

# Environmental Monitoring Report

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For the period covering August–December 2017  
Project Number: 38412-023  
June 2018

## India: Assam Integrated Flood and Riverbank Erosion Risk Management Investment Program — Project 1

Prepared by the Flood and River Erosion Management Agency of Assam (FREMAA) for the State Government of Assam and the Asian Development Bank.

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# **BI-ANNUAL REPORT ON IMPLEMENTATION OF EMP**

**Project No 38412  
Loan No 2684-IND**

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**India: Multitranche Financing Facility –  
Assam Integrated Flood and Riverbank Erosion Risk  
Management Investment Program**

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**Reporting Period – August 2017 to December 2017**

Submitted by Executing Agency



**Flood and River Erosion Management Agency of Assam (FREMAA)**

Prepared for FREMAA by Project Management Consultancy (PMC-FREMAA)

This report has been submitted to ADB by the Flood and River Erosion Management Agency of Assam (FREMAA) and is made publicly available in accordance with ADB's public communications policy (2011). It does not necessarily reflect the views of ADB.

**Bi-Annual Report on Implementation of Environmental Management Plan  
August 2017 to December 2017**

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## **ABBREVIATIONS**

ADB – Asian Development Bank  
AIFRERMIP – Assam Integrated Flood and Riverbank Erosion Risk Management Investment Program  
CBFRML – Community based flood risk management and livelihood  
EIA – Environmental impact assessment  
EMP – Environmental management plan  
EMoP – Environmental Monitoring Plan  
FRERM – Flood and riverbank erosion risk management  
FREMAA - Flood and River Erosion Management Agency of Assam  
MFF – Multitranche financing facility  
MIS – Management information system  
MoEF&CC – Ministry of Environment Forests and Climate Change  
GOI – Government of India  
NGOs – Nongovernment organizations  
PMU – Project management unit  
SEIA – Summary environmental impact assessment  
SGOA – State government of Assam  
SIO – Subproject implementation office  
SPCB – State Pollution Control Board  
UNDP – United Nations Development Program  
WRD – Water Resources Department

## **LOAN PROCESSING HISTORY**

Approval of PPTA 26 September 2008  
Fact-finding Mission 27 January-7 February 2009  
Management Review Meeting (MRM) 9 October 2009  
Appraisal Mission-1 1-16 February 2010  
Appraisal Mission (Final) 27 April – 10 May 2010  
Staff Review Meeting (SRM) 29 July 2010  
Loan Negotiations for MFF and Tranche 1 7-8 September 2010  
Board Circulation 29 September 2010  
Board Approval 19 October 2010  
Project 1 Approval IV October 2010  
Loan Agreement Signing November/December 2010  
Loan Effectiveness December/January 2010  
Physical Completion Date 31 March 2017  
Loan physical completion date 31 July 2017  
Loan Closing Date 30 September 2017

## 1. Introduction :

ADB's environmental and social safeguards are cornerstone of its support to inclusive economic growth and environmental sustainability. The objectives of the Safeguard Policy Statement (2009) is to avoid, or when avoidance is not possible, to minimize and mitigate adverse project impacts on the environment and affected people. Sound environmental management is critical to sustainable development and poverty reduction. Without committed efforts to safeguard the environment, pressure will continue to build on the land, forests, water systems, wetlands, and other natural resources on which people depend for their livelihoods.

The goal of the ADBs Safeguard Policy Statement (SPS) is to promote the environmental and social sustainability of ADB supported projects by protecting people and their environment from potential adverse impacts and enhancing the benefits provided. This goal is integral to achieving environmentally sustainable and socially inclusive growth and poverty reduction in Asia and the Pacific, a defining element of ADB's Long-Term Strategic Framework, Strategy 2020.

In complying with the SPS requirements :

- (i) environmentally sustainable projects are primarily achieved through a good project design during project preparation and effective environmental management during project implementation;
- (ii) integrating environmental considerations into the project feasibility study and design calls for the incorporation of environmental assessment and management into the economic, financial, institutional, social, and technical analysis of a project; and
- (iii) good environmental assessment and management enables the continued improvement of environmental performance throughout the life of a project, and can lead to enhanced economic, financial, and social outcomes.

The Flood and River Erosion Management Agency of Assam (FREMAA) under the state government of Assam is responsible for the implementation of ADB-financed Assam Integrated Flood and Riverbank Erosion Risk Management Investment Program (AIFRERMIP), as agreed jointly between the SGOA, Government of India and ADB, and in accordance with government and ADB's policies and procedures. ADB staff is responsible to support implementation including compliance by FREMAA of their obligations and responsibilities for program implementation in accordance with ADB's policies and procedures.

Assam Integrated Flood and Riverbank Erosion Risk Management Investment Program is likely to affect an area larger than the sites or facilities subject to physical works. The project under the program of Tranche-1 therefore come under **Category A**. Overall, the two subprojects (Dibrugarh, Palasbari and Gumi) are needed primarily to safeguard the people, property and environment from frequent floods of the Brahmaputra River, and strongly supported by the stakeholders. The FREMAA aims

to integrate key Environmental Safeguards at all the levels of planning and implementation so that critical natural ecosystem. The flood plains of Brahmaputra and the resources, are not destroyed. Nevertheless, close monitoring during pre construction, during construction and during operation phase will be operationalized so that any unforeseen impact will be detected and mitigation measures provided. Possible negative impacts include those associated with construction, which are temporary and were mitigated through prescribed mitigation measures under the environmental monitoring and management plan under the Project, with the necessary capacity building of the executing agency and outsourcing. This will help in maintaining environmental sustainability along with inclusive economic growth. The FREMAA aims to integrate key Environmental Safeguards at all the levels of planning and implementation so that the natural ecosystem are maintained and are least disturbed.

#### **Provisions for compliance:**

The FREMAA also aims to integrate key Environmental Safeguards at all the levels of planning and implementation so that critical natural ecosystem and the resources are not destroyed in this biodiversity hotspot. There was a need for recognition and following the compliance with national and state system and regulations on environmental standards by the contractors. Some of the specific environmental parameters were to be monitored periodically to check the compliance. This helps in maintaining environmental sustainability along with inclusive economic growth. Besides above, for achieving the compliance following specific arrangements were made in the contract.

The Contractor shall employ one fulltime inspector for supervising compliance with the environmental management plan. The environmental inspector shall keep one set of current environmental standards and regulations at the site at all times, available for consultation.

The environmental inspector shall submit an Environmental Management Plan and a monthly environmental report. The report shall be written in English language in a format acceptable to the Engineer.

Measures for monitoring and preventing pollution of air, water, noise, vehicle, waste. No part of the work shall be started before environmental and safety inspectors and first aid nurse are present at the site.

Other measures like, Borrow pit management, maintenance of access road, compensatory afforestation, emergency response plan, etc are also under the preview of the environmental safeguard measures under the project.

Structural works of the two subproject areas under Tranche-1 are :

**Palasbari Sub Project:****Palasbari Reach**

1. Palasbari Erosion Protection under water works below LWL (4.9 Km).
2. Construction of Palasbari Embankment and slope protection work above LWL along Brahmaputra river at Palasbari. (5.1 Km.)

