Environmental Impact Assessment (Draft)

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Bangladesh: Flood and Riverbank Erosion Risk Management Investment Program

Prepared by the Bangladesh Water Development Board for the Asian Development Bank.

10. Environmental Management Plan

381. In the previous chapter, the possible impacts for each selected Important Environmental Component (IEC) have been assessed and evaluated. In addition to that, a number of mitigation measures have been mentioned for the negative impacts only. This chapter depicts a detail elaboration of the Environmental Management Plan (EMP) suggested by the study team. The EMP entails mitigation measures for the negative impacts, enhancement measures for the positive impacts, compensation for the non-mitigated impacts and contingency measures for the accidental events that might occur.

382. The EMP has been organized per site and distinguishing pre-construction, construction, and post-construction phase, to facilitate the monitoring process.

383. Impacts and mitigation measures broadly cover the three topics: (i) construction, (ii) biodiversity and (iii) aquaculture. Most construction related impacts are mitigated by contractors during construction. Issues pertaining to biodiversity and aquaculture, especially related to the construction of the embankment at JRB-1 will be implemented through a specialist NGO, following the principles established by the biodiversity program of GIZ at Pabna, now extended to Sirajganj, and as part of the livelihood program of the resettlement plan. In addition, aquaculture will be supported to compensate for the loss of openwater fisheries on the floodplain after the construction of the embankment at JRB-1. Aquaculture has a strong relevance for the poor and is part of the livelihood component of the resettlement plan, which is a separate compensation mechanism.

384. In addition to mitigating direct impacts of the tranche-1 work, a specialist firm/NGO will be retained to study the establishment of a river sanctuary, in accordance with future (Tranche-2 and Tranche-3) stabilization plans, looking beyond the localized Tranche-1 measures and aiming at identifying and mitigating any impacts from larger scale river-reach stabilization during Tranche-2 and Tranche-3.

10.1

10.2 Subproject JRB-1

10.2.1 Pre-Construction Phase

IEC	Location	Impacts	Magnitude of impact	Mitigation/ Enhancement/ Compensation/ Contingency	Magnitude with EMP	EMP Cost (Lac Tk)	Responsible Agency
Activity: Construction of labor shed, stock yard and construction camp, mobilization of labor, materials, equipment and other machineries, construction of CC blocks at site.							
Air quality	- Possible locations of labor shed (Dombarla, Locha, Dorta Mehi, Jagtala, Gopalpur mauzas); stock yard (to be selected by the Engineer in Charge) and site of CC block construction (Benotia Mauza). - Road side places used for transportation of materials (Kaijuri-shahjadpur road and the rural roads from Hat panchil to barnia mauzas and from Nagardala to Shelachapri mauzas).	Minor impact may occur from the small amount of dust generated due to movement of vehicles, construction materials and machineries; construction of labor shed and stock yard; preparation of CC block at site.	-2	<u>Mitigation:</u> - Construction materials should be covered with thick materials (i.e. polythene) during transportation to resist the generation of dust. - Water to be sprinkled to control the generation and spreading of dust; as and where required.	-1	1	Implementation: Contractor Monitoring: Nominated Engineer (SMO, BWDB)
Noise	- Possible locations of labor shed (Dombarla, Locha, Dorta Mehi, Jagtala, Gopalpur mauzas), stock yard (to be selected by the Engineer in Charge), site of CC block construction (Benotia Mauza).	Low impacts caused due to noise generation for mobilization of construction materials and construction of labor shed, stockyard and CC blocks.	-2	<u>Mitigation:</u> - Noise levels due to vehicular movement are to be kept within permissible limit. - Construction camps, labor shed, and sites for CC block construction are to be located	-1	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
	- Road side places through which construction materials would be transported (Kaijuri-shahjadpur road and the rural roads from Hat panchil to barnia mauzas and Nagardala to Shelachapri mauzas).			far away from settlements.			

Land Resources

IEC	Location	Impacts	Magnitude of impact	Mitigation/ Enhancement/ Compensation/ Contingency	Magnitude with EMP	EMP Cost (Lac Tk)	Responsible Agency
Activity	***Construction of labor sheds, stocking yard with CC block preparation yard for Embankment Rehabilitation activities***						
Land loss	Location-1: Dombaria (Baghabari towards Shahzadpur-6.5km)	Possibility of loss of 1.04 ha land for existing embankment	0	• Construction activities should be carried out as per design. • Labor shed should preferably be constructed on fallow or khas land. • Landowners affected by the construction of labor shed and placement of filling materials on agriculture land should be noticed ahead of time so that the area might not be affected for growing crops. • Labor sheds, and other project related activities should be optimized with the purpose of minimum disruption to cultivable lands and standing crops. • Adequate cash compensation should be provided to the land owners /share croppers. • The compensation should be determined based on the amount of land temporarily going out of cultivation.	+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)	Possibility of Loss of 1.08 ha existing embankment land	0		+1		Implementation: Contractor Monitoring: Nominated Engineer (SMO, BWDB)
					Sub-Total	**00**	

IEC	Location	Impacts	Magnitude of impact	Mitigation/ Enhancement/ Compensation/ Contingency	Magnitude with EMP	EMP Cost (Lac Tk)	Responsible Agency
Activity	***Construction of labor sheds, stocking yard for construction of new embankment activities***						
Land loss	Location-1: Gopalpur (Kaizuri-Hura sagar offtake-10.5km)	Possibility of 1.02 ha of agricultural land would be lost temporarily	-1	• Construction activities should be carried out as per design. • Labor shed and stocking yard should preferably be constructed on fallow or khas land. • Landowners affected by the construction of labor shed and placement of filling materials on agriculture land should be noticed ahead of time so that the area might not be affected for growing crops. • Labor sheds and other project related activities should be optimized with the purpose of minimum disruption to cultivable lands and standing crops. • Adequate cash compensation should be provided to the land owners /share croppers. • The compensation should be determined based on the amount of land temporarily going out of cultivation.	+2	0.38	Implementation: Contractor Monitoring: Nominated Engineer (SMO, BWDB)
	Location-2: Jagtala Kaizuri-Benotia-2.0km)	Possibility of 1.04 ha of agricultural land would be lost temporarily	-1		+2	0.39	Implementation: Contractor Monitoring: Nominated Engineer (SMO, BWDB)
	Location-3: Doriamehi (Hura sagar – Baghabari-6.0km)	Possibility of 1.0 ha of agricultural land would be lost temporarily	-1		+2	0.37	Implementation: Contractor Monitoring: Nominated Engineer (SMO, BWDB)
					Sub total	**1.14**	
Activity	***Construction of labor sheds and stocking yard for Bank Protective activities***						
Land loss	Location-1: (Benotia-2.0km)	Possibility of 1.0 ha of agricultural land would be lost temporarily	-1	• Construction activities should be carried out as per design. • Labor shed and stocking yard should preferably be constructed on fallow or khas land. • Landowners affected by the construction of labor shed and placement of filling materials on agriculture land should be noticed ahead of time so that the area might not be affected for growing crops. • Labor sheds, and other project related activities should be optimized with the purpose of minimum disruption to cultivable lands and standing crops.	+2	0.37	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
				• Adequate cash compensation should be provided to the land owners /share croppers. • The compensation should be determined based on the amount of land temporarily going out of cultivation.			
					Sub total	**0.37**	
Activity	***Construction of labor sheds and stocking yard for construction of drainage sluices activities***						
Land loss	Location-1 (Hurashagar outfall)	Possibility of 0.05 ha of agricultural land would be lost temporarily	-1	• Construction activities should be carried out as per design. • Labor shed and stocking yard should preferably be constructed on fallow or khas land. • Landowners affected by the construction of labor shed and placement of filling materials on agriculture land should be noticed ahead of time so that the area might not be affected for growing crops. • Labor sheds, and other project related activities should be optimized with the purpose of minimum disruption to cultivable lands and standing crops. • Adequate cash compensation should be provided to the land owners /share croppers. • The compensation should be determined based on the amount of land temporarily going out of cultivation.	+2	0.01	Implementation: Contractor Monitoring: Nominated Engineer (SMO, BWDB)
	(ii)Location-2(Hurashagar intake)	Possibility of 0.08ha of agricultural land would be lost temporarily	-1		+2	0.03	Implementation: Contractor Monitoring: Nominated Engineer (SMO, BWDB)
	(iii)Location-3(at existing sluices)	Possibility of 0.08ha of agricultural land would be lost temporarily	-1		+2	0.03	Implementation: Contractor Monitoring: Nominated Engineer (SMO, BWDB)
					Sub total	**0.07**	
					Grand total	**2.72**	

Agricultural Resources

385. There would be no impact during the pre-construction phase

Fisheries Resources

386. There would be no impact during the pre-construction phase.

Ecological Resources

387. There will be no impact duriing the pre-construction phase.

Socio-economic

IEC	Location	Impacts	Magnitude of impact*	Mitigation/ Enhancement/ Compensation/ Contingency	Magnitude with EMP*	EMP Cost (in Lac Tk)	Responsible Agency
Activity->	Construction of labor shed with proper water and sanitation facilities, garbage disposal system, construction of stock yard and construction camp, mobilization of labor, materials, equipment and other machineries; preparing CC blocks at site.						
Resettlement	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 Baral Khal, Verakola Hat These villages/mauzas are:Ratankandi, Selachapri Dumbaria, Alokdia, Nundao,	About 1130 HHs in the different locations of project area will be displaced.	-1	Proper land compensation, PAPs should be ensured for displaced peopled of project area as per resettlement plan	0	Will be estimated from RAP report	Implementation: Deputy Commissioner, specialist NGO Monitoring: PMO
Gender Issues	The whole study area i.e. Ratankandi Mohakhola Sontosha Kashipur Dholai Marma Binotia	Labor mobilization may create disturbance for the local women.	-2	The labor mobilization activities should be strictly followed up by project authority.	-1	N/A	Implementation: Contractor Monitoring: Nominated Engineer (SMO, BWDB)
Public Health		Because of having limited access to toilet, unhygienic environment due huge gathering of labors can create disturbance to health.	-1	Labor shed should establish near to bazaar areas and also ring slab water-sealed sanitary latrines should be established in each shed.	0	N/A	Implementation: Contractor Monitoring: Nominated Engineer (SMO, BWDB)

10.2.2 Construction Phase

Water Resources

IEC	Location	Impacts	Magnitude of impact	Mitigation/ Enhancement/ Compensation/ Contingency	Magnitude with EMP	EMP Cost (Lac Tk)	Responsible Agency
Activity: 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 Benotia mauzas). - Places adjacent to the existing embankment of the Baral river (from Verakhola to Dambarla mauzas). - 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 barnia mauzas and Nagardala to Shelachapri mauzas).	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)
Activity: Excavation of earth materials from the location of embankment; dredging of soil from the Jamuna River; movement of vehicles for carrying earth materials.							
Noise	- Road side places for transportation of construction materials	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	-1	N/A	Implementation: Contractor Monitoring:

IEC	Location	Impacts	Magnitude of impact	Mitigation/ Enhancement/ Compensation/ Contingency	Magnitude with EMP	EMP Cost (Lac Tk)	Responsible Agency
	(Kaijuri-shahjadpur road and rural roads from Hat panchil to barnia mauzas and Nagardala to Shelachapri mauzas). - Location of embankment (from Kaijuri to Karatoya offtake)			dredging activities are to be kept within permissible limit.			Nominated Engineer (SMO, BWDB)
Activity: Dredging of earth materials from the Jamuna River; 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 Benotia mauzas) and Baral river (from Verakhola to Dambarla mauzas). - 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 Hurasagar offtake. 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 riverbank).	-1	200	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 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. • 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	+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)
					Sub total	**00**	
Activity	***Collection and disposal of earth materials for construction of new embankment activities***						
Land loss	Location-1: Gopalpur (Kaizuri-Hura sagar 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	+2	39.38	Implementation: Contractor Monitoring: Nominated Engineer

IEC	Location	Impact	Magnitude of impact	Mitigation/ Enhancement/ Compensation/ Contingency	Magnitude with EMP	EMP Cost (Lac Tk)	Responsible Agency
				disruption to cultivable lands and standing crops			(SMO, BWDB)
	Location-2: Jagtala Kaizuri-Benotia-2.0km)	0.2ha of agricultural 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, 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	7.50	Implementati on: Contractor Monitoring: Nominated Engineer (SMO, BWDB)
	Location-3: Doriamehi (Hura sagar – Baghabari-6.0km)	0.6ha of agricultural land would be lost permanentl y	-1		+2	22.5	Implementati on: 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: (Benotia-2.0km)	0.2ha of land would be lost permanentl y	-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	No cost involvement of cost for land due to activities in existing embankment	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
				• 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.			
					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 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	**0.37**	Implementation: Contractor Monitoring: Nominated Engineer (SMO, BWDB)
	Location-2: (Hurashagar inlet)	0.02ha of agricultural land would be lost permanently	-1		+2	**0.75**	Implementation: Contractor Monitoring: Nominated Engineer (SMO, BWDB)
	Location-3: (at existing sluice gates)	0.02ha of agricultural land would be lost permanently	-1		+2	0.75	Implementation: Contractor Monitoring: Nominated Engineer (SMO, BWDB)
					Sub total	**1.87**	
Land type	Entire study	Drainage	-2	• The sequence of work during construction	+2	1.50	Implementati

IEC	Location	Impact	Magnitude of impact	Mitigation/ Enhancement/ Compensation/ Contingency	Magnitude with EMP	EMP Cost (Lac Tk)	Responsible Agency
change	area	congested area would be increased due to rehabilitation of embankment, construction of new embankment, bank protective work and drainage sluice. So that land type would be changed.		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 .			on: Contractor Monitoring: Nominated Engineer (SMO, BWDB)
					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	Loss of crop production is expected to be about 27.9 metric ton for Construction of	-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.	+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
	(vii)Chauhali (viii)Bachamara (ix) Harirampu (x)Location-1(Not fix up) (xi)Location-2(Not fix up) (xii)Location-3(Not fix up)	labor sheds and stocking yard for bank rehabilitation, construction of new embankment, bank protection and construction of drainage sluices and disposal of spoils activities		• 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.			
					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
					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							

IEC	Location	Impacts	Magnitude of impact*	Mitigation/ Enhancement/ Compensation/ Contingency	Magnitude with EMP*	EMP Cost (Lac Tk/Yr) *	Responsible Agency
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							
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.	-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	-1	LS	Implementation: Contractor Monitoring: Nominated Engineer (SMO, BWDB) in
	Same as above		-2		-1		

IEC	Location	Impacts	Magnitude of impact*	Mitigation/ Enhancement/ Compensation/ Contingency	Magnitude with EMP*	EMP Cost (Lac Tk/Yr) *	Responsible Agency
		Deep pools (dor/duars) would temporarily be damaged.		(dor/duars).			coordination with Department of Fisheries
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 deep pools (dor/duars).	-3	Not applicable	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 3.3 MT within the project area.	-5	Same as above	-3	Not applic	Implementati

IEC	Location	Impacts	Magnitude of impact*	Mitigation/ Enhancement/ Compensation/ Contingency	Magnitude with EMP*	EMP Cost (Lac Tk/Yr) *	Responsible Agency
	Same as above	Capture fish production would temporarily be declined by 2 MT within the project area.	-5		-3	able	on: Contractor Monitoring: Nominated Engineer (SMO, BWDB) in coordination with Department of Fisheries
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 Department of Fisheries
	2 km from Benotia Hat/ Bazar to the start of Baral Khal, Verakola Hat		-2		-1		
Fish migration	Same as above	Lateral migration for fish will temporarily be disturbed.	-2		-2	Not applicable	Implementation: Contractor Monitoring: Nominated
	Same as above	Same as above	-2		-2		

