in Lower Meghna varies from 337 to 970 NTU. The Buriganga River near Dhaka, which was subjected to historic pollution from Dhaka city, shows a TDS of 90 mg/l, dissolved oxygen of 3.66 mg/l and biological oxygen demand of 7.65 mg/l. According to a secondary data on water quality of Buriganga during dry season (March and April) of 2004 showed BOD levels of 30 to 50 mg/l. The water quality in Lower Meghna exhibits seasonality due to tidal fluctuations and the salinity, in terms of TDS, varies from 100 to 4,000 mg/l.

River water salinity in coastal Bangladesh depends on the volume of freshwater discharges from the upstream river systems, the salinity of the Bay of Bengal near the coast, and the circulation pattern of the coastal waters induced by the ocean currents and the tidal propagation to the river systems. Average salinity concentrations of the rivers in the coastal area are higher in the dry season than in the monsoon because of lack of freshwater flow from upstream. Salinity level generally increases almost linearly from October to late May with the gradual reduction in the freshwater flow from the upstream. The salinity variation during high flow and low flow season in Chandpur is insignificant. At Ilisha ghat near the coastal area, the river water salinity for most of the year is generally less than 100 mg/l, but the salinity level is increased to 4000 mg/l during March and April.

Table 4.1: Surface Water Quality of Rivers in Project Area

Parameter	Unit	Sampling ID											
		SW1	SW2	SW3	SW4	SW5	SW6	SW7	SW8	SW9	SW10	SW11	SW12
pH	-	7.1	7.3	6.99	7.12	7.02	6.95	7.6	7.48	6.94	7.42	7.36	7.55
Temp	°C	25.2	24.7	25.1	25.1	25.2	25.1	24.8	25.2	24.8	25.3	25.2	25.2
Turbidity	NTU	337	14.9	32.7	8.06	9.6	5.32	905	110	88.5	165	90.1	98
EC	µS/cm	171	68.2	148	54.2	57.5	150	1193	128	147	151	139	132
DO	mg/L	6.12	5.3	5.09	5.89	5.61	3.66	5.05	5.1	5.12	5.2	5.29	0.89
BOD_5	mg/L	1.11	0.95	1.11	1.12	1.58	7.65	2.98	2.98	2.04	2.08	2.09	58.3
TOC	mg/L	10	6.54	1.28	<0.5	<0.5	0.67	8.04	7.83	7.28	14.7	7.43	1.24
TDS	mg/L	89.2	56	78.8	68.4	50.4	90	646	102	143	117	92.4	107
TSS	mg/L	391	9.6	91	153	53	22.8	953	110	202	301	327	109
Ca	mg/L	23.1	6.63	16	4.88	4.85	16.7	45.8	16.4	17.1	18.5	22.6	15.6
Mg	mg/L	10.6	2.3	4.42	2.08	2.26	4.46	38.7	4.66	5.47	6.6	7.44	4.47
Na	mg/L	5.9	3.06	5.23	3.19	3.33	5.9	130	4.48	4.8	4.4	4.2	4.4
K	mg/L	3	1.21	2.73	1.04	1.1	2.46	7.88	2.09	2.33	2.41	2.33	2.3
Cl^-	mg/L	1.63	6.57	1.84	1.06	1.18	1.98	459	1.93	1.58	1.41	1.33	1.35
F	mg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Br	mg/L	2.42	1.54	3.07	1.07	1.17	4.02	<1.0	1.81	<1.0	<1.0	1.12	<1.0
SO_4	mg/L	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0
NO_3	mg/L	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
Total PO_4	mg/L	11.4	<0.2	<0.2	<0.2	<0.2	0.58	29.7	3.15	1.33	1.32	1.17	0.77

Source: Field survey, September- October 2015, Cells in grey color shed indicate the exceedance the limit of DOE standard, SW1- Harinaghat, Chandpur, SW2- Gozaria, Munshiganj, SW3- Boktabali Ferryghat, Narayanganj, SW4- Araihazar, Narayanganj, SW5- Ashuganj, SW6- Sadarghat, Dhaka, SW7- Near Vasan Char (Chukkhalighat, Sandwip), SW8- Near Chairman Ghat (Noakhali), SW9- Near Beduria Launch Ghat (Sripurdwip, Barisal), SW10- Near Hizla (Mehendiganj, Kaliganj) SW11- Near Ilisha Ghat (Tulatali Bazar, Bhola), SW12- Near Dawlatkhan Launchghat (Vabanipur Lanchghat)

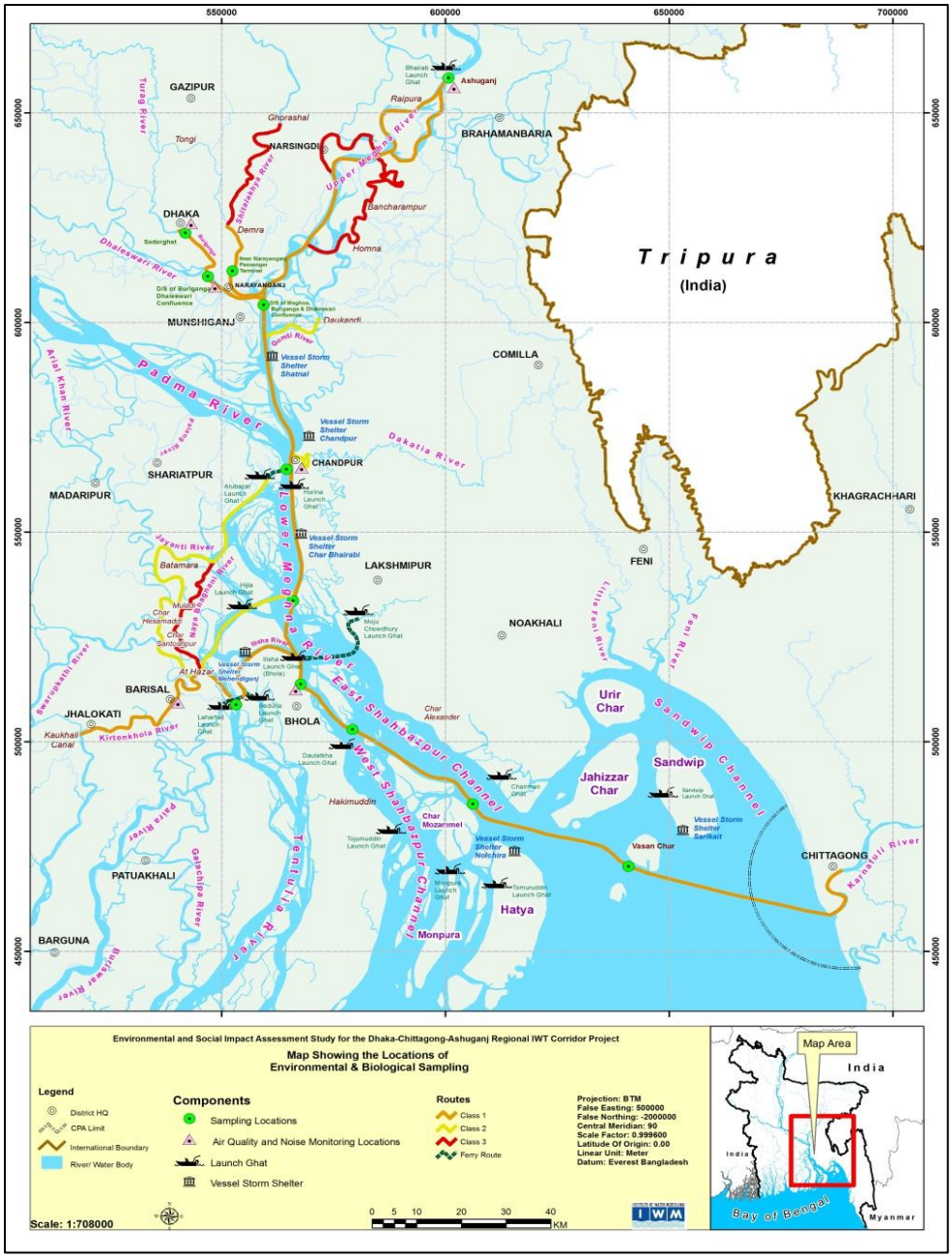


Figure 4.6: Locations of sampling points

4.4.2 River Bed Sediment Quality

Riverbed materials were analyzed at twelve locations and compared with OSPAR guidelines (Oslo/Paris convention for the Protection of the Marine Environment of the North-East Atlantic). The test results have shown all twelve samples are within the acceptable limit of OSPAR guidelines. No pollutants such as PCBs, POPs and hydrocarbons were identified in the sediments. The arsenic concentration in the sediment varies from 0.3 to 1.65 ppm (the standard is 30 to 80 ppm), cadmium varies from 0.11 to 0.24 ppm (the standard is 1 to 2 ppm), the chromium varies from 7 to 32 ppm (the standard is 150 to 200 ppm) and the zinc varies from 6 to 72 ppm (the standard is 250 to 500 ppm). The river bed sediment quality data is given in Table 4.2.

Table 4.2: Riverbed Sediment Quality of the Project Rivers

Parameter	Unit	Sampling ID												OSPAR*
		RBS1	RBS2	RBS3	RBS4	RBS5	RBS6	RBS7	RBS8	RBS9	RBS10	RBS11	RBS12	
Salinity	%	0.021	0.012	0.06	0.013	0.014	0.051	0.07	0.072	0.01	0.02	0.011	0.021	-
Total Mg	%	0.295	0.423	0.852	0.719	0.379	0.163	-	-	-	-	-	-	-
Total Ca	%	0.179	0.068	0.088	0.085	0.084	0.094	-	-	-	-	-	-	-
Total Na	%	0.01	0.012	0.028	0.022	0.018	0.011	-	-	-	-	-	-	-
Total K	%	0.099	0.204	0.612	0.599	0.414	0.093	-	-	-	-	-	-	-
Total Organic Carbon (TOC)	%	0.223	0.428	0.459	0.536	1.172	0.37	0.222	0.377	0.59	0.53	0.07	0.4	-
Total PO_4^{3-}	%	0.232	0.246	0.482	0.474	0.321	0.205	0.307	0.076	0.051	0.015	0.035	0.026	-
Total NO_3	ppm	8	37.96	36.28	33.89	10.63	34.2	8.87	6.85	6.14	4.3	1.44	4.72	-
Total As	ppm	0.34	0.31	1.32	0.7	1.65	0.38	0.79	1.24	0.67	0.75	0.3	1.81	30-80
Total Cd	ppm	0.13	0.12	0.1	0.21	0.11	0.11	0.24	0.17	0.18	0.14	0.11	0.1	1.0-2.5
Total Hg	ppm	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.6-1.0
Total Pb	ppm	0.12	4.56	10.25	8.14	8.36	14.63	0.52	0.57	0.112	0.124	0.113	0.11	100-120
Total Cr	ppm	11.38	24.87	45.02	39.35	32.9	10.56	27.36	42.04	21.25	11.45	7.49	9.73	150-200
Total Zn	ppm	12.16	34.95	85.68	72.27	64.05	39.84	28.53	59.07	24.99	12.46	6.04	16.15	250-500
Total Ni	ppm	56.19	56.84	79.66	51.86	33.83	82.26	8.48	28.54	10.27	2.89	2.55	6.62	50-100

Source: Field survey, September- October 2015, BDL- Below Detection Limit (Detection Limit: Hg = 5.0 ppb), *OSPAR Oslo/Paris convention (for the Protection of the Marine Environment of the North-East Atlantic), RBS1- Harinaghat, Chandpur, RBS2- Gozaria, Munshiganj, RBS3- Boktabali Ferryghat, Narayanganj, RBS4- Araihazar, Narayanganj, RBS5- Ashuganj, RBS6- Sadarghat, Dhaka, RBS7- Near Vasan Char (Chukkhalighat, Sandwip), RBS8- Near Chairman Ghat (Noakhali), RBS9- Near Beduria Launch Ghat (Sripurdwip, Barisal), RBS10- Near Hizla (Mehendiganj, Kaliganj) RBS11- Near Ilisha Ghat (Tulatali Bazar, Bhola), RBS12- Near Dawlatkhan Launchghat (Vabanipur Lanchghat)

4.4.3 Groundwater Quality

In general, the groundwater is suitable for drinking purposes with TDS ranging from 198 to 841 mg/l. At one location near Chairman Ghat, Noakhali high TDS concentration of 3,398 mg/l is recorded. It is also noticed that iron (ranges from 0.3 to 3.24 mg/l) and manganese (ranges from 0.07 to 2.60 mg/L) have exceeded national and WHO standards in most samples (0.3 mg/l for iron and 0.4 mg/l for manganese). The groundwater quality in the project area is shown in Table 4.3.

Table 4.3: Groundwater Quality in the Project Area

Parameter	Unit	Sampling ID												DOE Standard for Drinking Water
		GW1	GW2	GW3	GW4	GW5	GW6	GW 7	GW 8	GW 9	GW 10	GW 11	GW 12	
pH	-	6.82	6.85	4.7	6.52	6.55	6.65	7.85	6.98	7.38	7.92	7.52	7.5	6.5 – 8.5
Temp	°C	24.8	25.3	25.1	24.8	25.3	24.8	24.7	25.1	25.2	24.8	25.1	25.1	20 - 30
EC	µS/cm	425	802	907	1062	324	987	552	6500	1432	829	730	539	-
TDS	mg/L	254	461	841	620	198	622	339	3398	736	450	395	309	1000
Ca	mg/L	38.4	29.4	97.2	151	19.8	101	51.4	181	44.7	5.55	21.9	19.3	75
Mg	mg/L	19.5	21.2	14.6	54.9	16.5	28.8	1.34	74.9	17.9	2	13	12.7	30 – 35
Na	mg/L	38.6	113	93.6	29.2	19.9	53.1	107	767	200	170	120	75	200
K	mg/L	4.26	2.46	25.7	5.76	3.71	5.49	1.36	20.9	5.42	1.66	4.21	4.37	12
Cl^-	mg/L	6.94	111	86.9	11.6	15.1	116	18.2	1766	169	58.6	44.4	17.5	150 – 600
F	mg/L	<0.5	<0.5	29.8	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1
Br	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-
SO_4	mg/L	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	400
As	mg/L	<0.005	<0.005	0.369	0.04	0.03	<0.005	<0.005	0.02	<0.005	<0.005	<0.005	<0.005	0.05
Fe	mg/L	1.34	1.19	3.14	1.31	24.7	0.35	0.63	3.24	0.42	0.3	0.98	1.02	0.3 – 1.0
Mn	mg/L	0.07	0.07	2.57	2.6	1.73	0.5	<0.05	2.1	0.08	<0.05	0.05	<0.05	0.1

Source: Field survey, September- October 2015, Cells in grey color shed indicate the exceedance the limit of DOE drinking water standard, GW1- Harinaghat, Chandpur, GW2- Gozaria, Munshiganj, GW3- Boktabali Ferryghat, Narayanganj, GW4- Araihazar, Narayanganj, GW5- Ashuganj, GW6- Sadarghat, Dhaka, GW7- Near Vasan Char (Chukkhalighat, Sandwip), GW8- Near Chairman Ghat (Noakhali), GW9- Near Beduria Launch Ghat

(Sripurdwip, Barisal), GW10- Near Hizla (Mehendiganj, Kaliganj) GW11- Near Ilisha Ghat (Tulatali Bazar, Bhola), GW12- Near Dawlatkhan Launchghat (Vabanipur Lanchghat)

4.4.4 Air Quality

Air quality measurements carried out during 2 to 14 October 2015 in six locations of the Project are given in Table 4.4 along with national and World Bank group EHS standards. Particulate matter in air quality exceeds the standards set by EHS guidelines at all the locations.

Table 4.4: Ambient Air Quality Parameters in Project Area (in µg/m^3)

Location / Parameter	AA Q1	AAQ2	AAQ3	AAQ4	AAQ5	AAQ6	Air Quality Standards	
							DOE	WBG EHS
Carbon Monoxide (CO)	510.77	1016.25	254.14	319.08	802.77	421.25	10,000 (8 hour)	-
Nitric Oxide (NO)	20.61	31.84	12.51	18.22	27.76	19.07	100	40
Nitrogen dioxide (NO_2)	18.34	20.15	9.79	15.51	19.32	16.56	(Annual)	(Annual)
Sulphur dioxide (SO_2)	16.98	23.67	11.62	15.18	20.07	16.01	365 (24 hour)	20 (24 hour)
Ozone (O_3)	11.37	15.89	8.44	10.32	14.37	12.61	157 (8 hour)	100 (8 hour)
Particulate Matter (PM_{10})	89.21	127.18	49.67	83.11	95.83	87.22	150 (24 hour)	50 (24 hour)
Particulate Matter ($PM_{2.5}$)	41.41	54.33	21.84	28.56	46.17	37.58	65 (24 hour)	25 (24 hour)
Temperature	32.69	30.83	26.71	27.7	26.34	30.43	-	-
Humidity	55.01	57.82	62.56	69.91	67.48	57.88	-	-

Source: Field survey, October 2015, AAQ1-Ashuganj, Brahmanbaria, AAQ2- Sadarghat Launch Terminal, Dhaka, AAQ3- Char Shreepur, Barisal, AAQ4- Dhunia, Bhola, AAQ5- Chandpur Launch Terminal, AAQ6- Gozaria Launch Terminal, Munshiganj,

4.5 Biological Environment

4.5.1 General Ecosystem and Biodiversity

The ecosystems of Bangladesh could be categorized into two major groups, *i.e*. (i) terrestrial, and (ii) aquatic. The land-based terrestrial ecosystems include forest and hill ecosystems, agro-ecosystems and homestead ecosystems; while seasonal and perennial wetlands, rivers, lakes, coastal mangroves, coastal mudflats and chars, and marine ecosystems fall into the aquatic category. Each of the ecosystems has many sub-units with distinct characteristics as well. Bangladesh is classified into 25 bio-ecological zones (Figure 4.7). The description of ecosystem and key species in these ecosystems are described below

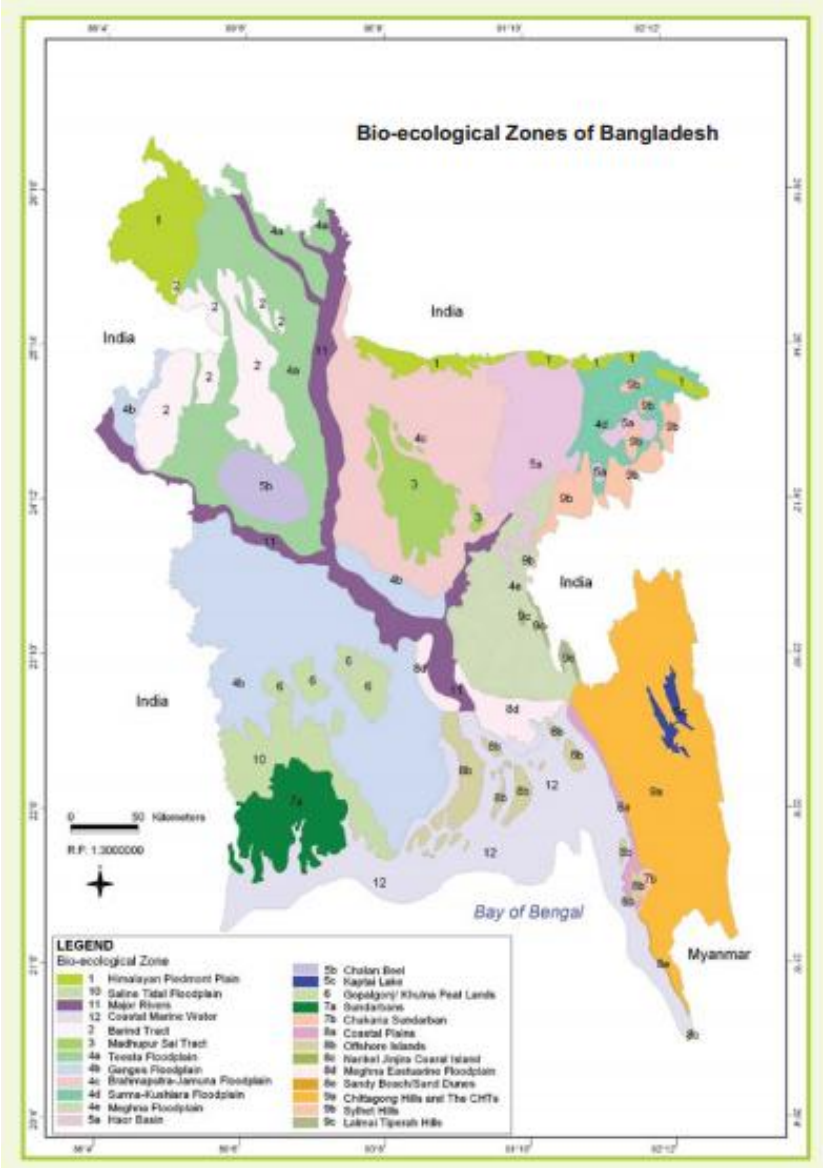


Figure 4.7: Bio-ecological zones of Bangladesh (Source: IUCN 2002)

4.5.2 Upper Meghna Habitat

The Upper Meghna and its flood Plain is a dominant freshwater environment inhabited by freshwater plant and animal species. The floodplain comprises a nutrient rich freshwater ecosystem supporting high fish production, and many aquatic species some of which are now endangered. Native waterfowl and migratory birds, freshwater turtles and other reptiles and amphibians depended on this system, and the area was rich in biodiversity.

The Gangetic Dolphin (*Platanista gangetica*) or 'shishu/shushuk' (in Bangla) is found in most of the areas of the Ganges-Brahmaputra-Meghna river system including Nepal, India and Bangladesh. This species is rated as 'Endangered' by the International Union for Conservation of Nature (IUCN) Red List (2010) with the wild populations decreasing drastically within the range countries.

4.5.3 Lower Meghna Habitat

The Lower Meghna River conveys the combined flows of the Brahmaputra, the Ganges and the upper Meghna rivers and the discharge into the Meghna estuary. The Lower Meghna supports wide variety of habitat for hilsa spawning, dolphins, migratory birds and freshwater and sea water turtles. The key habitats and species of Lower Meghna are described below:

- **Gangetic Dolphin/Irrawady Dolphin**. The Lower Meghna supports both the Ganges Dolphin and Irrawady Dolphin. However their distribution is marked by the salinity depending on seasonal freshwater discharge. The ecological boundary follows salinity and turbidity gradients.
- **Sea Turtles.** The coastal waters and the Bay of Bengal support five species of sea turtles – Olive Ridley turtle (Lepidochelys olivacea), Green Turtle (Chelonia mydas), Hawksbill Turtle (Eretmochelys imbricate), Loggerhead Turtle (Caretta caretta) and leatherback (Dermichelys coraicea).
- **Freshwater Turtles**. Three freshwater turtle species have been recorded in the Lower Meghna estuary. The Northern River Terrapin *Batagur baska* forages in the Lower Meghna Estuary and the Sundarban. Bangladesh is the last stronghold for this species as natural population of this species has been extirpated from the other range countries – Myanmar and India. Other freshwater species are: Narrow-headed Freshwater Turtle (*Chitra indica*), and Asian Giant Turtle (*Pelochelys cantorii*).
- **Duars/Kums**: Duars/Kums are the locally called deepest points of the river system usually formed at the river bends which support large fish and dolphin habitats.
- **Mangroves**. Mangroves are the nursery for various fish species and provide natural barrier against storm/tidal surges.
- **Hilsa spawning**: The lower Meghan river from Chandpur provides habitat for hilsa spawning and breeding. Department of Fisheries (DOF) has earmarked sanctuaries for hilsa in the Lower Meghna and associated rivers.
- **Migratory bird habitats**. Mudflats and chars will provide habitat for both resident and migratory birds. Huge congregations of migratory winter birds can be seen during November-March. Winter birds from the Himalayas, Central Asian highlands and faraway places like Siberia move to relatively warm swampy lands in Bangladesh including the project influence area to escape the freezing cold, and feed on various animal and plant food that are abundant in the mudflats, sandflats, rice fields and other areas. A total of about 98 species of shorebirds has so far been recorded from the coasts. Important sites at the central coasts are Nijhum Dweep, Char Bahauddin, Dhal Char, Char Jonak, Char Nogila, Patar Char and Kalkeniy Char and many more. Highest number of birds arrived in the central coasts are belongs to wetlands birdswaders (50000) gulls, terns and egrets (80,000), ducks and geese (50000). The important threatened species are Masked Finfoot (Heliopais personata; not in the project area), Indian Skimmer (Rhynchops albicollis), Black-headed Ibis (Treskeornis melanocephala), Greater Adjutant (Leptoptilos dubius), Lesser Adjutant (L. Javanicus), Baikal Teal (Anas formosa), Baer's Pochard (Aythya baeri), Ferruginous Pochard (Aythya ferina), Wood snipe (Gallinago nemoricola), Norman's Greenshank (Tringa guttifer), Spoon-billed Sandpiper (Eurynorynchus pygmeus)..

4.5.4 Protected Areas

Hilsa Sanctuaries

Hilsa is a major cash crop of Bangladesh and the hilsa fishery contributes to about 1% of the national GDP. In order to protect the hilsa fishery the government under the Protection and Conservation of Fish Rules 1985 (SRO No. 301 Law/2011 dated 29 September 2011) declared the following areas as hilsa fish sanctuary areas Figure 4.8. The Chandpur terminal and landing stations along Lower Meghna falls in to these sanctuaries. Fishing of hilsa is banned during in these sanctuaries. List of Hilsa fish sanctuaries and fishing ban period as notified by the government under the Protection and Conservation of Fish Rules 1985 is mentioned in Table **4.5.**

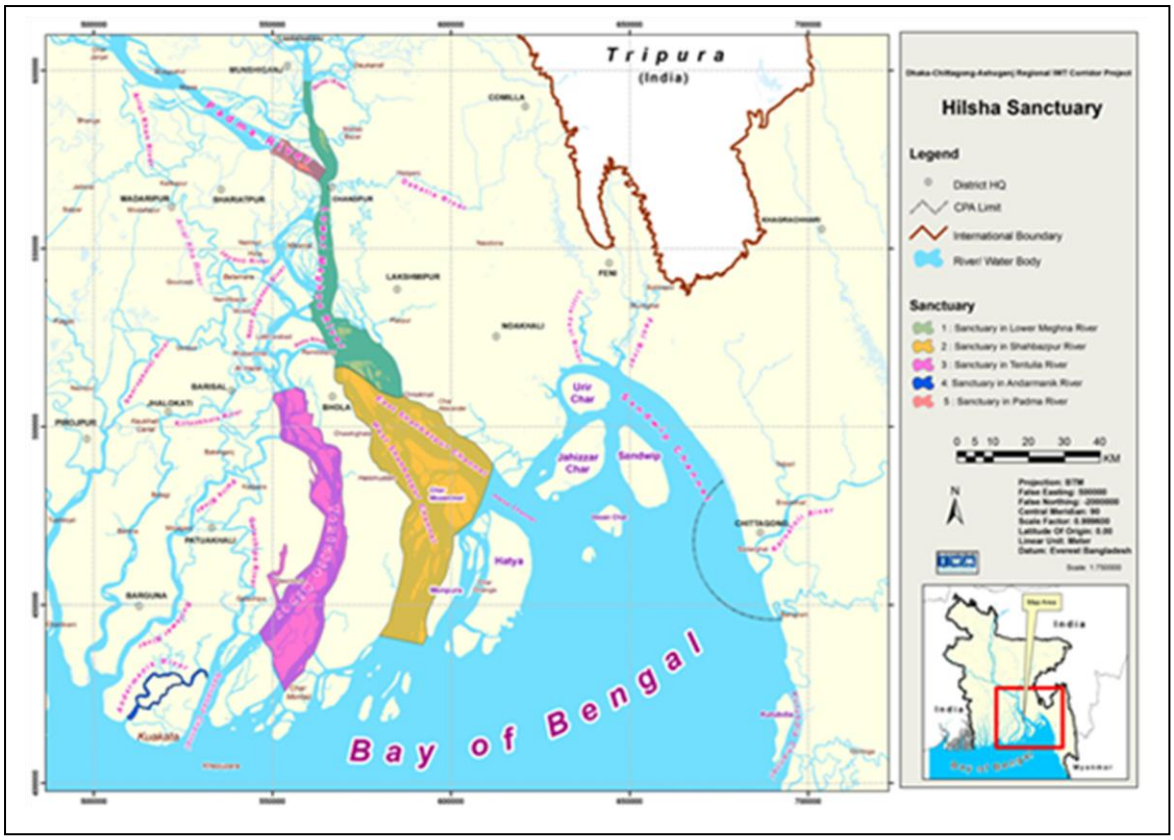


Figure 4.8: Hilsa sanctuaries declared by the government.

Table 4.5: Hilsa fish sanctuaries and fishing ban period

Hilsha Fish Sanctuary Area	Boundary Point	Period Fishing banned
From Shatnol of Chandpur to Char Alexander of Laxmipur (100km stretch of Lower Meghna)	Shatnol Point (90^{O}37.12'E and 23^{O} 28.19'N); Char Alexander Point (90^{O}49.30'E and 22^{O} 40.92'N)	From March to April of each year
Char Ilisha to Char Pial of Bhola District (90km stretch of Shahbazpur Channel, a tributary of Meghna River)	Char Ilisha Mosque Point (90^{O}38.85'E and 22^{O} 47.30'N); Char Pial Point (90^{O}44.81'E and 22^{O} 05.10'N)	From March to April each year
Bheduria of Bhola district to Char Rustam of Patuakhali (100km stretch of Tentulia River)	Bheduria Ferry Ghat Mosque Point (90° 33.89'E and 22° 42.31'N) Mandol Bazaar (Char Rustam) (90° 31.40'E and 21° 56.32'N)	From March to April each year
Whole 40km stretch of Andermanik River in Kalapara Upazila of Patuakhali District	Golbunia Point (90° 19.20'E and 21° 57.68'N) Confluence of Bay of Bengal and Andermanik River (90° 3.91'E and 21° 49.43'N)	From November to January each year
20 km stretch of Lower Padma between Naria-Bhedorganj Upazila of Shariatpur in the north and Matlab Upazilla of Chandpur and Bhedorganj Upazilla of Shariatpur in the south	Kachikata Point of Bhedorganj UZ of Shariatpur district in the northeast (90^{O}32.60'E and 23^{O} 19.80'N) Bhomkara Point of Naria UZ of Shariatpur District in the	From March to April each year

Hilsha Fish Sanctuary Area	Boundary Point	Period Fishing banned
	northwest (90^{O}28.80'E and 23^{O} 18.40'N) Beparipara Point of Matlab UZ of Chandpur District in the southeast (90^{O}37.70'E and 23^{O} 15.90'N) Tarabunia Point of Bhedorganj UZ of Shariatpur District in the southwest (90^{O}35.10'E and 23^{O} 13.50'N)	

Ecologically Critical Areas

The rivers surrounding the capital Dhaka including the Buriganga and Sitalakhya are declared as Ecologically Critical Areas (ECA) in 2009 by the GOB because of tremendous pressure on these rivers by rapid industrialization and urbanization. Under Article 5 (2) of the Environment Act 1995, the following activities are prohibited in ECAs:

- Cutting natural forests and trees or harvest
- All kinds of hunting and killing of wildlife
- All kinds of activities harmful for habitats of fauna and flora
- Activities those can damage/alter natural characteristics of land and water
- Establishment of industries those pollute soil, water and air
- Any other activities harmful for fishes and other aquatic fauna

The proposed Shashanghat passenger terminal and Pangaon cargo terminal are located on the Buriganga River, and Narayanganj terminal is located on Sitalakhya River. A meeting was held between BIWTA and the Department of Environment (DOE) to understand the implication of the above act on the proposed terminals. DOE has clarified that Port development and related activities are permitted in the Buriganga and Sitalakhya rivers, and adequate mitigation measures are to be provided in the proposed EISA to address impacts associated with various waste streams such as waste water discharges and solid waste; and water, air and soil pollution. These impacts are considered in the present EMF.