**Gumi Reach (completed before December, 2016)**

3. Construction of under water and Bank Revetment with loose boulder crates over geobag apron including supply of boulders and wire mesh nets for Gumi erosion Protection works along the Brahmaputra river. (4.5 Km)

**Dibrugarh Subproject**

- (i) Raising, Strengthening Upgradation and Construction of Road Works for Dibrugarh Town protection (DTP) Dyke along the Brahmaputra River in Dibrugarh – 8.53 Km,
- (ii) 1.8 km of bank protection through pro-siltation measures along the town protection dykes, (Fabrication and Launching of Porcupines Lot-1, Lot 2, Lot 3 and Lot 4)and
- (iii) Construction of Revetments, Geobag Aprons for Mothola Oakland Bank Area, Dibrugarh Erosion Protection Works from Ch. 000 to ch 2400m

**(Kaziranga Sub Project–** shifted to Tranche-2)

Table -1. **Achievement of Major Civil Works Packages**

Sl. No.	Description of the work	Physical Progress
1	Palasbari Erosion Protection underwater works below Working Low Water Level (WLWL) with two layers of sand filled geo-bags at apron.	100%
2	Gumi Erosion Protection Works	100%
3	Construction of Palasbari Embankment with black topped road and slope protection works above LWL along the Brahmaputra river	100%
4	Construction of Revetments, Geo-bag Apron, for Mothalla – Oakland bank protection works along the Brahmaputra River, Dibrugarh	100%
5	Raising, Strengthening, Up-gradation and Construction of Road Works for Dibrugarh Town Protection (DTP) Dyke	100%
6	Fabrication, Supply and Installation of Pre-Stressed Concrete (PSC) Porcupines (4 lots) at Oakland and DTP Dyke area.	100%

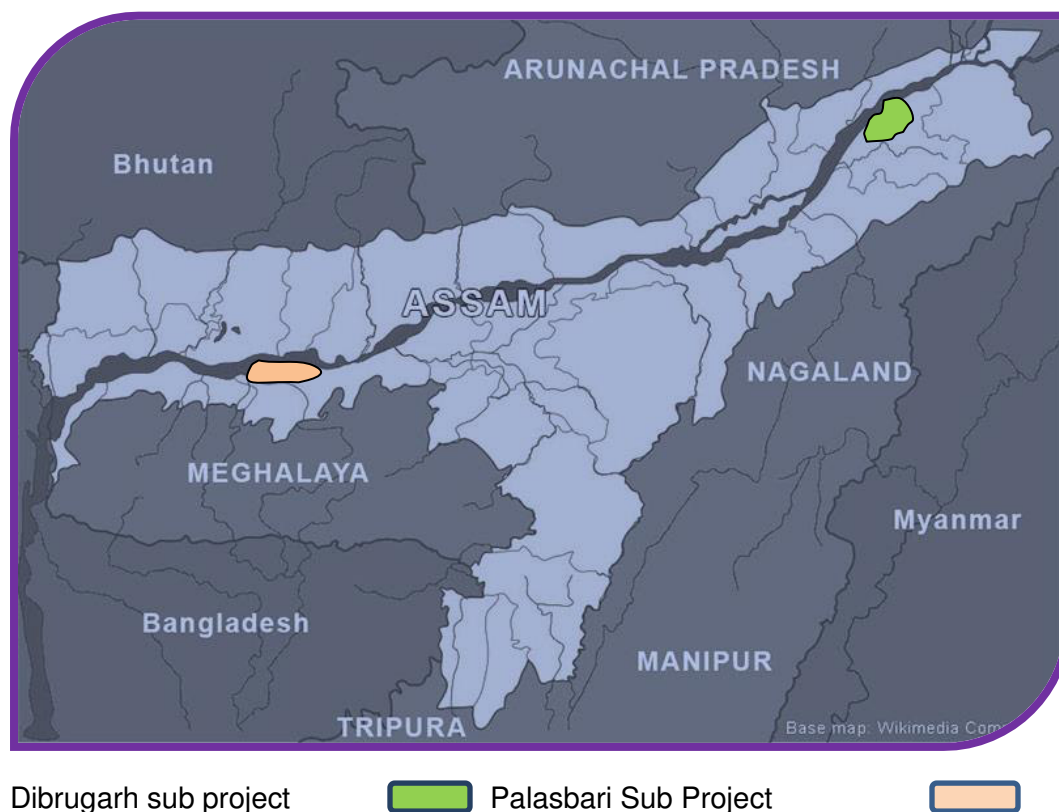
(All civil works completed before 31<sup>st</sup> July, 2017)

### 1.1. Report Purpose :

This project at two sub project sites (Dibrugarh, Palashbari and Gumi) in Assam is implemented by FREMAA through Water Resource Department, Assam in accordance with ADB's Safeguard Policy Statement, 2009 and Ministry of Environment, Forest and Climate Change (GOI) Guidelines so as to ensure that all environmental monitoring measures and when ever applicable Environmental mitigation measures as given in Environmental Impact Assessment and subsequent Environmental Management Plans incorporating all the Environmental concerns of the project, even in the operation stage.

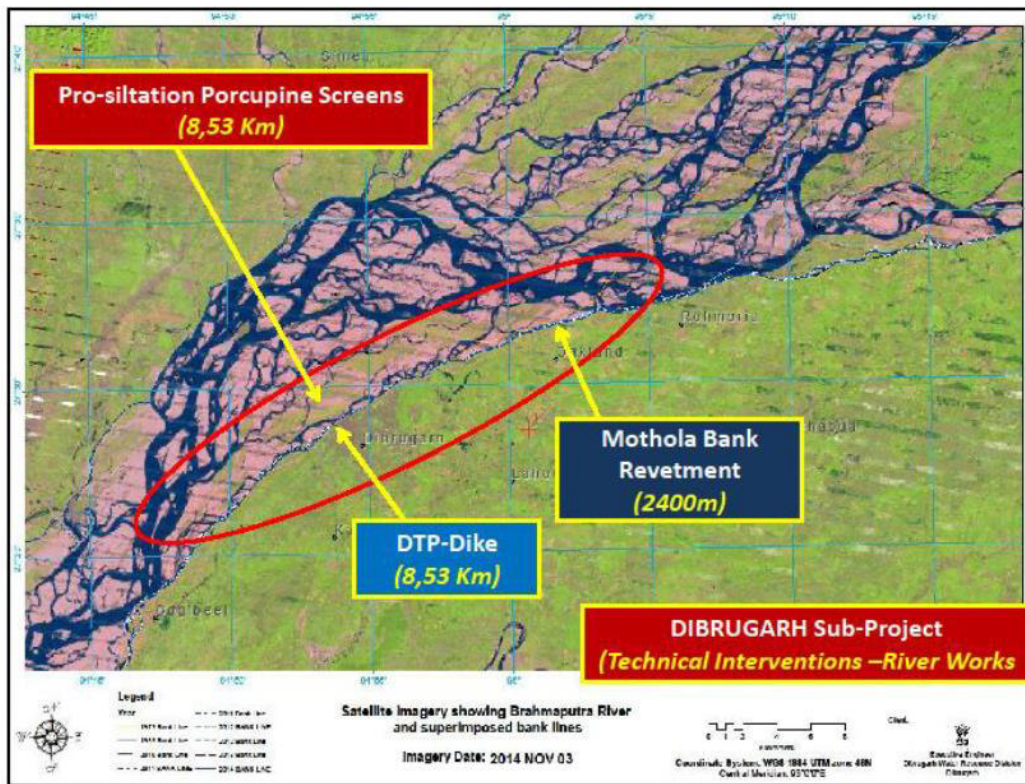
The principle objectives of the report are to :

- To ensure environmentally compatible project implementation by avoiding and mitigation of negative impacts that arises from the project during the period August to December, 2017.
- To ensure that EIA recommendations are adequately followed in EMP and EMoP to meet the Environmental Compliances of statutory requirements of MoEF&CC, GOI.



**Map-1. Project sites in Assam along the river Brahmaputra**





Map-2. Project sites in Dibrugarh



Map-3. Project sites in Palsbari and Gumi

The Bi Annual Report on the implementation of Environmental Management Plan ending December, 2017 delineates :-

- Environmental Monitoring of the project from August, 2017 to December, 2017 considering the environmental activities along with environmental compliances of statutory requirements of MoEF&CC, GOI and agreement conditions.
- This report also highlights the gaps and deficiencies while executing the environmental management.

## **1.2. Project Implementation Progress :**

Although the effectiveness of the loan started from December, 2010 and January 2011, consideration of the environment safeguard of the project started in the early part of 2013. Construction works started in February-2012 in both the subprojects of Dibrugarh and Palasbari and Gumi. Kaziranga subproject could not be started as required environmental clearance from the standing committee for National Board of Wildlife, MoEF&CC, GOI in 3<sup>rd</sup> quarter of 2014 and hence, the work shifted to tranche-2. Several meetings, trainings and workshops were conducted jointly by PMC and FREMAA with the contractors and SIO's in the month of April, 2013, May, 2014 and in subsequent months at the respective SIO office and in the site offices of the contractor for generating the awareness about the environmental safeguard and stipulations of the contract document on environment. Physical works completed on 31<sup>st</sup> July, 2017. Environmental monitoring was carried out during the operation phase from August, 2017 as per the EMP.