IEC	Location	Impacts	Magnitude of impact*	Mitigation/ Enhancement/ Compensation/ Contingency	Magnitude with EMP*	EMP Cost (Lac Tk/Yr) *	Responsible Agency
							Engineer (SMO, BWDB) in coordination with Department of Fisheries
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 increased.	-3		-1	1	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.	-3		-1		

IEC	Location	Impacts	Magnitude of impact*	Mitigation/ Enhancement/ Compensation/ Contingency	Magnitude with EMP*	EMP Cost (Lac Tk/Yr) *	Responsible Agency
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 coordination with Department of Fisheries
	Same as above		-5		-3		
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)will	-3	0.5	Implementation: Contractor Monitoring: Nominated
	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
				have to be taken to protect the deep pools (dor/duars).			Engineer (SMO, BWDB) in coordination with Department of Fisheries
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							
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
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		

IEC	Location	Impacts	Magnitude of impact*	Mitigation/ Enhancement/ Compensation/ Contingency	Magnitude with EMP*	EMP Cost (Lac Tk/Yr) *	Responsible Agency
Fish production		Capture fish production would temporarily be declined by 2 MT within the project area.	-1		-1		with Department of Fisheries
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 Baral Khal	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	6.5 km of the Verakhola towards start of Hurashagar	Shrubs and herbs of bank slopes will be damaged by excavated	-5	Do not dump large volume of excavated soil on bottom of the existing trees.	+3	2.0	Implementation: Contractor

IEC	Location	Impacts	Magnitude of impact*	Mitigation/Enhancement/Compensation/Contingency	Magnitude with EMP	EMP Cost (Lac Tk.)	Responsible Agency
ecosystem. Floral composition and diversity. Faunal composition and diversity	River (Char Andharmanik) 4km from the starting point of Hurashagar (Char Andharmanik) to Korotoa River bank.	soil dumping. Vegetation damage via dumping a high volume of excavated soil on the river banks		Observation of national and international days Awareness development activities should be conducted by the committee or nature club to protect the saplings.			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 Baral Khal, 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 Aquatic ecosystem. Floral composition and diversity. Faunal composition and diversity	2 km from Benotia Hat/ Bazar to the start of Baral Khal, Verakola Hat. 5 km of the Jamuna Left bank from Chauhali Sadar to Atpara. 2 km of the Jamuna Left bank from	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
	Jaffarganj to Bachamara 7 km of the Padma Left Bank at Harirampur						
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 Benotia Hat/Bazar to the start of Baral Khal, Verakola Hat.	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

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 Benotia mauzas). Places adjacent to the existing embankment of the Baral river (from Verakhola to Dambarla mauzas). 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)
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.						

IEC	Location	Impacts	Magnitude of impact*	Mitigation/ Enhancement/ Compensation/ Contingency	Magnitude with EMP*	EMP Cost (in Lac Tk)	Responsible Agency
Employment	Jamuna River (from Hat Panchil to Benotia mauzas). Baral River (from Verakhola to Dambarla mauzas). 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)

10.2.3 Post-construction Phase

Water Resources

IEC	Location	Impact	Magnitude of impact	Mitigation/ Enhancement/ Compensation/ Contingency	Magnitude with EMP	EMP Cost (Lac Tk)	Responsible Agency
Erosion	Location adjacent to the bank protection work (Benotia mauza)	Agricultural lands and settlements wil be saved from erosion. Roadway communication will be established along the Jamuna river.	+6	Enhancement: - Implementing Katkin and other small scale plantation along the slope of protective works - Providing fencing, biological protection (bamboo, other trees) at the country side of protective works to ensure soil stability	+7	15	Implementation: Community organizations Monitoring: Department of Forestry, BWDB Field Division

IEC	Location	Impact	Magnitude of impact	Mitigation/ Enhancement/ Compensation/ Contingency	Magnitude with EMP	EMP Cost (Lac Tk)	Responsible Agency
Drainage congestion	Karatoya and Hurasagar rivers, which drain out water from the sub reach to the Baral and Jamuna rivers.	Low impact may be generated as the conveyance capacity of internal rivers and lakes will be stressed, resulting in drainage congestion problems.	-1	Mitigation: Operationof sluices at the mouth of Hurasagar river, and places where required.	0	N/A	Implementation: Joint committee Monitoring: DoF, DAE, BWDB Field Division
Flood	Entire sub reach (especially near the location of embankment works i.e. from Hat Panchil to Benotia mauzas and from Verakhola to Dambarla mauzas).	Significant impact in flooding. The improvement in regular flooding would be around 30% in the entire sub-reach. This would lead to a better control in both irrigation and social status of the people in the subreach.	+5	Enhancement: - Forwarding the rehabilitated embankment an additional seven kilometers upto the Nagardala-Ratankandi bridge along the karatoya river to ensure better flood protection - Providing vegetative cover along the slope of the embankments and afforestation works in the countryside of the embankment	+8	2,000	Implementation: PMO BWDB when planning Tranche-2, Monitoring: BWDB, DOE Implementation: Community organizations Monitoring Department of Forestry, Field Division, BWDB
Water Availability and Use	Agricultural lands near the possible location of regulators and sluices.	The socio-economic status of the farmers would be enhanced due their increased chances of practicing Aman crops	+3	Enhancement: Providing inlets through embankments to allow farmers in using river water in irrigation	+5	1	Implementation: Joint committee Monitoring: DAE, DoF, BWDB Field Division

**No impact (0); Negative Impact (-); Positive Impact (+); Low Impact (1-3); Medium Impact (4-6); High Impact 7-8;Very High Impact (9-10).*

Land Resources

IEC	Location	Impact	Magnitude of impact	Mitigation/ Enhancement/ Compensation/ Contingency	Magnitude with EMP	EMP Cost (Lac Tk)	Responsible Agency
Land type change	Entire project area	Minimize River bank erosion, drainage congestion/water logging, flooding, siltation etc to 1,84,200 ha of agricultural land.	+2	• Formation of community organizations, strengthening through imparting training need to be done. • Involvement of community organizations in project activities (maintenance of embankment, functioning of regulators, etc) would improve the project situation. • Crop rotation with leguminous crops, application of more organic materials, organic manure, and green manuring and soil management should be practiced to improve soil fertility in the project area. • Crop diversification with multi-crops might improve environmental condition of the soil.	+4	3.50	Implementation: specialist NGOs Monitoring: PMO / DDM / DAE
Sand carpeting	Entire study area	Sand carpeting minimized due to proposed interventions.	+4	• Formation of community organizations, strengthening through imparting training need to be done. • Involvement of community organizationsin project activities (maintenance of embankment, functioning of regulators, etc) would improve the project situation. • Land of sand carpeting area might bring under cultivation through removal of coarse sand from field, incorporation of organic manure in the land, practicing of green manure, crop diversification through leguminous crops etc.	+6	3.5	Implementation: specialist NGOs Monitoring: PMO / DDM / DAE
					Sub-Total	***7.00***	
					Grand Total	***82.47***	

**No impact (0); Negative Impact (-); Positive Impact (+); Low Impact (1-3); Medium Impact (4-6); High Impact 7-8;Very High Impact (9-10)*

Agricultural Resources

IEC	Location	Impact	Magnitude of impact	Mitigation/ Enhancement/ Compensation/ Contingency	Magnitude with EMP	EMP Cost (Lac Tk)	Responsible Agency
Crop production	Entire project area(All locations)	Additional rice production would be about 148,065 metric tons	+3	• Organic manure should be applied for the increase of soil fertility; • Farmers group should have close contact with DAE for adaptation of various measures of IPM/ICM; • Irrigation should be provided in optimum level with minimum conveyance loss; • Involvement of Community organizationsin project activities would enhance crop production.	+6	3.50	Implementation: specialist NGOs Monitoring: PMO / DDM / DAE
Improved irrigation facilities	Entire project area(All locations)	Additional surface water irrigated area would be increased by about 75 ha due to re-excavation of khals.	+3	• Farmers expand surface irrigation during rabi and boro season • communityorganizations get training in irrigation management	+4	3.50	Implementation: Community organizations Monitoring: DAE

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 Embanment							

IEC	Location	Impacts	Magnitude of impact*	Mitigation/ Enhancement/ Compensation/ Contingency	Magnitude with EMP*	EMP Cost (Lac Tk/Yr)*	Responsible Agency
Fish habitat	6.5 km of the Verakhola towards start of Hurashagar river	Estimated net loss to fish habitat area would be 4321.3 ha	-7	1. Aquatic trees and herbs should be planted on the slope of the bank. 2. Proper protective device will have to take to protect the deep pools (dor/duars). 3. Use of surface water during the breeding period should be stopped. 4. Culture fisheries should be developed 5. Perennial beels should be developed under sanctuary program 6. Some flood water from the river should be allowed during normal or low floods (through sluice gates)	-4	0.5	Implementation: specialist NGOs, community organizations Monitoring: PMO in coordination with Department of Fisheries
	4km from the starting point of Hurashagar to Korotoa bank	Estimated net loss to fish habitat area would be 1659 ha	-4		-2		
Fish migration	6.5 km of the Verakhola towards start of Hurashagar river	Degraded fish migration	-5	Operation of sluice gates	-3	Not applicable	Implementation: joint management committees, Monitoring: Department of Fisheries (DoF)
	4km from the starting point of Hurashagar to Korotoa bank	Degraded fish migration	-5	Operation of sluice gates	-3		
Fish biodiversity	6.5 km of the Verakhola towards start of Hurashagar	Capture fish species diversity would be moderate to low	-2	1. Proper protective device) will have to take to protect the deep pools (dor/duars).	-2	0.5	Implementation: specialist NGOs, community

IEC	Location	Impacts	Magnitude of impact*	Mitigation/ Enhancement/ Compensation/ Contingency	Magnitude with EMP*	EMP Cost (Lac Tk/Yr)*	Responsible Agency
	river			2. Use of surface water during the breeding period should be stopped. 3. Culture fisheries should be developed 4. Perennial beels should be developed under biodiversityprogram 5. Proper training to increase the culture practice of high-valued fish species			organizations Monitoring: PMO / Department of Fisheries (DoF)
	4km from the starting point of Hurashagar to Korotoa bank	Capture fish species diversity would be moderate to low	-2		-		
Fish production	6.5 km of the Verakhola towards start of Hurashagar river	Estimated net loss to fish production: 1179.5 MT	-7		-5	1	Implementation: specialist NGOs, community organizations Monitoring: PMO / Department of Fisheries (DoF)
	4km from the starting point of Hurashagar to Korotoa bank	Estimated net loss to fish production: 461 MT	-6		-4		
Construction of New Embankment							
Fish habitat	10.5 km of the Jamuna river bank from Hat Pachil Bazar, Kaizuri to Benotia Hat/Bazar	Estimated net loss to fish habitat area would be 11038.5 ha	-9	1. Aquatic trees and herbs should be planted on the slope of the bank. 2. Proper protective device will have to take to protect the deep pools (dor/duars). 3. Use of surface water during the breeding period should be stopped.	-6	0.5	Implementation: specialist NGOs Monitoring: PMO / Department of Fisheries (DoF)
	2 km from Benotia Hat/Bazar to the start of Baral Khal, Verakola Hat	Estimated net loss to fish habitat area would be 409 ha	-9		-6		
Fish migration	10.5 km of the Jamuna river bank from Hat Pachil Bazar, Kaizuri to Benotia Hat/Bazar	Degraded fish migration	-5	Operation of sluice gates	-5	Not applicable	Implementation: joint management committees,

IEC	Location	Impacts	Magnitude of impact*	Mitigation/ Enhancement/ Compensation/ Contingency	Magnitude with EMP*	EMP Cost (Lac Tk/Yr)*	Responsible Agency
	2 km from Benotia Hat/Bazar to the start of Baral Khal, Verakola Hat	Degraded fish migration	-5		-5		Monitoring: Department of Fisheries (DoF)
Fish biodiversity	10.5 km of the Jamuna river bank from Hat Pachil Bazar, Kaizuri to Benotia Hat/Bazar	Capture fish species diversity would be moderate to low	-2	Aquaculture program including reexcavation of khals and borrow pits, developing fish ponds, and operation of sluice gates during the flood season	-2	0.5	Implementation: community organizations, joint management committees Monitoring: Department of Fisheries (DoF)
	2 km from Benotia Hat/Bazar to the start of Baral Khal, Verakola Hat	Capture fish species diversity would be moderate to low	-2		-		
Fish production	10.5 km of the Jamuna river bank from Hat Pachil Bazar, Kaizuri to Benotia Hat/Bazar	Estimated net loss to fish production: 99 MT	+3	Proper training to increase the culture practice of high-valued fish species	+4	1	Implementation: specialist NGOs Monitoring: PMO / Department of Fisheries (DoF)
	2 km from Benotia Hat/Bazar to the start of Baral Khal, Verakola Hat	Estimated net gain to fish production: 1 MT	+1	Not applicable	+1		
Riverbank Protection Work							
Fish habitat	2 km from Benotia Hat/Bazar to the start of Baral Khal	Estimated net loss to fish habitat area would be 1 ha	-2	1. Aquatic trees and herbs should be planted on the slope of the bank. 2. Proper protective device (i.e., declaration of Sanctuary) will have to take to protect the deep pools (dor/duars).	-2	0.5	Implementation: specialist NGOs, community organizations Monitoring: PMO / Department of Fisheries (DoF)

IEC	Location	Impacts	Magnitude of impact*	Mitigation/ Enhancement/ Compensation/ Contingency	Magnitude with EMP*	EMP Cost (Lac Tk/Yr)*	Responsible Agency
				3. Use of surface water during the breeding period should be stopped.			
Fish migration		Degraded fish migration	-5	Not applicable	-5	Not applicable	Not applicable
Fish biodiversity		Capture fish species diversity would be moderate to low	-2	Not applicable	-	Same as above	Not applicable
Fish production		Estimated net gain to fish production: 1 MT	+1	Not applicable	+1	1	Not applicable

Ecological Resources

IEC	Location	Impacts	Magnitude of impact*	Mitigation/Enhancement/Compensation/Contingency	Magnitude with EMP	EMP Cost (Lac Tk.)	Respons-ible Agency
Embankment Rehabilitation							
Terrestrial ecosystem Aquatic ecosystem. Floral composition and diversity. Faunal	10.5 km from Verakhola toward the Korotoa bank at Mohakhola	Protection of homestead, roadside and social forest habitat. Vegetation coverage of the project area will improve Faunal composition and diversity would be	+3	Do not dump large volume of excavated soil on bottom of the present trees. Observation of national and international days Awareness development activities should be conducted by the committee or nature club to protect the saplings.	+5	-	Implementation: specialist NGOs, community organizations Monitoring: PMO / Department of Forestry

