GOVERNMENT OF ASSAM

Assam Integrated River Basin Management Program (AIRBMP)
– Phase 1

Environment and Social Management Plan
High Priority River Works at Baksa & Barpeta District, Beki

November 2024

FREMAA

Flood and River Erosion Management Agency of Assam (FREMAA)

Guwahati, Assam

This page is intentionally left blank.

Table of Contents

List of Tables

List of Figures

This page is intentionally left blank.

1 Project overview

1.1 Project Description

1. AIRBMP is a twelve-year program with total WB financing of US$500[1] million with three overlapping phases. The present project is Phase 1 of the program is an IPF (Investment Project Finance) with WB financing of US$108 million. Phase 2 and Phase 3 of the program will be supported by WB financing of around US$192 and US$200 million. The Project Development Objective (PDO) of phase 1 is to "strengthen institutional capacity to improve integrated water resources planning and management and to build resilience to flood and erosion risks in Assam." The first phase of the project focuses on non-regrettable and urgent flood and erosion project works during the succeeding phases, i.e., phases 2 and 3, and more work will be taken up after the river basin management plan is prepared.

1.1.1 Project Components

2. The first phase of AIRBMP is a four-year project comprises of four components as listed below:

- Component 1: Institutional Strengthening and Strategic Studies (US$20 million). This component focuses on institutional strengthening of Water Resources Department (WRD) and Assam State Disaster Management Authority (ASDMA).
- Component 2: Water Resources Management (US$80 million). This component will finance the structural and non-structural activities to reduce flood and river erosion risks in selected sub-basins and establish a foundation for Integrated Water resources Management (IWRM).
- Component 3: Disaster Risk Management (US$35 million). This component strengthens Assam's overall disaster risk management capacity.
- Component 4: Contingent Emergency Response Component (US$ 0): This allows an immediate response to an Eligible Crisis or Emergency, as needed, from other components to partially cover emergency response and recovery costs. This component could also be used to channel additional funds should they become available because of the Emergency.

1.2 High priority works proposed in Baksa & Barpeta districts, Beki river basin

Beki River (also known as the Kurissu River in Bhutan) is one of the right bank tributaries of the mighty River, Brahmaputra which originates in Bhutan but a large part of its course flows n Assam. The soil erosion of Beki River has become a major problem of two districts, Barpeta and Baksa of Assam. The riverbank in these areas is eroding faster and causing damage to Agricultural land, public property, private property and affecting nearby communities .

The objective of undertaking this this high-priority work is to restore degraded lands and decrease the long-term vulnerability to erosion in the specified areas. It is proposed to take up high priority flood control measures as Anti-Erosion works totaling a length of 5590 meter in in identified critical reaches of Chunbari, Khagarbari (Bishpani) Maithabari, Nepalibasti, Biharibsti , Barobasti, Gabardhana, Katajhar and Kaurijahi under Baksa & Barpeta districts. The high priority works at Baksa & Barpeta districts under Beki river basin are proposed to be executed under component 2.1 (c.) small urgent and high priority river works. The details of the locations are given in Table 1-1 below.

[1] *Project Appraisal document, AIRBMP*

Table 1-1 location of proposed High priority works Baksa & Barpeta districts under Beki

Pkg/Contracts	Location (ID)	GPS locations of the starting points of the river works		Reach Length (m)	Work Provision
		Latitude	Longitude		
Beki package – 2	Chunbari (AE 3)	26° 36' 54.13"N	90° 58' 40.45"E	800	Anti Erosion Work
	Maithabari (AE 38)	26° 36' 49.39"N	90° 58' 34.46"E	348	Anti Erosion Work
	Nepalibasti (AE 39)	26° 36' 49.40"N	90° 58' 34.47"E	702	Anti Erosion Work
	Biharibasti (AE 40)	26° 35' 57.09"N	90° 58' 38.19"	420	Anti Erosion Work
	Barobasti (AE 41)	26° 36' 9.60"N	90° 58' 24.63"E	210	Anti Erosion Work
	U/S of Gabardhana (AE 5)Satra	26° 35' 42.72"N	90° 58' 40.13"E	490	Anti Erosion Work
	Katajhar (AE 10)	26° 32' 58.2"N	90° 58' 34.39"E	210	Anti Erosion Work
	Kaurjahi (AE 21)	26° 22'38.64"N	90° 54' 2.38"E	900	Anti Erosion Work
	Kaurjahi (PR 21)	26° 22'38.64"N	90° 54' 2.38"E	1510	Pro-siltation work

