

Environmental Monitoring Report

For the period covering January–June 2019
Project Number: 38412-023
September 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 Environmental Management Plan
January 2019 to June 2019**

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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 :

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.

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.

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.

As stated in the EMP FREMAA and SIO are monitoring the Tranche - 1 project areas during the operation phase also. It is a third report of the operation phase of Tranche - 1.

Measures for monitoring are of air, water, noise, compensatory afforestation, crop cultivation, etc are under the preview of the environmental safeguard measures under the project.

All the measures were 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 were :

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%

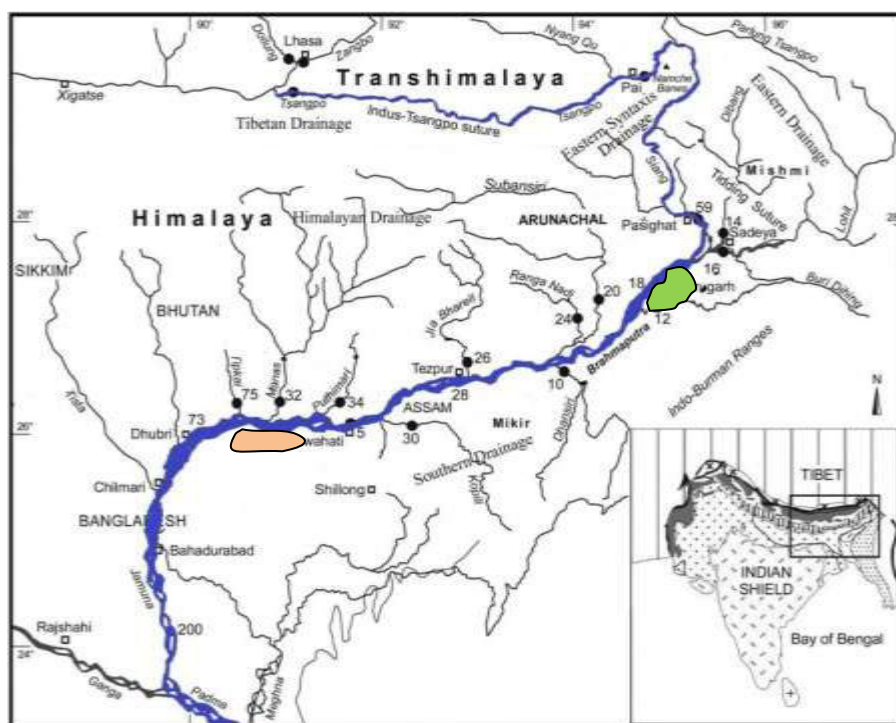
(All civil works completed before 31st July, 2017)

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 January to June, 2019.
- To ensure that EIA recommendations are adequately followed in EMP and EMoP to meet the Environmental Compliances of statutory requirements of MoEF&CC, GOI.

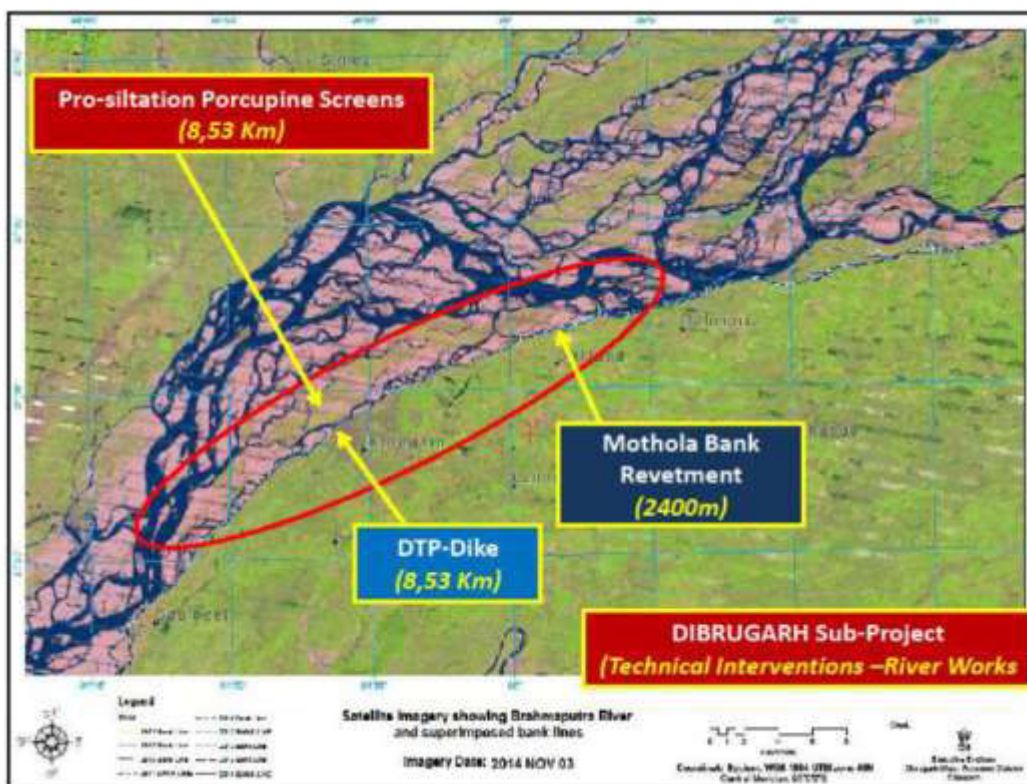


Dibrugarh sub project

 Palashbari Sub Project



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



The Bi Annual Report on the implementation of Environmental Management Plan ending June, 2019 delineates :-

- Environmental Monitoring of the project from January, 2019 to June, 2019 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 January, 2019 to June 2019.

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. 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.

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 - With in 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 for the period January 2019 to June 2019. 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. Monitoring site specific environment conditions

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 during January to June 2019.

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 (Dibrugarh on 16/06/19; Gumi on 2/6/19 and Palasbari on 3/5/19)
- **Noise**
 - Horns not used, unless essential
 - Checked Noise level by PCB approved lab (Dibrugarh on 6/5/19, Gumi on 2/5/19 and Palasbari on 6/5/19)
- **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 (Gumi on 2/5/19)
- **Ground water quality**
 - Checked ground water quality by PCB approved lab (Gumi on 2/6/19, Dibrugarh on 2/6/19)
- **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 30.06.2019)

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 were also assessed.

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, 2019 to June, 2019)




No.	Date	Locations	Meetings Results	Key outcome	
1	20.02.2019	Dibrugarh	Operation phase monitoring of EMP. Terrestrial and aquatic fauna status, and river morphology discussed for T1 works.	Monitoring of river morphology will be carried out in Tranche 1 site in the next phase by ISC.	
2	10.04.2019	Gumi	Operation phase monitoring of EMP. Fish productivity in the reach, monitoring of river morphology etc discussed.	Monitoring fish markets for fish availability and records of crop cultivation from SIO office.	
3	13.05.2019	Palasbari	Operation phase monitoring of EMP. Terrestrial and aquatic fauna status, River morphology discussed for T1 works.	Monitoring fish markets for fish availability from SIO office.	

Table 3. Field visit carried out by the experts of PMC, during January to June, 2019.

No.	Date	Place of visit	Meeting with	Results
1	10.04.2019	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	13.05.2019	Palasbari embankment and Palasbari Apron	WRD, Villagers, FREMAA	-aquatic migratory birds visited in the reach. -dolphin sighted -fishes found in the reach
3	20.02.2019 and in 04-05.06.2001 9	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, 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. (Test of ambient environment carried out in the month of May and June, 2019.)
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 May and June, 2019 in 3 reaches (Palasbari, Gumi and Dibrugarh).
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 January, 2019 to June, 2019. Compilation going on for the period of July, 2019 to December, 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 May and June, 2019, remaining surface water monitoring were carried out in July, 2019.
- **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.