IEC	Location	Impacts	Magnitude of impact*	Mitigation/Enhancement/Compensation/Contingency	Magnitude with EMP	EMP Cost (Lac Tk.)	Respons-ible Agency
composition and diversity		deteriorated					
Construction of New Embankment							
Terrestrial ecosystem Aquatic ecosystem. Floral composition and diversity Faunal composition and diversity	12.5 km of the Jamuna river bank from Hat Pachil Bazar, Kaizuri toward the Korotoa bank at Mohakhola	Protection of homestead, roadside and social forest habitat will improve bio-diversity Vegetation coverage of the project area will improve Faunal composition and diversity would be deteriorated	+2	Observation of national and international days Awareness development activities should be conducted by the committee or nature club to protect the saplings.	+3	Mention above	Implementation: specialist NGOs, community organizations Monitoring: PMO / Department of Forestry
Riverbank Protection Work							
Activity- Slope Protection Activities							
Terrestrial ecosystem Aquatic ecosystem. Floral composition and diversity.	2 km from Benotia Hat/ Bazar to the start of Baral Khal, Verakola Hat.	Protection of homestead, roadside and social forest habitat will improve bio-diversity Vegetation coverage of the project area will improve	+2	Awareness development activities should be conducted by the committee or nature club to protect the planted saplings.	5	-	Implementation: specialist NGOs, community organizations Monitoring: PMO / Department of Forestry

IEC	Location	Impacts	Magnitude of impact*	Mitigation/Enhancement/Compensation/Contingency	Magnitude with EMP	EMP Cost (Lac Tk.)	Respons-ible Agency
Faunal composition and		Faunal composition and diversity would be deteriorated					

**No impact (0); Negative Impact (-); Positive Impact (+); Low Impact (1-3); Medium Impact (4-6); High Impact 7-8; Very High Impact (9-10).*

Socio-economic

IEC	Location	FWOP	FWIP	Impacts	Magnitude of impact*	Mitigation/ Enhancement/ Compensation/ Contingency	Magnitude with EMP*	EMP Cost (in Lac Tk)	Responsible Agency
Jamuna Right Bank-1(JRB-1)									
Communication	Possible locations for communication in project area Hat Panchil Benotia Verakhola Dambarla	Embankment cum road wiped out for last 10 years. In near future, main road of Hat Panchil to Benotia would be affected.	Communication facilities will be improved both in local and upazila level.	Road communication will be improved which convey better economy by expanding business option.	+3	Not applicable	N/A	N/A	Not applicable

IEC	Location	FWOP	FWIP	Impacts	Magnitude of impact*	Mitigation/ Enhancement/ Compensation/ Contingency	Magnitude with EMP*	EMP Cost (in Lac Tk)	Responsible Agency
Employment	Ratankandi Selachapri Dumbaria Alokdia Nundao	Temporary employment will be created for many labors during labor shed construction	More employment opportunities will be created for farmers and fishers of the project area.	In future, a number of employments will generate in fish culture and agriculture activities.	+2	Ensure/arrange training from DAE and DOF for local labors.	N/A	N/A	Implementation: specialist NGOs Monitoring: PMO
Income generation		A small number of low earned people will enhance their income with this additional income source.	People income will increase in future by creating more work options.	Income will be increased for all classes i.e. labor to businessmen.	+4	Implement a livelihood program for vulnerable groups directly affected by the construction	N/A	N/A	Implementation: specialist NGOs Monitoring: PMO

10.3 Subproject JLB-2

10.3.1 Pre-Construction Phase

Water Resources

IEC	Location	Impacts	Magnitude of impact	Mitigation/ Enhancement/ Compensation/ Contingency	Magnitude with EMP	EMP Cost (Lac Tk)	Responsible Agency
Activity: Construction of labor shed with water and sanitation facilities, garbage disposal system, construction of stock yard and construction camp, labor and material/equipment mobilization							
Air quality	- Possible locations of labor camps (Char Jajuria and Khashkaulia mauzas at Chauhali and Char raghunathpur at Jafarganj). - Location of stock yard (to be selected by the Engineer In Charge). - Location of CC blocks construction (Khashkaulia mauza at Chauhali and raghunathpur amauza at Jafarganj).	Small amount of dust would be generated during movement of vehicles, construction materials and machineries; construction of labor shed and CC block.	-2	<u>Mitigation:</u> - Construction materials to be covered with thick materials i.e. polythene during transportation. - Water to be sprinkled to control the generation and spreading of dust; as and where needed.	-1	N/A	Implementation: Contractor Monitoring: Nominated Engineer (SMO, BWDB)
Noise	- Possible locations of labor shed (Char Jajuria and Khashkaulia mauzas at Chauhali and Char raghunathpur at Jafarganj). - Location of stock yard (to be selected by the Engineer In Charge). - Location of CC blocks construction (Khashkaulia mauza at Chauhali and raghunathpur amauza at	Low impacts caused due to noise generation due to mobilization of construction materials and construction of labor shed, stockyard and CC blocks. There is a high school and an upazilla office at the construction site of Chauhali and one primary school at Jafarganj which would face minor impacts due to noise generation.	-2	<u>Mitigation:</u> - Noise levels due to vehicular movement are to be kept within permissible limit. - Construction camps, labor shed, and sites for CC blocks construction are to be located far away from settlements, school, offices.	-1	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
	Jafarganj). - Roadside locations to be used during material transportation (Char jajuria, khashkaulia mauzas at Chauhali and raghunathpur and paila mauzas at Jafarganj)						

Land Resources

IEC	Location	Impacts	Magnitude of impact	Mitigation/ Enhancement/ Compensation/ Contingency	Magnitude with EMP	EMP Cost (Lac Tk)	Responsible Agency
Activity	***Construction of labor sheds and stocking yard for Bank Protective activities***						
Land loss	Location-2: (Chauhali-5.0km)	Possibility of 1.02 ha of agricultural land would be lost temporarily	-1	• Construction activities should be carried out as per design. • Labor shed and stocking yard should preferably be constructed on fallow or khas land. • Landowners affected by the construction of labor shed and placement of filling materials on agriculture land should be noticed ahead of time so that the area might not be affected for growing crops. • Labor sheds, and other project related activities should be optimized with the purpose of minimum disruption to cultivable lands and standing crops. • Adequate cash compensation should be provided to the land owners /share croppers. • The compensation should be determined based on the amount of land temporarily going out	+2	0.38	Implementation: Contractor Monitoring: Nominated Engineer (SMO, BWDB)
	Location-3: (Bachamara-2.0km)	Possibility of 1.01 ha of agricultural land would be lost temporarily	-1		+2	0.37	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
				of cultivation.			
					Sub total	**0.75**	

Agricultural Resources

388. There would be no impact during the pre-construction phase

Fisheries Resources

389. There will be no impact during the pre-construction phase.

Ecological Resources

390. There will be no impact duriing the pre-construction phase.

Socio-economic

IEC	Location	Impacts	Magnitude of impact*	Mitigation/ Enhancement/ Compensation/ Contingency	Magnitude with EMP*	EMP Cost (in Lac Tk)	Responsible Agency
Activity->	Construction of labor shed with water and sanitation facilities, garbage disposal system, construction of stock yard and construction camp, labor and material/equipment mobilization						
Resettlement	5 km of the Jamuna Left bank from Chauhali Sadar to Atpara 2 km of the Jamuna Left bank from	About 534 HHs in the different locations of project area will be displaced.	-2	Proper land compensation to the PAPs, displaced peopled of project area should be re-settled.	0	Will be estimated from RAP report	Implementation: Deputy Commissioner, specialist NGO Monitoring: PMO

IEC	Location	Impacts	Magnitude of impact*	Mitigation/ Enhancement/ Compensation/ Contingency	Magnitude with EMP*	EMP Cost (in Lac Tk)	Responsible Agency
	Jaffarganj to Bachamara These villages/mauzas are: Andharmanik Beda khola Mohakhola Kashipur Ata para Noya Para Dholai Kaulia Marma						
Employment	Possible locations of labor camps (Char Janjira and Khashkaulia mauzas). Location of stock yard (to be selected by the Engineer in Charge). Location of CC blocks construction (at Khashkaulia mauza).	A temporary employment opportunity will be created for local labors during labor shed construction.	+1	Recruit at least 60% of labors from locale for construction work.	N/A	N/A	Implementation: Contractor Monitoring: Nominated Engineer (SMO, BWDB)
Gender Issues	The whole study area i.e. Andharmanik Beda khola Mohakhola	Labor mobilization may create disturbance for the local women.	-2	The labor mobilization activities should strictly follow up by project authority.	-1	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
Public Health	Kashipur Ata para Noya Para Dholai Kaulia Marma	Because of having limited access to toilet, unhygienic environment and huge gathering of labors can create disturbance to health.	-1	Proper health and sanitation system should be ensured for labors.	0	N/A	Implementation: Contractor Monitoring: Nominated Engineer (SMO, BWDB)

10.3.2 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, Khash kaulia mauzas at Chauhali upazilla and Char pailadhusar, Raghunathpur, Banghabari and Paila mauzas at Jafarganj of Shibalaya upazilla)	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 Khashkaulia mauzas 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 y	-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. • 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	No cost involvement of cost for land due to activities in existing embankment	Implementati on: Contractor Monitoring: Nominated Engineer (SMO, BWDB)
	Location-3: (Bachamara-2.0km)	About 0.2ha of land would be lost permanentl y	-1		+2		Implementati on: Contractor Monitoring: Nominated Engineer (SMO, BWDB)
					Sub total	**00**	

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***						

IEC	Location	Impact	Magnitude of impact	Mitigation/ Enhancement/ Compensation/ Contingency	Magnitude with EMP	EMP Cost (Lac Tk)	Responsible Agency
	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
					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
Activity: Riverbankslope protection with concrete blocks and geobags (under water)							
Fish habitat	5 km of the Jamuna Left bank from Chauhali Sadar to Atpara	Borrowpit would be lost near the river bank at Chauhali sadar (East and North Khaskaulia)	-1	Not applicable	-1	Not applicable	Not applicable
	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 Chauhali Sadar to Atpara	No Impact	0	Not applicable	0	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	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 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	5 km of the Jamuna Left bank from	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
Activity: Slope protection							
Aquatic ecosystem. Floral composition and diversity. Faunal composition and diversity	Chauhali Sadar to Atpara. 2 km of the Jamuna Left bank from Jaffarganj to Bachamara	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 /

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, Khash kaulia mauzas at Chauhali upazilla and Char pailadhusar, Raghunathpur, Banghabari and Paila mauzas at Jafarganj of Sirajganj upazilla)	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

IEC	Location	Impacts	Magnitude of impact*	Mitigation/ Enhancement/ Compensation/ Contingency	Magnitude with EMP*	EMP Cost (in Lac Tk)	Responsible Agency
							Engineer (SMO, BWDB)
Public and Occupational Health	The whole project study area i.e.Andharmanik, Beda khola, Mohakhola, Kashipur Ata para, Noya Para, Dholai Kaulia 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)

10.3.3 Post-construction Phase

Water Resources

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

IEC	Location	Impact	Magnitude of impact	Mitigation/ Enhancement/ Compensation/ Contingency	Magnitude with EMP	EMP Cost (Lac Tk)	Responsible Agency
Erosion	- From Atapara to Khash kaulia mauzas at Chauhali upazilla - From Gangadia to the end of Paila mauzas at Jafarganj of Shibalaya upazilla	Massive impact to the livelihood of the local people. Due to the bank protection works at Chauhali and Jafarganj, huge amount of agricultural lands and settlements will be saved. Communication facilities will be re-established over the left bank of Jamuna river.	+8	Enhancement: - Implementing Katkin and other small scale plantation along the slope of protective works - Providing bamboo protection at the country side of protective works to increase soil strength.	+9	N/A	Implementation: Community organizations Monitoring: Department of Forestry, BWDB Field Division

**No impact (0); Negative Impact (-); Positive Impact (+); Low Impact (1-3); Medium Impact (4-6); High Impact 7-8;Very High Impact (9-10).*

Land Resources

391. There will be no impact during the post-construction phase.

Agricultural Resources

392. There will be no impact during the post-construction phase.

Fisheries Resources

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

Fish habitat	5 km of the Jamuna Left bank from Chauhali Sadar to Atpara	Estimated net loss to fish habitat area would be 1388.6 ha	-3	1. Aquatic trees and herbs should be planted on the slope of the bank. 2. Proper protective device (i.e., declaration of Sanctuary) will have to take to protect the deep pools (dor/duars). 3. Use of surface water during the breeding period should be stopped.	-1	1	Implementation: specialist NGOs, community organizations Monitoring: PMO / Department of Fisheries (DoF)
	2 km of the Jamuna Left bank from Jaffarganj to Bachamara	Estimated net loss to fish habitat area would be 550 ha	-3		-1		
Fish biodiversity	5 km of the Jamuna Left bank from Chauhali Sadar to Atpara	Capture and culture fish production would be the same as the base.	0	Not applicable	0	-	Not applicable
	2 km of the Jamuna Left bank from Jaffarganj to Bachamara	Same as above	0	Same as above	0		
Fish production	5 km of the Jamuna Left bank from Chauhali Sadar to Atpara	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 Not applicable	+2	0.5	Implementation: specialist NGOs Monitoring: PMO / Department of Fisheries (DoF)

	2 km of the Jamuna Left bank from Jaffarganj to Bachamara	**Estimated net gain to fish production: 1 MT**	**+1**		**+3**		

** No impact (0); Negative Impact (-); Positive Impact (+); Low Impact (1-3); Medium Impact (4-6); High Impact (7-8); Very High Impact (9-10).*

Ecological Resources

393. There will be no impact during the post-construction phase.

Socio-economic

IEC	Location	FWOP	FWIP	Impacts	Magnitude of impact*	Mitigation/ Enhancement/ Compensation/ Contingency	Magnitude with EMP*	EMP Cost (in Lac Tk)	Responsible Agency
Jamuna Left Bank-2 (JLB-2)									
Communication	Possible locations for communication in project area Char janjira Khasdalai Khash kaulia Pailadhusar Raghunathpur Paila	Embankment cum road could be wiped out. In near future, road of Char janjira, Khasdalai, Atapara, Khash kaulia mauzas at Chauhali upazilla and	Communication facilities will be improved both in local and upazila level.	Road communication will be improved which convey better economy by expanding business option.	+3	Plan upgrading of embankment with road during next tranches	N/A	N/A	Implementation: PMO, Monitoring: ADB

IEC	Location	FWOP	FWIP	Impacts	Magnitude of impact*	Mitigation/ Enhancement/ Compensation/ Contingency	Magnitude with EMP*	EMP Cost (in Lac Tk)	Responsible Agency
		Char pailadhusar, Raghunathpur, Banghabari and Paila mauzas at Jafarganj of Sirajganj upazilla would be affected.							
Protection of municipal area including markets and homesteads	Chouhali bazaar and adjacent villages Jafarganj bazaar and adjacent village	Municipal area including markets and homesteads will certainly be eroded	Protective work will protect the municipal area including markets and homestead	Municipal area, markets and homesteads will be protected and business will be run properly. Government office, and educational and religious institutions will be protected	+6	Extend protection where necessary during next tranches	N/A	N/A	Implementation: PMO, Monitoring: ADB
Employment	Char janjira Khasdalai Khash kaulia Pailadhusar	A temporary employment will be created for many	More employment opportunities will be created	In future, a number of employments will generate in	+4	Ensure/arrange training from DAE and DOF for local labors.	N/A	N/A	Implementation: specialist NGOs Monitoring: PMO

IEC	Location	FWOP	FWIP	Impacts	Magnitude of impact*	Mitigation/ Enhancement/ Compensation/ Contingency	Magnitude with EMP*	EMP Cost (in Lac Tk)	Responsible Agency
	Raghunathpur Paila	labors during labor shed construction.	for farmers and fishers of the project area.	fish culture and agriculture activities.					
Income generation		A small number of low earned people will enhance their income with this additional income source.	People income will increase in future by creating more work options.	Income will be increased for all classes i.e. labor to businessmen.	+4	Implement a livelihood program for vulnerable groups directly affected by the construction	N/A	N/A	Implementation: specialist NGOs Monitoring: PMO

