

Environmental Monitoring Report

For the period covering July–December 2018
Project Number: 38412-023
June 2019

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**

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

Reporting Period – July 2018 to December 2018

Submitted by Executing Agency



Flood and River Erosion Management Agency of Assam (FREMAA)

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

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**Bi-Annual Report on Implementation of Environmental Management Plan
July 2018 to December 2018**

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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 :

The **Flood and River Erosion Management Agency of Assam (FREMAA)** was set up in 2010-11 as an Executing Agency (EA) under Society Registration Act 1860. It is a special purpose vehicle established for implementation of the Assam Integrated Flood and Riverbank Erosion Risk Management Investment Program (AIFRERMIP) funded by ADB with provision of comprehensive, cost-effective and sustainable structural and non-structural measures in Palasbari, Gumi and Dibrugarh under Tranche 1, in accordance with government and 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 operational zed 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.

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. 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.

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.

Provisions for compliance:

The FREMAA 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. This was followed in construction phase of Tranche-1.

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. This was followed in construction phase of Tranche-1. In the initial stages contractor did not complied the contract conditions as they were not aware of the ADBs SPS 2009. In the later stage, after training by PMC and FREMAA, the contractors' abide by the contract stipulations.

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

Palasbari Sub Project:

Palasbari Reach (Construction works completed before June, 2017)

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 (Construction works 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 (Construction works completed before June, 2017)

- (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%

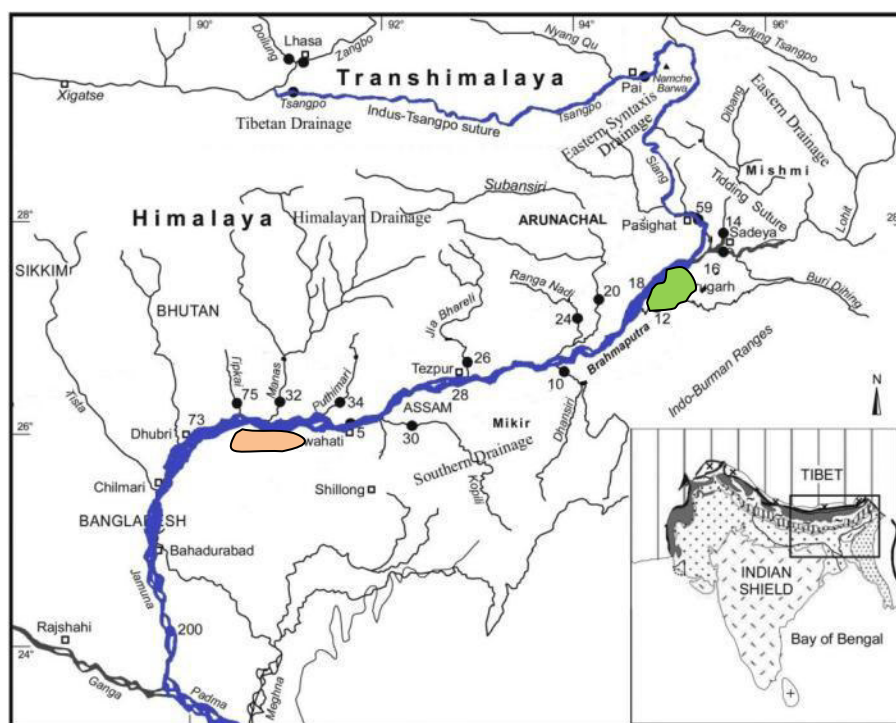
(All civil works completed before 31st July, 2017)

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 July to December, 2018.
- To ensure that EIA recommendations are adequately followed in EMP and EMoP to meet the Environmental Compliances of statutory requirements of MoEF&CC, GOI.

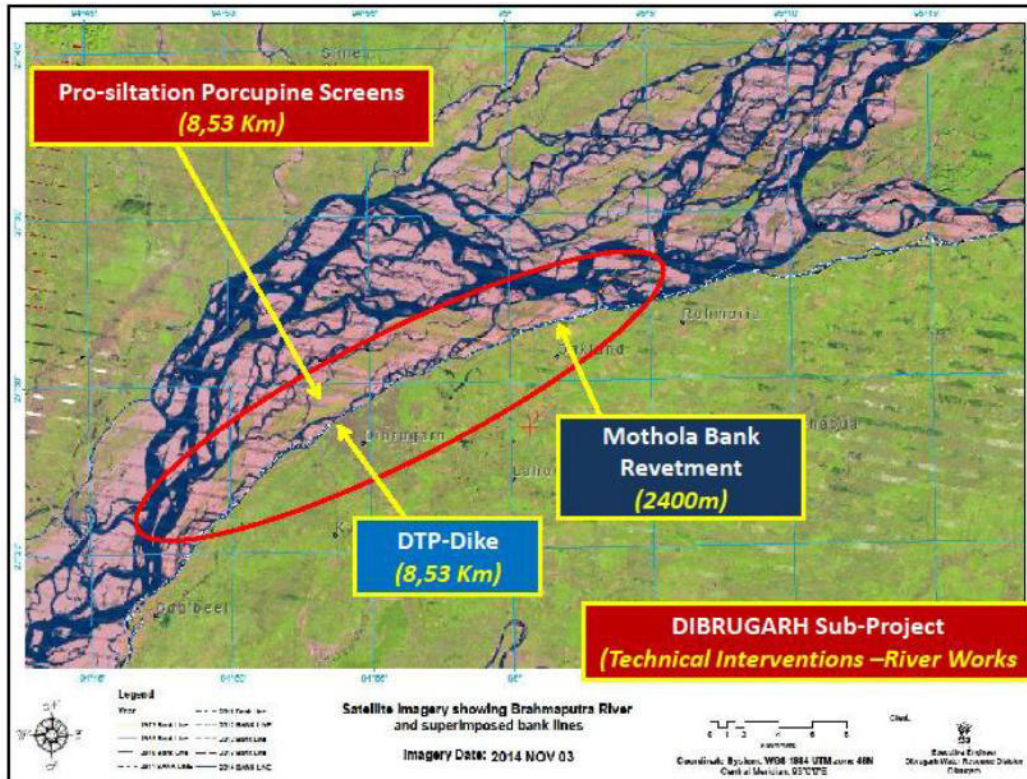


Dibrugarh sub project

Palashbari Sub Project



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, 2018 delineates :-

- Environmental Monitoring of the project from July, 2018 to December, 2018 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 3rd 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 31st July, 2017. Environmental monitoring was carried out during the operation phase from August, 2017 as per the EMP. This report covers monitoring between July 2018 to December 2018.

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,
- Other measures like, 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 for construction and operation phase enabling with ADB's Safeguard Policies and with environmental compliances of statutory requirements of MoEF&CC, GOI.

2A. Tests to check the ambient environment (during operation stage)

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

For Air Quality : SPM, RSPM, SO₂, NO_x, CO, Pb - Within 100 m of sensitive locations/settlement –Continuous 24- hourly, twice a week, for two weeks once every year (summer).

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.

Noise - Noise Level in dB (A) – Near the construction sites and sensitive locations close to embankment – One day hourly measurement, once in six months.

For Operation phase SIOs carried out regular checks on the stipulations mentioned in the EMP except the test of Air, Water, Noise in the completed reaches. Tests of ambient environment (Surface water quality Gumi, Dibrugarh) were carried out in the month of November 2018 for the period July 2018 to December 2018. Results of the tests reflected in this report.

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 reports river morphology, water levels, and discussions with stakeholders. During the operation, no major safeguard issues were identified and no major gaps in EMP implementation noticed (except the test of ambient environment). 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 (June, 2018)
- **Noise**
 - Horns not used, unless essential
 - Checked Noise level by PCB approved lab (June, 2018)
- **Surface water quality**
 - Store fuel and lubricants away from the river channels (awareness for the boat man)
 - Checked surface water quality by PCB approved lab (November, 2018 fro Gumi and Dibrugarh)
- **Ground water quality**
 - Checked surface water quality by PCB approved lab (June, 2018)
- **Pollution**
 - Spills of oils on the site and on river regularly checked by SIO
 - Surface discharges monitored

3.3. Status of the mechanisms present for the Implementation of EMP during operation phase(status as on 31.12.2018)

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:

- Meetings 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.
- Terrestrial and aquatic fauna status.