- 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



Fishing activities in Gumi

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

(direct observation and during interview)

(no additional species recorded during January to June, 2019)

	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>Tenuialosa ilisha</i>	<i>Cirrhinus reba</i>
4	<i>Tenuialosa 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>

	Palasbari	Gumi	Dibrugarh
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

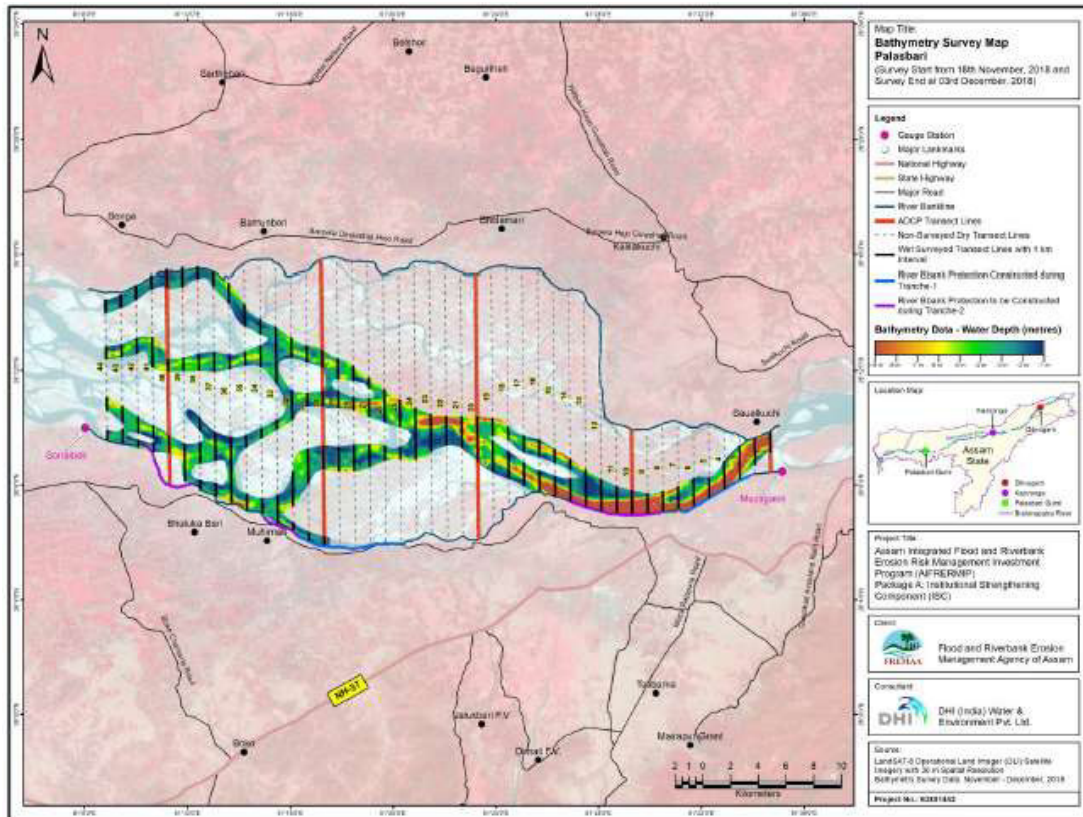
- **Crop Cultivation in the area :**

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

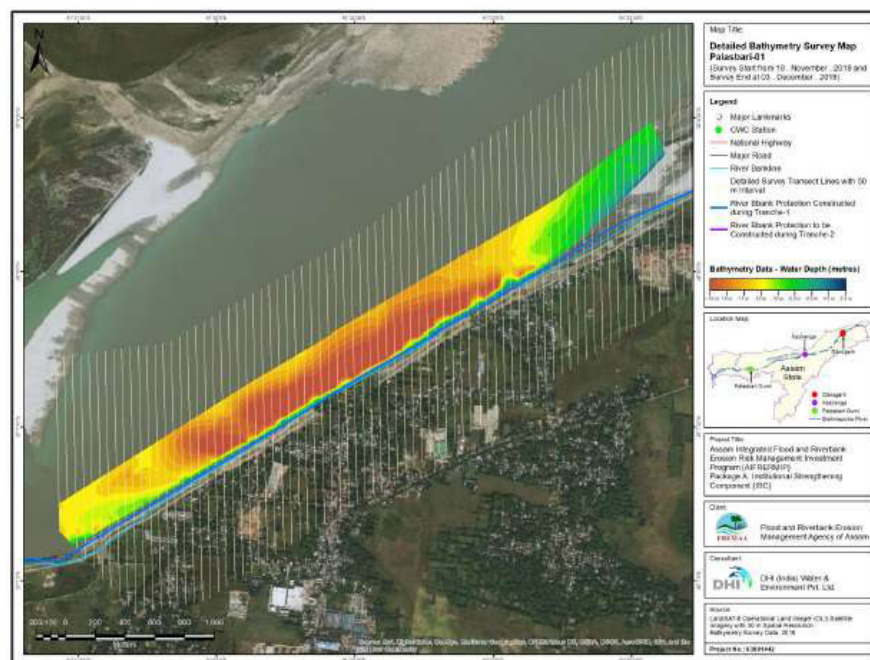
	Dibrugarh	Palasbari	Gumi
1	Rice	Rice	Brinjal
2	Mustard	Mustard	Cabbage
3		Sweet potato	Cauliflower
4		Tomato	German Turnip
5		Cabbage	Sweet potato
6		Potato	Tomato
7		Cauliflower	Rice
8			Potato
9			Brinjal
10			Pumpkin
11			Mustard

- **River Morphology**

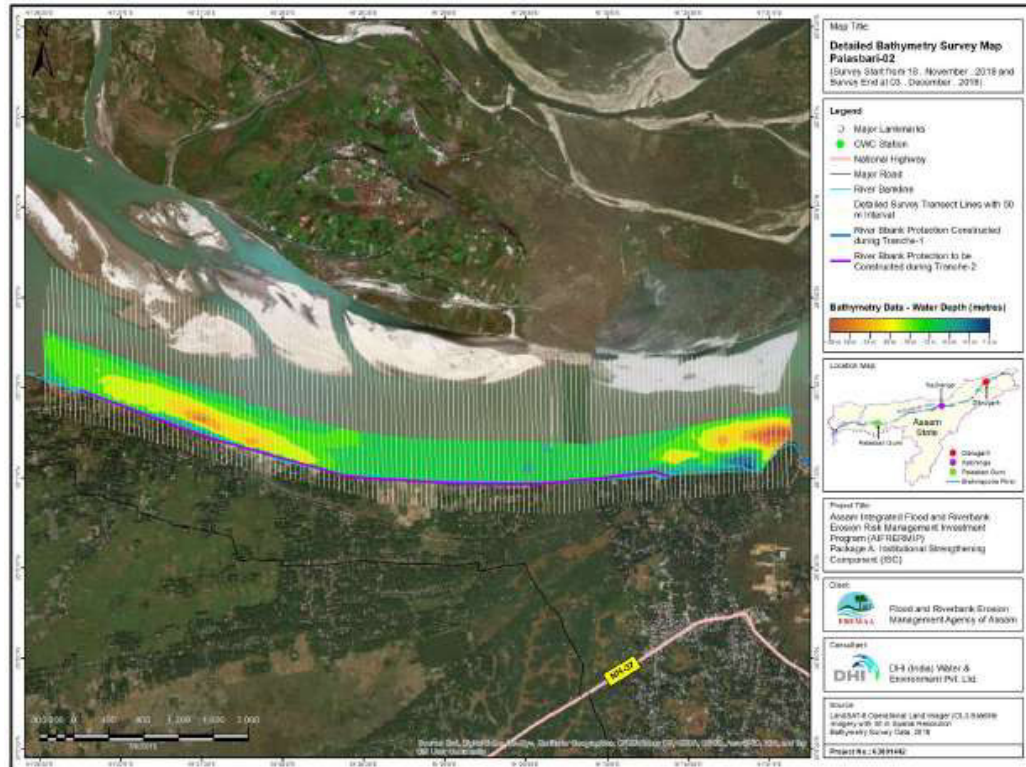
Bathymetric Survey was carried out by DHI under FREMAA in the month of November and December 2018 and the reports were available in the end of April, 2019 are presented here.