10.4 Subproject PLB-1

10.4.1 Pre-Construction Phase

Water Resources

IEC	Location	Impacts	Magnitude of impact	Mitigation/ Enhancement/ Compensation/ Contingency	Magnitude with EMP	EMP Cost (Lac Tk)	Responsible Agency
Activity: Construction of labor shed with water and sanitation facilities, garbage disposal system, construction of stock yard and construction camp, labor and materials/equipment mobilization							

IEC	Location	Impacts	Magnitude of impact	Mitigation/ Enhancement/ Compensation/ Contingency	Magnitude with EMP	EMP Cost (Lac Tk)	Responsible Agency
Air quality	- Possible locations of labor camps (Ramkrishnapur and Andarmanik mauzas) - Location of stock yard (to be selected by the Engineer In Charge), - Location of CC block construction (Andarmanik mauza) - Roadside locations to be used in carrying construction materials (Harirampur-Rathora road; Andarmanik and Ramkrishnapur mauzas)	Small amount of dust generation during movement of vehicles, construction materials and machineries, construction of labor shed and CC blocks.	-2	<u>Mitigation:</u> - Construction materials to be covered with thick materials i.e. polythene during transportation - Water to be sprinkled to control the generation and spreading of dust; as and where needed	-1	N/A	Implementation: Contractor Monitoring: Nominated Engineer (SMO, BWDB)
Activity: Construction of labor shed and construction camp; labor and materials/equipment mobilization							
Noise	- Possible locations of labor camps (Ramkrishnapur and Andarmanik mauzas) - Location of stock yard (to be selected by the Engineer In Charge), - Location of CC block construction (Andarmanik mauza) - Roadside locations to be used in carrying construction materials (harirampur-rathora road; andarmanik and ramkrishnapur mauzas)	Minor impact would be generated due to the construction of CC block, labor shed, stock yard and mobilization of materials.	-2	- Noise levels are to be kept within permissible standard	-1	N/A	Implementation: Contractor Monitoring: Nominated Engineer (SMO, BWDB)

Land Resources

IEC	Location	Impacts	Magnitude of impact	Mitigation/ Enhancement/ Compensation/ Contingency	Magnitude with EMP	EMP Cost (Lac Tk)	Responsible Agency
Activity	***Construction of labor sheds and stocking yard for Bank Protective activities***						
Land loss	Location-4: (Harirampur-7.0km)	Possibility of 1.04ha agricultural land would be lost temporarily lost	-1	• Construction activities should be carried out as per design. • Labor shed and stocking yard should preferably be constructed on fallow or khas land. • Landowners affected by the construction of labor shed and placement of filling materials on agriculture land should be noticed ahead of time so that the area might not be affected for growing crops. • Labor sheds, and other project related activities should be optimized with the purpose of minimum disruption to cultivable lands and standing crops. • Adequate cash compensationshould be provided to the land owners /share croppers. • The compensation should be determined based on the amount of land temporarily going out of cultivation.	+2	0.39	Implementation: Contractor Monitoring: Nominated Engineer (SMO, BWDB)
					Sub total	**0.39**	

Agricultural Resources

394. There would be no impact during the pre-construction phase

Fisheries Resources

395. There will be no impact during the pre-construction phase.

Ecological Resources

396. There will be no impact duriing the pre-construction phase.

Socio-economic

IEC	Location	Impacts	Magnitude of impact*	Mitigation/ Enhancement/ Compensation/ Contingency	Magnitude with EMP*	EMP Cost (in Lac Tk)	Responsible Agency
Activity->	Construction of labor shed with water and sanitation facilities, garbage disposal system, construction of stock yard and construction camp, labor and materials/equipment mobilization						
Resettlement	Possible locations of labor camps (Ramkrishnapur and Andarmanik mauzas) Location of stock yard (to be selected by the Engineer In Charge), Location of CC block construction (Andarmanik mauza). These villages are: Jaghannathpur, Boxor, Andharmanik, Bholabaj, Boyra	About 596 HHs in the different locations of project area will be displaced.	-2	Proper land compensation, PAPs should be ensured for displaced peopled of project area	-1	Will be estimated from RAP report	Implementation: Deputy Commissioner, specialist NGO Monitoring: PMO
Gender Issues	The whole study area ,i.e. Jaghannathpur,Boxor Andharmanik, Bholabaj, Boyra	Labor mobilization may create disturbance for the local women.	-2	The labor mobilization activities should strictly follow up by project authority.	-1	N/A	Implementation: Contractor Monitoring: Nominated Engineer (SMO, BWDB)
Public Health		Because of having limited access to toilet, unhygienic environment due huge gathering of	-1	Proper health and sanitation system should be ensured for labors.	0	N/A	Implementation: Contractor Monitoring: Nominated Engineer

IEC	Location	Impacts	Magnitude of impact*	Mitigation/ Enhancement/ Compensation/ Contingency	Magnitude with EMP*	EMP Cost (in Lac Tk)	Responsible Agency
		labors can create disturbance to health.					(SMO, BWDB)

10.4.2 Construction Phase

Water Resources

IEC	Location	Impacts	Magnitude of impact	Mitigation/ Enhancement/ Compensation/ Contingency	Magnitude with EMP	EMP Cost (Lac Tk)	Responsible Agency
Activity: 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 Boyra mauzas 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 Andarmanik mauzas)	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 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. • 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	No cost involvement of cost for land due to activities in existing embankment	Implementation: Contractor Monitoring: Nominated Engineer (SMO, BWDB)
					Sub total	**00**	

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***						

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

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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 Boyra mauzas 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 Boyra mauzas 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)

10.4.3 Post-construction Phase

Water Resources

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

IEC	Location	Impact	Magnitude of impact	Mitigation/ Enhancement/ Compensation/ Contingency	Magnitude with EMP	EMP Cost (Lac Tk)	Responsible Agency
Erosion	Ram krishnapur, Andarmanik and Boyra mauzas of Harirampur upazilla	Huge impacts in the impacted area. River Bank protection work at Harirampur will save agricultural lands and settlements. Communication system will be enhanced. The economic status of livelihood would improve.	+7	Enhancement: - Implementing Katkin and other small scale plantation along the slope of protective works. - Providing biological protection at the country side of protective works to ensure soil stability.	+8	N/A	Implementation: Community organizations Monitoring: Department of Forestry, BWDB Field Division

**No impact (0); Negative Impact (-); Positive Impact (+); Low Impact (1-3); Medium Impact (4-6); High Impact 7-8; Very High Impact (9-10).*

Land Resources

397. There will be no impact during the post-construction phase.

Agricultural Resources

398. There will be no impact during the post-construction phase.

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	Estimated net loss to fish habitat: 678 ha.	-6	1. Vegetation clearance should be done as low as possible	-2	0.5	Implementation: specialist NGOs

IEC	Location	Impacts	Magnitude of impact*	Mitigation/ Enhancement/ Compensation/ Contingency	Magnitude with EMP*	EMP Cost (Lac Tk/Yr)*	Responsible Agency
				Spawning ground should be taken under special consideration during the earthwork and earth filling Dredging will have to done during the dry season. Proper protective device will have to take to protect the deep pools (dor/duars).			Monitoring: PMO / Department of Fisheries (DoF)
Fish migration		Migration route would be disturbed	-2		-1		Implementation: specialist NGOs Monitoring: PMO / DoF
Fish biodiversity		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		-3	0.2	Implementation: specialist NGOs Monitoring: PMO / Department of Fisheries (DoF)
Fish production		Estimated net loss to fish production: 46 MT	-5		-3		

** No impact (0); Negative Impact (-); Positive Impact (+); Low Impact (1-3); Medium Impact (4-6); High Impact (7-8); Very High Impact (9-10).*

Ecological Resources

399. There will be no impact during the post-construction phase.

Socio-economic

IEC	Location	FWOP	FWIP	Impacts	Magnitude of impact*	Mitigation Measure	Magnitude with EMP*	EMP Cost (in Lac Tk)	Responsible Agency
Padma Left Bank-1 (PLB-1)									
Communication	The possible locations for communication system are: Jaghannathpur Boxor Andharmanik Bholabaj Boyra	Bank protection cum road wiped out recently. In near future, main road of Alfadanga to Faridpur would be affected.	Communication facilities will be improved both in local and upazila level.	Road communication will be improved which convey better economy by expanding business option.	+3	Plan upgrading of embankment with road during next tranches	N/A	N/A	Implementation: PMO, Monitoring: ADB
Protection of municipal area including markets and homesteads	Ramkrishnapur bazaar and adjacent other villages Andharmanik bazaar and adjacent other village	Municipal area including markets and homesteads will certainly be eroded	Protective work will protect the municipal area including markets and homestead	Municipal area, markets and homesteads will be protected and business will be run properly. Government office, and educational and religious institutions will be protected	+6	Extend protection where necessary during next tranches	N/A	N/A	Implementation: PMO, Monitoring: ADB

IEC	Location	FWOP	FWIP	Impacts	Magnitude of impact*	Mitigation Measure	Magnitude with EMP*	EMP Cost (in Lac Tk)	Responsible Agency
Employment	The possible locations for employment opportunities in future are: Jaghannathpur Boxor Andharmanik Bholabaj Boyra	Temporary employment will be created for many labors during labor shed construction.	More employment opportunities will be created in agriculture and fisheries field.	In future, a number of employments will generate in fish culture and agriculture activities.	+4	Ensure/arrange training from DAE and DOF for local labors.	N/A	N/A	Implementation: specialist NGOs Monitoring: PMO
Income generation		A small number of low earned people will enhance their income with this additional income source.	People income will increase in future by creating more work options.	Income will be increased for all classes i.e. labor to businessmen.	+4	Implement a livelihood program for vulnerable groups directly affected by the construction	N/A	N/A	Implementation: specialist NGOs Monitoring: PMO

10.5 Monitoring Plan

10.5.1 Monitoring schedule for Pre-construction Phase

400. In this phase, no implementation monitoring plan is needed for checking EMP implementation works. The below provides an non-exhaustive example how the EMP could be monitored, which needs to be expanded to the site specific conditions.

10.5.2 Monitoring schedule for construction Phase

	Bangladesh Water Development Board	
	Integrated Flood and Riverbank Erosion Management	
	Investment Program	

EMP IMPLEMENTATION

Book No. _____ Monitoring Report No._____

Date:_____ Time:_____

Contract:_____

Contractor:_____

Work Sites (s):_____

A	DAILY EHS CHECKLIST	Yes	No	Score Yes=+5 No=-5	A	DAILY EHS CHECKLIST	Yes	No	Score Yes=+5 No=-5
1	Correct Disposal of Construction Solid Waste				15	Dispensary working, Doctor present			
2	Correct Disposal of Liquid Waste				16	Ambulance Functional			
3	Vehicles and dredger With No Smoke or Noise				17	No Loss to Flora or Fauna (Specially Tree)			
4	Vehicles Within Speed Limit				18	Re-excavation work			
5	No Pollution from construction site				19	Placement of dredging spoil			
6	No Oil/Diesel Spills on Land or Water				20	Top-soil protection system from embankment area			
7	No Social Issue Created				21	Placement of Top Soil			
8	Any Threat Caused				22	Plantation			

A	DAILY EHS CHECKLIST	Yes	No	Score Yes=+5 No=-5	A	DAILY EHS CHECKLIST	Yes	No	Score Yes=+5 No=-5
	to Riverine area					system			
9	Water Sprinkled on embankment				23	Presence of Child Labour			
10	No embankment and bank Soil Erosion				24	Labour camp location & management in order			
11	Safety dress, helmet and field boots used				25	Drinking water and sanitation facilities for labour			
12	Health precautions taken				26	No Burning of wood in camp			
13	Placement of C.C blocks				27	Women wage			
14	Turfing materials								

B. EXPLANATION (of any of above points)	Total Scores = _____%

C. NON COMPLIANCE:

Non Compliance # Period Description	Class
	1. Minor: Under One Month (Contractor alerted)
	2. Moderate: Over One Month but under Two Months (Contractor warned)
	3. Major: About Two Months (Contractor's local bill withheld by RE* till compliance)
	4. Critical: Over Three Months (Contractor's overall bill withheld by RE and PM* till compliance)

D. CIRCULATION

1) DG, DOE, 2) DG, BWDB, 4) EE, Local BWDB Office

Field EHS* Monitor of Consultant (Full Name & Signature) *EHS- Environment Health & Safety *RE – Resident Engineer *ES – Environmental Supervisor of Consultants.	Field EHS Expert of Contractor (Full Name & Signature)

10.5.3 Monitoring schedule for Post-construction Phase

401. A monitoring plan has been 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	Monitoring Cost (Lac Tk per year)*	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 Hurasagar offtake.	Twice in a year (pre and post monsoon)	1	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)	0.5	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)	1	BWDB
River planform	Checking the diversion phenomenon, conveyance characteristics and plan forms of a number of rivers	Karatoya offtake (JRB-1), Ichamaty offtake (PLB-1), Kata khal at Andarmanik (PlB-1)	Once in a year (post monsoon)	1	BWDB
			Sub-total	**3.50**	

(b) Land and Agriculture Resources

Indicator	Method	Location	Frequency	Monitoring Cost (Lac Tk)*	Responsible Agency
Crop yield	The Water Management Organizations	All Upazilas within the project area namely-	The appropriate time for	3.0	DAE, BWDB with involvemen

Indicator	Method	Location	Frequency	Monitoring Cost (Lac Tk)*	Responsible Agency
	(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.	Balkuchi kamarkhanda, Shahjadpur, Nagarpur, Daulatpur, Saturia, Ghior, Manikganj sadar, Singair, Sibalaya, Harirampur and Chauhali	monitoring yield would be harvesting time for each crop season.		t 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- Balkuchi kamarkhanda, Shahjadpur, Nagarpur, Daulatpur, Saturia, Ghior, Manikganj sadar, Singair, Sibalaya, Harirampur and Chauhali	The appropriate time for monitoring damage would be harvest time of each crop.	3.0	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- Balkuchi kamarkhanda, Shahjadpur, Nagarpur, Daulatpur, Saturia, Ghior, Manikganj sadar, Singair, Sibalaya, Harirampur and Chauhali	Three times in dry season (mainly Boro crops).	3.0	DAE, BWDB with involvement of beneficiaries (WMOs).
			Sub-total	**9.0**	

(c) Fisheries Resources

Indicator	Method	Location	Frequency	Monitoring Cost (Lac Tk/Yr)*	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 Baral Khal, Verakola Hat 5 km of the Jamuna Left bank from Chauhali Sadar to Atpara 2 km of the Jamuna Left bank from Jaffarganj to Bachamara 7 km of the Padma Left Bank at Harirampur, Andharmanik Ghat	Two times per year. (Will continue for 2 years)	0.5	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 Baral vs karotoa connectivity Baral river to Karotoa and Baral to Hurashagor Major carp migration route at Andharmanik Ghat of Bayra Union for spawning	Two month e.g. May and June, per year. (Will continue for 2 years after completion of project activities).	1.0	DoF
Fish species and fish productio n	Catch monitoring and Fish Market Survey	Entire study area	Once per month in each location for 2 year after completion of	1.0	DoF

Indicator	Method	Location	Frequency	Monitoring Cost (Lac Tk/Yr)*	Responsible Agency
			proposed activities.		
Pond fish culture	Interviewing fish farmers and Fish Market Survey	Selected ponds	One time per month (Will continue 2 year)	0.5	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)	2.0	DoF, Community based Fisheries Management Organizations (CBFMOs) and Community based Organizations (CBOs) and other nature clubs.
			Sub-total	**5.00**	

(d) Ecological resources

Indicator	Method	Location	Frequency	Cost (Lac Tk.)	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 Baral Khal, Verakola Hat • 5 km of the Jamuna Left bank from Chauhali Sadar to Atpara • 2 km of the Jamuna Left bank from Jaffarganj to Bachamara	1 year after plantation (Every day by the recruited guard).	Mention above	BWDB in coordination with local group

Indicator	Method	Location	Frequency	Cost (Lac Tk.)	Responsible Agency
		• 7 km of the Padma Left Bank at Harirampur, Andharmanik Ghat			

(e) Socio-economic

Indicator	Method	Location	Frequency	Monitoring Cost (Lac Tk)*	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 Khash kaulia,Pailadhusar Raghunathpur, Paila **PLB-1** Jaghannathpur, Boxor Andharmanik, Bholabaj Boyra	Once	3	BWDB/consultant and contractor
			Sub-total	**3.0**	

11. Conclusion and Recommendations

11.1 Conclusion

402. 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 will start 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. During Tranche-2 first measures for larger scale river stabilization are planned, designed based on the Tranche-1 study outcomes and supported by environmental monitoring and mitigation measures. This approach will be carried forward and adapted in Tranche-3.

