Environmental Monitoring Report

1 Semi-Annual Report
For the period covered January to June 2016
Project Number: 44167-014
January 2017

Bangladesh: Flood and Riverbank Erosion Risk Management Investment Program (Tranche1)

Prepared by the Bangladesh Water Development Board for the Government of Bangladesh and the Asian Development Bank.

Government of the People's Republic of Bangladesh

Bangladesh Water Development Board

Flood and River Bank Erosion Risk Management Investment Program

ADB Loan Number: 3138 BAN (SF)

Semi-annual Environmental Monitoring Report
Period: January 2016 - June 2016

Government of the People's Republic of Bangladesh

Bangladesh Water Development Board

Flood and Riverbank Erosion Risk Management Investment Program

Semi-annual Environmental Monitoring Report

Tranche 1

Period: January 2016 - June 2016

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Abbreviations and Acronyms

ADB	Asian Development Bank
BWDB	Bangladesh Water Development Board
CEMP	Contractor's environmental management plan
DOE	Department of Environment
DPHE	Department of Public Health Engineering
EIA	Environmental impact statement
EMP	Environmental management plan
FGD	Focus Group Discussion
FRERMIP	Flood and Riverbank Erosion Risk Management Investment Program
ISPMC	Institutional Strengthening and Project Management Consultant
PMO	Project Management Office
RRA	Rapid Rural Appraisal

Executive Summary

This 1st Semiannual Environmental Monitoring Report for Flood and Riverbank Erosion Risk Management Investment Program (FRERMIP) has been prepared to fulfill the safeguard policy requirement of ADB. FRERMIP has been categorized as category-A for environment in accordance with ADB's Safeguard Policy Statement (2009).But according to Bangladesh Environment Act (1995) and Environment Conservation Rule-1997 it was categorized as Red Category and a detail Environmental Impact Assessment (EIA) including EMP was done to fulfill the GoB requirement as well as ADB's requirement. This 1st semiannual Environmental Monitoring Report is prepared for monitoring the EMP and following the Environmental Monitoring Plan described in that EIA report. To meet ADB's reporting requirements (a) semi-annual Environmental Monitoring Report (in July) and (b) annual Environmental Monitoring Report (in December) are mandatory to submit ADB for disclosure.

As a part of implementation of the FRERMIP a number of interventions have been planned in three (3) tranches. The Tranche-1 is already being implemented. The main components of tranche-1 are (a) Riverbank Protection work at Chauhali, Dist. Serajgonj- 7 km (b) Riverbank Protection work at Jaforgonj, Dist. Manikgonj- 1.88 km (c) Riverbank Protection work at Harirampur, Dist. Manikgonj- 8.66 km and (d) Construction and Rehabilitation of Embankment from Kaijuri to Hurasagar, Dist. Serajgonj&Pabna – 23 km.

The Project is expected to have generally positive impacts on the environment:

- To protect land and valuable infrastructure from riverbank erosion making risk free environment and poverty alleviation of the local people.

- Flood Embankments to reduce flood damage and infrastructure and to induce greater economic investment and productivity in flood plain agriculture by reducing flood risk

On the other hand, negative impacts identified include (i) degradation of Floodplain aquatic (wetland) habitats due to reduced flooded area, depth, and duration; reduced hydrologic connectivity; and physiochemical / water quality changes. This in turn will adversely affect floodplain-dependent open water fish species migration, population levels, as well as wetland biodiversity services, and more generallyyeld. The embankment can impede cross-drainage (drainage congestion), adversely affecting agriculture within the protected area, and blocking the movement of migrating fish and other animal and plant species and therewith reduce biodiversity of the area concerned, and thus ecosystem sustainability(ii) Due to bank protection work, accretion may result which in turn reduces the navigability in the river reaches (iii) water quality deterioration due to agriculture intensification (iv) temporary impacts during construction of structure and embankments.

These will be mitigated through (i) a number of sluice gates with fish pass that will reduce the risk of drainage congestion and allow some cross movement of fish during the migration season.However, the loss of open water fisheries will be compensated by the increase in culture fisheries, resulting in a net gain in fish production. The loss of floodplain fisheries will be further mitigated through a program enhancing wetland biodiversity and aquaculture. The program will be implemented through a specialist NGO and supervised through the Department of Fisheries (DOF). Vulnerable groups, specifically the poor, project affected people, and women will be given preference in these activities. (ii) The accretion in the river causing reduction of navigability may be reduced by grudging to be done during dry season. (iii) Introducing integrated pest management and effective soil

nutrient management as a part of agriculture extension (iv) involvement of Community organizations in project activities would enhance crop production. Proper resettlement as per safe guard methodology would compensate the land lose.

The positive and adverse impacts and their mitigation measures and enhancement were incorporated in the EIA for tranche-1 of FRERMIP. A comprehensive EMP was also in the EIA of the project distinguishing the phases i.e. pre-construction, construction and post-construction and is meant to manage and mitigate all identified adverse impacts of the project. At the field level contractors are responsible to implement prepared EMP of the project. To comply with the EMP at field level Environmental health and safety commensurate with nation and international laws have been included in the contractor's contract. A national and an international Environment Specialist have been engaged to monitor the EMP prepared for the project from consultant's team. A safeguard cell at PMO headed by an Executive Engineer is responsible to oversee the whole process and verify the claims and grievances raised by community people/farmers if any and finally prepare and submit safeguard report to ADB regularly for disclosure.

1. Project Background

1.1 Background

Bangladesh Water Development Board implemented many Flood Controls Drainage (FCD) and Flood Controls Drainage and Irrigation (FCDI) projects. Meghna-Dhonagoda Irrigation Project (MDIP) and Pabna Irrigation and Rural Development Project (PIRDP) are among those FCDI projects. MDIP was built during 1980s and PIRDP from 1980s to early 1990s. Both projects were financially assisted by the Asian Development Bank (ADB). The MDIP is located on the left bank of MeghnaRiver, between the upstream and downstream confluence points of PadmaRiver. The PIRDP is located on the right bank of the JamunaRiver, upstream of the confluence of the GangesRiver. In 1996, ADB provided a loan to further develop the command areas of the two projects. During later stage of implementation of Command Area Development Project (CADP), both the project area came under severe erosion attack of the adjoining rivers, threatening the very existence of the flood projection embankments, pumping stations and other infrastructures. In the circumstances, on request from the Government, ADB again came forward with technical assistance and subsequent loan to address the issue.

In 2001, 'Jamuna-Meghna River Erosion Mitigation Project (JMREMP)' was undertaken by Government with the financial and technical assistance of ADB with dual purposes - firstly to mitigate bank erosion at PIRDP and MDIP with sustainable and cost effective protection works; secondly, to develop a framework for sustainable erosion risk management system to be applied elsewhere in the country. Over the extended implementation period from 2002 to 2011, both the MDIP and PIRDP could be provided with the sustainable erosion protection works at locations identified during project preparation. Over and above these, additional length which more than original protection length could be provided at both the project area, with original cost estimate. This is due to development of low cost protection system parallel to providing building bank protection works at affected locations. Over the period of initial 4 years, through trial, supported by laboratory tests, the project finalized a bank protection system that has proved to be cost effective and sustainable. The project has developed the concept of phased planning and implementation to adapt to changing river condition known as adaptive management. This concept provides the necessary flexibility to respond in an appropriate manner to the largely unpredictable river behaviour and available funding. Core principles include (i) Erosion prediction during the dry season (ii) Extensive river surveys during the flood season (iii) Phased implementation of bank protection over several years starting with (a) optional immediate protection before the flood season, if there is an emergency situation, followed by (b) installation of main protection during the next dry season, and (c) later placement of adaptive protection to extend the existing work to deeper levels if river attack continues. Adaptive protection, which in this phased concept is a fundamental requisite for long-term stability, differs from traditional approaches where the initial design was expected to serve for a long time with only minor maintenance (iv) Monitoring on a regular basis to provide the information required for deciding on maintenance and adaptive protection (v) Placement of strategic stockpiles of geo-textile bags near the riverbank, to support emergency work and reduce response times. The most important development of the project is a special method of construction of underwater revetment by dumping sand filled geo-textile bags from positioned barges. All these made the JMREMP protection works low cost and sustainable.

On successful implementation of JMREMP with low cost riverbank protections ADB came forward for similar nature of bank protective projects along the main rivers Jamuna, Ganges and Padma.

FRERMIP aims to modify the flood season hydrology of a very large area of floodplain by providing new and rehabilitated embankments, leaving distributaries open, along selected reaches of the Padma / Jamuna River. To protect these embankments, river banks are being progressively stabilized, starting at critically eroding reaches. Over time, this approach may lead to general river stabilization, potentially transforming the geomorphology of the Padma / Jamuna in an unprecedented manner (particularly if a single-channel solution is implemented). The anticipated benefits are considerable: (i) reduced loss of agricultural and other land to river erosion, (ii) reduced flood damage to agriculture (etc), and (iii) increased agricultural production on less-flooded agricultural land.

The structural components of riverbank protection and embankments are accompined by non-structural components. These address institutional issues, on knowledgebase and planning level, and directly assist local communities in the sub-project areas in improving their preparedness to flood and erosion disaster. The latter will be implemented through DDM under a community-based flood risk management program covering around ome million people in the three subproject areas.

1.2 Objectives:

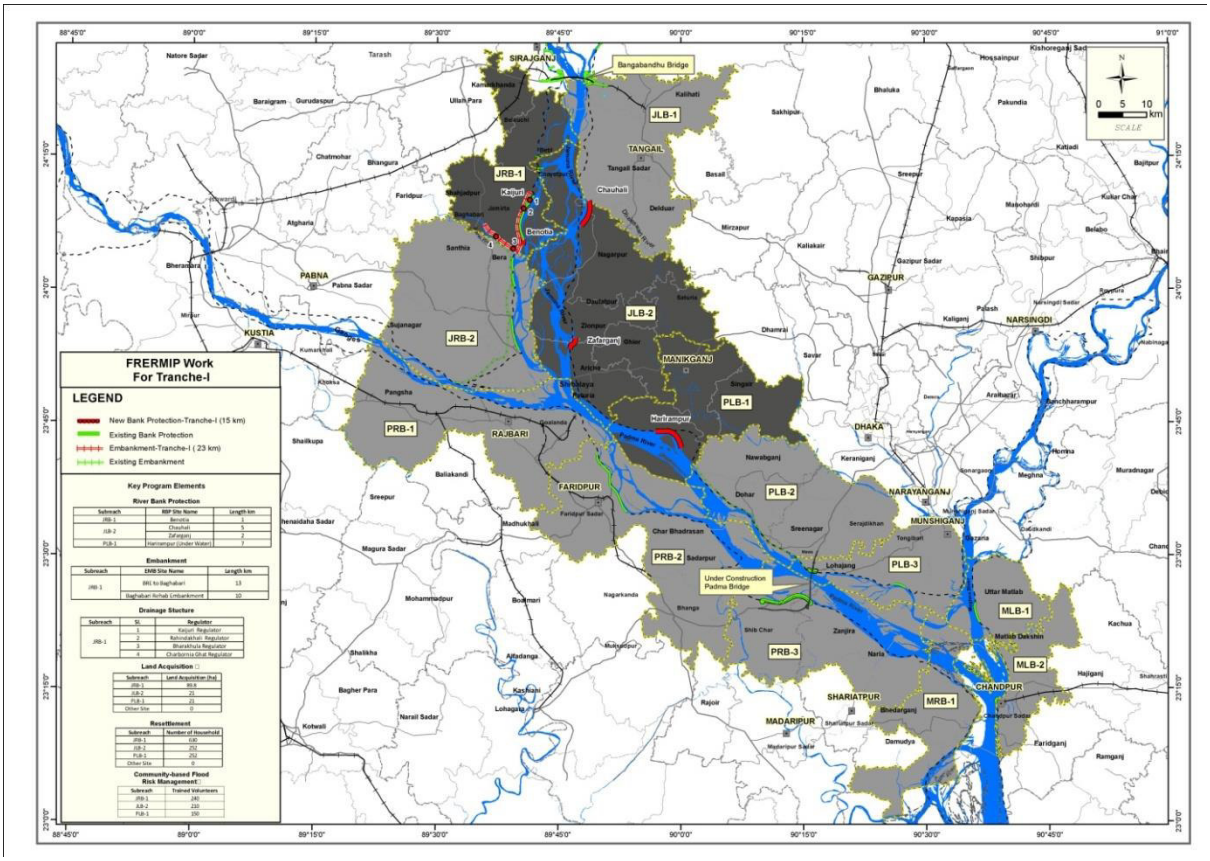
1. The objectives of the program are –
    - to sustain economic growth, poverty reduction and livelihoods of people, living in the areas threatened by riverbank erosion.
    - to enhance resilience to flood and riverbank erosion risks through strengthening the flood and riverbank erosion management system, including the knowledge base and underlying institutions;
    - to establish integrated non-structural and structural risk management measures at priority erosion sites and addressing their sustainability.

2. Project Description

2.1 FRERMIP Location and Area

The FRERMIP area encompasses the Jamuna River reach starting below the Jamuna Bridge and the proposed Ganges Barrage site, down to Chandpuron the Lower Meghna. Downstream of the Jamuna Bridge and the Barrage site, theJamuna and Ganges river courses are somewhat independent of upstream river developments. The FRERMIP area covers 9,300 km³ with a total population of 10.5 million (2011 census) in 40 upazilas and 431 unions, with an average population density of nearly 1,600 persons per km² of floodplain land.

Map 2.1 shows the locations of proposed interventions during Tranches 1. Project –Tranche 1

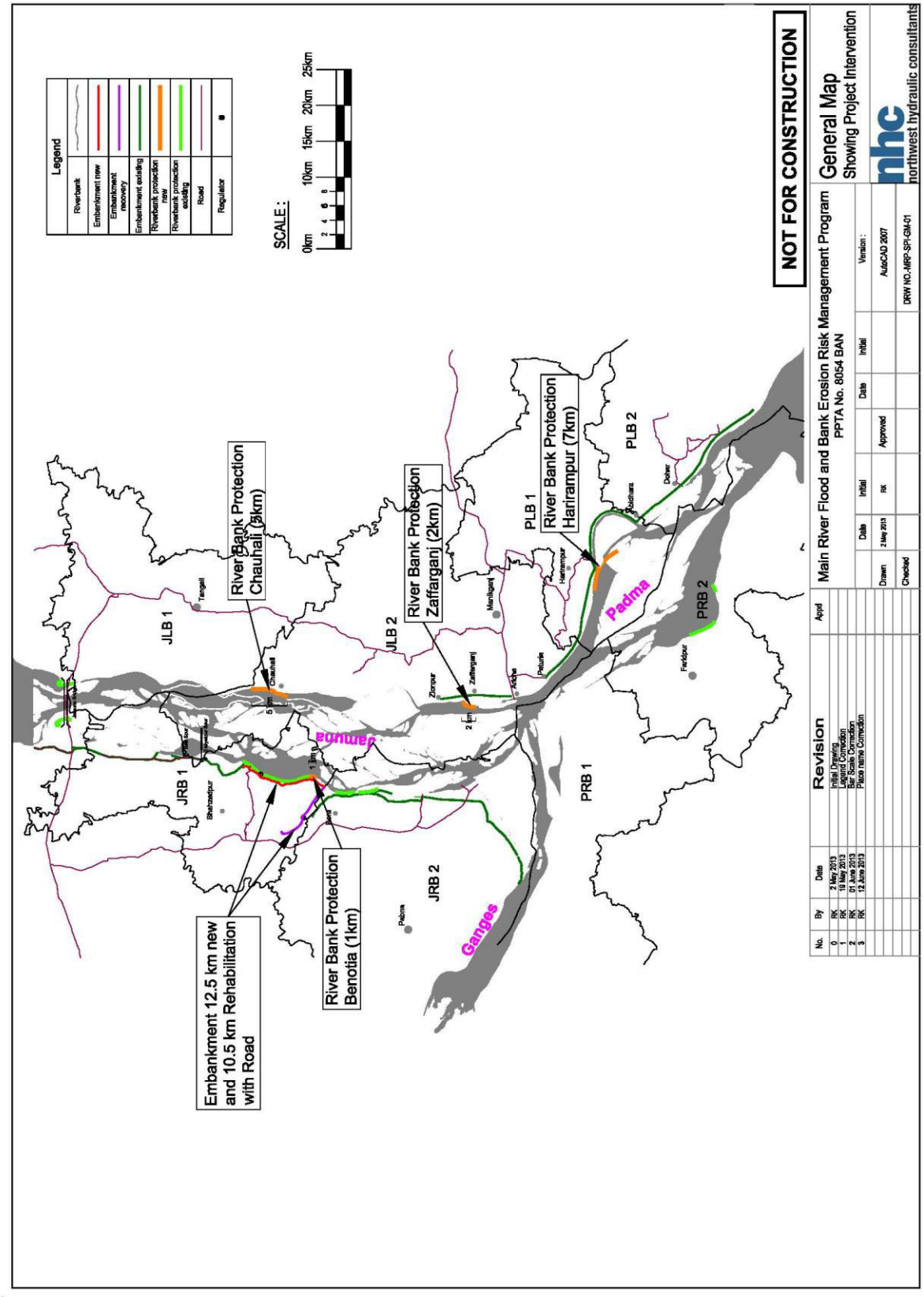


Map2.1: Location of Project area

2.2 Project Interventions

The major construction work of FRERMIP is located in three sites till June2016 viz. (i) Bank protection work at Chauhali-6.80 (ii) Bank protection work at Zaforjong- 1.22 km (iii) Bank protection work at Horirampur- 8.70 km, shown in Map 2.2. The works are in progress and schedule to complete by June 2017. The adverse environmental and social impacts of FRERMIP are mostly concentrated to construction and operation of these three sites

Proposed interventions under Tranche 1 fall into three categories: (i) riverbank protection, (ii) new and rehabilitated road/flood embankments, (iii) drainage sluices


NOT FOR CONSTRUCTION
General Map
Showing Project Intervention
Main River Flood and Bank Erosion Risk Management Program
PPTA No. 8054 BAN
nhc
northwest hydraulic consultants
Legend
Riverbank
Embankment new
Embankment recovery
Embankment existing
Riverbank protection new
Riverbank protection existing
Road
Regulator
SCALE :
0km 5km 10km 15km 20km 25km
Embankment 12.5 km new and 10.5 km Rehabilitation with Road
River Bank Protection Benotia (1km)
River Bank Protection Chauhali (5km)
River Bank Protection Zaffarganj (2km)
River Bank Protection Harirampur (7km)
Jamuna
Padma
Ganges
JRB 1
JRB 2
JLB 1
JLB 2
PRB 1
PRB 2
PLB 1
PLB 2
Revision
Initial Drawing
Layout Correction
Bar Scale Correction
Place name Correction