- Benefit assessment of the support during the project as a whole (done by BME team.)
- Fish productivity

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. Borrow area converted to fish pond as per borrow area rehabilitation plan and in the rest of the areas top soil were spread properly.

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 and SIO.

List of Meetings Attended (Period January, 2018 to June, 2018)

No.	Date	Locations	Meetings Results	
1	15.11.2018	Gumi	Operation phase monitoring of EMP. Fish productivity in the reach, monitoring of river morphology etc discussed.	
2	23.11.2018	Palasbari	Operation phase monitoring of EMP. Terrestrial and aquatic fauna status, River morphology discussed for T1 works.	

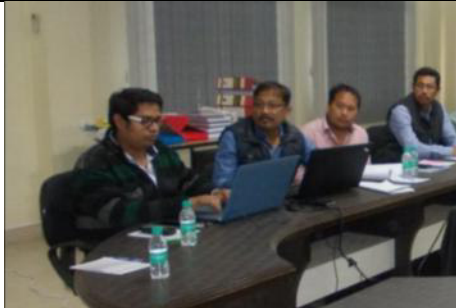
3	29.12.2018	Dibrugarh	Operation phase monitoring of EMP. Terrestrial and aquatic fauna status, and river morphology discussed for T1 works.	
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Table 3. Field visit carried out by the experts of PMC, during July to December, 2018.

No.	Date	Place of visit	Meeting with	Results
1	15.11.2018	Gumi works	WRD, Villagers, FREMAA	-aquatic migratory birds visited in the reach. -dolphin sighted -fishes found in the reach -crops cultivated in the area
2	23.11.2018	Palasbari embankment and Palasbari Apron	WRD, Villagers, FREMAA	-aquatic migratory birds visited in the reach. -dolphin sighted -fishes found in the reach
3	29.12.2018 & 30.12.2018	DTP Dyke, Mothola Oakland, Dibrugarh	WRD, Villagers, FREMAA	-aquatic migratory birds visited in the reach. -fishes found in the reach

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,	FREMAA, SIO	Under Compliance in accordance with ADB Environmental Policy and SPS Guideline. Acts and rules related to Water, Air, Noise, Environment,

	State of Assam and ADB's SPS (2009)		Biodiversity of Government of India and Govt. of Assam. (Test of ambient environment carried out in the month of November, 2018.)
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 during Operation phase monitoring done in the month of November 2018 in 2 reaches. Rest were done in June, 2018.
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 : Any unpredicted environmental impacts monitored by SIO office. So far no issues. Terrestrial and aquatic animals records were kept. Fish records were also kept at SIO office. Sites regularly monitored by SIO 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 / Bi Annual Report submitted for the period of July, 2018 to December 2018. Compilation going on for the period of January, 2019 to June 2019.

Condition of the embankment :

The overall condition of the embankment is good. No inundation occurred after completion of the embankment in all the three sites (Palasbari, Gumi and Dibrugarh).

DTP Dyke



Mothola Oakland - Dibrugarh



Palasbari Embankment



Palasbari Apron works



Gumi Works



4.1.2. Mitigation Compliance :

Following measures were taken to meet the compliance.

- **Pollution monitoring**
 - Air, Water and noise quality monitored till construction phase. Operation phase monitoring of ambient environment carried out in the month of June, 2018, remaining surface water monitoring were carried out in November, 2018.
- **Preservation of trees**
 - Protection of trees for their preservation.
Major trees near the embankment in Dibrugarh DTP Dyke (3 nos) were protected.



- Monitoring of the planted trees.
Survival rate of the planted trees are 80 %. More trees will be planted next monsoon.



- **Labour Camps**
 - Before vacating the camp after the work, SIO inspected the labour camp sites and cleared all the debris from the camp site. Photographs of the are submitted by the contractor in the final report.
- **Borrow area Rehabilitation**
 - All the borrow areas were either rehabilitated or utilized by the community as per the Borrow Area Management Plan. Stringent monitoring required from SIOs office during construction phase to implement all the stipulations given in the Environment Clearance. Borrow areas were converted to fish pond as per borrow area rehabilitation plan and in the rest of the areas top soil were spread properly.
- All **natural channels** were monitored by SIO and were monitored before monsoon season.



Monitoring the water pumps at Dibrugarh

- **Consultation with Fisherman in the Tranche-1 reach.**
During the field visit fisherman were interviewed. List of species found in the reach were recorded.



Fishing activities in Dibrugarh

Table : List of Fish species found in the 3 reaches during monitoring

(direct observation and during interview)

	Palasbari	Gumi	Dibrugarh
1	<i>Chitala chitala</i>	<i>Chitala chitala</i>	<i>Angilla bengalensis</i>
2	<i>Notopterus notopterus</i>	<i>Notopterus notopterus</i>	<i>Gudusia chapra</i>
3	<i>Gudusia chapra</i>	<i>Tenualosa ilisha</i>	<i>Cirrhinus reba</i>
4	<i>Tenualosa ilisha</i>	<i>Gonialosa manmina</i>	<i>Labeo calbasu</i>
5	<i>Gonialosa manmina</i>	<i>Setipinna phasa</i>	<i>Labeo gonius</i>
6	<i>Setipinna phasa</i>	<i>Chela cachius</i>	<i>Systomus sarana</i>
7	<i>Chela cachius</i>	<i>Amblypharyngodon mola</i>	<i>Pethia ticto</i>
8	<i>Amblypharyngodon mola</i>	<i>Danio rerio</i>	<i>Puntius sophore</i>
9	<i>Cabdio morar</i>	<i>Esomus danricus</i>	<i>Salmostoma bacaila</i>
10	<i>Danio rerio</i>	<i>Rasbora rasbora</i>	<i>Devario devario</i>
11	<i>Esomus danricus</i>	<i>Gibelion catla</i>	<i>Raiamas bola</i>
12	<i>Rasbora rasbora</i>	<i>Cirrhinus mrigala</i>	<i>Garra gotyla</i>
13	<i>Gibelion catla</i>	<i>Cirrhinus reba</i>	<i>Garra nasuta</i>
14	<i>Cirrhinus mrigala</i>	<i>Ctenopharyngodon idella</i>	<i>Psilorhynchus balitora</i>
15	<i>Cirrhinus reba</i>	<i>Cyprinus carpio</i>	<i>Acaanthocobitis botia</i>
16	<i>Ctenopharyngodon idella</i>	<i>Labeo bata</i>	<i>Schistura scaturigina</i>
17	<i>Cyprinus carpio</i>	<i>Labeo calbasu</i>	<i>Cantophrys gongota</i>
18	<i>Labeo bata</i>	<i>Labeo gonius</i>	<i>Botia dario</i>
19	<i>Labeo calbasu</i>	<i>Labeo rohita</i>	<i>Pseudocheneisis sulcatus</i>
20	<i>Labeo gonius</i>	<i>Acanthocobitis botia</i>	<i>Chanda nama</i>
21	<i>Labeo rohita</i>	<i>Botia dario guntea</i>	<i>Mastacembelus armatus</i>
22	<i>Pethia conchoni</i>	<i>Sperata seenghala</i>	<i>Macrogathus pancalus</i>
23	<i>Pethia ticto</i>	<i>Mystus cavasius</i>	<i>Xenentodon cancila</i>
24	<i>Acanthocobitis botia</i>	<i>Mystus vittatus</i>	<i>Olyra longicaudata</i>
25	<i>Lepidocephalus guntea</i>	<i>Rita rita</i>	<i>Heteropneustes fossilis</i>
26	<i>Botia dario guntea</i>	<i>Ompok bimaculatus</i>	<i>Clarias batrachus</i>
27	<i>Sperata aor</i>	<i>Wallago attu</i>	<i>Laguvia shawi</i>
28	<i>Sperata seenghala</i>	<i>Eutropiichthys vacha</i>	<i>Glossobius giuris</i>
29	<i>Mystus cavasius</i>	<i>Xenentodon cancila</i>	<i>Channa punctatus</i>
30	<i>Mystus vittatus</i>	<i>Chanda nama</i>	<i>Channa striatus</i>
31	<i>Rita rita</i>	<i>Glossogobius giuris</i>	<i>Tor tor</i>
32	<i>Ompok bimaculatus</i>	<i>Laubuka laubuca</i>	
33	<i>Wallago attu</i>	<i>Devario devario</i>	
34	<i>Eutropiichthys vacha</i>		
35	<i>Xenentodon cancila</i>		
36	<i>Chanda nama</i>		
37	<i>Glossogobius giuris</i>		