Source: Work specification of bid documents

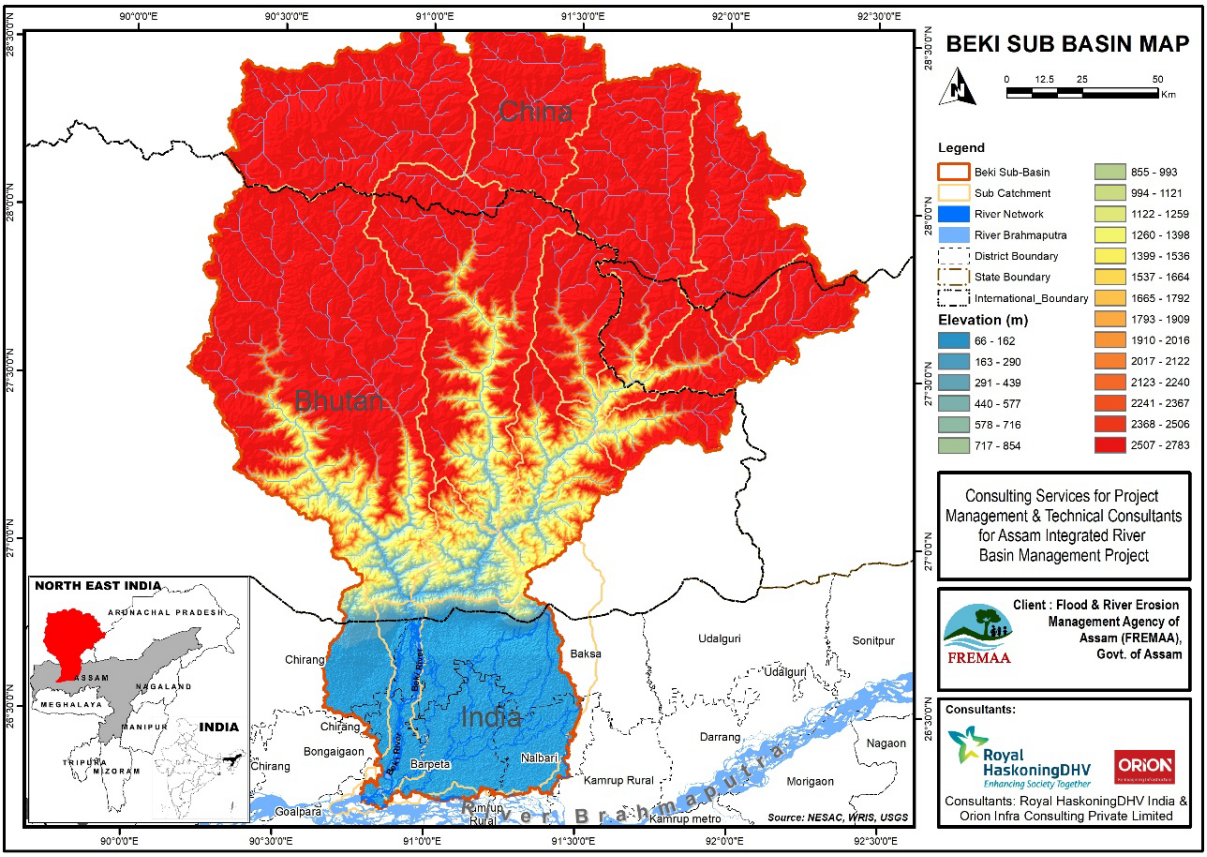

Figure 1-1: Beki Basin Map

1.3 Proposed activities

The proposed project scope of work can generally be divided into three phases as described below-:

1.3.1 Pre – construction (Planning & Design phase)

During the pre- construction stage, the detailed engineering design has been prepared and approved by the competent authority. Following this, the tender floated to select a contractor for the project execution. Additionally, Environment & Social Screening of the proposed intervention has been conducted and reports along with site-specific Environmental and Social Management Plans (ESMP) are prepared. The commencement of anti-erosion construction activities will occur after the approval of these reports and the ESMP. There will be a period between the contractor taking possession of the project site and the start of actual construction, during which time the contractor will undertake tasks such as establishing site facilities, conducting surveys, and setting out the project.
During the pre-construction stage, several key activities will take place:

- Mobilization of equipment, construction material, and vehicles.
- Recruitment of labor force for the project.
- Clearing of sites and removal of trees and vegetation as necessary.
- Obtaining permission for sand mining .
- Obtaining labor licenses, Workers' Compensation (WC) policy, All Risk policy, and registration under the Building and Other Construction Workers (BOCW) Act.
- Installation and development of workers' camps for accommodation.
- Establishment of a temporary construction camp for project operations.
- Implementation of rehabilitation and resettlement measures as applicable, ensuring the well-being of affected communities.

1.3.2 Construction stage for Anti Erosion works.

The period when physical construction activities take place. Sand-filled geo-textile bags (geo-bags) are used for riverbank protection against hydrodynamic forces. The geo-bags will be filled with sand coarse enough to be retained by the geo-textile and it is important that the sand does not leak out over time. In addition, geo-bags must withstand loads resulting from filling, handling, transporting, and dumping. Following activities are steps involved in anti-erosion works proposed under this package.

- Material Storage and Handling
- Borrowing of sand
- Geo-bag Filling
- Fabrication of WN Box for Toe Key
- Placing Galvanized Wire Mesh Gabion
- Wave Protection above Low Water
- Preparation of Bank Slope above Water and Toe
- Filling Works

1.3.3 Post-Construction activities–

The period between the completion of anti-erosion works and the handover to WRD, followed by the Taking-Over by WRD. Following activities are listed below which considered as post construction activities.

- Clearing the site of camps, sheds, equipment, materials, and waste used during the construction phase.

- Removing construction equipment from the site.
- Disposing of construction spoil and waste.
- Dismantling the contractor's temporary work camp.
- Managing the generation of waste and rubble from construction activities.

2 Overview of Environmental and Social Management Plan

3. Based on the assessment of potential negative impacts in the Environmental Screening, the Environmental and Social Management Plan (ESMP) is prepared by PMU for the proposed Anti-Erosion Works and presented in Annexure I. This ESMP is an instrument that details the measures to be taken during the planning, implementation, and operation of a project to eliminate or offset adverse environmental and social impacts or to reduce them to acceptable levels, and the agencies to implement these measures.