Map

2.1: Tranche 1 Interventions

a) Riverbank Protection

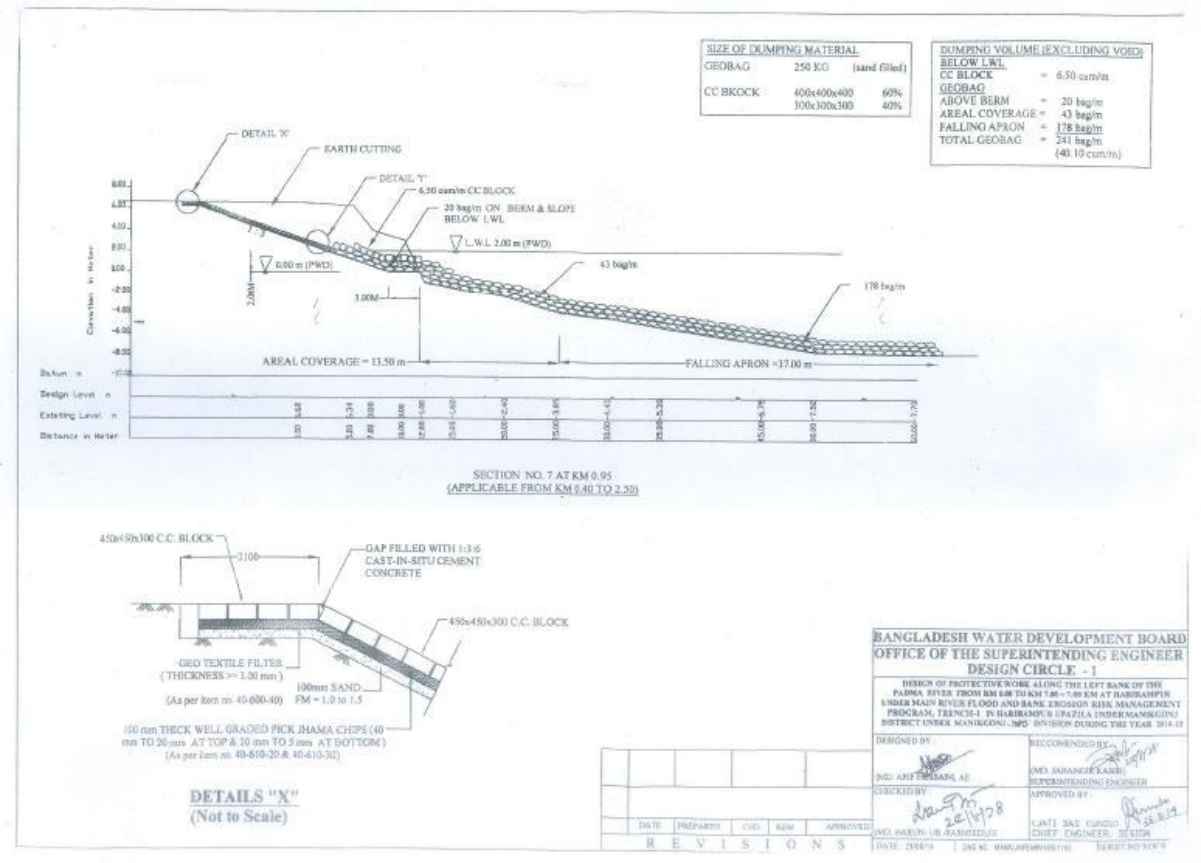


Figure 2-2: Riverbank Protection at Harirampur, Representative Cross-Section

b) Embankments

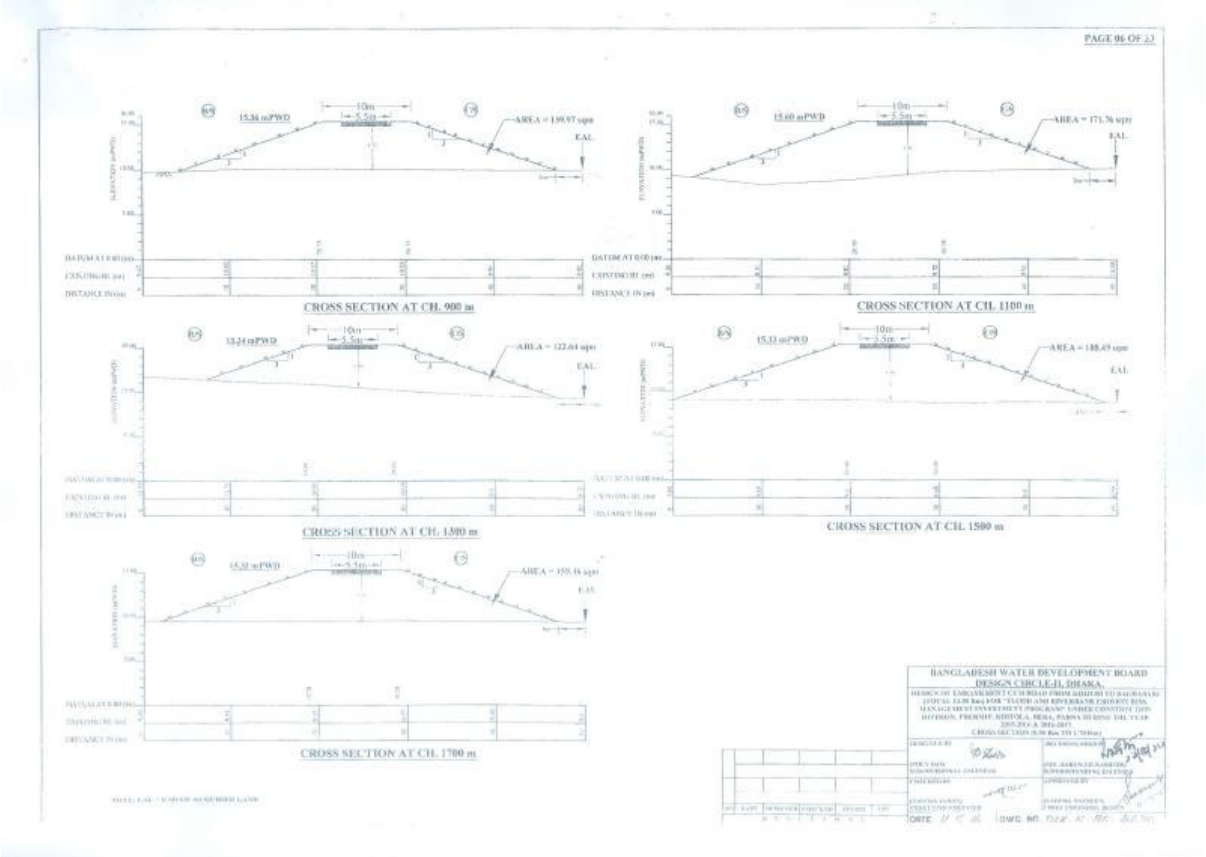


Figure 2.2: Embankment, Representative Cross-Section

c) Regulator

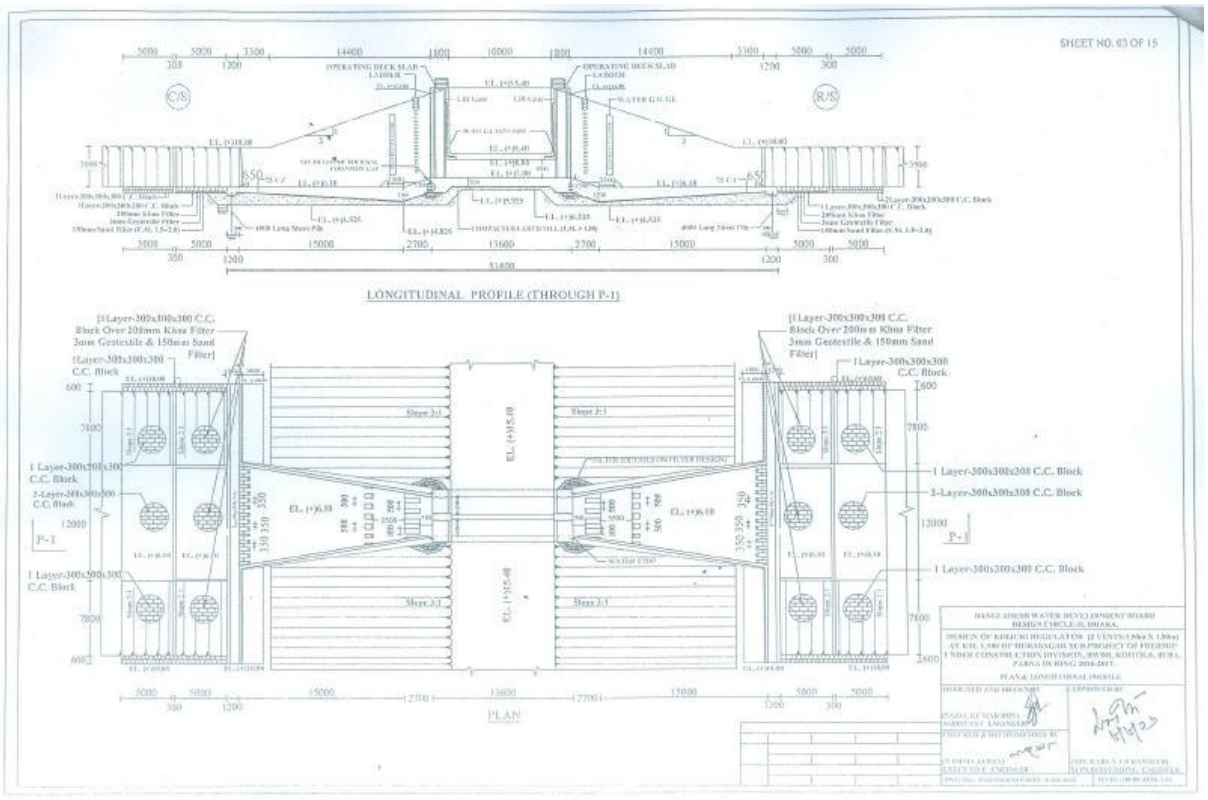


Figure 2.3: Design of Koijuri Regulator, Bera

The Progress of physical works of FRERMIP as on June 2016 is illustrated in following Table

Sl. no.	*Work component as per DPP (with quantity)*	*Economic code/sub code*	*Original Estimate Cost*	*Revised Estimated cost*	*Achievement up to June 2016*	
					Financial	*Physical (%)*
1	*2*	*3*	*4*	*5*	*6*	*7*
	(a) Revenue Component					
1.	*ADB Interest during implementation & services change for Netherlands grant*	*4826*	*1992.00*	-	100.00	5.02
2.	*BWDB Capacity Development Program*	*4840*	*1043..50*	-	147.02	14.09
3	*Resettlement Support Program*	*4849*	*297.00*	-		
4.	*Implementation Consultant*	*4874*	*4064.00*	-		
5.	*River Stabilization and Land Recovery Study*	*4874*	*4840.00*	-		
6.	*Feasibility of Tranche-2/3 Project*	*4874*	*1780..50*	-	1523.96	14.26
7.	*Resettlement Implementation Support*	*4874*	*175.00*	-	16.20	9.26
8.	*Livelihood Support Program*	*4874*	*651.30*	-	-	-

9.	*Environmental Management Program*	*4874*	*597.80*	-	-	-
10.	*Community based Disaster Management Program (DDM)*	*4874*	*668.80*	-	-	-
11.	*Participatory regular O&M training support*	*4874*	*240.00*	-	-	-
12.	*Land/River Survey and Data Processing*	*4886*	*80.00*	-	24.72	30.89
13.	*Survey and Investigation/ Data Processing*	*4886*	*867.20*	-	115.17	13.28
	PMO operational Expenses					
14.	*a) Salaries and allowances*	*4700*	*836.60*	-	-	-
15.	*b) PMO Operational Expenses*	*4800*	*496.10*	-	58.49	11.79
16.	*PIU-DDM Operational Expenses*	*4899*	*120.70*	-	-	-
	Sub-total Revenue Component of (a)		***18750.50***	-	**1985.56**	**10.59**
	(b) Capital Component			-	-	-
1.	*Transport vehicle (Jeep 5 unit, 10 motorcycle, 1 speed boat)*	*6807*	*641.40*	-	349.48	54.49
2.	*Computer and Office Equipment*	*6819*	*89.40*	-	43.63	48.80
3	*Computer and Office Equipment (DDM)*	*6819*	*5.80*	-	-	-
4.	*Survey Equipment*	*6851*	*89.00*	-	67.47	75.80
5.	*Land acquisition (136.00 ha.)*	*6901*	*8847.88*	-	6364.99	51.29
6.	*Construction of Inspection banglow at Manikganj*	*7016*	*50.00*	-	-	-
7.	*Regulator/Sluice (new construction 4 nos and repair 3 nos) in JRB1 subproject area*	*7041*	*1406.00*	-	-	-
8.	*23km Embankment along the Right Bank of Jamuna and the left bank of Baral-Hurasagar with 5km crest pavement*	*7081*	*7888.28*	-	-	-
9.	*Protective works at right bank of Jamuna at Kajuri area, at left bank of Jamuna at Chauhali, Jafforganj, Harrirampur& others area- 15.00 km.*	*7081*	*32659.90*	-	14110.07	14.00 km (55%)
10.	*Land Recovery/River Training Piloting Works*	*7081*	*3798.00*	-	-	-
11.	*Adaptive Protection and Emergency*	*7081*	*2790.80*	-	-	-
12.	*CD and SD*	*7901*	*723.25*	-	-	-
	Sub-total Capital Component of (b)		***58989.71***	-	**20935.64**	**37.59**
	Sub-total (a+b)		***77740.21***	-	**22921.20**	**35.80**
(c)	*Physical Contingency*		*1522.17*	-	-	-
(d)	*Price Contingency*		*3593.62*	-	-	-
	Grand Total (a+b+c+d)		***82856.00***	-	**22921.20**	**35.63**

2.3 Project Implementation Arrangements

BWDB is the executing agency, while DDM is the implementing agency for the community-based flood risk management component.As for all development projects, an inter-ministerial steering committee will review and discuss the project in annual meetings. A Panel of Experts will provide

guidance related to river morphology, flood risk management, institutional development, regional/local capacity development, and other issues emerging during implementation.

A Project Management Office (PMO) integrated into BWDB administration will be set up, headed by a Project Director who will be a senior Superintending Engineer or an Additional Chief Engineer (with powers similar to the zonal Chief Engineer), supported by two Superintending Engineers. The PMO might be converted to proposed office of the Chief Engineer River Management and River Management Wing, once these posts are approved and staffed. The River Management Wing will be responsible for national river management activities such as char reclamation and materials procurement and strategic stockpiling, and for implementing works through existing zonal divisions (whose staff levels will be increased) that already construct embankments and revetments. In addition to the PMO in Dhaka, sub-project management offices (SMO) will be established in the divisional offices located in the project sites areas of Koitola, Tangail, and Manikgonj. In addition to the Project Director and the two Superintending Engineers, the PMO will be staffed with four executive engineers, four sub-divisional engineers and one assistant engineer. All PMO staff will work full time on the project. One of the executive engineers will be responsible for environmental management, and will work with consultants to monitor and supervise activities in the project sites. Each SMO will be headed by an executive engineer who will be supported by a sub-divisional engineer, an assistant engineer, and three sub-assistant engineers. In the SMO, the sub-divisional engineer will be responsible for day to day management of environmental concerns.

BWDB is responsiblefor large-scale flood management and river erosion interventions, including the environmental aspects of their planning, assessment, and management, but it hasvery limited environmental staff in the Chief Planning office and no environmental- unit. Environmental management will be entrusted to executive engineer level PMO staff, supported by consultants. The PMO assures that environmental management will form part of construction contracts and regular monitoring of construction activities will be conducted. In addition future interventions will be studied at multiple levels to minimize negativeimpacts. A river stabilization study, and land recovery piloting, will assess potential river stabilization alternatives and their impacts, inter alia, on the environment. In addition, successive tranches will be designed through full feasibility studies, complying with ADB safeguard standard.

An Institutional Strengthening and Project Management Consultant (ISPMC) will provide consultancy and NGO services to support project implementation in a variety of ways, including the services of a specialist organization to conduct environmental assessment, planning and management to support the PMO in environmental monitoring; and, in Tranches 2 and 3, to assist PMO to design and develop a new Environmental Monitoring and Management Unit.

3. Environmental Management Plan

3.1 Introduction

The Environmental Management Plan (EMP) sets for the mitigation and monitoring to be undertaken. Three mitigation packages address:

- *Construction-phase impacts:* Management will be through the inclusion of standard environmental safeguard clauses in construction contract bidding packages, Contractor's Environmental Management Plans (CEMPs) and BWDB construction supervision.

- *Impacts on openwater fish biodiversity and production:* Measures to mitigate these impacts (i) include open water fisheries-related measures and (ii) expansion of aquaculture, particularly in areas benefitting from Project-led reductions in flood and erosion risk.

- *Land acquisition and resettlement impacts.*

The EMP were planned to be implemented by the Project Management Unit supported by an Institutional Strengthening and Project Management Consultant (ISPMC) team that includes an environment specialist. Implementation of EMP mitigation and monitoring activities are scheduled to ensure that each type of safeguards measure is in place and operating effectively by the time each corresponding impact (construction- or implementation-phase) is triggered.

An attempt has been made to evaluate the impacts with and without mitigation measures by assigning numerical scores. The scores have been assigned using expert level judgments of the study team. The impacts and mitigation measures distinguish pre-construction, construction, and post construction phases and are detailed for the following five resource categories:

- Physical and Water Resources
- Land Resources
- Agriculture Resources
- Fisheries Resources
- Ecological Resources
- Socio-economic Resources

The Detail EMP devised during feasibility study has been incorporated in Annex-1.