Scientific name as per: fishbase.org



Fishing catch in Dibrugarh

- **Crop Cultivation in the area :**

Table : Crop cultivation in area after protection works in Tranche 1

	Dibrugarh	Palasbari	Gumi
1	Rice	Rice	Brinjal
2	Mustard	Mustard	Cabbage
3		Sweet potato	Cauliflower
4		Tomato	German Turnip
5		Cabbage	Sweet potato
6		Potato	Tomato
7		Cauliflower	Rice
8			Potato
9			Brinjal
10			Pumpkin
11			Mustard

Gumi – Crop cultivation



Mustard cultivation



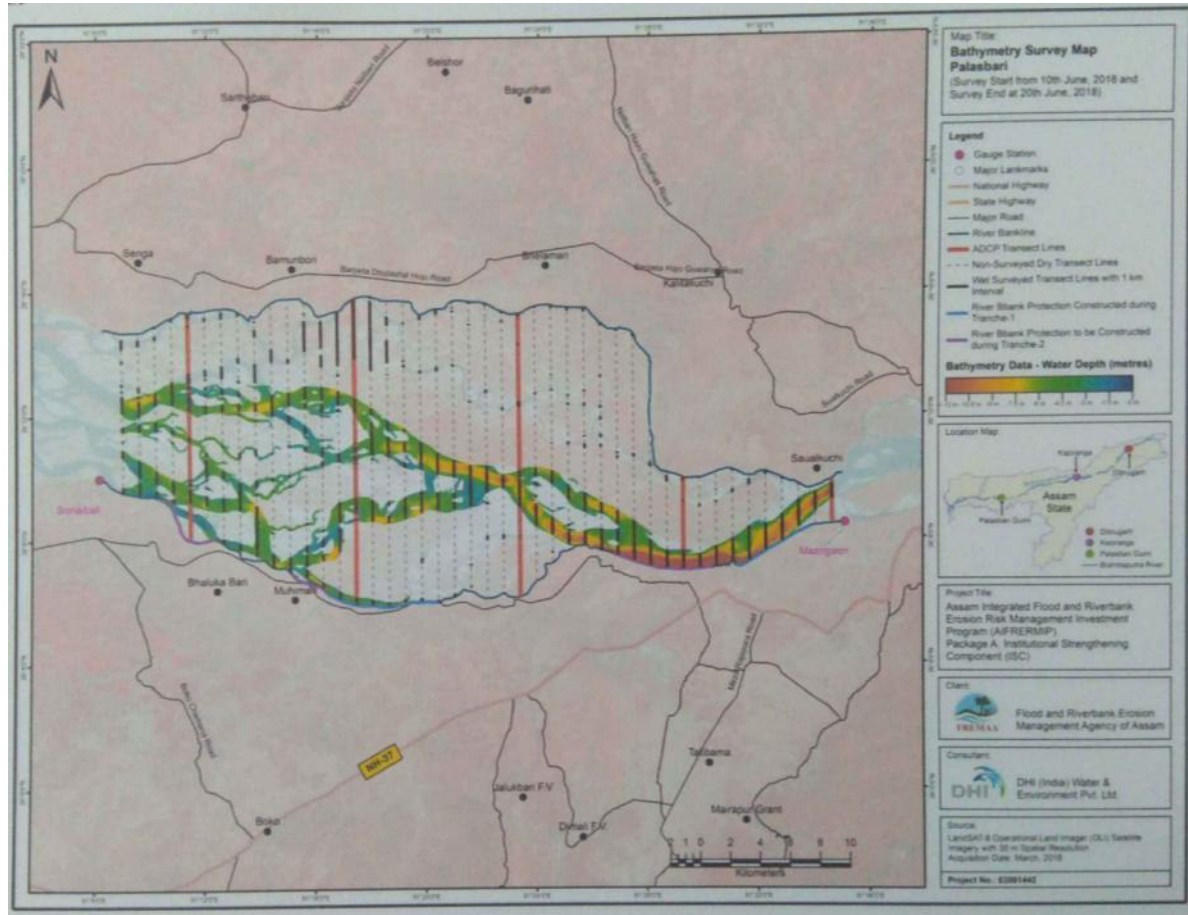
Cabbage



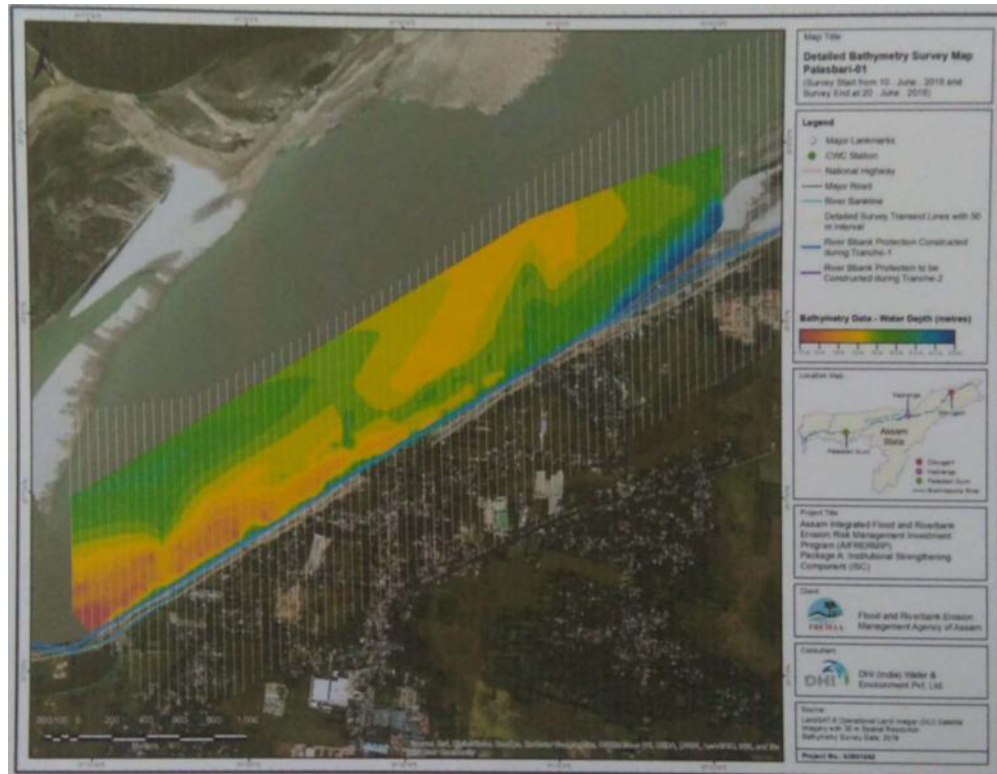
Tomato

- **River Morphology**

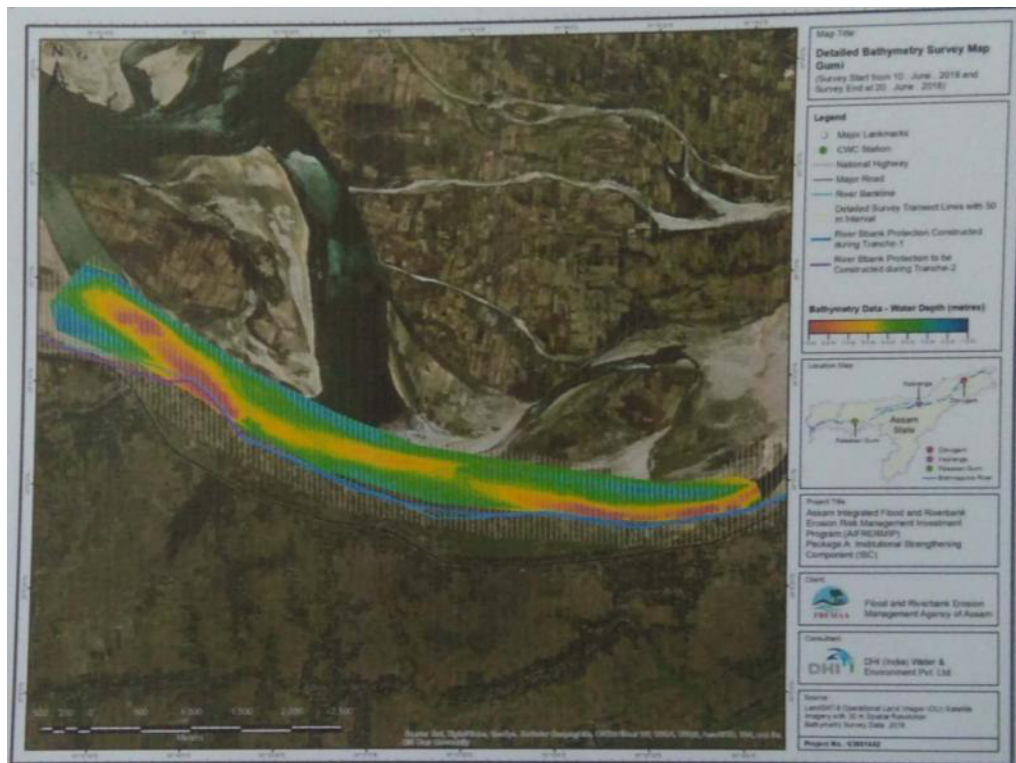
Bathymetric Survey was carried out by DHI under FREMAA in the month of July 2018 and the draft reports were available in the end of December 2018.



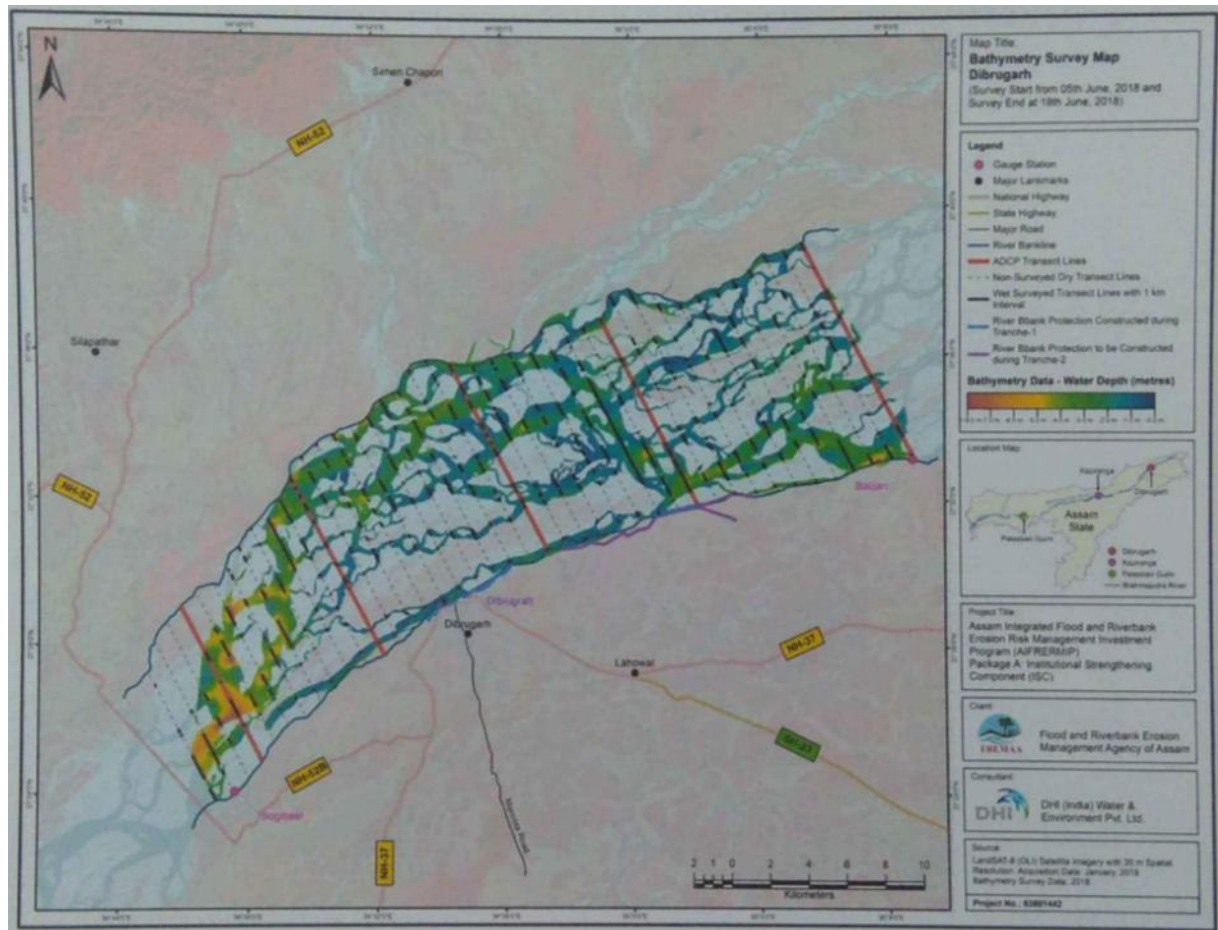
Detailed bathymetry of Palasbari and Gumi reach