2.1 Objectives of ESMP

4. The objective of the ESMP is not only to mitigate the negative impacts on the environment but also ensures that the Socio-Economic standards of the poor and vulnerable groups are improved. This ESMP consists of the set of mitigation, monitoring and institutional measures to be taken up during pre-construction, and construction phases to mitigate adverse environmental and social impacts or to reduce them. Following aspects are taken into consideration while developing the ESMP.

   - To a) anticipate and avoid risks and impacts, b) where avoidance is not possible, minimize or reduce risks and impacts to acceptable levels, c) once risks and impacts have been minimized or reduced, mitigate, and d) where significant residual impacts remain, compensate for, or offset them, where technically and financially feasible, the environmental and social risks and impacts.
   - To define the parameters and variables to be used to assess the environmental quality in the influence area of the Project.
   - To establish mechanisms so that concerned authorities can follow up on the Project environmental variables and implement necessary controls.

5. To support effective implementation of project components and mitigation/management measures, the required Institutional arrangements and responsibility mechanism are identified in the ESMP. Once the ESMP is approved, it should provide the basis for environmental & social monitoring of activities carried out on the site by the contractor.

2.2 Mitigation Measures and Management Plan

6. The various ESMP measures during pre-construction (planning and design stage) and construction stages are listed in this plan, including the monitoring indicators, monitoring plan. This is annexed to this report as Annexure.

2.3 ESMP to mitigate impacts.

7. The Environmental and Social Management Plan (ESMP) has been prepared which the PMU, PIU and Contractors needs to follow and comply with the provisions of this ESMP, which are developed to mitigate the risks and impacts identified during impact assessment. PMU will ensure that the following provisions are part of the bidding documents and later on contractor's contract. Penalty clauses for not complying with ESMP requirements proposed in the project are presented below:

8. The Contractor shall implement all mitigation/ management measures during the construction of the Anti-Erosion work . Any lapse in implementing the same will attract the penalty as detailed below:

- Any complaints of public, within the scope of the Contractor, formally registered with the PIU communicated to the Contractor, which are not properly addressed within the time period intimated by the PIU shall be treated as a major lapse.
- Non-conformity to any of the mitigation/ management measures stipulated in the ESMP (other than stated above) shall be considered as a minor lapse.
- On observing any such lapses, PIU shall issue a notice to the Contractor, to rectify the same.
- Any minor lapse for which notice was issued and not rectified, first and second reminders shall be given after ten days from the original notice date and first reminder date, respectively. Any minor lapse, which is not rectified, shall be treated as a major lapse from the date of issuing the second reminder.
- If a major lapse is not rectified upon receiving the notice, PIU shall invoke deduction from allocated ESMP budget in the subsequent interim payment.

For any non-compliance with regard to major lapses, PIU will initiate action including penalties as per the contract agreement and as per legal provisions.

2.4 Implementation Arrangements

9. Details of institutional arrangement for implementation of the ESMP are given in this Section. This ESMP will be approved by PMU. The principal responsibility for implementation of ESMP is with the WRD & FREMAA. The Contractor shall prepare the C-ESMP and submit it to the PIU for approval within 15 days of contract signing. The Existing institutional arrangements for implementation of ESMP during the project construction are given below:

2.4.1 FREMAA (PMU)

10. The focal point for the E&S risk management of AIRBMP is Flood & River Erosion Management Agency, Assam (FREMAA) headed by Chief Executive Officer (CEO) with extensive experience of Externally Aided Projects (EAP). FREMAA will organize ESMP implementation according to agreement with the World Bank

11. FREMAA has an E&S team comprising of Environmental Specialist, Social Development Specialist and Communication cum Gender Specialist, along with field supervisors in the field. The E&S team is responsible for the review and approval of documents submitted by the E&S Consultants prior to submitting it to WB for concurrence. Field supervisors assist the specialists and E&S Consultants for liaison with government departments, field-surveys, land acquisition etc. The Project Management Unit (PMU) at FREMAA will a) Coordinate with the WB, WRD, ASDMA and other line agencies, , b) With assistance of PMTC Prepare Quarterly Progress Reports and sharing with the World Bank, c) Ensure that all project activities are well-managed and coordinated, d) Coordinate for land acquisition with the Revenue Department and The DCs, e) Payment of compensation to the project affected households, f) Coordinate for clearances related to safeguards, g) Implement the ESCP, etc.

12. Deputy Chief Executive Officer, PMU will be responsible for the entire land procurement process, coordination between different agencies responsible for land transfer to the department/ project/ municipal corporations and its compliance with World Bank procedures (ESS5) and measures outlined by RFCTLARR Act, 2013 and other national/ state regulations.

13. The Environment Specialist at PMU is responsible for a) Environmental, Health and Safety Management, b) implementation of ESMP, LMP and ESCP, c) carrying out site assessment and environment screening d) supervising and monitoring the implementation, and e) reporting and capacity building on EHS aspects, etc.

14. The Social Specialist at PMU is responsible for a) social management, anchoring, supervision, monitoring and reporting, b) compliance with ESMF, SEP, RPF and IPPF and c) implementation supervision and monitoring of all social safeguard plans, ESMP, GAP, SEP, LMP, IPDP etc.
15. The RAP implementation NGO shall be engaged by FREMAA to facilitate RAP the implementation process during the execution of civil works

2.4.2 WRD (PIU)

16. Externally aided project (EAP) wing of Water Resources Department has its head office at Assam water center Guwahati, Assam headed by the Additional Chief Engineer. A Superintendent Engineer along with his supporting engineering staff, are deputed to EAP to supervise, coordinate, and finalize the technical aspects of the AIRBMP project. The EAP wing has dedicated full time Environmental Officer and social development officer, both are tasked with monitoring of Safeguard at river work sites, regular coordination with contractor team, review of monthly ESHS compliance report and providing feedback.