3.2 Summary of anticipated environmental Impacts and Mitigation Measures

Overall the proposed Tranche-1 riverbank protection of limited length has no siginificant negative impacts on the river but the potential to enhance the biodiversity in places. Locally more stable and deeper channels,as encouraged by riverbank protection, support fish populations. The deeper channels provide a better refugium especially during systematic fishing with floating nets, are more attractive for dolphins which depend on the deeper channels also for migration. The construction season lies outside of the migration season of the dolphins (during the rising and falling of flood waters) and does not overlap much with the surfacing time of the juvenile and neonate dolphins in the morning and afternoon-evening hours. Benthos communities are known to settle on geotextile bags and apart from the disturbance during the dry season construction, when benthos are not active, the inert geobag revetments do not have significant negative impacts on the river. The Program proposes to establish supporting enhancement measures during later tranches by placing navigation buoyage alongside protected riverbanks, which would discourage systematic, wide-scale fishing with floating nets, and to study sanctuary / protected area options.

3.3 Monitoring Plan

A monitoring plan was prepared to be carried out during the post-construction phase of the project. The monitoring plan has been prepared considering a number of environmental indicators related to the project interventions. The methods of carrying out the monitoring plan as well as the desired schedule of monitoring have also been recommended.

(a) Water Resources

Indicator	Method	Location	Frequency	Responsible Agency
Physical condition(***crest level, crest width, and slope***) of the new and rehabilitated embankments	To check whether any breaching or physical failures have occurred in the new and rehabilitated embankments	At places along the embankment, preferably at Kaijuri, Verakhola and Hurasagarofftake.	Twice in a year (pre and post monsoon)	BWDB
Technical performance of the drainage sluices	To examine the functionality of drainage sluices	At the locations of sluices (in every sub reach)	Once in a year (post monsoon)	BWDB
Physical condition of the river bank protection works	To check if the CC blocks and Geo-bags are in place	Locations where bank protection works have been carried out (Benotia, Chauhali, Jafarganj and Harirampur)	Twice in a year (pre and post monsoon)	BWDB
River planform	Checking the diversion phenomenon, conveyance characteristics and plan forms of a number of rivers	Karatoyaofftake (JRB-1), Ichamatyofftake (PLB-1), Kata khal at Andarmanik (PlB-1)	Once in a year (post monsoon)	BWDB

(b) Land and Agriculture Resources

Indicator	Method	Location	Frequency	Responsible Agency
Crop yield	The Water Management Organizations (WMOs) should be involved for monitoring the crop area and yield level of the crops. Focus Group Discussion (FGD) should be followed and also individual discussion has to be followed.	All Upazilas within the project area namely- Balkuchikamarkhanda, Shahjadpur, Nagarpur, Daulatpur, Saturia, Ghior, Manikganjsadar, Singair, Sibalaya, Harirampur and Chauhali	The appropriate time for monitoring yield would be harvesting time for each crop season.	DAE, BWDB with involvement of beneficiaries (WMOs).
Crop damage	The community organizations should be involved for monitoring the damage of the crops.	All Upazilas within the project area namely- Balkuchikamarkhanda, Shahjadpur, Nagarpur, Daulatpur, Saturia, Ghior, Manikganjsadar, Singair, Sibalaya, Harirampur and Chauhali	The appropriate time for monitoring damage would be harvest time of each crop.	BWDB, DAE and Community organizations
Irrigation Expansion	The Water Management Organizations (WMOs) should be involved for monitoring the activity related to the expansion of irrigated area.	All Upazilas within the project area namely- Balkuchikamarkhanda, Shahjadpur, Nagarpur, Daulatpur, Saturia, Ghior, Manikganjsadar, Singair, Sibalaya, Harirampur and Chauhali	Three times in dry season (mainly Boro crops).	DAE, BWDB with involvement of beneficiaries (WMOs).

(c) Fisheries Resources

Indicator	Method	Location	Frequency	Responsible Agency
Fish habitat status	Habitat observation	Seven locations beside the Baral river bank: 6.5 km of the Verakhola towards start of Hurashagar river 4km from the starting point of Hurashagar to Korotoa bank 10.5 km from Hat Pachil Bazar, Kaizuri to Benotia Hat/Bazar 2 km from Benotia Hat/Bazar to the start of BaralKhal, Verakola Hat 5 km of the Jamuna Left bank from ChauhaliSadar to Atpara 2 km of the Jamuna Left bank from Jaffarganj to Bachamara 7 km of the Padma Left Bank at Harirampur, AndharmanikGhat	Two times per year. (Will continue for 2 years)	DoF
Fish migration	Catch monitoring, RRA and FGD	Four locations: The mouth of Baral river to Hurashagar connectivity near sluice gates at Char Andharmanik near the end point of embankment at the mouth of Baralvskarotoa connectivity Baral river to Karotoa and Baral to Hurashagor Major carp migration route at AndharmanikGhat of	Two month e.g. May and June, per year. (Will continue for 2 years after completion of project activities).	DoF

Indicator	Method	Location	Frequency	Responsible Agency
		Bayra Union for spawning		
Fish species and fish production	Catch monitoring and Fish Market Survey	Entire study area	Once per month in each location for 2 year after completion of proposed activities.	DoF
Pond fish culture	Interviewing fish farmers and Fish Market Survey	Selected ponds	One time per month (Will continue 2 year)	DoF
Public awareness	Observation of wetland based national and international days, e.g. Fish week. Environment day, wetland day etc.	In the study area	Selected schedule (Will continue 2 year)	DoF, Community based Fisheries Management Organizations (CBFMOs) and Community based Organizations (CBOs) and other nature clubs.

(d) Ecological resources

Indicator	Method	Location	Frequency	Responsible Agency
Survival rate of planted saplings	Observation and counting	Locations are below: • 6.5 km of the Verakhola towards start of Hurashagar river • 4km from the starting point of Hurashagar to Korotoa river bank • 10.5 km from Hat Pachil Bazar, Kaizuri to Benotia Hat/Bazar • 2 km from Benotia Hat/Bazar to the start of BaralKhal, Verakola Hat • 5 km of the Jamuna Left bank from ChauhaliSadar to Atpara • 2 km of the Jamuna Left bank from Jaffarganj to	1 year after plantation (Every day by the recruited guard).	BWDB in coordination with local group

Indicator	Method	Location	Frequency	Responsible Agency
		Bachamara • 7 km of the Padma Left Bank at Harirampur, AndharmanikGhat		

(e) Socio-economic

Indicator	Method	Location	Frequency	Responsible Agency
Roadway communication Income generation Protection of municipal area including markets and homesteads	RRA	**JRB-1** Hat Panchil, Benotia Verakhola,Dambarla **JLB-2** Char janjira, Khasdalai Khashkaulia,Pailadhusar Raghunathpur, Paila **PLB-1** Jaghannathpur, Boxor Andharmanik, Bholabaj Boyra	Once	BWDB/consultant and contractor

4. Implementation of EMP Monitoring

Every monitoring report includes three parts, i.e.:

PART 1: General Project information, findings and recommendations

PART 2: Monitoring Contractor's EMP and Safety at Site Compliance

PART 3: Pictures taken during the monitoring visit

4.1 EMPMonitoring, Site: Zafarganj (JLB-2, Package W-08)

Date of visit: 5 June 2016

PART 1 – General Project Information, Findings and Recommendations

Main Contract features

Current Contract	Protection of the left (east) bank of JamunaRiver over 2 km by depositing sandbags (2016) and concrete blocks (2017) on eroding riverbanks near Zafarganj. Main contract activities are clearance and establishment of work sites and worker's camps, sand mining, transport of sand to filling areas and cement block making sites; filling and depositing sand bags on/from barges; laying of concrete blocks. In total some 400labourers have been employed, nearly all of these are men; few women have been employed for cooking/cleaning.
Start of the works	March 2016
End of the works	June 2017

Summary of observations

It was explained that some 1.2 km of the targeted 2 km of riverbank protection with sandbags has been achieved, and that placing of the concrete (cc) blocks has not started yet.

Significant adverse impacts of the physical construction works were not noted during the previous visit, and this is believed to remain the case. As dredging takes place on selected sites (with high sand content) in the middle of river where it is several km wide, negative impact is believed to be limited to very local and temporary disturbance of the water downstream of the dredger only. Sandbag filling cannot be expected to have a negative impact on the environment but the works (maneuvering barges, movement of ships, sandbag dumping) will temporarily chase away fish and dolphins (*susuk*) that return later.The main adverse impact of the works is therefore in and around worker's camps (water supply and sanitation facilities), and from moving vehicles through noise and dust generated by these.

Some improvement of the sanitation condition in the worker's camp has materialized, i.e. one tubewell has been protected by a concrete flooring surrounding the well and few more toilets have been constructed (see pictures). Other sanitary conditions in the worker's camps remain unchanged, i.e. littering paper and plastic abound, no wastebins provided or installed, wastewater is discharged in surface pits and local depressions where is stays stagnant.

Copies of the previous EMP compliance monitoring report (of March 2016) have not been sent by PMO to the concerned on-site as yet, contributing to why no proper follow up action has been taken as yet.

Senior staffs of PMO/SMO and Contractor have been trained by ISPMC in EMP implementation on 28/4/2016.

An Environmental Inspector has not been appointed by the Contractor yet, but the Contractor suggested during the visit to appoint one of the Site Engineers, MrYousuf to become the Environmental Inspector (he did take part in the EMP training but was sick during the visit). The Contractor was provided with a ToR and it was agreed to start with the monthly reporting.

No formal Grievance Redress Mechanism is in place as yet.

Due to the off-season (high water level and monsoon) the next monitoring round is currently planned for December 2016.

Summary of recommendations

For BWDB (PMO / SMO):	To be achieved by:
1. Assist, through SMO and Supervising Consultants, the Contractor in establishing and operating a formal Grievance Redress Mechanism.	1. With immediate effect.
2. Distribute the ISPMC EMP compliance monitoring reports to the concerned office in charge and assure proper follow up is being taken.	2. With immediate effect.
For On-site Supervising Consultant:	To be achieved by:
3. Follow-up on EMP compliance monitoring reports timely and effectively.	3. With immediate effect.
For Contractor:	To be achieved by:
4. Further instruct and assist the full-time Environmental Inspector for supervising EMP compliance	4. With immediate effect
5. Prepare and submit monthly environmental reports and establish a proper filing system for these.	5. As from June 2016.
6. Install proper noise silencer on boat and dredger engines.	6. As needed.
7. Improve on waste disposal in worker's camps, e.g. by installing waste bins, and deposing waste, and instructing workers through health awareness training.	7. With immediate effect.
8. Improve waste water management around water points.	8. Asap.
9. Improve sanitation facilities and increase number of toilets.	9. With immediate effect.

Part 2- Monitoring Contractor's EMP and Safety at Site Compliance

Scoring key: 4 = excellent; 3 = good; 2 = fair; 1 = poor; 0 = non-compliant

EMP Clause	Item	Score	Comment
2.1.1	**Inspector**		
	Employing one full-time EMP inspector.	0	Not employed as yet – see also 2.3.4
	Set of environmental standards at site.	0	A Contractor Contract (including the EMP) is available on site, however the Contractor seemed not to have seen the EMP enclosed in it yet.
	Monthly EMP reporting.	0	Is not taking place as yet – see also 2.3.4.
2.1.2	**Air & noise**		
	Spraying water on dry surfaces (roads and work sites).		Access road to the site office is some 100 m through a low-laying area only; no major issues assumed here – see also 2.2.2
	Noise cancellation at work sites.		No noise silencers provided.
2.1.3	**Land use**		
	Topsoil removal and replacement at work sites.	3	A land lease has been concluded with a land owner; the Contractor has constructed the site office here. As Contractor's site office/stock yard/cc block yard and labour camps are constructed on non-fertile agricultural land this issue is not relevant here.
	Restoring surface vegetation at work sites.		This issue is not relevant here.
2.1.4	**Pollution**		
	Preventing spills of lubricants and fuel.		During previous visit it was stated that used oil and lubricants are drained in the soil. Now it was stated that used oil and lubricants are collected in a container which is then collected by someone and disposed of.
	Waste disposal at work sites.		See above.
	Waste disposal at worker camps.	1	No wastebins available; wastewater in worker's camp is drained in open pit.
2.1.5	**Disruption of agricultural activities**		
	Minimizing disturbance.		Not noted / recorded.
	Compensation arrangements.		A land lease has been entered.
2.2.1	**Navigation**		
	Preventing navigation routes of riverine traffic.		No constraints noted or recorded.
	Clearance permits for protection works and sand mining.	3	Protection works require ECC from DoE and PMO has received clearance already. For sand mining, contractor has sub-contracted. Sub-contractor has received clearance from the district authority concerned, reportedly. See also 2.2.4.

EMP Clause	Item	Score	Comment
	Compliance to GoB navigation and safety standards.		Not assessed.
	Coordination with BWDB & BIWTA on dredging operations.		Not assessed.
2.2.2	**Roads**		
	Road inspections.	3	Access road to the site office is only some 100 m; this road is being maintained, no issues noted. See also 2.1.2
	Road use & maintenance.	3	Vehicle movement is limited anyway.
2.2.3	**Excavation of earth in slope protection**		
	Excavation is accordance with approvals.		No issues noted or recorded. Spoils are used by local people.
2.2.4	**Sand mining**		
	Mining in accordance with approvals.	3	See 2.2.1 – approval of sand mining is not the concern of the contractor since he is sub-contracting it to a dredging firm. No legal permits for sand mining have been issued, reportedly.
2.3.1	**Safety equipment to prevent accidents / injuries**		
	Helmets & life jackets / buoys.		Some equipment available (life jackets) in Contractor's office but not (yet) used
	Traffic control signboards.		Signboards are being prepared.
	Guards / walkways / etc.		Not noted or discussed.
2.3.2	**First aid**		
	First-aid nurse.		Not appointed. A first aid kit is available in the site office.
	Qualified medical doctor.		Not available.
	Health inspection & vaccination to workers.		Not discussed.
2.3.3	**Accidents**		
	Reporting of accidents within 24 h.		A daily register is not kept however the Supervising Consultant / Site Engineer produces daily reports in which he notes incidences if occurring.
2.3.4	**Full-time Safety Inspector**		
	Employed / on-site.		Not available yet – see also 2.1.1
	Monthly safety report.		Not prepared as yet – see also 2.1.1
2.4.1	**Site management**		
	Clearing obstructions, grading, working / storage sites.		Not noted.
	Protection of existing structures.	3	
	Maintenance of temporary roads.	2	Dust generation on temporary road to worker's camp.
	Building maintenance.	3	Building under construction
	Site fencing.	3	Most sites have been fenced.

EMP Clause	Item	Score	Comment
	Equipment management.		Not assessed.
2.4.2	**Lay-out drawings**		
	Submission on demand.		Not assessed.
2.4.3	**Sanitation conditions& waste management**		
	Water supply.	2	1 protected borehole is available.
	Sanitation (toilets etc).	2	8 toilets are available
	Waste management.	1	No wastebins are available; wastewater is drained in an open pit.

PART 3 – Pictures taken during the visit

- Riverbank protection with sandbags opposite the site office (viewed towards south)

- As picture 1 (viewed towards north)

- Concrete protection around tubewell in worker's camp

- Pond to which washwater is drained, containing catfish but polluted with solid waste (paper/plastic)

- Toilets with lid-covered pits

- Solar power unit at worker's camp

- Worker's camp

- Meeting with (f.l.t.r.) Supervising Stie Engineer, SMO officer

4.2 EMPMonitoring, Site: Harirampur (PLB-1, Package: W-9 & W-10)

Date of visit: 5June 2016

PART 1 – General Project Information, Findings and Recommendations

Main Contract features

Current Contract	Protection of the left (north) bank of Padma River over 10 km by depositing sandbags and concrete blocks on eroding riverbanks near Harirampur. Main contract activities are clearance and establishment of work sites and worker's camps, sand mining, transport of sand to filling areas and cement block making sites; filling and depositing sand bags on/from barges; laying of concrete blocks. In total some 1,400 labourers have been employed, nearly all of these are men; few women have been employed for cooking/cleaning. Most labourers come from 10-20 km away and reside in camps.
Start of the works	January 2016
End of the works	June 2016

Summary of observations

At time of visit 8 out of 10 km of riverbank protection works had been completed; the remaining works are expected to be completed by the end of June 2016.

Significant adverse impacts of the physical construction works were not noted during the previous visit, and this is believed to remain the case. As dredging takes place on selected sites (with high sand content) in the middle of river where it is several km wide, negative impact is believed to be limited to very local and temporary disturbance of the water downstream of the dredger only. Sandbag filling cannot be expected to have a negative impact on the environment but the works (maneuvering barges, movement of ships, sandbag dumping) will temporarily chase away fish and dolphins (*susuk*) that return later, as was confirmed by local fishermen during the previous visit.The main adverse impact of the works is therefore in and around worker's camps (water supply and sanitation facilities), and from moving vehicles through noise and dust generated by these.

Sanitary conditions in the worker's camps remain unchanged, i.e. littering paper and plastic abound, no wastebins provided or installed, wastewater is discharged in surface pits and local depressions where is stays stagnant, tubewells remain unprotected, and no improvements that were agreed during the previous visits have materialized (e.g. no doors provided). As during the previous visit there was a strong anger outbreak by some local people residing behind the row of toilets, complaining about continued bad smell and unsanitary conditions. It was understood that the Contractor had only applied some "medicine" following the previous visit.

Copies of the previous EMP compliance monitoring report (of March 2016) have not been sent by PMO to the concerned on-site as yet, contributing to why no proper follow up action has been taken as yet.

Senior staff of PMO/SMO and Contractor have been trained by ISPMC in EMP implementation on 27/4/2016.

An Environmental Inspector has been appointed by the Contractor recently, however he did not take part in the EMP training and has not been fully instructed on his roles and responsibilities. Hewas provided with a ToR and he will start the monthly reporting from now on.

No formal Grievance Redress Mechanism is in place as yet.

Due to the off-season (high water level and monsoon) the next monitoring round is currently planned for December 2016.

Summary of recommendations

For BWDB (PMO / SMO):	To be achieved by:
10. Assist, through SMO and Supervising Consultants, the Contractor in establishing and operating a formal Grievance Redress Mechanism.	10. With immediate effect.
11. Distribute the ISPMC EMP compliance monitoring reports to the concerned office in charge and assure proper follow up is being taken.	11. With immediate effect.
For On-site Supervising Consultant:	To be achieved by:
12. Follow-up on EMP compliance monitoring reports timely and effectively.	12. With immediate effect.
For Contractor:	To be achieved by:
13. Further instruct and assist the full-time Environmental Inspector for supervising EMP compliance	13. With immediate effect
14. Prepare and submit monthly environmental reports and establish a proper filing system for these.	14. As from June 2016.
15. Install proper noise silencer on boat and dredger engines.	15. As needed.
16. Improve on waste disposal in worker's camps, e.g. by installing waste bins, and deposing waste, and instructing workers through health awareness training.	16. With immediate effect.
17. Improve waste water management around water points.	17. Asap.
18. Improve sanitation facilities and increase number of toilets.	18. With immediate effect.