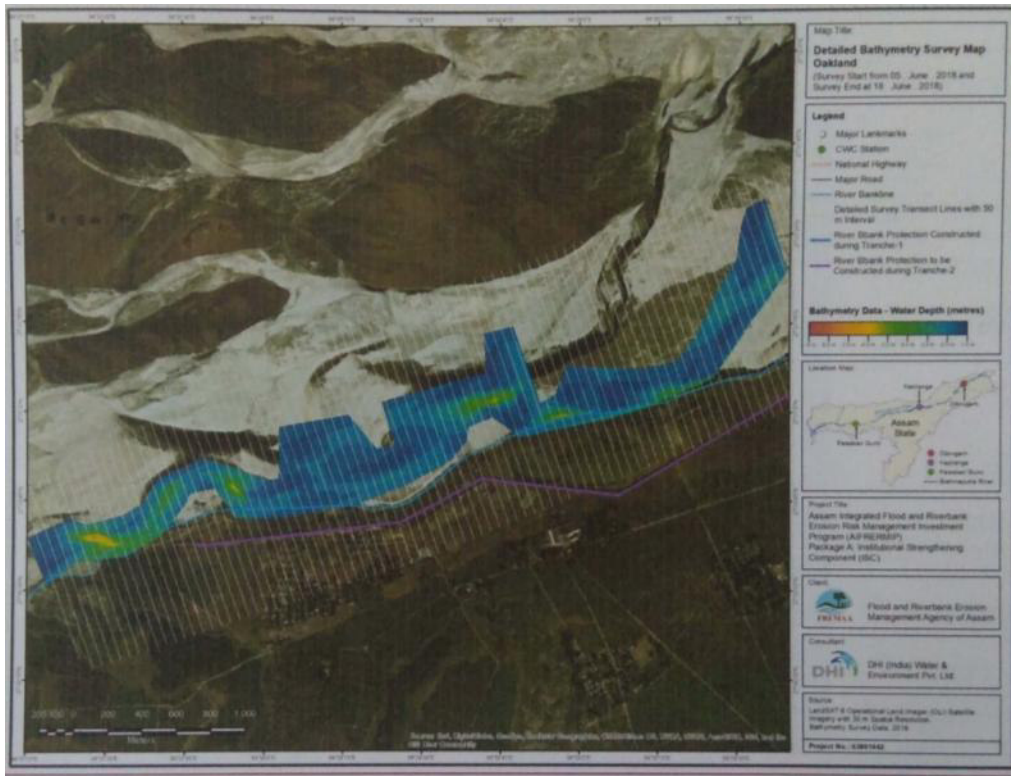
Palasbari Reach



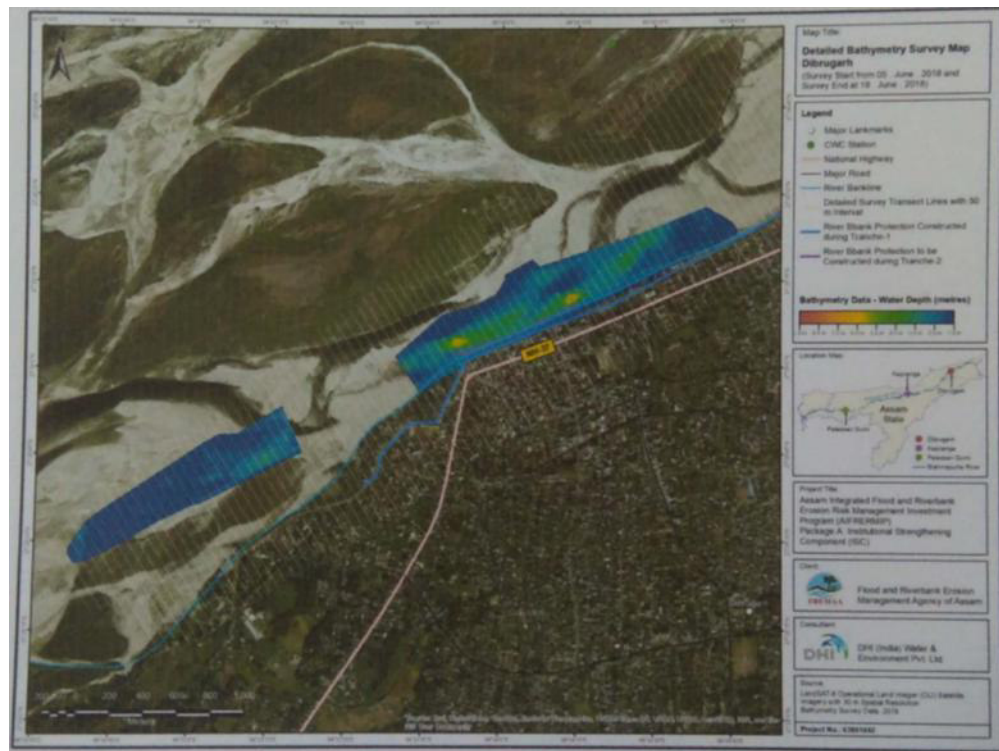
Gumi Reach



Detailed bathymetry of Dibrugarh reach



Oakland reach



Near DTP Dyke

- Discharge monitoring

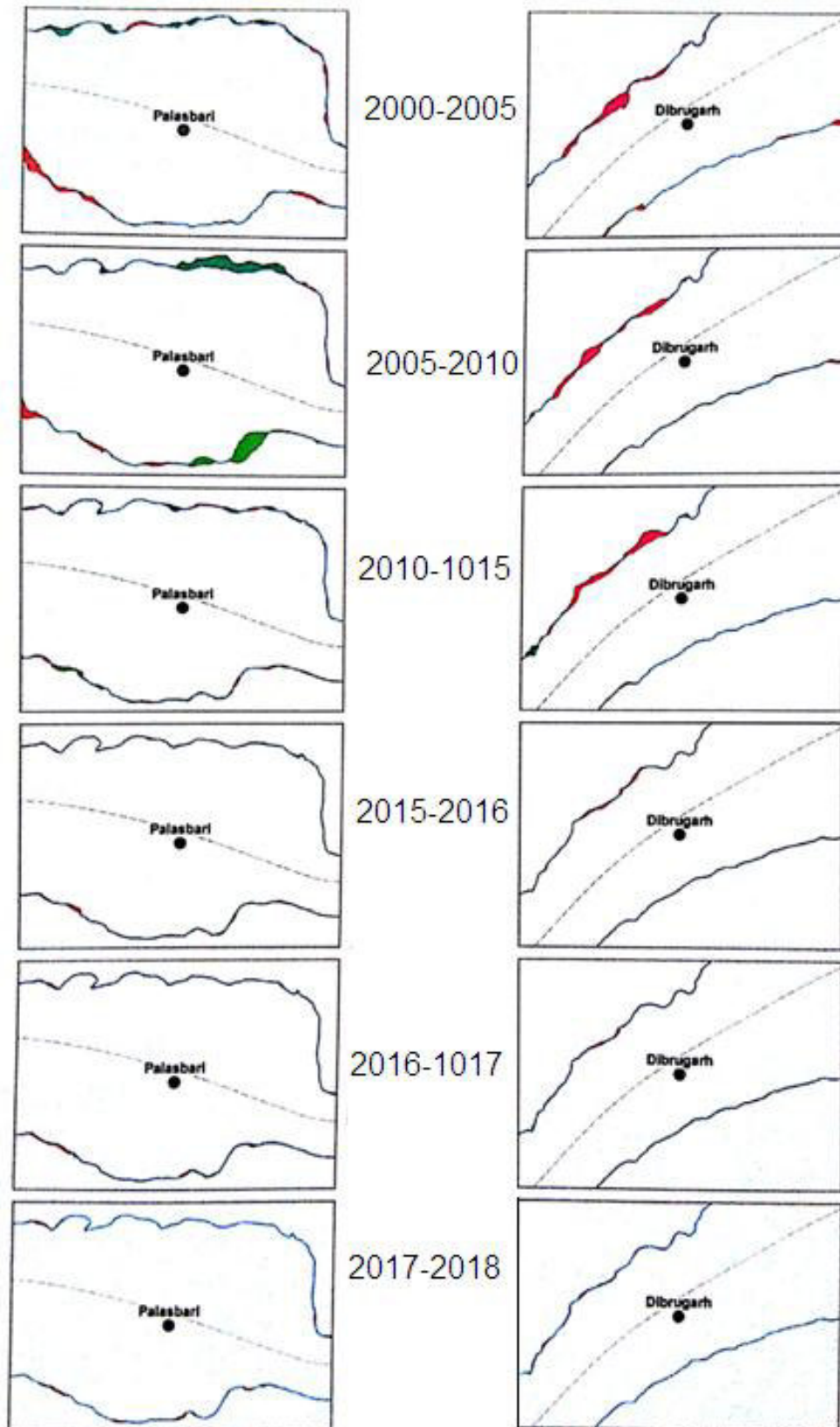
Discharge measures at Palasbari during Bathymetric survey:

Serial No	Location In km	Start Edge	Start Date	Start Time	Temperature (°C)	Track (m)	DMG (m)	Width (m)	Area (m ²)	Mean Speed (m/s)	Total Q (m ³ /s)
1	Sarai Ghat Bridge	Left Bank	12-06-2018	7:38:05 AM	29.6	1,296.44	1,168.78	1,188.78	12,088.66	0.865	10,451.54
2	1	Left Bank	12-06-2018	1:12:11 PM	29.6	1,090.06	886.6	906.601	9,272.91	1.129	10,464.85
3	10	Left Bank	13-06-2018	10:20:58 AM	28.8	1,198.99	1,160.33	1,200.33	10,588.97	0.962	10,184.62
4	20	Left Bank	13-06-2018	2:59:26 PM	29.3	2,565.53	2,487.07	2,522.07	11,491.73	0.871	10,008.70
5	30	Left Bank	14-06-2018	2:48:05 PM	29.2	1,598.13	1,523.59	1,553.59	4,653.89	0.805	3,746.02
6		Right Bank	15-06-2018	3:36:40 PM	28.1	400.62	382.41	407.409	1,602.65	0.338	542.369
7		Left Bank	17-06-2018	1:24:24 PM	26.3	1,101.97	1,062.28	1,082.28	5,734.02	1.055	6,051.50
8	40	Left Bank	16-06-2018	11:34:11 AM	27.3	1,550.11	1,420.11	1,460.11	5,381.80	0.919	4,947.35
9		Left Bank	17-06-2018	5:07:44 PM	26.2	1,933.36	1,815.12	2,135.12	6,763.80	0.973	6,584.17
10		Left Bank	18-06-2018	9:09:58 AM	25.8	710.13	516.38	546.385	1,687.71	0.964	1,627.42