### **1.2.1. Provisions for compliance :**

The FREMAA aims to integrate key Environmental Safeguards at all the levels so that critical natural ecosystem and the resources are not destroyed in this biodiversity hotspot. There is a need for recognition and following the compliance with national and state system and regulations on environmental standards by the contractors. Some of the specific environmental parameters are to be monitored periodically to check the compliance. This helps in maintaining environmental sustainability along with inclusive economic growth. Besides above, for achieving the compliance following specific arrangements were made in the EMP during the operation phase.

- Measures for monitoring and preventing pollution of air, water, noise, vehicle,
- Other measures like, maintenance of access road, emergency response plan, etc are also under the preview of the environmental safeguard measures under the project.

## **2. Incorporation of Environmental Requirements into Project Contractual Agreements** (Implemented during construction and operation phase as per EMP )

*Manner by which EMP requirements are incorporated into contractual arrangements, such as with contractors or other parties.*

Each project requires a suite of environmental safeguards defined by impact mitigations and environmental monitoring requirements that are specific to the project type, scale, activities, and location.

The key design considerations and elements of environmental monitoring are incorporated in the contract agreement enabling with ADB's Safeguard Policies and with environmental compliances of statutory requirements of MoEF&CC, GOI.

### **FIDIC-BASED BID DOCUMENTS**

#### **GC 4.18 Protection of the Environment**

Contractor shall protect the environment on and off site and limit damage/nuisance to public from water/soil/air pollution, noise and other adverse impacts.

#### **Section 6, Clause 2.1 - Environment**

Contractor must submit EMP for approval, employ full time environmental inspector, and submit monthly reports to Engineer and monitor impacts and the success of mitigation measures.

#### **Section 6, Clause 2.3 – Safety Precautions & Medical Attendance**

Contractor shall employ a full time safety inspector, provide safety and first aid equipment, access to nurse and doctor, etc

In terms of allowable pollutant values and occupational health and safety, the laws, standards and regulations in force in India will be the references to be adhered to by the Contractor.

Following the above clause of the ADB contract document were prepared.

### **• Environmental Management Plan (EMP) Compliance as per Bid Document**

## **Procurement of Works, Section 6 - Employers Requirements, Subsection 2**

### **2A. Components of Environmental Safeguards:**

To look after the safeguard issues FREMAA and PMC has one unit comprising of Environmental expert, Land acquisition expert, resettlement expert and Social safeguard expert. Environmental Safeguards are against the work packages executed under the project. These are as mentioned below.

➤ **Compliance to Environmental Management and Environmental Monitoring**

Under each packages of works, contract documents were prepared to safeguard the environment under subsection 2 of the Section 6.

- **Environmental Management Plan and Environmental Inspector:** In that section the Contractor have to appoint one fulltime Environmental Inspector for supervising compliance with the environmental management plan. The environmental inspector have to keep one set of current environmental standards and regulations at the site at all times, available for consultation. The environmental inspector has to submit an ***Environmental Management Plan*** including the Monitoring Plan and a ***Monthly environmental report***. The report should be acceptable to the Engineer in Charge.
- Provisions were also made in the contract document that, the Contractor shall remedy any damages resulting from non-compliance of stipulations of this Sub-section 2 at his own cost. All work shall be stopped until compliance is assured.
- **Monitor Pollution and measures for prevention :** To monitor the effect of the civil work on the local environment following provisions were kept in the contract.
  - Prevention of spills of oil and lubricants from vehicles, engines, etc at work sites are required. Used engine oil must be removed in an environmentally acceptable manner in accordance with current legislation of India. In the event of any spoil, debris, waste or any deleterious substance from the Site being deposited on any adjacent land, the Contractor shall immediately remove all such material and restore the affected area to its original state to the satisfaction of the Engineer.

- **Measures for prevention of Air Pollution**

The Contractor shall devise and arrange methods of working to minimize dust, gaseous or other air-borne emissions and carry out the Works in such a manner as to minimize adverse impacts on air quality.

The Contractor shall utilize effective water sprays during delivery manufacture, processing and handling of materials when dust is likely to be created, and to dampen stored materials during dry and windy weather. Stockpiles of friable materials shall be covered with clean tarpaulins, with application of sprayed water during dry and windy weather. Stockpiles of material or debris shall be dampened prior to their movement, except where this is contrary to the Specification.

Any vehicle with an open load-carrying area used for transporting potentially dust producing material shall have properly fitting side and tail boards. Materials having the potential to produce dust shall not be loaded to a level higher than the side and tail boards, and shall be covered with a clean tarpaulin in good condition. The tarpaulin shall be properly secured and extend at least 300 mm over the edges of the side and tail boards. In the event that the Contractor is permitted to use gravel or earth roads for haulage, he shall provide suitable measures for dust palliation, if these are, in the opinion of the Engineer, necessary. Such measures may include spraying the road surface with water at regular intervals.

- **Measures for prevention of Noise Pollution**

The Contractor shall: consider noise as an environmental constraint in his planning and execution of the Works.

The Contractor shall take all necessary measures so that the operation of all mechanical equipment and construction processes on and off the Site shall not cause any unnecessary or excessive noise, taking into account applicable environment requirements. The Contractor shall use all necessary measures and shall maintain all plant and silencing equipment in good condition so as to minimise the noise emission during construction works.

The Contractor shall avoid unnecessary noise, especially at night.

- **Measures for prevention of Water Pollution**

The Contractor shall prevent any interference with the supply to or abstraction from, and prevent any pollution of, water resources (including underground percolating water) as a result of the execution of the Works.

Areas where water is regularly or repetitively used for dust suppression purposes shall be laid to fall to specially-constructed settlement tanks to permit sedimentation of particulate matter. After settlement, the water may be re-used for dust suppression and rinsing.

All water and other liquid waste products arising on the Site shall be collected and disposed of at a location on or off the Site and in a manner that shall not cause either nuisance or pollution.

The Contractor shall not discharge or deposit any matter arising from the execution of the Works into any waters except with the permission of the Engineer and the regulatory authorities concerned.

The Contractor shall at all times ensure that all existing stream courses and drains within, and adjacent to, the Site are kept safe and free from any debris and any materials arising from the Works.

The Contractor shall protect all watercourses, waterways, ditches, canals, drains, lakes and the like from pollution as a result of the execution of the Works.

- **Measures to prevent Vehicular Pollution**

The Contractor shall regulate vehicle emission and noise in accordance with current legislation of India.

- **Control of Wastes**

The Contractor shall control the disposal of all forms of waste generated by the construction operations and in all associated activities. No uncontrolled deposit ion or dumping shall be permitted. Wastes to be so controlled shall include, but shall not be limited to, all forms of fuel and engine oils, all types of bitumen, cement, surplus aggregates, gravels, bituminous mixtures etc. The Contractor shall make specific provision for the proper disposal of these and any other waste products, conforming to local regulations and acceptable to the Engineer.

- **Land Use**

The Contractor shall remove and store topsoil for replacement after construction. The Contractor shall restore the surface vegetation in his work areas to the level found before the start of work. This includes the replacement of topsoil removed before construction.

- **Disruption of Agricultural Activities**

The Contractor shall minimize the disruption of any agricultural activities within the flood embankments. To the extent possible, land outside the flood embankments used for

construction purposes shall consist of WRD property. Any disruption of private agricultural land used shall be compensated by the Contractor at the current market value.

- **Access Routes**

Roads -The Contractor shall inspect all access roads for their appropriateness for moving construction equipment or materials. Roads found inappropriate shall be strengthened by the Contractor. If the access road degrades, by more than expected normal use, due to the Contractor's activities, it will be repaired by the Contractor at his own cost.

- **Site Installations**

The Contractor must provide and maintain reasonable sanitary facilities, proper lighting and adequate protection of the Site against accidents and the like. The Contractor shall organize the disposal of wastes in an environmentally acceptable manner, in accordance with environmental standards and regulations of India.