Part 2-Monitoring Contractor's EMP and Safety at Site Compliance

Scoring key: 4 = excellent; 3 = good; 2 = fair; 1 = poor; 0 = non-compliant

EMP Clause	Item	Score	Comment
2.1.1	**Inspector**		
	Employing one full-time EMP inspector	2	An Environmental Inspector has been appointed reportedly but he was absent during the visit.
	Set of environmental standards at site	1	The Contractor's contract is on-site but staff not familiar with EMP or its requirements; Contractor's staffhas been trained in environmental management, i.e. during a training course given by ISPMC on 27/4/2016.
	Monthly EMP reporting	0	No EMP reporting started – see also 2.3.4
2.1.2	**Air & noise**		
	Spraying water on dry surfaces (roads and work sites)		There are no complaints reported, according to the Contractor.
	Noise cancellation at work sites	0	Boat and dredger engines rather noisy (no or limited noise silencer)
2.1.3	**Land use**		
	Topsoil removal and replacement at work sites		As Contractor's site office/stock yard/cc block yard and labour camps are constructed on non-fertile agricultural land this issue is not relevant here. No complaints according to the Contractor.
	Restoring surface vegetation at work sites		Since no vegetation removal took place at work sites and their surroundings this issue is not relevant here.
2.1.4	**Pollution**		
	Preventing spills of lubricants and fuel		The Contractor states that used oils and lubricants are collected in a container and that this disposed of trough someone that reuses it (no details provided).
	Waste disposal at work sites		Not assessed during the visit. It is assumed that limited waste is being produced anyway; assumed mostly food leftovers that are dumped in the river
	Waste disposal at worker camps	1	Situation noted during previous visit is unchanged: solid waste in camp sites (paper / plastic / kitchen spoils) is not collected; there are no waste bins on site. Liquid waste flows in open pit depressions amidst dormitory/tent sites, attracting flies and other nuisance. Toilet facilities are considered poor. Villagers openly complain about bad smells.
2.1.5	**Disruption of agricultural activities**		
	Minimizing disturbance	2/3	Not applicable. Contractor hires office building and land for worker's camp from local farmer, reportedly.

EMP Clause	Item	Score	Comment
	Compensation arrangements		As above
2.2.1	**Navigation**		
	Preventing navigation routes of riverine traffic	3	No problems reported according to the Contractor.
	Clearance permits for protection works and sand mining	3	Protection works require ECC from DoE and PMO has received clearance already. For sand mining, contractor has sub-contracted. Sub-contractor has received clearance from the district authority concerned, reportedly. See also 2.2.4.
	Compliance to GoB navigation and safety standards		Not assessed as yet.
	Coordination with BWDB & BIWTA on dredging operations		No problems or concerns noted.
2.2.2	**Roads**		
	Road inspections		No problems reported according to the Contractor.
	Road use & maintenance	2	Most vehicle movement is on existing road system: these are normally narrow crowed rural roads where speeds should be low; speeding causes risks to road users and dust being a nuisance.
2.2.3	**Excavation of earth in slope protection**		
	Excavation is accordance with approvals		Excavation for slope preparation as per approved engineering design – no environmental problem in this regard.
2.2.4	**Sand mining**		
	Mining in accordance with approvals	3	See 2.2.1 – approval of sand mining is not the concern of the contractor since he is sub-contracting it to a dredging firm; legal permit has been given by local authority. Permits are available, reportedly.
2.3.1	**Safety equipment to prevent accidents / injuries**		
	Helmets & life jackets / buoys	2	Some equipment (helmets/vests) has been acquired and is available in inspection barge (not used though). Workers on dredgers and sand filling barges do not wear or use safety equipment.
	Traffic control signboards	0	None recorded.
	Guards / walkways / etc	0	Walkways on sand filling barges are available but there are no guards
2.3.2	**First aid**		
	First-aid nurse	2	First-Aid kit is available and staff have received some training, according to the Contractor
	Qualified medical doctor		On call available according to the Contractor
	Health inspection & vaccination to workers	0	No awareness campaign on health issues (e.g. AIDS/HIV, sanitation) has been given or is planned.
2.3.3	**Accidents**		
	Reporting of accidents within 24 h	0	No serious accidents have occurred according to

EMP Clause	Item	Score	Comment
			the Contractor, but no reporting on environmental / health / safety issues is taking place
2.3.4	**Full-time Safety Inspector**		
	Employed / on-site	2	Has been appointed, however was not present during the visit – see also 2.1.1
	Monthly safety report	0	No reporting taking place as yet – see also 2.1.1
2.4.1	**Site management**		
	Clearing obstructions, grading, working / storage sites	1	No fencing around worker's camp noted.
	Protection of existing structures		Not noted.
	Maintenance of temporary roads		Not noted.
	Building maintenance		Not noted.
	Site fencing		Not or only partial existing.
	Equipment management		Not assessed.
2.4.2	**Lay-out drawings**		
	Submission on demand		Not assessed.
2.4.3	**Sanitation conditions& waste management**		
	Water supply	1	No change visible since previous visit: few standpipes are available but there is no concrete platform around and drainage pipe away from these to divert wastewater that could pollute source. Open pit wastewater dump amidst tents or near toilets. Unhealthy conditions.
	Sanitation (toilets etc)	1	No change visible since previous visit: some 30 latrines provided (= 1400 / 30 = 50 persons/latrine), that all lack proper doors; drainage into open pits (that appear full) that cause nuisance to villagers in surroundings. Villagers complain again openly.
	Waste management	1	No change visible since previous visit: nowaste bins available for paper / plastic.

Pictures taken during the visit

- Completed riverbank protection works near site office

- As picture 1.

- Unprotected tubewell in worker's camp

- Unsanitary conditions at wastewater dump and scattered litter near cooking site in worker's camp

- Row of toilets where situation has not improved since March 2016 visit, i.e. people living right behind it.

- Backside of row of toilets

 • Worker's camp.	 • Meeting with Contractor and Supervising Consultant

4.3 EMPMonitoring, Site: Chauhali (JLB-2, Package: W-6 & W-7 & Extension)

Sub-Project	JLB-2		
Location:	Chauhali	**Monitoring report:**	Nr3
Date of visit:	4 June 2106	**Date:**	6June 2016

PART 1 – General Project Information, Findings and Recommendations

Main Contract features

Current Contract	Protection of the left (east) bank of JamunaRiver over 7.2 km by depositing sandbags and concrete blockson eroding riverbanks near Chauhali. Main contract activities are clearance and establishment of work sites and worker's camps, sand mining, transport of sand to filling areas and cement block making sites; filling and depositing sand bags on/from barges; laying of concrete blocks. In total some 900labourers have been employed of which some 200 are from nearby villages and the rest resides in two worker's camps; nearly all of these are men; few women have been employed for cooking/cleaning.
Start of the works	November/December 2015
End of the works	2017

Summary of observations

The works have progressed as planned: sandbags have been installed along the entire targeted riverbank, but placing of some additional 200,000 bags continues in June on locations where weak spots have been identified by diving teams. Concrete blocks have been made and will be laid as from mid-October when the monsoon has ended and river water recedes. Between June and October little activities will take place (high water level & monsoon).

Significant adverse impacts of the physical construction works were not noted during the previous visit, and this is believed to remain the case. As dredging takes place on selected sites (with high sand content) in the middle of river where it is several km wide, negative impact is believed to be limited to local and temporary disturbance of the water downstream of the dredger only. Sandbag filling is believed not have a negative impact on the environment but the works (maneuvering barges, movement of ships, sandbag dumping) temporarily chase away fish and dolphins (*susuk*) that return later, as was confirmed by local fishermen,earlier.The main adverse impact of the works is therefore in and around worker's camps (water supply and sanitation facilities), and from moving vehicles through noise and dust generated by these.

Copies of the previous EMP compliance monitoring report (of March 2016) have not been sent by PMO to the concerned on-site as yet, contributing to why no proper follow up action has been taken as yet.

Despite promises made by the Contractor during the previous visit there is no improvement visible in and around the worker's camps: water pumps remain unprotected, dirty water accumulates around the pumps and near the kitchens, solid waste (paper, plastic) abounds and there are no wastebins. Basically there is still no waste management system in place.

Senior staff of PMO/SMO and Contractor have been trained by ISPMC in EMP implementation on 26/4/2016.

An Environmental Inspector has been appointed by the Contractor recently, however he did not take part in the EMP training and has not been fully instructed on his roles and responsibilities. He was provided with a ToR and he will start the monthly reporting from now on.

No formal Grievance Redress Mechanism is in place as yet.

Due to the off-season (high water level and monsoon) the next monitoring round is currently planned for December 2016.

Summary of recommendations

For BWDB (PMO / SMO):	To be achieved by:
19. Assist, through SMO and Supervising Consultants, the Contractor in establishing and operating a formal Grievance Redress Mechanism.	19. With immediate effect.
20. Distribute the ISPMC EMP compliance monitoring reports to the concerned office in charge and assure proper follow up is being taken.	20. With immediate effect.
For On-site Supervising Consultant:	To be achieved by:
21. Follow-up on EMP compliance monitoring reports timely and effectively.	21. With immediate effect.
For Contractor:	To be achieved by:
22. Further instruct and assist the full-time Environmental Inspector for supervising EMP compliance	22. With immediate effect
23. Prepare and submit monthly environmental reports and establish a proper filing system for these.	23. As from June 2016.
24. Install proper noise silencer on boat and dredger engines.	24. As needed.
25. Improve on waste disposal in worker's camps, e.g. by installing waste bins, and deposing waste, and instructing workers through health awareness training.	25. With immediate effect.
26. Improve waste water management around water points.	26. Asap.
27. Improve sanitation facilities and increase number of toilets.	27. With immediate effect.

PART 2 – Monitoring Contractor's EMP and Safety at Site Compliance

Scoring key: 4 = excellent; 3 = good; 2 = fair; 1 = poor; 0 = non-compliant

EMP Clause	Item	Score	Comment
2.1.1	**Inspector**		
	Employing one full-time EMP inspector.	2	The Environmental Inspector has been appointed and was met; his English is poor and he did not seem to have been fully briefed on environmental issues and his role and responsibilities in the program.
	Set of environmental standards at site.	2	A Contractor Contract, including the EMP is available in the office.
	Monthly EMP reporting.	0	Is not taking place as yet – see also 2.3.4. The SMO and Contractor were provided with a proposed ToR for the Environmental Inspector. It was agreed that the Environmental Inspector will prepare a first monthly progress report, as per the provided template and in English, for June, October and November and that these will be handed over to ISPMC during the next monitoring round, currently planned for December 2016.
2.1.2	**Air & noise**		
	Spraying water on dry surfaces (roads and work sites.	2	During the visit electricity was provided by a generator nearby – which was rather noisy. Nevertheless, according to the Contractor there are no complaints about (too) high noise levels.
	Noise cancellation at work sites.		Not noted or discussed.
2.1.3	**Land use**		
	Topsoil removal/preservation and replacement at work sites.	3	As Contractor's site office/stock yard/cc block yard and labour camps are constructed on non-fertile agricultural land this issue is not relevant here. According to the Contractor there are no objections from the local residents; in general are happy with the bank protection works and do not complain.
	Restoring surface vegetation at work sites.		Since no vegetation removal took place at work sites and their surroundings this issue is not relevant here.
2.1.4	**Pollution**		
	Preventing spills of lubricants and fuel.	2	According to the Contractor there are fuel or lubricant spills occasionally but these are then removed and dumped somewhere inland. Used lubricants are collected in a container and periodically sold in the market, reportedly.
	Waste disposal at work sites.		Not assessed.
	Waste disposal at worker camps.	1	Despite promises made earlier, there are no wastebins available; paper and plastic waste

EMP Clause	Item	Score	Comment
			abound.
2.1.5	**Disruption of agricultural activities**		
	Minimizing disturbance.	3	No complaints have been received by the Contractor thus far.
	Compensation arrangements.		Not discussed.
2.2.1	**Navigation**		
	Preventing navigation routes of riverine traffic.	3	No accidents have occurred thus far according to the Contractor.
	Clearance permits for protection works.	3	Protection works require ECC from DoE and PMO has received clearance already. For sand mining, contractor has sub-contracted. Sub-contractor has received clearance from the district authority concerned, reportedly. See also 2.2.4.
	Compliance to GoB navigation and safety standards.		Not discussed.
	Coordination with BWDB & BIWTA on dredging operations.		Not discussed.
2.2.2	**Roads**		
	Road inspections.	3	No problems have been reported to the Contractor.
	Road use & maintenance.		Not assessed.
2.2.3	**Excavation of earth in slope protection**		
	Excavation is accordance with approvals.	3	Excavations are done as per the design; no problems have been recorded.
2.2.4	**Sand mining**		
	Mining in accordance with approvals.	3	See 2.2.1 – approval of sand mining is not the concern of the Contractor since he is sub-contracting it to a dredging firm; legal permit has been given by local authority.
2.3.1	**Safety equipment to prevent accidents / injuries**		
	Helmets & life jackets.		PPE was seen stored in the canteen; according to the Contractor there are sufficient PPE available and no serious incidents have happened thus far.
	Traffic control signboards.		Not noted.
	Guards / walkways / etc.		Not noted.
2.3.2	**First aid**		
	First-aid nurse.	3	A first aid kit was seen in the canteen.
	Qualified medical doctor.	3	A doctor is on call available.
	Health inspection & vaccination to workers.		Not discussed.
2.3.3	**Accidents**		
	Reporting of accidents within 24 h.		No serious accidents have occurred thus far according to the Contractor.

EMP Clause	Item	Score	Comment
2.3.4	**Full-time Safety Inspector**		
	Employed / on-site.		Assigned – see 2.1.1
	Monthly safety report.		Not being made yet – see also 2.1.1
2.4.1	**Site management**		
	Clearing obstructions, grading, working / storage sites.		No problems occurred thus far according to the Contractor.
	Protection of existing structures.	2	Fencing constructed, however accessible
	Maintenance of temporary roads.		Not discussed or assessed.
	Building maintenance.		Not noted.
	Site fencing.		Fencing constructed, however accessible to public
	Equipment management.		Not assessed.
2.4.2	**Lay-out drawings**		
	Submission on demand.		Not discussed.
2.4.3	**Sanitation conditions& waste management**		
	Water supply.	1	No improvement was noted in the existing tubewells; there is no protection and so are still defunct.
	Sanitation (toilets etc).	1	Existing toilets (about 1 per 90 workers) is insufficient; no change or improvement is visible.
	Waste management.	0	Still no wastebins or proper management system in place.

Other matters:

ISPMC developed and provided a training to 13 Chauhalistaff in EMP implementation on 26/4/2016 – see Training Report of April 2016.

There is no formal **Grievance Redress Mechanism**(GRM) in place. Establishing such system, responsibility of the BWDB, was discussed and a handout on how to establish and run such system was given and explained.

PART 3 – Pictures taken during the visit

- Riverbank protection by sandbags

- Situation regarding unprotected tubewells in worker's camp prevails.

- Unsanitary conditions near cooking sites in worker camps remain unchanged.

- Other pumps: as Picture 2, above.

- Littering paper and plastic abound; waste bins have still not been provided.

- Consulting local resident.

FRERMIP – Monitoring of EMP Implementation

Chauhali, Harirampur, Zafarganj

General Observations:

1. Little adverse environmental impacts are believed to result from the main works at each of the three sites, i.e. the collection of sand through dredgers, transport of sand by barge to bag filling sites, bag filling and dumping, and the making and placing of cement concrete (cc) blocks.

2. Adverse environmental impacts of the works are therefore mainly noted in and around the worker's camps: in all of these there is a lack of or inadequate waste management (paper and plastic littering is widespread, there are no waste bins), sanitary conditions are poor (wastewater drainage from cooking and washing areas in open pits), and toilet facilities are limited, generally of poor quality, and cause hindrance (smell, eyesore) not only to the workers themselves but also to surrounding villagers. The latter openly complained about the prevailing unsanitary conditions at one site (Harirampur) during two of the monitoring visits (in March and June 2016).

3. In general the Contractors,as well as the Supervising Consultant,give the impression that they do not take environmental management seriously. The Contractors do not know well what their responsibilities are for environmental management under their contract. On several occasions we had to point out to the Contractor where the EMP section is in their contract.

4. Although some site-specific EMP requirements have been achieved, Contractors do not comply with all of their contractual EMP obligations. They lag behind specifically in (i) employing, instructing and/or supervising their full-time Environmental Inspector; (ii) providing acceptable standards for water supply and waste management in worker's camps, while (iii) their monthly reporting on environmental management has nowhere started as yet.

5. As required by the Project design, the PMO office informed on 25 May 2016 that their Executive Engineer,MrMd. Jahangir Alam, has been nominated as focal point officer for smooth operation of especially the EMP of the FRERMIP.

6. Involved supervising BWDB officers, Supervising Consultants and Contractors have been trained in environmental management i.e. during brief training courses conducted by ISPMC on 26-28/4/2016. A Training Report of April 2016 has been prepared and issued. Each of the site offices has received a copy of the report.

7. The EARF (Environmental Review and Assessment Framework) for FRERMIP includes the responsibility of the PMO to establish and operate aGrievance Redress Mechanism (GRM) in each of the project sites. However, to date no formal GRM has been established in any of the three sites. It is noted that the EIA in the PPTA does not include the need for or guidance on a GRM, neither does the Contractor's contract.

8. In at least one site there is strong opposition against the presence of toilets near existing housing, however so far no or insufficient effort has been made by the Contractor, or indirectly the Supervising Consultant to redress the complaints.

9. As noted in the previous EMP compliance monitoring report, some items in the Contractor's EMP are duplications (e.g. 2.1.1 and 2.3.4) or have limited relevance to environmental management (e.g. 2.4.2).

10. It is noted that the previous EMP compliance monitoring report of ISPMC's of March 2016 had not been received by any of the consulted officers in the three sites.

5. Results of Environmental Monitoring

The PMO established an environmental safeguard monitoring unit headed by an Executive Engineer. Moreover an international and a local Environment Specialist of consultant's team is monitoring the environmental safeguard compliance. The working contractors have been given responsibility for day to day record and monitoring of environmental issues. So the quantitative environmental monitoring parameters specially water quality parameter, soil fertility parameter, vegetation coverage, wild life habitat, biodiversity loss**,** fish habitat, crop damage etc. mentioned in table below is beyond the scope of this 1st semi-annual safeguard report.