5 Screening of Potential Impacts and Mitigation Measures

Potential environmental issues in construction and operation of passenger and cargo terminals generally include dredging and dredge material management, air emissions, noise impacts, solid and liquid wastes, river water and sediment quality, floodplain and river habitats. The general mitigation measures and best management practices to address the construction related impacts are given in Annex 4 Environmental Code of Practices (ECoPs) which are prepared based on World Bank General EHS guidelines and experiences from other projects in Bangladesh. By inclusion by these ECoPs in general specifications of contractors bidding documents, most of the construction related impacts can be mitigated.

A screening checklist was used to evaluate the potential environmental impacts of the proposed activities. The screening matrix for the river terminals is given in Annex 7 and for landing stations is given in Annex 8, along with pictures of the sites visited in Annexes 5 and 6. Based on the outcome of these screening matrices, key environmental issues that are to be managed during planning, construction and operation of terminals and landing stations are described in the following categories and impacts and mitigation measures for each of these categories are discussed in the following subsections.

- Terminal Facilities and Land use planning
- Last mile connectivity
- Air Quality
- Surface Water and sediment quality
- Soil and groundwater quality
- Dredging impacts
- Noise impacts
- Energy and climate change mitigation
- Climate change adaptation
- Habitat and species health
- Public health and safety
- Ship-related Waste Management

5.1 Terminal Facilities and Land Use Planning

The issues with the current terminal facilities are:

- lack of accessibility to the port facilities due to narrow approach roads that remain congested with unplanned and unregulated residential and commercial development surrounding the port areas, and local and port related passenger and cargo movement
- lack of parking areas for the passenger and cargo vehicles and they occupy the access roads to the ports;
- no storage areas for cargo, which are mostly placed in the terminal buildings or on the road side, which are also common sources of congestion and air pollution;
- lack of adequate passenger facilities particularly for women and disabled people such as separate waiting rooms, separate counters, adequate toilet facilities, security and ramps to access the port buildings;
- encroachment of the port facilities by the squatters;
- lack of cargo handling facilities, which is currently done by the head loads and
- Lack of cleanliness at the terminal facilities (e.g. floating debris and uncontrolled dumping).

During the planning and design of the new terminals and augmentation of facilities at existing terminals, the BIWTA and its design and EIA consultants will consider the issues and provide adequate facilities in the terminal designs. As a part of the engineering designs, a long term terminal plan (e.g. for next 20 years as a minimum) should be developed for planning of terminal facilities with adequate buffer areas around the port facilities. Stakeholder consultations need to be

conducted during the planning process. BIWTA will need to coordinate with the relevant government agencies for controlling traffic around the terminal facilities.

5.2 Last mile connectivity

Access roads to the existing terminals are either narrow or not fully developed. The advantages of inland water transport are being compromised by the poor connectivity to the terminal facilities.

During the planning and design of the terminals, the BIWTA will include development of access roads as the part of the terminal designs. In order to improve transport by inland water ways, it is necessary to integrate with it other modes of transport. BIWTA will also coordinate with relevant government institutions for Planning on hinterland transport and multimodal transport to improve the IWT sector in the country and to maximize the benefits from the terminal developments.

5.3 Air Quality

During construction of terminal and landing stations, air pollution may be caused by emissions from construction related traffic and machinery. A lot of dust will be produced by earth works, other machinery, concrete mixing, and traffic from trucks and vehicles. These emissions could deteriorate the ambient air quality and affect public health, densely populated areas and crowded markets being also particularly vulnerable. Dust generated from these activities could also impact crops and livestock.

During operations of terminals and landing stations, the sources of air pollution are the combustion emissions from the vessels. These emissions may not be significant at the landing stations due limited vessel movements, but will be significant at the cargo and passenger terminals. These emissions will mainly be consisting of sulfur dioxide, nitrogen oxides, particulate matter and greenhouse gases such as carbon dioxide and carbon monoxide. Land-based operations of the cargo terminals will also generate emissions from vehicles and equipment. Fuel storage facilities and transfer may also release volatile organic compounds (VOC).

Mitigation

The mitigation measures to address air quality impacts during construction are given in ECoP 10 Air Quality Management. Dust generation will be restricted as much as possible and water sprinkling carried out as appropriate, especially where earthmoving, and excavation are carried out. Emissions from construction equipment and traffic will comply with World Bank EHS guidelines and will be monitored.

During operation emissions from combustion sources, dust from port operations and volatile organic compounds from fuel storages and transfers can be minimized by

- Developing air quality management procedures applicable to ship operators, such as Maintaining emissions of nitrous and sulfur oxides within the limits established by international regulations
- Using low-sulfur fuels in port, if feasible, or as required by international regulations
- Navigation of port access areas at partial power, achieving full power only after leaving the port area
- Avoiding or limiting the practice of blowing soot from tubes or flues on steam boilers while in port or during unfavorable atmospheric conditions
- Keeping transfer equipment (e.g. cranes, forklifts, and trucks) in good working condition
- VOC emissions from fuel storage and transfer activities should be minimized by means of equipment selection, such as the use of floating top storage tanks or vapor recovery systems for fuel storage, loading / offloading, and fueling activities (depending on the type of material to be stored), and adoption of management practices such as limiting or eliminating loading / unloading during poor air quality episodes or implementing tank and piping leak detection and repair programs.

- Dry bulk materials storage and handling facilities should be designed to minimize or control dust emissions, including: storing of loose materials in the closed areas, Installing dust suppression mechanisms (e.g. water spray or covered storage areas), Using vacuum collectors at dust-generating activities; and Regularly sweeping docks and handling areas.

5.4 Surface Water and sediment quality

During the construction phase, bank protection works and instream construction works (dredging related impacts are covered in a separate section) may cause local increase in water turbidity, but this increase unlikely to have a significant impact on overall water quality and aquatic fauna primarily because of its temporary and localized nature. Construction camps, offices and warehouses will generate substantial quantities of waste water. Other possible sources of water contamination include accidental leakage or spillage of fuels, oils, and other chemicals, and waste effluents from workshops and washing bays. Erosion from the construction works and material storage sites also increases the sediment load to the river.

During operation phase, sources of contamination of water and sediment are discharges of untreated waste water from port operations, storm water discharge, discharges of waste, runoff from roads which carries contaminated soil and soot particles; runoff from industrial sites (e.g. storm water runoff); spills (land and water), debris thrown overboard from ships. Spillage, leakage and accidents are significant potential sources of contamination, arising either directly from vessels, e.g. fuel oil and lubricants, or from their cargoes. Waste water releases from ships are covered under a separate section.

Mitigation

The mitigation measures to address water quality impacts during construction are given in ECoP 3 and 4 on Water Resources Management and Drainage Management. Sediment traps and sediment basins will be provided at the construction sites. Booms and skimmers along with trained main power will be in place by the Contractor for separation of oil spills from river. All discharges to the river will be treated to comply with relevant standards before release and will be monitored.

The mitigation measures given in ECoPs will also applicable to port operations. The additional mitigation measures specific to storm water and wastewater from port facilities include:

- Avoiding installation of storm drainage catch basins that discharge directly into surface waters, using containment basins in areas with a high risk of accidental releases of oil or hazardous materials (e.g. fueling or fuel transfer locations), and oil / grit or oil / water separators in all runoff collection areas. Oil / water separators and trapping catch basins should be maintained regularly to keep them operational. Recovered contaminated solids or liquids disposed of as hazardous materials;
- Installing filter mechanisms (e.g. draining swabs, filter berms, drainage inlet protection, sediment traps and sediment basins) to prevent sediment and particulates from reaching the surface water.

5.5 Soil and groundwater quality

Top soil in the proposed passenger terminal area near the Shashanghat might be contaminated with the current ship breaking industries in that site.

During construction period, soils in the construction area and nearby agricultural lands (particularly near Pangaon) will be prone to pollution from construction activities and facilities. Storage sites for fuel and hazardous materials and their handling are also potential sources for soil and ground water pollution.

During operation phase, the main sources of soil contamination in the port environment are: leakage and spillage of cargo storages including fuels, waste disposal sites and accidents. Spills of

fuels may occur due to accidents (e.g. collisions, groundings, fires), equipment failure (e.g. pipelines, hoses, flanges), or improper operating procedures during cargo transfer or fueling, and involve crude oils, refined products or residual fuels, liquid substances, and substances in packaged form.

Mitigation

The top soil quality at the Shashanghat will be evaluated during the EIA study of the terminal and if the soil is found to be contaminated it should be recovered and disposed as hazardous material.

The mitigation measures to address impacts on soil quality are given in ECoP 5 Soil Quality Management. For effluents to be discharged from workshops, camps, and offices, treatment arrangements such as retention ponds and septic tanks will be incorporated in the facility designs.

During operation phase, the mitigation measures to soil and groundwater contamination should be addressed through infrastructure measures (e.g. sealed floors, containment, and automatic valves) at the design stage and proper working procedures. Other specific mitigation measures to address spills are:

- Oil and chemical-handling facilities should be located with consideration of natural drainage systems;
- Ports should include secondary containment for above ground liquid storage tanks and tanker truck loading and unloading areas;
- Hazardous materials storage and handling facilities should be constructed away from active traffic and protect storage areas from vehicle accidents. Covered and ventilated temporary storage areas should be provided for leaking hazardous cargo and designed to facilitate collection of leaks and spills (e.g. slope surface to allow capture of spills, use valved catch basins that allow spills and releases to enter a dead-end sump from which spilled materials can be pumped);
- Fuel dispensing equipment should be equipped with “breakaway” hose connections that provide emergency shutdown of flow should the fueling connection be broken by movement. Fueling equipment should be inspected daily to ensure all components are in satisfactory condition.
- Preparation of spill prevention, control and countermeasure plan by the BIWTA

5.6 Dredging impacts

Dredging will be required at all the terminal sites during construction. Maintenance dredging will also be required during operation stage once in a few years primarily at Chandpur and Barisal terminals due to sedimentation to approach channels.

Dredging activities may cause several negative impacts on the aquatic habitat and fauna due to generation of high sediment flows, disturbance of benthic habitat, noise and emissions from construction machinery, and accidental spillage of fuels. Various stages of the dredging and potential impacts from each of these stages is summarized below.

- Excavation: Excavation is the process of physical removal of the material from its in situ location on the bed of a water body. This will be done either hydraulically or mechanically by dredger heads. The physical changes that can take place during excavation are the generation of suspended sediments (causing an increase in turbidity), mixing of soil layers and noise and air pollution from the equipment.
- Lifting: Lifting is the vertical transportation of the excavated material from the bed. Similar to excavation, this will also be done either hydraulically or mechanically. The physical changes that occur during lifting are the release of suspended sediments for example as overflow losses during loading. Sediment re-suspended in the water column in high concentrations can directly lead to physical abrasion of, for example, filter-feeding organs or gill membranes of fish and shellfish. If the sediments are rich in nutrients and metals; the resuspension of sediments may release nutrients, organic matter and toxic chemicals in to the water.

- Transportation: Transportation is the process of transferring the excavated material to the placement location. This will be done hydraulically through a pipeline. The potential impacts during transportation are spillage and safety in relation to other transport users of the river.
- Placement: Placement is the final stage, where the excavated material will be placed at designated sites (on the land for raising of terminal sites or in the river if there is excess material). Potential impacts during this stage are dispersion of deposited material and release of sediment laden runoff.

Dredging activities near Chandpur may particularly impact the hilsa if it is carried out during its spawning season of March and April. The dredging may potentially temporarily impact the habitats of migratory birds and dolphins by reducing feeding ground, creating noise, illumination, and increasing water turbidity.

Mitigation

The environmental code of practices (ECoP) to deal with the impacts of dredging are summarized in ECoP 20 Dredge Material Management. The Contractor should select the dredging methods to minimize suspension of sediments, minimize destruction of benthic habitat, and increase the accuracy of the operation. Inspection and monitoring of dredging activities should be conducted to evaluate the effectiveness of impact prevention strategies, and re-adjusted where necessary. The measures to be followed for planning and implementation of dredging activities are:

- River bed sediment material will be tested at all the dredging sites during preparation of EIA to ensure there is no contamination (parameters to be tested are given in ToR, Annex 1);
- Adequate measures are be taken during dredging to minimize the risk of sediment dispersal during excavation (most of the sediment excavated should be captured by the dredger to minimize sedimentation); low risk of sediment releases from lifting (most of the sediment captured should be lifted efficiently to minimize the re-suspension of sediments); and low risk of leakage from transportation; The baseline suspended solids (sediment) concentrations of the surface water will be established during the EIA studies. Suspended sediment concentrations due to dredging activities should not exceed 4,000 mg/l (a threshold value being followed in other projects in Bangladesh)..
- Dredging should be avoided near Chandpur terminal during hilsa spawning months of March and April
- Contamination of river bed sediments is expected in Buriganga River. But the sampling carried out during high flow season of October 2015 didn't show any sign of contamination. During future EIA studies, resampling will be carried during dry season and if any sign of contamination is noticed near the proposed terminal sites in Shasanghat and Pangaon terminals, these materials should be stored in a confined disposal facility
- If the dredged material is not contaminated it will be used for raising of the terminal sites. Prior to filling commencing, the areas being filled will be subdivided into compartments by construction of temporary containment bunds of suitable material (e.g. dredged sand). Filling will be achieved by progressively pumping a slurry of sand and water into the bunded areas, allowing the surplus water to drain away to artificial and natural waterways in a controlled manner through the pipeline, without affecting floodplains.
- If suitable and there is a demand, the excess dredged material will be used for other beneficial purposes such as raising of public lands and selling to the willing buyers
- The excess material will be disposed in the river through submerged and diffused discharge (to minimize the extent of sedimentation areas) away from the navigation channels. The material can also be sustainably relocated in the areas prone to significant erosion and building up the shoals by placing them on the designated locations through submerged and diffused discharge

5.7 Noise impacts

During construction on the land, noise levels produced by vehicles, machinery, concrete mixing, and other construction activities will exceed the applicable standards and may cause nuisance to local community and disturbance to birds. Instream construction activities such as piling will generate underwater noise levels that have a potential to impact dolphins and fish. Dredging activates will also create noise and vibration under water, which may cause disruption to fish migration and disturbance to dolphins.

Noise sources in port operations include cargo handling, vehicular traffic, and loading / unloading containers and ships.

Mitigation

Mitigation measures to address general construction related noise impacts are given in ECop 11: Noise and Vibration Management.

- Reduce the dredger noise at source by isolation of exhaust systems, by keeping engine room doors shut and by additional measures such as shielding.
- Limit the noisy dredging to daylight hours, where possible, rather than at sunrise or sunset (significant for wildlife) or during night time hours. Where unavoidable, the contractor should ramp up the levels of engines or other noise producing sources, so that the noise slowly increases. This will encourage riverine and terrestrial fauna to move away from the source area prior to significant noise emissions.
- The use of vibratory hammers shall be preferred for the construction of the piles. Piling work will adopt a 'soft start'; using a low energy start to the piling operations to give dolphins an opportunity to leave the area, gradually ramp up the sound levels to scare the dolphins and other cetaceans away before piling commences. Contractor will also use pingers upstream and downstream to chase away dolphins from the construction areas.

To avoid noise impacts during operation state, while preparing the layout of the terminals cargo handling activities (that generate more noise) should be located away from the residential areas and passenger facilities. Consideration should also be given in the planning stage for developing vegetation and walls around the port facilities to reduce noise levels.

5.8 Climate change mitigation and Adaptation

During port operations greenhouse gases such as carbon dioxide will be released, from terminal operations and related navigation and hinterland transport, contributing to global climate change.

According to the Bangladesh Climate Change Strategy and Action Plan (2009)[6], the following are the possible impacts of climate change in Bangladesh:

- increasingly frequent and severe tropical cyclones, leading to more damage in the coastal region;
- heavier and more erratic rainfall in the Ganges-Brahmaputra-Meghna system, including Bangladesh, during the monsoon resulting in higher river flows, causing over-topping and breaching of embankments and widespread flooding;
- river bank erosion resulting in loss of homes and agricultural land to the rivers;
- increased sedimentation in riverbeds leading to drainage congestion and water-logging;
- melting of the Himalayan glaciers, leading to higher river flows in the warmer months of the year, followed by lower river flows and increased saline intrusion after the glaciers have shrunk or disappeared;
- lower and more erratic rainfall, resulting in increasing droughts, especially in drier northern and western regions of the country;

[6] MoEF.(2009). Bangladesh Climate Change Strategy and Action Plan, 2009. Ministry of Environment and Forest (MOEF), Government of the People's Republic of Bangladesh

- sea level rise leading to submergence of low lying coastal areas and saline water intrusion up coastal rivers.

The impacts of above climate changes can possibly impact the operation of the terminals and inland navigation by:

- Increased flooding and damage to terminal and landing facilities due to sea level rise, cyclones and storm surges
- Loss of navigability due to increase in frequency and duration of dry spell (drought);
- Increase in frequency in wet and stormy period may imply higher costs due to weather disturbances and safety;
- Large variations in water levels and reduced water depth;

Mitigation and Adaptation

Mitigation measures to reduce carbon dioxide and other greenhouse gases emissions from ships, cargo handling equipment and related hinterland transport are:

Adaptation measures for climate change impacts are:

- Design of facilities sufficiently above the flood levels expected from climate change. During EIA study, climate change assessment will be carried out to estimate the future water levels due to rise in sea water level, monsoon rainfall, storm surges etc. The new terminal and landing facilities should be built above these levels.
- Climate change modeling and developing forecasts for river water levels
- long term planning and design for new infrastructure
- Identify the vulnerabilities in the IWT sector and proactive actions
- Design of new wider vessels that could accommodate low drafts
- Studies for alternate channel maintenance through river training works (will be carried out under Component 3)
- A hydro-meteorological station will be established at Chandpur to permanently monitor the climate

5.9 Habitat and Species Management

The sensitive habitats, such as hilsa sanctuaries and spawning areas, and presence of sensitive species such as dolphin near the proposed subprojects are given in the **Table 5.1**. No habitats of migratory birds such as reed lands and mudflats are located near any of the subprojects.

Table 5.1: Sensitive habitats near the subprojects of Component 2

Sensitive habitats and species located near the subprojects	**Cargo and passenger terminals**	**Landing Stations**
Hilsa sanctuaries – especially during months of March and April (key breeding period)	Chandpur	Hornia, Alubazar, Hornia, Hijla, Moju Chowdhry, Ilisha (Bhola), Beduria, Laharhat, Boddarhat, Daultkha, Chairman ghat
Hilsa spawning areas (spawning period is 11 days in Bangla month of Ashwin (October/November) – 5 days before and 5 days after the full moon)		Sandwip, Tojumuddhin, Monpura
Dolphin	Ashuganj	Bhirab

Construction works both on land and in the river (bank protection, piling, dredging) may generate sediment load in the river. Erosion from the construction works and material storage sites also increases the sediment load to the river. Sediment concentrations above natural levels can cause mortality of plankton and fish; for fish, damaged gills and sediment clogging of gill chambers eventually leads to death, which in turn will influence the availability of dolphin's diet and its habitat. Construction activities in the river particularly during hilsa spawning period, and in the hilsa sanctuaries during months of March and April may adversely affect the breeding population of hilsa. Underground noise and vibration levels caused by instream construction activities (such as piling and dredging) may cause disruption to fish migration and disturbance to dolphins. Construction and maintenance dredging may impact the benthic habitat and river water quality.

Site preparation works at the proposed terminal sites, particularly near Pangaon and Chandpur, require clearance of land and cutting of vegetation.

During operation, the waste water releases from port facilities and maintenance dredging activities will impact the river water quality and habitat.

Mitigation

Mitigation measures related to water quality and dredging were already discussed in Section 5.4 and 5.5. Additional mitigation measures to prevent and control these impacts include the following:

- No construction and maintenance activities in the river are to be carried out for the subprojects that are located in the hilsa sanctuaries during months of March and April
- No construction and maintenance activities in the river are to be carried out for the subprojects that are located in the hilsa spawning areas during 11 days of Bangla month of Ashwin (5 days before and 5 days after full moon). The Ashwin month usually falls between October and November
- Impacts on dolphins near the subprojects can be minimized by chasing away dolphins from the construction areas using pingers before carrying out any major activities, such as piling, that generate high underwater noise levels. Piling works will adopt a 'soft start'; using a low energy start to the piling operations to give dolphins an opportunity to leave the area, gradually ramp up the sound levels to scare the dolphins and other cetaceans away before piling commences.
- Compensatory tree plantation for the loss of trees from the site developments
- Potential Habitat enhancement measures are to be identified and planned during preparation of EIA of terminal sites
- Terminals will provide adequate reception facilities for collection of waste water from the ships and treatment.

5.10 Public Health and Safety

During construction phase, occupational and community health and safety issues are:

- **Occupational Health and Safety**: Construction activities may pose health and safety hazards to the workers at site during use of hazardous substances, lifting and handling of heavy equipment, operating machinery and electrical equipment, exposure to dust and hazardous materials that may be present in construction materials and demolition waste, hazardous materials in other building components; working near water or at height and more Inappropriate handling or accidental spillage/leakage of these substances can potentially lead to safety and health hazards for the construction workers as well as the local community.
- **Community Health and Safety**: During the construction phase, the population living in close proximity to the construction area, the construction workforce and individuals drawn to the area

in search of income opportunities will all be exposed to a number of temporary risks such as safety hazards associated with the construction activities and vehicular movement, exposure to dust, noise, pollution, infectious disease, and various hazards, including potential conflict with "outsiders" to the project influence area about employment and income. The influx and accommodation of a large work force will result in increased concerns for the health and safety of local population, including the spreading of sexually transmitted diseases such as HIV/AIDS.

During operation of terminal facilities, the occupation and community health and safety issues are mostly related with cargo handling and include:

- **Occupational Health and Safety**: Potential issues associated with OHS are physical hazards, chemical hazards, dust and noise. The main sources of physical hazards at ports are associated with cargo handling and use of associated machinery and vehicles. Port workers may be exposed to chemical hazards especially if their work entails direct contact with fuels or chemicals, or depending on the nature of bulk and packaged products transferred in port activities. Work with fuels may present a risk of exposure to volatile organic compounds (VOC) via inhalation or skin contact during normal use or in the case of spills. Fuels, flammable liquid cargo, and flammable dust may also present a risk of fire and explosions. Sources of dust hazards are exposure to fine particulates is associated with handling of dry cargo (depending on type of cargo handled, e.g. cement, grain, and coal) and from roads. Noise sources in ports may include cargo handling, including vehicular traffic, and loading / unloading containers and ships.
- **Community Health and Safety**: During operation of the cargo and passenger terminals, the potential community health and safety issues are risk of accidents with activities associated with cargo handling in the terminals, visual impacts from the illumination of the ports, and traffic activities associated with the port. Other visual concerns from cargo operations are uncontrolled dumping, floating debris, derelict warehouses and broken machinery.

Mitigation

Mitigation measures to address impacts on workers and community health and safety are discussed in various ECoPs given in Annex 3. The contractors will also be required to prepare and implement Health, Safety and Environment (HSE) plan in compliance with these ECOPs and WB EHS guidelines.

The mitigation measures given in ECoPs are also generally applicable to operation of terminals. In addition specific mitigation measures for terminals and landing stations are:

- To minimize impacts on visual concerns of the community and improve the cleanliness of port facilities, it is required to implement regular clean up (in the port facilities and water surface) and maintenance
- Visual impacts, including excessive background illumination, should be prevented during the port planning process or managed during operations through the installation of natural visual barriers such as vegetation or light shades, as applicable. The location and color of bulk storage facilities also should be selected with consideration of visual impacts
- Separation of people from vehicles and making vehicle passageways one-way, to the extent practical
- Constructing the surface of port areas to be: of adequate strength to support the heaviest expected loads; level, or with only a slight slope; free from holes, cracks, depressions, unnecessary curbs, or other raised objects; continuous; and skid resistant
- Providing safe access arrangements suitable for the sizes and types of vessels calling at their facilities. These access arrangements should include guard rails and / or properly secured safety nets to prevent workers from falling into the water between the ship's side and the adjacent quay
- Materials handling operations should follow a simple, linear layout to reduce the need for multiple transfer points.

- Development of Safety System. This safety system should include procedures to regulate the safe movement of vessels within the harbor (including pilotage procedures), protect the general public from dangers arising from marine activities at the harbor, and prevent events that may result in injury to workers, the public, or the environment. The Safety Management System should include comprehensive emergency preparedness and response plans that provide a coordinated response based on the port and community resources required to manage the nature and severity of the emergency event.

5.11 Ship-related Waste Management

The waste generated from ships mainly include inert materials such as food packaging, and food waste. Solid waste is being collected by the ships and are being dumped in to the municipal dust bins located near the terminals.

Liquid effluents associated with ships are sewage, bilge water (e.g. from oil tankers), and vessel cleaning wastewater from ships. Ship sewage and wastewater contains high levels of BOD and Coliform bacteria, with trace concentrations of constituents such as pharmaceuticals, and typically low pH levels. Wash water may contain residues such as oil. Pollutants in bilge water contain elevated levels of BOD, COD, dissolved solids, oil, and other chemicals that accumulate as the result of routine operations. Presently there are no facilities at the terminals for collection of liquid waste from the ships. The ships usually dispose these wastes in the river.

Mitigation

- Port facilities should provide adequate means of receiving and managing effluents and wastes to meet its own needs and those of visiting ships and for which the port is designed to service. Port waste reception facilities should provide adequate capacity to receive port and ship generated wastes including appropriately sized and located receptacles, and the capacity to deal with seasonal fluctuations.
- The reception facilities can be fixed, floating or mobile and should be adapted to collect the different types of ship generated waste and cargo residues.
- No waste should be disposed in the river. Dust bins and recycling or chemical toilets, or holding tanks should be provided on the ships. Information should be available for ship captains to identify waste reception facilities and acceptable handling procedures at ports.
- The wastes should be adequately disposed or treated, based on the type of waste, in cooperation with the local municipal authorities.

6 Environmental Management Plans

The basic objective of the EMP is to manage adverse impacts of proposed project interventions in a way that minimizes the adverse impact on the environment and people at the subproject sties. The specific objectives of the EMP are to:

- Facilitate the implementation of the mitigation measures discussed earlier in the document.
- Maximize potential project benefits and control negative impacts;
- Draw responsibilities for BIWTA, contractors, consultants, and other members of the project team for the environmental and social management of the Project;
- 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
- Assess environmental training requirements for different stakeholders at various levels.

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

6.1 Inclusion of Relevant Components of EMP in Contract Documents

The EIAs to be prepared for subcomponents should include a section on special environmental clauses 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 environment management plan (EMP), 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 project.

6.2 Institutional Arrangements

The Project implementation will be led by the Project Implementation Unit (PIU) that will be established within BIWTA. The PIU will be responsible for procurement of consultants for carrying out the EIA and engineering designs for the proposed sub components. The PIU will be headed by the Project Director (PD). The PIU will consists of an Environment and Social (E&S) Cell with qualified staff. This E&S Cell will assist the PMU on issues related to environmental and social management and oversee the Construction Supervision Consultant (CSC) and contractors and will compile quarterly monitoring reports on EMP compliance, to be sent to the Project Director and also shared with the World Bank, throughout the construction period. The E&S Cell will also provide trainings to the BIWTA field personnel responsible for monitoring of environmental compliance during both construction and O&M phases of the project. The organogram PIU is shown in Figure 6.1. In addition, BIWTA will establish a permanent Environmental, Social and Climate Change Unit in its institutional structure, which will ensure the long term sustainability, climate resilience and climate sensitivity of project investments as well as other activities across the organization.

The overall responsibility of environmental performance including EMP implementation of the Project will rest with the PIU. Aside from their in-house environmental and social specialists, the PIU will engage construction supervision consultants (CSC) to supervise the contractors including on their execution of construction-related environmental and social management requirements and

measures. The CSC will ensure adherence to the design parameters including quality requirements, as well as all EMP measures related to construction.

The E&S Cell will have adequate numbers of environmental and social scientists/specialists and maintain coordination and liaison with CSC for effective EMP implementation. A draft ToR for the environmental consultants of E&S cell is given in Annex 9. Similarly, the CSC will also have environmental and social monitors who will supervise and monitor the contractors for effective EMP implementation. The contractors in turn will also have HSE supervisors who will ensure EMP implementation during construction activities and will be tasked to develop necessary detailed HSE plans as per this EMP, and oversee their implementation.

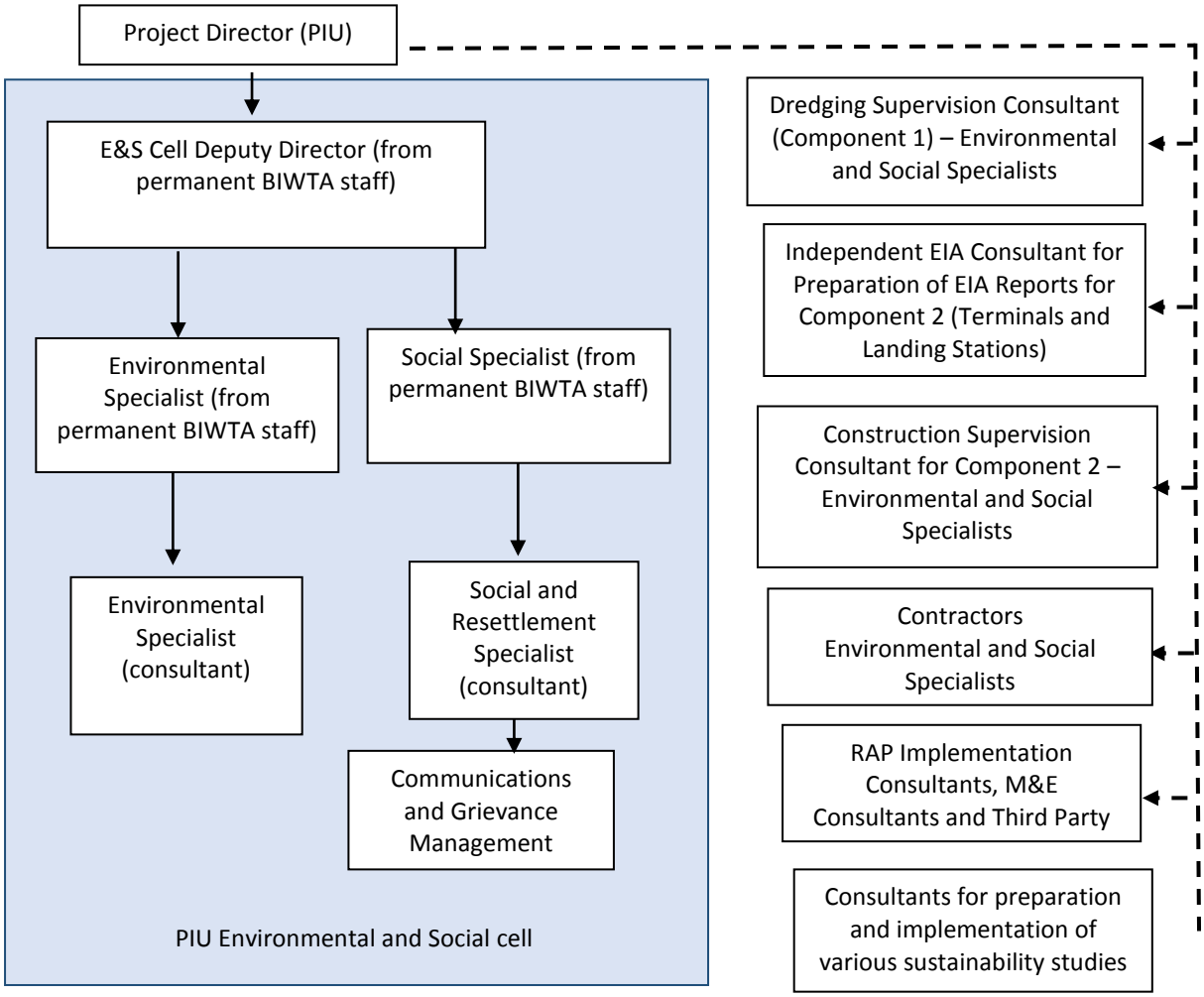


Figure 6.1: Organogram for Environmental and Social Management of the project

The PIU will also engage an independent organization to carry out third party environmental monitoring during project implementation. The roles and responsibilities of PIU and its consultants are presented in Table 6.1.