2.4.3 Divisional Office of WRD

17. All the high priority river works at Baksa and Barpeta districts under the Beki river basin shall come under the Chirang and Barpeta Water Resource Division which is headed by Executive Engineer. Chirang & Barpeta Water Resource Division will be implementing the anti-erosion high priority works at identified stretches of Beki river basin . There is no Environmental or Social staff at divisional or sub-divisional offices.

2.4.4 Pollution Control Board Assam (PCBA)

18. The contractor shall obtain the required consent, /clearance,/permission from the PCBA. PCBA official shall inspect the locations from time to time to ensure compliance of act and provision as per the national and state legal framework.

2.4.5 Department of Labour Welfare

19. The role of Department of Labour Welfare is regulatory, to ensure the establishments registered under it obtain licenses from it and are in compliance with labour laws. It can formulate and issue policies, rules, and standards for OHS consistent with the existing laws. As such, it can occasionally conduct monitoring and audit of workplaces, construction sites and offices of contractors and project management. It can also provide an expert review of the occupational and community health and safety aspects of the ESMP if required.

2.4.6 District Commissioner (DC) Office

20. The respective DC Office (Baksa & Barpeta district) will regulate quarries, soil and water conservation activities that support river works and minimize likely adverse impacts on the water resource management. The concerned Additional District Commissioner (ADC) for land acquisition or/and revenue deputed by the DC to conduct the Zirath survey through concerned Revenue Circle Offices along with all the line departments including WRD, PWD, forest, fishery, agriculture etc. to assess details of PAPs (Project Affected Persons).
21. The measurement and valuation of different structures like private houses, buildings etc. will need to be done by DLLPC committee comprising of concerned executive engineer of WRD, Circle Officer of revenue department and other line department officials through approved government valuators. The Standard Schedule of Rates (PWD) of GoA without depreciation would be the basis for valuation of the structures to be displaced or affected due to proposed

anti erosion works. The CPRs will either be renovated or shifted to a new location and the community's decisions would be the basis for renovating and/or rebuilding such CPRs.

2.4.7 Department of Archaeology

22. It regulates all archaeological activities in the country as per the provision of the Ancient Monuments and Archaeological Sites and Remains Act, 1958. The department is also charged with protection, preservation and management of the World Cultural Heritage Sites and maintains an inventory of the cultural heritage sites.

2.4.8 Project Management Technical Consultant (PMTC)

23. Project Management Technical Consultant is assisting FREMAA and WRD on environmental and social mitigation measures as per ESMP and compliance monitoring of the construction contractor's activities and assist FREMAA to prepare quarterly and other periodic monitoring reports for submission to WB. Environmental and Social Development Specialists of PMTC is also assisting FREMAA to review monthly monitoring report submitted by contractors, identify needed corrective actions and follow-up actions, conduct site inspections to validate monitoring reports and identify unanticipated environmental impacts, compel contractors to take corrective actions within specified timeframe to address non-compliances.

2.4.9 Contractor

24. The Contractor has primary responsibility for implementing and internally monitoring all environmental and social management measures linked to the proposed riverbank protection works. A site-specific Environmental and Social Management Plan (ESMP) has been developed for the project, covering all risks associated with the construction phase. Throughout the construction period, the Contractor bears sole responsibility for all activities conducted on sites under its control. This encompasses the actions of all subcontractors, whether engaged directly or indirectly by the Contractor. The Contractor shall prepare the C-ESMP and submit it to the PIU for approval within 15 days of contract signing.

25. Accordingly, it shall be the Contractor's responsibility to ensure that all activities are compliant with Project plans, permits, licenses and approval conditions, and any other statutory requirements. Contractor shall deploy all the qualified experts as mentioned in the Section III, Evaluation and Qualification Criteria of the RFB which includes one Environmental Specialist, one Social Specialist and one Health and Safety Supervisor to oversee the Project's ESHS performance and ensure that staffing and resources are adequate, commensurate with the magnitude and timing of work and potential ESHS risks The contractor submits monthly reports to PIU (WRD) on the status of ESMP implementation, implement corrective actions as instructed by FREMAA, PMTC and WRD.

26. The key responsibilities of the Contractor's Environmental Expert and Social Expert include a) orientation and training of the contractor's staff on environmental and social management, b) leading the implementation of ESMP, c) be regularly on sub-project sites to implement the ESMP during sub-project implementation, d) providing guidance and inputs to the contractor's working teams on environment and social management aspects, e) Reporting to PIUs on environmental and social aspects as given in below Table 2-1 f) Coordinating with PIUs, PMTC, concerned Department, Contractors and other consultants on Environmental and Social matters

Table 2-1 Contractor's reporting requirement

S. No.	Title of the Report	Timeline of Report Preparation	Report to be prepared by
1	Contractor's ESMP (CESMP)	Within 15 days from contract signing	
2	Occupational health and Safety (OHS) Plan	Within 15 days from contract signing	Contractor
3	Traffic Management plan (TMP)		Contractor
4	ESHS Monthly monitoring Report	The 7th day of each succeeding month until the completion of the project.	Contractor
5	Incident Reports covering all environmental (pollution events), OHS (accidents) and social (SEA/SH allegations) incidents.	Initial investigation report within 24 hours Detailed Investigation Report within ten days	Contractor

2.5 Budget for ESMP Implementation

27. A lump sum budget is provided for the implementation of the ESMP, which is estimated INR 11,29,800/- (Indian Rupees Eleven Lakhs Twenty Nine Thousands and Eight Hundred Only). This same amount will be entered by the Contractor in the Bill of Quantity (BoQ) of the RFB. The budget source is project funds and shall be approved by PMU and PIU-WRD.