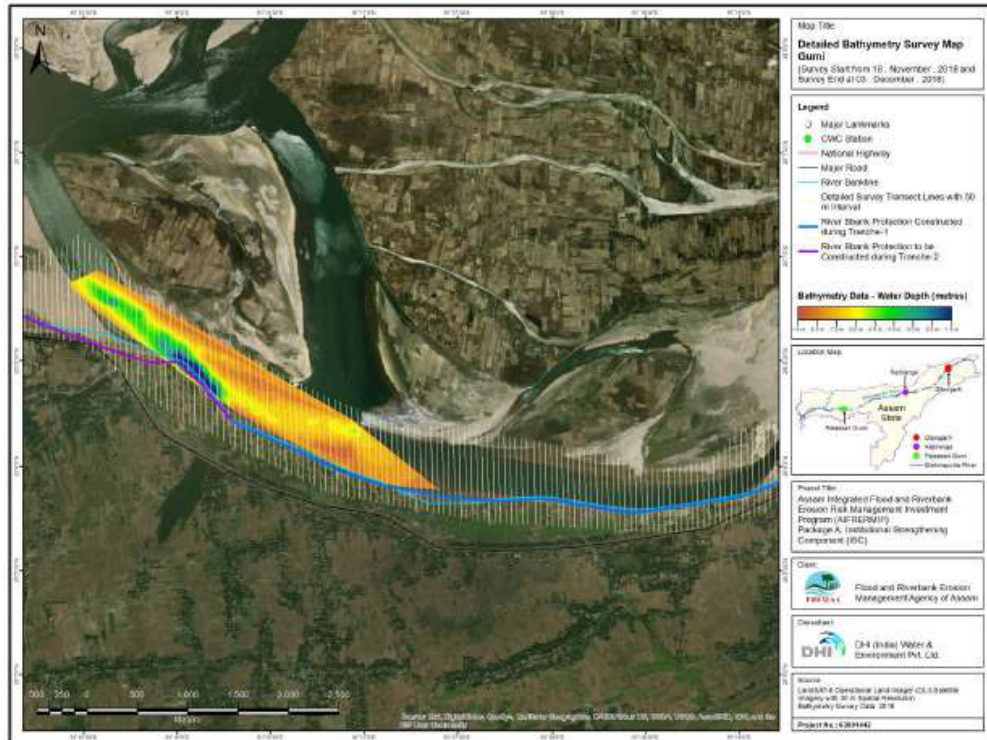


Detailed bathymetry of Palasbari and Gumi reach

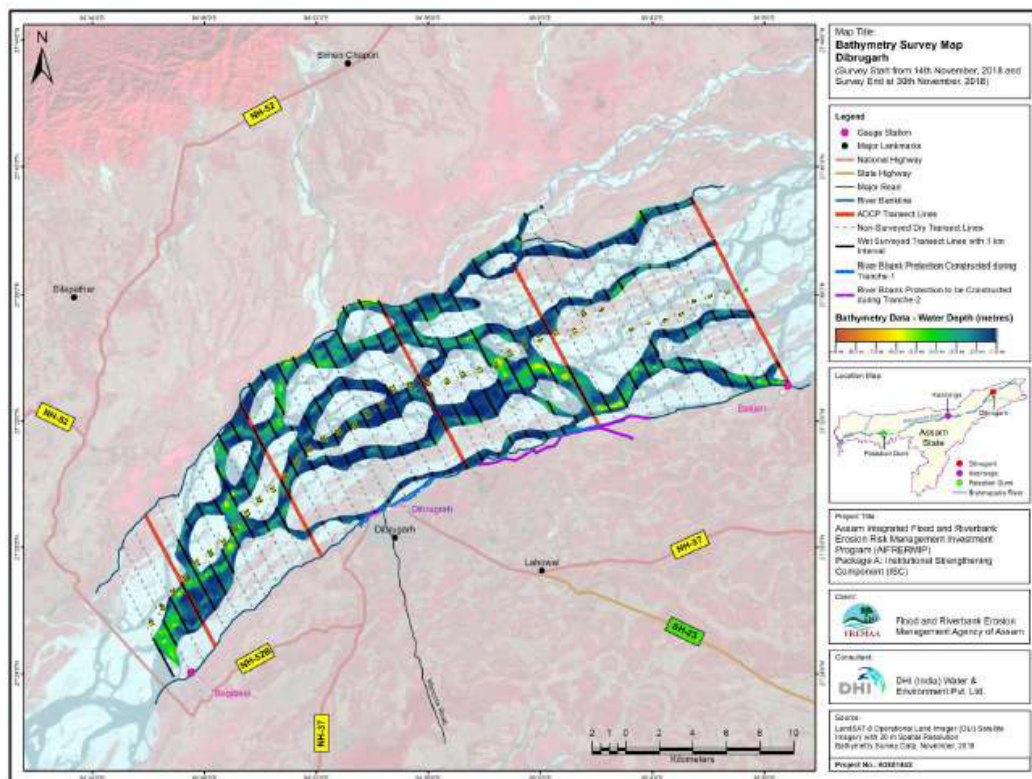


Palasbari Reach





Gumi Reach



Detailed bathymetry of Dibrugarh reach

- Discharge monitoring (Data of November, 2018 available, New data yet not received from CWC)

Discharge measures at Palasbari during Bathymetric survey:

Sl. No	File name	Line No.	Start Edge	Start Date	Start Time	Temp. (degC)	Track (m)	Width (m)	Area (m2)	Mean Speed (m/s)	Total Q (m3/s) GGA	Cumm. Q (m3/s)
1	20181118132857r	Pandu Bridge	Left Bank	11/18/2018	13:28	21.8	1,021.02	1,013.76	10,185.46	0.65	6,622.68	6,622.68
2	20181119114433r	1	Left Bank	11/19/2018	11:44	21.3	1,063.16	1,028.08	8,940.89	0.716	6,403.63	6,403.63
3	20181119160953r	10	Right Bank	11/19/2018	16:09	21.2	1,125.87	1,119.14	9,582.90	0.628	6,022.79	6,022.79
4	20181120103109r	20	Right Bank	11/20/2018	10:31	20.4	326.84	308.454	2,062.11	0.624	1,285.93	6,360.15
5	20181120130243r	20	Left Bank	11/20/2018	13:02	20.9	725.26	732.702	2,557.82	1.022	2,615.37	
6	20181120130954r	20	Left Bank	11/20/2018	13:09	21	627.02	646.56	2,600.08	0.946	2,458.85	6,530.94
7	20181120132100r	21	Left Bank	11/20/2018	13:21	21	1,385.31	1,384.96	7,157.40	0.912	6,530.94	
8	20181121091943r	30	Right Bank	11/21/2018	09:19	20.1	963.06	924.731	2,135.36	0.742	1,585.41	6,143.58
10	20181125135945r	30	Left Bank	11/25/2018	13:59	22.2	593.09	590.226	2,249.74	0.894	2,010.93	
11	20181126133007r	30	Left Bank	11/26/2018	13:30	21.8	74.21	92.95	360.953	0.237	85.668	
12	20181126133555r	30	Right Bank	11/26/2018	13:35	21.7	812.55	800.555	2,982.50	0.825	2,461.57	5,556.705
13	20181122132947r	40	Left Bank	11/22/2018	13:29	21.2	880.62	872.223	2,669.81	1.038	2,771.32	
14	20181128104444r	40	Right Bank	11/28/2018	10:44	20.9	484.1	449.935	2,030.55	1.186	2,408.60	5,480.43
15	20181128140047r	40	Right Bank	11/28/2018	14:00	22.1	299.5	303.688	580.405	0.649	376.788	
16	20181122153235r	44	Right Bank	11/22/2018	15:32	21	289.33	297.315	1,366.41	0.923	1,260.58	5,480.43
17	20181122160854r	44	Right Bank	11/22/2018	16:08	20.9	488.23	452.904	1,198.92	0.958	1,148.86	
19	20181128115905r	44	Left Bank	11/28/2018	11:59	21.5	633.64	609.173	2,921.78	0.915	2,673.67	
20	20181128131153r	44	Left Bank	11/28/2018	13:11	22.2	504.4	513.034	679.53	0.585	397.319	