Discharge measures at Dibrugarh during Bathymetric survey:

SL No	Cross Section No.	Start Edge	Start Date	Start Time	Total Q (m ³ /s)	Total Q (m ³ /s)	Temperature (°C)	Track (m)	Width (m)	Area (m ²)	Mean Speed (m/s)
1	1	Left Bank	07-06-2018	4:00:37 PM	337.434	3,857.28	24.7	106.17	356.186	515.206	0.655
2	1	Right Bank	08-06-2018	5:07:36 PM	52.568		28.2	80.21	296.043	709.965	0.074
3	1	Left Bank	09-06-2018	11:15:27 AM	806.831		24.2	278.9	326.822	750.527	1.075
4	1	Left Bank	09-06-2018	10:29:50 AM	2,713.01		25.1	2,749.85	3,546.28	7,138.70	0.38
5	12	Left Bank	07-06-2018	9:51:35 AM	5,022.22	6,165.42	23.8	2,944.26	2,788.72	6,781.84	0.741
6	12	Left Bank	07-06-2018	10:37:15 AM	452.272		23.5	348.98	340.616	717.871	0.63
7	12	Right Bank	07-06-2018	10:40:22 AM	690.925		23.8	376.1	406.923	793.52	0.871
8	20	Left Bank	06-06-2018	3:40:59 PM	171.182		30.2	2,133.00	602.599	1,282.27	0.133
9	20	Left Bank	12-06-2018	2:23:00 PM	1,660.43	3,708.47	25.5	1,830.85	1,871.52	2,840.91	0.584
10	20	Left Bank	13-06-2018	12:27:58 PM	1,876.86		23.5	637.75	665.433	2,257.10	0.832
11	30	Left Bank	10-06-2018	2:31:32 PM	3,499.44	12,340.98	27.4	1,581.59	2,511.35	3,860.92	0.906
12	30	Left Bank	14-06-2018	11:29:24 AM	8,584.02		22.1	2,776.67	2,766.77	7,780.34	1.103
13	30	Left Bank	16-06-2018	12:32:32 PM	257.517		23	175.86	220.67	396.996	0.649
14	38	Left Bank	15-06-2018	4:00:12 PM	15,186.00	15,186.00	21.7	5,066.98	5,115.50	15,465.48	0.97

- Monitoring river bank line: (source DHI, FREMAA from satellite images)



		Explanatory comments
Overall Compliance	Good	<ol style="list-style-type: none"> 1. Labour camp sites properly rehabilitated. 2. All the borrow areas were either rehabilitated or utilized by the community as per the Borrow Area Management Plan. 3. The environmental standards (Central Pollution Control Board, MoEF&CC, GOI) applicable for the sites are kept at the SIO office for reference. This helps SIOs to compare the results of the tests of ambient environment. 4. Monitoring of the planted trees. Satisfactory survival rate monitored by the Forest Department and district administration. Maintenance of the tree saplings were poor. But supplementary plantation required against the dead saplings. 5. Consultation with fisherman revealed that there was no impact on the fish catch and diversity. 6. River morphology monitoring was done by SIO and DHI of FREMAA through Bathymetric survey and analysis of satellite images. 7. Diver discharge data were also recorded by SIO. 8. Crop production also became stable after protection from erosion.

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 (July to December, 2018).
- 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 July to December, 2018

	Palashbari– Embankment and Palashbari–Apron (Test done on 16.06.2018)	Gumi (Test Done on 22/06/2018 & 25.11.2018)	Dibrugarh – DTP Dyke & Mothola Oakland (Test done on 24.06.2018 & 28.11.2018)
Ambient Air quality	Within the permissible limit	Within the permissible limit	Within the permissible limit
Surface Water Quality	Within the permissible limit	Within the permissible limit. Test done on : 25.11.2018.	Within the permissible limit. Test done on : 28.11.2018.
Ground water quality	Within the permissible limit	Within the permissible limit	Within the permissible limit
Noise level	Within the permissible limit	Within the permissible limit	Within the permissible limit
Complain lodged by the local residents on Environmental pollution July to December, 2018	No complaints lodged	No complaints lodged	No complaints lodged

Operation Phase ambient test carried out in the month of June, 2018 and November, 2018.

		Explanatory comments
Mitigation Effectiveness	Good	<ul style="list-style-type: none"> No complaints were lodged to SIO on environmental pollution by any of the fringe villagers, NGO's or other institutions Results of the ambient environmental tests were within the permissible limit of Central Pollution Control Board, MoEF&CC, GOI. (Test results of Palasbari –24th June, 2018, Gumi – 22nd June, 2018, 25th November, 2018; Dibrugarh – 16th June, 2018, 28th November, 2018) Monthly environmental monitoring of the embankment, Drainage, fish diversity, Birds diversity, discharge, etc reviewed by SIO's.

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

Not relevant to this project.

4.3. Ambient Environment Monitoring Program (if Relevant)

To monitor the ambient environment the following parameters are to be monitored with the frequencies described in the EMP. All the tests were performed from the Pollution Control Board, Assam and its approved labs during construction stage. Test of ambient environment initiated for operation phase as per EMP done in the month of June, 2018.

- For **Air Quality** :
SPM, RSPM, SO₂, NO_x, - 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, COD, TDS, TSS, DO, Oil and Grease – from Brahmaputra River
- Once during start of construction phase.
- **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
Air	SO ₂ , NO _x , 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
Surface Water	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
Noise	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&CC 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 during the construction phase. 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.

For operation phase monitoring, between July to December 2018 tests were carried out in the month of June, 2018 in all the 3 reaches (Dibrugarh, Palasbari and Gumi) and in November, 2018 for surface water quality in Dibrugarh and Gumi Reach.

Regular checking of the embankments were carried out by SIO. Following monitoring were also carried out during July to December, 2018.

- Terrestrial and aquatic fauna status
- Fish productivity
- Cropping pattern
- Soil erosion and siltation
- Visual check on Drainage Congestion
- River Hydrology, Morphology and Sediment Transport

Table 8 : EMP monitoring parameters for operation Phase

Location	Environmental Component	Parameter	Frequency	Remark
Dibrugarh and Gumi; and Palasbari	Fisheries	Fish productivity	Once in a year	TOR developed. The study will be initiated.
Dibrugarh and Gumi; and Palasbari	Cropping Pattern	Survey of existing cropping pattern and effect of change in cropping pattern in the impacted areas	Once in a year	Monthly monitoring done. BME captured in their report.
Dibrugarh and	Air Quality	SPM, RSPM,	Once during	Test carried out in

Gumi; and Palasbari		SO ₂ , NO _x , CO, Pb	construction and once after six months of completion of project	June, 2018.
Dibrugarh and Gumi; and Palasbari	Surface Water Quality	pH, BOD, COD, TDS, TSS, DO, Oil & Grease	Once during the dry season.	Test carried out in June, 2018 and November, 2018.
Dibrugarh and Gumi; and Palasbari	Ground water and Drinking Water Quality	pH, BOD, DO, total coliform, As, Cd, Mn and water levels		Test carried out in June, 2018.
Dibrugarh and Gumi; and Palasbari	Soil Erosion (inland erosion) and siltation		Once during operation of 1 st year	Monthly checking done by SIOs regularly.
Dibrugarh and Gumi; and Palasbari	Drainage Congestion	Visual check	After one year of construction.	Monthly checking done by SIOs regularly.
Dibrugarh and Gumi; and Palasbari	River Hydrology, Morphology and Sediment Transport	Scientific techniques applicable to the monitoring of these components	Regular	Bathymetric survey done by ISC and SIOs monitor the results.
Dibrugarh and Gumi; and Palasbari	Tree Plantation	Scientific techniques applicable to the monitoring of these components	Regular	Monitored by Forest Department.
Palasbari	Hydrology	Water level, discharge, river cross sections	As per CWC guidelines	SIO's do it regularly.
Palasbari	Morphology	Bank line profiles, Sediment transport, velocity, float tracking	As per CWC guidelines	SIO's do it regularly.