Annexure 1. Environmental and Social Management Plan (ESMP) of Anti-Erosion Works

Project Activity	Impacts	Mitigation Measures	Cost of Mitigation (INR)	Parameters to be measured	Methods of Measurement	Performance indicator	Sampling Location	Frequency of monitoring	Responsibility		Cost of monitoring (INR
									Implementation	Supervision	
Environment											
Pre-construction (Site clearing and Vegetation clearance)	▪ Loss of vegetation, removal of trees[2] and shrubs and habitat destruction	▪ Protect all vegetation not required to be removed against damage. ▪ Restrict removal of vegetation and trees to the area of need only Prevent damage to critical ecosystems and habitats. ▪ Undertake quick re vegetation of exposed soils with indigenous plant species once construction is completed. ▪ Prevent colonization by invasive species	No additional costs	Evidence of re-vegetation No disruption of vegetation outside project area	Clearly define the project areas Visual assessment	Visual observation by E & S team	Project areas, site camps, store	During construction	Contractor	PIU WRD	--
Pre-construction Loss of Trees / Felling of trees		Loss of commercial trees due to erosion and project activities shall be compensated as per the eligibility of compensation provision in the RAP.	Included in RAP budget	Monitor GRM records. RAP Implementation report	Ensure implementation of RAP	GRM records RAP Implementation report	Project areas,	During construction	RAP NGO / PIU	PMU	--
River sand mining	▪ Impacts on Borrow Areas ▪ Adverse impact to river channel flow due to improper mining of sand from riverbed	▪ Contractor will identify the site for mining prepare a sand mining plan for the proposed work sites and get it endorsed by WRD engineers before submission to forest department for obtaining NoC ▪ Contractor will undertake sand mining only with the approval of WRD engineers after obtaining NoC from Forest department. ▪ Sand excavation activity shall not alter the flow of river	No additional cost for mitigation Cost for Obtaining Permits / NoC – 100,000.00	Uninterrupted flow of river channel, where sand borrowed.	Inspection and Visual observation	Compliance of NOC condition for sand mining	Riverbed	During the mining of sand	Contractor	PIU WRD	--

[2] *Trees to be cut down other than forest area comes under list of tree species exempted from obtaining prior permission for felling and conversion under Schedule-I & II of 'The Assam Trees Outside Forest (Sustainable Management) Rules, 2022 as per official gazette notification published on 2nd January'2023*

Project Activity	Impacts	Mitigation Measures	Cost of Mitigation (INR)	Parameters to be measured	Methods of Measurement	Performance indicator	Sampling Location	Frequency of monitoring	Responsibility		Cost of monitoring (INR
									Implementation	Supervision	
		stream. ▪ Sand mining should only be allowed during the dry season. ▪ The depth of mining in Riverbed shall not exceed one meter or water level whichever is less. ▪ In the riverbed, only manual mining shall be allowed									
	▪	▪									
Air											
Excavation and riverbank trimming/ Vehicle movement	▪ Dust Generation ▪ Vehicular emission ▪ Deterioration in Air quality	▪ Use tarpaulins to cover earth material when transported by dumpers; and fit all heavy equipment and machinery with air pollution control devices, which are operating correctly. ▪ Regular water sprinkling at construction sites and access roads. ▪ Submit Traffic management plan within 15 days from signing of contract ▪ Enforced appropriate speed limit for vehicles engaged in construction activities. ▪ Ensure that the air quality levels are constantly monitored.	A 1 1,00,000	PM_{10},$PM_{2.5}$ SO_2, CO, NOX	NAAQ standard Weekly inspection of / vehicle maintenance records	Pre- mobilized Fitness certificate of vehicles	Project sites, vehicle, and transportation route	During Construction. Quarterly monitoring of Air Quality at work site	Contractor	PIU - WRD	60,000.00
Operation of Vehicles , Equipment, and machinery	▪ Accidents and injuries to workers and risk to community health and safety	▪ Pollution under control (PUC) test shall be conducted on regular basis and PUC certificate shall be submitted to PIU. ▪ Ensure regular maintenance of vehicles, boats to avoid leaks of oil.	No additional cost required	PM_{10},$PM_{2.5}$ SO_2, CO, NOX Records of respiratory diseases at site	Weekly inspection of maintenance records	Test result of Air Quality around project sites	Proposed work sites.	During construction Quarterly monitoring of Air quality at work site	Contractor	PIU - WRD	
Water											