- **Excavation and Filling of Earth for Raising and Strengthening works**

Earth excavation and filling activities shall take place after the area has been surveyed and inspected by the Engineer. The Contractor shall submit a map indicating the areas of planned earth excavation and filling activities; together with cross-sections showing earth cut and fill areas, based on the results of the baseline survey, within one week of survey completion. These earth excavation and fill volumes must be confirmed and revised during the subsequent pre-work survey, before actual excavation and filling work can proceed.

- **Borrow materials :**

Where the materials are to be obtained from designated borrow areas, the location, size and shape of these areas shall be as indicated by the Engineer and the same shall not be opened without his written permission. Where specific borrow areas are not designated by the Employer/the Engineer, arrangement for locating the source of supply of material for embankment and subgrade as well as compliance to environmental requirements in respect of excavation and borrow areas as stipulated, from time to time by the Ministry of Environment and Forests, Government of India and the local bodies, as applicable, shall be the sole responsibility of the Contractor. Borrow pits along the road shall be discouraged. If permitted by the Engineer, these shall not be dug continuously. Ridges of not less than 8 m width should be left at intervals not exceeding 300 m. Small drains shall be cut through the ridges to facilitate drainage. The depth of the pits shall be so regulated that their bottom does not cut an imaginary line having a slope of 1 vertical to 4 horizontal projected from the edge of the final section of the bank, the maximum depth in any case being limited to 1.5 m. Also, no pit shall be dug within the offset width from the toe of the embankment required as per the consideration of stability with a minimum width of 10 m. Haulage of material to embankments or other areas of fill shall proceed only when sufficient spreading and compaction plant is operating at the place of deposition. No excavated acceptable material other than surplus to requirements of the Contract shall be removed from the site. Should the Contractor be permitted to remove acceptable material from the site to suit his operational procedure, then he shall make good any consequent deficit of material arising there from. Where the excavation reveals a combination of acceptable and unacceptable materials, the Contractor shall, unless otherwise agreed by the Engineer, carry out the excavation in such a manner that the acceptable materials are excavated separately for use in the permanent works without contamination by the unacceptable materials. The acceptable materials shall be stockpiled separately. The



Contractor shall ensure that he does not adversely affect the stability of excavation or fills by the methods of stockpiling materials, use of plants or siting of temporary buildings or structures. The Contractor shall obtain representative samples from each of the identified borrow areas and have these tested at the site laboratory following a testing programme approved by the Engineer. It shall be ensured that the subgrade material when compacted to the density requirements shall yield the design CBR value of the subgrade.

- **Emergency Response**

The Contractor shall plan and provide for remedial measures to be implemented in the event of occurrence of emergencies such as spillages of oil or bitumen or chemicals.

The Contractor shall, provide the Engineer with a statement of the measures he intends to implement in the event of such an emergency which shall include a statement of how he intends to provide personnel adequately trained to implement such measures.

- **Measurement and Payment**

Protecting the Environment

The Bill of Quantities contains a separate line item to include all costs for protecting the environment. Cost for complying with all requirements related to construction of labour camps/ancillary sites, strengthening and/or repair of roads, rehabilitation of ancillary sites etc. are deemed to be included in the bill of quantities. Cost for specific activities related to the work, such as stripping and replacing top soils (agricultural soil), dust suppression, water supply, sanitation facilities, camp site waste disposal, control of pollution from leakage and spill of oils and lubricants, safety and warning signs/signals etc., should be included in this line item in the bill of quantities.

## **2B. Tests to check the ambient environment**

The following parameters are to be monitored with the frequencies described.

For Air Quality : SPM, RSPM, SO<sub>2</sub>, NO<sub>x</sub>, CO, Pb - Within 100 m of Hot mix plant, construction camp, crusher and near sensitive locations/ settlement –Continuous 24-hourly, twice a week, for two weeks once every year (summer).

For Dust & Smoke- Details of water sprinkling and frequency of sprinkling per day  
Vehicular pollution - Emission records of vehicular pollution of all the vehicles used (updated PUC)

Surface Water - pH, BOD, COD, TDS, TSS, DO, Oil and Grease – from Brahmaputra River - Once during the dry season.

Ground water - pH, BOD, DO, total coliform, As, Cd, Mn and Ground Water levels – Construction site, Rehabilitation site, service areas, - Once at the start of construction  
Noise - Noise Level in dB (A) – Near the construction sites and sensitive locations close to embankment – One day hourly measurement, once in six months

### **2.5 Compliance with Environmental Management Plan.**

During the construction phase following contract stipulations were made.

2.5.1: *“The Contractor shall work in strict compliance with the principles of the*

*Environmental Management Plan. No part of the work shall be started before environmental and safety inspectors and first aid nurse are present at the site. No part of the work shall be started, or if defects are found later, continued or restarted before complying with all conditions of Sub-section 2 in this Section.”*

*2.5.2 “The Contractor shall remedy any damages resulting from non-compliance of stipulations of this Sub-section 2 at his own cost. All work shall be stopped until compliance is assured.”*

*2.5.3 “If the Contractor is not able or unwilling to start remedial work within five working days after detection of any defect or omission, the Engineer can order remedial works through third parties. The cost for third-party services are to be borne by the Contractor and shall be deducted from the Contractor’s invoices or from the Retention Money.”*

For Operation phase SIOs carried out regular checks on the stipulations mentioned in the EMP.

## 2.6 Measurement and Payment.

### 2.6.1 Protecting the Environment:

*“The Bill of Quantities contains a separate line item to include all costs for protecting the environment. Cost for complying with all requirements related to construction of labour camps/ancillary sites, strengthening and/or repair of roads, rehabilitation of ancillary sites etc. are deemed to be included in the bill of quantities. Cost for specific activities related to the work, such as stripping and replacing top soil (agricultural soil), dust suppression, water supply, sanitation facilities, camp site waste disposal, control of pollution from leakage and spill of oils and lubricants, safety and warning signs/signals etc., should be included in this line item in the bill of quantities. Payments will be made on the basis of available market rates and prevailing schedule of rates of Government of Assam.”*

*Final bills of the contractors on implementation of EMP were scrutinised by PMC and FREMAA.*

## **3. Summary of Environmental Mitigation and Compensation Measures Implemented**

*Based on EMP, may include measures related to air quality, water quality, noise quality, pollution prevention, biodiversity and natural resources, health and safety, physical cultural resources, capacity building and others.*

- 3.1.** The implementation of environmental safeguards is satisfactory based onsite visits, reviews of monitoring reports, and discussions with stakeholders. During the implementation, no major safeguard issues were identified and no major gaps in EMP implementation noticed. Grievance redress mechanisms (GRMs) were established and no complaints were received.



### 3.2. Measures taken to reduce pollution:

Several measures taken to reduce the environmental pollution during operation phase, some of them are :

- **Air**
  - Checked air quality by PCB approved lab
- **Noise**
  - Horns not used, unless essential
  - Checked Noise level by PCB approved lab
- **Surface water quality**
  - Store fuel and lubricants away from the drains
  - Checked surface water quality by PCB approved lab
- **Pollution**
  - Spills of oils on the site and on river regularly checked
  - Surface discharges monitored

### 3.3. Status of the mechanisms present for the Implementation of EMP during operation phase (status as on 31.12.2017)

As most of the SIO's doing the ADB supported works for the first time, they do not have the knowledge about the safeguards requirements during operation phase by the ADB. To improve the scenario following Actions were taken :

- Several meetings and training were organized to aware the SIO's on the environmental safeguard of ADB (Strategy and directions), testing of selected environmental parameters, national environmental standards, acts and rules of MoEF&CC, GOI and Government of Assam.
- In all the meetings with SIO's during field visits and review meetings it has been emphasized to carry out the required numbers of tests as per EMP. Moreover, special efforts have been made from FREMAA and PMC so that that SIO's adheres to the EMP norms even after completion of the works.

## 4. Summary of Environmental Monitoring

### 4.1. Compliance Inspection (if relevant)

Following the EMP stipulations, SIO engage his officers to inspect the environmental; safeguards of the project areas.

#### 4.1.1. Summary of Inspection Activities

Officers under SIO's monitors the day to day environmental safeguards at the site and reports to the SIO. Moreover, FREMAA also monitors the implementation of the EMP (Table- 2).