403. With respect to flood mitigation and river stabilization, the program considers the following detailed approach:

(i) The program as a whole aims to reduce the flood risk at three priority sub-projects (JRB-1, JLB-2, and PLB-1) by providing new/rehabilitated embankments in all tranches. The program intends to mitigate negative impacts at the planning and designlevel, and through additional compensation measures. Planning and design account for: (a) leaving key distributariesopen to limited flood flowsto support the continued deposition of fertile sediments as well as flood season navigation, (b) designing the offtakes of the distributaries as part of the river stabilization work, in order to improve dry season flows, (c) providing embankments with sluice gates specifically for local drainage[39], and (d) designing embankments in accordance to international practice to reduce the risk of failure. Mitigation measures address: (e) loss in floodplain biodiversity, and (f) open water fisheries. At community-level, flood risk management training will be provided to the flood affected population in order to raise the awareness to the residual risk after strengthening the existing flood embankment lines.

(ii) To protect the flood embankments, river banks will be progressively stabilized through riverbank protection, starting in Tranche-1 at critically eroding reaches on an emergency basis. Over time, this approach may lead to general river stabilization. To avoid transforming the geomorphology of the Padma/Jamuna in an unprecedented manner, for example if a single-channel solution is implemented, as studied in the Capital Dredging and Sustainable River Management Project, (a) a multi-disciplinary river stabilization study[40] covering the whole Brahmaputra system from the Indian boarder will be conducted, supported by (b) piloting stabilization measures, focussing on bio-engineering techniques or “building with nature”; (c)siting of physical works will be planned over the three tranches using an innovative dynamic methodology that responds to evolving river behavior. Mitigation of potentially negative impacts of the

[39] As it is not possible to locate sluice gates for later tranches, cost have been reflected in the embankment kilometer cost.
[40] encompassing potential future river morphologies including the response of the system to man-made impacts on global (e.g. climate change), basin (e.g. sediment wave) and local (e.g stabilization) scale, plus socio-economic and environmental impacts of potential stabilization scenarios on floodplain and char habitants and biodiversity.

planned river stabilization will be based on (d) a river sanctuary study covering river- and floodplain land and conducted in tranche-1 potentially followed by implementation of a sanctuary in a suitable river reach.

11.2 Recommendations

404. Mitigation of embankment and revetment operation-phase impacts described in chapter 8 – on aquatic habitats including charlands and their biodiversity including fisheries, and on people who depend on them – will be implemented in three work packages:

- Aquaculture expansion (from Tranche-1).
- Wetland biodiversity mitigation and rehabilitation (from Tranche-1).
- Sanctuary (studied under Tranche-1, implemented from Tranche-2).

405. The anticipated environmental impacts of Tranch 1 are expected to be acceptable under the circumstances if the mitigation measures set forth in the EMP under Chapter 9 are implemented.

406. Tranch 1 can proceed without further environmental study. This EIA is the Project environmental assessment report.

Annex 1: List of Tables

Table 1: Species Lists – Terrestrial Flora

Terrestrial Flora				
Scientific Name	**Local name**	**Habit**	**Importance**	**Status**
Acacia nilotica	Babla	Tree	Ornamental	Common
Aegle marmelos	Bel	Tree	Medicinal,Fruits	Common
Adhatoda zeylanica	Bashak	Shrub	Medicinal	Rare
Aeschynomene aspera	Shola	Shrub	Fuel	Rare
Albiazia odoratissima	Shrish	Tree	Timber	Common
Albizia richardiana	Gagon serish	Tree	Firewood, timber, Avenue	Common
Abroma augusta	Ulatkambal	Shrub	Medicinal	Rare
Acacia moniliformis	Akashmoni	Tree	Note known	Common
Acalypha indica	Muktajhuri	Shrub	Medicinal	Common
Achyranthes aspera	Apang	Herb	Medicinal	Common
Adenanthera	Rakton	Tree	Firewood	Rare
Alostonia macrophylla	Chatim	Tree	Ornamental	Common
Alstonia scholaris	Shatim/Shatian	Tree	Timber	Rare
Amaarthus spinosa	Katanatea	Herb	Medicinal	Common
Anthocephalus chinensis	Kadam	Tree	Timber and fuelwood	Common
Aphanamixis polystachya	Pitraj	Tree	Timber	Rare
Areca catechu	Supari	Tree	Fruit and Timber	VC
Artocarpus heterophyllus	Kanthal	Tree	Timber, Fruits	Common
Artocarpus lakoocha	Deoa	Tree	Fruits	Rare
Averrhoa carambola	Kamranga	Tree	Fruits	Common
Azadirachta indica	Nim	Tree	Timber and medicine	Common
Bambusa sp	Bash	Woody Herb	Furniture	Common
Barringtonia acutangula	Hijal	Shrub	Fuelwood	Common
Bauhinia sp.	Kanson	Tree	Ornamental	Rare
Bombax ceiba	Shimul	Tree	Cotton and Fuelwood	Common
Borassus flabellifera	Tal	Tree	Timber	Common
Calamus tenuis	Bet	Shrub	Thatching	Common
Calophyllum inophyllum	Sultan Chapa/Punnag	Tree	Ornamental	Rare
Calotropis gigantea	Akand	Shrub	Medicinal	Common
Calotropis procera	Akand	Shrub	Medicinal	Common
Carica papaya	Papay	Shrub	Fruit	Common
Carissa carandas	Karamcha	Shrub	Fruit	Common
Cassia fistula	Sonalu	Tree	Ornamental	Common
Cassia alata	Dardmardon	Shrub	Medicinal	Common
Cassia occidentalis	Barahalkasunda	Shrub	Fuelwood	Common
Centella asitica	Thankuni	Herb	Medicinal and Vegetables	Common
Cestrum nocturnum	Hasnahena	Shrub	Ornamental	Rare
Citrus grandis	Jambura	Tree	Fruits	Common
Clerodendrum viscosum	Bhat	Shrub	Medicinal	Common
Cocos nucifera	Narikel	Tree	Fruit and Fuelwood	V.Common
Crataeva nurvala	Baroon	Tree	Fuel wood	Common
Cuscuta australis	Swarnalata	Herb	Medicinal	Common
Cynodon dactylone	Durba Gash	Herb	Medicinal	Common

Terrestrial Flora				
Scientific Name	**Local name**	**Habit**	**Importance**	**Status**
Dalbergia sissoo	Sisso	Tree	Timber	Common
Datura metel	Dhutura	Shrub	Medicinal	Rare
Delonix regia	Krichnochura	Tree	Ornamental	Common
Dillenia indica	Chalta	Tree	Fruit	Common
Diospyros discolor	Bilatigab	Tree	Fruit	Common
Diospyros perigrina	Deshigab	Tree	Fruit and Timber	Rare
E. ovalifolia	Tali Mander	Tree	Firewood	Common
Eichornia crassipes	Kachuripana	Herb	Fertilizer	Common
Enhydra fluctuins	Halencha	Herb	Vegetable	Common
Erythrina ovalifolia	Talimandar	Tree	Fuelwood	Common
Erythrina variegata	Mander	Tree	Firewood, Ornamental	Common
Excoecaria agallocha	Gheoa	Tree	Fuel wood	Common
Ficus hispida	Dumur	Tree	Fuel wood	Common
Ficus benghalensis	Bot	Tree	Fuel wood	Common
Ficus hispida	Dumur	Shrub	Fruit and Fuelwood	VC
Ficus religiosa	Assawath	Tree	Fuel wood	Common
Gardenia jesminoides	Ghandhoraj	Shrub	Flower	Common
Heletropium indicum	Hatisuri	Herb	Medicinal	Common
Hoya parasitica	Parghaca	Climber	Medicinal	Common
Ipomea fistulosa	Dhol Kalmi	Shrub	Fuel	Common
Leucauna laucocephalata	Ipil ipil	Tree	Timber	Common
Litchi chinensis	Lichu	Tree	Fruit	Common
Musa sapientum	Kacha kala	Herb	Vegetable	Common
Mangifera indica	Aum	Tree	Fruit and Timber	Common
Marsilea quadrifolia	Susnishak	Herb	Medicinal	Common
Mimosa pudica	Lajjaboti	Shrub	Medicinal	Common
Moringa oleifera	Sajna	Tree	Vegetable	Common
Muntinga calabura	China chari	Tree	Ornamental	Very Rare
Musa paradisiaca var. sapientum	Kala	Shrub	Fruit	Common
Musa paradisiaca var. sapientum	Kala	Shrub	Fruit	Common
Nerium odorum	Karobi	Shrub	Medicinal	Common
Nicotiana plumbaginifolia	Bantamak	Herb	Wild	Common
Nyctanthes arbortristris	Safali	Herb	Ornamental	Common
Nymphea nouchli	Sapla	Herb	Medicinal, Vegetable	Common
Ocimum americanum	Tulshi	Herb	Medicine	Common
Oryza sativa	Dhan	Herb	Food	Common
Phoenix paludosa	Hental	Tree	Wildlife	Common
Phoneix sylvestris	Khejur	Tree	Fruit and Fuel wood	Common
Pistia strateotes	Topapana	Herb	-	Common
Pithecolobium dulce	Dakshnia Babul	Tree	Ornamental, Avunue	Common
Polyalthia longifolia	Debdaru	Tree	Ornamental	Common
Psidium guajava	Peyara	Shrub	Fruit	Common
Raulwolfia serpentina	Sarpagandha	Shrub	Medicinal	Rare
Ricinus communis	Reri	Shrub	Oil	Common
Sesbania grandiflora	Bakphul	Shrub	Medicinal	Rare
Sesbania rostrata	Dhaincha	Herb	Fuel / Fertilizer	Common
Spondias dulcis	Amra	Tree	Fruit	Common
Streblus asper	Sheora	Shrub	Fuel wood	Common

Terrestrial Flora				
Scientific Name	**Local name**	**Habit**	**Importance**	**Status**
Swietenia mahagoni	Mahogoni	Tree	Timber, Medicinal	VC
Tamarindus indica	Tetul	Tree	Fruit	Common
Tectona grandis	Segun	Tree	Timber	Common
Terminalia arjuna	Arjun	Tree	Timber and Medicinal	Common
Terminalia bellirica	Bhorae	Tree	Medicinal	Rare
Terminalia catappa	Katbadam	Tree	Fruit	Common
Trewia nudiflora	Pitali/Latim	Tree	Timber and fuel wood	Common
Typha angustata	Hogla	Herb	Domestic use	Common
Zizyphus mauritiana	Baroi	Tree	Fruit	Common

Table2: Species Lists - Cropfield Vegetation

Cropfield Vegetation				
Scientific Name	Local name	Habit	Importance	Status
Acalypha indica	Muktajhuri	Herb	Medicinal	C
Achyranthes aspera	Apang	Herb	Medicinal	C
Alternanthera sessilis	Sachishak	Herb	Vegetable	VC
Amaranthus spinosus	Kata note	Herb	Vegetable	VC
Calotropis gigantea	Akand	Shrub	Medicinal	C
Calotropis procera	Akand	Shrub	Medicinal	C
Carissa carandas	Karamcha	Shrub	Fruits	R
Cotula hemispherica	Kancha ghash	Herb	Domestic food	C
Crotolaria retusa	Ban-san	Herb	Medicinal	VC
Cuscuta australis	Swarnalata	Herb	Medicinal	C
Cynodon dactylon	Durba	Herb	Medicinal	VC
Dentella repens	Hachuti	Herb	Medicinal	C
Marsilea quadrifolia	Susnishak	Herb	Vegetable	C
Nicotiana plumbaginifolia	Bantamak	Herb	Wild	C
Nyctanthes arbortristris	Sefali	Herb	Ornamental	C
Rhynchospora rufescens	Shimbhatraji	Herb	Medicinal	VC
Rorippa indica	Bansarisha	Herb	Medicinal	C
Sesbania rostrata	Dhaincha	Herb	Fuel/Fertilizer	VC

C – Common, VC – Very Common, R - Rare

Table 3: Species Lists - Wetland Vegetation

Wetland Vegetation				
Scientific Name	Local name	Habit	Importance	Status
Alternanthera philoxiroides	Helencha	Herb	Medicinal	VC
Aponogeton natans	Ghentu	Herb	Medicinal	C
Azolla pinnata	Kutipana	Herb	Fish food	C
Ceratophyllum desmersum	Jhangi	Herb	-	C
Colocasia esculenta	Kachu	Herb	Medicinal	C
Cyperus sp.	Mutha	Herb	Domestic food	VC
Cheratopteris sp	Fern	Herb	-	C
Eichhornia crassipes	Kochuripana	Herb	Fertilizer	VC
Enhydra fluctuans	Helencha	Herb	Vegetable	VC
Ipomoea aquatica	Kalmi sak	Herb	Vegetable	VC
Lemna perpusilla	Khudipana	Herb	-	C
Limnophila sessiliflora	Bijatighas	Herb	Domestic food	C

Wetland Vegetation				
Scientific Name	Local name	Habit	Importance	Status
Ludwigia abscendens	Keshordam	Herb	Medicinal	C
Ludwigia hyssopifolia	Keshordam	Herb	Medicinal	VC
Mersilea quadrifoliata	Susnisak	Herb	Vegetable	VC
Nachamendra alternifolia	Kaisha	Herb	Domestic food	C
Nymphaea nouchali	Shapla	Herb	Vegetable	VC
Nymphaea stellata	Nilshapla	Herb	Vegetable	R
Phragmites karka	Nol Khagra	Herb	Fuel	VC
Pistia stratiotes	Topapana	Herb	-	VC
Polygonum barbatum	Bishkatali	Herb	Medicinal	C
Salvina cucullata	Kuripana	Herb	-	C
Scirpus juncoides	Chasra	Herb	Fuel	C
Spirodela polyrhiza	Khudipana	Herb	-	C
Trapa natans	Singra	Herb	Fruit	R
Vetiveria zizanioides	Binna	Herb	Domestic use	C
Wolffia microscopica	Guripana	Herb	-	C