Project Activity	Impacts	Mitigation Measures	Cost of Mitigation (INR)	Parameters to be measured	Methods of Measurement	Performance indicator	Sampling Location	Frequency of monitoring	Responsibility		Cost of monitoring (INR
									Implementation	Supervision	
Water requirement for project		▪ No water required for construction activities; river water shall be used for sprinkling. ▪ Optimum use of water shall be ensured throughout the project to minimize wastage. ▪ Wastage of water by labour shall be discouraged. ▪ Packaged water/filter water will be used for domestic uses at workers camp	No Additional cost	Kitchen and dining area Labor Camp area	Inspection and visual inspection	Availability of water at workers camp	Project site, and labour camps	During construction	Contractor	PIU - WRD	--
Discharge of wastewater form Worker's camp	▪ Contamination of water	▪ Labour camps shall be located away from water bodies. ▪ Adequate no of Bio toilet, toilet (separate for male & female) with septic tank and soak pit shall be provided in the construction camp. ▪ The Diesel/fuel storage area shall be kept away from the waterbodies to prevent any wash away into water bodies and appropriate measures to be taken to prevent infiltration into the groundwater.Recommended overfill protection measures include: - Prepare written procedures for transfer operations that includes a checklist of measures to follow during filling operations and the use of filling operators trained in these procedures - Installation of gauges on tanks to measure volume inside - Use of a catch basin around the fill pipe to collect spills - provision of secondary containment ▪ Construction work close to water bodies will be avoided	B – 1 2,00,000	Periodic test of water quality as per the CPCB norms and IS 10500 (2012) (surface & ground water)	Waste Management Plan Site drainage plan	Permissible limit of surface water quality	River channels / workers camp area	During construction Quarterly monitoring of Water (Surface & ground water)quality at work site	Contractor	PIU - WRD	1,80,000 for Ground & surface water monitoring

Project Activity	Impacts	Mitigation Measures	Cost of Mitigation (INR)	Parameters to be measured	Methods of Measurement	Performance indicator	Sampling Location	Frequency of monitoring	Responsibility		Cost of monitoring (INR
									Implementation	Supervision	
		during the rainy season. ▪ Regular water quality testing and monitoring during construction activities shall be carried out									

Project Activity	Impacts	Mitigation Measures	Cost of Mitigation (INR)	Parameters to be measured	Methods of Measurement	Performance indicator	Sampling Location	Frequency of monitoring	Responsibility		Cost of monitoring (INR
									Implementation	Supervision	
Use of Workers Camp	▪ Waste Management	▪ Collection and segregation of solid waste into kitchen waste (organics), paper, glass, and plastic (recyclable) and inert (non-recyclable). Three kinds of waste bins (with different colors) with adequate numbers and capacities will be placed at the campsite (kitchen, offices, and rooms) to segregate the waste at the source. ▪ Organic waste will be treated through onsite composting or using in-vessel composters. ▪ Procure the services of waste management contractors for collecting and managing recyclable waste. ▪ Local municipal waste disposal sites will be used to dispose of inert and garbage. ▪ No disposal sites will be established by the Contractor.		Waste, odors, general aesthetics etc	▪ Visual observation of surroundings Ensure waste management plan is implemented	Proper segregation of wet & dry waste Compositing of wet waste & recycling of dry waste by tie up with Kabariwala / Local bodies. Clean environment	At worker's camps and work sites	Throughout the project duration	Contractor	PIU - WRD	
	▪ Sanitation	▪ Provide gender-sensitive temporary Sanitary Facilities along project site to prevent open defecation and pollution of water bodies. ▪ Inspect facilities provided such as Bio- toilets, Septic tank, disinfectant/ hand sanitizer etc.) ▪ Ensure facility provided align with the expected number of workers	Cost included in B – 1	Water, soil	Water and soil quality assessment	Adequate Number of sanitary facilities and toilets	Worker's camp, project sites	Weekly	Contractor	PIU	

Project Activity	Impacts	Mitigation Measures	Cost of Mitigation (INR)	Parameters to be measured	Methods of Measurement	Performance indicator	Sampling Location	Frequency of monitoring	Responsibility		Cost of monitoring (INR
									Implementation	Supervision	
Noise											
Noise from Vehicles, boats, Plants and Equipment	▪	▪ Construction operations should be undertaken primarily during daytime, i.e., 6:00am - 6:00pm, to minimize the noise impact. ▪ Construction activities near habitation areas shall be prohibited between 6 p.m. to 6 a.m. ▪ Selection and use of vehicles/equipment with lower sound power levels shall be done. ▪ The equipment used in construction shall strictly. conform to the MoEF&CC/ CPCB noise standards and shall have the latest noise suppression mountings. ▪ Provide and enforce the usage of hearing protection devices (ear plugs/muffs) for workers exposed to high noise levels. ▪ Install appropriate safety signage and/or use signalers at strategic locations to avoid occurrence of any untoward incident. ▪ Routine Noise monitoring with Noise meter instrument shall be done.	No Additional cost, signages cost included in C – 1	Ambient noise level standards Fitness certificates of equipment and vehicles Use of appropriate PPE	Noise monitoring at construction site near the sensitive receptors	Noise level at sensitive receptors not to exceed the permissible standard. Weekly at Construction site and nearby communities	Project sites, excavation sites, and transportation route,	Throughout construction Quarterly monitoring of Noise at work site	Contractor	PIU - WRD	36000.00
Flora											
Loss of trees and Plantation works	▪ Adverse impacts on biodiversity, including loss of biodiversity	▪ Clearing and uprooting shall be avoided beyond that which is directly required for construction activities. ▪ Wherever possible, avoid the removal of existing mature trees, which form important visual focal points.	No additional cost required	Clearly defined boundaries of protected areas Evidence of re-vegetation	Visual observation	Available number and diversity of plant species within baseline conditions Site restoration after construction	Proposed Anti Erosion work site / worker camp	During project execution & post construction	Contractor	PIU - WRD	