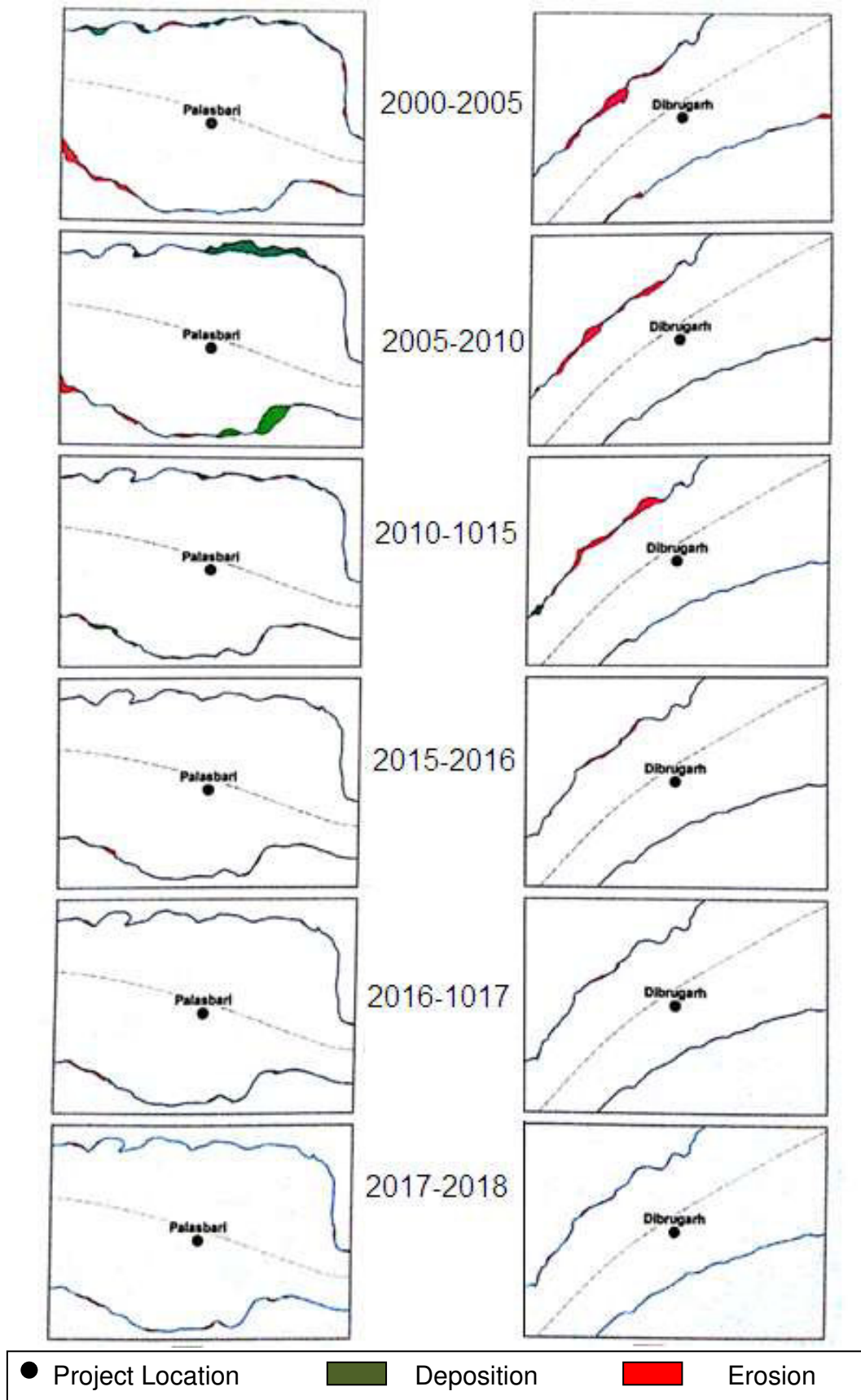
Discharge measures at Dibrugarh during Bathymetric survey:

File name	Start Edge	Line No	Start Date	Start Time	Temp. (degC)	Width (m)	Area (m2)	Boat Speed (m/s)	Mean Speed (m/s)	Total Q (m3/s)	Cum Q (m3/s)
20181116133033r	Left Bank	1	11/16/2018	13:30:33	18	61.669	352.969	1.021	1.252	441.866	2,143.18
20181116133551r	Left Bank	1	11/16/2018	13:35:51	17.9	213.157	945.698	0.938	1.345	1,272.31	
20181118092526r	Left Bank	1	11/18/2018	9:25:26	15.7	163.222	398.114	1.711	0.777	309.315	
20181120143838r	Left Bank	1	11/20/2018	14:38:39	17.9	81.398	485.894	0.396	0.246	119.685	
20181120144322r	Left Bank	1	11/20/2018	14:43:23	17.6	198.142	362.981	0.716	1.468	532.728	3,417.78
20181115143357r	Left Bank	10	11/15/2018	14:33:57	20.7	787.145	2,051.75	2.149	1.067	2,189.57	
20181118151548r	Left Bank	10	11/18/2018	15:15:49	18.4	181.717	316.84	1.051	0.993	314.62	
20181120094553r	Left Bank	10	11/20/2018	9:45:54	16.2	276.585	336	1.126	0.475	159.701	
20181121081818r	Right Bank	10	11/21/2018	8:18:18	15.8	153.954	252.507	1.044	0.876	221.166	2,510.57
20181121101442r	Left Bank	20	11/21/2018	10:14:42	18.4	260.385	581.086	0.909	0.874	391.379	
20181122090925r	Left Bank	20	11/22/2018	9:09:26	17.3	88.95	180.664	0.777	0.878	158.57	
20181122091652r	Right Bank	20	11/22/2018	9:16:51	16.9	301.569	923.801	0.958	1.197	1,105.42	
20181126092203r	Left Bank	20	11/26/2018	9:22:04	17.7	278.366	245.899	0.598	0.446	109.646	3,248.83
20181126124405r	Right Bank	20	11/26/2018	12:44:05	19.3	649.986	1,441.41	1.295	0.252	362.542	
20181127143838r	Left Bank	20	11/27/2018	14:38:38	20.5	433.19	534.17	1.471	0.717	383.009	
20181124095517r	Left Bank	30	11/24/2018	9:55:17	17.8	221.219	170.264	1.072	0.805	137.069	
20181124110023r	Left Bank	30	11/24/2018	11:00:24	18.9	1,052.23	2,301.35	1.991	0.979	2,252.61	3,490.56
20181125100905r	Right Bank	30	11/25/2018	10:09:05	19.1	811.484	1,002.99	2.266	0.857	859.148	
20181130093503r	Right Bank	39	11/30/2018	9:35:04	17.6	2,408.00	3,257.84	2.213	0.836	2,724.40	
20181130095008r	Right Bank	39	11/30/2018	9:50:09	18.2	655.843	1,353.48	1.431	0.566	766.165	

Suspended sediment concentrations :

Sample Id	Source	Total Suspended Solids
ETP-19/021 (1)	DIB/NOV/L10/CH1	260 mg/l
ETP-19/021(2)	DIB/ NOV/L1/CH1	290 mg/l
ETP-19/021(3)	DIB/ NOV/L1/CH3	356 mg/l
ETP-19/021(4)	DIB/ NOV/L10/C2	210 mg/l
ETP-19/021(5)	DIB/ NOV/L10/CH3	186 mg/l
ETP-19/021(6)	DIB/ NOV/L1/CH2	176 mg/l
ETP-19/021(7)	DIB/ NOV/L1/CH2A	158 mg/l
ETP-19/021(8)	DIB/ NOV/L10/CH4	108 mg/l
ETP-19/021(9)	DIB/ NOV/L20/CH1	164 mg/l
ETP-19/021(10)	DIB/ NOV/L20/CH2	200 mg/l
ETP-19/021 (11)	DIB/ NOV/L30/CH1	220 mg/l
ETP-19/021(12)	DIB/ NOV/L30/CH2	244 mg/l
ETP-19/021(13)	DIB/ NOV/L30/CH3	300 mg/l
ETP-19/021(14)	DIB/ NOV/L20/CH3	290 mg/l
ETP-19/021(15)	DIB/ NOV/L20/CH4	218 mg/l
ETP-19/021(16)	DIB/ NOV/L20/CH5	232 mg/l
ETP-19/021(17)	DIB/ NOV/L39/CH1	260 mg/l
ETP-19/021(18)	DIB/ NOV/L39/CH2	264 mg/l
ETP-19/021(19)	DIB/NOV/L39/CH3	162 mg/l
ETP-19/021(25)	PAL/L1/S1	274 mg/l
ETP-19/021(26)	PAL/L3/S2	320 mg/l
ETP-19/021(27)	PAL/L20/S3	260 mg/l
ETP-19/021(28)	PAL/L20-2/S4	264 mg/l
ETP-19/021(29)	PAL/L30/S5	334 mg/l
ETP-19/021(30)	PAL/L30/S6	140 mg/l
ETP-19/021(31)	PAL/L30-2/S7	154 mg/l
ETP-19/021(32)	PAL/L40/S8	200 mg/l
ETP-19/021(33)	PAL/L44/S9	160 mg/l

- 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. 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 (January to June 2019).
- Results of the ambient environmental tests carried out during May and June, 2019 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 January to June, 2019

	Palashbari– Embankment and Palashbari–Apron (Test done on 3/5/2019 & 6/5/2019)	Gumi (Test Done on 2/5/2019 and 2/6/2019)	Dibrugarh – DTP Dyke & Mothola Oakland (Test done on 6/5/2019, 2/6/2019 and 16/6/2019)
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 : 2/5/2019.	Within the permissible limit.
Ground water quality	Within the permissible limit.	Within the permissible limit. Test done on : 2/6/2019.	Within the permissible limit. Test done on : 2/6/2019.
Noise level	Within the permissible limit	Within the permissible limit	Within the permissible limit
Complain lodged by the local residents on Environmental pollution January to June, 2019	No complaints lodged	No complaints lodged	No complaints lodged

Operation Phase ambient test carried out in the month of May, 2019 and June, 2019.