C – Common, VC – Very Common, R - Rare

Table 4: Species Lists - Birds

Birds			
Scientific Name	**English Name**	**Local Name**	**Local Status**
Tyto alba	Barn Owl	Lokkhi Pecha	UR
Eudynamys scolopaceus	Asian Koel	Ashio Kalakokil	CR
Sturnus ginginianus	Bank Myna	Gaang Shalik	UR
Dicrurus macrocercus	Black Drongo	Kala Fingey	CR
Milvus migrans	Black Kite	Bhubon Chil	CR
Metopidius indicus	Bronze-winged Jacana	Dol Pipi	UR
Ketupa zeylonensis	Brown Fish Owl	Khoira Mechopecha	UR
Ixobrychus cinnamomeus	Cinnamon Bittern	Khoira Bogla	UR
Artamus fuscus	Ashy Wood swallow	Metey Bonbabil	CR
Anastomus oscitans	Asian Open bill	Ashio Shamkhol	CR
Terpsiphone paradisi	Asian Paradise-flycatcher	Ashio Shabulbuli	UR
Anser indicus	Bar-headed Goose	Dagi Rajhash	UWV
Ploceus philippinus	Baya Weaver	Deshi babui	CR
Ciconia nigra	Black Strock	Kala Manikjor	WV
Sterna acuticauda	Black-bellied Tern	Kalapet Panchil	UR
Nycticorax nycticorax	Black-crowned Night Heron	Kalamatha Nishibok	CR
Lonchura malacca	Black-headed Munia	Kalamatha Munia	UR
Oriolus xanthornus	Black-hooded Oriole	Kalamatha Benebou	CR
Haliastur Indus	Brahminy Kite	Shonkho Chil	CR
Lanius cristatus	Brown Shrike	Khoira Latora	CWV
Larus brunnicephalus	Brown-headed Gull	Khoiramatha Gangchil	CWV
Bubulcus ibis	Cattle Egret	Go Boga	CR
Motacilla citreola	Citrine Wagtail	Sitrin Khonjon	CWV
Acrocephalus stentoreus	Clamorous Reed Warbler	Bachal Nolfutki	CWV

Birds			
Scientific Name	**English Name**	**Local Name**	**Local Status**
Sarkidiornis melanotos	Comb Duck	Nakta Hash	RWV
Larus ridibundus	Common Black-headed Gull	Kalamatha Gangchil	CWV
Dinopium javanense	Common Golden back	Pati Kaththokra	CR
Numenius nebularia	Common Greenshank	Pati Shobujpa	CWV
Hierococcyx varius	Common Hawk-Cuckoo	Pati Chokhgelo	CR
Aegithina tiphia	Common Iora	Pati Fatikjal	CR
Alcedo atthis	Common Kingfisher	Pati Machranga	CR
LC Acridotheres tristis	Common Myna	Bhat Shalik	CR
Columba livia	Common Pigeon	Gola Paira	CR
Atthya ferina	Common Pochard	Pati Bhutihash	CWV
Tringa tetanus	Common Redshank	Pati Lalpa	CWV
Actitis hypoleucos	Common Sandpiper	Pati Batan	CWV
Tadorna tadorna	Common Shelduck	Pati Chokachoki	CWV
Gallinago gallinago	Common Snipe	Pati Chega	CWV
Orthotomus sutorius	Common Tailorbird	Pati Tuntuni	CR
Megalaima haemacephala	Coppersmith Barbet	Shekra Boshonto	CR
Nettapas coromandelianus	Cotton Pygmy Goose	Dhola Balihash	UR
Phylloscopus fuscatus	Dusky Warbler	Kalchey Futki	CWV
Upupa epops	Eurasian Hoopoe	Pati Hoodhood	UR
Zoothera torquatus	Eurasian Stone Chat	Pati Shilafidda	CWV
Anas crecca	Eurasian Teal	Pati Tilihash	CWV
Dendrocygna bicolor	Fulvous Whistling Duck	Raj Shorali	CWV
Anas querquedula	Garganey	Giria Hash	CWV
Prinia gracilis	Graceful Prinia	Shundori Prinia	RR (DD)
Larus brunnicephalus	Great Black-headed Gull	Palasi Gangchil	CWV
Phalacrocorax carbo	Great Cormorant	Boro Pankouri	CWV
Casmerodius albus	Great Egret	Boro Boga	CR
Parus major	Great Tit	Boro Tit	CR
Centropus sinensis	Greater Coucal	Boro Kubo	CR
Chrysocolaptes lucidus	Greater Golden back	Boro Kaththokra	CR
Charadrius leschenaultii	Greater Sand Plover	Boro Dhuljiria	CWV
Merops orientalis	Green Bee-eater	Shobuj Shuichora	CR
Numenius ochropus	Green Sandpiper	Shobuj Batan	UWV
Phaeniocophaeus tristis	Green-billed Malkoha	Shobujthot Malkoa	CR
Ardea cinerea	Grey Heron	Dhupni Bok	CR
Charadrius squatarola	Grey Plover	Metey Jiria	CWV
Motacilla cinerea	Grey Wagtail	Metey Khonjon	UWV
Dendrocopos canicapillus	Grey-cappedPygmy Woodpecker	Metetoopi Batkurali	UR
Ichthyophaga ichthyaetus	Grey-headed Fish Eagle	Metematha Kura-eegol	UR
Gelochelidon nilotica	Gull-billed Tern	Kalathot Panchil	CR
Corvus splendens	House Crow	Pati Kak	CR
Passer domesticus	House Sparrow	Pati Chorui	CR
Phalacrocorax fuscicollis	Indian Cormorant	Deshi Pankouri	V
Cuculus micropterus	Indian Cuckoo	Bokotakou Kokil	CR
Ardeola grayii	Indian Pond Heron	Deshi Kanibok	CR

Birds			
Scientific Name	**English Name**	**Local Name**	**Local Status**
Coracias benghalensis	Indian Roller	Bangla Nilkanto	CR
Lonchura malabarica	Indian Silver bill	Deshi Chandithot	UR
Anas poecilorhyncha	Indian Spot-billed Duck	Metey Hash	UR
Turdoides striatus	Jungle Babbler	Bon Satarey	CR
Acridotheres fuscus	Jungle Myna	Jhuti Shalik	CR
Corvus macrorhynchos	Large-billed Crow	Dar Kak	CR
Caprimulgus macrurus	Large-tailed Nightjar	Lenja Ratchora	CR
Centropus bengalensis	Lesser Coucal	Bangla Kubo	CR
Dinopium benghalense	Lesser Golden back	Bangla Kaththokra	CR
Charadrius mongolus	Lesser Sand Plover	Soto Dhuljiria	CWV
Dendrocygna javanica	Lesser Whistling Duck	Pati Shorali	CR
Megalaima lineata	Lineated Barbet	Dagi Boshonto	CR
Phalacrocorax niger	Little Cormorant	Choto Pankouri	CR
Egretta garzetta	Little Egret	Choto Boga	CR
Charadrius dubius	Little Ringed Plover	Choto Nothjiria	CR & CWV
Arachnothera longirostra	Little Spider hunter	Choto Makormar	CR
Calidris minuta	Little Stint	Choto Chapakhi	CWV
Buteo rufinus	Long -Legged Buzzard	Lombapa Tishabaj	RWV
Lanius schach	Long-tailed Shrike	Lenja Latora	CR
Tringa stagnatilis	Marsh Sandpiper	Bil Batan	UWV
Anas acuta	Northern Pintail	Utturey Lenjahash	CWV
Anthus hodgsoni	Olive-backed Pipit	Jolpaipith Tulika	CWV
Copsychus saularis	Oriental Magpie-Robin	Udoi Doel	CR
Alauda gulgula	Oriental Skylark	Udoi Ovrobhorot	CR
Zosterops palpebrosus	Oriental White-eye	Udoi Dholachokh	CR
Pluvialis fulva	Pacific Golden Plover	Proshanto Shonajiria	CWV
Anthus rufulus	Paddy field Pipit	Dhani Tulika	CR
Alauda erythrorhynchos	Pale-billed Flowerpecker	Metethot Fuljhuri	CR
Ceryle rudis	Pied Kingfisher	Pakra Machranga	CR
Sturnus contra	Pied Myna	Ashio Pakrashalik	CR
Gallinago stenura	Pin-tailed Snipe	Lenja Chega	CWV
Parus inornata	Plain Prinia	Nirol Prina	CR
Leptocoma zeylonica	Purple-rumped Sunbird	Begunikomor Moutushi	CR
Streptopelia tranquebarica	Red Turtle Dove	Lal Konthighughu	CR
Pycnonotus cafer	Red-vented Bulbul	Bangla Bulbul	CR
Vanellus indicus	Red-wattled Lapwing	Hot Titi	UR
Anthus richardi	Richard's Pipit	Richarder Tulika	CWV
Vanellus duvaucelii	River Lapwing	Nodi Titi	UR
Sterna aurantia	River Tern	Nodia Panchil	UWV
Psittacula krameri	Rose-ringed Parakeet	Modna Tia	CR
Anthus roseatus	Rosy Pipit	Golapi Tulika	CWV
Tadorna ferruginea	Ruddy Shelduck	Khoira Chokachoki	CWV
Dendrocitta vagabunda	Rufous Treepie	Khoira Harichacha	CR
Celeus brachyurus	Rufous Woodpecker	Khoira Khathkurali	CR
Lonchura punctulata	Scaly-breasted Munia	Butibook Munia	CR
Asio flammeus	Short-eared-Owl	Chotokan Pecha	RWV

Birds			
Scientific Name	**English Name**	**Local Name**	**Local Status**
Pericrocotus cinnamomeus	Small Minivet	Choto Saheli	CR
	Small Pratincole	Soto Babubatan	
Streptopelia chinensis	Spotted Dove	Tila Ghughu	CR
Athene brama	Spotted Owlet	Khuruley Kutipecha	CR
Pelargopsis capensis	Stork-billed Kingfisher		UR
Ploceus manyar	Streak Weaver	Dagi Babui	RR(DD)
Picus xanthopygaeus	Streak-throated Woodpecker	Dagigola Kathkurali	UR
Turdoides earlei	Striated Babbler	Dagi Satarey	UR
Megalurus palustris	Striated Grassbird	Dagi Ghashpakhi	CR
Butorides striata	Striated Heron	Khude Bok	CR
Gallicrex cinerea	Water cock	Deshi Kora	UR
Motacilla flava	Western Yellow Wagtail	Holdey Khonjon	CWV
Chlidonias hybrida	Whiskered Tern	Julphi Panchil	CR/WV
Motacilla alba	White Wagtail	Dhola Khonjon	CWV
Amaurornis phoenicurus	White-breasted Water hen	Dholabook Dahuk	UR
Motacilla madaraspatensis	White-browed Wagtail	Dholavru Khonjon	UR
Rhipidura albicollis	White-throated Fantail	Dholagola Chatighurani	CR
Halcyon smyrnensis	White-throated Kingfisher	Dholagola Machranga	CR
Numenius glareola	Wood Sandpiper	Bon Batan	CWV
Egretta intermedia	Yellow-billed Egret	Majhla Boga	CR
Treron phoenicopterus	Yellow-footed Green Pigeon	Holdepa Horial	CR
Cisticola juncidis	Zitting Cisticola	Bhomra Soton	CR
Alcdo hercules	Blyth's Kingfisher	Machranga	RR
Halcyon coromandra	Ruddy Kingfisher	Lal Machranga	RR
Heliopais personata	Masked Finfoot	Giolo Hansh	RR
Rynchops albicolis	Indian Skimmer	Panikata	RR
Haliaeetus leucogaster	White-bellied sea Eagle	Sindhu Eagle	RR
Platalea leucorodia	Eurasian Spoonbill	Kodali Bok	RR
Leptoptilos javanicus	Lesser Adjutant	Modontak	RR
Myctria leucocephala	Painted Stork	Rangila bok	RR

Local Status: CR-Common Resident; UR-Uncommon Resident; CWV- Common Winter Visitor; UWV-Uncommon Winter Visitor; RR-Rare Residant; DD-Data Deficient; WV-Winter Vagrant; RWV-Rare Winter Visitor

Table 5: Species List - Mammals

Mammals				
English name	**Local Name**	**Scientific Name**	**IUCN status**	**Local status**
Asian House Shrew	Chika/Chucho	*Suncus murinus*	NO	CR
Asian Palm Civet	Gandhogakul	*Paradoxurus hermaphroditus*	VU	CR
Asiatic Brush-tailed Porcopine	Sajaru	*Atherurus macrourus*	EN	RR
Asiatic Long tail Climbing Mouse	Gecho Indur	*Vandeleuria oleracea*	DD	CR
Bengal Fox	Pati Shial/Shial	*Vulpes bengalensis*	VU	CR
Common Tree Shrew	Gecho Chucho	*Tupaia glis*	DD	RR
Estern House Mouse	Nenti indur	*Mus musculus*	NO	CR

Mammals				
English name	**Local Name**	**Scientific Name**	**IUCN status**	**Local status**
Eurasian Otter	Ud Biral	*Lutta lutra*	EN	UR
Eurasian Wild Boar	Buno Shukar	*Sus scrofa*	NO	CR
Finless Porpoise	Shishu	*Neophocaenoides phocaenoides*	EN	UR
Fishing Cat	Mecho Biral/Baghailla	*Felis viverrina*	EN	UR
Ganges River Dolphin	Shishu / Shushuk	*Platanista gangetica*	EN	CR
Golden Jackal	Sial	*Canis aureus*	VU	CR
Greater Bandicot Rat	Dhari indur	*Bandicota indica*	NO	CR
Greater False Vampire Bat	Badur	*Megaderma lyra*	NO	CR
Greater Short-nosed fruit Bat	Kola badur	*Cynopterus sphinx*	DD	CR
House Rart	Indur	*Rattus rattus*	NO	CR
Indian crested Porcupine	Shojaru	*Hystrix indica*	EN	UR
Indian Flying Fox	Baro Badur	*Pteropus giganteus*	NO	CR
Indian Hare	Khargosh	*Lepus nigricolis*	EN	UR
Indian Pipistrelle	Chamchika/ Cham Badur	*Pipistrellus coromandra*	NO	CR
Irrawaddy Dolphin	Mohonar Shushuk	*Oracaela brevirostris*	CR	CR
Jungle Cat	Ban Biral	*Felis chaus*	EN	RR
Large- Indian Civet	Baro Baghdash	*Viverra zibetha*	EN	CR
Lesser Bandicot -rat	Baro indur	*Bandicota bengalensis*	NO	CR
Little Indian Field Mouse	Metho indur	*Mus booduga*	NO	CR
Northern palm Squirrel	Khatbirali	*Funambulus pennantii*	NO	CR
Oriental Small- Clawed Otter	Bhodor/ Ud Biral	*Amblonyx cinereus*	EN	CR
Rofous-tailed Hair	Khorgosh	*Lepus nigricolis*	EN	RR
Small- Indian Civet	Choto Bagdash	*Viverricula indica*	VU	CR
Small- Indian Mongoose	Benji, Nakul	*Herpestes auropunctatus*	NO	CR
Smooth -Coated Otter	Ud Biral	*Lutrogale perspicillata*	EN	RR

Local Status: CR – Common Resident, C – Common, UR – Uncommon Resident, RR – Rare Resident, V – Vagrant, WV – Winter Visitor; UWV – Uncommon Winter Visitor. *IUCN Status code*: CR – Critically Endangered, EN - Endangered, VU – Vulnerable, NO – Not Threatend

