

EXECUTIVE SUMMARY

ENVIRONMENTAL IMPACT ASSESSMENT

MAY 2019

1. Background

Governments of Assam intend to upgrade the existing Inland water transport system in state. To modernize and transform IWT in Assam, the World Bank is assisting the GoA through a phase-wise project which includes up gradation of ferry Infrastructure, last mile connectivity. Fleet modernization, institutional capacity development etc. for total 11 identified Terminal / Jetty / Landing point locations. However, in phase-I, three ghats/ landing points have been selected. The project includes civil works along with new construction activity; for which it has been categorized as Environment Category-A according to World Bank classifications.

Project development / civil intervention works during development may have interface with various physical, social and biological components of the environment, i.e. water quality, aquatic and terrestrial flora & fauna, air quality, noise levels, soil, project affected families, persons, cultural and historical monuments etc. at all project development stages. All these environmental & social components may get affected due to development and operation of the terminals and a detailed environment and social impact assessment has been carried out to assess all the potential impacts of the project.

2. Project Description

Project Development Objective (PDO)

The Project's Development Objectives are to (a) improve passenger ferry infrastructure and services in Assam, and (b) to improve the institutional capacity and framework. The Project has three main components and intended to tackle the regulatory, operational and infrastructure challenges of the sector. The three main components are:

1. Institutional, regulatory and safety strengthening (estimated cost USD 20 million). This component will include:

- a) Technical assistance: sector planning, design and roll-out of new Regulatory Authority, business planning for Assam Shipping Company and Assam Ports Company; training of staff to fulfill new roles in the restructured industry (USD 8 million);
- b) Safety management: river navigation aids, night navigation technology on some routes, and emergency response system (policy, procedures, vessel and equipment) (USD 12 million).

2. Fleet safety improvements and modernization (estimated cost USD 25 million). This will include financing of:

- a) GoA incentive scheme (known as Jibondinga) to assist industry transition to the new regulatory regime; it is designed to support the scrapping and replacement of unsafe or obsolete private vessels and replace them with new vessels, or retrofit existing but acceptable vessels with modern marine engines and safety equipment
- b) Procurement of new vessels

3. Improvement in terminal infrastructure (estimated cost USD 105 million). This will finance:

- c) Provision of priority terminals for the Guwahati and Majuli Island ferry routes (USD 70 million); and
- d) Provision of terminals on several other mainly rural routes, to be selected (USD 35 million).

The project components in 1st phase are summarized below-

Project Component	Sub Component	Physical Investments planned
Component1:	a. Technical assistance: sector planning,	Up-gradation of crew

Project Component	Sub Component	Physical Investments planned
Institutional, regulatory and safety strengthening	design and roll-out of new Regulatory Authority, business planning for Assam Shipping Company and Assam Ports Company; training of staff	training centre
	b. Safety management: river navigation aids, night navigation technology on some routes, and emergency response system (policy, procedures, vessel and equipment)	
Component 2: Fleet safety improvements and modernization	a. GoA incentive scheme (known as Jibondinga) to assist for up-gradation of country boats	Vessel improvement works for private boat operator (engine, hull etc.)
	b. Procurement of new vessels and retrofitting of existing public vessels	<ul style="list-style-type: none"> • Procurement of 20 new vessels • Retrofitting of few govt. vessels
Component 3: Improvement in terminal infrastructure	a. Infrastructure Development of terminals at Guwahati and Majuli Island ferry routes	<ul style="list-style-type: none"> • 2 terminals at Guwahati (Gateway Guwahati Ghat and North Guwahati) • 1 terminal at Majuli (Aphalamukh)
	b. Development of terminals on several other rural routes, to be selected	---

3. Objective of the EIA Study

The objectives of the study include:

- Identification of potential environmental relating to the Project through Environmental Management Framework (EMF)
- Assessment of possible environmental impact during stages of implementation of the project (construction and operation phase) through Environmental Impact Assessment (EIA)
- Mitigation measures suggested in accordance with World Bank's operational policies, WB Guideline, MoEF&CC Notification & Guidelines
- Environmental Management Plan (EMP) as per EMF followed by effective implementation.
- Incorporate environmental consideration during design

The EMF has been prepared considering all the 11 priority ghats for Assam Inland Water Transport Project. The EIA is prepared for Phase I locations, which include 2 Ghats in Guwahati Division i.e. Gateway Guwahati Ghat (GGG) on South Bank at about 100m upstream of Existing GG Ghat of the Brahmaputra River at Kamrup (Metro) district and North Guwahati Ghat on North Bank of the Brahmaputra River at Kamrup district and one Ghat in Dibrugarh Division i.e. Aphalamukh Ghat at Majuli district on North Bank of Brahmaputra River.