Indicator	Method of monitoring	Location	Frequency of monitoring	Monitoring results	National standard
Surface water quality - DO - pH - BOD Salinity Arsenic etc.	Sampling and testing	Canals, wetland and ponds within project area	Annually after completion of physical works	Will be monitored after completion	Stated in Annex- 4
Ground water quality -Salinity -Arsenic etc.	Sampling and testing	Tube wells with in project area	Annually after completion of physical works	Will be monitored after completion	Stated in Annex- 4
Vegetation Coverage	Quadrate & review of FD plantation records	Along the embankment	Annually after completion of physical works	Monitored after completion of physical work	Not applicable
Wildlife habitat loss -Wetlands -Terrestrial	Physical observation and estimation	Wetlands and village groves	Biannually after completion of physical works	Monitored after completion of physical work	Not applicable
Biodiversity loss -Aquatic -Terrestrial	Sampling & estimation	Wetlands, village groves & river	Biannually after completion	Monitored after completion of physical work	Not applicable
Crop damage	The community organization	All upazilas within project area namely Balkuchi,	Will be monitored during	Will be monitored during	Not applicable

	should be involved for monitoring the damage of the crop	kamarkhanda, shahjadpur, Nagarpur, Daulatpur, saturia, Ghior, Manikgonjsadar, singair, Sibalaya, Harirampur, and Chauhali	harvesting of each crop	harvesting of each crop	
Fish habitat status	Habitat observation	Seven locations beside the Baral river bank: 6.5 km of the Verakhola towards start of Hurashagar river 4km from the starting point of Hurashagar to Korotoa bank 10.5 km from Hat Pachil Bazar, Kaizuri to Benotia Hat/Bazar 2 km from Benotia Hat/Bazar to the start of BaralKhal, Verakola Hat 5 km of the Jamuna Left bank from ChauhaliSadar to Atpara 2 km of the Jamuna Left bank from Jaffarganj to Bachamara 7 km of the Padma Left Bank at Harirampur, AndharmanikGhat	Two times per year. (Will continue for 2 years)	Will be monitored after completion of embankment	Not applicable
Fish species and fish production	Catch monitoring and Fish Market Survey	Entire study area	Once per month in each location for 2 year after completion of proposed activities.	Will be monitored after completion of embankment	
Survival rate of planted saplings	Observation and counting	Locations are below: • 6.5 km of the Verakhola towards start of	1 year after plantation (Every day by the recruited	Will be monitored after completion of embankment	

		Hurashagarriver • 4km from the starting point of Hurashagar to Korotoa river bank • 10.5 km from Hat Pachil Bazar, Kaizuri to Benotia Hat/Bazar • 2 km from Benotia Hat/Bazar to the start of BaralKhal, Verakola Hat • 5 km of the Jamuna Left bank from ChauhaliSadar to Atpara • 2 km of the Jamuna Left bank from Jaffarganj to Bachamara • 7 km of the Padma Left Bank at Harirampur, AndharmanikGhat	guard).		

6. Recommendationsand Conclusion

The safeguard team of PMO recommends the following measures/corrective actions to overcome the present noncompliance/limited compliance issues of FRERMIP

- Contractors must step up their performance on EMP implementation, first and foremost by (i) formally assigning and/or properly instructing and supervising a full-time Environmental Inspector, (ii) by improving water supply and waste management, (iii) by monthly reporting on their on-site environmental management.

- The Supervising Consultant is to improve on supervising the Contractor in his obligations with respect to environmental management.

- Adequate and immediate measures are required in Harirampur to minimize hindrance experienced by residents near toilets in the worker's camp. Given the obvious improper siting of these toilets, and the end of the works in end-June, these toilets should be dismantled and, in case works are to continue during the next work season(s), rebuilt elsewhere with sufficient distance to settlement (at least 100 m, and considering prevail winds).

- PMO is to establish and operate a formal and effective Grievance Redress Mechanism in each of the work sites in accordance with guidance provided in the EARF. This GRM is also required to take care of any complaints that may result from land acquisition activities, and therefore needs close cooperation with other ISPMC specialists for example resettlement and institutional development.

- PMO is to adopt a system for sharing and following up on ISPMC's EMP compliance monitoring reports.

- For future Contractor's contracts the EMP section should be revisited and amended, based on experience gained in implementing the pilot area works.

- Labor working in construction and operation are ignorant about environment and social compliance, health and safety right etc. Field based training workshops for contractors specially the labor leaders, for raising awareness on Environment compliance measures, safeguard, health and safety measures, issues mandatory for contractors to comply international laws etc.

- Proper training on Environmental Monitoring, Environmental Health and Safety compliance, International Labor law and concerned compliances should be provided to concerned safeguard personnel working in PMO safeguard cell and construction contractor in order to develop safeguard monitoring, implementation and reporting (International Standard) capacity.

- The second semi-annual monitoring report will be submitted at the end of January, 2017 for the period July,16 to December, 16 with more information and result.

The program has a number of inbuilt mechanisms to reduce environmental impacts. Many mitigation measures have been aggressively mainstreamed into program planning and engineering designs. The flexibility of a phased MFF approach supports minimization and

mitigation of potential negative impacts in a gradual manner. Works has started in Tranche-1 with protection of critically eroding riverbanks and the reconstruction of the destroyed Brahmaputra Right Embankment, while conducting extensive studies on future impacts of river stabilization and associated embankment works, including piloting new measures.

Annexures

Annex 1: Environmental Management Plan Formulated in Feasibility Study

Subproject JRB-1, Construction Phase

Water Resources

IEC	Location	Impacts	Magnitude of impact	Mitigation/ Enhancement/ Compensation/ Contingency	Magnitude with EMP	EMP Cost (Lac Tk)	Responsible Agency
Activity: Excavation of earth materials from the location of embankment; dredging of soil from the Jamuna and Baral rivers; dumping of earthen materials on the embankment; embankment surface labeling through dumping machine; movement of vehicles for carrying materials.							
Air quality	- Places adjacent to the Jamuna River bank where the new embankment would be constructed (from Hat Panchil to Benotiamauzas). - Places adjacent to the existing embankment of the Baral river (from Verakhola to Dambarlamauzas). - At Benotia where the bank protection works is to be carried out. - Road side places through which transportation of construction materials would be carried out (Kaijuri-shahjadpur road and rural roads from Hat panchil to barniamauzas and Nagardala to Shelachaprimauzas).	Minor amount of dust may be generated during excavating and dumping of earth materials, surface labeling with dumping machine and vehicular movements.	-3	<u>Mitigation:</u> Water to be sprinkled on regular intervals, as and where required.	-2	N/A	Implementation: Contractor Monitoring: Nominated Engineer (SMO, BWDB)

IEC	Location	Impacts	Magnitude of impact	Mitigation/ Enhancement/ Compensation/ Contingency	Magnitude with EMP	EMP Cost (Lac Tk)	Responsible Agency
Activity: Excavation of earth materials from the location of embankment; dredging of soil from the JamunaRiver; movement of vehicles for carrying earth materials.							
Noise	- Road side places for transportation of construction materials (Kaijuri-shahjadpur road and rural roads from Hat panchil to barniamauzas and Nagardala to Shelachaprimauzas). - Location of embankment (from Kaijuri to Karatoyaofftake)	Low impacts would be caused during excavation and dredging of soiland vehicular movements.	-2	<u>Mitigation:</u> Noise levels due to vehicular movement, excavation and dredging activities are to be kept within permissible limit.	-1	N/A	Implementation: Contractor Monitoring: Nominated Engineer (SMO, BWDB)
Activity: Dredging of earth materials from the JamunaRiver; placing of geo-bags and CC blocks on the river banks; construction of sluices, disposal of waste generated from the labor shed.							
Surface water quality	- Jamuna river (from Hat Panchil to Benotiamauzas) and Baral river (from Verakhola to Dambarlamauzas). - Possible locations within the embankment for construction of the drainage sluices	The surface water quality might be affected due to the disposal of waste generated from the labor shed into the river. Additionally, minor quantity of sediments would be generated in the rivers during dredging of soil from river bed, which would temporarily hamper the aesthetic quality of river water.	-4	<u>Mitigation:</u> - The dredging locations should be selected so that dredge spoil would be minimized. - Proper waste disposal system is to be implemented.	-1	3	Implementation: Contractor Monitoring: Nominated Engineer (SMO, BWDB)
Activity: Rehabilitation of embankment							
Drainage congestion	- Hurasagar river	Low impact may occur due to the rehabilitation of embankment temporarily blocking the Hurasagarofftake. The river has two mouths at present, meeting the Baral river and blocking any one of these might stress the drainage characteristics of the other.	-2	- Constructing a sluice at one of the two channel mouths. (Currently there is a sluice at one of the two mouths of Hurasagar river, which will be rehabilitated and extended while another one will be constructed at the channel mouth at the Jamuna	-1	200	Implementation: Contractor Monitoring: Nominated Engineer (SMO, BWDB)

IEC	Location	Impacts	Magnitude of impact	Mitigation/ Enhancement/ Compensation/ Contingency	Magnitude with EMP	EMP Cost (Lac Tk)	Responsible Agency
				riverbank).			

Land Resources

IEC	Location	Impact	Magnitude of impact	Mitigation/ Enhancement/ Compensation/ Contingency	Magnitude with EMP	EMP Cost (Lac Tk)	Responsible Agency
Activity	***Collection and disposal of constructing materials for Embankment rehabilitation activities***						
Land loss	Location-1: Dombaria (Baghabari towards Shahzadpur-6.5km)	About 0.65ha of land	-1	• Top soil (0-15cm) should be managed properly for conserve the soil fertility. • Area for executing construction activities and other project related activities should be optimized with the purpose of minimum disruption to cultivable lands and standing crops • The filling materials should be collected from khas/fallow land /river. • Disposal of spoil/ constructing materials should preferably be stored on fallow or khas land so that the area might not be affected for growing crops. • Compensation will be paid for any crop damage. • The contractor will avoid cultivation fields during construction. • The contractor will avoid agricultural land for material borrowing and material stockpiling.	+1	No cost involvement of cost for land due to activities in existing embankment	Implementation: Contractor Monitoring: Nominated Engineer (SMO, BWDB)
	Location-2: Lochha (Shahzahdpur-Korotoa bank-4.0km)	About 0.4 ha of land	-1		+1	No cost involvement of cost for land due to activities in existing embankment	Implementation: Contractor Monitoring: Nominated Engineer (SMO, BWDB)

IEC	Location	Impact	Magnitude of impact	Mitigation/ Enhancement/ Compensation/ Contingency	Magnitude with EMP	EMP Cost (Lac Tk)	Responsible Agency
				• The contractor will ensure that no vehicular movements take place inside cultivation fields. • The contractor will ensure that no material is dumped inside cultivation fields. • The contractor will maintain liaison with communities			
					Sub total	**00**	
Activity	***Collection and disposal of earth materials for construction of new embankment activities***						
Land loss	Location-1: Gopalpur (Kaizuri-Hurasagar offtake-10.5km)	1.05ha of agricultural land would be lost permanently	-1	• Top soil (0-15cm) should be managed properly for conserve the soil fertility. • Area for executing construction activities and other project related activities should be optimized with the purpose of minimum disruption to cultivable lands and standing crops • The filling materials should be collected from khas/fallow land /river. • Disposal of spoil/ constructing materials should preferably be stored on fallow or khas land so that the area might not be affected for growing crops. • Compensation will be paid for any crop damage.	+2	39.38	Implementation: Contractor Monitoring: Nominated Engineer (SMO, BWDB)
	Location-2: Jagtala Kaizuri-Benotia-2.0km)	0.2ha of agricultural land would be lost permanently	-1		+2	7.50	Implementation: Contractor Monitoring: Nominated Engineer (SMO, BWDB)
	Location-3: Doriamehi (Hurasagar – Baghabari-6.0km)	0.6ha of agricultural land would be lost permanently	-1	• The contractor will avoid cultivation fields during construction. • The contractor will avoid agricultural land for material borrowing, material stockpiling, and labor camps. • The contractor will ensure that no vehicular movements take place inside cultivation fields. • The contractor will ensure that no material is dumped inside cultivation fields.	+2	22.5	Implementation: Contractor Monitoring: Nominated Engineer (SMO, BWDB)
					Sub total	**69.38**	
Activity	***Collection and disposal of construction materials for bank protection activities***						
Land loss	Location-1:	0.2ha of	-1	• Top soil (0-15cm) should be managed	+2	No cost	Implementati

IEC	Location	Impact	Magnitude of impact	Mitigation/ Enhancement/ Compensation/ Contingency	Magnitude with EMP	EMP Cost (Lac Tk)	Responsible Agency
	(Benotia-2.0km)	land would be lost permanently		properly for conserve the soil fertility. • Area for executing construction activities and other project related activities should be optimized with the purpose of minimum disruption to cultivable lands and standing crops • The filling materials should be collected from khas/fallow land /river. • Disposal of spoil/ constructing materials should preferably be stored on fallow or khas land so that the area might not be affected for growing crops. • Compensation will be paid for any crop damage. • The contractor will avoid cultivation fields during construction. • The contractor will avoid agricultural land for material borrowing and material stockpiling. • The contractor will ensure that no vehicular movements take place inside cultivation fields. • The contractor will ensure that no material is dumped inside cultivation fields.		involvement of cost for land due to activities in existing embankment	on: Contractor Monitoring: Nominated Engineer (SMO, BWDB)
					Sub total	**00**	
Activity	***Disposal of dumping spoil for construction of drainage sluices***						
Land loss	Location-1: (Hurashagar outfall)	0.01ha of agricultural land would be lost permanently	-1	• Top soil (0-15cm) should be managed properly for conserve the soil fertility. • Area for executing construction activities and other project related activities should be optimized with the purpose of minimum disruption to cultivable lands and standing crops • The filling materials for backfill should be collected from khas/fallow land /river. • Disposal of spoil/ constructing materials should preferably be stored on fallow or	+2	**0.37**	Implementation: Contractor Monitoring: Nominated Engineer (SMO, BWDB)
	Location-2: (Hurashagar inlet)	0.02ha of agricultural land would be lost	-1		+2	**0.75**	Implementation: Contractor Monitoring:

IEC	Location	Impact	Magnitude of impact	Mitigation/ Enhancement/ Compensation/ Contingency	Magnitude with EMP	EMP Cost (Lac Tk)	Responsible Agency
		permanentl y		khasland so that the area might not be affected for growing crops. • Compensation will be paid for any crop damage. • The contractor will avoid cultivation fields during construction. • The contractor will avoid agricultural land for material borrowing and material stockpiling. • The contractor will ensure that no vehicular movements take place inside cultivation fields. • The contractor will ensure that no material is dumped inside cultivation fields.			Nominated Engineer (SMO, BWDB)
	Location-3: (at existing sluice gates)	0.02ha of agricultural land would be lost permanentl y	-1		+2	0.75	Implementati on: Contractor Monitoring: Nominated Engineer (SMO, BWDB)
					Sub total	**1.87**	
Land type change	Entire study area	Drainage congested area would be increased due to rehabilitatio n of embankme nt, constructio n of new embankme nt, bank protective work and drainage sluice. So that land type would be changed.	-2	• The sequence of work during construction of regulators in the water channels would be carefully planned to avoid disruption of drainage system. • The contractor would ensure that there would be no negative impacts on crop cultivation in monsoon season. • The contractor would maintain liaison with community organizations .	+2	1.50	Implementati on: Contractor Monitoring: Nominated Engineer (SMO, BWDB)

IEC	Location	Impact	Magnitude of impact	Mitigation/ Enhancement/ Compensation/ Contingency	Magnitude with EMP	EMP Cost (Lac Tk)	Responsible Agency
					Sub total	**1.50**	

Agricultural Resources

IEC	Location	Impact	Magnitude of impact	Mitigation/ Enhancement/ Compensation/ Contingency	Magnitude with EMP	EMP Cost (Lac Tk)	Responsible Agency
Activity	***Construction of labor sheds, stocking yard for Bank rehabilitation, construction of new embankment, bank protection and construction of drainage sluices and disposal of spoils activities***						
Crop production loss	i) Dombaria (ii) Lochha (iii) Gopalpur (iv) Jagtala (v) Doria mehi (vi)Benotia (vii)Chauhali (viii)Bachamara (ix) Harirampu (x)Location-1(Not fix up) (xi)Location-2(Not fix up) (xii)Location-3(Not fix up)	Loss of crop production is expected to be about 27.9 metric ton for Construction of labor sheds and stocking yard for bank rehabilitation, construction of new embankment, bank protection and construction of drainage sluices and disposal of spoils activities	-1	• In cases where the disruption to farming becomes unavoidable, adequate cash compensation should be provided to the land owners. /share croppers. • Exact amount of compensation should be determined based on the amount of land temporarily going out of cultivation. • The rate should be decided on the basis of the one crop usually grown on the pieces of land. • Constructing materials • like sand, cement, construction of labor sheds, concrete, block, etc. should be placed in non-agricultural land as far as possible. These materials should not be placed in standing crops.	+3	9.33	Implementation: Contractor Monitoring: Nominated Engineer (SMO, BWDB)
					Sub-Total	***9.33***	
Community Organizations	All locations of regulators	Positive impact	+2	• The community organizations should be formed prior to implementation of the project. • The community organizations should be given orientation to protect their standing crops from river bank protection work, spoil soils, on farm water management, LCS, EMG etc.	+4	2.50	Implementation: specialist NGOs Monitoring: PMO / DDM / DAE

IEC	Location	Impact	Magnitude of impact	Mitigation/ Enhancement/ Compensation/ Contingency	Magnitude with EMP	EMP Cost (Lac Tk)	Responsible Agency
					Sub Total	***2.50***	

Fisheries Resources

IEC	Location	Impacts	Magnitude of impact*	Mitigation/ Enhancement/ Compensation/ Contingency	Magnitude with EMP*	EMP Cost (Lac Tk/Yr) *	Responsible Agency
(Re-habilitation of Embankment							
Activity: Dumping of earthen materials on the embankment							
Fish habitat	6.5 km of the Verakhola towards start of Hurashagar river (Char Andharmanik)	Temporary damage would occur in the seasonal fish habitat of 10.5 km long right bank of the Boral river due to either clearance of vegetation cover or draped by the filling earth during earth work for the fish species of marginal vegetation feeder.	-2	Vegetation clearance should be done as low as possible	-1	0.5	Implementation: Contractor Monitoring: Nominated Engineer (SMO, BWDB) in coordination with Department of Fisheries
	4km from the starting point of Hurashagar (Char Andharmanik) to Korotoa bank		-2		-1		
Fish biodiversity	Same as above	Riverine fish species i. e. major carp species, grass carp and other herbivorous species, eel (baim), big and small cat fish (boal, ayr, magur), might shift from the project area	-2		-1		
	Same as above		-2		-1		
Fish production	Same as above	Capture fish production would temporarily be declined by 3.3 MT within the project area.	-2		-1		
	Same as above	Capture fish production would temporarily be declined by 2 MT within the project area.	-2				
Activity: Collection of earth materials from river/khal through dredging							

