Bangladesh Weather and Climate Services Regional Project

Environmental Management Plan

Bangladesh Meteorological Department (BMD)
Bangladesh Water Development Board (BWDB)
Department of Agricultural Extension (DAE)

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Component- B Under package BWDB-W 1

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ABBREVIATIONS AND ACRONYMS

ARG	Automatic Rain Gauges
BAMIS	Bangladesh Agro-Metrological Information System
BMD	Bangladesh Metrological department
BWDB	Bangladesh Water Development Board
DAE	**Department of Agriculture Extension**
DOE	**Department of Environment**
EA	**Environmental Assessment**
ECA	**Environmental Conservation Act**
ECC	**Environmental Clearance Certificate**
ECop	**Environmental Code of Practice**
EIA	**Environmental Impact Assessment**
EMP	**Environmental Management Plan**
GOB	**Government of Bangladesh**
Khas	**Government owned Land**
MoEF	**Ministry of Environment and Forest**
NGO	**Non-Government Organization**
O&M	**Operation and Maintenance**
PCU	**Project Coordination Unit**
PIU	**Project Implementation Unit**
PSC	**Project Steering Committee**
PPE	**Personal Protective Equipment**
WB	**World Bank**

1. Introduction

The **Bangladesh Weather and Climate Services Regional Project** will support modernization of the country's weather, water and climate information infrastructure strengthening both the supply of hydro-meteorological data, information and services and delivery to sectors and communities. It will do so by modernizing meteorological and hydrological monitoring systems, forecasting, strengthening sector specific information services and targeted community based hazard early warning activities in selected districts. This project is part of a World Bank SAR regional "series of projects," the first of which, Nepal Building Resilience to Climate Hazards is under implementation and Bhutan Weather and Disaster Improvement project under preparation. The project will be financed through IDA credit with contributions from GoB counterpart funding.

As per policy and legislative requirement of the World Bank and the GoB, an Environmental Assessment (EA) has to be conducted at the preparation stage of the project. Since the exact location, size and the extent of specific intervention of the project will remain unknown during the preparation phase, a framework approach for EA has been adopted. The Environmental Management Framework (EMF) has been prepared to guide the detailed EAs addressing all environmental safeguard issues on each installation of equipment or physical intervention at any site from preparation, through review and approval, to implementation of the government clearances program.

2. Scope and Objectives of EMP

The proposed development objective of this project is "to strengthen the capacity of the Government of Bangladesh to deliver reliable weather and climate information services and improve the access to such services by priority sectors and communities". Such national level bottom up capacity strengthening activities support national development goals and also help implement key Regional Agreements relating to environment, disaster and climate resilience. The objectives related of each of the three main components are:

The main objective of the Environmental Management Plan (EMP) is to provide general policies, guidelines, and procedures of environment to be integrated into the design and implementation of all components under the proposed project. In order to achieve the main objective, the specific objectives of the EMP are to:

• Establish clear procedures and methodologies for the environmental and social planning, review, approval and implementation of components to be financed under the project;

• Provide an overall potential environmental impact assessments of the proposed project activities and suggest component specific standard environmental mitigation

• Specify appropriate roles and responsibilities, and outline the necessary reporting procedures, for managing and monitoring environmental and social concerns related to components;

• Identify the institutional barriers and determine the training, capacity building and technical assistance needed to successfully implement environmental management practices;

• Estimate the funding requirement environmental screening, implementation of management plan, monitoring, reporting and capacity building; and

• Provide practical information resources for environmental management related to the project.

3. Inclusion of Relevant Components of EMP in Contract Documents

Environmental Impact Screening for Refurbishing HQ of Hydrology offices building, 72 Green Road, Manikgonj Hydrology Section office , Bhagyakul Section office (Civil, Electrical & Sanitary) of Component - B under package BWDB-W1

The government of Bangladesh is implementing the Weather and Climate Services Regional Project (BWCSRP) with IDA credit in order to strengthen Government of Bangladesh's capacity to deliver reliable weather, water and climate information services and improve access to such services by priority sectors and communities. The project comprises of four components. Out of these components Bangladesh Water Development Board (BWDB) is implementing Component – B. There are a number of packages under this component.