4. Administrative and Legal (Regulatory) Framework

The national environmental legislations are broadly discussed. The MoEF&CC, Central Pollution Control Board (CPCB), Dept. of Environment & Forest, GoA and State Pollution Control Board, Assam (SPCB) together forms the regulatory authorities for implementation of provisions of environmental legislations. World Bank has also defined its Environmental and Social Safeguard

Operational Policies. World Bank's operational policy categorize the project into Category A, B & C on the basis of nature and extent of the impacts anticipated. This project is classified as **Category A** as per WB policy and therefore comprehensive environment assessment studies are required. The project is likely to impact quality of life, livelihood, terrestrial and aquatic ecology, air quality, water quality, economy, noise levels etc. The anticipated impacts are both positive and negative. MOEF&CC, GOI has notified standards under EP Act, 1986 for disposal of effluents, National Ambient Air Quality Standard (NAAQS) and surface water body, which would be complied with.

5. Planning considerations for Terminals and vessels

The terminals are planned considering ease accessibility and passenger comfort. Environmental & social consideration such as solid waste management, sewage treatment, vessel wastewater management, noise control devices, landscaping, green belt, solar energy, special provision for elderly, women & differently-able passengers have been taken into account during the designing and layout of the terminals.

6. Project Benefits

The major benefits from the project are outlined below.

- Higher quality ferry service with wider transport network
- Improve the infrastructure for better public convenience.
- Accommodate the enhance traffic volume by systematic and timely operation
- Have greater positive impact on socio-economy of the area
- Improve the safety and environment aspects
- Comfortable passenger vessels with all amenities
- Minimum impact on existing environmental status
- Improve connectivity to many regions / areas.

7. Environmental Safeguards Screening

As part of environmental and social assessment process, environmental and social safeguards screening exercises have been conducted. The screening exercise has identified the following potential impacts from the project activities:

Positive Impacts:

- Improvement in IWT and north south connectivity in Assam
- Protection of human lives
- Well-being of children
- Improvement in income and living standards.
- Protection of vulnerable groups from disasters
- Protection of villages and settlement from damages to housing and other physical assets.
- Reduction in temporary displacement.
- Decrease in area of land lost due to erosion.
- Improvement in local environmental and social conditions.
- Decrease in public health risk by reducing incidence of water borne and other disaster related diseases, and mental fears
- Protection against damages to crop and livestock.
- Increase in agricultural production and economic gain.
- Reduction in poverty through generation of employment opportunities for the locals.

Negative Impacts:

- Water pollution
- Elimination of washing areas/sites
- Leakages of chemicals etc.
- Land pollution may happen when solid waste material, camp site area, stone stacking area and removed vegetative cover is left unattended

- Noise and vibration due to use of machinery and movement of vessels
- Air pollution due to smoke and dust
- Traffic and public nuisance
- Removal of vegetation (mostly herbs and shrubs) during site clearance
- Land use change
- Health and safety issues of subprojects professional staff/labour and communities residing near project areas
- Risk hazard
- Terrestrial and aquatic ecology

The EMF assesses all of these potential negative environmental and social impacts and provide mitigation measures to address these impacts as well as lists down institutional arrangements to ensure that the mitigation measures are implemented.

The EMF identifies and categorizes all potential activities (subprojects) that may require physical works, identifies the instrument type that will be used to screen, assess, and mitigate the negative environmental impacts, details and extent of the stakeholder consultation that shall be needed for each assessment type, the disclosure requirements and the institutional, reporting and monitoring measures that shall be needed to ensure implementation of mitigation measures.

The EMF includes identification of all possible project-environment interactions, categorization of environmental impacts, identification of mitigation measures, a comprehensive environmental and social baseline, identification of stakeholders and details and results of a comprehensive stakeholder consultation exercise, institutional arrangements needed to ensure implementation of mitigation measures, monitoring, reporting and documentation regimes and table of costs associated with implementation of the EMF.

8. Screening Safeguards

The EMF categorizes subprojects on the basis of nature of activities, potential impacts on environment and or people. The EMF specifies types and extent of environmental and social assessments that will need to be carried out before initiating each subproject. The EMF includes checklists that will be used to assess the potential impacts of each subproject on the basis of its scale/size, nature and potential negative impacts. These checklists prescribe further screening and environmental management instruments to be prepared for subprojects which might have more expansive impacts.

9. Monitoring and Reporting

The project will employ a three tiered monitoring structure with focal persons nominated from the construction staff to monitor impacts during works phase. The environmental safeguards specialist will compile the monitoring checklists to prepare and collate regular environmental progress reports. In addition to this, third party safeguards monitoring will also be conducted to validate compliance with the EMF and implementation of safeguard instruments like the EMP.