IEC	Location	Impacts	Magnitude of impact*	Mitigation/ Enhancement/ Compensation/ Contingency	Magnitude with EMP*	EMP Cost (Lac Tk/Yr) *	Responsible Agency
Fish habitat	Same as above	Water quality (stream flow, temperature, pH, turbidity, DO, hardness etc.) of that portion of the Boral river will temporarily be changed which would change the behavior of riverine fish species (both the juveniles and adults). Feeding habitat for the demersal (boal, ayr) and benthopelagic (baim) fish species would be damaged. Deep pools (dor/duars) would temporarily be damaged.	-2	1. Dredging will have to done during the dry season. 2. Proper protective device (construction of silt fences) will have to take to protect the deep pools (dor/duars).	-1	LS	Implementation: Contractor Monitoring: Nominated Engineer (SMO, BWDB) in coordination with Department of Fisheries
	Same as above		-2		-1		
Fish migration	Same as above	Both the Longitudinal (hilsa) and lateral migration for fish will temporarily be disturbed.	-2	Dry season (December-March) is proposed for dredging.	-1	Not applicable	Implementation: Contractor Monitoring: Nominated Engineer (SMO, BWDB) in coordination with Department of Fisheries
	Same as above		-2		-1		
Fish biodiversity	Same as above	Riverine fish species i. e. hilsa, major carp species, eel (baim), big and small cat fish (boal, ayr, magur), etc. might shift from the project area	-5	1. Dredging will have to done during the dry season. 2. Proper protective device will have to take to protect the	-3	Not applicable	Implementation: Contractor Monitoring: Nominated Engineer (SMO, BWDB)
	Same as above		-5		-3		

IEC	Location	Impacts	Magnitude of impact*	Mitigation/ Enhancement/ Compensation/ Contingency	Magnitude with EMP*	EMP Cost (Lac Tk/Yr) *	Responsible Agency
				deep pools (dor/duars).			in coordination with Department of Fisheries
Fish production	Same as above	Capture fish production would temporarily be declined by 3.3 MT within the project area.	-5	Same as above	-3	Not applic able	Implementation: Contractor Monitoring: Nominated Engineer (SMO, BWDB) in coordination with Department of Fisheries
	Same as above	Capture fish production would temporarily be declined by 2 MT within the project area.	-5		-3		
Construction of New Embankment							
Activity: Collection of earth materials from the location of embankment through excavator, pay loader, head load , dump truck and trolley							
Fish habitat	10.5 km of the Jamuna river bank from Hat Pachil Bazar, Kaizuri to Benotia Hat/Bazar	Temporary damage would occur in the seasonal fish habitat due to either clearance of vegetation cover or draped by the filling earth during earth work for the fish species of marginal vegetation feeder.	-2	Vegetation clearance should be done as low as possible	-1	0.5	Implementation: Contractor Monitoring: Nominated Engineer (SMO, BWDB) in coordination with
	2 km from Benotia Hat/ Bazar to the start of BaralKhal, Verakola Hat		-2		-1		

IEC	Location	Impacts	Magnitude of impact*	Mitigation/ Enhancement/ Compensation/ Contingency	Magnitude with EMP*	EMP Cost (Lac Tk/Yr) *	Responsible Agency
							Department of Fisheries
Fish migration	Same as above	Lateral migration for fish will temporarily be disturbed.	-2		-2	Not applicable	Implementation: Contractor Monitoring: Nominated Engineer (SMO, BWDB) in coordination with Department of Fisheries
	Same as above	Same as above	-2		-2		
Fish biodiversity	Same as above	Riverine fish species i. e. major carp species, grass carp and other herbivorous species, eel (baim), big and small cat fish (boal, ayr, magur), might shift from the project area	-2		-1	0.5	Implementation: Contractor Monitoring: Nominated Engineer (SMO, BWDB) in coordination with Department of Fisheries
	Same as above		-2		-1		
Fish production	Same as above	Capture fish production would temporarily be declined by 13.3 MT within the project area. However, culture fisheries practice would be	-3		-1	1	Implementation: Contractor

IEC	Location	Impacts	Magnitude of impact*	Mitigation/ Enhancement/ Compensation/ Contingency	Magnitude with EMP*	EMP Cost (Lac Tk/Yr) *	Responsible Agency
		increased.					Monitoring: Nominated Engineer (SMO, BWDB) in coordination with Department of Fisheries
	Same as above	Capture fish production would temporarily be declined by 2 MT within the project area.	-3		-1		
Activity: Collection of earth materials from river/khal through dredging							
Fish habitat	Same as above	Water quality (stream flow, temperature, pH, turbidity, DO, hardness etc.) of that portion of the Boral river will temporarily be changed which would change the behavior of riverine fish species (both the juveniles and adults). Feeding habitat for the demersal (boal, ayr) and benthopelagic (baim) fish species would be damaged. - Deep pools (dor/duars) would temporarily be damaged.	-2	1. Dredging will have to done during the dry season. 2. Proper protective device (silt fence) will have to take to protect the deep pools (dor/duars).	-1	0.5	Implementation: Contractor Monitoring: Nominated Engineer (SMO, BWDB) in coordination with Department of Fisheries
	Same as above		-2		-1		
Fish migration	Same as above	Both the Longitudinal (hilsa) and lateral migration for fish will temporarily be disturbed.	-5	Dry season (December-March) is proposed for dredging.	-3	Not applicable	Implementation: Contractor Monitoring: Nominated Engineer (SMO, BWDB) in
	Same as above		-5		-3		

IEC	Location	Impacts	Magnitude of impact*	Mitigation/ Enhancement/ Compensation/ Contingency	Magnitude with EMP*	EMP Cost (Lac Tk/Yr) *	Responsible Agency
							coordination with Department of Fisheries
Fish biodiversity	Same as above	Riverine fish species i. e. hilsa, major carp species, eel (baim), big and small cat fish (boal, ayr, magur), etc. might shift from the project area	-5	1. Dredging will have to done during the dry season. 2. Proper protective device (silt fence)willhave to be taken to protect the deep pools (dor/duars).	-3	0.5	Implementation: Contractor Monitoring: Nominated Engineer (SMO, BWDB) in coordination with Department of Fisheries
	Same as above		-5		-3		
Fish production	Same as above	Capture fish production would temporarily be declined by 13.3 MT within the project area. In opposite, culture fisheries practice would be increased. Net fish production would be increased by 25 MT	-5	1. Dredging will have to done during the dry season. 2. Proper protective device (silt fence) will have to be taken to protect the deep pools (dor/duars).	-3	1.0	Implementation: Contractor Monitoring: Nominated Engineer (SMO, BWDB) in coordination with Department of Fisheries
	Same as above	Capture fish production would temporarily be declined by 2 MT within the project area. Culture fisheries practice would be slightly increased.	-5		-3		
Riverbank Protection Work							
Activity: Embankment slope pitching and turfing							

IEC	Location	Impacts	Magnitude of impact*	Mitigation/ Enhancement/ Compensation/ Contingency	Magnitude with EMP*	EMP Cost (Lac Tk/Yr) *	Responsible Agency
Fish habitat	1km from Benotia Hat/Bazar toward the start of Baral river.	Temporary damage would occur in the seasonal fish habitat due to either clearance of vegetation cover or draped by the filling earth during earth work for the fish species of marginal vegetation feeder.	-1	Vegetation clearance should be done as low as possible	-1	1	Implementation: Contractor Monitoring: Nominated Engineer (SMO, BWDB) in coordination with Department of Fisheries
Fish biodiversity		Riverine fish species i. e. major carp species, grass carp and other herbivorous species, eel (baim), big and small cat fish (boal, ayr, magur), might shift from the project area	-1		-1		
Fish production		Capture fish production would temporarily be declined by 2 MT within the project area.	-1		-1		
Fish production		Capture fish production would temporarily be declined by 2 MT within the project area. Culture fisheries practice would be slightly increased.	-1				
Activity: Placing and dumping of C.C. blocks as per design							
Fish biodiversity	1 km from Benotia Hat/Bazar to the start of BaralKhal	Riverine fish species i. e. hilsa, major carp species, eel (baim), big and small cat fish (boal, ayr, magur), etc. might shift from the project area. Different types disease producing materials/chemicals would be input	-5	1. Dredging will have to done during the dry season. 2. Proper protective device (silt fence) will have to take to protect the deep pools (dor/duars).	-3	LS	Implementation: Contractor Monitoring: Nominated Engineer (SMO, BWDB) in coordination with Department of Fisheries

Ecological Resources

IEC	Location	Impacts	Magnitude of impact*	Mitigation/Enhancement/Compensation/Contingency	Magnitude with EMP	EMP Cost (Lac Tk.)	Responsible Agency
Embankment Re-habilitation							
Activity: Collection of earth materials and construction of embankment							
Terrestrial ecosystem Aquatic ecosystem. Floral composition and diversity. Faunal composition and diversity	6.5 km of the Verakhola towards start of Hurashagar River (Char Andharmanik) 4km from the starting point of Hurashagar (Char Andharmanik) to KorotoaRiver bank.	Shrubs and herbs of bank slopes will be damaged by excavated soil dumping. Vegetation damage via dumping a high volume of excavated soil on the river banks	-5	Do not dump large volume of excavated soil on bottom of the existing trees. Observation of national and international days Awareness development activities should be conducted by the committee or nature club to protect the saplings.	+3	2.0	Implementation: Contractor Monitoring: Nominated Engineer (SMO, BWDB)
Construction of New Embankment							
Activity: Collection of earth for construction of embankment							
Terrestrial ecosystem Aquatic ecosystem. Floral composition and diversity. Faunal composition and diversity.	10.5 km of the Jamuna river bank from Hat Pachil Bazar, Kaizuri to Benotia Hat/ Bazar 2 km from Benotia Hat/Bazar to the start of BaralKhal, Verakola Hat.	Aquatic flora as well as zooplankton and phytoplankton will destroy. Shrubs and herbs of bank slopes will be damaged.	-3	Do not collect the soil from the fertile land and do not dump the soil.	-1	-	Implementation: Contractor Monitoring: Nominated Engineer (SMO, BWDB)
Riverbank Protection Work							
Activity: Slope protection							
Terrestrial ecosystem	2 km from Benotia Hat/ Bazar to the	Vegetation of river banks and some aquatic flora	-5	Awareness development activities should be conducted by the	+7	-	Implementation:

IEC	Location	Impacts	Magnitude of impact*	Mitigation/Enhancement/Compensation/Contingency	Magnitude with EMP	EMP Cost (Lac Tk.)	Responsible Agency
Aquatic ecosystem. Floral composition and diversity. Faunal composition and diversity	start of BaralKhal, Verakola Hat. 5 km of the Jamuna Left bank from ChauhaliSadar to Atpara. 2 km of the Jamuna Left bank from Jaffarganj to Bachamara 7 km of the Padma Left Bank at Harirampur	will reduce. Wildlife population like terrestrial birds and palm squirrels will be disturbed.		committee or nature club to protect the saplings.			specialist NGOs Monitoring : PMO /
Activity: Plantation at JRB-1							
Terrestrial ecosystem Aquatic ecosystem. Floral composition and diversity. Faunal composition and diversity.	6.5 km of the Verakhola towards start of Hurashagar river (Char Andharmanik) 4km from the starting point of Hurashagar (Char Andharmanik) to Korotoa bank. 10.5 km of the Jamuna river bank from Hat Pachil Bazar, Kaijuri to Benotia Hat/Bazar 2 km from	Vegetation of river bank will damage.	-5	• Plantation of 50,000 saplings. (Bot, Pakur, Shimul, Jam, Pitali, Khajur, Tal and water tolerance fruit and timber are suggested for plantation). • Do not dump large volume of excavated soil on bottom of the present trees. • Awareness development on natural resources. • Observation of national and international days. • Nature club or Local committee should be formed to protect the saplings. • Awareness development activities should be conducted by the committee or nature club.	+5	50.0 (Sapling-25 Tk. Stick-20Tk Fertilizer - 15 Plantation-10Tk. Guarding - 30tk/year).	Implementation: specialist NGOs Monitoring : PMO

IEC	Location	Impacts	Magnitude of impact*	Mitigation/Enhancement/Compensation/Contingency	Magnitude with EMP	EMP Cost (Lac Tk.)	Responsible Agency
	BenotiaHat/Bazar to the start of BaralKhal, Verakola Hat.						

Socio-economic

IEC	Location	Impacts	Magnitude of impact*	Mitigation/ Enhancement/ Compensation/ Contingency	Magnitude with EMP*	EMP Cost (in Lac Tk)	Responsible Agency
Jamuna Right Bank-1(JRB-1)							
Activity->	Excavation of earth materials from the location of embankment; dredging of soil from the Jamuna and Baral rivers; dumping of earthen materials on the embankment; embankment surface labeling through dumping machine; movement of vehicles for carrying earth materials.						
Employment	Places adjacent to the Jamuna River bank where the new embankment would be constructed (from Hat Panchil to Benotiamauzas). Places adjacent to the existing embankment of the Baral river (from Verakhola to Dambarlamauzas). At Benotia where the bank protection works is to be carried out.	A temporary employment will be created for labors during bailing out activities.	+1	Ensure employment for local people for both technical and non-technical works. If possible, 60% labor should be recruited from locale.	N/A	N/A	Implementation: Contractor Monitoring: Nominated Engineer (SMO, BWDB)

IEC	Location	Impacts	Magnitude of impact*	Mitigation/ Enhancement/ Compensation/ Contingency	Magnitude with EMP*	EMP Cost (in Lac Tk)	Responsible Agency
Labor migration	Labor would be internally in-migrated from adjacent upazilas/districts.	The in-migrated people can take part in construction work and this will bring opportunities for them also.	+2	A number of labors should be recruited to prompt the work.	N/A	N/A	Implementation : Contractor Monitoring: Nominated Engineer (SMO, BWDB)
Activity->	Dredging of earth materials from the Jamuna and Baral rivers; filling placing of geo-bags and casting and placing of CC blocks on the river banks; construction of sluices.						
Employment	Jamuna River (from Hat Panchil to Benotiamauzas). Baral River (from Verakhola to Dambarlamauzas). Other possible locations of construction of drainage sluices.	Temporary employment opportunity will be created for many labors.	+1	Ensure employment for local people for both technical and non-technical works. If possible, 60% labor should be recruited from locale.	N/A	N/A	Implementation : Contractor Monitoring: Nominated Engineer (SMO, BWDB)

Subproject JLB-2, Construction Phase

Water Resources

IEC	Location	Impacts	Magnitude of impact	Mitigation/ Enhancement/ Compensation/ Contingency	Magnitude with EMP	EMP Cost (Lac Tk)	Responsible Agency
Activity: Movement of vehicles for carrying earth materials							
Air quality	Places along the left bank of the Jamuna river where bank protection works would be carried out (Char janjira, Khasdalai, Atapara, Khashkauliamauzas at Chauhaliupazilla and Char pailadhusar, Raghunathpur, Banghabari and Pailamauzas at Jafarganj of Shibalayaupazilla)	Small amount of dust generated due to movement of vehicles and construction materials.	-2	Mitigation: Water to be sprinkled on the roads at regular intervals.	-1	N/A	Implementation: Contractor Monitoring: Nominated Engineer (SMO, BWDB)
Activity: Waste disposal, generated from the labor shed							
Surface water quality	Possible locations of labor shed (Char Janjira and Khashkauliamauzas at Chauhali and Char raghunathpur at Jafarganj).	Impacts can be generated due to improper disposal system which may eventually contaminate the water of Jamuna River.	-4	Mitigation: Proper waste disposal system, not interfering with the Jamuna river flow.	-1	N/A	Implementation: Contractor Monitoring: Nominated Engineer (SMO, BWDB)

Land Resources

IEC	Location	Impact	Magnitude of impact	Mitigation/ Enhancement/ Compensation/ Contingency	Magnitude with EMP	EMP Cost (Lac Tk)	Responsible Agency
Activity	***Collection and disposal of construction materials for bank protection activities***						
Land loss	Location-2: (Chauhali-5.0km)	About 0.5ha of land would be lost permanentl	-1	• Top soil (0-15cm) should be managed properly for conserve the soil fertility. • Area for executing construction activities and other project related activities should be	+2	No cost involvement of cost for land due to activities in existing	Implementation: Contractor Monitoring: Nominated

IEC	Location	Impact	Magnitude of impact	Mitigation/ Enhancement/ Compensation/ Contingency	Magnitude with EMP	EMP Cost (Lac Tk)	Responsible Agency
		y		optimized with the purpose of minimum disruption to cultivable lands and standing crops		embankment	Engineer (SMO, BWDB)
	Location-3: (Bachamara-2.0km)	About 0.2ha of land would be lost permanentl y	-1	• The filling materials should be collected from khas/fallow land /river. • Disposal of spoil/ constructing materials should preferably be stored on fallow or khas land so that the area might not be affected for growing crops. • Compensation will be paid for any crop damage. • The contractor will avoid cultivation fields during construction. • The contractor will avoid agricultural land for material borrowing and material stockpiling. • The contractor will ensure that no vehicular movements take place inside cultivation fields. • The contractor will ensure that no material is dumped inside cultivation fields.	+2		Implementati on: Contractor Monitoring: Nominated Engineer (SMO, BWDB)

Agricultural Resources

IEC	Location	Impact	Magnitude of impact	Mitigation/ Enhancement/ Compensation/ Contingency	Magnitude with EMP	EMP Cost (Lac Tk)	Responsible Agency
Activity	***Construction of labor sheds, stocking yard for Bank rehabilitation, construction of new embankment, bank protection and construction of drainage sluices and disposal of spoils activities***						
Crop production loss	i) Dombaria (ii) Lochha (iii) Gopalpur (iv) Jagtala (v) Doria mehi (vi)Benotia (vii)Chauhali (viii)Bachamara	Loss of crop production is expected to be about 27.9 metric ton for Construction of labor sheds and stocking yard for	-1	• In cases where the disruption to farming becomes unavoidable, adequate cash compensation should be provided to the land owners. /share croppers. • Exact amount of compensation should be determined based on the amount of land temporarily going out of cultivation. • The rate should be decided on the basis of the one crop usually grown on the pieces of land.	+3	9.33	Implementation: Contractor Monitoring: Nominated Engineer (SMO, BWDB)