The package no. BWDB-W1 includes Refurbishing HQ of Hydrology offices building. This building is located at 72 Green road in the BWDB premises which have Refurbishing HQ of Hydrology offices (Ground & 1st floor of CE Hydrology building. Refurbishing HQ of Hydrology Offices under Bangladesh Weather and Climate Services Regional Project Component-B Strengthening Hydrological Information Services and Early Warning Systems These activity will enable BWDB to know the ground water and surface water quality around the country. Thus Refurbishing HQ of Hydrology offices building (Civil, Electrical & Sanitary) will contribute to overall positive impact in terms of sustainable management of the surface water as well as public health of the country.

This environmental impact screening checklist along with an assessment of environmental impact for Refurbishing (Civil, Electrical & Sanitary work) HQ of Hydrology offices building, 72 Green Road, Manikgonj Hydrology Section office , Bhagvakul Section office under package BWDB-W1 and Detailed **Contract Documents** are **Shown Annex 1.**

4. Institutional Arrangements

The Environmental Management Plan (EMP) implementation requires an organization support structure in the form of organizational requirements, training needs and plan, and information management system. The Government of Bangladesh (GoB) is responsible for overall project management and coordination through its Ministry of Defense (MoD), Ministry of Water Resources (MoWR), and Ministry of Agriculture (MoA). The purpose of project management is to ensure(i) Project Oversight and Policy Direction, (ii) Project Coordination and Management, and (iii) Project Implementation.

To carry out the above functions, (i) a Project Steering Committee (PSC) and (ii) three Project Implementation Units (PIUs) each at BMD, BWDB and DAE will be established. To facilitate coordination between the three PIUs during implementation, the PSC will set up a Project Coordination Unit (PCU) and the PCU will have an Environment Specialist for the duration of the project.

5. Role and responsibility of the team

Therefore, EMP will have two levels of implementation.

5.1 Project Level: A central Project Steering Committee (PSC) will take the lead in overseeing and monitoring of the implementation of components and this unit will periodically supervise and monitor the safeguard implementation performance and include the progress/results in the Project Progress Report. The PSC will be convened by the Secretary of the MoD. The PSC will include the Secretaries, or their representatives from the Finance Divisions, Ministry of Defense, Ministry of Agriculture, Ministry of Water Resources, Ministry of Disaster Management and Relief and any relevant Government Stakeholders.

For more regular project monitoring, BWDB Head Office will create a Project Coordination Unit (PCU) headed by a Project Coordinator (PC) who will be the Chief Planning of the BWDB. Its office will serve as the secretariat to the PSC. The PCU will appoint an Environmental Specialist who will be responsible for effective and timely implementation of safeguard activities, monitoring of the environmental impacts of components throughout the project period and environmental enhancement of project activities.

5.2 Component Level: Each implementing agency will establish their own Project Implementation Unit (PIU), which will be responsible for ensuring effective implementation of safeguard measures in close consultation with local authorities and local communities. Each PIU will assign at least one full time staff as the safeguard focal person to be responsible for forging effective implementation of safeguard activities. PIU-BMD and PIU-DAE will assign one additional staff each for training purposes and to ensure continuity in case of transfer of assigned focal person. The PIU will be responsible for incorporating environmental considerations in bidding and contractual documents. During implementation, the PIU will assign local officials for monitor environmental issues. The results will be part of the component progress report and the safeguard focal point will be responsible for ensuring proper documentation of safeguard activities.

In summary, an Environmental Specialist, part of the PCU will be responsible for effective and timely implementation of safeguard activities, monitoring of the environmental impacts of components throughout the project period and environmental enhancement of project activities. Each PIU will have at least one Environment Focal Point who will be responsible for forging effective implementation of safeguard activities. PIU-BMD and PIU-DAE will assign one additional staff each for training purposes and to ensure continuity in case of transfer of assigned focal person. The PSC will ensure coordination between the three implementing agencies. The Table 1 provides roles and responsibilities of different stakeholders of the project implementation team.