Project Activity	Impacts	Mitigation Measures	Cost of Mitigation (INR)	Parameters to be measured	Methods of Measurement	Performance indicator	Sampling Location	Frequency of monitoring	Responsibility		Cost of monitoring (INR
									Implementation	Supervision	
		▪ Non-wood fuel for cooking and heating shall be done.									
Fauna	▪ Construction activities and workers may cause harm to fauna.	▪ Any animal sightings will be recorded by the Contractor. and shared with the official of Forest department. ▪ Training to the workers on the potential impacts of their behavior, including wildlife poaching and habitat degradation/pollution ▪ All the workers will need to be oriented. so as not to cause any harm to the fauna, and handout on wildlife encounters SOP shall be distributed. ▪ With the help of Environment Specialist of PIU, one time fauna survey shall be conducted during the construction stage.	No additional cost, awareness cost included in C - 1	Code of conduct signed by all workers for protection of wildlife.	Record of animal sighting if any Training imparted to workers.	Signages / hoarding placed for conservation of wildlife.	Project area / workers camp	During construction	Contractor	PIU - WRD	
Social Impacts											
Barriers to accessing the river	▪ Loss of access to the river for fishers	▪ Contractor's & PIU's safeguard team will conduct consultation with community to explore the requirement of access to river at river protection site. ▪ Suitable arrangement for access to river shall be provided at mutually agreed locations as per provision of contract	Provision in Civil work	Number of accesses required for fisher community to be planned in consultation with local community	Public consultation and number of Grievances received	Number of ramps / accesses to river provided to fisher community	Project area	During Construction	Contractor	PIU - WRD	
Labor influx from employment on project	▪ Risk of social conflict ▪ Threat to community culture, safety, and security due to presence of workers	▪ Local community members including women shall be ensured to have the priority opportunity for employment as skilled and semi-skilled workers. ▪ Engagement of local labor shall be encouraged by	1,00,000	Complaints lodged, suggestion box, GRM process. Incident reported.	Reporting of social conflict Visual observation and interviews Eye-Witness Reports of incidents	GRM Records Rates of crimes reported. Enlightenment campaign/ health	Project area	During Construction	Contractor	PIU - WRD	

Project Activity	Impacts	Mitigation Measures	Cost of Mitigation (INR)	Parameters to be measured	Methods of Measurement	Performance indicator	Sampling Location	Frequency of monitoring	Responsibility		Cost of monitoring (INR
									Implementation	Supervision	
		limiting the number of migrant labors. ▪ Promote equal opportunities for employment for all (both male & female) ▪ Develop an induction program including a code of conduct for all workers. ▪ Provide cultural sensitization training to improve awareness of workers to local cultures, traditions, and lifestyles. ▪ Prohibit child and forced labour. ▪ Employment process to include procedures for engagement where ID showing verified date of birth are mandatory. ▪ Establishment of GRM for redressal of GBV grievances ▪ Engagement of competent security personnel at work site.		Presence of security personnel Recruitment records Camp facilities	Inspection of construction Sites/ camps	education statistics. Incident reports records of cases of abuse in the workforce, etc. Availability of services in workers camp for recreation etc.					
	▪ GBV-SEAH Risks	▪ Code of conduct for all staff and workers ▪ Sensitization of workers on the content of code of conduct ▪ Training on GBV for all staff and workers engaged. ▪ Site specific gender focal person ▪ GBV GRM logbook ▪ Emergency contact numbers (Hospitals and legal aid council) ▪ Gender sensitive toilets and changing rooms at work	C – 1 1,00,000	Complaint or incidents recorded on GBV/SEA	▪ Ensure Compliance and Signing of the GBV CoC ▪ Ensure Defaulters are punished severely according to laws preventing rape, sexual abuse etc.	▪ GRM records ▪ Rape/sexual exploitation, reports ▪ GBV Code of Conduct compliance ▪ Percentage of health care facilities following national and international guidelines on clinical care for GBV/SEA victims/	Workers camps/ nearby community / project area	During Construction	Contractor	PIU - WRD	

Project Activity	Impacts	Mitigation Measures	Cost of Mitigation (INR)	Parameters to be measured	Methods of Measurement	Performance indicator	Sampling Location	Frequency of monitoring	Responsibility		Cost of monitoring (INR
									Implementation	Supervision	
		sites. ▪ Sensitization of community on GBV ▪ Install signages / post to create awareness against GBV				survivors					
	▪ Health and safety (Hygiene)	▪ All measures outlined in the ESMP shall be implemented to ensure that health and safety of the workers, visitors, and neighboring communities.		Health, HIV/AIDs, STDs etc.	▪ HIV/AIDs, STD tests	▪ Health record	Worker's Camps and worksites	During construction	Contractor	PIU - WRD	
	▪ HIV/AID and STI management	▪ Arranging HIV/ AIDs awareness campaign in villages and work sites at regular intervals. Workers need to be rotated in the project and they need to be allowed to meet their partner (back home) at regular.	Awareness cost included in C – 1 (Rs. 100000)	Statistics of health awareness campaigns Checking recruitment record	▪ Monthly health check-up camps shall be organized to assess the health of workers ▪ Awareness campaign organized in villages and worker's camp .	▪ Health assessment records	Construction Camps and Surrounding Villages	During pre-construction and construction stage	Contractor	PIU – WRD/PMU	Contractor shall organize monthly health check – up camp at site under contingency budget of ESMP
Traffic Management	▪ Unplanned and unmanaged traffic diversion and detours can result in public nuisance.	▪ Project drivers will be trained in defensive driving. ▪ Ensure that all construction vehicles observe speed limits on the construction sites and on public roads. ▪ Necessary signage and barricading will be provided for the safety of road users. ▪ Prepare Traffic Management plan (TMP) and ensure its implementation after approval from PIU	1,00,000.00	Road signage's, dissemination of information, driving permit and statistics, Presence, and use of covering materials	▪ Monitor Traffic Situation reports, Monitor Accident records, IVMS records etc	Journey management record; number &adequacy of signs/ speed breakers , Presence of a TMP ▪	Project site and along transport route	Weekly	Contractor	PIU	
Construction Safety											