IEC	Location	Impact	Magnitude of impact	Mitigation/ Enhancement/ Compensation/ Contingency	Magnitude with EMP	EMP Cost (Lac Tk)	Responsible Agency
	(ix) Harirampu (x)Location-1(Not fix up) (xi)Location-2(Not fix up) (xii)Location-3(Not fix up)	bank rehabilitation, construction of new embankment, bank protection and construction of drainage sluices and disposal of spoils activities		• Constructing materials • like sand, cement, construction of labor sheds, concrete, block, etc. should be placed in non-agricultural land as far as possible. These materials should not be placed in standing crops.			
					Sub-Total	***9.33***	
Community Organizations	All locations of regulators	Positive impact	+2	• The community organizations should be formed prior to implementation of the project. • The community organizations should be given orientation to protect their standing crops from river bank protection work, spoil soils, on farm water management, LCS, EMG etc.	+4	2.50	Implementation: specialist NGOs Monitoring: PMO / DDM / DAE

Fisheries Resources

IEC	Location	Impacts	Magnitude of impact*	Mitigation/ Enhancement/ Compensation/ Contingency	Magnitude with EMP*	EMP Cost (Lac Tk/Yr) *	Responsible Agency
Activity: Riverbankslopeprotectionwith concrete blocks and geobags (under water)							
Fish habitat	5 km of the Jamuna Left bank from ChauhaliSadar to Atpara	Borrowpit would be lost near the river bank at Chauhalisadar (East and North Khaskaulia)	-1	Not applicable	-1	Not applicable	Not applicable

IEC	Location	Impacts	Magnitude of impact*	Mitigation/ Enhancement/ Compensation/ Contingency	Magnitude with EMP*	EMP Cost (Lac Tk/Yr) *	Responsible Agency
	2 km of the Jamuna Left bank from Jaffarganj to Bachamara	Capture and culture fish production would be the same as the base.	0		0		
Fish biodiversity	Same as above	Capture and culture fish production would be the same as the base.	0		0		
	Same as above		0		0		
Fish production	Same as above	Capture and culture fish production would be the same as the base.	0	Proper training to increase the culture practice of high-valued fish species	+2	0.5	Implementation: specialist fisheries NGOs Monitoring: PMO in coordination with Department of Fisheries
	Same as above	Culture fish production would be increased by 47.32 MT MT within the project area.	+5		+6		
Activity: Placing and dumping of C.C. blocks above low water as per design							
Fish biodiversity	5 km of the Jamuna Left bank from ChauhaliSadar to Atpara	No Impact	0	Not applicable	0	Not applicable	Not applicable
	2 km of the Jamuna Left bank from Jaffarganj to Bachamara	Cat fish (boal, ayr, magur, etc.) might shift from the project area	-3	Proper protective device will have to be taken to protect the deep pools (dor/duars).	-2	0.2	Implementation: Contractor Monitoring: Nominated Engineer (SMO, BWDB) in

IEC	Location	Impacts	Magnitude of impact*	Mitigation/ Enhancement/ Compensation/ Contingency	Magnitude with EMP*	EMP Cost (Lac Tk/Yr) *	Responsible Agency
							coordination with Department of Fisheries
Fish production	Same as above	Capture and culture fish production would be the same as the base.	0	Proper training to increase the culture practice of high-valued fish species	+1	1	Implementation: specialist NGOs Monitoring: PMO in coordination with Department of Fisheries
	Same as above	Culture fish production would be increased by 47.32 MT MT within the project area.	+5		+5		

Ecological Resources

IEC	Location	Impacts	Magnitude of impact*	Mitigation/Enhancement/Compensation/Contingency	Magnitude with EMP	EMP Cost (Lac Tk.)	Responsible Agency
Activity: Slope protection							
Terrestrial ecosystem Aquatic ecosystem. Floral composition and diversity. Faunal composition	5 km of the Jamuna Left bank from ChauhaliSadar to Atpara. 2 km of the Jamuna Left bank from Jaffarganj to Bachamara	Vegetation of river banks and some aquatic flora will reduce. Wildlife population like terrestrial birds and palm squirrels will be disturbed.	-5	Awareness development activities should be conducted by the committee or nature club to protect the saplings.	+7	-	Implementation: specialist NGOs Monitoring: PMO /

IEC	Location	Impacts	Magnitude of impact*	Mitigation/Enhancement/Compensation/Contingency	Magnitude with EMP	EMP Cost (Lac Tk.)	Responsible Agency
Activity: Slope protection							
and diversity							

Socio-economic

IEC	Location	Impacts	Magnitude of impact*	Mitigation/ Enhancement/ Compensation/ Contingency	Magnitude with EMP*	EMP Cost (in Lac Tk)	Responsible Agency
Activity->	Filling placing of geo-bags and casting and placing of CC blocks on the river banks						
Employment	Places along the left bank of the Jamuna river where bank protection works would be carried out (Char janjira, Khasdalai, Atapara, Khashkauliamauzas at Chauhaliupazilla and Char pailadhusar, Raghunathpur, Banghabari and Pailamauzas at Jafarganj of Sirajganjupazilla)	A temporary employment will be created for many labors during bailing out activities.	+1	Recruit at least 60% of labors from locale for construction work.	N/A	N/A	Implementation: Contractor Monitoring: Nominated Engineer (SMO, BWDB)
Labor migration	Labor would be internally in-migrated from adjacent upazilas/districts.	Opportunities for in-migrant labors could be ensured during earthwork activities.	+2	A number of labors should be recruited to prompt the work.	N/A	N/A	Implementation: Contractor Monitoring: Nominated Engineer (SMO, BWDB)
Public and Occupational Health	The whole project study area i.e.Andharmanik, Beda khola, Mohakhola, Kashipur Ata para, Noya Para, Dholai	Because of having limited access to toilet, unhygienic environment and huge	-1	Proper health and sanitation system should be ensured for labors.	-1	N/A	Implementation: Contractor Monitoring: Nominated Engineer (SMO,

IEC	Location	Impacts	Magnitude of impact*	Mitigation/ Enhancement/ Compensation/ Contingency	Magnitude with EMP*	EMP Cost (in Lac Tk)	Responsible Agency
	Kaulia Work sites	gathering of labors can create disturbance to health. Accidents during construction activities		Safety measures, first aid provisions, and arrangements for medical evacuation and attention			BWDB)

Subproject PLB-1, Construction Phase

Water Resources

IEC	Location	Impacts	Magnitude of impact	Mitigation/ Enhancement/ Compensation/ Contingency	Magnitude with EMP	EMP Cost (Lac Tk)	Responsible Agency
Activity: Placing of geo-bags							
Air quality	Places along the left bank of the Padma river, where bank protection works would be carried out (Ramkrishnapur, Andarmanik and Boyramauzas of Harirampurupazilla).	Minor amount of dust generation during placing and dumping of CC blocks, Geo-bags; slope preparation and pitching, construction of sluices and movement of vehicles and construction materials.	-2	Mitigation: Water to be sprinkled as and where needed.	-1	N/A	Implementation: Contractor Monitoring: Nominated Engineer (SMO, BWDB)
Activity: Waste disposal from the labor sheds.							
Surface water quality	- Possible locations of labor camps (Ramkrishnapur and Andarmanikmauzas)	Impacts can be generated due to improper disposal system which may eventually contaminate the water of Padma River.	-4	Proper waste disposal system, not interfering with the Padma River flow.	-1	N/A	Implementation: Contractor Monitoring: Nominated Engineer (SMO, BWDB)

Land Resources

IEC	Location	Impact	Magnitude of impact	Mitigation/ Enhancement/ Compensation/ Contingency	Magnitude with EMP	EMP Cost (Lac Tk)	Responsible Agency
Activity	***Collection and disposal of construction materials for rbank protection activities***						
Land loss	Location-4: (Harirampur-7.0km)	0.7ha of land would be lost permanentl	-1	• Top soil (0-15cm) should be managed properly for conserve the soil fertility. • Area for executing construction activities and other project related activities should be	+2	No cost involvement of cost for land due to activities in	Implementation: Contractor Monitoring:

IEC	Location	Impact	Magnitude of impact	Mitigation/ Enhancement/ Compensation/ Contingency	Magnitude with EMP	EMP Cost (Lac Tk)	Responsible Agency
		y		optimized with the purpose of minimum disruption to cultivable lands and standing crops • The filling materials should be collected from khas/fallow land /river. • Disposal of spoil/ constructing materials should preferably be stored on fallow or khas land so that the area might not be affected for growing crops. • Compensation will be paid for any crop damage. • The contractor will avoid cultivation fields during construction. • The contractor will avoid agricultural land for material borrowing and material stockpiling. • The contractor will ensure that no vehicular movements take place inside cultivation fields. • The contractor will ensure that no material is dumped inside cultivation fields		existing embankment	Nominated Engineer (SMO, BWDB)

Agricultural Resources

IEC	Location	Impact	Magnitude of impact	Mitigation/ Enhancement/ Compensation/ Contingency	Magnitude with EMP	EMP Cost (Lac Tk)	Responsible Agency
Activity	***Construction of labor sheds, stocking yard for Bank rehabilitation, construction of new embankment, bank protection and construction of drainage sluices and disposal of spoils activities***						
Crop production loss	i) Dombaria (ii) Lochha (iii) Gopalpur (iv) Jagtala (v) Doria mehi (vi)Benotia (vii)Chauhali	Loss of crop production is expected to be about 27.9 metric ton for Construction of labor sheds and	-1	• In cases where the disruption to farming becomes unavoidable, adequate cash compensation should be provided to the land owners. /share croppers. • Exact amount of compensation should be determined based on the amount of land temporarily going out of cultivation. • The rate should be decided on the basis of the	+3	9.33	Implementation: Contractor Monitoring: Nominated Engineer (SMO, BWDB)

IEC	Location	Impact	Magnitude of impact	Mitigation/ Enhancement/ Compensation/ Contingency	Magnitude with EMP	EMP Cost (Lac Tk)	Responsible Agency
	(viii)Bachamara (ix) Harirampu (x)Location-1(Not fix up) (xi)Location-2(Not fix up) (xii)Location-3(Not fix up)	stocking yard for bank rehabilitation, construction of new embankment, bank protection and construction of drainage sluices and disposal of spoils activities		one crop usually grown on the pieces of land. • Constructing materials • like sand, cement, construction of labor sheds, concrete, block, etc. should be placed in non-agricultural land as far as possible. These materials should not be placed in standing crops.			
Community Organizations	All locations of regulators	Positive impact	+2	• The community organizations should be formed prior to implementation of the project. • The community organizations should be given orientation to protect their standing crops from river bank protection work, spoil soils, on farm water management, LCS, EMG etc.	+4	2.50	Implementation: specialist NGOs Monitoring: PMO / DDM / DAE

Fisheries Resources

IEC	Location	Impacts	Magnitude of impact*	Mitigation/ Enhancement/ Compensation/ Contingency	Magnitude with EMP*	EMP Cost (Lac Tk/Yr) *	Responsible Agency
Fish habitat	7 km of the Padma Left Bank at Harirampur	Temporary damage would occur in the seasonal fish habitat due to either clearance of vegetation cover or draped by the filling earth during earth work for the fish species of marginal vegetation feeder. Spawning ground would be lost	-6	1. Vegetation clearance should be done as low as possible 2. There should be now work on spawning grounds during the spawning season	-2	1	Implementation: Contractor Monitoring: Nominated Engineer (SMO, BWDB) in coordination with Department of Fisheries
Fish migration		Migration route would be disturbed	-6		-2		
Fish biodiversity		Riverine fish species i. e. major carp species, grass carp and other herbivorous species, eel (baim), big and small cat fish (boal, ayr, magur), might shift from the project area	-6		-2		
Fish production		Capture fish production would temporarily be declined by 592 MT within the project area.	-1		-1		

Ecological Resources

IEC	Location	Impacts	Magnitude of impact*	Mitigation/Enhancement/Compensation/Contingency	Magnitude with EMP	EMP Cost (Lac Tk.)	Responsible Agency
Activity: Slope protection							
Terrestrial ecosystem Aquatic ecosystem. Floral composition and diversity. Faunal composition and diversity	7 km of the Padma Left Bank at Harirampur	Vegetation of river banks and some aquatic flora will reduce. Wildlife population like terrestrial birds and palm squirrels will be disturbed.	-5	Awareness development activities should be conducted by the committee or nature club to protect the saplings.	+7	-	Implementation: specialist NGOs Monitoring: PMO /

Socio-economic

IEC	Location	Impacts	Magnitude of impact*	Mitigation/ Enhancement/ Compensation/ Contingency	Magnitude with EMP*	EMP Cost (in Lac Tk)	Responsible Agency
Pdma Left Bank-1 (PLB-1)							
Activity->	filling placing of geo-bags on the river banks						
Employment	Places along the left bank of the Padma River, where bank protection works would be carried out (Ram krishnapur, Andarmanik and Boyramauzas of Harirampurupazilla).	Temporary employment opportunities will be created for labors during bailing out activities.	+1	Recruit at least 60% of labors from locale for construction work.	N/A	N/A	Implementation: Contractor Monitoring: Nominated Engineer (SMO, BWDB)
Labor migration	Labor would be internally in-migrated from adjacent	Opportunities of in-migrant labors could	+2	A number of labors should be recruited to	N/A	N/A	Implementation: Contractor Monitoring:

IEC	Location	Impacts	Magnitude of impact*	Mitigation/ Enhancement/ Compensation/ Contingency	Magnitude with EMP*	EMP Cost (in Lac Tk)	Responsible Agency
	upazilas/districts.	be created during earthwork activities.		prompt the work.			Nominated Engineer (SMO, BWDB)
Public and Occupational Health	Places along the left bank of the Padma River, where bank protection works would be carried out (Ram krishnapur, Andarmanik and Boyramauzas of Harirampurupazilla). Work sites	Because of having limited access to toilet, unhygienic environment and huge gathering of labors can create disturbance to health. Accidents during construction activities	-1	Proper health and sanitation system should be ensured for labors. Safety measures, first aid provisions, and arrangements for medical evacuation and attention	-1	N/A	Implementation: Contractor Monitoring: Nominated Engineer (SMO, BWDB)

Annex 2: Standard Environmental Safeguard Clauses

A. Environmental Protection and Control of Pollution

1. General

The Contractor shall observe and comply with all National Laws and Government Regulationspertaining to environmental protection, pollution control, waste management, and biodiversity protection.

In conducting his construction activities, the Contractor shall take all necessary precautions to minimise environmental disturbance to the project area and surroundings and to prevent the escape of polluting substances into streams, water courses, and ground water. The Contractor shall also utilise all necessary practicable methods and devices as are available to prevent and otherwise minimize atmospheric emissions or discharges of air contaminants.

Except where otherwise agreed or provided for by the Employer or expressly stipulated in Particular Specifications or Technical Specifications forming part of the Contract Documents, no separate payment will be made for complying with the provisions of this Clause and attendant sub-clauses; and all costs shall be deemed to be included in the prices for the Contractor's mobilisation for construction, and the various rates and lump sum items for the works included in the priced Bill of Quantities.

2. Pollution of Water Courses and Streams

The emission of polluting liquids or other waste into drains, water courses or ground water shall not be permitted.

No concrete or cement washings from the works or drainage from the Contractor's concrete batching and mixing areas, asphalt (hot mix) plants or other manufacturing or production facilities shall be allowed to discharge into streams or drains without passing through an adequate system of settling ponds.

Storage of fuels, fuelling and maintenance of plant and vehicles, etc. shall take place only on sites and under conditions that that do not allow spilt fuels to be discharged to water bodies. Fuel storage and fuelling areas shall be equipped with adequate protective measures to confine and retain accidental spillages. No drainage from fuel store and plant maintenance depots shall be allowed to be discharged without passing through an adequate arrangement of oil traps and separators.

Washing of vehicles shall not be permitted in streams but only in specially designated and equipped areas.

Operations in quarries and borrow areas shall be carried out in such a way as to minimize any possible pollution from particulate matter entering the streams.

Adequate sanitary waste control facilities shall be provided in site offices and workers camps, and sewage waste shall be collected regularly and disposed in accordance with relevant environmental legislation.

The Contractor shall accordingly be responsible for the installation, operation and maintenance of a comprehensive drainage system to all areas of the Works. The system shall be constructed such that

no discharges of oil, cement, silt or other liquid or solid waste matter can enter the streams and water courses at the site; and it shall have all necessary solid waste and sediment traps, settling ponds, oil separators, etc. required to ensure that pollution of streams watercourses and natural bodies of water does not occur. The Contractor shall be responsible for maintaining the system to the satisfaction of the Employer's Construction Supervisor and all costs of providing the system shall be deemed to be included in the various rates and lump sum items for the works included in the priced Bill of Quantities.

3. Air Pollution

The Contractor shall take all necessary steps to minimize air pollution resulting from his operations.

Except where stipulated in these Specifications for the disposal of natural vegetation and organic materials from clearing operations, the burning of waste materials for disposal, particularly oil and petroleum wastes, rubber, plastics and similar materials will not be permitted.

During the performance of the work required under the Contract or of any operations appurtenant thereto, whether on the Project Site or elsewhere, the Contractor shall take all steps necessary, and shall furnish all labor, equipment, materials and means, required to reduce dust nuisance from the Works, and to prevent dust originating from his operations from damaging crops, orchards, cultivated fields, and dwellings; or causing a nuisance to persons. The Contractor shall be held liable for any damage resulting from dust originating from his operations including on Government roads, rights-of-way or elsewhere.

The emission of dust into the atmosphere shall not be permitted during the manufacture, handling and storage and handling of cement and of concrete aggregates and the Contractor shall use such methods and equipment as are necessary for the prevention, or the collection and disposal, of dust during such operations. All truckloads of loose materials shall be covered during transportation

Concrete batching and mixing areas, asphalt (hot mix) plants, or other manufacturing or production facilities shall be sited at least 500m from the nearest habitation. Emission outlets shall be fitted with pollution control devices in compliance with relevant current Government of Bangladesh emission control legislation.