10. EMF Disclosure

The EMF shall be released on the IAs and project website, hard copies have been sent to all institutional stakeholders and all their regional offices. The Executive Summary of the EMF has been translated into local language and disclosed on the websites of IAs and the projects, and distributed among institutional stakeholders and affected and beneficiary communities at the early stage of sub-projects.

11. Stakeholder Consultation

Key findings from the public consultations were mostly on improvement and extension of terminals, safety and security of passengers, impact on livelihood, dredging, river ecology and environmental issues including management of dredged materials. All the stakeholders and community overall appreciated the project. Stakeholders also expressed their concern on ecology of river, safety of passengers, special facilities for women & senior citizen at terminals & ferries, facilities for differently-able passengers. The stakeholders also suggested to ensure selection of sub-projects on the basis of community needs, regular consultations, participation, communication, access to information, grievance redressal of project affected and beneficiary communities and other stakeholders.

12. Grievance Redress Mechanism (GRM)

An integrated grievance mechanism has been created to handle any complaints related project performance on environmental aspects, along with social aspects. Complaints can be registered through multiple grievance uptake channels, such as a dedicated helpline, email, by letter to the GRCs (a divisional level or upper level GRC) or walk-ins and registering a complaint on grievance logbook to be provided at each project site/ghat or suggestion box.

13. Current Environmental Scenerio

For the activities identified for execution until now, detailed Environmental Impact Assessment had been completed. Baseline environmental status around 10 km radius of the proposed terminals is considered and relevant primary and secondary data with respect to various environmental components were collected, compiled, analysed and presented. Environmental monitoring was carried out to understand the baseline status. Various environment monitoring conducted in the study area for relevant parameters.

13.1 Physiography

The Brahmaputra Valley has a uniform level alluvial Plain interspersed with low elevated hillocks scattered along the banks of the River. The alluvial fans formed by the coarse alluvial debris in the northern fringe of the Valley have given rise to semi-tame conditions where water percolates down resulting in wet soil and dense forest. In the South Brahmaputra plain the meandering course of the tributaries is conspicuous only in the eastern part where there are numerous beels and oxbow lakes. The most physical characteristic of the Brahmaputra is that the river itself is highly braided due to its gradient. As a result, there are innumerable Chars or riverine islands.

13.2 Landuse pattern

The existing land use pattern of the area was analysed from the Satellite data: The Indian Remote Sensing satellite data RESOURCESAT-2, LISS III and Topographical maps of the study area. Land use pattern of study area of three proposed terminals with respect to Agricultural crop, Fallow land, Settlement, Forest, Open Scrub/Grazing Land, Wetland, Water body, river are analysed. It is observed that settlement in the study area of GGG (18.76%) and NG (17.04%) is higher than Aphalamukh (0.21%). There is no forest area in the study area of Aphalamukh, where as in GGG and NG the forest over are 48% and 45.43 % respectively. Agricultural in Aphalamukh (20.17%) are higher than GGG (8.31%) and NG (9.23%). River and sandy areas comparable (GGG-8.85%, NG-9.51 and Aphalamukh-11.92%)

13.3. Water Environment

Surface Water Quality

Brahmaputra river water quality has been monitored by Central Pollution control Board (CPCB). As per Water quality Monitoring data of CPCB, pH, DO and Total Coliforms meet the water quality criteria, Class (C) for drinking water source after conventional treatment and disinfection at most of the monitoring locations except samples at Jogijhoga. The BOD ranges from 0.3 to 9.2 mg/l. The maximum BOD was recorded at Brahmaputra at Kherghat. Faecal Coliform ranges from 0 to 1500 MPN/100 ml at Sualkuchi. Total coliform ranges from 0 to 15000 MPN/100 ml at Jogighopa. This may be due to domestic wastewater discharge from urban bodies. Surface water sample were collected from the upstream and downstream of the proposed terminals/ jetty / landing points.

The water samples were analysed for Physico-chemical parameters and bacteriological parameters. It is revealed from the analysis that water quality meets with BDU Class C Criteria of CPCB. Parameters pH & DO which meets A class criteria of CPCB.

Ground Water Quality

Ground water samples were collected from 3 different locations of each proposed terminals/ jetty / landing points. The water samples were examined for physico-chemical parameters and bacteriological parameters. The results of samples are compared and found that all the parameters are within the permissible limits of drinking water Standard (IS: 10500).