		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 –5th May, 2019 & 6th May, 2019, Gumi – nd June , 2019; Dibrugarh – 5th May, 2019, 2nd June, 2019 and 16th June, 2019) Monthly environmental monitoring of the embankment, Drainage, fish diversity, Birds diversity, discharge, etc reviewed by SIO's.

4.2 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. Tests were carried out in November, 2018 again. For this period it was conducted in May and June 2019.

- **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.

4.2.1. 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

4.2.2. 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 January to June, 2019 tests were carried out in the month of May and June, 2019 in all the 3 reaches (Dibrugarh, Palasbari and Gumi). Remaining tests of surface water in Dibrugarh and tests of surface water and ground water in Palasbari will be carried out in the month of July, 2019.

Regular checking of the embankments was carried out by SIO. Following monitoring were also carried out during January to June, 2019.

- 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 after flood water recedes.
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

Location	Environmental Component	Parameter	Frequency	Remark
Gumi; and Palasbari		SO ₂ , NO _x , CO, Pb	construction and once after six months of completion of project	May and June, 2019.
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 Gumi in May, 2019
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 Dibrugarh and Gumi in June, 2019.
Dibrugarh and Gumi; and Palasbari	Noise			Test carried out in May and June, 2019.
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 (16 th June, 2019)	Palasbari Apron, & Palasbari Embankment, (3 rd May, 2019)	Gumi (2 nd June 2019)
PM 2.5	42	38	55
PM10	83	78	90
NO2	7	7	6
SO2	8	<5	6
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 6 th June, 2019	Palasbari Embankment & Apron 6 th May, 2019	Gumi 2 nd May, 2019		
Location	DTP Dyke	Ch 1500 m	Old camp area	Ch 1200 m	Ch 50 m
Noise levels on dB (A) scale Day Time	54.9	54.8	54.5	53.5	55.2
Noise levels on dB (A) scale Night Time	45.6	42.8	45.4	43.8	43.5

Table-11. Quality of Ground Water at the site

Parameter	Unit	Dibrugarh DTP Dyke and Mothola Oakland 2 nd June, 2019	Palasbari Apron, Embankment 24 th June, 2018 (Sample collect in July, 2019)	Gumi 2 nd June, 2019
Colour	Hazen	20	5	20
Odour		Un- objectionable	Un- objectionable	Un- objectionable
Turbidity	NTU	2	7	3
pH		6.01	6.6	7.4
Temperature	°C	22.6	22.1	18.6
TDS	mg/l	355	97	136
Oil & Grease	mg/l	<5	<5	<5
Total Hardness as CaCO ₃	mg/l	44	32	45
Chloride as Cl	mg/l	30	9	12.7
Sulphates as SO ₄	mg/l	61	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	<0.0014	<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 (Sample collect in July, 2019)	Gumi 2 nd May, 2019	Dibrugarh 28 th Nov, 2018 (Sample collect in July, 2019)
Colour	Hazen	8	20	
pH		7.35	8.35	6.87
Temperature	°C	22.9	17.6	
TDS	mg/l	104	100	60
TSS	mg/l		45	0.015
Oil & Grease	mg/l	<5	<5	0.034
Chloride as Cl	mg/l	9	14	
Phenols	mg/l	<0.005	<0.005	
Selenium Se	mg/l	<0.05	<0.05	
Sulphates as SO ₄	mg/l	28	72	
Copper Cu	mg/l	<0.05	<0.05	
Chromium Cr	mg/l	<0.01	<0.01	
Cyanide CN	mg/l	<0.05	<0.05	
DDT	mg/l	BDL	BDL	
Detergents	mg/l	<1	<1	
COD	mg/l		2.86	10
Dissolved oxygen	mg/l	6.1	7.3	2.5
BOD	mg/l	3	0.8	1.01
Lead Pb	mg/l	<0.1	<0.1	
Iron as Fe	mg/l	<0.06	0.02	
Fluorides as F	mg/l	<0.1	<0.1	
Total Coliform	MNP/100ml	2000	Absent	

(Ref: Appendix-1)

Test of ambient environment monitoring sites:

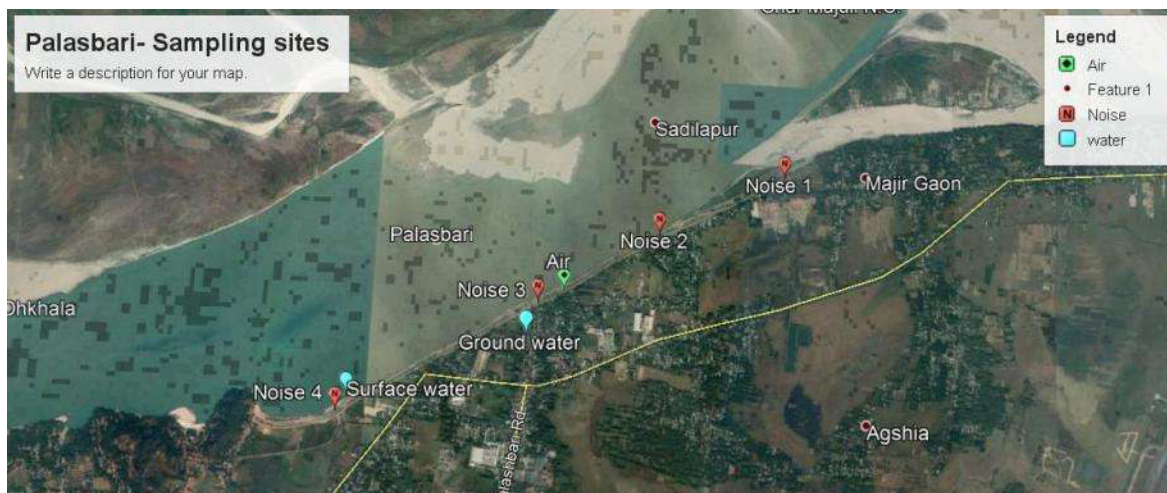


Table 13 : Showing GPS coordinates of the test sites

	Lat	Long	Jan to June 2019
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	✓
Palasbari			
Air	26° 7'38.73"N	91°32'35.54"E	✓
Noise 2	26° 7'54.22"N	91°33'2.16"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 May, 2019 and June, 2019. • 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 mg/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.