Table 6: Species Lists - Amphibians

Amphibians				
English name	**Local Name**	**Scientific Name**	**IUCN status**	**Local status**
Asian Brown Tree Frog	Gecho Bang	*Polypedates leucomystax*	NO	CR
Cricket Frog	Jhijhi Bang	*Limnonectes limnoccharis*	NO	CR
Green Frog	Sabuj Bang	*Euphlyctis hexadactylus*	VU	UR
Indian Bull Frog	Sona bang	*Hoplobactrachus tigerinus*	NO	CR
Indian Tree Frog	Gecho Bang	*Polypedates maculatus*	NO	UR
Large Tree Frog	Baro Gecho Bang	*Rhacophorus maximus*	VU	UR
Leaping Frog	Pana bang	*Hylarana tytleri*	NO	UR
Ornate Microhylid	Cheena Bang	*Microhyla ornata*	VU	CR
Southern Cricket Frog	Jhijhi Bang	*Fejervarya syhadrensis*	NO	CR
Two-striped Grass Frog	Kaad Bang	*Sylvirana taipehensis*	EN	RR

CR – Critically Endangered, EN - Endangered, VU – Vulnerable, NO – Not Threatened

Table7: Species Lists - Reptiles

Reptiles				
English name	**Local Name**	**Scientific Name**	**IUCN Status**	**Local Status**
Bengal Monitor	Ghuy Shap	*Varanus bengalensis*	VU	CR
Brooks House Gecko	Tiktiki	*Hemidactylus brookii*	NO	CR
Brown Roofed Turtle	Baro Kori Kasim	*Pangshura smithii*	EN	UR
Checkered Keelback	Dhora Shap	*Xenochropis piscator*	NO	CR
Common Garden Lizard	Roktochosha	*Calotes versicolor*	NO	CR
Common House Gecko	Tiktiki	*Hemidactylus frenatus*	NO	CR
Common Krait	Kal-keutey Shap	*Bungarus caeruleus*	EN	UR
Common River Terrpain	Boro Kasim	*Batagur baska*	CR	RR
Common Smooth Water Snake	Painna Shap	*Enhydris enhydris*	NO	CR
Common Vine Snake	Laodoga Shap	*Ahaetulla nasuta*	VU	UR
Common Wolf Snake	Gharginni Shap	*Lycodon aulicus*	VU	CR
Crowned River Turtle	Kali Kasim	*Hardella thurjii*	EN	UR
Estuarine Crocodile	Lonapanir Kumir	*Crocodylus porosus*	CR	UR
Ganges softshell Turtle	Khalua Kasim	*Aspideteres gangeticus*	EN	UR
Gharial	Ghorial/Baishal	*Gavialis gangeticus*	CR	UR
Indian Rat Snake	Daraj Shap	*Ptyas mucosus*	VU	CR
Indian Roofed Turtle	Kori/Hali Kasim	*Pangshura tectum*	-	CR
Jerdon's Blind Snake	Dumukh Shap	*Typhlops jerdoni*	-	CR
Keeled Grass skink	Anjoni	*Mabuya carinata*	-	CR
Median Roofed Turtle		*Pangshura tentoria*	EN	UR
Monocled Cobra	Gokhra Shap	*Naja kaouthia*	VU	RR
Narrow-headed Softshell Turtle	Sim Kasim	*Chitra indica*	CR	UR
Olive Keelback	Maita Shap	*Atretium schistosum*	-	CR
Olive Ridley Turtle	Jalpaironga Samudrik Kasim	*Lepidochelys olivacea*	EN	CR
Peacock-marked Softshell Turtle	Dhum Kasim	*Aspideteres hurma*	EN	CR
Pond tortoise	Kalo Kasim	*Melanochelys trijuga*	EN	UR
Red Crowned Roofed Turtle	Kori Kasim	*Kachuga kachuga*	EN	UR
Spectacled Cobra	Khoiya Gokhra Shap	*Naja naja*	EN	CR
Spotted Flapshell Turtle	Patapori	*Lissemys punctata*	VU	UR
Spotted Litter skink	Anzoni	*Sphenomorphus maculatus*		CR
Spotted Pond Turtle	Mogom Kasim	*Geoclemys hamiltonii*	EN	UR
Three- Striped Roofe Turtle	Dhoor Kasim	*Kachuga dhongoca*	CR	UR
Tokay Gecko	Takkhak	*Gekko gecko*	VU	CR
Yellow Monitor	Sona Guy	*Varanus flavescens*	EN	RR
Yellow-bellied House Gecko	Tiktiki	*Hemidactylus flaviviridis*	-	CR
Ring Lizard	Ram Godi	*Varanus salvator*	EN	
Paintet Bronzedback tree Snake	Gecho	*Dendrelaphis pictus*	VU	

CR – Critically Endangered, EN - Endangered, VU – Vulnerable, NO – Not Threatened

Table6: Species Lists – Fish (Jamuna River March 1993 – February 1994)

Table - List of Riverine fish Species

Sl.	Local name of fish	Scientific name of Fishes
1	Bali chata	*Nemaceheilus botia*
2	Gharpoia	*Somileptes gongota*
3	Kachki	*Corica soborna*
4	Phasa	*Setipinna phasa*
5	Nuna baila	*Brachygobius nunus*
6	Chiring	*Apocryptes bato*
7	Ghaura	*Clupisoma garua*
8	Baghair	*Bagarius bagarius*
9	Kajuli	*Ailia coila*
10	Magur	*Amblyceps mangois*
11	Rita	*Rita rita*
12	Gang tengra	*Gagata youssoufi*
13	Gang tengra	*Gagata nangra*
14	Sisor	*Sisor rhabdophorus*
15	Kauwa/Cenia	*Gagata cenia*
16	Ilish	*Tenulosa ilisha*
17	Gang Magur	*Plotosus canius*
18	Koi Puti	*Anodontostoma chacunda*
19	Khorsula	*Sicamugil cascasia*
20	Piali	*Aspidoparia morar*
21	Kalabata	*Crossocheilus latius*
22	Rani	*Botia dario*
23	Khorsula	*Rhinomugil corsula*
24	Shilong	*Silong silondia*
25	Kutakanti	*Hara hara*
26	Poa	*Pama pama*
27	Shangus	*Himantura sp.*

Table - List of Migratory Fish Species		
1	Catla	*Catla catla*
2	Kalibaus	*Labeo calbasu*
3	Rui	*Labeo rohita*
4	Mrigal	*Cirrhinus mrigala*
5	Bata	*Labeo bata*
6	Raik	*Cirrhinus reba*
7	Chital	*Notopterus chittala*
8	Ayre	*Aorichthys aor*
9	Guzza ayre	*Aorichthys seengala*
10	Golsha tengra	*Mystus bleekeri*
11	Kabashi tengra	*Mystus cabasius*
12	Bacha	*Eutropiichthys vacha*
13	Batashi	*Pseudeutroplus atheridonoide*
14	Boal	*Wallago attu*
15	Kani pabda	*Ompok pabda*
16	Modhu pabda	*Ompok bimaculatus*
17	Pabda	*Ompok pabo*
18	Katari	*Salmostoma bacaila*

19	Fulchela	*Salmostoma phulo*
20	Ghora chela	*Securicula gora*
21	Chapila	*Gudusia chapra*
22	Kash khaira	*Chela laubuca*

Table - List of Floodplain Resident Fishes		
1	Baro baim	*Mastacembalus armatus*
2	Guchi baim	*Macrognathus pancalus*
3	Tara baim	*Macrognathus aculatus*
4	Lal Chanda	*Chand a ranga*
5	Nama chanda	*Chanda nama*
6	Chanda	*Chanda baculis*
7	Shing	*Heteropneus. fossilies*
8	Magur	*Clarias batrachus*
9	Shol	*Channa striatus*
10	Taki	*Channa puncalus*
11	Gojar	*Channa marulius*
12	Tit puti	*Puntius ticto*
12	Puti	*Puntius sophore*
14	Deshi Sarputi	*Puntius sarana*
15	Phutani puti	*Puntius phutunio*
16	Gilli puti	*Puntius gelius*
17	Kanchon puti	*Puntius conconius*
18	Kanpona	*Aplocheilus panchax*
19	Gutum	*Lepidocephalus guntea*
20	Chep chala	*Chela cachius*
21	Baila	*Glossogobius giurus*
22	Napit Koi	*Badis badis*
23	Darkina	*Rasbora daniconius*
24	Chebli	*Danio devario*
25	Anju	*Brachydanio rerio*
26	Mola	*Amblyphayngodon mola*
27	Keti	*Osteobrama cotio cotio*
28	Kaikla	*Xenentodon cancila*
29	Soto Kholisa	*Colisa sota*
30	Lal kholisa	*Colisa lalius*
31	Kholisa	*Colisa fasciatus*
32	Tengra	*Mystus vittatus*
33	Bajari tengra	*Mystus tengara*
34	Potka	*Tetradon cutcutia*

Total number of fish species in the Jamuna River, **March 1993 – February 1994**

Sl.	Habitat Preference	Number
1	Riverine	27
2	Migratory	22
3	Floodplain Resident	34
	Total	83

Source - FAP 17, Fisheries Studies and Pilot Project, FINAL REPORT (Draft) JUNE 1994, Supporting Volume No. 10, FISHERIES STUDY, THE JAMUNA AND PADMA RIVERS.

- After FAP 17 Study no intensive survey has conducted on fish in Jamuna River. Further study in required.
- But after this study some fish species like Deshi Sarputi , Rita, Pabda, Gojar are almost absent in the fish catch in Jamuna River.

Table 9: Embankment and Dredging Projects Affecting River Cetaceans in Bangladesh

Project	River and location	Purpose	Technical and Hydrological Specifications	Status	Summary of dolphin occurrence and potential or realized impacts
Embankments					
Bank Protection and River Training Pilot Projects (FAP 21/22)	Right bank of Jamuna River near Kamarjani and left bank of Jamuna River near Bahadurabad	Prototype works to investigate whether river training is feasible or desirable.	Three embankments on right bank. Eight slope revetments on right and left banks.	Embankments recently constructed. Slope revetments currently in construction.	Dolphins observed in the area during surveys in April 1996. Project will reduce hydraulic complexity and eliminate spawning habitat for floodplain-dependent fish.
Brahmaputra Right Embankment (BRE)	Jamuna River near Serajgonj, Rajshahi	Protection of Serajgonj and adjacent floodplain.	Embankment length 220km. Over half the length of the embankment has been eroded.	Completion date unknown.	Dolphins observed in the area during surveys in October 1995 and in April 1996. The embankment has reduced hydraulic complexity and eliminated spawning habitat for floodplain-dependent fish.
Brahmaputra River Bank Priority Works (BPW)	Jamuna River near Serajgonj, Rajshahi	Protection of Serajgonj from migration of Jamuna River	Two hard points linking the existing realigned BRE with low earth embankments.	Advanced stages of planning	Dolphins observed in the area during surveys in October 1995 and in April 1996. Additional impacts beyond the effects of the existing BRE are unknown.
Jamuna Bridge Project Embankments	Jamuna River slightly upstream of Serajgonj, Rajshahi	Protection of bridge foundation from erosive flooding.	Paired embankments upstream and a hard point/guide bund on the right bank down-stream. Embankment on left bank will be linked to BPW.	Completed in 1998	Dolphins observed in the area during surveys in October 1995 and in April 1996. Project will reduce hydraulic complexity and eliminate spawning habitat for floodplain-dependent fish.
Jamalpur Priority Project (FAP 3.1)	Divergence of Jamuna and Old Brahmaputra rivers near Jamalpur	Flood control and drainage	82km embankment along left bank of the Jamuna river and a 43km embankment along the right bank of the Old Brahmaputra River.	Detailed engineering study in progress.	Dolphins observed in the area during surveys in April 1996. Project will reduce hydraulic complexity and eliminate spawning habitat for floodplain-dependent fish.
Dredging					
Jamuna Bridge Project Dedging	Jamuna River upstream of Serajgonj, Rajshahi	Facilitate construction of bridge	?	Dredging believed to have been completed after bridge commissioned in 1998	Dolphins observed in the area during surveys in October 1995 and in April 1996. Potential problem with increased turbidity during dredging operations and increased sedimentation downstream.
Kalni-Kushiyara River Improvement Project	Kushiyara River between Asmiriganj and Katkhal, Chittagong	Facilitate passage of water in the Kushiyara River during the monsoon season.	Dredging at three sites extending for 0.25-1.0 km each. If successful, 10 additional sites will be dredged in the 50km stretch of river between Markuli and Mudha.	Advanced stages of planning	Dolphins observed in the area during surveys in October 1995. Potential problem with increased turbidity during dredging. Project could potentially benefit dolphins by increasing counter-current habitat.

Source: Brian D. Smith, Ravindra K. Sinha, Zhou Kaiya, A. Aleem Chaudhry, Liu Renjun, Wang Ding, Benazir Ahmed, A.K.M. Aminul Haque, R.S.L. Mohan, and Kumar Sapkota. 2000. "Register of Water Development Projects Affecting River Cetaceans in Asia." In *Biology and Conservation of Freshwater Cetaceans in Asia*, edited by Randall R. Reeves, Brian D. Smith, and Toshio Kasuya. Occasional Paper 23. IUCN Species Survival Commission. http://data.iucn.org/dbtw-wpd/edocs/ssc-op-023.pdf.

Table 10: Ground Water Depth

Well ID	Location	Groundwater Depth (m)					
		1980		1990		2000	
		April	September	April	September	April	September
8811001	Shrenagar village, Belkuchithana, Sirajganj	6.78	2.83	4.51	1.70	5.84	1.42
5678012	Uthali village, Shibalayathana, Manikganj	6.31	1.39	5.91	1.89	7.07	0.90
9376032	Bhalkutia village, Nagarpurthana, Tangail	6.46	1.64	5.51	1.94	6.31	1.52

Source: BWDB.

Annex 2: Dolphin Threats

1.1 Threats

Dolphins have been very adversely affected by human use of the river systems in the sub-continent. Entanglement in fishing nets can cause significant damage to local population numbers. Some individuals are still taken each year and their oil and meat used as a liniment, as an aphrodisiac and as bait for catfish. Irrigation has lowered water levels throughout the ranges. Poisoning of the water supply from industrial and agricultural chemicals may have also contributed to population decline. Perhaps the most significant issue is the building of more than 50 dams along many rivers, causing the segregation of populations and a narrowed gene pool in which dolphins can breed.

This species is considered to be particularly threatened by overfishing (incidental by-catch, direct exploitation, resource depletion), and high industrial and agricultural pollutant loads may also have a severe impact on dolphin immune competence and fertility. The immediate danger for the resident population of dolphin in the haor basin is the decrease in river depth due to sedimentation.

1.2 Threats from Other Human Activities

1.2.1 Use of Dolphin Products

Dolphin oil is used by people in Bangladesh as a liniment, claimed to be effective for treating rheumatism, burns, and nervous disorders, and a tonic for treating impotence and asthma. It is noted that pregnant women sometimes drink the oil in the belief that it will ensure a healthy baby and that the oil is mixed with banana leaves and fed to cows to fatten them before being taken to market. Pelletier and described a factory in Chandpur used for processing dolphin oil. Recent survey recorded that the dolphin oil is used as mosquito repellant. On the bank of river Kushyiara near Kawadighi Haor, people are using oil of dolphin as mosquito repellant for the cattle and buffalo. They used to rub the oil over the body of cow and buffalo.