**Table 2. Showing the site inspections by FREMAA.**

**List of Meetings Attended (Period August, 2017 to December, 2017)**

No.	Date	Meetings
1	14.09.2017	Meetings with FREMAA and SIO at Palasbari
2	16.09.2017	Meeting with FREMAA and SIO at Gumi
3	08.11.2017	Meeting with SIO and FREMAA on EMP implementation at Dibrugarh

**Table 3. Field visit carried out by the experts of PMC, during August to December, 2017.**

No.	Date	Place of visit	Meeting with	Purpose of Visit
1	13.09.2017	Palasbari embankment, Palasbari Apron and Gumi works	Meeting with WRD, Villagers, FREMAA	Implementation of operation phase EMP.
2	07.11.2017	DTP Dyke, Mothola Oakland, Dibrugarh	Meeting with WRD, Villagers, FREMAA	Implementation of EMP during operation phase.

Inspection activities on Environmental Safeguards are done in several stages :

- SIO also monitor the implementation of EMP during their inspection.

**Table 4. Compliance with ADB's Safeguard Requirements – Tranche- I – Environment**

Environmental Safeguards :

Environmental Loan Covenants		Responsibility	Status of Compliance
1	All the Project facilities are designed, implemented, operated and maintained in accordance with applicable laws, and regulations of the Government of India, State of Assam and ADB's SPS (2009)	FREMAA, SIO	Under Compliance in accordance with ADB Environmental Policy and SPS Guideline. Acts and rules related to Water, Air, Noise, Environment, Biodiversity of Government of India and Govt. of Assam.
2	Social and environmental safeguard unit	FREMAA	Under Compliance; comprising of Land acquisition expert, resettlement expert and environmental expert.
3	Monitoring of quality of Air, Water Noise at the project sites	FREMAA, SIO, Contractor	Under Compliance. Within the acceptable limits of the Environmental Standards,

			Central Pollution Control Board, Ministry of Environment and Forest, GOI. of the projects where tests were already been conducted. Rest are performing the tests to check the ambient environment.
4	Prepare and implement Environmental Management Plan under all the contract packages of the works	Contractor, SIO, FREMAA,	Under Compliance : EMP's prepared under and submitted to the SIOs. Works completed as per EMP in the later stage of the project.
5	All monitoring and mitigations measures indicated in the EIA and respective EMP are undertaken for the project	SIO, FREMAA	Under Compliance : Sites regularly monitored for compliance
6	An environmental assessment and review framework for implementation of minor CBFRM measures	SIO, FREMAA	As highland were not created under CBFRM, but villagers were trained under DDMA's and kits were distributed to cope flood. Other than that ambient environment was monitored.
7	Semi Annual Report on implementation of EMP	FREMAA	Under Compliance : Semi Annual Report submitted for the period of January, 2017 to July 2017. Compilation going on for the period of January, 2018 to June 2018.

#### **Condition of the embankment :**

##### **Dibrugarh Sub Project**

The overall condition of the embankment is good, except in few chainages some minor rain cut has been observed and was immediately repaired.



UPERADATION WORKS OF DTP DYKE



Palasbari Embankment and Apron works





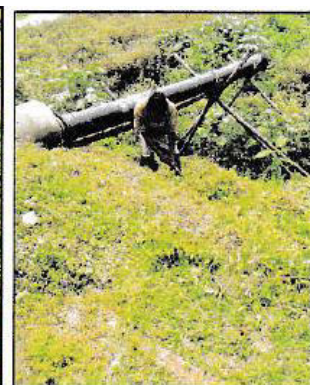
No inundation occurred after completion of the embankment.

Condition of DTP Dyke during high water level in Brahmaputra river



Repairing of solar Light repairing of damaged guard post, repairing of hand rail of steps.





#### 4.1.2. Mitigation Compliance :

Following measures were taken to meet the compliance.

- **Pollution monitoring**
  - Air, Water and noise quality monitored.
- **Preservation of trees**
  - Protection of trees for their preservation.
  - Monitoring of the planted trees.
- **Labour Camps**
  - Before vacating the camp after the work, SIO inspected the labour camp sites and cleared all the debris from the camp site.
- **Borrow area Rehabilitation**
  - All the borrow areas were either rehabilitated or utilized by the community as per the Borrow Area Management Plan.

		Explanatory comments
Overall Compliance	<b>Good</b>	<ol style="list-style-type: none"> <li>1. Monitoring of the planted trees. Satisfactory survival rate monitored by the Forest Department and district administration.</li> <li>2. Labour camp sites properly rehabilitated.</li> <li>3. All the borrow areas were either rehabilitated or utilized by the community as per the Borrow Area Management Plan.</li> <li>4. The environmental standards (Central Pollution Control Board, MoEF&amp;CC, GOI) applicable for the sites are kept at the SIO office for reference.</li> <li>5. Suggestion made on - Ambient test frequency to be as per EMP</li> </ol>

#### 4.1.3. Mitigation Effectiveness

- To monitor the mitigation effectiveness the parameters mentioned in EMP were monitored.
- No complaints were lodged to SIO on environmental pollution by any of the fringe villagers, NGO's or other institutions during the reporting period (Aug to Dec, 2017).
- Results of the ambient environmental tests were within the permissible limit of Central Pollution Control Board, MoEF&CC, GOI.

To monitor the mitigation effectiveness the following parameters were monitored.

**Table-5 :Mitigation Effectiveness during August to December, 2017**



	Palashbari– Embankment and Palashbari– Apron (Test done March- 2017)	Gumi (December, 2016)	Dibrugarh – Mothola Oakland (December, 2016)	Dibrugarh – DTP Dyke (Test done November, 2016)
Ambient Air quality	Within the permissible limit	Within the permissible limit	Within the permissible limit	Within the permissible limit
Surface Water Quality	Within the permissible limit	Within the permissible limit	Within the permissible limit	Not carried out this time
Noise level	Within the permissible limit	Within the permissible limit	Within the permissible limit	Within the permissible limit
Complain lodged by the local residents on Environmental pollution August to December, 2017	No complaints lodged	No complaints lodged	No complaints lodged	No complaints lodged

		Explanatory comments
Mitigation Effectiveness	<b>Good</b>	<ul style="list-style-type: none"> <li>No complaints were lodged to SIO on environmental pollution by any of the fringe villagers, NGO's or other institutions</li> <li>Results of the ambient environmental tests were within the permissible limit of Central Pollution Control Board, MoEF&amp;CC, GOI.</li> <li>Quarterly environmental Report reviewed by SIO's.</li> </ul>

#### 4.2. Emission Discharge (Source) Monitoring Program (if Relevant)

Not relevant to this project.

#### 4.3. Ambient Monitoring Program (if Relevant)

To monitor the ambient environment the following parameters are to be monitored with the frequencies described in the SEIA. All the tests were performed from the Pollution Control Board, Assam and its approved labs..

- For **Air Quality** :  
SPM, RSPM, SO<sub>2</sub>, NO<sub>x</sub>, - With in 100 m of sensitive locations/ settlement  
–Continuous 24- hourly, once every year.

- **Surface Water :**  
pH, BOD, COD, TDS, TSS, DO, Oil and Grease – from Brahmaputra River  
- Once during the dry season.
- **Ground water :**  
pH, BOD, DO, total coliform, As, Cd, Mn and Ground Water levels –  
Rehabilitation site, service areas, - Once at the start of construction.
- **Noise :**  
Noise Level in dB (A) – Near the sensitive locations close to embankment  
– One day hourly measurement, once in six months

#### 4.3.1. Summary of Monitoring

**Table-7 : Ambient Environment Monitoring Plan**

Attribute	Parameter	Special Guidance	Standards	Duration	Location
<b>Air</b>	SO <sub>2</sub> , NO <sub>x</sub> , SPM, RSPM, CO, Pb	High volume sampler to be located 50m from the river bank site Downwind direction. Use method specified by PCB, Assam for analysis	Air (prevention and Control of Pollution) Rules, CPCB, 2009	24 hours Sampling	Along the river bank area
<b>Surface Water</b>	pH, BOD, COD, TDS, TSS, DO	Grab sample collected from source and Analyse as per Standard Methods for Examination of Water	Indian Standards for Inland Surface Waters (IS: 2296, 1982)	Grab Sampling	Along the Surface water sources
<b>Noise</b>	Noise levels on dB (A) scale	Equivalent noise levels using an integrated noise level meter kept at a distance of 15 m from the river bank.	MoEF Noise Rules, 2000	Leq in dB(A) of day time and night time	Along the river bank

#### 4.3.3. Results

Results of the specific tests on the selected parameters, for Air Quality, noise, surface water and ground water from Pollution Control Board approved labs provide some indicators to compare them with the baseline information and national permissible standards. The test results of the samples collected lies within permissible limits described in the '*Environmental Standards for Ambient Air, Automobiles, Fuels, Industries and Noise, 2000*' (Central Pollution Control Board) and a minor difference

between the baseline and the test results during the work being observed, this suggest that the contractor's activity has complied with the contract stipulations on protection of environment.