Project Activity	Impacts	Mitigation Measures	Cost of Mitigation (INR)	Parameters to be measured	Methods of Measurement	Performance indicator	Sampling Location	Frequency of monitoring	Responsibility		Cost of monitoring (INR
									Implementation	Supervision	
Safety Measures During Construction	▪ Unsafe work practice at work site may lead to injury of workers	▪ All measures outlined in the Contract agreement GCC clause 18 - Health, Safety and Protection of the Environment, and ESMP shall be implemented to ensure no accident during construction. ▪ Prepare Occupational health and Safety management plan (OHSMP) and ensure its implementation after approval from PIU	2,00,000	First aid awareness reports Statistics of social and health awareness program Number of PPEs procured. and distributed to workers	Assessment of first aid & HSE knowledge Routine unannounced inspection of PPE,	▪ Number of health checkup camps organized. ▪ first aid kit records. ▪ Accident register	Work sites	During construction	Contractor	PIU - WRD	
	▪ Electrical risk / Fires safety	▪ Fire risk assessment/fire safety training shall be conducted for all staff. ▪ Adequate precautions will be taken to prevent danger from electrical equipment. ▪ No material in any of the sites will be stacked or placed as to cause danger or inconvenience to any person or the public. ▪ All necessary fencing and lights will be provided to protect the public.	Fire extinguishers (including mock drill – two nos) shall be supplied by Contractor within ESMP budget for health and safety The contractor is responsible for establishing the site camp in a safe and secure manner within the project cost, No additional cost required under ESMP	NoC for fire safety Number of Fire extinguisher installed.	Number of mock drills organized	▪ Emergency response plan	Workers camps.	During Construction	Contractor	PIU - WRD	
	▪ Accidents or injuries to workers due to unsafe practice at work	▪ Necessary steps shall be taken to prevent accidents, injury, and disease, like uses of appropriate PPEs at work	Awareness cost included in C – 1	No. of accidents/ incidents	Level of Awareness among workers and community.	▪ Number of visible warning signs	Proposed Anti Erosion work site / worker camp	During Construction	Contractor	PIU - WRD	

Project Activity	Impacts	Mitigation Measures	Cost of Mitigation (INR)	Parameters to be measured	Methods of Measurement	Performance indicator	Sampling Location	Frequency of monitoring	Responsibility		Cost of monitoring (INR
									Implementation	Supervision	
	site	sites, maintain hygiene at worker's camp, conduct regular health checkups and follow preventive measures against potential hazards ▪ Appropriate treatment shall be provided to those suffering from occupational injuries/ diseases. ▪ Reporting to PIU / PMU ▪ Ensuring insurance facilities for labour. ▪ All measures outlined in the ESMP, and contract agreement shall be implemented to achieve zero accident rates. ▪ Awareness and training camp on OHS and health checkup camp shall be organized among the labour		Record of safety meetings held.	Uses of PPEs ate work sites.						
Impacts on Public Utility (water, electricity, etc.)	▪ Damages to utilities and disruption in utility services to the public.	▪ Temporary access routes will be provided to the residences and agricultural fields, where access is blocked. ▪ Proper barricading and sign boards will be erected around public utilities during construction. ▪ The scheduling of the construction works will be shared with the electricity department, and communities to ensure uninterrupted services during construction.	Separate provision for utility shifting by line department	Presence of cut wires/cables	▪ Inspection of public utilities along the project corridor	▪ Detailed works planning/ construction schedule document ▪ Public utilities like, electric poles underground pipelines, wires etc. were found to be intact without any damage	Project sites	During Construction and post completion of work	Contractor	PIU - WRD	
Risk caused by Force' Majure	Sudden instruction of work	▪ Reasonable precaution will be taken to prevent danger of the workers and the public from flooding, fire, etc. ▪ First aid facility shall be		Tie-up with Hospital	Usage of signage and demarcations	Emergency preparedness plan	Project sites	During Construction	Contractor	PIU - WRD	

Project Activity	Impacts	Mitigation Measures	Cost of Mitigation (INR)	Parameters to be measured	Methods of Measurement	Performance indicator	Sampling Location	Frequency of monitoring	Responsibility		Cost of monitoring (INR
									Implementation	Supervision	
		available with trained first aid personal. ▪ Tie up with hospital in case of medical emergency.		Number of first aid box available at site Number of trained first Aiders	Signage's placed of emergency contracts.						
Total Mitigation cost			**8,00,000**				**Total monitoring cost**				**276000**
Miscellaneous, Provisional sum- and contingency cost @5% of total			**40,000**				Miscellaneous, Provisional sum- and contingency cost @5% of total				**13,800**
Grand Total (Mitigation & Monitoring)			**11,29,800**								