Table 1: Roles and responsibilities of project implementation team

Responsible Unit	Major Activities	Output	Action Time Frame
Project Steering Committee (PSC)	• Guide overall Environmental Performance of the project	Ensure overall environmental compliance of the project	Throughout project life cycle
Environmental	Capacity development of PIU and professionals of	Quality assurance	Throughout project life cycle

Specialist, Project Coordination Unit (PCU)	implementing agencies Review all the screening report, EMPs, monitoring reports prepared by three agencies Monitor key activities and track performance. Identify and correct problems. Keep adequate records of EA performance. Conduct periodic environmental management system audits	Project level Environmental report Instructions to PIU and contractor Support for necessary no objection clearance	
Environment Focal Person, Project Implementation Units (PIU)	Environmental Screening Preparation of EMP, if needed Costing of EMP implementation Community relations Ensure inclusion of environmental clauses in technical specifications Implementation of mitigation measures Environmental performance of equipment Support implementation of ECoPs	Component level Annual Environmental reports Obtain no-objection certificate	Once a month but responsibility runs throughout the project life cycle
Contractors	Environmental performance of equipment and plants. Implementation of relevant mitigation measures.	Maintenance records Trained workers Mitigating actions	On-going responsibility throughout installation phase

6. Environmental Management Plan (EMP)

A project's EMP consists of a set of mitigation, monitoring, and institutional measures to be taken during implementation and operation to eliminate adverse environmental and social impacts, offset them, or reduce them to acceptable levels. The plan also includes the actions needed to implement these measures. For this particular project, EMPs will be required if equipment installations and construction works are conducted in environmentally sensitive areas (Installations and construction works is environmentally sensitive areas). The EMP to be prepared should include the analysis of impacts on the sensitive areas and mitigation measures commensurate with the magnitude of impacts.

7. Environmental Code of Practice (ECoPs)

ECoP will consist of routine systematic checking that all mitigations are effectively implemented during the relevant periods of the project. The following ECoPs will be considered and applied for the project based on the nature of the interventions.

Tree Plantation ECoP, Pollution Prevention ECoP, Waste Management ECoP Construction Management ECoP, Buoy Installation ECoP and Health and safety ECoP. **Detailed ECoP are Shown Annex 11.**

8. Mitigation and compliance monitoring plans

A detailed Mitigation and Compliance Monitoring Plan given in Table 2 shows the mitigation actions (based on ECoPs, responsibility for execution and mitigation, key performance indicator and cost allocation.

Table 2: Mitigation and Compliance Monitoring Plan

Environmental Impact/Issue	Mitigation Actions	Responsibility		Key Performance Indicator	Cost Allocation
		Execution	Monitoring		
Vegetation removal	Clearing natural vegetation will be avoided as far as possible Equipment will be established in a natural clearing, to the extent possible. Any loss or damage to vegetation will be compensated in accordance with Tree Plantation plan In Reserved Forest or Ecologically Critical Areas equipment will be installed in government office premises wherever possible, in case this is not possible, equipment needs to be installed in natural cleaning Complete record will be maintained for any tree cutting Tree Plantation ECoP g.	Contractor	PIU (BMD, BWDB and DAE)	Number of any non-compliance reports Number of tree felled Area of vegetation restored.	Included in contractors' costs.
Radio-frequency emissions from equipment	Equipment with adequate safety standards can onl be procured Storage, handling and installation of equipment will follow standard safety instructions given by manufacturer.	Procurement Committee and PCU	PIU (BMD, BWDB and DAE)	Monitoring in accordance with Ground Water Monitoring Program No breaches of Material Safety Data Sheet (MSDS) for hazardous substances	Included in cost of equipment
Electronic and chemical waste	Waste Management ECoP A Waste Management Plan will be prepared and approval obtained from PSC	PIU (BMD, BWDB and DAE)	Environmental Specialist	Approved Plan appropriate KPIs for its implementation.	Included in O& M cost
Scouring of benthic habitat	Buoy Installation ECoP Environmental friendly anchoring and mooring options need to be installed to reduce impact area of the seafloor. Installations should not be located near coral reefs or sea grass areas.	Contractor	Environmental Specialist PIU(BMD),PCU	Reduced disturbance in sea floor	Included in contractors' costs
Damage from lightning	Adequate lightning safety measures will be taken to equip the weather stations with surge protectors to protect appliances. Precautionary steps during thunder storms will be taken, live connections for computers and equipment should be termed should not be using computers during l thunderstorms.		**PIU**(BMD, BWDB, DAE).	No. of equipment damaged from lighting	Included in contractors' costs
Health and safety	Concrete pillars placed in water need adequate facilities (example ladders, steps) to improve access; Motor boat speed will be limited to 15 km/h in accordance with best international practices; Place a high emphasis on good housekeeping practices. That is maintain all construction sites in a cleaner, tidy and safe condition Vessels must be maintained regularly. Life jackets have to be used by crew and crew has to be	Contractor	**PIU**(BMD, BWDB,DAE)	Occurrence of accidents	Included in O& M costs

