

# EXECUTIVE SUMMARY

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### 1.0 Introduction

National waterways are cost efficient, and is an environment-friendly mode of transport. This will ensure enormous gains in terms of economic growth, livelihood generation and prosperity, leading to political and social stability. The Government of Assam (GoA) has taken up a Project titled 'Assam Inland Water Transport Project (AIWTP)' to improve the quality of inland water transport services and integrate high quality passenger and vehicle ferry services in river Brahmaputra. Assam Inland Water Transport Development Society (AIWTDS) has been formed by the GoA under Transport Department to implement the Project. The Project is conceptualised to promote Inland Water Transport as eco-friendly, economic and convenient mode of transport and is likely that the project will help in regional & economic development of Assam and nearby States in providing better connectivity and access to the hinterland.

To modernize IWT in Assam, the World Bank is assisting GoA through a phase-wise project, which includes up gradation of ferry Infrastructure, Fleet Modernization, institutional capacity development etc. for 11 identified Terminal / Jetty / Landing points locations in Phase I.

### 1.1 Project Development Objective (PDO)

The Project's Development Objectives are to:

- (a) Improve passenger ferry infrastructure and services in Assam
- (b) To improve the institutional capacity and framework.

### 1.2 Project Components

The project components in 1<sup>st</sup> phase are summarised below

Project Component	Sub Component	Physical Investments planned
<b>Component 1:</b> Institutional, regulatory and safety strengthening	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	Upgradation of crew training centre
	b. Safety management: river navigation aids, night navigation technology on some routes, and emergency response system (policy, procedures, vessel and equipment)	
<b>Component 2:</b> Fleet safety improvements and modernization	a. GoA incentive scheme (known as Jibondinga) to assist for upgradation 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"> <li>• Procurement of 20 new vessels</li> <li>• Retrofitting of few govt. vessels</li> </ul>
<b>Component 3:</b> Improvement in terminal infrastructure	a. Infrastructure Development of terminals at Guwahati and Majuli Island ferry routes	<ul style="list-style-type: none"> <li>• 2 terminals at Guwahati (Gateway Guwahati Ghat and North Guwahati)</li> <li>• 1 terminal at Majuli (Aphalamukh)</li> </ul>
	b. Development of terminals on several other rural routes, to be selected	---

### 1.3 Objective of EIA study

The objectives of the EIA study include:

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

The present EIA report 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 GGG of the Brahmaputra River and North Guwahati Ghat on North Bank of the Brahmaputra River and one Ghat in Dibrugarh Division i.e. Aphalamukh Ghat on North Bank of Brahmaputra River<sup>1</sup>. Rest identified Ghats will be studied for EIA in next phase.

## 2.0 Administrative and Legal (Regulatory) Framework

The national environmental legislations are broadly discussed. The MoEF&CC, Central Pollution Control Board (CPCB), Dept. of Env. & Forest, GoA and State Pollution Control Board, Assam (SPCB) together form 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, environment and social 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.

### 2.1 Environmental Standards & Guidelines

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.

### 2.2 Planning considerations for Terminals and vessels

The terminals are planned considering ease accessibility and passenger comfort. Environmental consideration such as solid waste management, sewage treatment, vessel wastewater management, noise control devices, landscaping, green belt, solar energy etc. have been taken into account during the designing and lay out of the terminals .

### 2.3 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

<sup>1</sup> This has been finalized in joint site visit held on January, 2019 in presence of management representatives of WB, AIWTDS and key consultants of the project including ISDP, Design DPR, EIA-SIA.

- Comfortable passenger vessels with all amenities
- Minimum impact on existing environmental status
- Improve connectivity to many regions / areas.

### 3.0 Stakeholder's 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.

### 4.0 Current Environmental Scenario

Baseline environmental status around 10 km radius of the proposed terminals are 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.

#### 4.1 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.

#### 4.2 LandusePattern

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%)

#### 4.3 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 Jogijhoga. 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).

## 4.4 Climate and 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 & direction 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.

## 4.5 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, SO<sub>2</sub>, NO<sub>x</sub>, 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 site 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 (SO<sub>2</sub>), Oxides of Nitrogen (NO<sub>x</sub>), 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 are well within the NAAQMS.

## 4.6 Noise

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..

## 4.7 Ecology and 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
- Phyto & Zoo Planktons, 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).

#### **A. 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 initiated<sup>2</sup>.

### **4.8 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 AphalamukhGhat indicate that the soil in all three terminals are acidic and is sandy loam. Clay percentage varies between 67.2% to 72.4%. Heavy metals content in soil is negligible.

### **4.9 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.

### **5.0 Assessment of Impacts and 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.

<sup>2</sup> Dolphin 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.