13.4 Climate & Hydrometeorology

The climate of the project area is sub-tropical in nature with four distinct seasons. The southwest monsoon lasts from June to September. Almost 90% of the annual rainfall occurs during this timeframe. The annual average rainfall in the area is about 1722mm. Mean daily temperatures reach a minimum of about 18°C in January, occasionally dropping in some cold years below 10°C. In April, maximum daily temperatures often exceed 35°C. Wind speeds & directions are of primary importance in the diffusion and transport of atmospheric pollutants. The wind rose for Guwahati shows that the predominating Wind direction is from East-Northeast to West-Southwest (WSW). Humidity is an indicator of water vapor content of air. It is observed that monsoon season has the highest humidity level.

13.5. Air Environment

Ambient air quality monitoring was conducted in the study area of the proposed project sites during August –September, 2018 for PM10, PM2.5, SO₂, NO_x, CO and compared with National Ambient Air Quality standards (NAAQS, 2009), notified under EP Act, 1986 by MOEF&CC. Three monitoring stations were located within 5.0 km radius of each sites for baseline air quality of the area. The monitoring was carried out following CPCB guideline. The ambient air quality monitoring was carried out for Particulate Matter (PM10 & PM2.5), Sulphur dioxide (SO₂), Oxides of Nitrogen (NO_x), CO & all parameters as per NAAQS, 2009. Sampling was carried out on 24 hourly twice a week for one week. It is observed that ambient air quality for the monitored parameters in all locations well within the NAAQMS.

13.6 Noise Environment

Noise levels in three project sites were monitored for 24 hrs. Monitoring was conducted at three locations in each site by using Sound Level Meter. Noise level was monitored for day time (06.00

AM to 10.00 PM) and night time (10.00 PM to 06.00 AM) for comparison with the standard. The noise monitoring results show that the day and night time noise level at all locations meet the norms for commercial zone. However, the noise level exceeds the standard (45 dBA) during day time for residential zone. The major source of the noise in the study area is vehicular movement as well as commercial activities.

13.7 Ecology & Biodiversity

Ecology & biodiversity study is an important aspect of EIA. Existing status covers the following:

- Study of the ecology & biodiversity (Terrestrial & Aquatic) of the project area along with identification of Rare, Endangered & Threatened (RET) species if any.
- Identification of Protected areas/Ramsar sites.
- Identification of IBAs near project influence areas.
- Identification of breeding ground of Fishes & Avifauna near project locations.

Ecology and Biodiversity Study is carried out in 10 km radius of individual proposed terminals including stretches of Brahmaputra River. Detail studies were conducted on followings:

- Floral & Faunal diversity both Aquatic & Terrestrial
- Phytoplankton's & Zooplanktons, Benthos
- Forest Area and endangered species

Gangatic /River Dolphin were spotted in project locations. The active breeding period of sensitive aquatic fauna is during the monsoon period (June to August).

Endangered Species (Aquatic Fauna): Endangered (EN) has been categorized by the International Union for Conservation of Nature (IUCN). No aquatic species is found endanger in the study area. Dolphin which is a schedule-I species is reported in Brahmaputra River. Dolphins were spotted at the Gateway Guwahati Ghat (GGG) area during site visit and also dolphin movement were reported in and around the proposed site. Secondary data on dolphin presence in stretches of the river have been relied on. However, the number of Dolphins in the project area was not estimated. A fresh study on Dolphin has been initiated¹.

13.8 Soil Quality

Three samples of soils were collected from each proposed terminal site and analysed for Physical-chemical parameters. The soil analysis results of Gateway Guwahati Ghat, North Guwahati Ghat and Aphalamukh Ghat indicate that the soil in all three terminals are acidic and is sandy loam. Clay percentage varies from 67.2% to 72.4%. Heavy metals content in soil is negligible.

13.9 River Bed Sediment Quality

The riverbed sediment is an integral component of the aquatic ecosystem. The sediment quality influence benthic organisms, vegetative communities, and the aquatic food web. Organisms and plants, particularly those living in the sediment, can get affected. Secondary data on sediment quality from IIT, Guwahati was collected for all three proposed terminals. From the study report, it is concluded that the sediment is non-hazardous and not contaminated.

14. Current Social Scenario

¹Dolphin survey for 'dry season' has been completed in March, 2019 and for 'wet season' it is proposed on June-July'2019. Final estimated numbers of dolphin in project location will be ensured after the 'wet season' Dolphin Survey which will be incorporated in the Final EIA.

14.1 Land Requirement for the Project (Phase-I)

Three Ghats viz. Gateway Guwahati Ghat and North Guwahati Ghat in Guwahati Division and Aphalamukh Ghat in Dibrugarh Division were selected for the 1st phase implementation of the of the project. The extent of land required for the construction of these Ghats is shown below:

Name of/ type of sub-project	Amount of land required (in Acres)	Type of Land (private, government, community)		
		Private	Government	Community
Gateway Guwahati Ghat	0.0378 Acres	Nil	0.0378 Acres	Nil
North Guwahati	0.0341 Acres	Nil	0.0341 Acres	Nil
Aphalamukh	0.3188 Acres	Nil	0.3188 Acres	Nil

N.B.: Construction of approach road and the requirement of land are not considered in this.