Table 6.1: Roles and Responsibilities for EMP Implementation

Organizations	Responsibilities
PIU	• Ensure that all project activities are well-managed and coordinated. • Recruitment of consultants for EIA and engineering designs; and approval of EIA by the DOE • Procurement of works and goods.

Organizations	Responsibilities
	• Payment of compensation to the project affectees • Recruitment and supervision of Construction Supervision Consultants (CSC) • Recruitment and supervision of external monitor and independent Panel of Experts
E&S Cell within PIU	• Responsible for screening and determining scope of EA work required for Component 3 activities and studies, assisting PD with developing TORs and hiring of consultants to carry out any required environmental assessment work for Components 2 and 3, reviewing consultant deliverables related to environmental assessment, reviewing bid documents for inclusion of EMP measures, supervising construction activities, producing periodic monitoring reports, • Ensuring inclusion of EMP in bidding documents • Providing training on EMP principles and requirements to CSC, contractors, BIWTA field staff, and others as needed to ensure effective implementation of EMP • Supervising CSC for the implementation of EMP • Closely coordinate with other concerned agencies, local governments and communities to support implementation of EMP • Preparation of progress reports on implementation of EMP. • Ensure effective implementation of EMP components not directly tasked to the contractor including components dealing with indirect, induced and cumulative effects, as well as operations and maintenance stage plans and measures. • Commissioning and oversight/review of consultant reports for EIAs/EMPs to be developed for the subcomponents of the Project •
EIA Consultants	• Carrying out EIA studies in compliance with the GoB and World Bank guidelines following the EMF • Preparing EMP for inclusion in the bid documents
CSC	• Supervise civil works, ensuring compliance with all design parameters including quality requirements • Supervising contractors for EMP implementation • Prepare monthly reports and submit to PIU • CSC will have dedicated environmental and social staff
Contractor	• Responsible for implementation of mitigation and monitoring measures proposed in the EMP • Each contractor will recruit an Environmental, Health, and Safety Manager, who will be responsible for implementing the contractors' environmental, health and safety responsibilities, and liaising with government agencies. S/he will have adequate number of staff to support him/her for these tasks.
External Monitor	• Independent monitoring of implementation of EMP • External Monitoring and evaluation

6.3 Environmental and Social Management

Various environmental and social management plans will be prepared during preparation of EIA for the Project components. Suggestive plans to be prepared and tasks to be carried for Component 2 and Component 3 works in the Table 6.2, which will be revisited during the preparation of the EIA.

Table 6.2: Management Plans/ Additional Tasks

	Plan/Task	Responsibility			Timing
		Plan Preparation	Plan Approval	Review/ Implementation	
	Plans prepared / to be prepared by BIWTA / its Consultants				

	Plan/Task	Responsibility			Timing
		Plan Preparation	Plan Approval	Review/ Implementation	
1.	Preparation of detailed TORs for the EIA studies for Component 2	E&S Cell	BIWTA/ WB	Independent Environmental Consultant	ToR for Component 2 works is already prepared (Annex 1).
2.	Screening of Component 3 Works for preparation of detailed TORs for EIA studies	E&S Cell	BIWTA/ WB	Independent Environmental Consultant	During first year of project implementation (2016-2017)
3.	ESIA/RAP studies for Component 2 Works	ESIA Consultant	BIWTA/ WB	E&S Cell, Independent Environmental Consultant	During first year of project implementation (2016-2017)
4. 4	ESIA/RAP studies for Component 2 Works	ESIA Consultant	BIWTA/ WB	E&S Cell, Independent Environmental Consultant	2017-2018
5.	Mitigation and Compliance Monitoring Plans	ESIA Consultants	BIWTA /WB	BWDB through contractors	Preliminary plans are prepared (Table 6.3), but will be updated during detailed ESIA studies of subprojects
6.	Environmental Codes of Practice (ECPs)	ESIA Consultants	BIWTA /WB	BIWTA through contractors	Already prepared (Annex 3)
7.	Inclusion of environmental clauses in bid documents for various contracts	E&S Cell	BIWTA /WB	CSC	2016-2018
	Plans to be prepared by contractors				
8.	Dredging for terminal sites and Dredge Material Management	Contractor	BWDB /WB	Terminal works Contractors	Within one month of mobilization and prior to any initiation of dredging activities
9.	OHS Plan	All contractors	CSC and PIU	All contractors	Before mobilization of each contractor
10.	Pollution Prevention Plans (related to air, noise, soil, water resources)	All contractors	CSC and PIU	All contractors	Before mobilization of each contractor
11.	Waste Disposal and Effluent Management Plan	All contractors	CSC and PIU	All contractors	Before mobilization of each contractor
12.	Drinking Water Supply and Sanitation Plan	All contractors	CSC and PIU	All contractors	Before mobilization of each contractor
13.	Traffic Management Plan	All Contractors	CSC and PIU	All contractors	Before mobilization of each contractor
14.	Construction Camp	All	CSC and PIU	All contractors	Before mobilization

	Plan/Task	Responsibility			Timing
		Plan Preparation	Plan Approval	Review/ Implementation	
	Management Plan	contractors			of each contractor
15.	Fuels and hazardous substances management plan	All contractors	CSC and PIU	All contractors	Before mobilization of each contractor
16.	Instream Construction Works Management Plan	All contractors	CSC and PIU	All contractors	Before mobilization of each contractor
17.	Emergency Preparedness Plan (for construction phase)	All contractors	CSC and PIU	All contractors	Before mobilization of each contractor
	Plans to be prepared for O&M Phase				
18.	O&M Phase Environmental Code of Practices	BIWTA (through consultants)	-	BIWTA	Prior to completion of construction
19.	Environmental Management System (waste disposal, air and noise quality, etc.)	BIWTA (through consultants)	-	BIWTA	Prior to completion of construction
20.	Safety Management Systems (OHS Management)	BIWTA (through consultants)	-	BIWTA	Prior to completion of construction

6.3.1 Environmental Codes of Practice

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 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 (discussed later in the Section). The ECoPs are listed below and attached in Annex 3.

- ECoP 1: Waste Management
- ECoP 2: Fuels and Hazardous Substances Management
- ECoP 3: Water Resources Management
- ECoP 4: Drainage Management
- ECoP 5: Soil Quality Management
- ECoP 6: Erosion and Sediment Control
- ECoP 7: Top Soil Management
- ECoP 8: Topography and Landscaping
- ECoP 9: Borrow Areas Management
- ECoP 10: Air Quality Management
- ECoP 11: Noise and Vibration Management
- ECoP 12: Protection of Flora
- ECoP 13: Protection of Fauna
- ECoP 14: Protection of Fisheries
- ECoP 15: Road Transport and Road Traffic Management
- ECoP 16: River Transport management
- ECoP 17: Construction Camp Management
- ECoP 18: Cultural and Religious Issues

- ECoP 19: Workers Health and Safety
- EcoP 20: Dredging Management

6.3.2 Mitigations and Compliance Monitoring Plans

The mitigation and compliance monitoring plans are the key element of EMP to be prepared on the basis of impact assessment described in Chapter 5. The Plans describe the potentially negative impacts of each subproject activity, lists mitigation and control measures to address the negative impacts, and assigns responsibilities for implementation and monitoring of these measures. The Plans are outlined in Table 6.3, Table 6.4 and Table 6.5 which will be updated by detailed ESIA study.

6.3.3 Construction Stage Site Specific Management Plans

Dredging Management plan will be prepared and implemented by the contractors on the basis of the ECoPs, WBG EHS Guidelines (2007) and the mitigation measures given in Chapter 5. The Plan will describe among others the methodology to be adopted, locations of dredged material placement sites, restrictions to be followed, prior survey to be conducted, and documentation to be maintained for the dredging activity. The Plan will be submitted to the CSC for their review and approval before initiating the sand extraction activity.

Pollution Prevention Plan will be prepared and implemented by the contractors on the basis of the ECoPs and WBG EHS Guidelines (2007) that will be part of the bidding documents. The Plan will be submitted to the CSC for their review and approval before contractor mobilization.

Waste Disposal and Effluent Management Plan will be prepared and implemented by the Contractor on the basis of the EMP, ECoP, and WBG EHS Guidelines (2007), which will be part of the bidding documents. The Plan will be submitted to the CSC for their review and approval before contractor mobilization.

Drinking Water Supply and Sanitation Plan: Separate water supply and sanitation provisions will be needed for the temporary facilities including offices, labor camps and workshops in order not to cause shortages and/or contamination of existing drinking water sources. The Plan will be submitted to the CSC for their review and approval before contractor mobilization.

Occupational Health and Safety (OHS) Plan will be prepared and implemented by each contractor on the basis of the WBG EHS Guidelines (2007), ECoPs, and other relevant standards. The Plan will be submitted to the CSC for their review and approval before contractor mobilization.

Traffic Management Plan will be prepared by each contractor after discussion with BIWTA and authorities responsible for roads and traffic. The Plan will be submitted to the CSC for their review and approval before contractor mobilization. The Plan will identify the routes to be used by the contractors, procedures for the safety of the local community particularly pedestrians, and monitoring mechanism to avoid traffic congestion.

Construction Camp Management Plan will be prepared by each contractor. The Plan will include the camp layout, details of various facilities including supplies, storage, and disposal. The Plan will be submitted to the CSC for their review and approval before camp establishment.

Fuel and Hazardous Substances Management Plan will be prepared by each contractor in accordance with the standard operating procedures, relevant guidelines, and where applicable, material safety data sheets (MSDS). The Plan will include the procedures for handling the oils and chemical spills. The Plan will be submitted to the CSC for their review and approval before contractor mobilization.

An **Emergency Preparedness Plan** will be prepared by each contractor after assessing potential risks and hazards that could be encountered during construction. The Plan will be submitted to the CSC/BIWTA for their review and approval before contractor mobilization.

Table 6.3: Mitigation and Compliance Monitoring Plan – Pre-Construction/Design Phase

Environmental and sustainability issue	Issues/Impacts/impact sources	Mitigation Measures/Action Plan	Responsibility	
			Execution	Monitoring
Terminal facilities and land use planning	Issues with existing terminal facilities are • lack of access roads • Unregulated development around port facilities • Lack of parking areas • lack of adequate passenger facilities; • encroachment of the port facilities by the squatters	• Design and provide adequate facilities in the terminal designs. • As a part of the engineering designs, a long term terminal plan (e.g. for next 20 years as a minimum) should be developed for planning of terminal facilities with adequate buffer areas around the port facilities. • BIWTA will need to coordinate with the relevant government agencies for hinterland and multimodal transport to maximize the benefits of IWT sector	Consultant	BIWTA
Last mile connectivity	• Access roads to the existing terminals are either narrow or not fully developed. • The advantages of inland water transport are being compromised by the poor connectivity to the terminal facilities	• During the planning and design of the terminals, development of access roads should be part of the terminal designs. • BIWTA will also coordinate with relevant government institutions for Planning on hinterland transport and multimodal transport to improve the IWT sector in the country and to maximize the benefits from the terminal developments.	Consultant	BIWTA
Ship Wastes	• Liquid effluents associated with ships are sewage, bilge water (e.g. from oil tankers), and vessel cleaning wastewater from ships. • Ship sewage and wastewater contains high levels of BOD and Coliform bacteria, with trace concentrations of constituents such as pharmaceuticals, and typically low pH levels	• Port facilities should provide adequate means of receiving and managing effluents and wastes to meet its own needs and those of visiting ships and for which the port is designed to service. • Port waste reception facilities should provide adequate capacity to receive port and ship generated wastes including appropriately sized and located receptacles, and the capacity to deal with seasonal fluctuations.	Consultant	BIWTA

Table 6.4: Mitigation and Compliance Monitoring Plan – Construction Phase

Environmental and sustainability issue	Issues/Impacts/impact sources	Mitigation Measures	Responsibility	
			Execution	Monitoring
Air Quality	• Emissions from construction related traffic and machinery. • Dust from works, other machinery, concrete mixing, and traffic from trucks and vehicles. •	• Implement measures in ECoP 10 Air Quality Management. Dust generation will be restricted as much as possible and water sprinkling carried out as appropriate, especially where earthmoving, and excavation are carried out. • Emissions from construction equipment and traffic will comply with World Bank EHS guidelines and will be monitored.	Contractor	CSC, PIU
Surface Water and Sediment Quality	• Increase in water turbidity from bank protection and instream construction works. • Waste water from construction camps, offices and warehouses. • Spillage of fuels, oils, and other chemicals, and waste effluents from workshops and washing bays. • Erosion from construction works	• Implement measures in ECoPs 3, 4 and 6 • Oil / water separators and trapping catch basins should be installed and maintained regularly to keep them operational. Recovered contaminated solids or liquids disposed of as hazardous materials; • Installing filter mechanisms (e.g. draining swabs, filter berms, drainage inlet protection, sediment traps and sediment basins) to prevent sediment and particulates from reaching the surface water.	Contractor	CSC, PIU
Soil and groundwater quality	• Pollution from construction activities and facilities. • Storage sites for fuel and hazardous materials and their handling are also potential sources for soil and ground water pollution	• Implement ECoP 5: Soil Quality Management • The top soil quality at the Shasanghat will be evaluated during the EIA study of the terminal and if the soil is found to be contaminated it should be recovered and disposed as hazardous material. • For effluents to be discharged from workshops, camps, and offices, treatment arrangements such as retention	Contractor	CSC, PIU

Environmental and sustainability issue	Issues/Impacts/impact sources	Mitigation Measures	Responsibility	
		ponds and septic tanks will be incorporated in the facility designs.		
Dredging Impacts	• Dredging activities may cause several negative impacts on the aquatic habitat and fauna due to generation of high sediment flows, disturbance of benthic habitat, noise and emissions from construction machinery, and accidental spillage of fuels.	• Implement ECoP 20: Dredging Management • River bed sediment material will be tested at all the dredging sites during preparation of EIA to ensure there is no contamination; • Suspended sediment concentrations due to dredging activities should not exceed 4,000 mg/l (a threshold value being followed in other projects in Bangladesh). • If the dredged material is not contaminated it will be used for raising of the terminal sites. Filling will be done in bunded areas to avoid sediment laden runoff. • Dredging should be avoided near Chandpur terminal during hilsa spawning months of March and April • If suitable and there is a demand, the excess dredged material will be used for other beneficial purposes such as raising of public lands and selling to the willing buyers. • The excess material will be disposed in the river through submerged and diffused discharge (to minimize the extent of sedimentation areas) away from the navigation channels.	Contractor	CSC, PIU
Noise	• During construction on the land, noise levels produced by vehicles, machinery, concrete mixing, and other construction activities will exceed the applicable standards and may cause nuisance to local community and disturbance to birds. • Instream construction activities such as piling will generate underwater noise	• Reduce the dredger noise at source by isolation of exhaust systems, by keeping engine room doors shut and by additional measures such as shielding. • Limit the noisy dredging to daylight hours, where possible, rather than at sunrise or sunset (significant for wildlife) or during night time hours. • Soft start approach for dredging and piling operations to give an opportunity to riverine and terrestrial fauna leave the area	Contractor	CSC, PIU

Environmental and sustainability issue	Issues/Impacts/impact sources	Mitigation Measures	Responsibility	
	levels that have a potential to impact dolphins and fish. • Dredging activates will also create noise and vibration under water, which may cause disruption to fish migration and disturbance to dolphins.	• Use pingers upstream and downstream to chase away dolphins from the construction areas.		
Habitat species and management	• Sediment loads from construction works and material storage sites above natural levels can cause mortality of plankton and fish; • Underground noise and vibration levels caused by instream construction activities (such as piling and dredging) may cause disruption to fish migration and disturbance to dolphins. • Construction and maintenance dredging may impact the benthic habitat and river water quality.	• Implement mitigation measures described above on dredging and water quality • Compensatory tree plantation for the loss of trees from the site developments • Instream construction and dredging activities in Chandpur should not be carried out during hilsa spawning period of March and April • Potential Habitat enhancement measures are to be identified and planned during preparation of EIA of terminal sites • Terminals will provide adequate reception facilities for collection of waste water from the ships and treatment.	Contractor	CSC, PIU
Health and Safety:	• Workers health and safety hazards associated with construction activities • Community health and safety hazards at the construction sites, including exposure to sexually transmitted diseases such as HIV/AIDS	• Implement ECoP 19 pm Workers Health and Safety, ECoP 17: Construction Camp Management • Separation of people from vehicles and making vehicle passageways one-way, to the extent practical • Traffic management • Materials handling operations should follow a simple, linear layout to reduce the need for multiple transfer points.	Contractor	CSC, PIU

Table 6.5: Mitigation and Compliance Monitoring Plan – Operation Phase

Environmental and sustainability issue	Issues/Impacts/impact sources	Mitigation Measures	Responsibility	
			Execution	Monitoring
Air Quality	• Combustion emissions from the vessels. These emissions will mainly be consisting of sulfur dioxide, nitrogen oxides, particulate matter and greenhouse gases such as carbon dioxide and carbon monoxide. Land-based operations of the cargo terminals will also generate emissions from vehicles and equipment. • Fuel storage facilities and transfer may also release volatile organic compounds (VOC).	• Developing air quality management procedures applicable to ship operators, such as Maintaining emissions of nitrous and sulfur oxides within the limits established by international regulations • Keeping transfer equipment (e.g. cranes, forklifts, and trucks) in good working condition • Implementing tank and piping leak detection and repair programs. • Regularly sweeping docks and handling areas	E&S Cell	BIWTA
Surface Water and Sediment Quality	• Discharges of untreated waste water from port operations, storm water discharge, discharges of waste, runoff from roads which carries contaminated soil and soot particles; runoff from industrial sites (e.g. storm water runoff); spills (land and water), debris thrown overboard from ships. • Spillage, leakage and accidents are significant potential sources of contamination, arising either directly from vessels, e.g. fuel oil and lubricants, or from their cargoes. Waste water releases from ships are covered under a separate section. •	• Avoiding installation of storm drainage catch basins that discharge directly into surface waters, using containment basins in areas with a high risk of accidental releases of oil or hazardous materials (e.g. fueling or fuel transfer locations), and oil / grit or oil / water separators in all runoff collection areas. Oil / water separators and trapping catch basins should be maintained regularly to keep them operational. Recovered contaminated solids or liquids disposed of as hazardous materials; • Installing filter mechanisms (e.g. draining swabs, filter berms, drainage inlet protection, sediment traps and sediment basins) to prevent sediment and particulates from reaching the surface water. •	Terminal Operator	BIWTA
Soil and	• Leakage and spillage of cargo storages	• Oil and chemical-handling facilities should be located	Terminal	BIWTA

Environmental and sustainability issue	Issues/Impacts/impact sources	Mitigation Measures	Responsibility	
groundwater quality	including fuels, waste disposal sites and accidents. • Spills of fuels may occur due to accidents (e.g. collisions, groundings, fires), equipment failure (e.g. pipelines, hoses, flanges), improper operating procedures during cargo transfer or fueling, and involve crude oils, refined products or residual fuels, liquid substances, and substances in packaged form.	with consideration of natural drainage systems; • Ports should include secondary containment for above ground liquid storage tanks and tanker truck loading and unloading areas; • Hazardous materials storage and handling facilities should be constructed away from active traffic and protect storage areas from vehicle accidents • Fuel dispensing equipment should be equipped with "breakaway" hose connections that provide emergency shutdown of flow should the fueling connection be broken by movement. • Fueling equipment should be inspected daily to ensure all components are in satisfactory condition. • Preparation of spill prevention, control and countermeasure plan by the BIWTA	Operator	
Dredging Impacts	• Dredging activities may cause several negative impacts on the aquatic habitat and fauna due to generation of high sediment flows, disturbance of benthic habitat, noise and emissions from construction machinery, and accidental spillage of fuels.	• Implement ECoP 20: Dredging Management • Dredging should be avoided near Chandpur terminal during hilsa spawning months of March and April • If suitable and there is a demand, the excess dredged material will be used for other beneficial purposes such as raising of public lands and selling to the willing buyers • The excess material will be disposed in the river through submerged and diffused discharge (to minimize the extent of sedimentation areas) away from the navigation channels.	Contractor	E&S Cell
Noise	• Noise sources in port operations include cargo handling, vehicular traffic, and loading / unloading containers and ships.	• To avoid noise impacts during operation state, while preparing the layout of the terminals cargo handling activities (that generate more noise) should be located away from the residential areas and passenger facilities.	E&S Cell	BIWTA

Environmental and sustainability issue	Issues/Impacts/impact sources	Mitigation Measures	Responsibility	
		• Consideration should also be given in the planning stage for developing vegetation and walls around the port facilities to reduce noise levels.		
Impacts on climate change	• During port operations greenhouse gases such as carbon dioxide will be released, from terminal operations and related navigation and hinterland transport, contributing to global climate change.	• Preparing GHG emissions inventory (from the current operations) and setting goals to reduce emissions. Also periodic reporting. • Introduce cleaner fuels such as CNG (comparatively less emissions) in the vessels owned by the ministry to set a good example for others to follow. • Improving efficiency within the logistic chains by streamlining the movement of cargo, truck traffic and inland navigation access • Reduce energy dependence with in the ports by developing and using renewable energy sources • Greening of vessel fleet	E&S Cell	BIWTA
Climate change impacts	• damage to terminal and landing facilities due to sea level rise, cyclones and storm surges • Loss of navigability due to increase in frequency and duration of dry spell (drought); • Increase in frequency in wet and stormy period may imply higher costs due to weather disturbances and safety; • Large variations in water levels and reduced water depth;	• Design of facilities sufficiently above the flood levels expected from climate change. • Climate change modeling and developing forecasts for river water levels • long term planning and design for new infrastructure • Identify the vulnerabilities in the IWT sector and proactive actions • Design of new wider vessels that could accommodate low drafts • Studies for alternate channel maintenance through river training works (will be carried out under Component 3) • A hydro-meteorological station will be established at Chandpur to permanently monitor the climate	Climate change Unit of BIWTA	BIWTA

Environmental and sustainability issue	Issues/Impacts/impact sources	Mitigation Measures	Responsibility	
Habitat species and management	• During operation, the waste water releases from port facilities and maintenance dredging activities will impact the river water quality and habitat.	• Implementation of mitigation measures related to water quality and dredging • Dredging activities in the river near hilsa sancturies should not be carried out during months of March and April; and in hilsa spawning areas during 11 days in the Bangla month of Ashwin (5 days before and 5 days after full moon. Ashwin month usually occurs between October and November. • • Implementation of potential habitat enhancement measures that are identified and planned during preparation of EIA of terminal sites • Maintenance of reception facilities that are established for collection of waste water from the ships and treatment.	E&S Cell	BIWTA
Occupational health and safety	• Physical hazards associated with cargo handling and use of associated machinery and vehicles. • Port workers may be exposed to chemical hazards especially if their work entails direct contact with fuels or chemicals, or depending on the nature of bulk and packaged products transferred in port activities. • Work with fuels may present a risk of exposure to volatile organic compounds (VOC) via inhalation or skin contact during normal use or in the case of spills. • Fuels, flammable liquid cargo, and flammable dust may also present a risk of fire and explosions.	• Constructing the surface of port areas to be: of adequate strength to support the heaviest expected loads; level, or with only a slight slope; free from holes, cracks, depressions, unnecessary curbs, or other raised objects; continuous; and skid resistant • Providing safe access arrangements suitable for the sizes and types of vessels calling at their facilities. These access arrangements should include guard rails and / or properly secured safety nets to prevent workers from falling into the water between the ship's side and the adjacent quay • Materials handling operations should follow a simple, linear layout to reduce the need for multiple transfer points. • Development of Safety System. This safety system should include procedures to regulate the safe	Terminal Operator	BIWTA

Environmental and sustainability issue	Issues/Impacts/impact sources	Mitigation Measures	Responsibility	
	• Exposure to dust from handling of dry cargo (depending on type of cargo handled, e.g. cement, grain, and coal) and from roads. • Noise from cargo handling, including vehicular traffic, and loading / unloading containers and ships.	movement of vessels within the harbor (including pilotage procedures), protect the general public from dangers arising from marine activities at the harbor, and prevent events that may result in injury to workers, the public, or the environment. The Safety Management System should include comprehensive emergency preparedness and response plans that provide a coordinated response based on the port and community resources required to manage the nature and severity of the emergency event.		
Community health and safety	• Risk of accidents with activities associated with cargo handling in the terminals, • Visual impacts from the illumination of the ports, and traffic activities associated with the port. • Visual concerns from cargo operations are uncontrolled dumping, floating debris, derelict warehouses and broken machinery	• To minimize impacts on visual concerns of the community and improve the cleanliness of port facilities, it is required to implement regular clean up (in the port facilities and water surface) and maintenance • Visual impacts, including excessive background illumination, should be prevented during the port planning process or managed during operations through the installation of natural visual barriers such as vegetation or light shades, as applicable. The location and color of bulk storage facilities also should be selected with consideration of visual impacts • Separation of people from vehicles and making vehicle passageways one-way, to the extent practical	Terminal Operator	BIWTA
Ship Wastes	• Liquid effluents associated with ships are sewage, bilge water (e.g. from oil tankers), and vessel cleaning wastewater from ships. • Ship sewage and wastewater contains high levels of BOD and Coliform bacteria,	• Establish reception facilities for collection of wastes from ships. • The reception facilities can be fixed, floating or mobile and should be adapted to collect the different types of ship generated waste and cargo residues. • No waste should be disposed in the river. Dust bins	Terminal Operator	BIWTA

Environmental and sustainability issue	Issues/Impacts/impact sources	Mitigation Measures	Responsibility	
	with trace concentrations of constituents such as pharmaceuticals, and typically low pH levels. • Wash water may contain residues such as oil. Pollutants in bilge water contain elevated levels of BOD, COD, dissolved solids, oil, and other chemicals that accumulate as the result of routine operations.	and recycling or chemical toilets, or holding tanks should be provided on the ships. Information should be available for ship captains to identify waste reception facilities and acceptable handling procedures at ports. • The wastes should be adequately disposed or treated, based on the type of waste, in cooperation with the local municipal authorities.		

6.4 Monitoring Program

As one of the key elements of the EMP, a three-tier monitoring program has been 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 EMP particularly the mitigation measures are implemented in an effective manner, and also to evaluate program impacts on the key environment and social parameters. Various types of EMP monitoring are discussed below.

6.4.1 Compliance Monitoring

The purpose of the compliance monitoring is to ensure that the contractor implements the mitigation measures given in the EMP are effectively and timely implemented. This monitoring will generally be carried out by the CSC with the help of checklists prepared on the basis of the mitigation measures given in Chapter 5.

6.4.2 Effects Monitoring during Construction

Effects monitoring is a very important aspect of environmental management to safeguard the protection of environment. The effects monitoring plan proposed for the subprojects is presented in Table 6.6; which will be revisited and revised during EIA studies. The monitoring will comprise surveillance to check whether the contractor is meeting the provisions of the contract during construction and operation of the project including the responsible agencies for implementation and supervision.

Table 6.6: Effects Monitoring Plan

Parameter/ Activity	Location	Means of Monitoring	Frequency	Responsible Agency	
				Implemented by	Supervised by
Dredging	At all dredging points	Ecological inspection of the site prior to development;	Weekly	Contractor	CSC
Pb, Cd, Cr, Cu, Zn, Mn, As, Se, Hg, PCBs, POPs, and hydrocarbons	Riverbed sediments at 6 terminals	Laboratory analysis of material for screening for metals and oil/grease	Before sand extraction	Contractor through a nationally recognized laboratory	CSC
Soil Pollution	At terminal and landing construction sites	Visual inspection that filling is through several compartments	Beginning of earth filling works	Contractor	CSC
	Construction and material storage sites	Ensure no contaminated effluent is leaving from the filling area to the nearby agricultural lands	Weekly	Contractor	CSC
Hydrocarbon and chemical storage	Construction camps and yards	Visual Inspection of storage facilities	Monthly	Contractor	CSC
Traffic Safety	Haul Roads	Visual inspection to see whether proper	Monthly	Contractor	CSC

		traffic signs are placed and flag-men for traffic management are engaged			
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	CSC
	Material storage sites	Visual inspection to ensure dust suppression work plan is being implemented	Monthly	Contractor	CSC
Air quality (PM, CO_2, SOx, NOx)	Near the terminal sites	24 hours continuous monitoring with the help of appropriate instruments and analyzers	Quarterly during the construction phase	Contractor	CSC
Noise	Construction sites	Noise measurement using noise meter; Ensure work restriction between 21:00-06:00 close to the sensitive locations	Weekly	Contractor	CSC
Water quality (For all drinking water parameters including As, and coliforms)	Locations of tube-well installation installed for each landing station	Depth of tube well should be more than 30m. Test water for arsenic and iron 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	CSC External Monitor
	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	CSC
Waste Management	Construction camps and construction sites	Visual inspection that solid waste is disposed at designated site	Monthly	Contractor	CSC
Drinking water and sanitation	Camps, offices	Ensure the construction workers are provided with safe water and sanitation facilities in the site	Weekly	Contractor	CSC

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	CSC	M&E Consultant, BIWTA
Cultural and archeological Sites	At all work sties	Visual observation for chance finds	Daily	Contractor	CSC, M&E Consultant, BIWTA
Restoration of Work Sites	All Work Sites	Visual Inspection	After completion of all works	Contractor	CSC, M&E Consultant, BIWTA
Safety of workers Monitoring and reporting accidents	At work sites	Usage of Personal Protective equipment and implementation of contractor OHS plan	Monthly	Contractor	CSC, M&E Consultant, BIWTA
Grievances	In the project area	Number of grievances registered and addressed	Monthly	PIU	CSC, M&E Consultant, BIWTA
During Operation and Maintenance					
Cleanliness	At all terminal sites	Visual Inspection	Monthly	Terminal Administration Offices	BIWTA
Waste effluents	Along the terminal sites	Visual inspection that solid and liquid waste effluents are properly managed during maintenance works	Six-monthly	Terminal Administration Offices	BIWTA
Waste reception facilities	At the terminal sites	Visual inspection that waste collection facilities are in use	Six-monthly	Terminal Administration Offices	BIWTA
Workers and community health and safety	At all terminal sites	Visual inspection on health and safety issues	Six-monthly	Terminal Administration Offices	BIWTA
Water Quality	At all terminal sites	Sampling and analysis	Six-monthly	BIWTA through a nationally recognised university	BIWTA
Accidents	At all terminal sites	Visual assessment and Interviews with involved people	As and when happened	Terminal Administration Offices	BIWTA

6.5 Third Party Monitoring

The BIWTA will engage an independent consulting firm to conduct external and independent monitoring of the EMP implementation. The main purpose of the external monitoring will be to ensure that all the key entities including E&S, CSC, and contractors are effectively and adequately

fulfilling their designated role for EMP implementation, and that all the EMP requirements are being implemented in a timely and effective manner.