	trained in life-saving techniques. Only trained professionals will install and inspect buoy There should be no travel during stormy weather				
Water pollution and disturbance to land ecosystem	The lakes, water bodies and lowlands must not be used for disposal of any waste or debris. Equipment will not be repaired in the field, repairs will take place in BMD and BWDB laboratories. Concrete pillars placed in water need adequate facilities (example ladders, steps) to improve access, thereby increasing safety during inspection. During measurement in canals, rivers, surveyors need to be careful not to throw anything in water and prevent leakages of oil from boats and catamarans. In-situ monitoring activities will not be continued in one place in long, contiguous stretches at a time. Motor boat speed accordance with best international practices will be limited to 15 km/h in accordance with best international practices Construction materials will be stored, used and handled appropriately.	Field team of PIU	**Environmental Specialist, PIU**	Number of non-compliance reports.	Included in contractors' costs
Personnel protective equipment (PPE)	Mandatory PPE identified in below is specific to all persons in all Project managed areas. Hard Hat, Safety Footwear, Eye protection, Gloves.	Contractor	**PIU**(BMD, BWDB,DAE)	Occurrence of accidents	Included in O&M costs

9. Site Specific Management Plans

The plan has been prepared fully by considering the GoB regulatory framework and WB safeguard policy. This is not an attempt to predict the specific impacts of projects or activities, but rather to minimize the overall potential change to the natural environment whilst implementing activities. The Environmental Management Plan(EMP) has been prepared based on the: (i) assessment on surrounding environment of the proposed locations; (ii) evaluation of the potential overall environmental impacts of the proposed project activities; (iii) suggestions for component specific standard environmental mitigation and monitoring plan with unit costing; (iv) public consultations; identification of the institutional barriers and capacity building needs for environmental management; and (vi) agreements necessary on the institutional arrangements for the environmental management.

Using the major steps outlined below, the EMP describes the process for ensuring that environmental and social concerns are adequately addressed through the institutional arrangements and procedures used by the project for managing the identification, preparation, approval, and implementation of Components. The major steps are:

Screening and Impact Assessment

Review, Approval, and Disclosure of Component Safeguard Instruments

Implementation, Supervision, Monitoring, and Reporting

10. Overview of Impacts and Mitigating Measures

Environmental Impact Assessment: Based on the types of the intervention to be financed under the project, it is evident from screening matrix for environmental impact assessment

that the project interventions will not cause any significant, irreversible and long term environmental impacts. The environmental impacts of the project are expected to be mostly minor construction or equipment installation related and limited within the project boundaries. However there are possibilities of a few likelihood adverse environmental and social impacts like; installation of instrument for automatic weather station system and disposal of damage or end-of-life equipment. Most of the adverse impacts identified are reversible in nature and can be managed by appropriate mitigation measures.

The potential impacts and possible mitigation measures have been identified for each component.

Adverse Environmental Impacts:

a. Vegetation removal: The equipment and necessary hardware will be installed in the compounds of Upazila Parishad offices, Union Parishad offices or BMD office premises across the country. These weather stations will require 5m by 5m land, which means trees or plants may need to be removed.

b. Radio-frequency emissions from equipment: Low-powered, intermittent, or inaccessible transmitters and facilities are normally "categorically excluded" from the requirement for routine evaluation for radio-frequency exposure.

c. Water pollution and disturbance to land ecosystems: Limited pollution of water sources with regular mobility of office staff observers and gauge readers in and around the stations and during measurements using echo-sounder, Acoustic Doppler Current Profiler (ADCP), sub-bottom profiler.