Table-9. Quality of ambient Air at the site

Parameter	DTP Dyke & Mothola Oakland (15 th June, 2018)	Palasbari Apron, & Palasbari Embankment, (24 th June, 2018)	Gumi (22 nd June 2018)
PM 2.5	42	50	53
PM10	82	96	95
NO2	7	9	6
SO2	<5	<5	<5
CO	<1	<1	<1
Pb	<0.01	<0.01	<0.01
Weather	Clear	Clear	Clear

Table-10. Quality of Noise at the site

Parameter	Dibrugarh DTP Dyke & Mothola Oakland 15 th June, 2018	Palasbari Embankment & Apron 24 th June, 2018				Gumi 22 nd June, 2018		
Location	DTP Dyke	Ch 0.00 m	Ch 1500 m	Ch 3000 m	Ch 4500 m	Ch 3000 m	Ch 1200 m	Ch 50 m
Noise levels on dB (A) scale Day Time	53.9	65.4	65.3	58.4	65.3	54.6	53.2	53.2
Noise levels on dB (A) scale Night Time	44.1	46.8	44.6	44.8	53.8	44.4	43.8	43.2

Table-11. Quality of Ground Water at the site

Parameter	Unit	Dibrugarh DTP Dyke and Mothola Oakland 15 th June, 2018	Palasbari Apron, Embankment 24 th June, 2018	Gumi 22 nd June, 2018
Colour	Hazen	10	5	20
Odour		Un-objectionable	Un-objectionable	Un-objectionable
Turbidity	NTU	3	7	3
pH		6.47	6.6	7.64
Temperature	°C	22.1	22.1	18.2
TDS	mg/l	75	97	130
Oil & Grease	mg/l	<5	<5	<5
Total Hardness as CaCO ₃	mg/l	26	32	47
Chloride as Cl	mg/l	9	9	11.4
Sulphates as SO ₄	mg/l	28	42	47
Phosphates	mg/l	-	-	-
BOD	mg/l	-	<2	-
Lead Pb	mg/l	<0.1	<0.1	<0.1
Arsenic as As	mg/l	<0.01	<0.01	<0.01
Iron as Fe	mg/l	<0.0001	<0.06	0.023
Total Coliform	MNP/100ml	-	Absent	Absent
E.Coli	MNP/100ml	Absent	Absent	Absent

Table-12. Quality of Surface Water at the site

Parameter	Unit	Palasbari Apron, Embankment 24 th June, 2018	Gumi 25 th Nov, 2018	Dibrugarh 28 th Nov, 2018
Colour	Hazen	8		
pH		7.35	7.1	6.87
Temperature	°C	22.9	25	
TDS	mg/l	104	105	60
TSS	mg/l		45	0.015
Oil & Grease	mg/l	<5	BDL	0.034
Chloride as Cl	mg/l	9		
Phenols	mg/l	<0.005		

Selenium Se	mg/l	<0.05		
Sulphates as SO ₄	mg/l	28		
Copper Cu	mg/l	<0.05		
Chromium Cr	mg/l	<0.01		
Cyanide CN	mg/l	<0.05		
DDT	mg/l	BDL		
Detergents	mg/l	<1		
COD	mg/l		2.86	10
Dissolved oxygen	mg/l	6.1	6.8	2.5
BOD	mg/l	3	0.8	1.01
Lead Pb	mg/l	<0.1		
Iron as Fe	mg/l	<0.06		
Fluorides as F	mg/l	<0.1		
Total Coliform	MNP/100ml	2000		

(Ref: Appendix-1)

Test of ambient environment monitoring sites:





Table 13 : Showing GPS coordinates of the test sites

	Lat	Long	Jan to June 2018	July to December 2018
Dibrugarh				
Air	27°29'28.21"N	94°54'56.36"E	✓	
Noise	27°29'27.00"N	94°54'54.55"E	✓	
Water- ground	27°29'28.17"N	94°54'56.38"E	✓	
Water - Surface	27°29'27.00"N	94°54'54.55"E		✓
Palasbari				
Air	26° 7'38.73"N	91°32'35.54"E	✓	
Noise 1	26° 8'10.01"N	91°33'37.67"E	✓	
Noise 2	26° 7'54.22"N	91°33'2.16"E	✓	
Noise 3	26° 7'35.81"N	91°32'28.26"E	✓	
Noise 4	26° 7'6.58"N	91°31'33.10"E	✓	
Water -Ground	26° 7'26.91"N	91°32'25.36"E	✓	
Water -Surface	26° 7'10.48"N	91°31'35.90"E	✓	
Gumi				
Air	26° 5'53.75"N	91°20'42.02"E	✓	
Noise 1	26° 5'57.49"N	91°20'55.49"E	✓	
Noise 2	26° 6'0.52"N	91°21'36.16"E	✓	
Noise 3	26° 6'3.12"N	91°21'53.25"E	✓	
Water- ground	26° 5'31.92"N	91°20'57.38"E	✓	
Water - Surface	26° 6'0.52"N	91°21'36.16"E		✓

		Explanatory comments
Ambient Environment condition	Good	<ul style="list-style-type: none"> • Operation phase monitoring performed in the month of June, 2018 and November 2018. • Air qualities are within prescribed limits of CPCB. • Noise levels are within the levels of Residential area and commercial area. • As the surface water at the site contains grease and oils less than 5 ml/l, it indicates that the users following the environmental norms prescribed to reduce water pollution. • For those site where the tests are being conducted in operation phase, the results are within the prescribed limits of the Central Pollution Control Board, MoEF&CC, GOI. • Other monitoring Hydrology, sediment flow, drain congestion, fish diversity, cropping pattern were monitored on regular basis.

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	Limits	DTP Dyke & Mothola Oakland (15 th June, 2018)	Palasbari Apron, & Palasbari Embankment, (24 th June, 2018)	Gumi (22 nd June 2018)
PM 2.5	60	42	50	53
PM10	100	82	96	95
NO2	80	7	9	6
SO2	80	<5	<5	<5
CO	2	<1	<1	<1
Pb	1	<0.01	<0.01	<0.01

Noise

Parameter	Category of the Area / Zone		Dibrugarh DTP Dyke & Mothola Oakland 15 th June, 2018	Palasbari Embankment & Apron 24 th June, 2018				Gumi 22 nd June, 2018		
Location	Limit in dB(A) Leq		DTP Dyke	Ch 0.00 m	Ch 1500 m	Ch 3000 m	Ch 4500 m	Ch 3000 m	Ch 1200 m	Ch 50 m
Noise levels on dB (A) scale Day Time	Industrial Area	75	53.9	65.4	65.3	58.4	65.3	54.6	53.2	53.2
	Commercial area	65								
	Residential area	55								
	Silence Zone	50								
Noise levels on dB (A) scale Night Time	Industrial Area	70	44.1	46.8	44.6	44.8	53.8	44.4	43.8	43.2
	Commercial area	55								
	Residential area	45								
	Silence Zone	40								

Surface water quality

Parameter	Unit	Limits IS:2296 (Class C)	Palasbari Apron, Embankment 24 th June, 2018	Gumi 25.11.18	Dibrugarh 28.11.18
Colour	Hazen	300	8		
pH		6-9	7.35	7.1	6.87
Temperature	°C	-	22.9	25	
TDS	mg/l	1500	104	105	60
TSS	mg/l	100		45	0.015
Oil & Grease	mg/l	-	<5	BDL	0.034
Chloride as Cl	mg/l	600	9		
Phenols	mg/l	0.005	<0.005		
Selenium Se	mg/l	0.05	<0.05		
Sulphates as SO ₄	mg/l	400	28		
Copper Cu	mg/l	1.5	<0.05		
Chromium Cr	mg/l	0.05	<0.01		
Cyanide CN	mg/l	0.05	<0.05		
DDT	mg/l	-	BDL		
Detergents	mg/l	1	<1		
Dissolved oxygen	mg/l	4	6.1	6.8	2.5
BOD	mg/l	<3	3	0.8	1.01
COD	mg/l	30		2.86	10
Lead Pb	mg/l	0.1	<0.1		
Iron as Fe	mg/l	0.5	<0.06		
Fluorides as F	mg/l	1.5	<0.1		
Total Coliform	MNP/100ml	5000	2000		