6.6 Performance Indicators

For evaluating the performance of the environmental management and monitoring plan, performance indicators are identified to for efficient and timely implementation of measures/actions proposed in EMP. The indicators are defined both for implementation phase and for operation phase. CSC will be responsible for compiling the information on these indicators and report to BIWTA.

To measure the overall environmental performance of the project, a list of performance indicators is given below, however a detailed list of indicators will be prepared by EIA studies

- Number of inspections carried out by CSC per month
- Number of non-compliances observed by CSC or E&S.
- Availability of environmental specialists in E&S.
- Availability of environmental specialists in CSC.
- Availability of environmental specialists with contractors.
- Timely reporting of documents (as defined in EMP and monitoring plan)
- Number of trainings imparted to stakeholders/other capacity building initiatives
- Timely disbursement of compensation/ timely resettlement of project affectees
- Timely implementation of resettlement schedule.
- Number of grievances received.
- Number of grievances resolved.
- Number of construction related accidents.

6.7 Grievance Redress Mechanism [7]

It was agreed with the BIWTA that the Project will establish a project level Grievance Redress Mechanism (GRM) which will be implemented by Project Implementation Unit (PIU) under leadership of BIWTA Secretary who will oversee the grievance management. GRM will be implemented in two phases: i) Phase 1 to support safeguards implementation, ii) Phase two of GRM will cover all components and overall project implementation. A formal grievance redress process for phase two will be outlined in the project's operational manual and a protocol will be set up and distributed to project staff and implementers. The project level protocol will build on existing institutional grievance management system which will be automated and include a toll free helpline service. It is envisaged that the PIU will have a dedicated person who can oversee the preparation of the guidelines and rollout of the project GRM.

6.8 Capacity Building

Capacity building for effective implementation of the environmental and social safeguard requirements is a key element of the EMP. Capacity building for environmental and social safeguard management will need to be carried out at all tiers of the project, including BIWTA, E&S Cell, CSC, and contractors. At the construction site, CSC will take the lead in implementing the capacity building plan, though the contractors will also be responsible to conduct trainings for their own staff and workers. The various aspects that are covered under the capacity building will include general environmental and social awareness, key environmental and social sensitivities of the area, key environmental and social impacts of the project, EMP requirements, OHS aspects, and waste disposal. Table 6.3 provides a summary of various aspects of the environmental and social trainings to be conducted at the construction site. E&S Cell may revise the plan during the project implementation as required.

[7] Further details on GRM are available in RPF.

During the O&M phase of the project, these trainings will continue to be conducted by BIWTA staff for all relevant O&M personnel and community.

Table 6.7: Environmental and Social Trainings

Contents	Participants	Responsibility	Schedule
General environmental and socioeconomic awareness; Environmental and social sensitivity of the project influence area; Key findings of the EIA; Mitigation measures; EMP; Social and cultural values of the area.	Selected staff of BIWTA, CSC, and contractors	CSC	Prior to the start of the project activities. (To be repeated as needed.)
General environmental and socioeconomic awareness; Environmental and social sensitivity of the project influence area; Mitigation measures; Community issues; Awareness of transmissible diseases Social and cultural values.	PIU; CSC; selected contractors' crew	CSC	Prior to the start of the field activities. (To be repeated as needed.)
EMP; Waste disposal; OHS	Construction crew	Contractors	Prior to the start of the construction activities. (To be repeated as needed.)
Road/waterway safety; Defensive driving/sailing; Waste disposal; Cultural values and social sensitivity.	Drivers; boat/launch crew	Contractors	Before and during the field operations. (To be repeated as needed.)
Camp operation; Waste disposal; OHS Natural resource conservation; Housekeeping.	Camp staff	Contractors	Before and during the field operations. (To be repeated as needed.)
Restoration requirements; Waste disposal.	Restoration teams	Contractors	Before the start of the restoration activities.

6.9 Documentation

The E&S Cell with assistance from CSC and contractors will produce the following environmental reporting documentation:

Environmental Monitoring Reports: The environmental monitoring reports will include environmental mitigation measures undertaken, environmental monitoring activities undertaken, details of monitoring data collected, analysis of monitoring results particularly the non-compliances, recommended mitigation and corrective measures, environmental training conducted, and environmental regulatory violations observed. The environmental monitoring reports will be submitted quarterly during the construction period and annually for three years after completion of construction.

Project Completion Environmental Monitoring Report: One year after completion of construction, the E&S Cell will submit a Project Completion Environmental Monitoring Report which will summarize the overall environmental impacts from the project.

BIWTA will engage External Monitors during construction period to measure the effectiveness and outcome/impact of EMP, as stated earlier. The External monitors will submit the quarterly reports

throughout the contract time, impact evaluation report at the end of each year and finally a completion Report at the end of contract period.

6.10 EMP Implementation Cost

Cost estimates will need to be prepared for all the mitigation and monitoring measures to be proposed in the future subprojects EIAs. The cost estimates for some of the mitigation measures to be identified in the EMP will be part of civil works contract. Tentative cost estimates EMP implementation (beyond civil works contract) for Component 2 works is given in Table 6.8. Detailed cost estimates will be prepared during detailed EIA studies. In addition, USD 14.8 million was provided under Component 3 of the Project for overall EMP implementation of the Project (See ESA Executive Summary) which covers additional studies, institutional strengthening and capacity building measures for PMU.

Table 6.8: EMP Cost Estimates for overall Project (all components)

	Description	Amount, million USD	Project Component (See Table 3.5)
1.	Contractor's Budget (for development and implementation of management plans, staff, training, etc.	1.0	Component 1: IWT
2.	Sediment, water, soil, air and noise quality monitoring during construction (quarterly for 6 years)	0.5	
3.	DSC Environmental and Social Staff	1.0	
4.	CSC Environmental and Social Staff	1.0	Component 2: Terminals
5.	Contractor's Budget (for development and implementation of management plans, staff, training, etc.)	1.5	
6.	Sediment, water, soil, air and noise quality monitoring during construction (quarterly for 6 years)	0.5	
7.	Administrative budget for RPF activities	3.8	
8.	Study, development of action plan, and capacity building of BIWTA to ensure effective and sustainable long-term maintenance of river terminals, landings and other BIWTA assets. Origin destination survey of inland waterways along Dhaka-Chittagong corridor, including understanding which supply chains to promote, and logistics gaps for development	0.5 0.35	Component 3: Institutional Capacity Development and Sustainability
9.	Social NGO to support BIWTA on implementation of Social Management Plans / RAPs for specific investments	0.2	
10.	Third party M&E consultant for social safeguards (including midterm and ex-post evaluations of RAP implementation)	0.25	
11.	Third party M&E consultant for environmental safeguards	0.25	
12.	Environmental NGO or firm to: (a) carry out additional baseline data collection on biodiversity at sensitive locations; and (b) develop and implement biodiversity management programs including habitat enhancement and protection for key species	0.5	
13.	Study to develop strategy and implement pilot program on greening the vessel fleet (including research, outreach, and incentive programs on developing and adopting cleaner technologies such as improvements in vessel engine and propeller design, fuel quality, port operational practices, cargo handling equipment, etc.)	2.0	
14.	PMU Environmental staff	1.5	
	TOTAL	**14.9**	

7 Consultations and Disclosure

Field surveys, consultations with different stake holders, a national consultation workshop and two regional public consultations were carried out to develop a comprehensive Environmental Management Framework (EMF) of the Project. Consultation meetings were held during the field visits to identify issues and problems to enable the institution to corrective measures and to identify lessons and opportunities to enhance Project implementation mechanism.

7.1 Objectives of Consultations

The GoB as well as international donors (e.g. the World Bank) place great importance on involving primary and secondary stakeholders for determining the environmental and social impacts associated with project implementation. In order to gather local knowledge for baseline conditions, understand perceptions of the community regarding impact significance, and propose meaningful mitigation measures, participation of stakeholders is an integral part of the environmental assessment process. During the preparation of the present EMF, initial consultations with the key stakeholders have been carried out to obtain their views on the Project interventions. Additional consultations have been held on this draft EMF as well as the full draft EIA for the Component 1 on 17th and 18th November 2015 at Ashuganj and Barisal, respectively. This process will be continued during the subsequent EIAs of the subprojects.

The consultation process has been conceived, planned, and initiated with the following key objectives:

- To provide key project information and create awareness among various stakeholders about project intervention;
- To share the terms of reference of the current EMF and EIA for the Component 1;
- To have interaction for primary and secondary data collection with project beneficiaries, affectees, and other stakeholders;
- To identify environmental and social issues such as displacement, safety hazards, employment, and vulnerable persons;
- To begin establishing communication and an evolving mechanism for the resolution of social and environmental problems at local and project level;
- To involve project stakeholders in an inclusive manner; and
- To receive feedback from primary stakeholders on mitigation and enhancement measures to address the environmental and social impacts of the project.

7.2 Methodology and Tools for Consultation

The consultation and participation process undertaken so far has adopted a highly participatory approach fully involving all the stakeholders, both primary and secondary. The various tools used for consultations included household level interviews, focus group discussions (FGD), stakeholders consultation meetings, issue specific consultation meetings, open meetings, and workshops. News paper notifications are given before conducting reginal workshops in Ashuganj and Barisal.

7.3 Consultation Meetings and FGDs

A total of 24 consultation meetings were held in the project areas. Both male and female stakeholders were consulted through these meetings. Additionally, teachers, businessmen, village leaders, and local government members, farmers, and fishermen were consulted individually. Female heads of the households were also interviewed. List of consultation meetings and details of participants are given in Table 7.1. Details of consultations meetings carried out at national level in Dhaka and regional level in Ashuganj and Barisal are given in Table 7.2. Photographs of public

consultations are given in Figure 7.1, Figure 7.2 and Figure 7.3. Photographs of village level consultations and FGDs are given in Annex 10.

Table 7.1: Details of Consultation Meetings at the Project sites

S.N.	Venue	Date & Time	Numbers of male Participants	Numbers of Female Participants
1.	Sadar Ghat , Ward No – 37, Thana : Kotwali, District: Dhaka.	17.09.2015 10 AM	31	3
2.	Aganagar Ward No - 05, Thana: Keraniganj, District: Dhaka.	17.09.2015 12 PM	48	3
3.	Jinjira Bottola Union: Jinjira, Thana : Keraniganj, District: Dhaka.	17.09.2015 2 PM	21	3
4.	Munshiganj Launch Ghat Ward No – 03 Thana: Munshiganj Sadar, District: Munshiganj.	18.09.2015 10 AM	58	6
5.	Munshiganj Ferry Ghat , Thana : Munshiganj Sadar, District: Munshiganj.	18.09.2015 12.00 PM	42	3
6.	Narin Pur Ward No - 04, Thana: Titas, District: Comilla.	18.09.2015 3 .00 PM	19	4
7.	Batakandi Bazaar Ward No - 03, Thana : Titas, District: Comilla.	18.09.2015 5.00 PM	60	3
8.	Bhairab Bazaar Launch Ghat Ward No - 01, Thana: Bhairab, District: Kishorganj.	20.09.2015 10. 00 AM	39	0
9.	Ashuganj Ferry Ghat Ward No - 03, Ashuganj, District: Brahmanbaria.	20.09.15 12 .00 PM	38	1
10.	Shatnol Launch Ghat Ward No- 05, Thana : Matlab Uttar, District: Chandpur.	01.10.2015 12.30 PM	19	2
11.	Horina Ferry Ghat, Ward No- 13, Thana: Chandpur, District: Chandpur.	01.10.2015 4 .00 PM	23	0
12	Horina Ferry Ghat (Fisherman), Ward No- 13, Thana: Chandpur, District: Chandpur.	01.10.2015 5.00PM	47	4
13.	Boro Station Mul Head, Ward No- 07, Thana: Chandpur, District: Chandpur.	02.10.2015 11.00AM	15	2
14.	Boro Station (Camp Office), Ward No- 07, Thana : Chandpur, District: Chandpur.	02.10.2015 12.30 PM	15	2
15.	Char Bhairabi, Ward No – 06, Thana: Haimchar, District: Chandpur.	02.10.2015 6 .00 PM	39	2
16.	Moju Chawdhury Ghat, Ward No- 20, Union: Chor Romoni, Thana : Lakshmipur.	03.10.2015 12.30 PM	20	1

S.N.	Venue	Date & Time	Numbers of male Participants	Numbers of Female Participants
17.	Boyar Chor, Chairman Ghat (Fisherman), Union: Horini, Thana: Hatia, District: Noakhali.	04.10.2015 10.30 AM	17	3
18.	Chairman Ghat, 1 No Horini, Thana : Hatia, District: Noakhali.	04.10.2015 12.30 PM	29	2
19.	Tojumuddin Launch Ghat, Ward No-05, Thana: Tojumoddin, District: Bhola.	04.10.2015 1 .00 PM	15	4
20.	Kaliganj Launch Ghat, Ward No-04 Ulania, Thana: Mehendiganj, District: Barisal.	06.10.2015 12.00 PM	9	0
21.	Chadpur Launch Ghat, Ward No. 07, Thana- Chandpur, District: Chandpur.(KII)	02.10.2015 10.00 AM	3	0
22.	Bagoir, Union: Sreenagar Upazila: Raipura District: Narsingdi	19.11.2015 02.00 PM	21	2
23.	Karimpur, Upazila Narsingdi Sadar, District: Narsingdi	19.11.2015 04.00 PM	24	0
24.	Gopinathpur, Upazila Raipura, District: Narsingdi	19.11.2015 03.30 PM	33	0
25	Narsingdi Jute Mill gate Narsingdi	20.11.2015 10.00 AM	10	0
26	Uttar Mogdhara Launch Ghat, Sandwip, Chittagong	26.12.2015 10.30 AM	22	0
27	Kalapania Ghat, Sandwip, Chittagong	26.12.2015 2.30 PM	11	0
28	Tomurudding Launch Ghat, Hatiya, Noakhali	28.12.2015 10.30 AM	21	0
29	Location : Tomurudding Launch Ghat Bazaar, Hatiya, Noakhali	28.12.2015 12.30 PM	18	0
30	Nolchira Steamer Ghat, Hatiya, Noakhali	28.12.2015 3.00 PM	21	0
31	Monpura Launch Ghat, Bhola	29.12.2015 11.30 AM	19	0
		Total	830	47
		Grand Total	877	

Table 7.2: Details of National and Regional Consultations

Location	Date	Male Participants	Female Participants	Total Participants
Dhaka	14 Oct 2015	122	05	127
Ashuganj	17 Nov 2015	67	09	76
Barisal	18 Nov 2015	30	00	30

Figure 7.1: Participants of national workshop at Dhaka

Figure 7.2: Public consultation at Ashuganj

Figure 7.3: Public consultaiton, Laharhat Ferry Ghat, Barisal

7.4 Key Findings of the Consultations

All the stakeholders and community correspondents appreciated the project. The concern of the consultation participants were mainly focused on improvement and extension of terminals, safety and security of passengers, impact on livelihood, dredging and environmental issues including management of dredged materials. The summary of points discussed in these consultation meetings are given in Table 7.3.

Table 7.3: Summary of Consultations

Stakeholders Type	**List of concerned raised**	**Responses and mitigation measures under the Project – Summary**
Shopkeepers	Shopkeepers opined in favor of the project but they want to see the launch ghat improved with more facilities such as toilets, sufficient space for shops on a designated area so that they will be bound to shift their structure frequently. They expressed that the project will increase their business opportunities and new venture of business will be open after completion of the project.	Toilets and drinking water facilities will be included in the design of launch ghats and river terminals. The designs of terminals will also include shops and while leasing out these shops, priority will be given to the affected communities.
Physically Disabled	There is no special facility for the disabled people in the launch terminals and water vessels. But they want separate place in ghat and launch terminals for their easy movement. Wheel chair and bed facilities are available only for patients and for emergency situation. There are no doctors permanently on duty. Disabled persons want proper safety and security in terminal and launch as well. Disable persons do not know the facilities about river transports. Most of the people think that road transport is easier than river transport especially for the disables persons as they cannot swim. They want separate space/seat for them in the launch/ferry and easy riding facility such as smooth way, wheel chairs, etc. If such facilities are provided for the disable people then they may comfortably use the river transport.	Ramps will be provided at the terminals for embark and debark of disabled people.
Fishermen	Fishermen communities are mostly living along the river or within one km from the river. They want modern signalling system and safety and security during fishing. Some time they are to face trouble from pirates or even some politically influenced persons who made them bound to pay money for fishing. They welcomed the project but requested to keep in mind about fish moving routes, season and fishing areas during dredging so that their livelihoods will not be disturbed.	Navigational signals will be provided along the navigational channels. Spawning areas of fish, migratory routes and commercial areas for fishing will be avoided for dredging and dredge material placement.
Launch and Ferry Workers	Launch and ferry workers expressed their views in favour of the project. They are concern about dredging and signalling system in the river routes as there are some incidents of collision among the water vessels. Improved signalling system may decrease accidents. They want sufficient personal protective equipment (PPE) for their safety in the launch and other water vessels. PPE can also be available for the passengers.	Safety measures are included in the project planning and such as provision of river information, VHF equipment and search lights.

Women	Female particularly housewives of the project routes move here and there by launch along with husband or even only with children for their needs. Safety and security, separate space for them in the launch terminals and vessels, separate ticket counter, etc. are their needs.	Separate ticket counters, waiting rooms and toilets will be provided at the women passengers near the terminals. Separate toilets will also be provided at the landing stations.
Mobile Vendors	Usually mobile vendors deal in the ferry/ launch ghats as well as in water vessels. They always move from one ghat to another and sell their goods. They need safety and security in the ghats as well as in the transport. Sometime they face trouble by the policemen and guard of the ghats and vessels	BIWTA will need to provide licenses to the mobile vendors.

7.5 Framework for Future Consultations

Consultations with the key stakeholders will need to be carried out throughout the Project life. These will include consultations and liaison with communities and other stakeholders during the construction phase and also extensive consultations with the grass-root as well as institutional stakeholders during the EIA studies of the various subprojects. The framework for the future consultations is presented in Table 7.4.

Table 7.4: Consultation Framework

Description	Objective/Purpose	Responsibility	Timing
Consultations with communities and other stakeholders during construction phase	Information dissemination; public-relation; confidence building; awareness about risks and impacts; minimizing conflicts and frictions.	E&S Cell, BIWTA; Contractors; CSC	Construction phase
Consultations with communities and other stakeholders during EIA studies of subprojects	Sharing EIA TOR	BIWTA and EIA team	During scoping stage of EIA
	Dissemination of information on project and its key impacts and proposed mitigation measures; soliciting views, comments, concerns, and recommendations of stakeholders	BIWTA and EIA team	During EIA study (once draft analysis is available for discussion and feedback)
Consultations with communities	Liaison with communities and project beneficiaries	BIWTA	O&M phase

7.6 Access to Information

The EMF and RPF reports for Component 2 along with draft ESIA of Component 1 have been disclosed in the BIWTA website and hard copies of the reports have been made available in the BIWTA offices at the existing terminals. The Executive Summary of the Project will be translated in to Bengali and was disclosed in BIWTA website. Hard copies of Bengali version of the Executive Summary have been made available at all the BIWTA terminal sties in the Project area and also sub-district heard quarters. The documents have also been disclosed on the World Bank infoshop.

ANNEX 1: Terms of Reference for Environmental and Social Impact Assessment (ESIA) and Resettlement Action Plan (RAP) of River Terminals, Landing Stations and Vessel Shelters under Bangladesh Regional Inland Water Transport Project 1 (Dhaka-Chittagong-Ashuganj Corridor)

A. Background

The Bangladesh Inland Water Transport Authority (BIWTA) is planning to develop 'Bangladesh Regional Inland Water Transport Project 1 (Dhaka-Chittagong Corridor Project)', which involves investments in development of Inland Water Transport (IWT) routes and infrastructure between Dhaka – Chittagong IWT Corridor, including branches to Ashuganj, Narayanganj and Barisal. The World Bank is currently considering the project for financing. Key components of this proposed project include:

- **Component 1: Improved Inland Waterway Navigation:** This component includes inland Waterway Maintenance through long-term performance-based contracts for: (i) dredging/river maintenance and provision of visual Aids to Navigation Class 1 route between Dhaka and Chittagong Corridor, including Class 1, 2 and 3 branches to Ashuganj, Narayanganj and Barisal; (ii) construction and maintenance of six vessel storm shelters along the aforementioned routes; and (iii) maintenance dredging of the main river ferry crossing routes (Chandpur and Shariatpur; Lakshmipor and Bhola; and Beduria and Laharhat). This component shall include work to maintain advertised depths and mark channel routes through provision of long-term (7-years) performance-based contracts for maintenance dredging and provision of visual aids to navigation including light buoys (lateral marks, cardinal marks, isolated danger and other marks), radar beacons (for navigation during rain and fog), leading lines and other aids to assist day and night navigation.
- **Component 2 Improved Services at Priority Inland Waterway Terminals and Landing Ghats/Stations.** This sub-component includes works to improve six common user cargo and passenger terminals with last mile connectivity access infrastructure as well as fourteen river landings and one general terminal on the Dhaka-Chittagong route and connecting routes. The passenger terminals included are: a new terminal at Shasanghat near Dhaka, and rehabilitation/upgradation of three existing terminals at Narayanganj, Chandpur (reconstruction or completely new construction) and Barisal. The cargo terminals included in the project are: a new terminal at Pangaon near Dhaka and rehabilitation/upgradation of existing Ashuganj cargo terminal.

BIWTA has carried out an Environmental and Social Impact Assessment (ESIA) for the Component 1 and an **Environmental** Management Framework (EMF) and Social Management Framework (RPF) for the Component 2. **The present TOR has been prepared for the detailed ESIA and Resettlement Action Plan (RAP) studies for the works under Component 2 (six Passenger/Cargo Terminals and 14 landing stations and a general terminal) and six vessel shelters under Component 1.**

B. Project Overview

Locations of the proposed sites for the terminals, landing stations and vessel shelters are given in Figure 1. Description of existing and proposed facilities at the terminal sites, landing stations and vessels shelters are given in Table 1, Table 2 and Table 3, respectively.

Table 1 in Annex 1: Details of existing and proposed facilities at the six terminal sties

Passenger Terminal	Existing Facilities	Proposed Facilities
Sashanghat Passenger Terminal Located 2.5 km downstream of the Sadharghat terminal at Dhaka on the Buriganga River	Greenfield site. There are no existing facilities.	The proposed facilities to be developed include: • A Six storied terminal building, with a total floor are of approximately 20,000 square meters; • A quay wall (bank protection) of approximately 250 m length • Three terminal pontoons of approximately 200m length and five steel gangways • A parking yard of approximately 2,000 square meters • new landside pedestrian and vehicle access roadways • pedestrian and vehicle turn-outs, drop-off, collection and waiting facilities
Chandpur Passenger Terminal. Located on Lower Meghna River	Established in 1995. Existing facilities include a walkway (167 m^2), steel jetty – 2 nos, steel spud – 6 nos., pontoon – 4 nos., passenger waiting shed (74 m^2) and parking yard (8010 m^2)	The proposed facilities include: • Land development (21,669 m^3), • 3-storied terminal Building (4061 m^2), • Bank protection (253 m), • Boundary wall (231 m), • RCC Ramp- 3 nos, • Steel gangway – 3 nos, • Spud and spud ring -22 nos. Terminal pontoon -4Nos, • steel jetty (267.65m^2). • Widening of 265 m of access road
Barisal Passenger Terminal Located on Kirtonkhola River (Lower Meghna Tributary)	Established in 1964. Existing facilities include: two storied terminal building, passenger waiting space, 6nos. of pontoons, 4 nos. of gangway, cargo shed, transit shed, parking yard and access road.	The proposed facilities include: • Extension of existing terminal building (346 m^2), • construction of 4 storied multipurpose building for port facilities (5600 m^2), • RCC Ramp 2 nos., • Steel Gangway 2 nos., and • bank Protection works
Narayanganj Passenger Terminal Located on Sitalakya River	Established in 1972. Existing facilities include a single storied building, 4 pontoons, 3 gangways, an RCC jetty and an administrative office. Existing facilities also include cargo handling facilities with 4 pontoons.	The proposed facilities include • extension of existing terminal building, • RCC ramps and • 2 steel gangways.
Pangaon Cargo Terminal Located next to existing Pangaon Container terminal on Buriganga River, near Dhaka	Greenfield site. No existing facilities.	The proposed facilities include: • Two berths, constructed on RCC piles with a suspended deck – total length 190m; • An apron area of approximately 2,750 square meters • A open storage area of 2,220 square

Passenger Terminal	Existing Facilities	Proposed Facilities
		meters; • A transit Shed of 1,500 square meters; • Vehicle parking areas of 500 square meters; and A new port road of 400m length together with a gate house.
Ashuganj Cargo Terminal Located on Upper Meghan River	Established in 2004 primarily for use by. Existing facilities include: office (150 m^2), RCC Jetty (425 m^2), steel jetty (90 m^2), pontoons – 2nos., gangway, warehouse (225 m^2), parking area (1000 m^2)	Proposed facilities include: • office building, RCC Jetty (425 m^2), • steel jetty – (2x45m), • pontoon- 2nos., • gangway – 2nos., • bank protection, • warehouse (225 m^2), and • parking area (2000 m^2)

Table 2 in Annex 1: Details of existing and proposed facilities at the landing stations

Landing Station/ Launch Ghat	Existing Facilities	Proposed Facilities
Bhairab Bazar	Established in 2004. Daily about 300 to 400 passengers use this launch ghat. Existing facilities include two pontoons and one gangway.	The proposed facilities include two pontoons and one gangway.
Alubazar	This is a ferry terminal established in 2001. Daily traffic include 3 launches, 4 ferries and 15 local boats. Daly weight of goods transported is 20 t. Existing facilities include: shore connection seri -1, pontoon -1, steel jetty, ferry ghat with pontoon.	Estimated 0.18 ha of addition land acquisition required for proposed facilities, which include: • Shore connection seri-4 • Steel jetty -45m² • Steel spud – 4nos • Approach Road -372m² • Passenger waiting sheed-75m² • Parking yard – 1860m² • Toilet complex – 42m² • Bank protection -200m²
Horina	This is a ferry terminal established in 2001. Daily traffic includes 2 launches and 4 ferries. Approximate daily weight of goods transported is 15 t. Existing facilities include a ferry ghat with a pontoon	Estimated 0.093 ha of addition land acquisition required for proposed facilities, which include: • Shore connection seri-4 • Steel jetty -45.00m² • Steel spud – 4nos • Approach Road -372m² • Bank protection -200m²
Hijla	The average daily traffic at this launch ghat is 150 passengers and 10 boats. Approximate daily weight of goods transported is 3t. Existing facilities include a shore connection seri and a pontoon	Estimated 0.12 ha of addition land acquisition required for proposed facilities, which include: • Passenger waiting shed:125 m^2 • Parking yard : 2500 m^2 • Toilet complex: 75 m^2 • Access road: 1000 m^2 • Deep tube-well: 01 No

Landing Station/ Launch Ghat	Existing Facilities	Proposed Facilities
Ilisha (Bhola)	The average daily traffic at this launch ghat is 251 passengers and 12 vessels. Approximate daily weight of goods transported is 19t. Existing facilities include 2 shore connection seris and a pontoon	Estimated 0.30 ha of addition land acquisition required for proposed facilities, which include: • Passenger waiting shed:125 m^2 • Parking yard : 2000 m^2 • Toilet complex: 75 m^2 • Access road: 2000 m^2 • Deep tube-well: 01 No
Moju Chowdhury	A ferry ghat established in 2008. Daily traffic is 2 ferries, 2 sea trucks and a launch. Approximate daily weight of goods transported is 20t. Existing facilities include a shore connection seris, a pontoon, and a passenger waiting shed (55 m^2)	Area required for proposed facilities is 0.5 ha but land acquisition is not required. The proposed facilities include: • Shore connection seri-4 • Steel jetty -45 m^2 • Steel spud – 4nos • Approach road • Passenger shed • Parking yard • Bank protection
Laharhat	The average daily traffic at this launch ghat is 277 passengers and 13 vessels. Approximate daily weight of goods transported is 21 t. Existing facilities include: • Passenger waiting shed : 125 m^2 • Parking yard : 3375.00 m^2 • Toilet complex: 75.00 m^2 • Access road: 2000.00 m^2 • Deep tube-well: 01 No • Shore connection sheri-01 • Pontoons- 01	Area required for proposed facilities is 0.28 ha but land acquisition is not required. The proposed facilities include: • Passenger waiting shed: 125 m^2 • Parking yard : 1500 m^2 • Toilet complex: 75 m^2 • Access road: 2000 m^2 • Shore connection sheri-01 • Pontoons- 01
Beduria	The average daily traffic at this launch ghat is 81 passengers and 13 vessels. Approximate daily weight of goods transported is 6 t. Existing facilities include a shore connection seri and a pontoon	Area required for proposed facilities is 0.047 ha but land acquisition is not required. The proposed facilities include: • Passenger waiting shed:125 m^2 • Parking yard : 2000 m^2 • Toilet complex: 75 m^2 • Access road: 2000 m^2 • Deep tube-well: 01 No
Daulatkha	The average daily traffic at this launch ghat is 1000 passengers and 4 vessels. Approximate daily weight of goods transported is 730 t. Existing facilities include a 22 m jetty and 1 pontoon	Area required for proposed facilities is 0.12 ha but land acquisition is not required. The proposed facilities include: • Passenger waiting shed:125 m^2 • Parking yard : 2000.00 m^2 • Toilet complex: 75.00 m^2 • Access road: 2000.00 m^2 • Deep tube-well: 01
Tojumuddin	The average daily traffic at this launch ghat is 307 passengers and 4 vessels. Approximate daily weight of goods	Area required for proposed facilities is 0.12 ha but land acquisition is not required. The proposed facilities include:

Landing Station/ Launch Ghat	Existing Facilities	Proposed Facilities
	transported is 23 t. Existing facilities include 2 shore connection seris and a pontoon	• Passenger waiting shed:125 m^2 • Parking yard : 2000.00 m^2 • Toilet complex: 75.00 m^2 • Access road: 2000.00 m^2 • Deep tube-well: 01 No • Pontoons- 01
Monpura	The average daily traffic at this launch ghat is 207 passengers and 2 vessels. Approximate daily weight of goods transported is 9.5 t. Existing facilities include: • Pontoons-1 • Sheri - 02 • Transit shed • RCC Jetty 625.00 M	Area required for proposed facilities is 0.12 ha but land acquisition is not required. The proposed facilities include: • Passenger waiting shed:125 m^2 • Parking yard : 2000.00 m^2 • Toilet complex: 75.00 m^2 • Access road: 2000.00 m^2 • Deep tube-well: 01 No • Shore connection
Chairman Ghat (Char Bata)	The average daily traffic at this launch ghat is 620 passengers 2 launches, 6 local boats and 12 speed boats. Approximate daily weight of goods transported is 18 t. Existing facilities include: • Steel Jetty (12m) 1Nos • Spud 2 Nos • Pontoon 1Nos • Waiting Shed 45 m^2	0.5 ha of addition land acquisition required for proposed facilities, which include: • Passenger Terminal 120 m^2 • Parking Yard 550 m^2 • Deep tube well -1nos • Approach Road 450 m^2 • Bank Protection 290 m^2
Sandwip RCC Jetty	The average daily traffic at this RCC Jetty is 200 passengers 2 steamer, 10 local boats and 30 speed boats. Approximate daily weight of goods transported is 30 t. Existing facilities include: • RCC Jetty 750m • Waiting shed 60 m^2 • Parking yard 200 m^2	Area required for proposed facilities is 1 ha but land acquisition is not required. The proposed facilities include: • CC Jetty 30m • Harbour Basin • Passenger Terminal 125 m^2 • Parking Yard 550 m^2 • Deep tube well 1nos • Approach Road 450 m^2 • Bank Protection 2000 m^2
Boddarhat Launch ghat	The average daily traffic at this RCC Jetty is 150 passengers 2 launch and 10 local boats. Approximate daily weight of goods transported is 30 t. Existing facilities include: • RCC Jetty 750m • Waiting shed 60 m^2 • Parking yard 200 m^2	0.4 ha of addition land acquisition required for proposed facilities, which include: • Shore connection seri-4 • Steel jetty -185.00m^2 • Steel spud – 4nos • Approach Road -150m^2 • Passenger waiting sheed-100m^2 • Parking yard – 4048m^2 • Toilet complex – 42m^2 • Bank protection -200m^2
Tomuruddin	The average daily traffic at this launch	0.5 ha of addition land acquisition

Landing Station/ Launch Ghat	Existing Facilities	Proposed Facilities
	ghat is 600 passengers 2 launches, a sea truck and 6 local boats. Approximate daily weight of goods transported is 18 t. Existing facilities include: Steel Jetty (28m) 1Nos Spud 2 Nos Pontoon 1Nos	required for proposed facilities, which include: Passenger Terminal 120 m^2 Parking Yard 550 m^2 Deep tube well 1nos Approach Road 450 m^2

Table 3 in Annex 1: Details of existing and proposed facilities at vessel shelters

Vessel Shelter	Existing Facilities	Proposed Facilities
Shatnal Amirabad Chadpur Mehendiganj Sandwip (Sarikait) Nolchira	All the proposed locations are greenfield sites, except in Chandpur where an existing Madrasa Ghat terminal can be modified as vessel shelters	About 4 ha of land acquisition is required for proposed facilities, which include for each site: • Dredging for navigation and basin • Bank protection • Berthing facilities (spud, ramp, gangway, pantoon) • Mooring facilities • Break water system • approach road • Attendant room • Water supply

C. ESIA and RAP Studies

The proposed study is being commissioned to assess environmental and social consequences of the proposed developments including their pre-construction, construction, and operation and maintenance phases, and to ensure that land acquisition and involuntary resettlement required for the project are carried out in line with the World Bank's Operational Policies as well as compliance with applicable national regulations on environment and social aspects. The proposed study is aimed at screening and assessing the proposed developments against adverse environmental and social impacts and recommending, where necessary, appropriate mitigation and enhancement measures, and course of action for implementation. The study will also provide recommendations on gender and disability sensitive design, including aspects of terminal design and management that reduce specific barriers that women and physically disabled face in using the facilities. These include but are not limited to issues of safety, lighting, drinking water facilities, separate toilets and waiting areas.