d. Hazardous and Electronic waste: The devices such as batteries, thermometer, barometer, weather balloons, solar panels, transducers and computer related electronics are e-wastes that may contain mercury, lead, cadmium, nickel, zinc, lithium and compounds such as Manganese dioxide, Potassium hydroxide, Sodium hydroxide and Ammonium chloride. Proper disposal or end-of-life management of the expired equipment needs to be done carefully. Leaching of these chemicals into soil or water or into air affect the environment, wildlife and human health, or the staff/workers may come in direct contact with them.
Scouring of benthic habitat: Few buoy stations will installed in the Bay of Bengal. Studies show that depending on the scope of chain, tidal range, and environmental forces where the buoy is located, benthic habitat can be scoured by the buoy chain and anchor. The laying down and picking up of sinkers and chain associated with floating or anchored buoy establishment, disestablishment, and maintenance can temporarily increase turbulence, turbidity, and sedimentation in their vicinities. Additionally, coral and seagrass species through direct contact with equipment can cause coral fragmentation, overturning, and abrasion. Disturbances of seabed biomass hinder organic matter production and nutrient recycling, and destabilize the sediment substrate, which are detrimental to seagrass regrowth.

e. Safety Issues: The installation and inspection of buoys in the sea could be hazardous and cause risk to installation team and inspection team, especially during inclement weather.

f. Damage from lightning: Tall electrical equipment and wiring attracts lightning during thunderstorms and can cause harm to equipment, buildings and even indoor equipment and people near the structures.

Positive Environmental Impacts

Promote scientific understandings

Improved disaster management

Mitigation measures

Clearing natural vegetation will be avoided and equipment will be installed in a natural clearing.

The removed trees or plants should be replaced with new plantation at appropriate locations.

The lakes, water bodies and lowlands must not be used for disposal of any waste or debris.

Solid waste and electronic waste should be properly disposed. The options include: storage, incineration, municipal solid waste landfill, recycling and hazardous waste process.

Equipment will not be repaired in the field. But rather in BMD laboratories. Where ever possible prefabrication in built up areas to avoid damage to vegetation.

Buoys with environmental friendly anchoring and mooring options need to be installed to reduce impact area of the seafloor. Installations should not be located near coral reefs or sea grass areas.

Adequate lightning safety measures should be taken to equip the weather stations with surge protectors to protect appliances and equipment. Precautionary steps during thunder storms should to be taken, live connections for computers and equipment should be turned off and personnel should not be using computers during thunderstorms.

Implement suitable safety standards for all workers and site visitors, with sufficient provisions to comply with international standards proper PPE to be used (e.g. International Labor Office guideline on ‘Safety and Health in Construction; World Bank Group’s ‘Environmental Health and Safety Guidelines’) and contractor’s own safety standards, in addition to complying with national standards.

Adequate safety measures should be taken by staff, during travel on boats and vessels during buoy installation and inspection. Vessels must be maintained regularly. Life jackets have to be used by crew and crew has to be trained in life-saving techniques. Only trained professionals will install and inspect buoy. There should be no travel during stormy weather;

Ensure the riverine transports, vessels and ships are well maintained and do not have oil leakage to contaminate river water. Contain oil immediately on river in case of accidental spillage from vessels and ships and in this regard, make an emergency oil spill containment plan to be supported with enough equipment, materials and human resources.

Provide lightning arrestor.

Radio-frequency emissions from equipment: Low-powered, intermittent, or inaccessible transmitters and facilities are normally "categorically excluded" from the requirement for routine evaluation for radio-frequency exposure.

Hazardous and e-wastes: Dry-cell batteries are commonly used for power supply for operation of hydrological and meteorological sensors in automated stations. Such batteries can affect human health and environment if they are not disposed properly. Devices such as batteries, thermometer, barometer, weather balloons and a computer related electronics are e-wastes that may contain mercury, lead, cadmium, nickel, zinc, lithium and compounds such as Manganese dioxide, Potassium hydroxide, Sodium hydroxide and Ammonium chloride. Disposal or end-of-life disposal of these equipment needs to be done carefully. Leaching of these chemicals into soil or water or into air affect the environment, wildlife and human health, or the staff/workers may come in direct contact with them.

Safety Issues: All equipment needs to have adequate and safe access provisions for installation, operation and maintenance. Concrete pillars placed in water need adequate facilities (example ladders, steps) to improve access, thereby increasing safety during inspection.