14.2. The Socio-Economic Profile of the PIA²

- **Gateway Guwahati Ghat** is in Ward No 02 of Guwahati Municipal Corporation, is the 7th most populous ward in the city and as per 2011 census report, have a population of 16613 persons, 8780 (53%) males and 7833 (47%) females (2011 census). Sex ratio is 892. Average Literacy rate is 91% with 94% male and 88% female literates. 6317 persons (38%) in Guwahati Ward No.-2 are engaged in main or marginal works. Male work participation rate is 55% and female work participation is 19%. 47% of male workers are engaged in Main works and 8% of the men are engaged in marginal works. Among working women 14% are main workers and 6% are marginal workers.
- **North Guwahati** has a Town Committee in Kamrup district of Assam. The city is divided into 4 wards. As per 2011 census data, it has a population of 10,328 persons with 5,088 males and 5,240 females. Sex Ratio is of 1030 against state average of 958. Literacy rate 93.68 %, higher than state average of 72.19 %, with 96.51% male literates and 90.97% female literates.

Aphalamukh Ghat is in the Majuli Island where there are 144 villages. Total population of the island is 150,000 with a population density of 300 individuals per square km. **The total literacy rate is 78.56% with 74.56% male literates and 61.34% female literates.** Four villages viz. GaramurJugi Pathar, AtoiChuk, Dakhinpat Satra and Borboka Pathar are the core area villages falling in the PIA of this Ghat.

15. Environmental Impact & Mitigation Measures

This chapter describes the environmental impacts that are likely to result from the project activities. The interaction between various project components and environmental elements are being analysed to identify and evaluate impacts. Mitigation measures proposed to be taken to minimize environmental impacts are also discussed. EMF Guideline, public consultation and observations during field survey of the project sites were important inputs and incorporated in the mitigation measures. Impact during construction and operational phases are separately dealt. Impact due to maintenance dredging of channels is typical to the project activities and discussed separately. Dolphins in the river are endangered species and therefore special emphasis has been given for their conservation and least impact.

Major environmental factors, covered are as follows:

² For details on Social Aspects summarized here in Section 14 and 16, please refer to the SMF and RAP which have been prepared for the project and disclosed separately.

- Impact due to solid and liquid waste disposal
- Sanitation, health and safety facilities
- Impact on Ambient Air Quality due to emission during construction and operational phase
- Impact on river water quality due to proposed amenities
- Impact on noise level
- Impact due to Dredging Activities
- Impact on environmental aesthetics and cultural values
- Impact on Biological Environment
- Impact due to Climate Change
- Impact on Social Environment (Project Affected People)
- Labour Influx, Gender Based Violence, Community Health & Safety.

All the project activities and relevant environmental parameters are covered in the study. It is concluded that the environmental impact during construction phase will be temporary and with the mitigation measures, it will be localised. All the dredged materials shall be disposed off-shore since the river bed sediment is not contaminated. The overall impact during this phase will be within the acceptable limit. Due to integration of environmental factors in the project, the environmental impact during operational phase will be negligible and overall environmental quality of the area will improve with better infrastructure and amenities.

16. Social Impact & Mitigation Measures

The project has direct and indirect impact on the people and their families as summarized below. A detailed analysis of social impact and mitigation measures has been highlighted in the Executive Summary of the SIA, SMF/RPF-cum-IPDF and consolidated RAP-cum-IPDP for three priority terminals prepared under the project.

Land required for the project is limited as the constructions of the Ghats mostly happen in the River portion. Still some land is required especially for approach road and parking etc and in these 3 priority Ghats, Government land is available and no private land need to be acquired, during the 1st phase. Some commercial squatters occupying government land will be impacted and they will be resettled providing compensation for their loss as per the entitlement matrix. Some other people occupying the Ghat vicinity may also be affected during construction phase and they will be compensated for their livelihood loss as per the entitlement matrix, prepared in line with the World Bank OP 4.12 and RFCTLARR Act, 2013 and Assam LARR Rule 2015.

Major and Minor Impacts Impact on the affected properties

Major impact: The land proposed for the construction of the 3 Ghats are Government properties and some commercial squatters are running small tea shops / pan shops in temporary sheds and kiosks. 13 such structures were identified to be shifted to adjacent places and their livelihood will be impacted.

Minor impact: Some Common Property Resources such as a potable water kiosk, parking area and a ticket counter etc. will be impacted in Lachit Ghat area, which can be shifted or allowed to continue as per the technical design proposed for the Ghat. After the construction phase the possibility of repositioning some of these shops can be considered by the authorities, as these services are required for the passengers as well.