The ESIA and RAP will need to follow the framework provided in the EMF and RPF prepared for the Bangladesh Regional Inland Water Transport Project 1 (see last paragraph of section A); comply with the World Bank safeguards requirements given in different operational policies (a list of applicable policies are provided at end of this document). The ESIA will also comply with the national environmental requirements defined through Bangladesh Environmental Conservation Act, 1995

and subsequent regulations and guidelines. For purposes of these TOR, it is assumed that two separate ESIA reports (one for terminals and other one covering both landing stations and vessel shelters) will be prepared; however, during the scoping stage the consultant shall verify whether the Bangladesh Department of Environment will require a stand-alone ESIA for each terminal, and if so, shall prepare separate reports for each of terminals.

The ESIA will take into account the natural environment (air, water, and land); human health and safety; social aspects (involuntary resettlement, physical cultural resources and gender aspects and for physically disabled people for terminal design); climate change and its implications, and also induced impacts as well as the cumulative impacts of other development projects in the area. The ESIA will consider natural and social aspects in an integrated way. It will also take into account the country's overall policy framework, national legislation, and institutional capabilities related to the environment and social aspects; and obligations of the country, pertaining to project activities, under relevant international environmental treaties and agreements.

D. Specific Tasks for the Consultant - ESIA

To complete the ESIA study or studies, the consultant will carry out the following tasks

1. Review the Project details

Review the proposed developments and their geographic, ecological, social, and temporal context, including any offsite investments that may be required. Work closely with BIWTA and its design consultants to identify the need for any additional land requirements for proposed developments, including associated facilities or other directly related investments. Review the ESIA for Component 1 and EMF and RPF studies for investments in Component 2 (documents are available on BIWTA website). Define 'project influence area' on the basis of the project scope and extent. Review the shapes of river channels within the influence area and how they change over time.

2. Review of the Legislative and Regulatory Framework

Review the policy, legal, and administrative framework within which the ESIA is carried out. Review the national environmental requirements. Identify relevant international environmental agreements to which the country is a party. Review the country's resettlement and rehabilitation policies. Also review the WB OPs and their triggering status for the Project. Also state the policy requirements as applicable to the proposed investments, and actions taken/planned in response to each OP triggered.

Review existing systems on grievance management and citizen's feedback within BIWTA, and suggest measures for strengthening to ensure access to community and timely response during both construction and operation phases of the proposed subprojects.

3. Scoping

Scoping is the first step of the ESIA and is essentially the process of identifying the significant issues relating to the proposed action and of determining the scope of the issues to be addressed in the ESIA. The key tasks include: i) carry out reconnaissance field visits; ii) carry out stakeholder mapping, hold initial stakeholder consultations, and develop a stakeholder participation plan for the completion of the studies; iii) identify the key aspects to be studied during the detailed ESIA, iv) finalize ESIA ToRs in consultation with the stakeholders for approval of DOE if required; v) prepare work plan for the subsequent ESIA tasks; and vi) prepare the Scoping Statement compiling the process and outcome of the scoping tasks described above. Review the definition of project influence area and revise if necessary. Facilitate, on behalf of BIWTA, the obtaining of DOE's approval of the final TORs for ESIA, if required.

4. Project Planning and Analysis of Alternatives

Provide input to the BIWTA and its design consultants for inclusion of waste collection and treatment facilities (ship related waste management), land use planning, climate change adaptation and resilience, last mile connectivity, female and physically disabled friendly facilities(such as separate toilets, waiting areas and ticket counters, inspection areas, adequate lighting and safety features, etc.), relocation of public facilities (for example, the local boat crossing point at Pangaon to be relocated), and access roads to public facilities (e.g. access to graveyard/burial and ashes immersion sites will be restricted at both Pangaon and Shasanghat) to be incorporated in the project planning and design. In addition to these, study integrating the resettlement aspects into the design process, for e.g. provision for building of shops and facilities (that affected people can be given priority to occupy) in the terminal designs.

Systematically compare feasible alternatives to the proposed project location, design, and operation - including the "without project" situation - in terms of their potential environmental and social impacts; and state the basis for selecting the particular project design.

5. Detailed Baselines Studies and Analysis

Review relevant physical, biological, and socioeconomic conditions of the study area, including any changes anticipated before the project commences. Also identify current and proposed development activities within the project area but not directly connected to the project. Also analyze the trends in the key environmental and social parameters of the area. Data should be relevant to decisions about project location, design, operation, or mitigatory measures.

Review the primary and secondary data collected during the preparation stage of the Bangladesh Regional Inland Water Transport Project 1 by the IWM ESIA team, and presented in EMF and RPF reports, and collect additional data if required on the following aspects:

Physical Environment. The data on physical environment should cover, inter alia:

- physiography,
- climate,
- geology and seismology,
- soils,
- hydrology and river dynamics, including annual and seasonal peak discharges, recurrence intervals and flood levels for various peak discharges (including at minimum for 5, 10, and 100-year flood events as well as historic maximum discharge), annual and seasonal low-flow discharges and recurrence intervals including historic minimum discharge, etc.
- groundwater,
- vulnerability of area to flooding and storm surges,
- river morphology, including erosion and sedimentation / sediment deposition patterns, currents and bathymetry
- soil quality,
- river bed sediment quality, in areas where dredging may be required and/or construction activities may disturb sediments, such as piling works (including the presence of contaminants, pollutants or heavy metals such as PCBs, POPs, hydrocarbons, and heavy metals such as arsenic, cadmium, mercury, etc.).
- water quality, in particular including major ions, TSS, TDS, DO, BOD, NO3, pH, etc.,
- ambient air quality and noise

Characterize the baseline status for each parameter, and discuss trends underway independent of the project which could change baseline conditions over the life of the project, including trends in land use changes and climate change.

Biological Environment. The data on biological environment should cover, inter alia:

- natural habitats and ecosystems;

- flora - trees, grasses, others;
- fauna - mammals, birds including migratory birds, reptiles, amphibians, insects, fish and red listed species;
- biodiversity including carrying capacity;
- protected and non-protected areas including hunting, poaching, illegal fishing;
- wetlands;
- fish;
- benthic flora and fauna; and
- others as identified by the consultant.

The trends underway independent of the project which could change baseline conditions over the life of the project, including trends in land use changes and climate change, should also be covered.

Socio-Economic Baseline. The socioeconomic baseline should identify and characterize all affected households as well as general socioeconomic aspects of the area of influence of each project investment location. This shall include using mobile application to geo-tag all affected households with Photographs of household members and the asset(s) affected, prepare maps of affected households and communities, and describe their present socioeconomic conditions, mobility, livelihoods, gender and vulnerability based on household surveys of all directly and indirectly affected households, and consultations with communities and key stakeholders. The data will also cover:

- population and demography;
- use of land, river and natural resources in the project area including for agriculture, fishing, livestock, grazing;
- other economic activities e.g. sand quarrying/extraction, trade, services;
- existing river traffic (both commercial and recreational) and navigation routes, etc; existing traffic patterns on access routes;
- social infrastructure and services including education, health, communications, others;
- economic activities;
- identification of direct and indirect beneficiaries;
- access and security;
- community organizations;
- vulnerable groups and poverty situation;
- gender aspects;
- Physically disabled;
- recreation areas;
- cultural heritage and cultural property;
- objects of special interest, e.g. cultural practices, graveyards and monuments; and
- others as identified by the consultant.

6. Stakeholder Consultations

The consultants need to identify all the stakeholders; both direct and indirect, and carry out a detailed stakeholder analysis and identify key stakeholders at each site. Continued consultations are required during the project preparation with the affected communities and relevant stakeholders. In addition, at least two major consultation meetings are to be held at the project sites (the first one during the initial stages of ESIA study and the second one after

preparation of draft ESIA report) with the affected communities and businesses as well as other relevant stakeholders including boat owner associations, commuters, auto-rickshaw unions, women, institutional stakeholders and local nongovernmental organizations, etc. Consultation methodologies should also include focus group discussions (FGD) and key informant interviews, which shall be briefly documented using mobile application and geo-tagged, to complement larger consultation events and ensure social inclusion of the consultation process. FGD should include in particular different user groups of the future terminals, including specific FDGs with women only, as well as with stakeholders with physical disabilities. All consultations shall be fully documented, including with photolog, and included in an annex to the final ESIA report. Documentation should include dates and locations of consultation events, stakeholder groups consulted, information shared and issues raised, and how feedback received will be taken into account in the analysis and design of the project.

7. Environmental Impact Assessment

Predict and assess the project's likely positive and negative impacts, in quantitative terms to the extent possible, associated with Project siting, design, construction, and operation. This analysis will require in depth interpretation, particularly on impacts related with instream construction activities such as piling, bank protection works and dredging (on aquatic ecology and river erosion); disposal of dredge spoils; management of solid and liquid waste (from ships and cargo activities); water and sanitation; air and noise quality; site remediation and disposal of contaminated soils– especially for Shasanghat where the site is currently being used for metal scrap business, ship breaking and fabrication facilities; occupational health and safety issues; on-land traffic impacts, emergency management; and traffic safety issues associated with terminal development and ongoing use. Predict the impacts and mitigation measures due to construction of breakwaters, RCC piles and sheet piles. Analyze the morphology of river channels within the influence area and how they change over time due to construction of proposed facilities and the increased traffic movement.

Explore opportunities for environmental enhancement. Identify and estimate the extent and quality of available data, key data gaps, and uncertainties associated with predictions, and specify topics that do not require further attention.

8. Social Impact Assessment

Assess the impacts of land acquisition (if any) and land use change (even if it is government land) on the livelihoods of the affected people and their socioeconomic conditions through detailed census surveys, and identify the options for resettlement of affected people and restoration of their livelihoods through focused consultation with affected groups. Assess the impact of proposed developments on the access to public facilities, community health and safety, gender and employment

The social research and census surveys should cover the squatters living in the proposed development areas owned by BIWTA (for e.g. in Pangaon area about 50 both residential and commercial; in Shashaghat area about 50 businesses dealing with scrap from shipbreaking and fabrication; in Barisal area about 60 shops) There are common property resources to be considered during the assessment at both sites. A robust socio-economic baseline of all these affected people will form the backbone of this assessment. The assessment should not limit the surveys to the impacts cited here, but list all the direct and indirect impacts due to the proposed project. All socio-economic survey should be carried out using mobile device for real time data collection.

The social impact assessment will cover the directly affected people and affected communities to formulate development strategies in order to assist in determining project impacts on the social, economic, cultural, and livelihood activities of affected communities. This will establish a social baseline against which changes resulting from the intervention can be measured in the future. A socio-economic survey of the area to analyse the demographic, socio-economic cultural and other

social relations and stakeholders needs to be conducted. Local tenure and property rights arrangements, which may include usufruct or customary rights to the land or other resources taken for the project including common property resources needs to be assessed.

9. Cumulative and Induced Impacts

Consider and assess the cumulative impacts of other development projects in the area (on-going and planned). In particular, review the projects and facilities associated with IWT and consider and assess any potential interaction of impacts of those projects with those of proposed facilities.

10. Environmental Management Plan (EMP)

Prepare EMP complete with mitigation plan, compliance monitoring plan, effects monitoring plan, institutional arrangements, training needs, documentation and communication protocol, grievance redressal mechanism, cost of implementing EMP, and mechanism to integrate EMP with the Project (e.g., through design changes, contractual clauses, etc.). Prepare environmental code of practices (ECoPs) with standard mitigation measures and best management practices to address the impacts associated with both during construction and operation phases of the proposed facilities. Describe in details who will (a) implement the environmental mitigation activities; (b) carry out environmental monitoring; (c) supervise environmental mitigation and monitoring; (d) design, implement and apply the environmental management information system (EMIS); and (e) prepare monthly/ quarterly progress reports on environmental management. Include measures for emergency response to accidental events (such as entry of raw sewage or toxic wastes into the river, collision of boats, flooding of facilities, etc.). Provide an itemized budget for implementing the EMP, as well as descriptions of minimum qualifications for key personnel responsible for its implementation. Prepare a detailed plan, including schedule and necessary budget, to monitor the implementation of mitigating measures and the impacts of the project during construction and operation (e.g., emissions thresholds and ambient levels of pollutants where these may be detrimental to human health, soil erosion, etc.). Provide guidance for reporting and enforcement and conducting environmental audits.The EMP should be divided into two sections: one encompassing the requirements of the civil works contractors (in a format that can be annexed easily to the bid packages), and one for all other aspects of environmental and social management during construction and operational phases.

11. Resettlement Action Plan (RAP)

A stand-alone Resettlement Action Plan shall also be prepared, in accordance with World Bank OP 4.12 on Involuntary Resettlement, as well as applicable Bangladeshi land acquisition, resettlement and rehabilitation laws, regulations and guidelines.

Aside from the RAP (described below), the social management plan should be delivered as a stand-alone section of the ESIA and should include, among other aspects: (i) Social mitigation and enhancement measures for the proposed investments, ii) Grievance redressal mechanism, iii) Monitoring protocol, and iv) Strategies and plans for a) Community consultation and engagement, b) Women engagement, c) Small, ethnic and vulnerable communities development, d) Communication plan and e) Capacity building.

In preparation of the RAP and any other social management plan, the tasks to be performed are as below:

- To photograph the affected/ displaced family with the affected assets and number each asset; to videograh the entire affected area including the affected land and assets.
- To conduct census survey of all PAPs residing/ using the corridor of impact to collect an inventory of types and extent of losses of each affected household, family composition and

details on age and sex of all the members of the household, income and expenditure levels and occupational patterns, vulnerability status, legal ownership status (private, traditional and customary ownership, lease), asset ownership status and skills possessed. Prepare a fact sheet and attach the photograph of each project-affected person/family.

- Assess in detail all the adverse impacts and categorise each type of losses specific to the project area.
- To conduct focus group discussions on the preliminary designs options such on location, accessibility, facilities, safety and others and integrate the outputs in the technical design with that of the mitigation measures proposed.
- To carry out public consultations with different project affected social groups about their options and rights pertaining to resettlement and with other stakeholders like NGOs, District Administration, etc., and provide a plan for continuous public consultation during implementation.
- Identification of key formal and informal institutions operating at village, up-zilla and regional levels and assessment of their role in community decision making processes as these affect project activities.
- To carry out market survey and focus group discussion with different social groups including women and vulnerables to prepare socially, technically and economically feasible income generations schemes including skill upgradation plans.
- To determine the legal framework of private land, customary and traditional laws governing land tenure, usufruct rights, leasehold and land acquisition, or transfer plans for the total project including for tree plantation, if any, according to the revenue records (including acquisition for temporary purposes).
- Based on draft detailed designs conduct field verification and consultation to identify locations for further minimization of social impacts if any, and integrate with final designs.
- To establish the legal status of the affected people and carry out joint verification with the revenue department and implementing agency, of the project affected area to pre- pare land acquisition plans and provide specific details on the gaps between physical ownership and revenue records; identify land allotted to affected people by government departments and other agencies, if any.
- Modify and update database of project affected persons on a user friendly platform.
- To finalize estimate of land required for resettlement and for economic rehabilitation.
- To identify the land and prepare a plan for relocation in consultation with the project displaced people with different social groups including women and local administration.
- To prepare a plan that ensures the host population will not be adversely impacted and plan for consultation on the impact on resources and infrastructure with increase in population of the host areas.
- Based on project RPF policy provide an appropriate action plan for additional support for the vulnerable, and other action plans if necessary.
- To determine the impact on community assets/ cultural property and prepare a management plan for relocation and restoration in consultation.
- To develop terms of reference for NGOs, external evaluation consultants, and for any other study identified for impact evaluation.
- To assess institutional capacity and propose the institutional arrangement for implementation of RAP, addressing grievances, and ensuring gender equity, and identify the roles and responsibilities of each agency.
- To identify various formal and informal institutions that may provide support for the implementation of RAP.

- To develop a training program on R&R, based on the assessment of the capacity of the implementing agency.
- To develop monitoring indicators and formats for physical and financial progress, process monitoring and impact evaluation and indicators to for other stakeholders and finalize the same.
- To prepare an implementation schedule synchronized with time frame of civil works, and ensure that no civil works will begin until people are fully compensated and adequately rehabilitated.
- Conduct risk assessment for proposed mitigation measures.
- To develop detailed budget based on the based on the outcomes of study.
- Develop a mobile based web based interactive application for monitoring, grievance redressal and feedback, which can be used by the community including PAPs, during preparation and implementation.

E. Deliverables

The deliverables to be submitted are:

- Inception report, including results of scoping, final proposed TOR for ESIA, and work plan
- Executive Summary (a summary of the ESIA report), written in a form that is understandable and accessible to a layman audience, in both English and Bengali
- Draft and final ESIA Reports, including Environmental and Social Management Plans (e.g. for social plans: relocation of ghats, enhancement of ghat and terminal facilities, etc.)
- Draft and final Resettlement Action Plan, with adequate measures for compensation, relocation, livelihoods restoration, grievance redresses and budgetary provisions, in both English and Bengali

F. Time Schedule

The assignment is expected to be completed within 10 months. The inception report should be submitted within 4 weeks. The draft ESIA and RAP reports along with management plans should be submitted at the end of the 6th month.

G. Study Team

The proposed core team for the ESIA study is given below. The man months shown are initial estimates only for core skill areas, and may not be inclusive of all required skills and team members necessary to complete the studies. The consultant is responsible to make a determination on the required staffing to complete the assignment, and is free to employ whatever resources are required.

S.No.	Key Specialists	Man Months
1	Environmental Specialist and team leader – International experience with experience on ESIAs for ports or terminals	10 months
2	Environmental engineer – National with expertise on	4 months

	management and remediation of contaminated soils and sediments, preferably with relation to port or terminal development	
3	Ecologist – National with experience on river ecology, and preferably prior knowledge of the ecology of the relevant rivers under study.	5 months
4	Social Development and Social Research Specialist – International experience with experience in SIA and preparation of RAPs	10 months
5	Community Engagement Expert – National with experience in engaging communities in preparation of RAPs; preferably female 2 persons	6months for each person
6	Gender Expert – National with experience in gender mainstreaming in preparation of RAPs; preferably female	4 months

H. Applicable OPs

Operational Policies (OP) /Bank Procedures (BP) that are applicable to the proposed ESIA study are:

OP / BP 4.01	Environmental Assessment
OP / BP 4.04	Natural Habitats
OP 4.11	Physical Cultural Resources
OP / BP 4.12	Involuntary Resettlement
OP / BP 7.50	Projects on International Waterways
BP 17.50	Disclosure of Operational Information

The consultants will also make use of and follow applicable thresholds and standards outlined in the WBG Environmental, Health, and Safety (EHS) Guidelines, including both General EHS Guidelines as well as EHS Guidelines for Ports, Harbors and Terminals (available for download at http://www.ifc.org/wps/wcm/connect/9e558c00488556ebbaf4fa6a6515bb18/Final%2B-%2BPorts%252C%2BHarbors%2Band%2BTerminals.pdf?MOD=AJPERES&id=1323152828015).

I. I Proposed/Indicative Structure of EIA Report

The suggested and indicative contents of the EIA report is given below

Executive Summary

Concisely discusses significant findings and recommended actions.

1. Introduction

1.1 Overview

1.2 Background of the project

1.3 Objective of EIA

1.4 Approach to work

1.5 Area/Corridor of Impact

1.6 Composition study team

2. Legal and administrative framework

2.1 GoB requirements (legislation; guidelines and rules; policies; international treaties signed by Bangladesh; national and provincial authorities; environmental procedures), their applicability, and compliance status for the Project.

2.2 World Bank requirements (operational Policies and safeguard requirements; and WBG Environmental Health guidelines) and their triggering and compliance status for the Project.

3. Project description

3.1 Need and purpose of project
3.2 Project location
3.3 Salient features
3.4 Description of project components
3.5 Construction activities
3.6 Construction machinery, materials and other supplies (including estimated numbers/quantities)
3.7 Waste generation and disposal (including estimated quantities)
3.8 Manpower requirements
3.8 Operation and maintenance (supplies; waste generation and management; manpower requirements; others).

4. Baseline description/analysis

4.1 Study area
4.2 Physical environment
4.3 Biological environment
4.4 Social and economic environment
4.5 Cultural aspects (cultural heritage; archaeology; and other objects of special interest, e.g. graveyards, monuments).

5. Project alternatives

5.1 Without project alternative
5.2 Site Options
5.3 Design Options
5.6 Other temporary and permanent facilities

6. Climate Change

6.1 Climate Change
6.2 Risk of flooding

7. Public Consultation and Information Disclosure

7.1 Scoping sessions
7.2 Focused group discussions
7.3 Public consultations
7.4 Information disclosure

8. Potential environmental impacts and their mitigations

8.1 Impact assessment, prediction, and characterization method.
8.2 Impacts during construction phase
8.3 Impacts during operational phase
7.4 Impacts during decommissioning phase.

9. Potential social impacts and their mitigations

9.1 Resettlement and compensation
9.2 Impacts and their mitigations during construction phase
9.3 Impacts and their mitigations during operational phase.

10. Cumulative and Induced Impacts

10.1 Cumulative impacts of on-going and planned projects in the area and on Indus River
10.2 Induced impacts of the Project.

11. Environmental management plan (EMP)

11.1 Types of impacts and their mitigations
11.2 Mitigation measures
11.3 Environmental Code of Practices
11.4 Monitoring Plan
11.6 Communication and documentation
11.7 Cost of EMP
11.8 Integration with Project (contract clauses, others)

11.9 Grievance redressal.
11.10. Institutional strengthening
REFERENCES
ANNEXES
- Flora and fauna list
- Documentation on Public consultations
- Environmental code of practices, etc.

The suggested and indicative contents of the SIA and RAP report is given below:

Executive Summary: Concisely discusses significant social findings and recommended mitigation measures and actions.

1. Introduction
- 1.1 Overview
- 1.2 Background of the project
- 1.3 Objective of SIA and key tasks
- 1.4 Approach and methdology
- 1.5 Area/Corridor of Impact
- 1.6 Composition study team

2. Legal and administrative framework
- 2.1 GoB requirements (legislation; guidelines and rules; policies; international treaties signed by Bangladesh; national and provincial authorities; social procedures), their applicability, and compliance status for the Project.
- 2.2 World Bank requirements (operational Policies and safeguard requirements; and WBG Environmental Health guidelines) and their triggering and compliance status for the Project.

3. Project description
- 3.1 Need and purpose of project
- 3.2 Project location
- 3.3 Salient features
- 3.4 Description of project components
- 3.5 Construction activities
- 3.6 Construction machinery, materials and other supplies (including estimated numbers/quantities)
- 3.7 Waste generation and disposal (including estimated quantities)
- 3.8 Manpower requirements
- 3.8 Operation and maintenance (supplies; waste generation and management; manpower requirements; others).

4. Baseline description/analysis
- 4.1 Study area
- 4.2 Demographic Profile
- 4.3 Socio-economic profile
- 4.4 Socio-economic analysis based on primary data
- 4.4 Cultural aspects (cultural heritage; archaeology; and other objects of special interest, e.g. graveyards, monuments).

5. Stakeholder Analysis
- 5.1 Stakeholders at different levels
- 5.2 Stakeholder expectations
- 5.3 Overall issues emerged during consultations

6. Public Consultation and Information Disclosure
- 6.1 Stakeholder consultations
- 6.2 Focused group discussions
- 6.3 Public consultations
- 6.4 Information disclosure

7. Potential social impacts and their mitigations

7.1 Impacts
7.2 Risks and Assumptions
7.3 Issues of significance
7.4 Resettlement and compensation
7.5 Impacts and their mitigations during construction phase
7.6 Impacts and their mitigations during operational phase.

Annexure

I. Resettlement Action Plan (RAP) as an annexure

1. Introduction

1. Brief Introduction of the sub-project
2. Description of Component(s) that cause land acquisition/alienation and resettlement
3. Overall Estimates of Land Acquisition and R&R

2. Measures to Minimize Resettlement

1. Description of Efforts Made for Minimizing Displacement
2. Description of the Results of these Efforts
3. Description of Mechanisms to Minimize Displacement and Loss of Livelihood/Income during Implementation

3. Census and Socio-Economic Surveys

1. Provide the results of the census and socio-economic surveys
2. Identify all categories of impacts and the extent of impact on each affected

4. Consultation and involvement of PAPs

1. Describe various Stakeholders
2. Summarize process of consultation on the results of socio-economic surveys
3. Describe the need and mechanisms to conduct updates to socio-economic surveys
4. Describe how this process of consultation would be continued through implementation and monitoring
5. Describe the plan for disseminating information to Project Affected Persons

5. Entitlement Framework

1. Provide a definition of PAFs and PAPs together with their categorization based on impacts
2. Describe R&R entitlements for each category of impact
3. Describe method of valuation used for affected land, structures and other assets
4. Using Entitlement Matrix, present a table of all PAFs/PAPs and their losses/ impacts and entitlements

6. Relocation (if applicable)

1. Does the Project need community relocation sites? If yes, have they been inspected and accepted by PAPs?
2. Have the Project Affected Persons agreed to the strategy for housing replacement? Will new housing be constructed/allocated? If PAPs are to construct houses, explain if compensation entitlement for housing is sufficient to help them construct houses.
3. List of proposed sites along with number of affected families to be relocated
4. Describe respective mechanisms for (i) procuring/acquiring/alienating ; (ii) developing and (iii) allotting resettlement sites
5. Provide detailed description of arrangements for development of resettlement sites including provision of social infrastructure
6. Describe the feasibility studies conducted to determine the suitability of the development of sites.

7. Income Restoration

1. Are the compensation entitlements sufficient to restore income streams for each category of impact? If not, what additional economic rehabilitation measures are necessary?
2. Briefly spell out the restoration strategies for each category of impacts, and describe institutional, financial and technical arrangements/aspects involved
3. Describe the process of consultation with PAPs to finalize strategies for income restoration
4. How do strategies for restoration vary with the area/locality of impact
5. If income restoration involves change in livelihoods or other economic activities allow substantial amount of time for capacity building, accessing institutional funds/credits/markets, preparation and implementation. Work out the rate of returns for each of the economic activities opted by the entitled person.
6. How are the risks of impoverishment proposed to be addressed?
7. Explain the main institutional and other risks for effective implementation of plans for restoration of livelihood
8. Describe the process for monitoring the effectiveness of income restoration activities

8. Institutional Arrangements

1. Describe institution(s) responsible for: (a) delivery of each item/activity in the entitlement policy; (b) implementation of resettlement and rehabilitation programs and (c) coordination of all other activities as described in the Rehabilitation Action Plan
2. State how coordination issues will be addressed in cases where resettlement and rehabilitation are spread over a number of institutional/departmental jurisdictions
3. Indicate the agency that will coordinate all implementing agencies – do they have the necessary mandate and the resources
4. Describe the external (non-Project) institutions/departments involved in the process of resettlement and restoration of income such as land development, land allocation, credit, training for capacity building and the mechanisms in place to ensure adequate cooperation and performance of these institutions/departments
5. Describe the results of the institutional capacity assessment and give the institutional development plans including staffing schedule and training requirements
6. Discuss institutional capacity for, and commitment to, resettlement and rehabilitation

9. Monitoring and Evaluation

1. Describe the internal monitoring process
2. Define key monitoring indicators for resettlement, rehabilitation and participation and provide a list of these indicators which would be used for internal monitoring
3. Describe institutional (including financial) arrangement
4. Describe frequency of reporting and contents of reports
5. Describe the process for integrating feedback from internal monitoring into implementation
6. Describe financial arrangements for external monitoring including process for awarding and maintenance of contracts for the entire duration of R&R
7. Describe the methodology for external monitoring
8. Describe frequency of external reporting and its contents

10. Redress of Grievances

1. Describe the structure and process of grievances mechanisms at various levels including step-by-step process for registering and addressing grievances and provide specific details regarding registering complaints, discussing them with PAPs, response time, communication modes etc.
2. Describe the mechanism for appeal
3. Describe the provision, if any, to enable PAPs to approach civil courts in case these provisions fail.