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11. Technical Assistance, Capacity Building, Environmental Training

The effectiveness of the Environmental Management Framework and implementation depends considerably on the understanding and preparedness of project staff and in particular their Environmental Team. It is important that the project authority to sensitize the team on management of environmental issues. **This EMF provides guidance, and encourages them to build requisite capacities.**

One of the most critical aspects of this project is to strengthen the technical capacity of the three implementing agencies. The capacity building program will be based on an assessment of the current capacity of staff, identification of training needs and involve development of a time-bound plan for areas of training, phasing, and modalities and institutions through which specific training will be provided. The capacity building program should also provide an opportunity for integrating environmental issues into the different policies, projects and activities of BMD, BWDB and DAE. Inter-sectoral coordination in dealing with cross-cutting issues like environment is a major lacking in Bangladesh. While many of the policies and sectoral regulations in Bangladesh have incorporated environmental issues into their regulatory framework, there is lack of directions for cooperation, coherence and coordination within the different agencies. Additionally inadequate capacity and structural reforms means environmental issues are not treated with appropriate urgency and priority and thus create inconsistencies. Present capacities of the three agencies with respect to environmental assessment are summarized in Table 3

Table 3: Capacity to incorporate environmental assessment and consultation

Implementation Agency	Activities related to EA	Gaps
Bangladesh Meteorological Department (BMD)	BMD has no prior experience of implementation of EA	No dedicated person or cell for EA or environmental issues
Bangladesh Water Development Board (BWDB)	Many BWDB projects fall under Red Category and therefore detailed EIA and IEE is done by independent consultants/ consulting farms	No dedicated person or cell for EA or environmental issu Activities related to EIA and IEE done project-wise and on an adhoc basis EA monitoring and implementation is absent A number of professionals have received training on EIA and environmental issues but there is no scope of structural reformation and continuity to sustain the capacity gained from training.
Department of Agricultural Extension (DAE)	DAE projects fall under Green Category and therefore DAE has no prior implementation of experience of EA	No dedicated person or cell for EA or environmental issues

Table 4 provides a summary of various aspects of the environmental trainings to be conducted. The PCU will update the plan during the Project implementation in consultation with the World Bank. During the implementation phase of the project, these trainings will continue to be conducted and coordinated by Environmental Specialist and PIU staff for all relevant O&M personnel and community.

Table 4: Environmental Trainings

Participants	Contents	Responsibility	Schedule	Type of program
Bangladesh Meteorological Department (BMD)				

Central and Divisional officers	General environmental and socioeconomic awareness Principles and policies for (natural) environmental mitigation in development projects; Legal and institutional aspects Project mandates; Environmental sensitivity of the project influence area Probable environmental impacts from project; Key findings of the EMF; Mitigation measures; ECoPs listed in the EMF	Environmental Specialist with selected national / international trainerS	During planning stage of project	Long term(5 days with 1 day field work)
Participants	**Contents**	**Responsibility**	**Schedule**	**Type of program**
Lab Technicians	General environmental and socioeconomic awareness Environmental sensitivity of the project influence area Probable environmental impacts from project; Key findings of the EMF; Mitigation measures; ECoPs listed in the EMF	Environmental Specialist with national trainers and trained Central BMD officers	During planning stage of project (To be repeated as needed)	Medium term(3 days)
Bangladesh Water Development Board (BWDB)				
Director to Sub Assistant level officers primarily in Hydrology, O&M and Planning divisions	General environmental and socioeconomic awareness; Principles and policies for (natural) environmental mitigation in development projects; Legal and institutional aspects; Project mandates; Environmental sensitivity of the project influence area. Probable environmental impacts from project; Key findings of the EMF; Mitigation measures; ECoPs listed in the EMF also occupational health and safety and EHS.	Environmental Specialist with national / international trainerS	During planning stage of project	Long term(5 days with 1 day field work)
Field staff from Hydrology and O&M Divisions in the relevant districts	General environmental and socioeconomic awareness Principles and policies for (natural) environmental mitigation in development projects; Legal and institutional aspects Project mandates; Environmental sensitivity of the project influence area Probable environmental impacts from project; Key findings of the EMF; Mitigation measures; ECoPs listed in the EMF also occupational health and safety and EHS.	Environmental Specialist with national trainers and trained BWDB officers	During planning stage of project (To be repeated as needed)	Medium term(3 days)
Drivers; boat/launch crew	Road/waterway safety Defensive driving/sailing Waste disposal	Trained BWDB officers	Before and during the field operation. (To be repeated as needed)	Short term(1 day)
Department of Agricultural Extension (DAE)				
Central and Divisional officers	General environmental and socioeconomic awareness Principles and policies for (natural) environmental mitigation in development projects; Legal and institutional aspects Project mandates; Environmental sensitivity of the project influence area Probable environmental impacts from project; Key findings of the EMF; Mitigation measures; ECoPs listed in the EMF	Environmental Specialist with selected national / international trainerS	Prior to the start of the(To be repeated as needed)	Long term(5 days with 1 day field work)
Upazila officers	General environmental and socioeconomic awareness Principles and policies for (natural) environmental mitigation in development projects; Legal and institutional aspects Project mandates; Environmental sensitivity of the project influence area Probable environmental impacts from project; Key findings of the EMF; Mitigation measures; ECoPs listed in the EMF	Environmental Specialist with selected national trainers and trained DAE officers	During planning stage of project (To be repeated as needed)	Medium term(3 days)
Sub Assistant Agricultural	General environmental and socioeconomic awareness Environmental sensitivity of the	Environmental Specialist with	During planning	Short term(1 day)