Ground water quality

Parameter	Unit	Limits IS:2296 (Class C)	Dibrugarh DTP Dyke and Mothola Oakland 15 th June, 2018	Palasbari Apron, Embankment 24 th June, 2018	Gumi 22 nd June, 2018
Colour	Hazen	300	10	5	20
Odour		Un- objectionable	Un- objectionable	Un- objectionable	Un- objectionable
Turbidity	NTU	-	3	7	3
pH		6-9	6.47	6.6	7.64

Temperature	°C	-	22.1	22.1	18.2
TDS	mg/l	1500	75	97	130
Oil & Grease	mg/l	-	<5	<5	<5
Total Hardness as CaCO ₃	mg/l	-	26	32	47
Chloride as Cl	mg/l	600	9	9	11.4
Sulphates as SO ₄	mg/l	400	28	42	47
Phosphates	mg/l	-	-	-	-
BOD	mg/l	3	-	<2	-
Lead Pb	mg/l	0.1	<0.1	<0.1	<0.1
Arsenic as As	mg/l	0.2	<0.01	<0.01	<0.01
Iron as Fe	mg/l	0.5	<0.0001	<0.06	0.023
Total Coliform	MNP/100ml	5000	-	Absent	Absent
E.Coli	MNP/100ml	-	Absent	Absent	Absent

		Explanatory comments
Ambient Environment condition	Good	<ul style="list-style-type: none"> Noise level was within the prescribed limit for Residential areas under Dibrugarh and Gumi. Noise level in Palasbari area falls under commercial area. Ground Water quality of the river bank in Dibrugarh, Palasbari and Gumi area were found within the limit. Surface Water quality of the river bank in Palasbari was found within the limit, DO is slightly more. Air quality was within the prescribed standards in all the sites Operation phase monitoring of the ambient air, water and noise initiated. Tests carried out in the month of June, 2018.

5. Key Environmental Issues

5.1.1. Key Issues Identified

- SIO's started Operation phase monitoring of the completed works regular and quarterly reviewing the EMP stipulations.
- Documentation of environmental safeguards was satisfactory.
- SIO's were 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.
- 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 operation phase EMP, testing of selected environmental parameters, national environmental standards, acts and rules of MoEF&CC, GOI and Government of Assam.
- Plan developed for plantation against dead saplings.
- Check list prepared for the SIOs to check the drainage status, rehabilitation of the camp sites.
- Monitoring formats developed for keeping records
- Format developed for the monitoring of survival rate of the compensatory afforestation.
- Operation phase monitoring continued for :
 - Terrestrial and aquatic fauna status
 - Fish productivity
 - Cropping pattern
 - Soil erosion and siltation
 - Visual check on Drainage Congestion
 - River Hydrology, Morphology and Sediment Transport

5.1.3. Additional Action Required

- Constant monitoring and providing suggestions on the implementation of the operation phase EMP by FREMAA and PMC.
- Awareness on environmental safeguards –SIO and local residents / fringe communities
- Initiation of fish productivity study to compare the impact of the interventions on the fish production is required.

- Initiate study on Terrestrial and aquatic fauna status, Cropping pattern, Soil erosion and siltation.
- Plantation in the gaps against dead saplings. Protection of the planted saplings.

6. Conclusion

6.1. Overall Progress of implementation of Environmental Management Measures

		Explanatory comments
	Good	<ul style="list-style-type: none"> • SIO's become aware about the importance of the environmental safeguards during operation phase. • The SIO's started monitoring of operation phase EMPs like Terrestrial and aquatic fauna status, Cropping pattern, Soil erosion and siltation, Visual check on Drainage congestion, etc under FREMAA. • Operation phase monitoring of implementation of EMP during operation phase was initiated in all the Tranche 1 sites. Test of ambient environment done in the month of June 2018 and in November 2018. • Monitoring of the drainages throughout the year along the Tranche 1 sites done. • Test of ambient environment initiated as per EMP during operation phase. • Camp sites were restored as per SIO's satisfaction. • Borrow area were rehabilitated as per the plan. • Awareness carried out for safe use of oil by the boatman. • Discharge data recorded and maintained.

6.2. Problems Identified and Actions Recommended

Problems

- Awareness about the importance of environmental safeguards monitoring during operation phase, to be strengthened.
- Local people have less knowledge on the environmental issues, safeguards; so no grievances reported or registered so far.
- Awareness of the people on lodging complaints of environmental pollution if any was not adequate during construction and operation phase.

- Documentation and reporting on environment safeguard were still to be improved.
- Plantation was done by district administration and (District Rural Development Agency) DRDA in designated sites not under the jurisdiction of WRD. So maintenance and monitoring of the survival rates as per EMP was difficult for WRD.

Actions Recommended

- Regular awareness Training on Environmental Safeguards required for the SIOs for implementation of construction and operation phase EMP.
- Regular reporting to FREMAA on implementation of EMP during operation phase to be strengthened.
- Stringent monitoring to be initiated from SIOs office during construction phase to implement all the stipulations given in the Environment Clearance.
- In future projects following can be thought of :
 - 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
 - Afforestation sites to be monitored and maintained by Forest Department for next 5 years.
 - Exposure of the environment and safety officers to the best sites (on Implementation of EMP) of the nearby project within the state.

Ambient Monitoring Results Dibrugarh- Surface water Quality



EASTERN ENVO PROTECT

(RESEARCH AND DEVELOPMENT DIVISION)
AGRO-VET FARM CARE AND ENVIRONMENTAL PROTECTION LABORATORY
Progoti Commercial Complex (Opp. Down Town Hospital)
G.S. Road Guwahati-781022 Assam

TEST REPORT

WATER ANALYSIS REPORT

Sample Location:
Fool Bagan, Near S.P Office,
Dibrugarh
Sample Source: Surface
Water

DATE	29/11/2017
REF. NO	ENVOLAB/GHY/287/18-19
T.R No	TR/GHY/187
Date of Collection	28.11.2018
Sample Collected By	Client

SL.NO	PARAMETERS	METHOD USED	LIMITS (as per IS: 10500)	RESULTS
Physical				
1.	Total Suspended Solids(TSS)	IS 3025 (Part 17)	100 mg/L	0.015 mg/L
2.	Total Dissolved Solid(TDS)	IS 3025 (PART 16)	500 mg/L	60 mg/L
3.	pH	IS 3025 (Part 11)	8.5	6.87
4.	Oil & Grease	IS 3025 (PART 39)	0.1 mg/L	0.034 mg/L
Chemical				
5	COD	IS 3025 (PART 58)	30 mg/L	10 mg/L
6	Dissolved Oxygen(DO)	IS 3025 (PART 44)	5 mg/L	2.5 mg/L
7	Biological Oxygen Demand(BOD)	IS 3025 (PART 44)	3 mg/L	1.01 mg/L

Method of Analysis Followed: I.S. 3025

Opinion : All the parameters are under permissible limit.


ENVO LAB, R & D DIVISION, EASTERN ENVO PROTECT

Tested By

Checked & Approved by


Debashish Das
(Chemist)

Recognized by
Pollution Control Board, Assam


Dr. Mayur Mahanta
(Scientific Officer)

End of Report

Gumi- Surface water Quality

POLLUTION CONTROL BOARD, ASSAM
BAMUNIMADAM, GUWAHATI-781021

Analysis Report of B. Tech- 20/18

1. Source : Brahmaputra river at Gumi Chaygaon (down stream project site), FREMAA
2. Date of collection : 25.11.2018 at 10.30 AM
3. Date of Receipt : 27.11.2018
4. Collected by : Sri R. Bordoloi, ES & Sri K. Nath, ES

PHYSICAL PARAMETERS:

pH : 7.1
Temperature : 25 °C

CHEMICAL PARAMETERS: (mg/l)

DO : 6.80
BOD : 0.80
COD : 2.86
TDS : 105.0
TSS : 45.0
Oil & Grease : BDL

BDL: Below Detectable Limit



Addl. Chief Env. Scientist