4.2.3 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 (16 th June, 2019)	Palasbari Apron, & Palasbari Embankment, (3 rd May, 2019)	Gumi (2 nd June 2019)
PM 2.5	60	42	38	55
PM10	100	83	78	90
NO2	80	7	7	6
SO2	80	8	<5	6
CO	2	<1	<1	<1
Pb	1	<0.01	<0.01	<0.01
		Clear	Clear	Clear

Noise

Parameter	Category of the Area / Zone		DTP Dyke & Mothola Oakland 6 th June, 2019	Palasbari Embankment & Apron 6 th May, 2019	Gumi 2 nd May, 2019		
Location	Limit in dB(A) Leq		DTP Dyke	Ch 1500 m	Old camp area	Ch 1200 m	Ch 50 m
Noise levels on dB (A) scale Day Time	Industrial Area	75	54.9	54.8	54.5	53.5	55.2
	Commercial area	65					
	Residential area	55					
	Silence Zone	50					
Noise levels on dB (A) scale Night Time	Industrial Area	70	45.6	42.8	45.4	43.8	43.5
	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 2 nd May, 2019	Dibrugarh 28.11.18
Colour	Hazen	300	8	20	
pH		6-9	7.35	8.35	6.87
Temperature	°C	-	22.9	17.6	
TDS	mg/l	1500	104	100	60
TSS	mg/l	100		45	0.015
Oil & Grease	mg/l	-	<5	<5	0.034
Chloride as Cl	mg/l	600	9	14	
Phenols	mg/l	0.005	<0.005	<0.005	
Selenium Se	mg/l	0.05	<0.05	<0.05	
Sulphates as SO ₄	mg/l	400	28	72	
Copper Cu	mg/l	1.5	<0.05	<0.05	
Chromium Cr	mg/l	0.05	<0.01	<0.01	
Cyanide CN	mg/l	0.05	<0.05	<0.05	
DDT	mg/l	-	BDL	BDL	
Detergents	mg/l	1	<1	<1	
Dissolved oxygen	mg/l	4	6.1	2.86	2.5
BOD	mg/l	<3	3	7.3	1.01
COD	mg/l	30		0.8	10
Lead Pb	mg/l	0.1	<0.1	<0.1	
Iron as Fe	mg/l	0.5	<0.06	0.02	
Fluorides as F	mg/l	1.5	<0.1	<0.1	
Total Coliform	MNP/100ml	5000	2000	Absent	

Ground water quality

Parameter	Unit	Limits IS:2296 (Class C)	Dibrugarh DTP Dyke and Mothola Oakland 2 nd June, 2019	Palasbari Apron, Embankment 24 th June, 2018	Gumi 2 nd June, 2019
Colour	Hazen	300	20	5	20
Odour		Un- objectionable	Un- objectionable	Un- objectionable	Un- objectionable
Turbidity	NTU	-	2	7	3
pH		6-9	6.01	6.6	7.4

Parameter	Unit	Limits IS:2296 (Class C)	Dibrugarh DTP Dyke and Mothola Oakland 2 nd June, 2019	Palasbari Apron, Embankment 24 th June, 2018	Gumi 2 nd June, 2019
Temperature	°C	-	22.6	22.1	18.6
TDS	mg/l	1500	355	97	136
Oil & Grease	mg/l	-	<5	<5	<5
Total Hardness as CaCO ₃	mg/l	-	44	32	45
Chloride as Cl	mg/l	600	30	9	12.7
Sulphates as SO ₄	mg/l	400	61	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	<0.0014	<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 Palasbari and Gumi. 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 May and June, 2019.

4. Key Environmental Issues

5.1.1. Key Issues Identified

- 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.
- SIO's started Operation phase monitoring of the completed works regular and quarterly reviewing the EMP stipulations.
- Documentation of environmental safeguards was satisfactory.
- Checking the PUC of the vehicles plying on the embankment were not possible as implementing agency (DTO) is different.
- Monitoring by SIO's has 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 after flood.
- 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
 - River Hydrology, Morphology and Sediment Transport
 - Visual check on Drainage Congestion
 - Fish productivity
 - Cropping pattern
 - Soil erosion and siltation

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
- Initiate study on Terrestrial and aquatic fauna status, Cropping pattern, Soil erosion and siltation.

- Complete the fish productivity study to compare the impact of the interventions on the fish production after flood.
- Plantation in the gaps against dead saplings. Protection of the planted saplings.

5. 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 May and June 2019. • 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.
 - In future projects following can be thought of :
 - Afforestation sites to be monitored and maintained by Forest Department for next 5 years.
 - Exposure of the environment and safety officers (SIO office) to the best sites (on Implementation of EMP) of the nearby project within the state.

Ambient Monitoring Results Dibrugarh- Air Quality



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TEST REPORT

URL Number: TC599118000000368P			
Test Report No. :	GEEC/FL/22/2019/12/22	Date of Reporting:	27/06/2019
Customer Name & Address:	M/S FREMAA G.S. Road, Guwahati	Lab. ID No.:	GEEC/AA/2019/12/22
Project Name:	Bank Protection works Tranche 1, Dibrugarh Reach	Date of Sampling:	16/06/2019
Sampling Location:	DTP Dyke N:27°29'28" E:94°54'56"	Ambient Temperature:	Max. Min. 25.0°C 12.5°C
Wind Direction/ Weather Condition:	Calm and Clear	Date of Sample Receipt:	17/06/2019
Sampling Condition:	In GF/A, PTFE Filter Paper & Plastic Bottle	Test Start Date:	17/06/2019
Monitored By:	Mr. Rohan Singh	Test End Date:	27/06/2019
Equipments Details:	RDS Sampler & ADS PM Sampler		

AMBIENT AIR QUALITY

Sampling and Analysis carried out as per GEEC/SOP/01

Sl. No.	Parameters	Unit	Results	Limits	Test Method
1	Particulate Matter (PM ₁₀)	µg/m ³	83	100	IS 5182(23)
2	Particulate Matter (PM _{2.5})	µg/m ³	42	60	CPCB Guidelines
3	Sulphur Dioxide (SO ₂)	µg/m ³	8	80	IS 5182(2)
4	Nitrogen Dioxide (NO ₂)	µg/m ³	7	80	IS 5182(VI)
5*	Carbon Monoxide (CO)	mg/m ³	< 1	2	IS 5182(22)
6*	Lead (Pb)	µg/m ³	< 0.01	1	IS 5182(22)

***** End of Report *****

Authorised by: Lab -in-Charge

(Dr. Belinda Lahon)

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Dibrugarh – Noise Quality



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TC-5991

GEEC/FM/47/B

TEST REPORT					
URL NO.: TC599118000000369F					
Ref. No.:	GEEC/FL/32/2019/12/19		Date:	16/05/2019	
Name of the Industry	M/S FREEMAA		Lab Id	GEEC-SLM/2019/12/19	
Address	Guwahati, ASSAM, India,				
Name of the Works:	DTP Dyke area, Dist- Dibrugarh, Assam				
Noise Level Report					
Monitoring Location	DTP Dyke		Date of Monitoring	06/05/2019	
Weather /Wind	Calm		Sound Level Meter Model	SL4023 SD	
Monitored by:	Mr.Rohan Singh		Sl.No.	629510	
Calibration certificate No:	ECL/GTE/2018-19/MECH/427		Calibration valid upto: 16/05/2019		
Measurement Results					
Sl.No.	Location	Time Duration	Sound Parameters (dBA)		
			Leq	Lmin	Lmax
1	DTP Dyke N:27°29'28" E:94°54'56"	Day Time	54.9	38.3	67.4
		Night time	45.6	37.6	58.9
Gazette of India, vide S.O. 123(E), dated 14.2.2000 and subsequently amended vide S.O. 1046(E), dated 22.11.2000, S.O. 1088(E), dated 11.10.2002, S.O. 1569 (E), dated 19.09.2006 and S.O. 50 (E) dated 11.01.2010 under the Environment (Protection) Act, 1986.)		Categories of Area/Zone		Limit in dB (A) Leq	
				Day Time	Night Time
		Industrial Area		75	70
		Commercial Area		65	55
		Residential Area		55	45
		Silence Zone	50	40	
Remark:		Noise level recorded are complied with the CPCB Limit			
Authorised by: Lab -in-Charge (Dr. Belinda Lahon)					

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Dibrugarh – Ground water quality



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TEST REPORT

URL Number: TC599118000000368P					
Ref. No.:		GEEC/FL/23/18/12/22		Date of Reporting: 07/06/2019	
Customer Name & Address:		M/S FREEMAA, Assam			
Project Name :		DTP Dyke area, Dist- Dibrugarh, Assam			
Lab. ID No.:		GEEC/W/18/12/22		Date of Sampling: 02/06/2019	
Sampling Location:		DTP Dyke N-27°29'28" E-94°54'56"		Sample Receipt Date: 06/06/2019	
Sample Description:		Ground Water		Test Start Date: 03/06/2019	
Sample Drawn By:		Mr. Rohan Singh		Test Completion Date: 06/06/2019	
Sample Condition:		Sealed		Sampling Method : GEEC/SOP/2	