Officers at union level	project influence area Probable environmental impacts from project; Key findings of the EMF; Mitigation measures; ECoPs listed in the EMF	selected national trainers and trained central DAE officers	stage of project (To be repeated as needed)	
General				
Focal Person from PIU-BMD (2 person), PIU-BWDB (1 person) and PIU-DAE	Training of trainers	Environmental Specialist with selected national trainers	During planning stage of project	Short term(10 days)
Contractors and installation crew	General environmental and socioeconomic awareness Environmental sensitivity of the project influence area Probable environmental impacts from project; Key findings of the EMF; Mitigation measures; ECoPs listed in the EMF	Environmental Specialist with national trainers and trained Central DAE officers	During planning stage of project	Short term(1 day)

12. Environmental Monitoring Program

Environmental Monitoring of the performance of a project is very important and sometimes vital. Monitoring for this project will help to evaluate the extent and severity of environmental impacts against the predicted impact and the performance of environmental protect measures. The following table has prepared for monitoring the operation & maintenance phase activities of the project and shown in the table below.

Table 5 Compliance Monitoring / Effects Monitoring During Project Implementation

Project Activity	Potential Environmental Impact(s)	Mitigation Measures	Estimated Mitigation Cost	Responsibility	
				Implementation	Supervision
Preconstruction					
Construction of labour camp	May be Loss of agricultural land, improper waste disposal may affect on environment.	Identify the location of construction camps so that minimum disturbance on agricultural land. Camps shall not be located near settlements or near water supply intakes. Place will be kept neat and clean strictly to ensure good sanitary condition.	According to overall environmental management plan in addition to compliance to be included in BOQ	Contractor	PIU (BMD, BWDB and DAE)
Construction					
Vegetation removal	Local flora are important habitats for birds, provide fruit harvest, timber/fire wood, protect soil from erosion and overall keep the natural balance for human - living. As such damage to flora has wide range of adverse environmental impacts	Minimize disturbance to surrounding vegetation. Get approval from supervision consultant for clearance of vegetation. Make selective and careful pruning of trees where possible to reduce need of tree removal. the vegetation that needs to be cleared in accordance with the engineering plans and designs. Local varieties of trees should be planted as much as possible;	According to overall environmental management plan in addition to compliance with included in BOQ	Contractor	PIU (BMD, BWDB and DAE)

Project Activity	Potential Environmental Impact(s)	Mitigation Measures	Estimated Mitigation Cost	Responsibility	
				Implementation	Supervision
Hazardous material and Waste	Water pollution from the storage, handling and disposal of hazardous materials and general construction waste, and accidental spillage	Follow the management guidelines proposed in ECP 3: Waste Management Minimize the generation of spoils, oil and greases, excess nutrients, organic matter, litter, debris and any form waste (particularly petroleum and of chemical wastes).	According to overall environmental management plan in addition to compliance with included in BOQ	Contractor	PIU (BMD, BWDB and DAE)
Noise	Noise level of the construction site increase	Proper scheduling of transportation of material and noise generated work. All vehicles and equipment used in construction shall be fitted by exhaust silencers, maintain regularly to maintain noise standard.	According to overall environmental management plan in addition to compliance with included in BOQ	Contractor	PIU (BMD, BWDB and DAE)
Surface water	Contamination surface water	Ensure wastes/effluent are disposed properly away from site	According to overall environmental management plan in addition to compliance with included in BOQ	Contractor	PIU (BMD, BWDB and DAE)
Drinking water	Untreated surface water is not suitable for drinking purposes due to presence of suspended solids and ecoli.	Provide drinking water that meets National and WHO Drinking Water standards.	As per BOQ of bidding document	Contractor	PIU (BMD, BWDB and DAE)
Operation Phase					
Lose of tree and related income.	Local flora are important habitats for birds, provide fruit harvest, timber/fire wood, protect soil from erosion and overall keep the natural balance for human - living. As such damage to flora has wide range of adverse environmental impacts.	Encourage tree plantation program.	As per BOQ of bidding document	BWDB	PIU (BMD, BWDB and DAE)