The cost of spraying water on haul roads, access roads, government roads, aggregate stockpiles, etc.; or of any other methods of reducing the formation of dust; and the cost of furnishing and applying materials to maintain the works areas, adjacent areas, and roads, in a dustless condition, shall be deemed to be included in the various rates and lump sum items for the works included in the priced Bill of Quantities.

4. Noise Pollution

The Contractor shall take all necessary precautions to minimize the amount of noise and vibrations coming from construction activities.

The Contractor shall ensure that all plant and equipment is properly maintained in good operating condition, and that noisy construction activities shall be effectively sound reduced by means of silencers, mufflers, acoustic linings or shields, acoustic sheds or screens or other means, to avoid disturbance to any nearby noise sensitive receivers. All plant and equipment shall comply with relevant Government of Bangladesh legislation covering sound emissions.

Quarry operations and blasting shall be undertaken so as to minimize blasting and disturbance during the night and, insofar as possible, noise, vibration and dust. Operation of trucks and heavy vehicles and machinery shall be restricted to the hours of 06:30 to 19:00.

All necessary measures shall be undertaken to protect schools, hospitals and other adjacent noise sensitive receptors, including the use of noise barriers.

5. Damage to Property, Crops, and Vegetation

The Contractor shall limit the movement of his employees and equipment within the project area and on adjacent land, including access routes approved by the Employer's Construction Supervisor, so as to minimize damage to natural vegetation, crops and property, and shall endeavor to avoid any damage to land.

The Contractor shall strictly ensure employees and equipment do not enter any sensitive environmental areas that are demarcated as "no-entry" zones.

The Contractor shall preserve existing trees, plants and other vegetation that are to remain within or adjacent to the Works and shall use every precaution necessary to prevent damage or injury thereto. Trees or shrubs shall only be felled or removed where such impinge directly on the permanent works or necessary temporary works areas; and where such is approved by the Employer's Construction Supervisor.

On completion of the Works all areas disturbed by the Contractor's construction activities shall be restored by the Contractor to their original condition, or as may be acceptable to the Employer.

The Contractor shall be responsible directly to the Employer for any excessive or unnecessary damage to crops or lands arising from his operations, whether within the project area, on lands adjacent thereto, or adjacent to approved access roads: and deductions will be made from the payment due to the Contractor to cover the cost of such excessive or unnecessary damage, as determined by the Employer.

B. Sanitation Facilities and Arsenic Safe Water Supplies

At each construction area, (i) an appropriate number of tubewells will be installed to supply water for construction and safe drinking water to laborers and the construction camps, and (ii) latrines with septic tanks will be provided. Tubewells will be tested for arsenic and marked accordingly (green/red for safe/unsafe).

C. Reporting

The Contractor shall maintain a record of all emissions and spills of liquid, solid and gaseous matter which occur at the site, whether into water courses, streams, on land, or into the air. This record shall be compiled daily and shall include details of date, time and nature of the event, along with details of the remedial and clean-up measures carried out. Copies of these records shall be given to the Employer monthly.

The Contractor shall also maintain a record of any complaints made by any Governmental or Community Organization or by the public, regarding his operations. This record shall contain the date and time of receipt of the complaint, the name and address of the complainant and the action taken to remedy the situation. Copies of these records shall be given to the Employer monthly.

D. Environmental Management Plan

The requirements of this clause and attendant sub-clauses on Environmental Protection and Pollution Control notwithstanding; the Contractor shall observe and comply with all relevant environmental protection and mitigation, monitoring and reporting requirements in the Environmental Management Plan (EMP) as stipulated in the Particular Specification. In the event of any conflict between the foregoing sub-clauses and the environmental protection and mitigation measures and pollution control requirements of the EMP, the EMP shall take precedence.

The Contractor shall prepare and submit to the Employer's Construction Supervisor a Construction Environmental Management and Monitoring Plan (CEMP) demonstrating the manner in which the Contractor will comply with the requirements of the foregoing sub-clauses on Environmental Protection and Pollution Control, the EMP, and any particular environmental mitigation measures as stipulated in the Particular Specifications or Technical Specifications forming part of the Contract Documents.

The CEMP shall be submitted within 15 working days of the Contractor receiving the Notice to Proceedwith the Works, and shall include a waste management plan detailing procedures for waste management for the site covering all solid, liquid and gaseous waste materials and emissions. The waste management plan shall include procedures for the collection and disposal of all waste materials in such a way as to ensure that no damage is caused to the environment. Training shall be provided to workers about the appropriate implementation of the CEMP and waste management plan measures.

Where stipulated in the Particular Specifications or Technical Specifications forming part of the Contract Documents and provision has been made in the Bill of Quantities; payment for the implementation of the CEMP will be made in accordance with the Unit Rates, Lump Sum or Provisional Sum Items included in the Priced Bill of Quantities.

Annex 3: Clearance from DOE

Appendix- N

Government of the People's Republic of Bangladesh
Department of Environment
www.doe.gov.bd
Head Office, Paribesh Bhaban
E-16 Agargaon, Dhaka-1207

Memo No: DOE/Clearance/5215/2013/ 128 Date: 14 /05/2014

Subject: Environmental Clearance for Flood and Riverbank Erosion Risk Management Investment Program.

Ref: Your application dated 06/03/2014 and 09/04/2014.

Dear Sir,

Please refer to your letter of 06th March 2014 and 09th April 2014 on the captioned subject, I have the pleasure to convey the approval of Environmental Clearance for Flood and Riverbank Erosion Risk Management Investment Program under Jamuna-Meghna River Erosion Mitigation Project.

A copy of the said Environmental Clearance Certificate is attached herewith for your kind information and necessary action at your end.

Yours Sincerely,

14.05.2014

(Syed Nazmul Ahsan)
Deputy Director (Environmental Clearance)
and
Member-Secretary
Environmental Clearance Committee
Phone # 8181778

Project Director
Flood and Riverbank Erosion Risk Management Investment Program
Jamuna-Meghna River Erosion Mitigation Project
Bangladesh Water Development Board (BWDB)
28, Toyenbb Circular Road (3rd Floor)
Motijheel C/A, Dhaka-1000.

Copy Forwarded to :

1) Director General, Bangladesh Water Development Board, WAPDA Bhaban, Dhaka.
2) Private Secretary to the Hon'ble Secretary, Ministry of Environment and Forests, Bangladesh Secretariat, Dhaka..
3) Director, Department of Environment, Dhaka Regional/Rajshahi Divisional Office, Dhaka/Bogra.
4) Assistant Director, Office of the Director General, Department of Environment, Head Office, Dhaka.

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Government of the People's Republic of Bangladesh
Department of Environment
Head Office, E-16 Agargaon
Dhaka-1207
www.doe.gov.bd

Environmental Clearance Certificate

Section 12(1) of the Environment Conservation Act, 1995 (Amended 2010)

Clearance Certificate Number: ১28

File number: DOE/Clearance/5215/2013

Clearance Certificate Issue Date: 12 May, 2014

Renewal date not later than: 11 May, 2015

A. Clearance Certificate Type

Environmental Clearance Certificate

B. Clearance Certificate Holder

Project Director
Flood and Riverbank Erosion Risk Management Investment Program
Jamuna-Meghna River Erosion Mitigation Project
Bangladesh Water Development Board (BWDB)
28, Toyenbb Circular Road (3rd Floor)
Motijheel C/A, Dhaka-1000.

C. Premises to which this Clearance Certificate Applies

Flood and Riverbank Erosion Risk Management Investment Program.
Project Director
Jamuna-Meghna River Erosion Mitigation Project
Bangladesh Water Development Board (BWDB)

D. Activities for which this Clearance Certificate Authorizes and Regulates

a. Construction of 12.5 km new Embankment.
b. Rehabilitation of 10.5 km Embankment.
c. Construction of 16.0 km River Bank Protection.
d. Construction of Drainage cum Flushing Regulator (1 vent, 4 vent & 6 vent).
e. Rehabilitation of 2 existing Drainage cum Flushing Regulators (4 vent).
f. Afforestation älong the embankment.

E. Terms and Conditions for Environmental Clearance Certificate

1. **Limit Condition for Discharges to Air and Water**: The Environmental Clearance Certificate must comply with schedule 2 and 10, rule 12 of the Environment Conservation Rules, 1997.

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2. **Noise Limit**: The Environmental Clearance Certificate must comply with the Noise Pollution (Control) Rules, 2006

In case of non-coverage of ECR 1997, the World Bank Environment, Health and Safety Guideline shall be adhered to.

3. **Operating Conditions:**

3.1 Activities must be carried out in a competent manner. This includes:
(a) the processing, handling, movement and storage of materials and substances used to carry out the activity; and
(b) the treatment, storage, processing, reprocessing, transport and disposal of waste generated by the activity.

3.2 All plants and equipments installed at the premises or used in connection with the Environmental Clearance activity:
(a) must be maintained in a proper and efficient condition; and
(b) must be operated in a proper and efficient manner.

3.3 Construction works shall be restricted to day time hours so as to avoid/mitigate the disturbance of local lives as well as implementation schedules of the works shall be notified in advance to nearby residents.

3.4 Storage area for chemicals and other construction materials shall be carefully selected to avoid disturbance of the natural drainage. To avoid soil contamination at labour camp and work-site chemical, cement and petroleum derivatives shall be handled cautiously.

3.5 Sufficient number of culverts, bridges, sluice and other drainage/inlet facilities shall be installed properly to ensure sufficient cross drainage capacity.

3.6 During site preparation, piling work, construction/re-construction of land embankments, regulators, approach roads and temporary access roads, top soil shall be kept aside and shall be restored after completion of the said activities.

3.7 The open areas that are grasslands can be used for construction but with appropriate safeguards to maintain material and dump sites from contaminating river waters.

3.8 This shall be ensured that soil is not obtained from agricultural land and it should be obtained nearby river/khal/beel areas, which are free of invasive plants. The construction equipment and vehicles shall be cleaned regularly.

3.9 Re-vegetation and replanting shall be undertaken if rehabilitation works involve extensive vegetation clearance.

3.10 Vegetation clearance shall be minimizing at the construction phase as to minimize soil erosion. Soils for embankments shall be properly tested and compacted to ensure stability.

3.11 Soil erosion caused by removal of vegetative cover and excavated loose soil shall be checked by adequate protective works and plantation with local vegetation as soon as possible; loose soil shall be covered and stored away from the edge of the sea/river.

3.12 Proper construction practices shall be followed that minimize loss of habitats and fish breeding, feeding and nursery sites.

3.13 Necessary steps shall be taken to protect flooding of local areas due to restricted flow at the project sites.

3.14 Proper and adequate sanitation facilities shall be ensured in labor camps throughout the proposed project period.

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3.15 In order to control noise pollution, vehicles & equipment shall be maintained regularly; working during sensitive hours and locating machinery close to sensitive receptor shall be avoided.

3.16 No solid waste can be burnt in the project area. An environment friendly solid waste management should be in place during whole the period of the project in the field.

3.17 Proper and adequate on-site precautionary measures and safety measures shall be ensured so that no habitat of any flora and fauna would be demolished or destructed.

3.18 Any heritage site, ecological critical area and other environmentally and/or religious sensitive places shall be avoided during project construction phase.

3.19 To control dust vehicles and equipment to be used for this project shall be maintained properly, water trucks shall be used, stockpiles to be located away from sensitive receptors and vehicle speed limits shall be enforced.

3.20 Resettlement plan should be properly implemented and people should be adequately compensated, where necessary.

3.21 Climate Change effects and maximum storm surge height shall have to consider at the design phase.

3.22 Construction material should be properly disposed off after the construction work is over.

3.23 Appropriate permission would be required to obtain from the forest department in favor of cutting/felling of any plant/tree/sapling forested by any individual or government before doing such type of activity.

3.24 The mitigation measures described in the Environmental Management Plan (EMP) report along with the emergency response plan included in the EIA report shall strictly be implemented and kept functioning on a continuous basis.

4.1 Monitoring and Recording Conditions:

4.1.1 The results of any monitoring required to be conducted by this Clearance Certificate must be recorded.

4.1.2 The following records must be kept in respect of any samples required to be collected for the purposes of this Clearance Certificate:
(a) the date(s) on which the sample was taken;
(b) the time(s) at which the sample was collected;
(c) the point at which the sample was taken; and
(d) the name of the person who collected the sample.

4.2 Requirement to Monitor Concentration of Pollutants Discharged

For each monitoring, the Clearance Certificate holder must monitor (by sampling and obtaining results by analysis) the following parameter: water flow, water quality, air quality, noise, the surrounding areas for spread of invasive species, the changes in aquatic habitats before, during and after construction, fish catch during and after construction.

5. **Reporting Conditions:** Environmental Monitoring Reports shall be made available simultaneously to Head quarters, Dhaka Regional and Rajshahi Divisional office of the Department of Environment on a quarterly basis during the whole period of the project.

6. **Notification of environmental harm:** The Clearance Certificate holder or its employees must notify the Department of Environment of incidents causing or threatening material harm to the environment as soon as practicable after the person becomes aware of the incident.

F. RECORDING OF POLLUTION CONTROL:

The certificate holder must keep a legible record of all complaints made to the certificate holder or any employee or agent of the certificate holder in relation to pollution arising from any activity to which this Environmental Certificate applies. The record must include details of the following:

(a) the date and time complaint;
(b) the method by which the complaint was made;
(c) any personal details of the complaint which were provided by the complaint or, if no such details were provided, a note to that effect;
(d) the nature of the complaint;
(e) the action taken by the certificate holder in relation to the complaint, including any follow-up contact with the complaint; and
(f) if no action was taken by the certificate holder, the reasons why no action was taken.

The record of a complaint must be kept for at least 4 (four) years after the complaint was made. The record must be produced to any authorized officer of the DOE who asks to see them.

G. VALIDITY OF THE CLEARANCE CERTIFICATE:

This Environmental Clearance is valid for one year from the date of issuance and the Project authority shall apply for renewal to the Head Office of DOE with a copy to the Dhaka Regional and Rajshahi Divisional Office of DOE at least 30 (thirty) days ahead of expiry.

Violation of any of the above conditions shall render this clearance void.

This Environmental Clearance Certificate has been issued with the approval of the appropriate authority.

14.05.2014

(Syed Nazmul Ahsan)
Deputy Director (Environmental Clearance)
and
Member Secretary
Environmental Clearance Committee

Annex 4: Water Quality Parameters

Sl. No.	Water Quality Parameters	Bangladesh Standards (mg/L)	WHO Guide Line	Methods/ Equipments
01	Aluminum	0.2	-	Atomic Absorption Apectrophotometer (AAS)
02	Ammonia	0.5		UV-VIS
03	Arsenic	0.05	0.01	AAS
04	Barium	0.01	0.7	AAS
05	Benzene	0.01	0.01	Gas Chromatograph
06	BOD 5 Day, 200C	0.2	-	5 days Incubation
07	Boron	1.0	-	UV-VIS
08	Cadmium	0.005	0.003	AAS
09	Calcium	75	-	AAS
10	Chloride	150-600	-	Titrimetric
11	Chlorinated Alkenes			
11.1	Carbontetrachloride	0.01	0.004	Gas Chromatograph
11.2	1.1 Dichloroethelene	0.001	0.03	Gas Chromatograph
11.3	1.2 Dichloroethelene	0.03	0.03	Gas Chromatograph
11.4	Tetrachloroethelene	0.03	0.04	Gas Chromatograph
11.5	Trichloroethelene	0.09	0.07	Gas Chromatograph
12.1	Pentachlorophrnol	0.03	0.009	Gas Chromatograph
12.2	2,4,6-Trichlorophenol	0.03	0.2	Gas Chromatograph
13	Chlorine (Residual)	0.2	-	Titrimetric
14	Chloroform	0.09	0.2	Gas Chromatograph
15	Chromium (Hexavelent)	0.05	-	Iron Chromatograph
16	Chromium (Total)	0.05	0.05(P)	AAS
17	COD	4	-	Closed Reflux Method
18	Coli form (Faecal)	0 CFU (N/100mL)	0	Membrane Filtration Method
19	Coli form (Total)	0 CFU (N/100mL)	0	Membrane Filtration Method
20	Colour	15 Hazen	-	Colour Comparator
21	Copper	1	2	AAS
22	Cyanide	0.1	0.07	UV-VIS/Specific Ion Electrode
23	Detergent	0.2	-	UV-VIS
24	DO	6	-	Multimeter
25	Electric Conductivity	-us/cm	-	Multimeter
26	Fluoride	1	1.5	UV-VIS
27	Hardness as CaCO3	200-500	-	Titrimetric
28	Iodine	200-500	-	Titrimetric

29	Iron	0.3-1.0	-	AAS
30	Kjelhl Nitrogen (Total)	1	-	UV-VIS/ Digestion
31	Lead	0.05	0.01	AAS
32	Magnesium	30-35	-	AAS
33	Manganese	0.1	-	AAS
34	Mercury	0.001	0.001	Mercury Analyzer
35	Nickel	0.1	0.02(P)	AAS
36	Nitrate	10	50.0 as N	UV-VIS
37	Nitrite	<1	3.0(0.2)	UV-VIS
38	Odour	Odourless	-	Threshold Method
39	ORP (Eh)	-	-	ORP meter
40	Oil and Grease	0.01	-	Oil and Grease meter
41	pH		6.5-8.5	pH Meter
42	Phenolic Compounds	0.002	-	Gas Chromatograph
43	Phosphate	6	-	UV-VIS
44	Phosphorus	0	-	Digestion
45	Potassium	12	-	AAS
46	Radioactive Materials (Gross Alpha Activity)	0.01 Bq/L	0.5 Bq/L	-
47	Radioactive Materials (Gross Beta Activity)	0.1 Bq/L	1.0 Bq/L	-
48	Salinity	-%0	-	Multimeter
49	Selenium	0.01	0.01	AAS
50	Silver	0.02	-	AAS
51	Sodium	200	-	AAS
52	Suspended Solids	10	-	Filtration and Drying
53	Sulphide	0	-	UV-VIS
54	Sulphate	400	-	UV-VIS
55	Taste	-	-	Threshold Method
56	Total Alkalinity	-	-	Titrimetric
57	Total Dissolved Solid	1000	-	Multimeter
58	Temperature	20-30C		Thermometer
59	Tin	2	-	AAS
60	Turbidity	10 NTU	-	Turbidity meter
61	Zinc	5	-	AAS

Note: *UV-VIS : UV-Visible Spectrophotometer*
AAS : Atomic Absortion Spectrophotometer
ORP : Oxidation-Reduction Potential

Source: DPHE