11. Implementation Schedule

1. List the chronological steps in implementation of R&R Action Plan including identification of agencies responsible for each activity along with a brief explanation of each activity

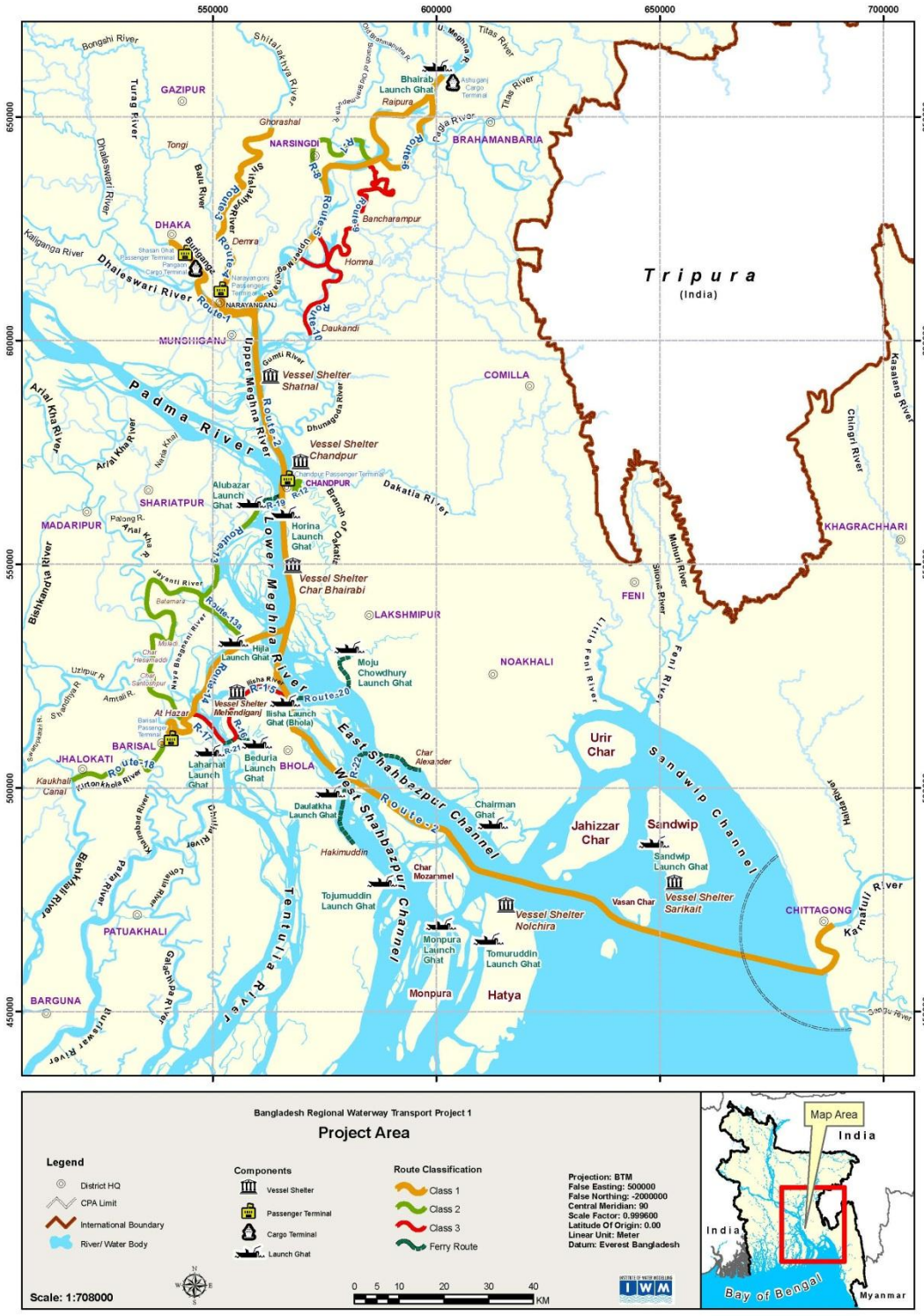
2. A month-wise implementation schedule (Gantt chart) of activities to be taken as part of R&R Action Plan
3. Description of the linkage between R&R implementation and initiation of civil works for each of the Project component

12. Costs and Budgets

1. Clear statement of financial responsibility and authority
2. List the sources of funds for R&R and describe the flow of funds
3. Indicate if costs of R&R are included in the overall Project costs
4. Identify R&R costs, if any, to be funded by the WB
5. Provide a cost-wise, item-wise budget estimate for the entire R&R costs including administrative expenses, monitoring and evaluation and contingencies
6. Describe the specific mechanisms to adjust cost estimates by *inflation* factor
7. Describe provisions to account for different types of contingencies

II Documentation on Public consultations

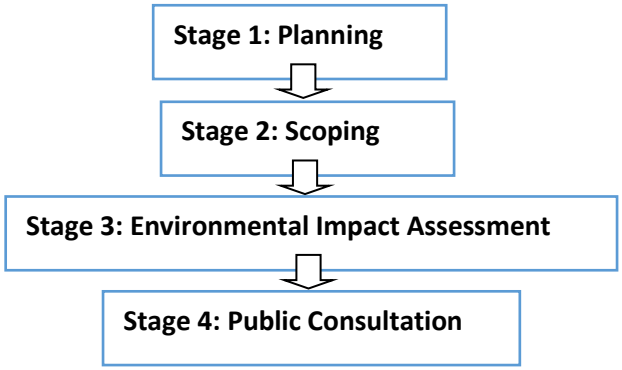
Figure 1 in Annex 1: Locations of the proposed terminal, landing stations and vessel shelter sites



ANNEX 2: Scope of Work for ESIA studies for Improvement of Terminals and Landing Stations

1.1. Environmental Assessment Process

The environmental assessment will be conducted using major stages as shown in the following diagram.



Stage 1: Planning

Soon after the commencement of planning and design process, based on desk study, reconnaissance survey and experience of earlier projects, detailed methodology and schedule should be prepared for the effective and timely execution of the Environmental Assessment.

Desk Study: To collect the secondary information and checking out the methodology for carrying out the EA study and fixing of responsibilities of the EA team members for preparing a complete, addressing all issues, Environmental Management Plan.

Reconnaissance survey: To collect the first hand information about the project area and develop a perspective of the entire team and revise the methodology and work program.

Experience from Earlier Project:

Focus on the main issues: It is important that the EA does not try to cover too many topics in too much detail. Effective scoping can save both time and money by focusing the EA studies on the key issues.

EA requires the formation of a multidisciplinary team and the leadership of a strong EA coordinator. The range of effects considered in the EA requires the skills of technical experts to be employed on an assessment team, led by a Team Leader. It is important to involve the right people (e.g., scientists, engineers, policymakers, government representatives, representatives of public interest groups and the local community) and agencies (e.g., the developer, the aid agency, regulatory authorities and politicians) in the EA process. Selection will be made through consultation at different stages.

Make maximum use of existing information before engaging expensive field studies.

Determination of Project influence Area. Based on reconnaissance survey and desk study and modeling, project influence area will be finalized.

Present clear and appropriate options for mitigation of impacts and for sound environmental management. Mitigation is an integral part of impacts assessment. Application of appropriate mitigation can eliminate or reduce negative impacts, and improve the net overall environmental

performance of a project. Hence public consent, practical viability will be considered in proposing the mitigation measures.

Post-EIA audits and monitoring programs are essential to ensuring that EA commitments are carried out and that future EA improve. An effective monitoring plan will be proposed in consultation with the client and the World Bank. Proper budgeting will be ensured for smooth functioning of monitoring plan proposed.

Stage 2: Scoping

Scoping will identifies which of the activities has a potential to interact with the environment. Scoping will be conducted early in the EA process so that a focus on the priority issues (i.e. those that have the greatest potential to affect the natural and/or environment) can be established for the rest of the EA process. Necessary consultation with stakeholders will be made after scoping to incorporate any unattended issues. Key elements/inputs to the scoping exercise will be as follows:

- Gathering and reviewing existing environmental data like atmosphere, climate, topography, congestion area, alternative requirement, land use pattern, hydrology and drainage pattern, major River and waterways, religious, cultural and archaeological sites and sensitive areas.
- Identifying project stakeholders; including PAPs, Government and non-government agencies (utilities), Bangladesh Water Development Board, Department of Fisheries, Agricultural Department, Department of Environment (DOE) etc.
- Assemble and review relevant legislative requirements, environmental standards and guidelines (national and international) associated with the proposed development as well as the World Bank's operational policies and standards.
- Gathering existing information sources and local knowledge;
- Informing stakeholders of the project and its objectives and get input on the EA;
- Identifying the key environmental concerns (community and scientific) related to a project and the relative importance of issues;
- Defining/preparing the EA work program, including a plan for public and stakeholder involvement;
- Carrying out monitoring of natural environment including air, water, soil, noise etc.
- Defining the range of project alternatives to be considered.
- Obtaining agreement/consensus on the methods and techniques to be used in EA studies and document preparation;
- Determining/freezing the spatial and temporal boundaries for the EA studies.

The following issues will be addressed through scoping, but will not be limited to.

- To improve the quality of EA information by focusing scientific efforts and EA analysis on truly significant issues;
- To ensure environmental concerns identified and incorporated early in the project planning process, at the same time as cost and design factors are considered;
- Reducing the likelihood of overlooking important environmental issues;
- Thinning the chance of prolonged delays and conflicts later in the EA process by engaging stakeholders in a constructive participatory process early in the EA process.

The scooping report will be submitted to DOE in a form of IEE for approval.

Stage 3: Environmental Impact Assessment

After conducting IEE, the EIA should be conducted, as per TOR for EIA suggested in IEE study and approved by DOE. The process of EIA study is briefly described below.

Analysis of the Project Design and Components: All the components of the DCA IWT PROJECT and design specifications will be analyzed to get insight of the project interventions. This will guide detail environmental baseline survey and particular investigations.

Data collection on Environmental and social baseline: Environmental and social baseline condition of the proposed subprojects has already been collected through several field visits, surveys and intensive consultation with local people. Intensive consultation with the stakeholders should be carried out for updating the baseline condition to obtain their perceptions on the proposed interventions and the possible impacts.

Major Field investigations: At this stage, detailed field survey (social and environmental) will be carried out to obtain information on the possible impact of the interventions on the environmental parameter.

Assessment of Environmental and social Impacts: The impacts of the proposed subprojects on the environmental and social components will be identified through consultation with experts and local community. The impacts will be analyzed and graded qualitatively (e.g. high, medium, low) in order to identify the major impacts. The future-without-project condition will be generated through trend analysis using information collected. The future-with-project condition will be predicted using professional judgment of the multi-disciplinary team members based on information collected. Difference between the two (with and without project) conditions will be taken as impact of the proposed interventions. The impact of the priority reach will also be monitored. Moreover, cumulative impacts of the project inside or outside the project area will be analyzed. Possible mitigation measures for alternatives of the project will be identified in this stage. For true impacts prediction following questionnaire will be attempted to answer:

- How will a particular project activity give rise to an impact?
- How likely is it that an impact will occur?
- What will be the consequence of each impact?
- What will be the spatial and temporal extent of each impact?

Analysis of Alternatives: The various criterial to be considered in evaluating various alternatives are given below

- Technical Aspects: Robustness, constructability, geology, maintenance requirements, history of performance, etc.
- Financial Aspects: Construction cost and maintenance cost
- Environmental Aspects: project footprints, material requirements, impact on river flows and channels, impact on flood plains and erosion, impact on chars, impact on aquatic and terrestrial habitats, impact on river banks, safety, etc.
- Social Aspects: Land acquisition, Resettlement, Impacts on navigation, Impacts on char people, socioeconomic impacts, etc.

Evaluation of impacts: Impact assessed on different parameters will be evaluated for both positive (+) and negative (-) impacts considering magnitude, immediacy, reversibility and sustainability.

Preparation of environmental management plan: The EMP will be prepared suggesting mitigation measures for minimizing the effect of the negative impacts, compensation measures for the negative impacts which cannot be mitigated, enhancement measures for increasing the benefits of the positive impacts, emergency plan for taking care of natural hazards and accidental events. An environmental monitoring plan will also be suggested in the EMP. Each component of the EMP will be divided into pre-construction, during construction, post construction and operation and maintenance phases. Responsibilities of the institutions in the implementation of the EMP will be suggested to ensure efficient utilization of all the parties

involved. The EMP should also include institutional capacity assessment and capacity building plan.

EIA Report Preparation: All the findings would be presented in the EIA reports.

Stage 4: Public Consultation

"Public consultation" refers to the process by which the concerns of local affected persons and others who have plausible stake in the environmental impacts of the project or activity are ascertained with a view to taking into account all the material concerns in the project or activity design as appropriate. All Category 'A' projects or activities shall undertake public consultation. The key points of public consultation are given below:

Stakeholder Consultation at all Stages of Project

- Identification of primary and secondary stakeholders.
  - Primary stakeholders include people having direct impact.
  - Secondary stakeholders include village representatives, women's group, voluntary organizations NGOs, field level officers and staff, other government officials.
- Structured Consultation at the subproject sties, district and divisional levels

Consultation at Village Level

- Along with preliminary inventory and survey information dissemination will be done along the bank and the affected villages included in the project influence area canvassing about the project. Date and venue for detailed consultation will be fixed.
- Pictorial method (Pamphlet) will be adopted to explain proposed improvements and possible environmental impact in the concerned villages.
- Public consensus would try to be arrived for and mitigation proposed.
- Public suggestion and graveness will be addressed at appropriate level.

Consultation at Upazila and District Level

- Consultation with officers of Agricultural Department, Forest Department, Soil Department, Fisheries Department, Department of Public Health Engineering (DPHE), etc.
- Consultation with the elected representatives and other stakeholders.

Consultation at Divisional level

- Consultation with senior department officers, like DOE office, District Commissioner Offices, Settlement offices etc. and mechanism of regulatory clearance, utility shifting, land acquisition etc.

After completion of the public consultation, the design consultant shall address all the material environmental concerns expressed during this process, and make appropriate changes in the draft EIA and EMP. The final EIA report, so prepared, shall be submitted by the client to the concerned regulatory authority for appraisal.

ANNEX 3: Environmental Code of Practices

ECoP 1: Waste Management

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
General Waste	Soil and water pollution from the improper management of wastes and excess materials from the construction sites.	The Contractor shall • Develop waste management plan for various specific waste streams (e.g., reusable waste, flammable waste, construction debris, food waste etc.) prior to commencing of construction and submit to CSC for approval. • Organize disposal of all wastes generated during construction in an environmentally acceptable manner. This will include consideration of the nature and location of disposal site, so as to cause less environmental impact. • Minimize the production of waste materials by 3R (Reduce, Recycle and Reuse) approach. • Segregate and reuse or recycle all the wastes, wherever practical. • Prohibit burning of solid waste • Collect and transport non-hazardous wastes to all the approved disposal sites. Vehicles transporting solid waste shall be covered with tarps or nets to prevent spilling waste along the route • Train and instruct all personnel in waste management practices and procedures as a component of the environmental induction process. • Provide refuse containers at each worksite. • Request suppliers to minimize packaging where practicable. • Place a high emphasis on good housekeeping practices. • Maintain all construction sites in a cleaner, tidy and safe condition and provide and maintain appropriate facilities as temporary storage of all wastes before transportation and final disposal.
Hazardous Waste	Health hazards and environmental impacts due to improper waste management practices	The Contractor shall • Collect chemical wastes in 200 liter drums (or similar sealed container), appropriately labeled for safe transport to an approved chemical waste depot. • Store, transport and handle all chemicals avoiding potential environmental pollution. • Store all hazardous wastes appropriately in bunded areas away from water courses. • Make available Material Safety Data Sheets (MSDS) for hazardous materials on-site during construction. • Collect hydrocarbon wastes, including lube oils, for safe transport off-site for reuse, recycling, treatment or disposal at approved locations. • Construct concrete or other impermeable flooring to prevent seepage in case of spills

ECoP 2: Fuels and Hazardous Goods Management

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Fuels and hazardous goods.	Materials used in construction have a potential to be a source of contamination. Improper storage and handling of fuels, lubricants, chemicals and hazardous goods/materials on-site, and potential spills from these goods may harm the environment or health of construction workers.	The Contractor shall • Prepare spill control procedures and submit the plan for CSC approval. • Train the relevant construction personnel in handling of fuels and spill control procedures. • Store dangerous goods in bunded areas on a top of a sealed plastic sheet away from watercourses. • Refueling shall occur only within bunded areas. • Make available MSDS for chemicals and dangerous goods on-site. • Transport waste of dangerous goods, which cannot be recycled, to a designated disposal site approved by DoE. • Provide absorbent and containment material (e.g., absorbent matting) where hazardous material are used and stored and personnel trained in the correct use. • Provide protective clothing, safety boots, helmets, masks, gloves, goggles, to the construction personnel, appropriate to materials in use. • Make sure all containers, drums, and tanks that are used for storage are in good condition and are labeled with expiry date. Any container, drum, or tank that is dented, cracked, or rusted might eventually leak. Check for leakage regularly to identify potential problems before they occur. • Store hazardous materials above flood plain level. • Put containers and drums in temporary storages in clearly marked areas, where they will not be run over by vehicles or heavy machinery. The area shall preferably slope or drain to a safe collection area in the event of a spill. • Put containers and drums in permanent storage areas on an impermeable floor that slopes to a safe collection area in the event of a spill or leak. • Take all precautionary measures when handling and storing fuels and lubricants, avoiding environmental pollution. • Avoid the use of material with greater potential for contamination by substituting them with more environmentally friendly materials. • Return the gas cylinders to the supplier. However, if they are not empty prior to their return, they must be labeled with the name of the material they contained or contain, information on the supplier, cylinder serial number, pressure, their last hydrostatic test date, and any additional identification marking that may be considered necessary.

ECoP 3: Water Resources Management

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Hazardous Material and Waste	Water pollution from the storage, handling and disposal of hazardous	The Contractor shall • Follow the management guidelines proposed in ECPs 1 and 2.

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
	materials and general construction waste, and accidental spillage	• Minimize the generation of sediment, oil and grease, excess nutrients, organic matter, litter, debris and any form of waste (particularly petroleum and chemical wastes). These substances must not enter waterways, storm water systems or underground water tables
Discharge from construction sites	During construction both surface and groundwater quality may be deteriorated due to construction activities in the river, sewerages from construction sites and work camps. The construction works will modify groundcover and topography changing the surface water drainage patterns of the area including infiltration and storage of storm water. These changes in hydrological regime lead to increased rate of runoff, increase in sediment and contaminant loading, increased flooding, groundwater contamination, and effect habitat of fish and other aquatic biology.	The Contractor shall • Install temporary drainage works (channels and bunds) in areas required for sediment and erosion control and around storage areas for construction materials • Install temporary sediment basins, where appropriate, to capture sediment-laden run-off from site • Divert runoff from undisturbed areas around the construction site • Stockpile materials away from drainage lines • Prevent all solid and liquid wastes entering waterways by collecting solid waste, oils, chemicals, bitumen spray waste and wastewaters from brick, concrete and asphalt cutting where possible and transport to an approved waste disposal site or recycling depot • Wash out ready-mix concrete agitators and concrete handling equipment at washing facilities off site or into approved bunded areas on site. Ensure that tires of construction vehicles are cleaned in the washing bay (constructed at the entrance of the construction site) to remove the mud from the wheels. This shall be done in every exit of each construction vehicle to ensure the local roads are kept clean.
Soil Erosion and siltation	Soil erosion and dust from the material stockpiles will increase the sediment and contaminant loading of surface water bodies.	The Contractor shall • Stabilize the cleared areas not used for construction activities with vegetation or appropriate surface water treatments as soon as practicable following earthwork to minimize erosion • Ensure that roads used by construction vehicles are swept regularly to remove sediment. • Water the material stockpiles, access roads and bare soils on an as required basis to minimize dust. Increase the watering frequency during periods of high risk (e.g. high winds)
Construction activities in water bodies	Construction works in the water bodies will increase sediment and contaminant loading, and effect habitat of fish and other aquatic biology.	The Contractor Shall • Dewater sites by pumping water to a sediment basin prior to release off site – do not pump directly off site • Monitor the water quality in the runoff from the site or areas affected by dredge plumes, and improve work practices as necessary • Protect water bodies from sediment loads by silt screen or bubble curtains or other barriers • Minimize the generation of sediment, oil and grease, excess nutrients, organic matter, litter, debris and any

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
		form of waste (particularly petroleum and chemical wastes). These substances must not enter waterways, storm water systems or underground water tables. • Use environment friendly and nontoxic slurry during construction of piles to discharge into the river. • Reduce infiltration of contaminated drainage through storm water management design • Do not discharge cement and water curing used for cement concrete directly into water courses and drainage inlets.
Drinking water	Groundwater at shallow depths is contaminated with arsenic and hence not suitable for drinking purposes.	The Contractor Shall • Pumping of groundwater shall be from deep aquifers of more than 300 m to supply arsenic free water. Safe and sustainable discharges are to be ascertained prior to selection of pumps. • Tube wells will be installed with due regard for the surface environment, protection of groundwater from surface contaminants, and protection of aquifer cross contamination • All tube wells, test holes, monitoring wells that are no longer in use or needed shall be properly decommissioned
	Depletion and pollution of groundwater resources	• Install monitoring wells both upstream and downstream areas near construction yards and construction camps to regularly monitor the water quality and water levels. • Protect groundwater supplies of adjacent lands

ECoP 4: Drainage Management

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Excavation and earth works, and construction yards	Lack of proper drainage for rainwater/liquid waste or wastewater owing to the construction activities harms environment in terms of water and soil contamination, and mosquito growth.	The Contractor shall • Prepare a program for prevent/avoid standing waters, which CSC will verify in advance and confirm during implementation • Provide alternative drainage for rainwater if the construction works/earth-fillings cut the established drainage line • Establish local drainage line with appropriate silt collector and silt screen for rainwater or wastewater connecting to the existing established drainage lines already there • Rehabilitate road drainage structures immediately if damaged by contractors' road transports. • Build new drainage lines as appropriate and required for wastewater from construction yards connecting to the available nearby recipient water bodies. Ensure wastewater quality conforms to the relevant standards provided by DoE, before it being discharged into the recipient water bodies. • Ensure the internal roads/hard surfaces in the

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
		construction yards/construction camps that generate has storm water drainage to accommodate high runoff during downpour and that there is no stagnant water in the area at the end of the downpour. • Construct wide drains instead of deep drains to avoid sand deposition in the drains that require frequent cleaning. • Provide appropriate silt collector and silt screen at the inlet and manholes and periodically clean the drainage system to avoid drainage congestion • Protect natural slopes of drainage channels to ensure adequate storm water drains. • Regularly inspect and maintain all drainage channels to assess and alleviate any drainage congestion problem. • Reduce infiltration of contaminated drainage through storm water management design
Ponding of water	Health hazards due to mosquito breeding	• Do not allow ponding of water especially near the waste storage areas and construction camps • Discard all the storage containers that are capable of storing of water, after use or store them in inverted position

ECoP 5: Soil Quality Management

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Filling of Sites with dredge spoils	Soil contamination will occur from drainage of dredged spoils	The Contractor shall • Ensure that dredged sand used for land filling shall be free of pollutants. Prior to filling, sand quality shall be tested to confirm whether soil is pollution free. Sediments shall be properly compacted. Top layer shall be the 0.5 m thick clay on the surface and boundary slopes along with grass. Side Slope of Filled Land of 1:2 shall be constructed by suitable soils with proper compaction as per design. Slope surface shall be covered by top soils/ cladding materials (0.5m thick) and grass turfing with suitable grass. • Leaching from the sediments shall be contained to seep into the subsoil or shall be discharged into settling lagoons before final disposal. • No sediment laden water in the adjacent lands near the construction sites, and/or wastewater of suspended materials excessive of 200mg/l from dredge spoil storage/use area in the adjacent agricultural lands.
Storage of hazardous and toxic chemicals	Spillage of hazardous and toxic chemicals will contaminate the soils	The Contractor shall • Strictly manage the wastes management plans proposed in ECP1 and storage of materials in ECP2 • Construct appropriate spill contaminant facilities for all fuel storage areas • Establish and maintain a hazardous materials register detailing the location and quantities of hazardous substances including the storage, use of disposals • Train personnel and implement safe work practices for minimizing the risk of spillage

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
		• Identify the cause of contamination, if it is reported, and contain the area of contamination. The impact may be contained by isolating the source or implementing controls around the affected site • Remediate the contaminated land using the most appropriate available method to achieve required commercial/industrial guideline validation results
Construction material stock piles	Erosion from construction material stockpiles may contaminate the soils	The Contractor shall • Protect the toe of all stockpiles, where erosion is likely to occur, with silt fences, straw bales or bunds

ECoP 6: Erosion and Sediment Control

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Clearing of construction sites	Cleared areas and slopes are susceptible for erosion of top soils, that affects the growth of vegetation which causes ecological imbalance.	• Reinstate and protect cleared areas as soon as possible. • Mulch to protect batter slopes before planting • Cover unused area of disturbed or exposed surfaces immediately with mulch/grass turfings/tree plantations
Construction activities and material stockpiles	The impact of soil erosion are (i) Increased run off and sedimentation causing a greater flood hazard to the downstream, (ii) destruction of aquatic environment in nearby lakes, streams, and reservoirs caused by erosion and/or deposition of sediment damaging the spawning grounds of fish, and (iii) destruction of vegetation by burying or gullying.	The Contractor shall • Locate stockpiles away from drainage lines • Protect the toe of all stockpiles, where erosion is likely to occur, with silt fences, straw bales or bunds • Remove debris from drainage paths and sediment control structures • Cover the loose sediments and water them if required • Divert natural runoff around construction areas prior to any site disturbance • Install protective measures on site prior to construction, for example, sediment traps • Control drainage through a site in protected channels or slope drains • Install 'cut off drains' on large cut/fill batter slopes to control water runoff speed and hence erosion • Observe the performance of drainage structures and erosion controls during rain and modify as required.

ECoP 7: Top Soil Management

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Land clearing and earth works	Earthworks will impact the fertile top soils that are enriched with nutrients required for plant growth	The Contractor shall • Strip the top soil to a depth of 15 cm and store in stock piles of height not exceeding 2m. • Remove unwanted materials from top soil like grass, roots

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
	or agricultural development.	of trees and similar others. • The stockpiles will be done in slopes of 2:1 to reduce surface runoff and enhance percolation through the mass of stored soil. • Locate topsoil stockpiles in areas outside drainage lines and protect from erosion. • Construct diversion channels and silt fences around the topsoil stockpiles to prevent erosion and loss of topsoil. • Spread the topsoil to maintain the physico-chemical and biological activity of the soil. The stored top soil will be utilized for covering all disturbed area and along the proposed plantation sites • Prior to the re-spreading of topsoil, the ground surface will be ripped to assist the bunding of the soil layers, water penetration and revegetation
Transport	Vehicular movement outside ROW or temporary access roads will affect the soil fertility of the agricultural lands	• Limit equipment and vehicular movements to within the approved construction zone • Construct temporary access tracks to cross concentrated water flow lines at right angles • Plan construction access to make use, if possible, of the final road alignment • Use vehicle-cleaning devices, for example, ramps or wash down areas

ECoP 8: Topography and Landscaping

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Land clearing and earth works	Flood plains of the existing Project area will be affected by the construction of various project activities. Construction activities especially earthworks will change topography and disturb the natural rainwater/flood water drainage as well as will change the local landscape.	The Contractor shall • Ensure the topography of the final surface of all raised lands (construction yards, approach roads, access roads, bridge end facilities, etc.) are conducive to enhance natural draining of rainwater/flood water; • Keep the final or finished surface of all the raised lands free from any kind of depression that insists water logging • Undertake mitigation measures for erosion control/prevention by grass-turfing and tree plantation, where there is a possibility of rain-cut that will change the shape of topography. • Cover immediately the uncovered open surface that has no use of construction activities with grass-cover and tree plantation to prevent soil erosion and bring improved landscaping

ECoP 9: Borrow Areas Management

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Development	Borrow areas will have	The Contractor shall

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
and operation of borrow areas	impacts on local topography, landscaping and natural drainage.	• Use only approved quarry and borrow sites • Identify new borrow and quarry areas in consultation with Project Director, if required. • Reuse excavated or disposed material available in the project to the maximum extent possible. • Store top soil for reinstatement and landscaping. • Develop surface water collection and drainage systems, anti-erosion measures (berms, revegetation etc.) and retaining walls and gabions where required. Implement mitigation measures in ECoP 3: Water Resources Management, ECoP 6: Erosion and Sediment Control • The use of explosive should be used in as much minimum quantity as possible to reduce noise, vibration and dust. • Control dust and air quality deterioration by application of watering and implementing mitigation measures proposed in ECoP 10: Air Quality Management • Noise and vibration control by ECoP 11: Noise and Vibration Management.