Sl. No.	PARAMETERS	METHODS	UNITS	RESULTS	LIMIT IS: 2296 (Class C)
1	Colour	IS:3025 Part 4	Hazen	20	300
2 nd	Odour	IS:3025 Part 5	-	Un-objectionable	Un-objectionable
3	Turbidity	APHA 22 nd EDITION, 2012	NTU	2	-
4	pH	APHA 22 nd EDITION, 2012	-	6.01	6.0 - 9.0
5 th	Temperature	APHA 22 nd EDITION, 2012	°C	22.6	-
6	Total Dissolved Solids	APHA 22 nd EDITION, 2012	mg/l	355	1500
7	Oil & Grease	APHA 22 nd EDITION, 2012	mg/l	<5	-
8 th	Total Hardness as CaCO ₃	APHA 22 nd EDITION, 2012	mg/l	44	-
9	Chlorides as (Cl)	APHA 22 nd EDITION, 2012	mg/l	30	600
10	Sulphates as (SO ₄)	APHA 22 nd EDITION, 2012	mg/l	61	400
11 th	Phosphates	APHA 22 nd EDITION, 2012	mg/l	-	-
12	BOD	IS:3025 (44)	mg/l	-	3.0
13	Lead as Pb	APHA 22 nd EDITION, 2012	mg/l	< 0.1	0.1
14	Arsenic as (As)	APHA 22 nd EDITION, 2012	mg/l	< 0.01	0.2
15	Iron (Fe)	APHA 22 nd EDITION, 2012	mg/l	0.0014	0.5
16 th	Total coliform	APHA 22 nd EDITION, 2012	MPN/100ml	-	5000
17 th	E. Coli	APHA 22 nd EDITION, 2012	MPN/100ml	Absent	-

***** End of Report *****

Authorised by: Laboratory in-charge
(Dr. B. Lahori)

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Gumi- Air Quality



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TC-0001

TEST REPORT

URL Number: TC599119000000009P			
Test Report No.:	GEEC/FL/22/2019/01/21	Date of Reporting:	07/06/2019
Customer Name & Address	M/S FREEMA	Lab ID No.	GEEC/AA/2019/01/21
Project Name:	Bank protection works Gumi Kamrup	Date of Sampling	02/06/2019
Sampling Location:	Gumi 3000m	Ambient Temperature:	Max
Wind Direction/ Weather Condition:	Calm and Clear		Min.
			20.2°C
			12.7°C
Sampling Condition:	In GF/A PTFE Filter Paper & Plastic Bottle	Date of Sample Receipt	02/06/2019
Monitored By:	Mr. Dilip Deka	Test Start Date:	02/06/2019
Equipments Details:	RDS Sampler & ADS PM Sampler	Test End Date:	07/06/2019

AMBIENT AIR QUALITY

Sampling and Analysis carried out as per GEEC/SOP/01

Sl. No.	Parameters	Unit	Results	Limits	Test Method
1	Particulate Matter (PM ₁₀)	µg/m ³	90	100	IS 5182(23)
2	Particulate Matter (PM _{2.5})	µg/m ³	55	60	CPCB Guidelines
3	Sulphur Dioxide (SO ₂)	µg/m ³	6	80	IS 5182(2)
4	Nitrogen Dioxide (NO ₂)	µg/m ³	6	80	IS 5182(VI)
5*	Carbon Monoxide (CO)	mg/m ³	<1	2	IS 5182(22)
6*	Lead (Pb)	µg/m ³	<0.01	1	IS 5182(22)

***** End of Report*****

Authorised by: Lab-in-Charge

Belinda Lahon
(Dr. Belinda Lahon)

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Gumi- Noise Quality



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GEEC/FM-44-B

TEST REPORT					
URL NO: TC599115000000002F					
Ref No	GEEC/FL/32/2019/01/21			Date:	07/05/2019
Name of the Industry	FREEMA			Lab Id	GEEC-SLM/2019/01/21
Address	G S Road, Guwahati, Assam				
Name of the Works:	Bank protection works Gumi, Kamrup				
Noise Level Report					
Monitoring Location	Project Site T 1	Date of Monitoring	02/05/2019		
Weather (Wind)	Calm	Sound Level Meter Model	SL4023 SD		
Monitored by	Mr Dilip Deka	Sl No.	629510		
Calibration certificate No.	ECL/GTE/2018-19/MET/427	Calibration valid upto: 16/05/2019			
Measurement Results					
Sl.No.	Location	Time Duration	Sound Parameters (dBA)		
			Leq	Lmin	Lmax
1	Old Camp Area	Day Time	54.5	37.4	64.2
		Night time	45.4	37.2	58.2
2	Ch:1200 M	Day Time	53.5	37.3	69.2
		Night time	43.8	37.2	58.9
3	Ch:50 M	Day Time	55.2	38.4	68.3
		Night time	43.5	38.4	55.9
Gazette of India, vide S.O. 123(E), dated 14.2.2000 and subsequently amended vide S.O. 1046(E), dated 22.11.2000, S.O. 1068(E), dated 11.10.2002, S.O. 1569 (E), dated 19.09.2006 and S.O. 50 (E) dated 11.01.2010 under the Environment (Protection) Act, 1986)		Categories of Area/Zone	Limit in dB (A) Leq		
			Day Time	Night Time	
		Industrial Area	75	70	
		Commercial Area	65	55	
		Residential Area	55	45	
		Silence Zone	50	40	
Remark:		Noise level recorded are complied with the CPCB Limit			
Authorized by: Lab. in-Charge (Dr. Belinda Lahon)					

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Gumi- Surface water Quality



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TEST REPORT

L/R Number: T C59911900000014P					
Ref. No.		GEEC/F/23-19-01/12		Date of Reporting	
Customer Name & Address:		FREEMA			
Project Name		G S Road, Guwahati, Assam			
Lab ID No		GEEC/W/19-01/12		Date of Sampling	
Sampling Location		Brahmaputra T-1 site		Sample Receipt Date	
Sample Description		Surface Water		Test Start Date	
Sample Drawn By		Mr Dip Deka		Test Completion Date	
Sample Condition		Sealed		Sampling Method	
				GEEC-SOP-2	

Sl. No.	PARAMETERS	METHODS	UNITS	RESULTS	LIMIT IS:2296 (Class C)
1	pH	APHA 22nd EDITION, 2012	-	8.35	6.0 - 9.0
2	BOD (3 days, 27°C)	IS:3025 (14)	mg/l	<1	3
3 ^o	Temperature	-	°C	17.6	-
4	Dissolved Oxygen	APHA 22nd EDITION, 2012	mg/l	7.3	4
5	Colour	APHA 22nd EDITION, 2012	Hazen	20	300
6	Fluorides as (F)	APHA 22nd EDITION, 2012	mg/l	<0.1	1.5
7	Chlorides (Cl)	APHA 22nd EDITION, 2012	mg/l	14	600
8	Total Dissolved Solids	APHA 22nd EDITION, 2012	mg/l	100	1500
9	Sulphates as (SO ₄)	APHA 22nd EDITION, 2012	mg/l	72	400
10	Iron (Fe)	APHA 22nd EDITION, 2012	mg/l	0.02	0.5
11	Cu & Gross	APHA 22nd EDITION, 2012	mg/l	<5	-
12	Chromium (Cr ⁶⁺)	APHA 22nd EDITION, 2012	mg/l	<0.01	0.05
13	Lead (Pb)	APHA 22nd EDITION, 2012	mg/l	<0.1	0.1
14	Copper (Cu)	APHA 22nd EDITION, 2012	mg/l	<0.05	0.5
15 ^o	Cyanide (CN)	APHA 22nd EDITION, 2012	mg/l	<0.05	0.05
16 ^o	Selenium (Se)	APHA 22nd EDITION, 2012	mg/l	<0.05	0.05
17	Phosphorus	APHA 22nd EDITION, 2012	mg/l	<0.005	0.005
18 ^o	Detergents	APHA 22nd EDITION, 2012	mg/l	<1	1
19 ^o	DDT	APHA 22nd EDITION, 2012	mg/l	BDL	-
20 ^o	Total Coliform	High Media Kit	Present/Absent	Nil/Nil	Absent

***** End of Report *****

Authorized by: Laboratory In-charge
Blahan
 (Dr. B. Lahon)