**Table-8. Quality of ambient Air at the site**

Parameter	Palasbari Apron, (Mar, 2017)	Palasbari Embankment, (Mar, 2017)			Gumi (Dec 2016)	DTP Dyke (Nov, 2016)	Mothola Oakland (Dec, 2016)
		Ch. 3560	Ch 250	Ch 1200		Ch 5000	
PM 2.5	35	34.4	36.7	35.9	Within permissible limit	24.9	
PM10	66	65.3	64.2	68		72.7	64.8
NO2	12	11.2	13.9	9.4		9.3	14.8
SO2	4.1	4	4.5	3.8			
Weather	Clear	Clear	Clear	Clear		Clear	Clear

(Ref: Appendix-1)

**Table-9. Quality of Ground Water at the site**

Parameter	Palasbari Apron Drinking water quality	Mothola Oakland, Dibrugarh	DTP Dyke
Turbidity	BDL		
pH	6.83	6.8	6.7
TDS mg/l	87.3		213
BOD	8.7	7	
COD	37.9	23	
DO	5.1	44	
Ca	42.9		43
Cl	27.8		52
Fluorides	0.38		0.27
Fe	0.2659		0.23
Mg	21.6		4.8
NO <sub>3</sub>	5.4		5.1
SO <sub>2</sub>	11.6		46
Total alkalinity CaCO <sub>3</sub>	58.7		
Total Hardness mg/L	63.8		78

(Ref: Appendix-1)

**Table-10. Quality of Surface Water at the site**

Parameters	Units	Results					
		Palasbari Apron - Upstream	Palasbari Apron – Down stream	Palsbari Embankment	DTP Dyke (Nov, 2016)	Mothola Oakland (Dec, 2016)	Gumi (Dec 2016)
Temperature	C	22	23	20			Within Permissible limit
pH		6.9	7.8	7.1	6.9	6.8	
Dissolved Oxygen	mg/l	8.7	7.5	6.8	5.1	4.3	
Biological Oxygen Demand	mg/l	4.2	3.9	3.7	4	12	
Chemical oxygen Demand	mg/l	43.6	61.2	57.5	31	35	
Total suspended solid	mg/l	355.8	375.6	359.6	81	922	
TDS		178.5	212.4	176.9	342	71	
Oil and Grease	mg/l	0.5	0.7	0.2	<0.05	2.2	

(Ref: Appendix-1)

**Table-11. Quality of Noise at the site**

Parameter	Palasbari Apron- (test-March, 2017)	Palasbari Embankment (test March, 2017)			Gumi (Dec 2016)	DTP Dyke CH 5300 (Nov, 2016)	Mothola Oakland (Dec, 2016)
Location	Ch 1200	Ch 3560	Ch 250	Ch 1200			
Noise levels on dB (A) scale Day Time	50.1	48.1	51.7	52.0	Within Permissible limit	58	67

		Explanatory comments
Ambient Environment condition	<b>Good</b>	<ul style="list-style-type: none"> <li>For those site where the tests are being conducted, the results are within the prescribed limits of the Central Pollution Control Board, MoEF&amp;CC, GOI.</li> <li>As the surface water at the site contains grease and oils below the detectable level, it indicates that the users following the environmental norms prescribed to reduce water pollution.</li> </ul>

#### 4.3.3. Assessment

**Table-12. Comparison of ambient Air, Surface water, Ground water and Noise at the site with the baseline data and National Standards.**

**Ambient Air**

Parameter	National Standard	Palasbari Apron, Mar, 2017	Palasbari Embankment, Mar, 2017			Gumi (Dec 2016)	DTP Dyke (Nov, 2016)	Mothola Oakland (Dec, 2016)
			Ch 3560	Ch 250	Ch 1200		Ch 5000	
PM 2.5	60 $\mu\text{g}/\text{m}^3$	35	34.4	36.7	35.9	Within Permissible limit	24.9	
PM10	100 $\mu\text{g}/\text{m}^3$	66	65.3	64.2	68		72.7	64.8
NO2	80 $\mu\text{g}/\text{m}^3$	12	11.2	13.9	9.4		9.3	14.8
SO2	80 $\mu\text{g}/\text{m}^3$	4.1	4	4.5	3.8			
Weather		Clear	Clear	Clear	Clear		Clear	Clear

**Noise**

Para meter	National Standards		Palasb ari Apron- (March , 2017)	Palasbari Embankment (March, 2017)			Gumi (Dec 2016)	DTP Dyke (Nov, 2016)	Moth ola Oakla nd (Dec, 2016)
Locati on			Ch 1200	Ch 3560	Ch 250	Ch 1200			
Noise levels on dB (A) scale Day Time	Are: Category of Area / Zone Cod	Limits in dB(A) Leq* ----- Day Time    Night Time	50.1	48.1	51.7	52.0	Within Permis sible limit	58	67
	(A) Industrial area	75            70							
	(B) Commercial area	65            55							
	(C) Residential area	55            45							
	(D) Silence Zone	50            40							

**Surface water quality**

Parameters	Units	Results					
		Palasbari Apron - Upstream	Palasbari Apron – Down stream	Palsbari Embankment	Gumi (Dec 2016)	DTP Dyke (Nov, 2016)	Mothola Oakland (Dec, 2016)
	C	22	23	20	Within Permissible limit		
Within Permissible limit		6.9	7.8	7.1		6.9	6.8
	mg/l	8.7	7.5	6.8		5.1	4.3
	mg/l	4.2	3.9	3.7		4	12
Chemical oxygen Demand	mg/l	43.6	61.2	57.5		31	35
Total suspended solid	mg/l	355.8	375.6	359.6		81	922
TDS		178.5	212.4	176.9		342	71
Oil and Grease	mg/l	0.5	0.7	0.2		<0.05	2.2

		Explanatory comments
Ambient Environment condition	<b>Good</b>	<ul style="list-style-type: none"> <li>Noise level was within the prescribed limit for Industrial areas under Dibrugarh. Noise level in Palasbari area falls under commercial area.</li> <li>Ground Water quality of the river bank in Palasbari and Dibrugarh was found within the limit.</li> <li>Surface Water quality of the river bank in Palasbari and Dibrugarh was found within the limit.</li> <li>Air quality was within the prescribed standards in all the sites</li> </ul>

## 5. Key Environmental Issues

#### 5.1.1. Key Issues Identified

- Operation phase monitoring of the completed works is not common in Assam. But after training SIO's started regular monitoring and quarterly reviewing the EMP.
- Documentation of environmental safeguards was moderately satisfactory.
- SIO's were not aware of the tests to be conducted during operation phase to know the ambient air quality, surface water quality ground water quality and noise levels.
- Frequency of the tests for ambient environment were at per EMoP. All the parameters prescribed in EMoP were not tested.
- Checking the PUC of the vehicles plying on the embankment were not possible as implementing agency (DTO) is different
- Monitoring by SIO's improved on safeguard issues but still they need training on ADB's safeguard procedures

#### 5.1.2. Action Taken

- Few meetings and training were organized to aware the SIO's on the environmental safeguard of ADB (Strategy and directions), stipulations of the contract document, testing of selected environmental parameters, national environmental standards, acts and rules of MoEF&CC, GOI and Government of Assam.
- Monitoring formats developed for keeping records and status of the Borrow areas.
- Check list prepared for the SIOs to check the drainage status, rehabilitation of the camp sites.