ECoP 10: Air Quality Management

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Construction vehicular traffic	Air quality can be adversely affected by vehicle exhaust emissions and combustion of fuels.	The Contractor shall • Fit vehicles with appropriate exhaust systems and emission control devices. Maintain these devices in good working condition. • Operate the vehicles in a fuel efficient manner • Cover haul vehicles carrying dusty materials moving outside the construction site • Impose speed limits on all vehicle movement at the worksite to reduce dust emissions • Control the movement of construction traffic • Water construction materials prior to loading and transport • Service all vehicles regularly to minimize emissions • Limit the idling time of vehicles not more than 2 minutes
Construction machinery	Air quality can be adversely affected by emissions from machinery and combustion of fuels.	The Contractor shall • Fit machinery with appropriate exhaust systems and emission control devices. Maintain these devices in good working condition in accordance with the specifications defined by their manufacturers to maximize combustion efficiency and minimize the contaminant emissions. Proof or maintenance register shall be required by the equipment suppliers and contractors/subcontractors • Focus special attention on containing the emissions from generators • Machinery causing excess pollution (e.g. visible smoke) will be banned from construction sites Service all equipment regularly to minimize emissions • Provide filtering systems, duct collectors or humidification or other techniques (as applicable) to the concrete batching

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
		and mixing plant to control the particle emissions in all its stages, including unloading, collection, aggregate handling, cement dumping, circulation of trucks and machinery inside the installations
Construction activities	Dust generation from construction sites, material stockpiles and access roads is a nuisance in the environment and can be a health hazard.	• Water the material stockpiles, access roads and bare soils on an as required basis 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 gravel and sand shall be covered and confined to avoid their being wind-drifted • Minimize the extent and period of exposure of the bare surfaces • Reschedule earthwork activities or vegetation clearing activities, where practical, if necessary to avoid during periods of high wind and if visible dust is blowing off-site • Restore disturbed areas as soon as practicable by vegetation/grass-turfing • Store the cement in silos and minimize the emissions from silos by equipping them with filters. • Establish adequate locations for storage, mixing and loading of construction materials, in a way that dust dispersion is prevented because of such operations • Crushing of rocky and aggregate materials shall be wet-crushed, or performed with particle emission control systems

ECoP 11: Noise and Vibration Management

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Construction vehicular traffic	Noise quality will be deteriorated due to vehicular traffic	The Contractor shall • Maintain all vehicles in order to keep it in good working order in accordance with manufactures maintenance procedures • Make sure all drivers will comply with the traffic codes concerning maximum speed limit, driving hours, etc. • Organize the loading and unloading of trucks, and handling operations for the purpose of minimizing construction noise on the work site
Construction machinery	Noise and vibration may have an impact on people, property, fauna, livestock and the natural environment.	The Contractor shall • Appropriately site all noise generating activities to avoid noise pollution to local residents • Use the quietest available plant and equipment • Modify equipment to reduce noise (for example, noise control kits, lining of truck trays or pipelines) • Maintain all equipment in order to keep it in good working order in accordance with manufactures maintenance procedures. Equipment suppliers and contractors shall present proof of maintenance register of their equipment. • Install acoustic enclosures around generators to reduce

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
		noise levels. • Fit high efficiency mufflers to appropriate construction equipment • Avoid the unnecessary use of alarms, horns and sirens
Construction activity	Noise and vibration may have an impact on people, property, fauna, livestock and the natural environment.	The Contractor shall • Notify adjacent landholders prior any typical noise events outside of daylight hours • Educate the operators of construction equipment on potential noise problems and the techniques to minimize noise emissions • Employ best available work practices on-site to minimize occupational noise levels • Install temporary noise control barriers where appropriate • Notify affected people if major noisy activities will be undertaken, e.g. pile driving • Plan activities on site and deliveries to and from site to minimize impact • Monitor and analyze noise and vibration results and adjust construction practices as required. • Avoid undertaking the noisiest activities, where possible, when working at night near the residential areas

ECoP 12: Protection of Flora

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Vegetation clearance	Local flora are important to provide shelters for the birds, offer fruits and/or timber/fire wood, protect soil erosion and overall keep the environment very friendly to human-living. As such damage to flora has wide range of adverse environmental impacts.	The Contractor shall • Reduce disturbance to surrounding vegetation • Use appropriate type and minimum size of machine to avoid disturbance to adjacent vegetation. • Get approval from supervision consultant for clearance of vegetation. • Make selective and careful pruning of trees where possible to reduce need of tree removal. • Control noxious weeds by disposing of at designated dump site or burn on site. • Clear only the vegetation that needs to be cleared in accordance with the plans. These measures are applicable to both the construction areas as well as to any associated activities such as sites for stockpiles, disposal of fill and construction of diversion roads, etc. • Do not burn off cleared vegetation – where feasible, chip or mulch and reuse it for the rehabilitation of affected areas, temporary access tracks or landscaping. Mulch provides a seed source, can limit embankment erosion, retains soil moisture and nutrients, and encourages re-growth and protection from weeds. • Return topsoil and mulched vegetation (in areas of native vegetation) to approximately the same area of the roadside it came from. • Avoid work within the drip-line of trees to prevent damage to the tree roots and compacting the soil. • Minimize the length of time the ground is exposed or

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
		excavation left open by clearing and re-vegetate the area at the earliest practically possible. • Ensure excavation works occur progressively and re-vegetation done at the earliest • Provide adequate knowledge to the workers regarding nature protection and the need of avoid felling trees during construction • Supply appropriate fuel in the work caps to prevent fuel wood collection

ECoP 13: Protection of Fauna

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Construction activities	The location of construction activities can result in the loss of wild life habitat and habitat quality,.	The Contractor shall • Limit the construction works within the designated sites allocated to the contractors • check the site for animals trapped in, or in danger from site works and use a qualified person to relocate the animal
	Impact on migratory birds, its habitat and its active nests	The Contractor shall • Not be permitted to destruct active nests or eggs of migratory birds • Minimize the tree removal during the bird breeding season. If works must be continued during the bird breeding season, a nest survey will be conducted by a qualified biologist prior to commence of works to identify and located active nests • Minimize the release of oil, oil wastes or any other substances harmful to migratory birds to any waters or any areas frequented by migratory birds.
Vegetation clearance	Clearance of vegetation may impact shelter, feeding and/or breeding and/or physical destruction and severing of habitat areas	The Contractor shall • Restrict the tree removal to the minimum required. • Retain tree hollows on site, or relocate hollows, where appropriate • Leave dead trees where possible as habitat for fauna • Fell the hollow bearing trees in a manner which reduces the potential for fauna mortality. Felled trees will be inspected after felling for fauna and if identified and readily accessible will be removed and relocated or rendered assistance if injured. After felling, hollow bearing trees will remain unmoved overnight to allow animals to move of their own volition.
Construction camps	Illegal poaching	• Provide adequate knowledge to the workers regarding protection of flora and fauna, and relevant government regulations and punishments for illegal poaching.

ECoP 14: Protection of Fisheries

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Construction activities in River	The main potential impacts to fisheries are hydrocarbon spills and leaks from riverine transport and disposal of wastes into the river	The Contractor shall • Ensure the riverine transports, vessels and ships are well maintained and do not have oil leakage to contaminate river water. • Contain oil immediately on river in case of accidental spillage from vessels and ships and in this regard, make an emergency oil spill containment plan to be supported with enough equipment, materials and human resources • Do not dump wastes, be it hazardous or non-hazardous into the nearby water bodies or in the river
Construction activities on the land	The main potential impacts to aquatic flora and fauna River are increased suspended solids from earthworks erosion, sanitary discharge from work camps, and hydrocarbon spills	The Contractor shall • follow mitigation measures proposed in ECoP 3 : Water Resources Management and EC4: Drainage Management
	Filling of ponds for site preparation will impact the fishes.	The Contractor shall • Inspect any area of a water body containing fish that is temporarily isolated for the presence of fish, and all fish shall be captured and released unharmed in adjacent fish habitat • Install and maintain fish screens etc. on any water intake with drawing water from any water body that contain fish

ECoP 15: Road Transport and Road Traffic Management

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Construction vehicular traffic	Increased traffic use of road by construction vehicles will affect the movement of normal road traffics and the safety of the road-users.	The Contractor shall • Prepare and submit a traffic management plan to the CSC for his approval at least 30 days before commencing work on any project component involved in traffic diversion and management. • Include in the traffic management plan to ensure uninterrupted traffic movement during construction: detailed drawings of traffic arrangements showing all detours, temporary road, temporary bridges temporary diversions, necessary barricades, warning signs / lights, and road signs. • Provide signs at strategic locations of the roads complying with the schedules of signs contained in the Bangladesh Traffic Regulations. • Install and maintain a display board at each important road intersection on the roads to be used during construction, which shall clearly show the following information in Bangla: • Location: chainage and village name • Duration of construction period • Period of proposed detour / alternative route

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
		• Suggested detour route map • Name and contact address/telephone number of the concerned personnel • Name and contact address / telephone number of the Contractor • Inconvenience is sincerely regretted.
	Accidents and spillage of fuels and chemicals	• Restrict truck deliveries, where practicable, to day time working hours. • Restrict the transport of oversize loads. • Operate road traffics/transport vehicles, if possible, to non-peak periods to minimize traffic disruptions. • Enforce on-site speed limit

ECoP 16: River Transport management

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Construction activities in River	The presence of construction and dredging barges, pipe lines and other construction activities in the river can cause hindrance and risks to the river traffic.	The Contractor shall • Not obstruct other normal riverine transport while doing riverine transport and works • Identify the channel to be followed clearly using navigation aids such as buoys, beacons, and lighting • Provide proper buoyage, navigation lights and markings for bridge and dredging works to guide the other normal riverine transport • Keep regular and close contacts with Bangladesh Inland Water Transport Authority (BIWTA) regarding their needs during construction of the project • Plan the river transport and transportation of large loads in coordination with BIWTA to avoid traffic congestions. • Provide signage for river traffic conforming to the BIWTA requirements • Position the dredge and pipeline in such a way that no disruption to the channel traffic will occur
	Accidents	The Contractor shall • Prepare an emergency plan for dealing with accidents causing accidental sinking of the vessels and ships • Ensure sufficient equipment and staffs available to execute the emergency plans • Provide appropriate lighting to barges and construction vessels.

ECoP 17: Construction Camp Management

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Siting and Location of construction camps	Campsites for construction workers are the important locations that have significant impacts such as health and safety hazards on	The Contractor shall • Locate the construction camps at areas which are acceptable from environmental, cultural or social point of view. • Consider the location of construction camps away from communities in order to avoid social conflict in using the

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
	local resources and infrastructure of nearby communities.	natural resources such as water or to avoid the possible adverse impacts of the construction camps on the surrounding communities. • Submit to the CSC for approval a detailed layout plan for the development of the construction camp showing the relative locations of all temporary buildings and facilities that are to be constructed together with the location of site roads, fuel storage areas (for use in power supply generators), solid waste management and dumping locations, and drainage facilities, prior to the development of the construction camps. • Local authorities responsible for health, religious and security shall be duly informed on the set up of camp facilities so as to maintain effective surveillance over public health, social and security matters
Construction Camp Facilities	Lack of proper infrastructure facilities , such as housing, water supply and sanitation facilities will increase pressure on the local services and generate substandard living standards and health hazards.	Contractor shall provide the following facilities in the campsites • Adequate housing for all workers • Safe and reliable water supply. Water supply from deep tube wells of 300 m depth that meets the national standards • Hygienic sanitary facilities and sewerage system. The toilets and domestic waste water will be collected through a common sewerage. Provide separate latrines and bathing places for males and females with total isolation by wall or by location. The minimum number of toilet facilities required is one toilet for every ten persons. • Treatment facilities for sewerage of toilet and domestic wastes • Storm water drainage facilities. Both sides of roads are to be provided with shallow v drains to drain off storm water to a silt retention pond which shall be sized to provide a minimum of 20 minutes retention of storm water flow from the whole site. Channel all discharge from the silt retention pond to natural drainage via a grassed swale at least 20 meters in length with suitable longitudinal gradient. • Paved internal roads. Ensure with grass/vegetation coverage to be made of the use of top soil that there is no dust generation from the loose/exposed sandy surface. Pave the internal roads of at least haring-bond bricks to suppress dusts and to work against possible muddy surface during monsoon. • Provide child crèches for women working construction site. The crèche shall have facilities for dormitory, kitchen, indoor and outdoor play area. Schools shall be attached to these crèches so that children are not deprived of education whose mothers are construction workers • Provide in-house community/common entertainment facilities. dependence of local entertainment outlets by the construction camps to be discouraged/prohibited to the extent possible.

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Disposal of waste	Management of wastes is crucial to minimize impacts on the environment	The Contractor shall • Ensure proper collection and disposal of solid wastes within the construction camps • Insist waste separation by source; organic wastes in one pot and inorganic wastes in another pot at household level. • Store inorganic wastes in a safe place within the household and clear organic wastes on daily basis to waste collector. Establish waste collection, transportation and disposal systems with the manpower and equipments/vehicles needed. • Dispose organic wastes in a designated safe place on daily basis. At the end of the day cover the organic wastes with a thin layer of sand so that flies, mosquitoes, dogs, cats, rats, are not attracted. One may dig a large hole to put organic wastes in it; take care to protect groundwater from contamination by leachate formed due to decomposition of wastes. Cover the bed of the pit with impervious layer of materials (clayey or thin concrete) to protect groundwater from contamination. • Locate the garbage pit/waste disposal site min 500 m away from the residence so that peoples are not disturbed with the odor likely to be produced from anaerobic decomposition of wastes at the waste dumping places. Encompass the waste dumping place by fencing and tree plantation to prevent children to enter and play with. • Do not establish site specific landfill sites. All solid waste will be collected and removed from the work camps and disposed in approval waste disposal sites.
Fuel supplies for cooking purposes	Illegal sourcing of fuel wood by construction workers will impact the natural flora and fauna	The Contractor shall • Provide fuel to the construction camps for their domestic purpose, in order to discourage them to use fuel wood or other biomass. • Made available alternative fuels like natural gas or kerosene on ration to the workforce to prevent them using biomass for cooking. • Conduct awareness campaigns to educate workers on preserving the protecting the biodiversity and wildlife of the project area, and relevant government regulations and punishments on wildlife protection.
Health and Hygiene	There will be a potential for diseases to be transmitted including malaria, exacerbated by inadequate health and safety practices. There will be an increased risk of work crews spreading sexually transmitted infections and HIV/AIDS.	The Contractor shall • Provide adequate health care facilities within construction sites. • Provide first aid facility round the clock. Maintain stock of medicines in the facility and appoint fulltime designated first aider or nurse. • Provide ambulance facility for the laborers during emergency to be transported to nearest hospitals. • Initial health screening of the laborers coming from outside areas • Train all construction workers in basic sanitation and health care issues and safety matters, and on the specific hazards of their work

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
		• Provide HIV awareness programming, including STI (sexually transmitted infections) and HIV information, education and communication for all workers on regular basis • Complement educational interventions with easy access to condoms at campsites as well as voluntary counseling and testing • Provide adequate drainage facilities throughout the camps to ensure that disease vectors such as stagnant water bodies and puddles do not form. Regular mosquito repellant sprays during monsoon. • Carryout short training sessions on best hygiene practices to be mandatorily participated by all workers. Place display boards at strategic locations within the camps containing messages on best hygienic practices
Safety	In adequate safety facilities to the construction camps may create security problems and fire hazards	The Contractor shall • Provide appropriate security personnel (police / home guard or private security guards) and enclosures to prevent unauthorized entry in to the camp area. • Maintain register to keep a track on a head count of persons present in the camp at any given time. • Encourage use of flameproof material for the construction of labor housing / site office. Also, ensure that these houses/rooms are of sound construction and capable of withstanding wind storms/cyclones. • Provide appropriate type of firefighting equipments suitable for the construction camps • Display emergency contact numbers clearly and prominently at strategic places in camps. • Communicate the roles and responsibilities of laborers in case of emergency in the monthly meetings with contractors.
Site Restoration	Restoration of the construction camps to original condition requires demolition of construction camps.	The Contractor shall • Dismantle and remove from the site all facilities established within the construction camp including the perimeter fence and lockable gates at the completion of the construction work. • Dismantle camps in phases and as the work gets decreased and not wait for the entire work to be completed • Give prior notice to the laborers before demolishing their camps/units • Maintain the noise levels within the national standards during demolition activities • Different contractors shall be hired to demolish different structures to promote recycling or reuse of demolished material. • Reuse the demolition debris to a maximum extent. Dispose remaining debris at the designated waste disposal site. • Handover the construction camps with all built facilities as it is if agreement between both parties (contactor and land-owner) has been made so. • Restore the site to its condition prior to commencement of the works or to an agreed condition with the landowner. • Not make false promises to the laborers for future

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
		employment in O&M of the project.

ECoP 18: Cultural and Religious Issues

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Construction activities near religious and cultural sites	Disturbance from construction works to the cultural and religious sites, and contractors lack of knowledge on cultural issues cause social disturbances.	The Contractor shall • Communicate to the public through community consultation and newspaper announcements regarding the scope and schedule of construction, as well as certain construction activities causing disruptions or access restriction. • Do not block access to cultural and religious sites, wherever possible • Restrict all construction activities within the foot prints of the construction sites. • Stop construction works that produce noise (particularly during prayer time) shall there be any mosque/religious/educational institutions close to the construction sites and users make objections. • Take special care and use appropriate equipment when working next to a cultural/religious institution. • Stop work immediately and notify the site manager if, during construction, an archaeological or burial site is discovered. It is an offence to recommence work in the vicinity of the site until approval to continue is given by the CSC/PMU. • Provide separate prayer facilities to the construction workers. • Show appropriate behavior with all construction workers especially women and elderly people • Allow the workers to participate in praying during construction time • Resolve cultural issues in consultation with local leaders and supervision consultants • Establish a mechanism that allows local people to raise grievances arising from the construction process. • Inform the local authorities responsible for health, religious and security duly informed before commencement of civil works so as to maintain effective surveillance over public health, social and security matters

ECoP 19: Worker Health and Safety

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Best practices	Construction works may pose health and safety risks to the construction workers and site visitors leading to severe injuries and deaths. The population in the	The Contractor shall • Implement suitable safety standards for all workers and site visitors which shall not be less than those laid down on the international standards (e.g. International Labor Office guideline on 'Safety and Health in Construction; World Bank Group's 'Environmental Health and Safety Guidelines') and contractor's own national standards or

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
	proximity of the construction site and the construction workers will be exposed to a number of (i) biophysical health risk factors, (e.g. noise, dust, chemicals, construction material, solid waste, waste water, vector transmitted diseases etc), (ii) risk factors resulting from human behavior (e.g. STD, HIV etc) and (iii) road accidents from construction traffic.	statutory regulations, in addition to complying with the national standards of the Government of Bangladesh (e.g. `The Bangladesh Labor Code, 2006') • Provide the workers with a safe and healthy work environment, taking into account inherent risks in its particular construction activity and specific classes of hazards in the work areas, • Provide personal protection equipment (PPE) for workers, such as safety boots, helmets, masks, gloves, protective clothing, goggles, full-face eye shields, and ear protection. Maintain the PPE properly by cleaning dirty ones and replacing them with the damaged ones. • Safety procedures include provision of information, training and protective clothing to workers involved in hazardous operations and proper performance of their job • Appoint an environment, health and safety manager to look after the health and safety of the workers • Inform the local authorities responsible for health, religious and security duly informed before commencement of civil works and establishment of construction camps so as to maintain effective surveillance over public health, social and security matters
	Child and pregnant labor	The Contractor shall • not hire children of less than 14 years of age and pregnant women or women who delivered a child within 8 preceding weeks, in accordance with the Bangladesh Labor Code, 2006
Accidents	Lack of first aid facilities and health care facilities in the immediate vicinity will aggravate the health conditions of the victims	• Provide health care facilities and first aid facilities are readily available. Appropriately equipped first-aid stations shall be easily accessible throughout the place of work • Document and report occupational accidents, diseases, and incidents. • Prevent accidents, injury, and disease arising from, associated with, or occurring in the course of work by minimizing, so far as reasonably practicable, the causes of hazards. In a manner consistent with good international industry practice. • Identify potential hazards to workers, particularly those that may be life-threatening and provide necessary preventive and protective measures. • Provide awareness to the construction drivers to strictly follow the driving rules Provide adequate lighting in the construction area and along the roads
Construction Camps	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	The Contractor shall provide the following facilities in the campsites to improve health and hygienic conditions as mentioned in ECoP 17 Construction Camp Management • Adequate ventilation facilities • Safe and reliable water supply. Water supply from deep tube wells that meets the national standards • Hygienic sanitary facilities and sewerage system. The toilets and domestic waste water will be collected through a common sewerage.

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
	hazards.	• Treatment facilities for sewerage of toilet and domestic wastes • Storm water drainage facilities. • Recreational and social facilities • Safe storage facilities for petroleum and other chemicals in accordance with ECoP 2 • Solid waste collection and disposal system in accordance with ECP1. • Arrangement for trainings • Paved internal roads. • Security fence at least 2 m height. • Sick bay and first aid facilities
Water and sanitation facilities at the construction sites	Lack of Water sanitation facilities at construction sites cause inconvenience to the construction workers and affect their personal hygiene.	The contractor shall provide portable toilets at the construction sites, if about 25 people are working the whole day for a month. Location of portable facilities shall be at least 6 m away from storm drain system and surface waters. These portable toilets shall be cleaned once a day and all the sewerage shall be pumped from the collection tank once a day and shall be brought to the common septic tank for further treatment. Contractor shall provide bottled drinking water facilities to the construction workers at all the construction sites.
Other ECPs	Potential risks on health and hygiene of construction workers and general public	The Contractor shall follow the following ECPs to reduce health risks to the construction workers and nearby community ECoP 2: Fuels and Hazardous Goods Management ECoP 4: Drainage Management ECoP 10: Air Quality Management ECoP 11: Noise and Vibration Management ECoP 15: Road Transport and Road Traffic Management ECoP 16: River Transport management
Trainings	Lack of awareness and basic knowledge in health care among the construction workforce, make them susceptible to potential diseases.	The Contractor shall • Train all construction workers in basic sanitation and health care issues (e.g., how to avoid malaria and transmission of sexually transmitted infections (STI) HIV/AIDS. • Train all construction workers in general health and safety matters, and on the specific hazards of their work Training shall consist of basic hazard awareness, site specific hazards, safe work practices, and emergency procedures for fire, evacuation, and natural disaster, as appropriate. • Commence the malaria, HIV/AIDS and STI education campaign before the start of the construction phase and complement it with by a strong condom marketing, increased access to condoms in the area as well as to voluntary counseling and testing. • Implement malaria, HIV/AIDS and STI education campaign targeting all workers hired, international and national, female and male, skilled, semi- and unskilled occupations, at the time of recruitment and thereafter pursued throughout the construction phase on ongoing and regular basis. This shall be complemented by easy access

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
		to condoms at the workplace as well as to voluntary counseling and testing.

ECoP 20: Dredging Management

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Locations of dredging	Impact on habitats of sensitive species such dolphin and migratory birds, and fish habitats	The Contractor shall • Avoid sensitive areas (dolphin and bird habitats, fish spawning areas and charlands) identified in the EIA. No dredging will be carried out within one kilometer from these sensitive areas. • Obtain approval from CSC (construction supervision consultant) before starting dredging from any location •
Preconstruction studies	Quality of river bed sediments are to be established to identify potential impacts associated with dredging and placement. Proposed dredging locations are to be studied for their ecological sensitivity.	BIWTA and CSC • Will evaluate the river bed materials for their physical, chemical, biological, and engineering properties prior to initiation of dredging activities. Sediment quality studies for nutrients and pollutants are particularly important to monitor the impacts of dredging • Carry out survey of the area prior to dredging • Identify any sensitive receptors/habitats (e.g., turtle nesting area, birds colony) at or near the proposed dredging locations. • Determine 'no-go' areas for dredging, based upon the above survey, • Monitor the activity to ensure that the contractor complies with requirements • Survey the area after dredging to identify any leftover impacts.
Dredging - Excavation	Increased turbidity, loss of transparency and increased suspended sediment concentrations. Impact on benthic habitats.	The Contractor shall • Select dredging equipment (e.g. Cutter Suction Dredger) which are known to have a low risk of sediment dispersal. The suction action inside the Cutter Suction Dredger means that most of the sediment removed by the cutter is captured. As high dredging efficiency and low turbidity at the cutter head are closely linked, it is uncommon for turbidity generated by the cutter head to cause environmental concern. • Monitor the dredging operation and, if necessary, change the dredge location to minimise fines or modify operations, e.g. restrict the amount of material being dredged (or the number of dredgers allowed to operate) at any one time. • Maintain record of all sand or sediment extraction (quantities, location shown on map, timing, any

		sighting of key species)
Dredging: Lifting	The release of suspended sediments during lifting can cause mortality to fish. The re-suspension of sediments can also release toxic chemicals or nutrients such as phosphates and nitrates, which may increase the eutrophic status of the system. Release of anaerobic sediment and organic matter in high concentrations may in some cases deplete the dissolved oxygen.	The Contractor shall • Select dredging equipment (e.g. Cutter Suction Dredger) which are known to have a low risk of sediment releases from lifting. • Reduce the suspended material released into the water column by adjusting the ratio of cutter revolutions to pump velocity to ensure that the cutter advancement rate is not greater than the ability of the suction pump to remove the material that has been cut. • Monitor the lifting operations and if required use techniques (e.g. silt curtains) to minimize adverse impacts on aquatic life from the resuspension of sediments.
Dredging: Transportation	Leakages and spillage from the hydraulic pipeline	The Contractor shall • Regularly inspect and maintain equipment in order to prevent leaks. • Develop and implement a spill prevention plan to prevent and contain accidental spills
Dredging: Placement	Dispersion of sediments and release of high sediment laden runoff from the placement sites.	The Contractor • Shall directly place the sediments for filling the proposed disposal areas. Prior to filling commencing, the areas being filled will be subdivided into compartments by construction of temporary containment bunds of suitable material (e.g. dredged sand). Filling will be achieved by progressively pumping a slurry of sand and water into the bunded areas, allowing the surplus water to drain away to artificial and natural waterways in a controlled manner through the pipeline, without affecting floodplains. • Control the discharge of site runoff, including excess dredge water, by the installation and correct use of containment walls, bunds and weirs. • Monitor the quality of water (e.g. sediment content) in site runoff to confirm that the design and operation of the bunds and weirs, and the retention time for dredge waters which facilitates the settlement out of fine sediments prior to discharge off site, is adequate. If required, additional siltation ponds are to be provided to divert the runoff water before discharging in to the river.
River Traffic	The presence of barges and associated vessels and discharge pipelines will pose a risk to local river traffic. There is also risk of collision of construction boats with dolphins.	The Contractor shall • Provide proper navigational lighting for the barges and associated vessels • Provide appropriate lighting to all floating pipelines and buoys • Check all navigational lights routinely to ensure that they are working properly. • Limit the motor boat speed to 15 km/h in accordance with best international practices and

		to avoid any collision with dolphins. . Pingers will be used to chase away dolphins form the construction areas thus minimizing the chances of any collision
Noise from dredging activities	Noise and vibration under water: Disruption to fish migration and disturbance to dolphins Noise and vibration above water: Nuisance to local community, disturbance to birds	The Contractor shall • Reduce the dredger noise at source by isolation of exhaust systems, by keeping engine room doors shut and by additional measures such as shielding. • Limit the noisy dredging to daylight hours, where possible, rather than at sunrise or sunset (significant for wildlife) or during night time hours. Where unavoidable, the contractor should ramp up the levels of engines or other noise producing sources, so that the noise slowly increases. This will encourage riverine and terrestrial fauna to move away from the source area prior to significant noise emissions • Inspect and maintain equipment in good working condition
Exhaust emissions	Air pollution and release of greenhouse gases from construction equipment	The Contractor shall • Inspect and maintain equipment in good working condition. Proper maintenance of engines ensures full combustion with low soot emissions. • Select and operate equipment and manage operations to reduce engine emissions. • Use low-Sulphur heavy fuels to reduce noxious emissions. • Provide Exhaust filtering.
Oil spills	Oil spills	The Contractor shall • Refuel of barges and boats with a proper care to avoid any spills. • Make available spill kits and other absorbent material at refueling points on the barges
Bilge water	Waste water disposal from the barges and associated vessels	The Contractor shall • Properly collect, treat and dispose the bilge water from of barges, and boats. • Empty barge or hopper from rest load by washing or mechanical cleaning before moving between different dredging areas to prevent distribution of contaminated material through residual loads.

ANNEX 4: Chance Find Procedures

(Ref: The World Bank Operational Manual, 1999 OP4.11)

Works could impact sites of social, sacred, religious, or heritage value. “Chance find” procedures would apply when those sites are identified during the design phase or during the actual construction period and the related activity will not be eligible for financing under the project.

(1) Cultural property includes monuments, structures, works of art, or sites of significant points of view, and are defined as sites and structures having archaeological, historical, architectural, or religious significance, and natural sites with cultural values. This includes cemeteries, graveyards and graves.

(2) The list of negative subproject attributes which would make a subproject ineligible for support includes any activity that would adversely impact cultural property.

(3) In the event of finding of properties of cultural value during construction, the following procedures for identification, protection from theft, and treatment of discovered artifacts should be followed and included in standard bidding document.

(a) Stop the construction activities in the area of the chance find;

(b) Delineate the discovered site or area;

(c) Secure the site to prevent any damage or loss of removable objects.

(d) Notify the supervisory Engineer who in turn will notify the responsible local authorities;

(e) Responsible local authorities and the relevant Ministry would be in charge of protecting and preserving the site before deciding on subsequent appropriate procedures.

(f) Decisions on how to handle the finding shall be taken by the responsible authorities and the relevant Ministry. This could include changes in the layout (such as when finding an irremovable remain of cultural or archeological importance), conservation, restoration and salvage.

(g) Implementation of the authority decision concerning the management of the finding shall be communicated in writing by the relevant Ministry.

(h) Construction work could resume only after permission is given from the responsible local authorities and the relevant Ministry concerning safeguard of the heritage.

(4) These procedures must be referred to as standard provisions in construction contracts. During project supervision, the Site Engineer shall monitor the above regulations relating to the treatment of any chance find encountered.

(5) Relevant findings will be recorded in World Bank Supervision Reports and Implementation Completion Reports will assess the overall effectiveness of the project’s cultural property mitigation, management, and activities, as appropriate.

ANNEX 5: Photographs of Passenger and Cargo Terminals

Shasanghat Passenger terminal location	Proposed site for the terminal  Ship breaking workshops in the proposed terminal site 
Chandpur Passenger	Overview of terminal

Terminal	 Extension Area  Approach road to the terminal 
Barisal Passenger Terminal	Overview of the terminal location

	 Proposed extension area of the terminal 
Narayanganj Passenger Terminal	Terminal location  Administrative building

	
Pangaon Cargo terminal location (greenfield)	Existing Pangaon container terminal and location of proposed cargo terminal  Approach to the proposed cargo terminal site 
Ashuganj Cargo terminal	Overview of the terminal site

Access road to the terminal and storage area

ANNEX 6: Photographs of Landing Stations

Bhairab Bazar	
Horina	
Hijla	

Moju Chowdhury	
Laharhat	
Beduria	

Daulatkha	
Tojumuddin	
Monpura	

Chairman Ghat (Char Bata)	

ANNEX 7: Screening Matrix on Anticipated Environmental Impacts from the Terminals

Screening Questions	Yes / No / ? . Briefly describe	Is this likely to result in a significant effect? Yes/No/? – Why?					
		Shasanghat passenger terminal (greenfield)	**Narayanganj Passenger Terminal**	**Chandpur Passenger Terminal**	**Barisal Passenger Terminal**	**Ashuganj Passenger Terminal**	**Pangaon passenger terminal (greenfield)**
1. Will construction, operation or decommissioning of the Project involve actions which will cause physical changes in the locality (topography, land use, changes in water bodies, etc.)?	Yes, dredging works and land filling works are needed. Development of port facilities trigger commercial development in the region and may induce land use changes.	Yes, this is a greenfield site and extensive dredging and land filling activities are required.	No, construction works are mainly related to augmentation of administration buildings and provision of passenger facilities	Yes. Extensive dredging works will be created for maintenance of access channels and river training works.	Yes. Extensive dredging works will be created for maintenance of access channels and river training works.	No. Construction works are mainly augmentation of existing facilities.	Yes, this is a greenfield site and extensive dredging and land filling activities are required.
2. Will construction or operation of the Project use natural resources such as land, water, materials or energy, especially any resources which are non-renewable or in short supply?	Yes. Petroleum products will be required for both construction (dredging and construction equipment) and operation of terminals.	Yes, due to extensive construction and dredging activities involved.	No.	Yes, due to extensive construction and maintenance dredging activities involved.	Yes, due to extensive construction and maintenance dredging activities involved.	No.	Yes, due to extensive construction and dredging activities involved.
3. Will the Project involve use, storage, transport, handling or production of substances or materials which could be harmful to human health or the environment or raise	Yes. Some petroleum products will be stored during construction and dredging works. For cargo terminals, storage may be required	No	No	Yes, extensive dredging works for yearly maintenance may need storage of petroleum products	Y Yes, extensive dredging works for yearly maintenance may need storage of	No.	Yes. Storage facilities for petroleum products may be developed here.