Details of major/minor impacts of the project are shown below

Category of PAPs	Type of Impact	Unit of Entitlement	Nos. affected
Titleholder – Agriculture Land / Non-agriculture land / Homestead Land	Loss of Land and Assets	Nil	Nil

and assets			
Titleholder – Residential Structure	Loss of Structure	Nil	Nil
Titleholder-Commercial/ industrial Structure	Loss of Structure	Nil	Nil
Titleholder-Residential cum-commercial/ industrial structure	Loss of Structure	Nil	Nil
Tenants-Residential / commercial / industrial Structure	Loss of Structure	Nii	Nil
Squatter-Residential / Commercial / Residential cum-commercial	Loss of Structure	4Nos	4
Encroacher	Loss of Structure/ Assets	Nil	Nil
Additional support to vulnerable groups	Nil	Nil	Nil
Employees in shops, agricultural labourers, sharecropper	Loss of Livelihood	9 structures	9
Community Assets	Loss of Community Assets	Water kiosk Ticket counter	1 1
Scheduled Tribes	Loss of Land, Structure or both	Nil	Nil
Disruption	Temporary Impact	9 structures	9

Type of Structures affected

Structure	Total Affected Structure	Major Impact			Minor Impact		
		Pucca	Semi Pucca	Kutcha	Pucca	Semi Pucca	Kutcha
Residential	Nil	NA	NA	NA	NA	NA	NA
Commercial	4	Nil	4	Nil	Nil	Nil	Nil
Mixed	Nil	NA	NA	NA	NA	NA	NA
Other(cattle-shed)	Nil	NA	NA	NA	NA	NA	NA

Loss of other Assets

Types of Assets	Nos.
Trees	2
Open Well	Nil
Boundary Wall	1
Cattle shed	Nil
Water Tank/kiosk	1
Others	Park

Impact on cultural properties and community assets

Some Community assets such as water kiosk, park, ticket counter etc in a closed premise owned by the Inland Water authority and used by the public will be impact by the Gateway Guwahati Ghat Project. But these structures can be shifted to an appropriate place in the premises, for continued use of public. No cultural properties will be impacted.

17. Environmental Monitoring Programme

Environmental Monitoring Programme is to ensure that the intended environmental protection goals are achieved and result in desired benefits of the project. The monitoring programme on each environmental parameter with frequency of monitoring for individual project site has been worked out for both construction as well as operational phase. The same will be included in tender / bid document. This has been done as per CPCB guideline.

18. Additional Environmental Studies

Flood Assessment and Erosion Control

Flooding in river Brahmaputra is observed almost every year. From 1953 -2003 the Flood Control Department of Assam has so far constructed 105.2 km. of embankments on the bank of the Brahmaputra, Kherkotia and Subansiri Rivers.

No substantial changes on the embankment cope line observed in Guwahati Gateway Ghat (GGG) and North Guwahati Ghat. However, it is observed in Aphalamukh that, between 2009 and 2014, substantial changes on position of river have occurred (October 2012 and February 2014 vary between 100 - 190m westwards). Additional studies have been conducted on flood assessment and river bank erosion control. Erosion control measures have also been suggested.

19. Risk Assessment

Hazard Identification: Following hazard potentials are identified and emergency response and preparedness plan suggested-

- Damage of Fuel tanks and oil leaks into the river.
- Fire hazard from Fuel Storage
- Emergency during ship manoeuvring
- Vessel or boat collision

The degree of damage depends on-

- Nature of hazardous substances (gas, liquid or vapour);
- Pathway of release (boat, vessel etc.);
- Dispersion of released gas or vapour in atmosphere or liquid in river water.

Oil spill disaster management due to vessel collision and/or accidental oil leakage has been discussed in greater detail. Coordination and control emergency have also been suggested. Safety standards are applied during all phase of project activities. The personnel would be periodically undergoing medical check to identify anybody suffering from occupational health hazard. Special emphasis has been given to Training and Awareness, which cover the following-

- Types of emergencies with potential threats, hazards, and protective actions
- Components of emergency preparedness and response plan
- Individual roles and responsibilities
- Relevant standards and Codes
- Notification, Warning, and Communications procedures
- Evacuation, Shelter, and Head Count procedures
- Location and use of common emergency equipment
- Mock Drill procedure and accounting for personnel
- Techniques of accident investigations

20. Entitlement Matrix

The entitlement framework specified in the RPF-cum-IPDF and consolidated RAP-cum-IPDP for three priority terminals has been designed for various categories, based on the central RFCTLARR Act, 2013 and RTFCTLARR Rules, 2015 of GoA and World Bank OP 4.12 on Involuntary Settlement. Each category of loss for the purpose of R&R entitlements is classified under two major categories-