Environmental Monitoring

Environmental Monitoring plan for this project will help to evaluate the extent and severity of environmental impacts against the predicated impact and the performance of environmental project measures. The effectiveness of the Environmental Management and implementation depends considerably on the understanding and preparedness of project staff and in particular their Environmental Team. It is important that the project authority to sensitize the team on management of environmental issues. environmental and social included extensive consultations with stakeholders through several focus group discussions, informal

consultation meetings. The following table 6. has prepared for monitoring the operation & maintenance phase activities of the project.

Table 6. Effects Monitoring During Project Implementation

It was observed from the screening that the installations will have no negative impact on environmental components. No big tree will be affected for these installations but might involve stripping of petty amount of vegetation during installations which will be regenerated within a short period of time after installations. Minimum health and safety issues may arise during installation of tube wells, for which mitigation measure have been incorporated in the bid document. However, if any environmental impact is observed during implementation, necessary mitigation measures will be taken as per EMF of the project.

Environmental Indicator	Parameters/ Units	Means of Monitoring	Frequency/Duration Standards	Responsibilities		Estimated Cost
				Execution	Monitoring	
Vegetation removal	Measurement PM	Inspection	Continuous Monitoring	Contractor	PIU (BMD, BWDB and DAE)	Included in contractors' costs.
Waste management	Monitoring of collection. Inspection of construction camp.	Inspection	Continuous Monitoring	Contractor	PIU (BMD, BWDB and DAE)	Included in contractors' costs.
Water pollution and disturbance to land ecosystem	Measurement PM	Inspection	Continuous Monitoring	Contractor	PIU (BMD, BWDB and DAE)	Included in contractors' costs.
Health and safety	Monitoring health and safety workers	Inspection	Continuous Monitoring	Contractor	PIU (BMD, BWDB and DAE)	Included in contractors' costs.
Air quality	Measurement PM	Inspection	Continuous Monitoring	Contractor	PIU (BMD, BWDB and DAE)	Included in contractors' costs.
Dust	Measurement PM	Inspection	Continuous Monitoring	Contractor	PIU (BMD, BWDB and DAE)	Included in contractors' costs.
Noise	Measurement PM	Inspection	Continuous Monitoring	Contractor	PIU (BMD, BWDB and DAE)	Included in contractors' costs.

In consideration to the above mentioned environmental impacts and their mitigation measures for this project, the following items need to be incorporated in the BOQ of the project. The following table 7 has prepared for **Environmental** Mitigation & Enhancement Works.

Table 7. Environmental Mitigation & Enhancement Works

	Description of Item	Costs (TK)
	Environmental Mitigation & Enhancement Works	
1	Overall environmental management in addition to compliance to the entire satisfaction of E-I-C	
	a) Temporary camp site waste disposal facility improvement	
	b) First Aid box 2 nos	
	c) Suspected to have been contaminated with **COVID-19**, Providing them with appropriate Personal Protective Equipment (PPE) : aprons, gloves, eye protection (masks, goggles or face screens) and boots.	
2	Providing and maintaining adequate potable water supply facilities (Tube well) at camp site and work site to the entire satisfaction of E-I-C.	
	a) Water supply	
	b) Sanitation	

Environmental Management and Monitoring Cost:

The cost of overall environmental and social management includes Waste management, Dissemination, and Impact compliance and evaluation and capacity building and is estimated to be **USD 0.62 million** over the project period.

ANNEX- 1 Contract Documents

ANNEX-2

Package BWDB-W2

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