#### 5.1.3. Additional Action Required

- Constant monitoring and providing suggestions on the implementation of the EMP by FREMAA and PMC.
- Frequency of the tests to be maintained as per EMP
- Awareness on environmental safeguards –SIO and local residents / fringe communities
- River morphology study and Bathymatric study to know the hydrology along the executed works required to know the impact of the tranche 1 works.
- Initiation of fish productivity study to compare the impact of the interventions on the fish production is required.

- Survival Monitoring of the compensatory afforestation to be initiated.

## 6. Conclusion

### 6.1. Overall Progress of implementation of Environmental Management Measures

		Explanatory comments
Overall Project implementation measures	<b>Good</b>	<ul style="list-style-type: none"> <li>• After the training and meetings the SIO's become aware about the importance of the environmental safeguards during operation phase.</li> <li>• The SIO's after few trainings developed perceptions on the SPS and monitoring of operation phase EMPs.</li> <li>• Regular monitoring of EMP was initiated in all the Tranche 1 sites.</li> <li>• Borrow area monitoring initiated.</li> <li>• Monitoring of the drainages throughout the year along the Tranche 1 sites initiated.</li> </ul>

### 6.2. Problems Identified and Actions Recommended

#### Problems

- Awareness about the importance of environmental safeguards in the operation phase, particularly in this part of India is very poor
- Local people have less knowledge on the environmental issues.
- Awareness of the people on lodging complaints of environmental pollution if any was not adequate.
- Officials of Water Resource Department do not practice the Environmental Safeguards for the projects during operation phase of the State or Central Government of India, so they are not trained for such implementation of the EMP prescribed measures. Hence the implementation of the EMP were not as per the schedule including the frequency of the tests to be performed, and the parameters of the tests by the SIOs. But at the later stages they were aware of the procedures of EMP.



- Documentation and reporting on environment safeguard were still to be improved. After repeated training and instructions from PMC and FREMAA , this section still required improvement.

### **Actions Recommended**

- Regular awareness Training on Environmental Safeguards required for the SIOs.
- Regular reporting to FREMAA on implementation of EMP during operation phase to be initiated.
- In future projects or in Tranche 2, following can be thought of :
  - Pre bid awareness workshop on the implementation of EMP for the probable bidders.
  - Awareness/ training on the preparation of EMP budget of the contractor.
  - Qualification and experience of the environment and safety officers to be strictly followed as in the case of civil works.
  - Workshop on implementation of EMP for the awarded contractors and environment and safety officers
  - Exposure of the environment and safety officers to the best sites (on Implementation of EMP) of the nearby project within the state.

### **Appendix 1 Ambient Monitoring Results** (Scanned copy of the reports)

Air Quality – Palasbari embankment (Contractor SGCCL)

Recognized by Pollution Control Board, Assam.

## AMBIENT AIR ANALYSIS REPORT

Rep.No. 170328\_1503048\_01\_925 <sup>982</sup>

Date: 28/03/2017

### Name & Address:

M/s. Shree Gautam Construction Co. Ltd.

Project Name: (Construction of palasbari Embankment with black topped road and slop protection works above LWL along the Brahmaputra River), Dist: Kamrup, Assam.

SL. NO.	DATE OF SAMPLING	LOCATION/ SOURCE	WEATHER	PARAMETERS			
				PM <sub>10</sub> ( $\mu\text{g}/\text{m}^3$ )	PM <sub>2.5</sub> ( $\mu\text{g}/\text{m}^3$ )	NO <sub>x</sub> ( $\mu\text{g}/\text{m}^3$ )	SO <sub>2</sub> ( $\mu\text{g}/\text{m}^3$ )
i)	23/03/17	Near Palasbari Ward No. 7 (Ch. 3560m)	Clear	65.3	34.4	11.2	4.0
ii)		Near Palasbari Ward No. 1 (Ch. 250m)		64.2	36.7	13.9	4.5
iii)		Satilapur (Ch. 1200m)		68.0	35.9	9.4	3.8

Remarks: - Parameters are within the permissible limit.

### NATIONAL AMBIENT AIR QUALITY STANDARDS:

SL.No	Pollutant	Time Weighted Average	Concentration in Ambient Air
			Industrial, Residential, Rural and Other Area
1	Sulphur Dioxide (SO <sub>2</sub> ), $\mu\text{g}/\text{m}^3$	24 hours	80
2	Nitrogen Dioxide (NO <sub>x</sub> ), $\mu\text{g}/\text{m}^3$	24 hours	80
3	Particulate Matter (PM <sub>10</sub> ), $\mu\text{g}/\text{m}^3$	24 hours	100
4	Particulate Matter (PM <sub>2.5</sub> ), $\mu\text{g}/\text{m}^3$	24 hours	60

Envision Enviro Technologies North East, Guwahati

(Quality control Manager)

Note: i) The results relate only to the parameters tested

ii) The test report shall not be reproduced except in full, without written approval of laboratory.

Page 1 of 1

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Quality of Noise- Palasbari Apron

Recognized by Pollution Control Board, Assam

## AMBIENT NOISE LEVEL MEASUREMENT REPORT

Rep.No. 170324\_1409037\_06A\_745

Date: 24/03/2017

### Name & Address:

M/s. Brahmaputra Infrastructure Ltd.  
Palasbari, (Brahmaputra River Under  
Water Works), Vill: sadilapur,  
Dist: Kamrup, Assam.

SL. NO.	DATE OF SAMPLING	LOCATION /SOURCE	NOISE LEVEL in dB(A)Leq
i)	20/03/17	Palasbari, CH.No. - 1200	50.1

Remarks: Noise level is carried out during day time.

### Ambient Noise Standards:

Area Code	Category of area	Limits in dB(A) Leq	
		Day (6:00 am to 10:00 pm)	Night (10:00 pm to 6:00 am)
A	Industrial Area	75	70
B	Commercial Area	65	55
C	Residential Area	55	45
D	Silence Zone	50	40

Envision Enviro Technologies North East, Guwahati

(Quality Control Manager)

Note: i) The results relate only to the parameters tested  
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Quality of Noise- Palasbari Apron ( near 15 KV Gen set)

Recognized by Pollution Control Board, Assam & MSME

## D.G. NOISE LEVEL MEASUREMENT REPORT

Rep.No. 170324\_1409037\_06A\_746

Date: 24/03/17

### Name & Address:

M/s. Brahmaputra Infrastructure Ltd.  
Palasbari, (Brahmaputra River Under  
Water Works), Vill: Sadilapur,  
Dist: Kamrup, Assam.

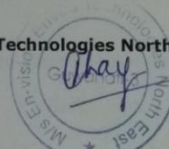
SL. NO.	DATE OF SAMPLING	LOCATION /SOURCE	NOISE LEVEL in dB(A)Leq
i)	20/03/17	DG set - 15 KVA	71.4

Remarks: Noise level is carried out during day time at a distance 1 metre from the enclosure surface.

### DG Set Noise Standards:

Noise limit viz. 75 dB(A) at 1m distance.

Envision Enviro Technologies North East, Guwahati



(Quality Control Manager)

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**Quality of Noise- Palasbari Sub Project (Palasbari Embankment)**



Recognized by Pollution Control Board, Assam.

## AMBIENT NOISE LEVEL MEASUREMENT REPORT

Rep No.: 170328\_1503048\_06A\_926/382

Date: 28/03/2017

Name & Address:

M/s. Shree Gautam Construction Co. Ltd.

Project Name: (Construction of palasbari Embankment with black topped road and slop protection works above LWL along the Brahmaputra River), Dist: Kamrup, Assam.

SL. NO.	DATE OF SAMPLING	LOCATION /SOURCE	NOISE LEVEL in dB(A)Leq
i)	23/03/17	Near Palasbari Ward No. 7 (Ch. 3560m)	48.2
ii)		Near Palasbari Ward No. 1 (Ch. 250m)	51.7
iii)	24/03/17	Satilapur (Ch. 1200m)	52.0

Remarks: Noise level are carried out during day time.

### Ambient Noise Standards:

Area Code	Category of area	Limits in dB(A) Leq	
		Day (6:00 am to 10:00 pm)	Night (10:00 pm to 6:00 am)
A	Industrial Area	75	70
B	Commercial Area	65	55
C	Residential Area	55	45
D	Silence Zone	50	40

Envision Enviro Technologies North East, Guwahati.