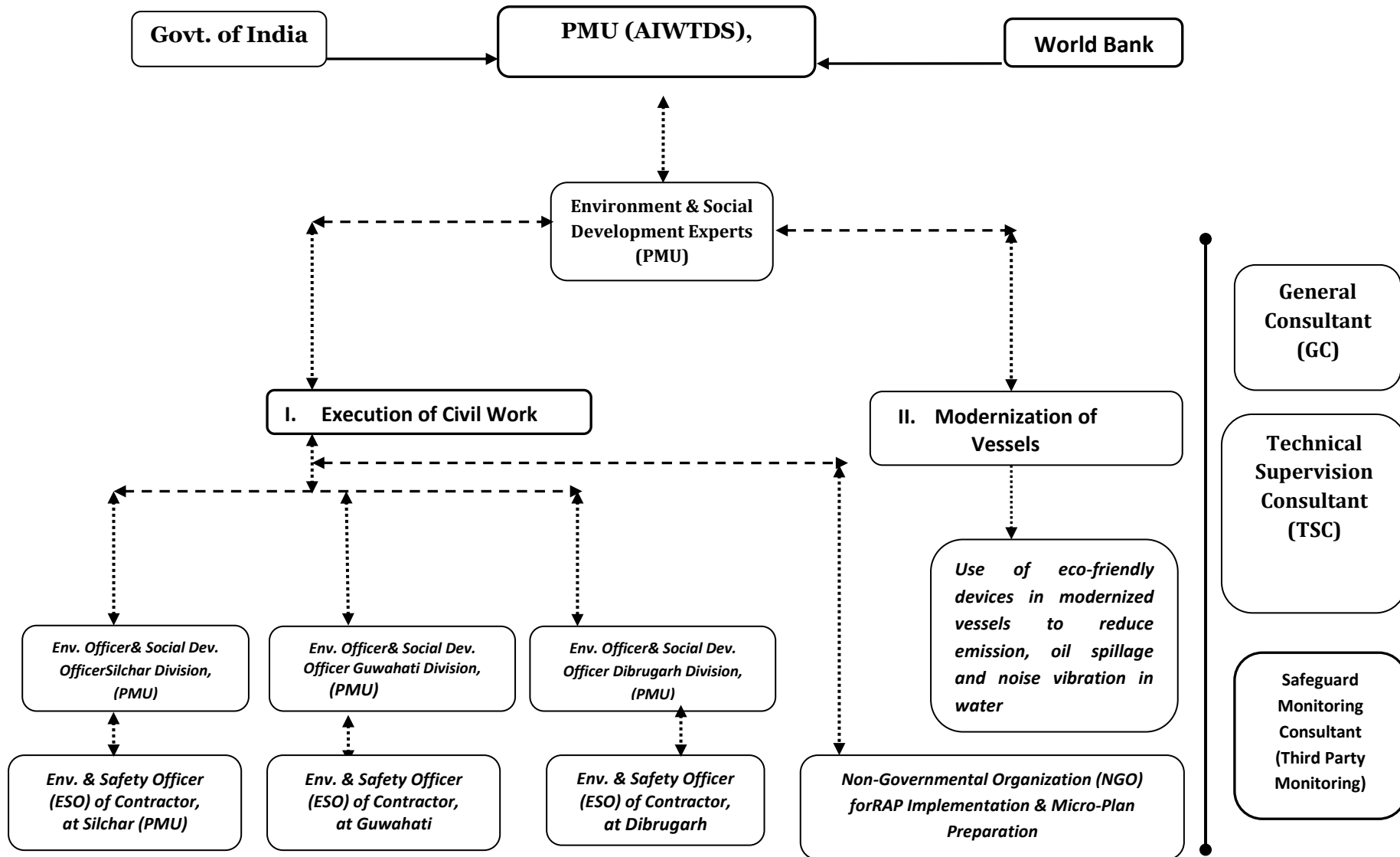
1. Titleholders (owners)
2. Non-titleholders (Tenants in the commercial/residential properties, Encroachers and Squatters).

The entitlement matrix will be informed to the PAPs, to ensure that their interests are protected and if not, to submit their grievances to the appropriate authorities and get it resolved in the right time.

21. Implementation of Environmental Management Plan (EMP)

The proposed organogram for the implementation and monitoring of EMP is presented below:

Figure-1: Organization Structure for Implementation of EMP



21.1 Environmental Management Plan

The key components of EMP are summarized below and each of these components is explained in detail in the following subsections:

- Mitigation Measures
- Monitoring Measures
- Institutional Arrangement
- Reporting Requirements
- EMP Budget

Impact identification and EMF application for the development interventions are carried out to set the management framework

The Environmental Management Plan, covering project activities and relevant environmental components for proposed Terminal Project for both constructional and operational phase has been worked out and approximate timeframe and institutional responsibilities have been specified. The same has been presented in Tabular form.