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Gumi- Ground water Quality



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TEST REPORT

Lab. Number: TC 59911900000019P					
Ref. No.		GEEC/FL/25/1901/61		Date of Reporting	
Customer Name & Address		FREEMA G S Road, Guwahati, Assam			
Project Name		Bank protection works Gumi			
Lab. ID No.		GEEC/W/1901/61		Date of Sampling	
Sampling Location		Ground Water (Tube Well)		Sample Receipt Date	
Sample Description		Ground Water		Test Start Date	
Sample Drawn By		Mr Dip Deka		Test Completion Date	
Sample Condition		Sealed		Sampling Method	
				GEEC 36/4 Z	
Sl. No.	PARAMETERS	METHODS	UNITS	RESULTS	LIMIT IS:2296 (Class C1)
1	Colour	IS 3025 Part 4	Hazen	20	300
2	Odour	IS 3025 Part 4	-	Un-objectionable	Un-objectionable
3	Turbidity	APHA 22 nd EDITION 2012	NTU	3	-
4	pH	APHA 22 nd EDITION 2012	-	7.4	6.0 - 9.0
5	Temperature	APHA 22 nd EDITION 2012	°C	18.6	-
6	Total Dissolved Solids	APHA 22 nd EDITION 2012	mg/l	136	1500
7	Oil & Grease	APHA 22 nd EDITION 2012	mg/l	<0	-
8	Total Hardness as CaCO ₃	APHA 22 nd EDITION 2012	mg/l	45	-
9	Chlorides as (Cl)	APHA 22 nd EDITION 2012	mg/l	12.7	600
10	Sulphates as (SO ₄)	APHA 22 nd EDITION 2012	mg/l	47	400
11	Phosphates	APHA 22 nd EDITION 2012	mg/l	-	-
12	BOD	IS 3025 (44)	mg/l	-	3.0
13	Lead as Pb	APHA 22 nd EDITION 2012	mg/l	<0.1	0.1
14	Arsenic as (As)	APHA 22 nd EDITION 2012	mg/l	<0.01	0.2
15	Iron (Fe)	APHA 22 nd EDITION 2012	mg/l	0.023	0.5
16	Total Coliform	High Media Kit	Present/ Absent	Absent	Absent
17	E. Coli	High Media Kit	Present/ Absent	Absent	Absent
***** End of Report *****					
				Authorised by: Laboratory In-charge Dr. B. Laloni	

- The results relate only to the item tested
- The properties stated are within the scope of ISIRI
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Palasbari- Air Quality



GREEN TECH ENVIRONMENTAL ENGINEER & CONSULTANTS

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TEST REPORT

URL Number: TC599118000000363P			
Test Report No. :	GEEC/FL/22/2019/12/20	Date of Reporting:	19/05/2019
Customer Name & Address:	M/S FREEMAA	Lab. ID No.:	GEEC/AA/2019/12/20
Project Name:	Bank protection works, Palasbari, Tranche-1	Date of Sampling:	03/05/2019
Sampling Location:	Palasbari, Tranche-1	Ambient Temperature:	Max.
Wind Direction/ Weather Condition:	Calm and Clear		Min.
			25.0°C
Sampling Condition:	In GF/A, PTFE Filter Paper & Plastic Bottle	Date of Sample Receipt:	03/05/2019
Monitored By:	Mr. Rohan Singh	Test Start Date:	05/05/2019
Equipments Details:	RDS Sampler & ADS PM Sampler	Test End Date:	15/05/2019

AMBIENT AIR QUALITY

Sampling and Analysis carried out as per GEEC/SOP/01

Sl. No.	Parameters	Unit	Results	Limits	Test Method
1	Particulate Matter (PM ₁₀)	µg/m ³	78	100	IS 5182(23)
2	Particulate Matter (PM _{2.5})	µg/m ³	38	60	CPCB Guidelines
3	Sulphur Dioxide (SO ₂)	µg/m ³	< 5	80	IS 5182(2)
4	Nitrogen Dioxide (NO ₂)	µg/m ³	7	80	IS 5182(VI)
5 [#]	Carbon Monoxide (CO)	mg/m ³	<1	2	IS 5182(22)
6 [#]	Lead (Pb)	µg/m ³	<0.01	1	IS 5182(22)

***** End of Report*****

Authorised by: Lab -in-Charge

Belinda Lahon
(Dr. Belinda Lahon)

The parameters tested on the specific date are found to be within the NATIONAL AMBIENT AIR QUALITY STANDARDS, CPCB NOTIFICATION DATED 18TH NOVEMBER, 2009.

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Palasbari – Noise Quality



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TC-5991

GEEC/FM/45/B

TEST REPORT

URL NO.: TC599118000000366F					
Ref. No.:	GEEC/FL/32/2019/12/13		Date:	16/05/2019	
Name of the Contractor	M/S FREEMAA		Lab Id	GEEC-SLM/2019/12/13	
Address					
Name of the Works:	Bank Protection works at Palasbari, Tranche -1				
Noise Level Report					
Monitoring Location	Palasbari	Date of Monitoring	06/05/2019		
Weather /Wind	Calm	Sound Level Meter Model	SL4023 SD		
Monitored by:	Mr.Rohan Singh	Sl.No.	629510		
Calibration certificate No:	ECL/GTEE/2018-19/MECH/427	Calibration valid upto: 16/05/2019			
Measurement Results					
Sl.No.	Location	Time Duration	Sound Parameters (dBA)		
			Leq	Lmin	Lmax
1	Palasbari Ch 1500	Day Time	54.8	38.4	68.4
		Night time	42.8	37.2	54.9
Gazette of India, vide S.O. 123(E), dated 14.2.2000 and subsequently amended vide S.O. 1046(E), dated 22.11.2000, S.O. 1088(E), dated 11.10.2002, S.O. 1569 (E), dated 19.09.2006 and S.O. 50 (E) dated 11.01.2010 under the Environment (Protection) Act, 1986.)		Categories of Area/Zone	Limit in dB (A) Leq		
			Day Time	Night Time	
		Industrial Area	75	70	
		Commercial Area	65	55	
		Residential Area	55	45	
		Silence Zone	50	40	
Remark:		Noise level recorded are complied with the CPCB Limit			
Authorised by: Lab -in-Charge (Dr. Belinda Lahon)					

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Palasbari sub Project - 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

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

Palasbari – Ground water quality



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TC-5991

GEEC/PM/49A

TEST REPORT

URL Number: TC59911900000350P					
Ref. No.:		GEEC/FL/23/18/03/04		Date of Reporting:	
				30/06/2018	
Customer Name & Address:		FREMAA			
Project Name :		Bank Protection works Palasbari Area			
Lab. ID No.:		GEECW/18/03/04		Date of Sampling:	
				24/06/2018	
Sampling Location:		Tube Well, Palasbari Area		Sample Receipt Date:	
				24/06/2018	
Sample Description:		Ground Water		Test Start Date:	
				24/06/2018	
Sample Drawn By:		Mr. Rohan Singh		Test Completion Date:	
				27/06/2018	
Sample Condition:		Sealed		Sampling Method :	
				GEEC/SQP/2	

Sl. No.	PARAMETERS	METHODS	UNITS	RESULTS	LIMIT IS:2296 (Class C)
1	Arsenic as (As)	IS 3025 Part 37-1988(RA:2014)	mg/l	< 0.01	0.2
2	BOD	IS:3025 Part 44-1993(RA:2014)	mg/l	<2	<3
3	Chloride	IS 3025 Part 32-1988(RA:2007)	mg/l	9	600
4	Colour	IS:3025 Part 4-1983(RA:2017)	Hazen	5	300
5	Iron (Fe)	IS 3025 Part 53 2003(RA:2014)	mg/l	<0.06	0.5
6	Lead	IS 3025 Part 47 2003(RA:2014)	mg/l	<0.1	0.1
7*	Odour	IS:3025 Part 5 1983(RA:2017)	—	Un-objectionable	Un-objectionable
8	Oil & Grease	IS 3025 Part 39 1991(RA:2014)	mg/l	<5	—
9	pH	IS 3025 Part 11 1983(RA:2012)	—	6.6	6.0 - 9.0
10*	Phosphates	APHA 22 nd EDITION, 2012	mg/l	—	—
11	Sulphate	IS 3025 Part 24 1989(RA:2014)	mg/l	42	400
12#	Temperature	—	°C	22.1	—
13	Total Dissolved Solids	IS 3025 Part 16 1984(RA:2012)	mg/l	97	1500
14	Total Hardness as CaCO ₃	IS 3025 Part 21 2009	mg/l	32	—
15	Turbidity	IS 3025 Part 10 1983(RA:2012)	NTU	7	—
16*	Total coliform	APHA 22 nd EDITION, 2012	MPN/100ml	Absent	5000
17*	E. Coli	APHA 22 nd EDITION, 2012	MPN/100ml	Absent	—

*****End of Report*****

Authorised by: Laboratory In-charge
B. Lahon
(Dr. B. Lahon)

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