(Quality Control Manager)

Note: i) The results relate only to the parameters tested  
ii) The test report shall not be reproduced except in full, without written approval of laboratory.

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## Quality of Surface water – Palasbari Apron

# en-VISION

Enviro Technologies North East

Technologies for better tomorrow

Recognized by Pollution Control Board, Assam.

**WATER ANALYSIS REPORT**

Rep.No: 170325\_14080099\_0 Date: 25/03/17

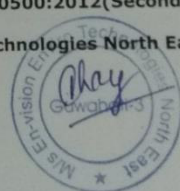
Name & Address of Client	M/s. Brahmaputra Infrastructure Ltd, Palashbari, (Brahmaputra River Under Water Works), VIII-Sadilapur, Dist-Kamrup, Assam
Sample Description	Water collected from the Brahmaputra River downstream of Palashbari
Date of Sampling	20/03/16
Sample collected by	M/s. En-vision Enviro Technologies North East

SN	Parameters	Unit	Result	Method	Desirable limit
1	p <sup>H</sup>	--	7.8	Potentiometric	6.5-8.5
2	Temperature	°C	23	Thermometer	---
3	TDS	mg/L	212.4	Dried at 105°C	500
4	DO	mg/L	7.5	Azide Modification	---
5	BOD	mg/L	3.9	3 days Incubation at 27°C	---
6	COD	mg/L	61.2	Dichromate Reflux	---
7	TSS	mg/L	375.6	Gravimetric	---
8	Oil & Grease	mg/L	0.7	Gravimetric	---

NOTE: TSS Total Suspended Solids, BOD Biochemical Oxygen Demand, COD Chemical Oxygen Demand, DO Dissolved Oxygen, TDS Total Dissolved Solids  
**The desirable limits are for drinking water only as per IS 10500:2012(Second revision).**

For En-vision Enviro Technologies North East, Guwahati



(Quality Control Manager)

Note: i) The results relate only to the parameters tested.  
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## WATER ANALYSIS REPORT

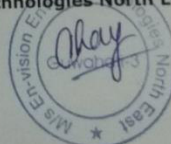
Rep.No: 170325\_14080099\_0

Date: 25/03/17

Name & Address of Client	M/s. Brahmaputra Infrastructure Ltd, Palashbari, (Brahmaputra River Under Water Works), Vill-Sadilapur, Dist-Kamrup, Assam
Sample Description	Water collected from the Brahmaputra River upstream of Palashbari
Date of Sampling	20/03/17
Sample collected by	M/s. En-vision Enviro Technologies North East

SN	Parameters	Unit	Result	Method	Desirable limit
1	p <sup>H</sup>	--	6.9	Potentiometric	6.5-8.5
2	Temperature	°C	22	Thermometer	---
3	TDS	mg/L	178.5	Dried at 105°C	500
4	DO	mg/L	8.7	Azide Modification	---
5	BOD	mg/L	4.2	3 days Incubation at 27°C	---
6	COD	mg/L	43.6	Dichromate Reflux	---
7	TSS	mg/L	355.8	Gravimetric	---
8	Oil & Grease	mg/L	0.5	Gravimetric	---

NOTE: TSS Total Suspended Solids, BOD Biochemical Oxygen Demand, COD Chemical Oxygen Demand, DO Dissolved Oxygen, TDS Total Dissolved Solids  
 The desirable limits are for drinking water only as per IS 10500:2012 (second revision).  
 For En-vision Enviro Technologies North East, Guwahati



(Quality Control Manager)

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## Quality of Surface water – Palasbari Embankment



**Enviro Technologies North East**

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**WATER ANALYSIS REPORT**


Rep.No: 170330\_1502075\_0 Date: 30/03/17

<b>Name &amp; Address of Client</b>	M/s. Shree Gautam Construction Co. Ltd. Project Name: (Construction of Palashbari Embankment with black topped road and slop protection works above LWL along the Brahmaputra River), Dist: Kamrup, Assam.
<b>Sample Description</b>	Surface water collected from Brahmaputra River of Palashbari
<b>Date of Sampling</b>	23/03/17
<b>Sample collected by</b>	M/s. En-vision Enviro Technologies North East

SN	Parameter	Unit	Result	Method	Desirable limit
1	p <sup>H</sup>	--	7.1	Potentiometric	6.5-8.5
2	Temperature	°C	20	Thermometer	---
3	TDS	mg/L	176.9	Dried at 105°C	500
4	DO	mg/L	6.8	Azide Modification	---
5	BOD	mg/L	3.7	3 days Incubation at 27°C	---
6	COD	mg/L	57.5	Dichromate Reflux	---
7	TSS	mg/L	359.6	Gravimetric	---
8	Oil & Grease	mg/L	0.2	Gravimetric	---

NOTE: TSS Total Suspended Solids, BOD Biochemical Oxygen Demand, COD Chemical Oxygen Demand, DO Dissolved Oxygen, TDS Total Dissolved Solids  
**The desirable limits are as per IS 10500:2012(Second revision).**  
**For En-vision Enviro Technologies North East, Guwahati**

  
**(Quality Control Manager)**

Note: i) The results relate only to the parameters tested.  
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## Quality of Drinking Water -Palasbari Apron (BIL)

**en-VISION**

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### WATER ANALYSIS REPORT

Rep.No: 170325\_14080099\_0

Date: 25/03/17

<b>Name &amp; Address of Client</b>	M/s. Brahmaputra Infrastructure Ltd, Palashbari,(Brahmaputra River Under Water Works),Vill-Sadilapur, Dist-Kamrup, Assam
<b>Sample Description</b>	Drinking Water
<b>Date of Sampling</b>	20/03/17
<b>Sample collected by</b>	M/s. En-vision Enviro Technologies North East.

Sl No.	Parameters	Unit	Result	Reference Method	IS 10500: 2012	
					Acceptable limit	Permissible limit
1	p <sup>H</sup>	---	6.83	Potentiometric	6.5-8.5	No relaxation
2	Turbidity	NTU	BDL	Nephelometric	1.0	5.0
3	TDS	mg/L	87.3	Dried at 105° C	500	2000
4	DO	mg/L	5.1	Azide Modification	----	----
5	Total hardness	mg/L	63.8	EDTA Titrimetric	200	600
6	Calcium	mg/L	42.9	EDTA Titrimetric	75	200
7	Magnesium	mg/L	21.6	EDTA Titrimetric	30	100
8	Total Alkalinity	mg/L	58.7	Titrimetric	200	600
9	Chloride	mg/L	27.8	Argentometric	250	1000
10	Sulphate	mg/L	11.6	Turbidimetric	200	400

Cont...

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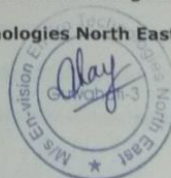
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Sl No.	Parameters	Unit	Result	Reference Method	IS 10500: 2012	
					Acceptable limit	Permissible limit
11	Nitrate	mg/L	5.4	Spectrophotometric	45	No relaxation
12	Fluoride	mg/L	0.38	SPADNS Method	1.0	1.5
13	Residual Chlorine	mg/L	BDL	Iodometric	0.2	1.0
14	Copper	mg/L	0.0187	Flame AAS	0.05	1.5
15	Iron(as Fe)	mg/L	0.2659	Flame AAS	0.3	No relaxation
16	Cadmium	mg/L	BDL	Flame AAS	0.003	No relaxation
17	Lead	mg/L	BDL	Flame AAS	0.01	No relaxation
18	Zinc	mg/L	0.3465	Flame AAS	5	15
19	Total Chromium	mg/L	0.0023	Flame AAS	0.05	No relaxation
20	Manganese	mg/L	0.0317	Flame AAS	0.1	0.3
21	Selenium	mg/L	0.0035	Flame AAS	0.01	No relaxation
22	BOD	mg/L	8.7	Incubation 3 days, 27°C	----	----
23	COD	mg/L	37.9	Dichromate Reflux	----	----

All the measurement methods conform to IS 10500:2012 & World Health Organization (WHO) Guidelines.

For En-vision Enviro Technologies North East, Guwahati



(Quality Control Manager)

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