A three-tier monitoring program has been proposed:

- 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 are implemented in an effective manner, and also to evaluate program impacts on the key environment and social parameters. The same has been presented in Tabular form as **Attachment 1** to the Summary.

21.2 Institutional Set-up for Effective EMP Implementation and its Monitoring

The Project implementation will be led by the Project Implementation Unit (PIU) that will be established within AIWTDS. The PIU will be responsible for engagement of consultants for carrying out the various studies related to EMP. The PIU will be headed by the Project Director (PD).

The PIU consists of an Environment and Social (E&S) Cell with environmental & social expert. E&S Cell will assist the PMU on issues related to environmental and social management and oversee the Construction Supervision Consultant (CSC) and contractors. Quarterly monitoring reports on EMP compliance is to be sent to the Project Director and also shared with the World Bank, throughout the construction period. The CSC 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.

21.3 Environmental Codes of Practices and Performance Indicators

The contractor will be required to follow the environmental codes of practice (ECoP's) by preparing site-specific management plans. For evaluating the performance of the environmental management and monitoring plan, performance indicators are identified to evaluate the efficiency. The indicators are defined both for construction and operation phase.

Integrated Grievance Redressal Mechanism

A formal grievance redress process will be outlined in the project's operational manual and a protocol will be set up. The grievance submission mechanism should be online or through toll-free communication system. The GRM is based on four guiding principles of the company which include: Transparency, Fairness, Response, Accountability

Capacity Building / Training and environmental awareness

Capacity building for effective implementation EMP is highly essential. Capacity building on environmental and social safeguard will be taken up for all levels stakeholders, including AIWTDS, E&S Cell of AIWTDS, supervisor, and contractors. At the construction site, supervisor will take the lead in capacity building plan. The contractors will also be responsible to conduct trainings for their own staff and workers. During the O&M phase of the project, these trainings will continue to be conducted by AIWTDS staff for all relevant O&M personnel and community.

It is vital that all personnel are adequately trained to efficiently perform their designated tasks. In addition to training, general environmental awareness must be fostered among the project's workforce and general public to encourage the environmentally sound practices.

Documentation and Record Keeping

A document handling system will be established to ensure updating of EMP documents, and availability of documents for the effective functioning of the EMP. The document handling system have been suggested

Stakeholder Engagement

It is expected that the stakeholders would have opportunity to comment on the content of the EIA report.

21.4 Environmental Monitoring Plan & EMP Budget

Tentative Environment budget has been prepared for design, construction and operation phase of the project. The Environmental budget includes the cost of environmental structures like septic tank & soak pit, Air Pollution Control System at terminals, monitoring, enhancement measures, training and awareness and technical support for establishment, enhancement measures and environmental guidelines. EMP cost estimates of North Guwahati Terminal, Gateway Guwahati Terminal and Aphalamukh ghat are Rs 30,58,650/-, Rs 30,58,650/- and Rs.31,42,650/- respectively.

22 Summary & Conclusion

Environmental impact assessment is carried out pertaining to the up-gradation proposals of Ghats and other components of the project. The investigation is taken into account both national and international legal requirements (as per WB).The EIA is prepared based on field investigation, secondary data/information, environmental quality monitoring and feedback from the stakeholders.

Both positive and negative environmental impacts are evaluated.

The positive environmental impacts of the Project are development of all weather navigation routes for transportation of passengers and generation of employment opportunities during construction, operation and maintenance stages. The project will induce economic growth in the region. The negative environmental impacts are not significant. However, the positive impact of the project will improve the sanitary condition, proper waste management and over all aesthetics of the area.

EMP has been formulated to mitigate the negative impacts during various phases (pre-dredging/construction, during dredging/ construction and Post dredging/O&M).The main monitoring parameters include monitoring of dredging and dredge material disposal, biological monitoring and enhancement, environmental quality monitoring (air, noise, surface water, river bed sediment), health and safety, etc. Most of the potential impacts are short-term that can be addressed by adopting mitigation measures and relevant ECoPs. To keep the project influence area environmentally friendly, AIWTDS should ensure that the Contractor prepare site specific EMPs including Emergency response plan, Oil Spill Contingency Plan and Workers Health and Safety plan and Environmental Pollution Abatement and Mitigation Measures Plan. Regular and effective monitoring of environmental quality parameters as indicated in this EIA report. AIWTDS should follow the EMP for improvement of navigation and environment quality of the area.