Screening Questions	Yes / No / ? . Briefly describe	Is this likely to result in a significant effect? Yes/No/? – Why?					
		Shasanghat passenger terminal (greenfield)	**Narayanganj Passenger Terminal**	**Chandpur Passenger Terminal**	**Barisal Passenger Terminal**	**Ashuganj Passenger Terminal**	**Pangaon passenger terminal (greenfield)**
concerns about actual or perceived risks to human health?					petroleum products		
4. Will the Project produce solid wastes during construction or operation or decommissioning?	Yes. Both solid and liquid waste will be produced by the terminals during construction and operation. Vessels will also bring solid waste and liquid wastes to dispose at the terminal sites.	Yes. Solid waste will be generated at the terminal site. Vessels also generate waste.	Yes. Solid waste will be generated at the terminal site. Vessels also generate waste.	Yes. Solid waste will be generated at the terminal site. Vessels also generate waste.	Yes. Solid waste will be generated at the terminal site. Vessels also generate waste.	Yes. Solid waste will be generated at the terminal site. Vessels also generate waste.	Yes. Solid waste will be generated at the terminal site. Vessels also generate waste.
5. Will the Project release pollutants or any hazardous, toxic or noxious substances to air?	Yes. Construction related traffic and machinery may generate emissions. During operations vessels and cargo equipment may generate emissions	No	No	No	No.	Yes. Operation of cargo vessels and land based operation of the cargo terminals will generate emissions from vehicles and equipment	Yes. Operation of cargo vessels and land based operation of the cargo terminals will generate emissions from vehicles and equipment
6. Will the Project cause noise and vibration or release of light, heat energy or electromagnetic radiation?	Yes. Construction works both on the land and in water will generate noise and vibration. Visual impacts from the illumination from terminals	Yes	Yes	Yes	Yes	Yes	Yes
7. Will the Project lead	Yes. There is a risk of	Yes, the	Yes	Yes	Yes	Yes	Yes, the dredging

Screening Questions	Yes / No / ? . Briefly describe	Is this likely to result in a significant effect? Yes/No/? – Why?					
		Shasanghat passenger terminal (greenfield)	**Narayanganj Passenger Terminal**	**Chandpur Passenger Terminal**	**Barisal Passenger Terminal**	**Ashuganj Passenger Terminal**	**Pangaon passenger terminal (greenfield)**
to risks of contamination of land or water from releases of pollutants onto the ground or into surface waters, groundwater, coastal wasters or the sea?	contamination from construction; and also from cargo storages. Sewage water and bilge water disposal in the river may affect the water quality	dredging of contaminated sediments may affect the aquatic fauna and habitat					of contaminated sediments may affect the aquatic fauna and habitat
8. Will there be any risk of accidents during construction or operation of the Project which could affect human health or the environment?	Yes. Construction works may pose health and safety hazards to the workers and nearby community. During operation, major sources are dust and emissions from with activities associated with terminals and related facilities and traffic.	Yes. There are risks of physical hazards (cargo handling and use) and chemical hazards (dust and emissions form fuels.	Yes, general	Yes	Yes	Yes	Yes. There are risks of physical hazards (cargo handling and use) and chemical hazards (dust and emissions form fuels.
9. Will the Project result in social changes, for example, in demography, traditional lifestyles, employment?	Yes. Better access for the local population and more formal businesses will flourish due to the improved accessibility all year around.	Yes	Yes	Yes	Yes	Yes	Yes
10. Are there any other factors which should be considered such as consequential	Yes. Based on the experience of the existing terminals, it is anticipated that there	Yes	Yes	Yes	Yes	Yes	Yes

Screening Questions	Yes / No / ? . Briefly describe	Is this likely to result in a significant effect? Yes/No/? – Why?					
		Shasanghat passenger terminal (greenfield)	**Narayanganj Passenger Terminal**	**Chandpur Passenger Terminal**	**Barisal Passenger Terminal**	**Ashuganj Passenger Terminal**	**Pangaon passenger terminal (greenfield)**
development which could lead to environmental effects or the potential for cumulative impacts with other existing or planned activities in the locality?	will be lot of unplanned and unregulated development will takes places around the terminal facilities.						
11. Are there any areas on or around the location which are protected under international or national or local legislation for their ecological, landscape, cultural or other value, which could be affected by the project?	Yes.	Yes. Buriganga is declared as ecologically critical area due to ongoing pollution from various industrial activities around Dhaka	No	Yes. Hisla sanctuaries are located near this terminals.	No	No	Yes. Buriganga is declared as ecologically critical area due to ongoing pollution from various industrial activities around Dhaka
12. Are there any other areas on or around the location which are important or sensitive for reasons of their ecology e.g. wetlands, watercourses or other waterbodies, the coastal zone, mountains, forests or	Yes, the terminal facilities will be located along the rivers and will have some impact on the river waters	Yes	Yes	Yes	Yes	Yes	Yes

Screening Questions	Yes / No / ? . Briefly describe	Is this likely to result in a significant effect? Yes/No/? – Why?					
		Shasanghat passenger terminal (greenfield)	**Narayanganj Passenger Terminal**	**Chandpur Passenger Terminal**	**Barisal Passenger Terminal**	**Ashuganj Passenger Terminal**	**Pangaon passenger terminal (greenfield)**
woodlands, which could be affected by the project?							
13. Are there any areas on or around the location which are used by protected, important or sensitive species of fauna or flora e.g. for breeding, nesting, foraging, resting, overwintering, migration, which could be affected by the project?	Yes. Endangered species such as dolphins are located in the Meghna. Migratory birds also use the lower Meghna estuary.	No	No	Yes, the terminal site is located to the breeding area of hilsa, which are declared as sancturies	No	Yes, dolphin habitats	No
14. Are there any inland, coastal, marine or underground waters on or around the location which could be affected by the project?	The terminals are located near inland water bodies	Yes	Yes	Yes	Yes	Yes	Yes
15. Are there any areas or features of high landscape or scenic value on or around the location which could be affected by the project?	The entire waterway route is a scenic beauty, will have a positive impact by maintaining navigation all round year.	No	No	No	No	No	No
16. Are there any routes or facilities on	Though there are no specific recreation	No	No	No	No	No	No

Screening Questions	Yes / No / ? . Briefly describe	Is this likely to result in a significant effect? Yes/No/? – Why?					
		Shasanghat passenger terminal (greenfield)	**Narayanganj Passenger Terminal**	**Chandpur Passenger Terminal**	**Barisal Passenger Terminal**	**Ashuganj Passenger Terminal**	**Pangaon passenger terminal (greenfield)**
or around the location which are used by the public for access to recreation or other facilities, which could be affected by the project?	facilities available, the river front near the terminal sites will provide natural scenic landscape						
17. Are there any transport routes on or around the location which are susceptible to congestion or which cause environmental problems, which could be affected by the project?	No. The rivers are very wide (up to 12 km in lower Meghna) and no traffic congestion is notices	No	No	No	No	No	No
18. Is the project in a location where it is likely to be highly visible to many people?	Yes, the terminals are located near the major cities and towns. This is positively influence the local community	Yes	Yes	Yes	Yes	Yes	Yes
19. Are there any areas or features of historic or cultural importance on or around the location which could be affected by the project?	Some graveyards are located in the Shashaghat and Pangaon terminals	Yes. Access to an ashes immersion site will be restricted by the project	No	No	No	No	Yes. Access to a graveyard site will be restricted by the Project
20. Is the project located in a previously undeveloped area	Two of the projects are greenfield.	Yes. Though the land is owned by	No	No	No	No	Yes. Located next to the Panagaon

Screening Questions	Yes / No / ? . Briefly describe	Is this likely to result in a significant effect? Yes/No/? – Why?					
		Shasanghat passenger terminal (greenfield)	**Narayanganj Passenger Terminal**	**Chandpur Passenger Terminal**	**Barisal Passenger Terminal**	**Ashuganj Passenger Terminal**	**Pangaon passenger terminal (greenfield)**
where there will be loss of greenfield land?		BIWTA it is being used by ship breaking industries and the top soil could be polluted by these activates.					Container terminals. Existing land use is residential and fish pond.
21. Are there existing land uses on or around the location e.g. homes, gardens, other private property, industry, commerce, recreation, public open space, community facilities, agriculture, forestry, tourism, mining or quarrying which could be affected by the project?	The land use mostly commercial near the terminal sites, which will be affected	Yes, about 50 households (squatters) working in the ship breaking industry will be affected	No	No	Yes, about 60 shops (squatters) will be affected by the extension activities	No.	Yes, about 50 residences and shops (squatters) will be affected by the project
22. Are there any plans for future land uses on or around the location which could be affected by the project?	Proper land use planning and zoning is required around the terminals to address unplanned commercial development.	No	No	No	No	No	No
23. Are there any areas on or around the	Yes, the project areas are located near the	No	No	No	No	No	No

Screening Questions	Yes / No / ? . Briefly describe	Is this likely to result in a significant effect? Yes/No/? – Why?					
		Shasanghat passenger terminal (greenfield)	**Narayanganj Passenger Terminal**	**Chandpur Passenger Terminal**	**Barisal Passenger Terminal**	**Ashuganj Passenger Terminal**	**Pangaon passenger terminal (greenfield)**
location which are densely populated or built-up, which could be affected by the project?	towns and cities, and hence these areas are densely populated.						
24. Are there any areas on or around the location which are occupied by sensitive land uses e.g. hospitals, schools, places of worship, community facilities, which could be affected by the project?	Some of the facilities may be affected. Needs to be confirmed during the EIA.	No	No	No	No	No	No
25. Are there any areas on or around the location which contain important, high quality or scarce resources e.g. groundwater, surface waters, forestry, agriculture, fisheries, tourism, minerals, which could be affected by the project?	No. There are abundant surface water and fisheries resources in the project area	No.	No.	No.	No.	No.	No.
26. Are there any areas on or around the location which are already subject to	Yes, the Buriganga river where the Shashangaht and Panagaon cargo	No	No	No	No	No	No

Screening Questions	Yes / No / ? . Briefly describe	Is this likely to result in a significant effect? Yes/No/? – Why?					
		Shasanghat passenger terminal (greenfield)	**Narayanganj Passenger Terminal**	**Chandpur Passenger Terminal**	**Barisal Passenger Terminal**	**Ashuganj Passenger Terminal**	**Pangaon passenger terminal (greenfield)**
pollution or environmental damage e.g. where existing legal environmental standards are exceeded, which could be affected by the project?	terminals are located is polluted by the industrial facilities located near Dhaka along these rivers						
27. Is the project location susceptible to earthquakes, subsidence, landslides, erosion, flooding or extreme or adverse climatic conditions e.g. temperature inversions, fogs, severe winds, which could cause the project to present environmental problems?	Yes. Climate change may possibly impact the terminal facilities due to flooding and increased sedimentation	No	No	Yes, the impacts would be more in Lower Meghan which is subjected to tidal flows and high sedimentation	Yes, the impacts would be more in Lower Meghan which is subjected to tidal flows and high sedimentation	No	No

ANNEX 8: Screening Matrix on Anticipated Environmental Impacts from the Proposed Landing Stations

Screening Questions	Yes / No / ? Briefly describe	Is this likely to result in a significant effect? Yes/No/?														
		Bhairab	Alubazar	Hornia	Hijla	Moju Chowdhury	Ilisha IBhola)	Beduria	Laharhat	Boddarhat	Daulatkha	Chairma Ghat	Sandwip	Tojumuddi ng	Monpura	Tomurudd in
1. Will construction, operation or decommissioning of the Project involve actions which will cause physical changes in the locality (topography, land use, changes in water bodies, etc.)?	No. The proposed works are very minor and generally include provision of shore connection facilities. Dredging works are required at the ferry ghats	No	Yes. Dredging will be required near this ferry ghat	Yes. Dredging will be required near this ferry ghat	No	Yes. Dredging will be required near this ferry ghat	Yes. Dredging will be required near this ferry ghat	Yes. Dredging will be required near this ferry ghat	Yes. Dredging will be required near this ferry ghat	No	No	No	No	No	No	No
		No	Yes	Yes	No	Yes	Yes	Yes	Yes	No	No	No	No	No	No	No
2. Will construction or operation of the Project use natural resources such as land, water, materials or energy, especially any resources	No. Limited petroleum products are required during construction works and dredging works at the	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No

Screening Questions	Yes / No / ? Briefly describe	Is this likely to result in a significant effect? Yes/No/?														
		Bhairab	Alubazar	Hornia	Hijla	Moju Chowdhury	Ilisha IBhola)	Beduria	Laharhat	Boddarhat	Daulatkha	Chairma Ghat	Sandwip	Tojumuddi ng	Monpura	Tomurudd in
which are non-renewable or in short supply?	ferry ghats.															
3. Will the Project involve use, storage, transport, handling or production of substances or materials which could be harmful to human health or the environment or raise concerns about actual or perceived risks to human health?	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
4. Will the Project produce solid wastes during construction or operation or decommissioning?	Limited solid waste will be generated	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
5. Will the Project release pollutants or any hazardous, toxic or noxious substances to air?	Limited releases during construction and operation of vessels	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
6. Will the Project	Yes. Noise	No	Yes, due	Yes, due	No	Yes, due	Yes, due	Yes, due	Yes, due	No	No	No	No	No	No	No

Screening Questions	Yes / No / ? Briefly describe	Is this likely to result in a significant effect? Yes/No/?														
		Bhairab	Alubazar	Hornia	Hijla	Moju Chowdhury	Ilisha IBhola)	Beduria	Laharhat	Boddarhat	Daulatkha	Chairma Ghat	Sandwip	Tojumuddi ng	Monpura	Tomurudd in
cause noise and vibration or release of light, heat energy or electromagnetic radiation?	pollution from the vessels and ferry traffic		to ferry traffic	to ferry traffic		to ferry traffic	to ferry traffic	to ferry traffic	to ferry traffic							
7. Will the Project lead to risks of contamination of land or water from releases of pollutants onto the ground or into surface waters, groundwater, coastal wasters or the sea?	There is a risk of contamination from construction and vessel operations	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
8. Will there be any risk of accidents during construction or operation of the Project which could affect human health or the environment?	Community impacts associated with vessel traffic	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
9. Will the Project result in social changes, for example, in	Yes. Better access for the local population and	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Screening Questions	Yes / No / ? Briefly describe	Is this likely to result in a significant effect? Yes/No/?														
		Bhairab	Alubazar	Hornia	Hijla	Moju Chowdhury	Ilisha IBhola)	Beduria	Laharhat	Boddarhat	Daulatkha	Chairma Ghat	Sandwip	Tojumuddi ng	Monpura	Tomurudd in
demography, traditional lifestyles, employment?	more formal businesses will flourish due to the improved accessibility all year around.															
10. Are there any other factors which should be considered such as consequential development which could lead to environmental effects or the potential for cumulative impacts with other existing or planned activities in the locality?	Yes. Markets and shops will be developed around the landing stations. Solid waste collection and disposal facilities will be required	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
11. Are there any areas on or around the location which are protected under international or national or local legislation for their ecological,	Yes. Hilsa sanctuaries are located near some of the launch ghats	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No

Screening Questions	Yes / No / ? Briefly describe	Is this likely to result in a significant effect? Yes/No/?														
		Bhairab	Alubazar	Hornia	Hijla	Moju Chowdhury	Ilisha IBhola)	Beduria	Laharhat	Boddarhat	Daulatkha	Chairma Ghat	Sandwip	Tojumuddi ng	Monpura	Tomurudd in
landscape, cultural or other value, which could be affected by the project?																
12. Are there any other areas on or around the location which are important or sensitive for reasons of their ecology e.g. wetlands, watercourses or other waterbodies, the coastal zone, mountains, forests or woodlands, which could be affected by the project?	The launch ghats are located along the rivers and will have limited impcts on the water courses	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
13. Are there any areas on or around the location which are used by protected, important or sensitive species	Yes. Migratory birds also use the lower Meghna estuary.	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No

Screening Questions	Yes / No / ? Briefly describe	Is this likely to result in a significant effect? Yes/No/?														
		Bhairab	Alubazar	Hornia	Hijla	Moju Chowdhury	Ilisha IBhola)	Beduria	Laharhat	Boddarhat	Daulatkha	Chairma Ghat	Sandwip	Tojumuddi ng	Monpura	Tomurudd in
of fauna or flora e.g. for breeding, nesting, foraging, resting, overwintering, migration, which could be affected by the project?																
14. Are there any inland, coastal, marine or underground waters on or around the location which could be affected by the project?	The launch ghats are located near inland water bodies	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
15. Are there any areas or features of high landscape or scenic value on or around the location which could be affected by the project?	The entire waterway route is a scenic beauty.	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
16. Are there any routes or facilities on or around the location which are used by the public	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No

Screening Questions	Yes / No / ? Briefly describe	Is this likely to result in a significant effect? Yes/No/?														
		Bhairab	Alubazar	Hornia	Hijla	Moju Chowdhury	Ilisha IBhola)	Beduria	Laharhat	Boddarhat	Daulatkha	Chairma Ghat	Sandwip	Tojumuddi ng	Monpura	Tomurudd in
for access to recreation or other facilities, which could be affected by the project?																
17. Are there any transport routes on or around the location which are susceptible to congestion or which cause environmental problems, which could be affected by the project?	No. The rivers are very wide (up to 12 km in lower Meghna) and no traffic congestion is notices	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
18. Is the project in a location where it is likely to be highly visible to many people?	No the project sites are mostly located in rural settings	Yes, located near the town	No	No	No	No	No	No	No	No	No	No	No	No	No	No
19. Are there any areas or features of historic or cultural importance on or around the location which could be affected	Not noticed near the immediate vicinities. Need to be studied in detail during ESIA study	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No

Screening Questions	Yes / No / ? Briefly describe	Is this likely to result in a significant effect? Yes/No/?														
		Bhairab	Alubazar	Hornia	Hijla	Moju Chowdhury	Ilisha IBhola)	Beduria	Laharhat	Boddarhat	Daulatkha	Chairma Ghat	Sandwip	Tojumuddi ng	Monpura	Tomurudd in
by the project?																
20. Is the project located in a previously undeveloped area where there will be loss of greenfield land?	No. All the launch ghats are existing	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
21. Are there existing land uses on or around the location e.g. homes, gardens, other private property, industry, commerce, recreation, public open space, community facilities, agriculture, forestry, tourism, mining or quarrying which could be affected by the project?	The land use mostly agricultural near the launch ghats and about 0.5 ha land will be affected at each landing station	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
22. Are there any plans for future land uses on or around the	No.	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No

Screening Questions	Yes / No / ? Briefly describe	Is this likely to result in a significant effect? Yes/No/?														
		Bhairab	Alubazar	Hornia	Hijla	Moju Chowdhury	Ilisha IBhola)	Beduria	Laharhat	Boddarhat	Daulatkha	Chairma Ghat	Sandwip	Tojumuddin	Monpura	Tomuruddin
location which could be affected by the project?																
23. Are there any areas on or around the location which are densely populated or built-up, which could be affected by the project?	No, except the Bhirab all ghats are located in rural setting	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
24. Are there any areas on or around the location which are occupied by sensitive land uses e.g. hospitals, schools, places of worship, community facilities, which could be affected by the project?	Not noticed near the immediate vicinities. Need to be studied in detail during ESIA study	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
25. Are there any areas on or around the location which contain important, high quality or	No. There are abundant surface water and fisheries resources in the project	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.

Screening Questions	Yes / No / ? Briefly describe	Is this likely to result in a significant effect? Yes/No/?														
		Bhairab	Alubazar	Hornia	Hijla	Moju Chowdhury	Ilisha IBhola)	Beduria	Laharhat	Boddarhat	Daulatkha	Chairma Ghat	Sandwip	Tojumuddi ng	Monpura	Tomurudd in
scarce resources e.g. groundwater, surface waters, forestry, agriculture, fisheries, tourism, minerals, which could be affected by the project?	area															
26. Are there any areas on or around the location which are already subject to pollution or environmental damage e.g. where existing legal environmental standards are exceeded, which could be affected by the project?	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
27. Is the project location susceptible to earthquakes, subsidence, landslides,	Yes. Climate change may possibly impact the landing stations due to	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Screening Questions	Yes / No / ? Briefly describe	Is this likely to result in a significant effect? Yes/No/?														
		Bhairab	Alubazar	Hornia	Hijla	Moju Chowdhury	Ilisha IBhola)	Beduria	Laharhat	Boddarhat	Daulatkha	Chairma Ghat	Sandwip	Tojumuddi ng	Monpura	Tomurudd in
erosion, flooding or extreme or adverse climatic conditions e.g. temperature inversions, fogs, severe winds, which could cause the project to present environmental problems?	flooding and increased sedimentation															

ANNEX 9: Draft Terms of References of Proposed Environmental Staff in PIU

A. Background:

The Bangladesh Inland Water Transport Authority (BIWTA) is planning to develop 'Bangladesh Regional Inland Water Transport Project 1 (Dhaka-Chittagong Corridor Project), which involves investments in development of Inland Water Transport (IWT) routes and infrastructure between Dhaka – Chittagong IWT Corridor, including branches to Ashuganj, Narayanganj and Barisal. The World Bank is currently considering the project for financing. The components of the Project are described below:

Component 1: Improved Inland Waterway Navigation. This component shall include work to maintain and increase advertised depths and to delineate channel routes through provision of long-term navigation Performance-Based Contracts (PBCs). The 6 or 7-year Performance-Based Contracts will depart from the current practice of payments based on dredging volume which is unreliable and does not assure depth, and instead commits the contractors to guarantee Year-Round Least Available Depth. A Supervision/Performance Monitoring Consultant will be contracted to monitor the performance of the contractors for the PBCs. Only selective and limited dredging of problem areas such as on chars and sand bars is expected to maintain navigability as most of the river route has the required depth. In addition, six vessel shelters will be developed within remote cyclone areas on the Project Corridor route allowing vessels to seek shelter from inclement weather.

Component 2: Improved Services at Priority Inland Waterway Terminals and Landing Ghats/Stations. This component supports the development of two cargo terminals, four passenger terminals and 14 landing ghats. The facilities shall specifically incorporate the needs of women users (such as toilet facilities for women, women-only waiting rooms) and less abled users, and address safety-related issues for all users. BIWTA will also make suggested changes to operational guidelines to improve safety and experiences using inland water transport services. All investments under this component will also aim to enhance the climate change resiliency of terminals and landing stations, such as through design adaptations to account for the expected increased variation in river flows, more intense or frequent extreme storm events, etc.

- The cargo terminals include: (i) development of a new common user general cargo terminal with access infrastructure at on the Buriganga river adjacent to the existing Pangaon container terminal; and, (ii) Rehabilitation and modernization of the existing general cargo terminal at Ashuganj.
- The passenger terminals include: (i) the development of a new passenger terminal at Shashanghat in Dhaka District; (ii) rehabilitation of the passenger terminal at Narayanganj; (iii) rehabilitation of the passenger terminal at Chandpur; and, (iv) extension of the existing passenger terminal at Barisal

Component 3: Institutional Capacity Development and Sustainability. A series of activities are proposed that will support BIWTA's overall enhancement of its management systems and human resources capacity for modern, efficient, and high quality management of the IWT sector in line with international standards. This in turn is critical for the long-term sustainability of the investments supported through the project, as well as the sector's ongoing attractiveness to users, its potential for green innovations in support of national climate mitigation targets, and its resilience to changing conditions including those posed by climate change. Activities to be supported include: (i) the development of River Information Systems to help BIWTA improve data collection for the planning,

maintenance and development of IWT, as well as enhance climate resiliency of the IWT sector in Bangladesh by creating a more systematized baseline understanding of river hydrology and navigational implications, and provision of *a Traffic Monitoring System for passengers and cargo*; (ii) improvement of Human Resources capacity for better management of the IWT sector through upgrading and modernizing the IWT Deck and Engine Personnel Training Centre (DEPTC)) into a regional IWT Training Center with open access to all users in the Region and the world; (iii) commissioning of a study to propose an institutional structure and reforms needed to develop an effective Search and Rescue organization; (iv) support for environmental and social sustainability, climate change resiliency, and "greening" of IWT; (v) a project preparation facility to finance feasibility, surveys, design and safeguards studies for continuous sector development; and, (vi) support for the Project Management Unit including the hiring of key staff and procurement of selected systems needed for implementation of the Project.

An Environmental and Social Cell (E&S Cell) will be setup in IMU to oversee (i) the implementation of various management plans proposed in the Environmental Impact Assessment (EIA) of Component 1; (ii) environmental assessment and management of Component 2 activities; and (iii) environmental screening, assessment and management of any activities under Component 3 with environmental implications (including preparatory studies for future projects), in accordance with the Environmental Management Framework (EMF) of the overall program. The following individual consultants will be hired to work in the SECO.

- Senior Environmental Specialist
- Additional Environmental Consultants as required (e.g. Environmental Specialist and Ecologist)

B. Scope of Services of the Consultants

1. Senior Environmental Specialist

Responsibilities of the Senior Environmental Specialists will include, but not limited to:

i. Assist the Project Director (PD) in implementing the Environmental Management Plan of Component 1 and preparation of Environmental Assessment and finalization of the same in close co-ordination with the design consultants and the World Bank;
ii. Assist the Project Director in finalizing the terms of references and request for proposals for various environmental consulting firms or NGOs to be hired for implementation of the EMP
iii. Undertake environmental screening, assessment and management of any activities under Component 3 with environmental implications (including preparatory studies for future projects),
iv. Oversee the pre-construction baseline monitoring of air, noise, water, soil and sediment quality to be carried out by the construction supervision consultant
v. Ensure integration of the EA and resulting EMP into the project redesign and implementation plans (contract documents);
vi. Assist the PD in review and approval the Construction Environmental Action to be prepared by the contractor before starting of the construction works
vii. Ensure incorporation of appropriate environmental specifications into the respective bidding and contract documents;
viii. Ensure compliance of the mitigation measures by the Contractors;
ix. Documenting and reporting on the experience in the implementation of the environmental process;
x. Liaison with the Contracts, CSC for the Implementation of the EMP;
xi. Liaison with the DOE on environmental and other regulatory matters; including renewal of environmental clearance documents as and when required

xii. Develop training program on environmental aspects for the key stakeholders (BIWTA, contractors, public representatives and local government institutions/ NGOs;
xiii. Interact with and oversee the NGOs and Community based organizations to be involved in the project for EMP implementation;
xiv. Dialogue with the project affected persons (PAPs) and ensure that the environmental concerns and suggestions are incorporated and implemented in the project;
xv. Undertaking environmental monitoring and reporting to the Project Director and follow-up activities;
xvi. Document the standard construction practices in the project on incorporation and integration of environmental issues into engineering design and on implementing measures reconstruction/rehabilitation and maintenance programs;
xvii. Assist the PD to arrange for the Environmental Auditing and follow up action on the Audit recommendation.
xviii. Report to the PD on the environmental aspects pertaining to the project.
xix. To guide and assist the PD and the BIWTA to strengthen the environmental management practices in embankment rehabilitation, revetment and road construction.
xx. Ensuring development and regular update of database for project specific environmental information
xxi. Prepare periodic progress reports on the implementation of the EMF/EMP for transmission to the World Bank throughout the project implementation period.
xxii. Update of Environmental Management Plan and Environmental Impact Assessment after receiving information from the contractors and design consultants.
xxiii. Maintaining project-specific Database for Environmental Management
xxiv. Draft terms of reference and oversee contracting and implementation of contract requirements for consultants hired to complete EA work for Component 2of the program. Ensure and facilitate effective and smooth ongoing communication and flow of information between the environmental consultants, design consultants and social consultants. Review draft deliverables and provide comments to consultants.
xxv. Any other tasks specified by the PD
xxvi. Compiles monthly, quarterly and annual reports to update ongoing environmental processes and address current issues. Provide recommendations for implementation of corrective actions and suggest program improvements.

2. Environmental Specialist

Responsibilities of the Environmental Specialists will include, but not limited to:

i. Assist the Senior Environmental Specialists in in implementation of the EMP for Component 1 and Preparation of EIA for Component 2.
ii. Assist the Design Consultants in environmental screening and scoping process
iii. Assist the PIU in Environmental and Social Assessments for the projects; including environmental screening, assessment and management of any activities under Component 3 with environmental implications (including preparatory studies for future projects),
iv. Assist PIU in obtaining of requisite Environmental Clearances for the project;
v. Assist the Senior Environment Specialist and the Environmental Specialist of the Design Consultants and CSC in preparation of the training materials and in conducting training;
vi. Review the contractor's Implementation Plan for the environmental and social mitigation measures, as per the EMP with assistance from the Environmental Specialist of the consultant;
vii. Liaison with the contractors and CSC on the implementation of the EMP;
viii. Carry out consultations with the NGOs and Community groups to be involved in the project;
ix. Establish dialogue with the affected communities and ensure that the environmental concerns and suggestions are incorporated and implemented in the project;

x. Carry out site inspections, check and undertake periodic environmental monitoring and initiate necessary follow-up actions;
xi. Document the good practices in the project on incorporation and integration of environmental issues into engineering design;
xii. Report to the PD on the environmental aspects pertaining to the project;
xiii. Assist in the preparation of periodic reports for dissemination to the PIU, and World Bank.
xiv. Any other tasks specified by the PD and Senior Environmental Specialist

3. Ecologist

Responsibilities of the Environmental Specialists will include, but not limited to:

i. Assist the Senior Environmental Specialists in in implementation of the EMP for Component 1 and Preparation of EIA for Component 2
ii. Review and finalize the terms of references for the consulting firms and NGOs to be hired under the project for biodiversity conservation and monitoring, fisheries development and community development. Monitor and assess progress of study execution, suggesting corrective measures if necessary. Review and comment on study findings.
iii. Assist the PIU in Environmental and Social Assessments for the Component 2;
iv. Assist the Senior Environment Specialist and the Environmental Specialist of the Design Consultants and CSC in preparation of the training materials and in conducting training;
v. Liaison with the contractors and CSC on the implementation of the EMP;
vi. Carry out consultations with the NGOs and Community groups to be involved in the project;
vii. Carry out site inspections, check and undertake periodic environmental monitoring and initiate necessary follow-up actions;
viii. Document the good practices in the project on incorporation and integration of environmental issues into engineering design;
ix. Assist in the preparation of periodic reports for dissemination to the PIU, and World Bank.
x. Any other tasks specified by the PD and Senior Environmental Specialist

C. Key Qualification of the Consultant

1. Senior Environmental Specialist

Masters in environment engineering or environmental science with 15 years working background in planning, implementation and monitoring of environmental management for large infrastructure projects. Experience in institutional capacity analysis, preparation and implementation of EMPs, and knowledge of latest environmental safeguard policies of the international development financing institutions in Bangladesh are required.

2. Environmental Specialist

Masters in environment engineering or environmental science with 10 years working experience in environmental impact assessment including field surveys, stakeholder consultations, and analyzing environmental impacts to identify mitigation measures in compliance with environmental safeguard policies of the international development financing institutions and national legislations. Experience of preparing and implementing EMP for externally financed projects is essential.

3. Ecologist

Masters in biological sciences with 15 years working experience in relevant fields. Thorough knowledge of ecological issues (natural vegetation, terrestrial as well as aquatic fauna, fish, and birds) and their implications for development projects; research and work experience relating to ecological issues; and knowledge of techniques for data collection and analysis.

ANNEX 10: Photographs of consultation meetings and FGDs

Ashuganj Terminal

Batakandi Bazar, Comilla

Munshiganj Launch Ghat

Jinjira Battala, Dhaka

Harina Ferry Ghat

Moju Chowdhury Ghat, Laksmipur

Baro Station Tek, Mul head, Chandpur

Bhairab Bazaar Launch ghat

Physically disabled people at Laharhat

Physically disabled people at Ashuganj;

Disabled people ate Sadarghat, Dhaka

Sand businessmen, Boulpara, Narsingdi

Laharhat, Barisal

Female group at Ashuganj