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:

- 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.

## 6.0 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.

## 7.1 Additional 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.

## 7.2 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 have 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

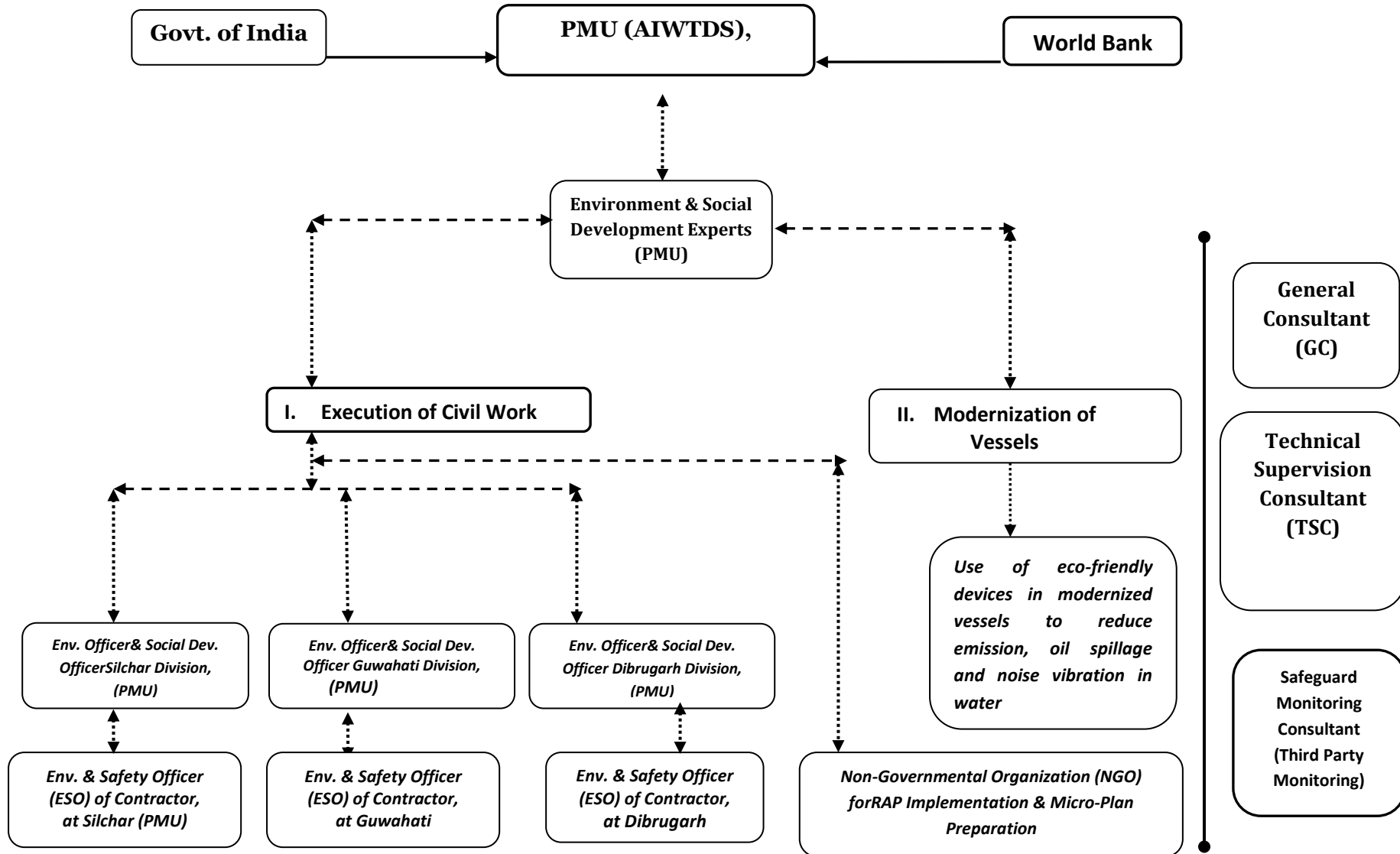
- Types of emergencies with potential threats, hazards, and protective actions
- Components of emergency preparedness and response plan
- Individual roles and responsibilities
- Relevant standards and Codes
- Notification, Warning, and Communications procedures
- Evacuation, Shelter, and Head Count procedures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

### **7.3 Implementation of EMP**

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



Figure 0-1: Organization Structure for Implementation of EMP



## 7.4 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.

## 7.5 Institutional setup 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

## 7.6 Environmental Codes of Practices and Performance Indicators

The contractor will be required to follow the environmental codes of practice (ECoPs) 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.

## **7.7 Environment 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.

## **8.0 Summary and 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.