1.2.2 Fisheries Bycatch

Cetaceans worldwide are threatened from incidental mortality in gillnets. According to local fishermen, incidental catch in monofilament gill nets, called *current jals,* is their primary source of dolphin products. It is difficult to determine if the catch of dolphins in nets is deliberate or accidental, especially since dolphin products are highly valued and nets are often deployed for multispecies catch (Reeves and others 1993). Although *current jals* with a stretched mesh size of below 4.5 cm are prohibited in Bangladesh, their use is increasing throughout the country. We were told by fishermen that dolphins are sometimes caught in *jam jals.* These rectangular nets have an 8- to 10-cm mesh size and are used to catch large broodstock in river *duars.*

1.2.3 Directed Catch

Local villagers appeared to be unaware that hunting dolphins is prohibited under the laws of Bangladesh. In villages along the Kalni-Kushiyara river, a small group of fishermen from a Hindu minority caste in the Bhawol (Sylhet District) come every year during December or January to hunt

dolphins in major *duars.* They hunt dolphins at night with long iron-tipped harpoons made from bamboo.

1.2.4 Overexploitation of Fisheries

The Rivers of Bangladesh sustain one of the most productive freshwater fisheries in the world. Significant declines in carp and catfish production suggest that exploitation may be exceeding sustainable yields. Major factors cited for declines are the use of small mesh gillnets (*current jals* and *kona ber jals*) in tributaries and harvesting large fish in *duars* during their breeding season. The strong correlation between the distribution of river dolphins and large fish species and the reported decline of these fishes may indicate a potential problem in maintaining an adequate food base to support dolphins.

1.2.5 Pollution

The main sources of water pollution in Bangladesh are leather, paper and pulp, fertilizer, pharmaceutical, sugar, jute, textile, and petrochemical industries, which generally discharge untreated wastes directly into rivers. The widespread use of fertilizers and pesticides for ‘‘green revolution’’ rice crops also creates serious water-quality problems. Recent studies of the biodegradation capacity and residue patterns of organochlorines in dolphins inhabiting the Ganges river in India indicate that, similar to marine cetaceans, *P. gangetica* is unable to metabolize these chemicals. The high concentrations of heavy metals (Fe, Mn, Zn, Cu, Pb, Mi, and Cd) found in the tissues of one neonatal male dolphin and one slightly larger immature male dolphin suggest considerable transfer of these contaminants across the fetal membrane and through milk (Reeves and others 1993). The lack of systematic monitoring of pollutant levels in Bangladesh.

Scientists believe that eddy countercurrents, called *duars* in Bengali (or *koom* or *khari* in larger rivers), are essential to the survival of river dolphins and to the productivity of riverine biota. A recent fisheries study in the northeast region of Bangladesh supports the idea of a linkage between dolphin occurrence and *duars.* The same study also found that *duars* are essential overwintering habitat for *boromaach* (commercially important fishes including major carp, catfish, and other large migratory species). During surveys in the Kushiyara River, all sightings of dolphins were located within the eddy boundaries of obvious *duars.* Larger *duars,* created by sharp meanders and convergent or divergent channels, contained a greater number of dolphins than smaller *duars,* created by gentle meanders. River channels in the Kushiyara River are a few hundred meters wide and are generally contained within well-defined banks. The aggregate nature of river dolphin distribution can also be used to the dolphins’ advantage by allowing conservation strategies to focus on areas that already require judicious stewardship for protecting vital fishery resources. The concentration of dolphins in limited and circumscribed areas makes them particularly vulnerable to habitat disturbance from water development, direct exploitation, accidental entanglement in fishing nets, and local sources of pollution.

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Annex 3: Public Consultation Meeting, First Round

A. Overview of Meetings

Four first-round meetings were conducted at Chowhali, Harirampur, and Shahjadpur and Shibalaya, attended by 247 participants. Locations, dates, numbers and types of participants, and meeting photos are provided in Tables A8.1 and A8.2, and Photos A8.1 to A8.4.

B. Stakeholder Concerns and Meeting Documentation

Summaries of stakeholder concerns expressed in each meeting are provided in Tables A8.3 to A8.6. Copies of the meeting sign-in sheets and Bengali questionnaire are shown in Photos A8.5 to A8.9.

Table A8.1:

District	Upazila	Union	Meeting venue	Meeting date	Time
Sirajganj	Chauhali	Sadar	UP conference room	12/03/2013	11 am
Sirajganj	Harirampur	Sadar	UP conference room	26/02/2013	10 am
Manikganj	Shahjadpur	Sadar	UP conference room	27/02/2013	10:30 am
Sirajganj	Shibalaya	Sadar	UP conference room	17/04/2013	02:00 pm

Table A8.2: Public Consultation Meeting Participant Details

Meeting venue	Type of Participants	No. of participants
Chauhali Upazila conference room	Primary and secondary stakeholders	30
Harirampur Upazila conference room	Primary stakeholders	57
Shahjadpur Upazila conference room	"	26
Shibalaya Upazila conference room	"	44

Photo A8.1: PCM at Chouhali

Photo A8.2: PCM at Harirampur

Photo A8.3: PCM at Shahjadpur

Photo A8.4: PCM at Shibalya

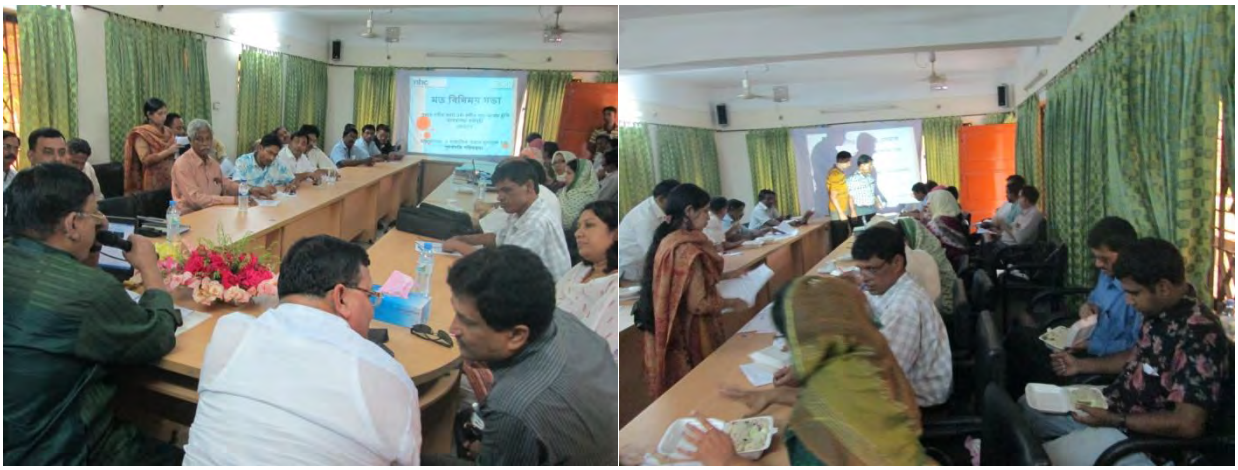

Table A8.3: First-Round Meeting Summary, Chouhali Upazila Complex, Sirajgonj

Project/Subproject: **Integrated Flood and Riverbank Erosion Management Investment Program**
Meeting date: 12.03.2013
Place: Chouhali Upazila Complex, Sirajgonj
Attending: **Proponents:** BWDB, NHC, ADB **Stakeholders:** • ***Primary:*** farmers, fishermen, local business community as well as the households to be displaced, women groups, and caretakers of community properties. • ***Secondary:*** those who may not be directly affected but have interests that could contribute to the study, play a role in implementation at some stage, or affect decision making on Project aspects. In this Project NGOs, concerned government departments, and line agencies are considered. **Reported by**:Manju Ara, Jr. Professional, CEGIS
Issues, questions, responses, comments - People's perception, opinion and attitude
1.1 Main problems due to erosion and flooding: - Flooding and eroding of homesteads - Accommodation problems for livestock - Land erosion in river side areas - Spreading of water-borne diseases and resulting health hazards - Problems in crop cultivation - Students cannot go to the educational institutions - Siltation Problem in the Jamuna River - Communication and transportation problems - Problems in various rural infrastructures (educational institutions, religious institutions etc.) - Reduce employment opportunities for river erosion **1.2 Peoples' responses to the FRERMIP project:** - People are very much positive to the implementation of this projects. Additionally, they added the following suggestions: - Ensure the use of Geo-bag and CC-Block in protective work - Requirements of embankment

- Construction of new embankment along the river bank

1.3 Impacts of the project

- People opined that this project must bring immense socio-economic benefits for them
- Save Chowhali upazila complex and different govt. office
- Prevent River erosion and protect house hold, livestock etc.

1.4 Impacts on Charlands

- Increase density in Muradpur Char for relocation
- Erosion of Charlands if construction cross dam or river

Resettlement/ Relocation issues

2.1. Impact of land acquisition on different group of people

- Loss of homesteads
- Damages of agricultural land
- Increases the number of landless of people
- loss of market facilities
- Some of peoples have no land or not able to purchase land and they take shelter others home stated

2.2. Relocation of houses and other establishments

- Landless people will be rehabilitated
- People will be economically benefited
- Price of adjacent land might be increased
- Relocation should be ensured through the consultation with local allied persons

2.3. Choice of relocation site, availability of land and its current price

There is availability of land for relocation. The current price of land 1000 0BDT for cultivable land and 30,000 BDT for homesteads land.

People suggested that in compensation process, prices should be fixed by the consultation with the local people rather than the average price of sub-registered office.

2.4. Present community social services the affected areas and relocated areas

Presently, there is inadequacy of social services both in the affected and relocated area

2.5. Will this situation be improved or deteriorated after relocation?

The present situation must be improved if the concerned authority manage it effectively and relocate them in desired locations

2.6. Present level of access to market centers and towns/future level of access to market centers and towns after relocation

At present, access level of local people to markets and towns is low. But, it will be improved if the project is implemented.

2.7. What are the patterns of transport and communication in the affected area/relocated area?

Rickshaw, Nosiman, tempo, boat, CNG, Horse cab, cycle are the main transportation in the affected and relocated area. But, overall transportation and communication facilities are not good.

2.8. What are the patterns for utilizing cultural and religious facilities? Will it generate conflicts in the host community?

There exists homogeneous religious and cultural scenario both in the affected and relocated area.

So, there is no possibility any sort of social conflict.

2.9. What types of conflicts may arise due to relocation/resettlement?

There is no possibility of social conflict. In spite of this, local allied persons should be involved in the process of relocation the affected people.

Compensation issues

3.1. ADB and GoB policies on involuntary resettlement

Local people do not know the policies on involuntary resettlement of ADB and GoB

3.2. Discussion on entitlements, compensation rates, income restoration, and grievance redress mechanism

- Compensation should be given on the basis current price land rather than traditional policy
- Ensuring compensated money to the actually affected people

3.3. People's preference on mode of compensation payment and their previous experience

In case of compensation they prefer money rather land as they feel freedom of choice

3.4. Cut-off date for listing affected properties

Income restoration and generation

4.1. What are the current income generating activities of APs?

- Agriculture
- Fish culture
- Livestock rearing
- Small entrepreneurship
- Employed
- Business Etc.

4.2. Are there possibilities for continuing employment in the project area? Which type of occupation?

- It is possible to continue the current occupation in the project area

4.3. What types of income-generating activities are available at relocation sites? and to be generated?

- Agriculture
- Fish culture/capture
- Livestock rearing
- Small entrepreneurship
- Employed
- Business Etc.

4.4. How does relocation of households affect the current market situation (job opportunities, competition, land price and market price situation)

- Labour availability will be increased. There is a chance to be more labor than less work
- Land price will be increased
- Social neighborhood will increased

4.5. How many people can be absorbed?

About 75 to 80 percent people can be absorbed

4.6. Does this require training for skill development and IGA?

- Livestock roaring training
- Swinging training

- Health training
- Fish culture training
- Agricultural training
- Skill development training is highly needed for the local people. In addition, training should be given on disaster risk reduction

4.7. How many people need to be trained and for what occupation?

- About 70% people need to be trained up. *Training sectors:*
  - Fish culture
  - Farming
  - Livestock and poultry

Social Development Support

5.1. Name of NGOs prevailing in the relocation site

- Proshika, BRAC, ASA, Manob Mukti Sangstha, BDPC Etc.

5.2. Willingness of NGOs to support the APs for savings and income generation programs, providing capital support for income restoration and poverty reduction.

- Various NGOs show greater interest to support the affected people through poverty reduction activities

5.3. Social safeguard and safety nets

- At present the coverage of social safety net is quiet good

Outcome (s)

- All livelihood sectors are affected by erosion and flood
- They demanded immediate bank protection
- They show willingness to be relocated in purpose of protective work
- There is no social conflict regarding relocation
- Prior consultation with local allied persons is highly required before starting work
- Income and employment will be generated
- Compensation should be given in money considering the current market price
- Lifestyle of the local people will be improved

Special Attention

- Requirements of new embankment and protect work

Table A8.4: First-Round Meeting Summary, Harirampur Upazila Complex, Manikganj

Project/Subproject:**Integrated Flood and Riverbank Erosion Management Investment Program**

Meeting date: **26 /02/ 2013**

Place: **Harirampur Upazila Complex, Manikganj**

Attending:

Proponents:

BWDB, NHC, ADB

Stakeholders:

- ***Primary:*** Farmers, fishers, local business community as well as the households to be displaced, women groups, and caretakers of community properties.
- ***Secondary:*** Those who may not be directly affected but have interests that could contribute to the study, play a role in implementation at some stage, or affect decision making on Project

aspects. In this Project NGOs, concerned government departments, and line agencies are considered.

ported by: Muhammad Shifuddin Mahmud, Professional, CEGIS

Issues, questions, responses, comments

People's perception, opinion and attitude

1.1 Main problems due to erosion and flooding:

- Flooding and eroding of homesteads
- Accommodation problems for livestock
- Scarcity of safe drinking water
- Sanitation problems
- Spreading of water-borne diseases and resulting health hazards
- Problems in crop cultivation
- Students cannot go to the educational institutions
- Problems in movements for population and livestock
- Destruction in fishery sector
- Communication and transportation problems
- Problems in various rural infrastructures (educational institutions, religious institutions etc.)

1.2 Peoples' responses to the FRERMIP project:

- People are very much positive to the implementation of this project. Additionally, they added the following suggestions:
- Ensure the use of Geo-bag in protective work
- Repairing of sluice gate at Kantapara
- Construction of new embankment at Dhulshura, Boyra and Lesraganj UP

1.3 Impacts of the project

- People opined that this project would bring immense socio-economic benefits for them

Resettlement/ Relocation issues

2.1. Impact of land acquisition on different group of people

- Loss of homesteads
- Damages of agricultural land
- Increases the number of landless of people

2.2. Relocation of houses and other establishments

- Landless people will be rehabilitated
- People will be economically benefited
- Price of adjacent land might be increased
- Relocation should be ensured through the consultation with local allied persons

2.3. Choice of relocation site, availability of land and its current price

- There is availability of land for relocation. The current price of land is 10,000 BDT for cultivable land and 30,000 BDT for homesteads land.
- People suggested that in compensation process, prices should be fixed in consultation with the local people instead of considering the average price of sub-registered office.

2.4. Present community social services the affected areas and relocated areas

- Presently, there is inadequacy of social services both in the affected and relocated area

2.5. Will this situation be improved or deteriorated after relocation?

- The present situation would improve if the concerned authority manage it effectively and relocate them in desired locations

2.6. Present level of access to market centers and towns/future level of access to market centers and towns after relocation

- At present, access level of local people to markets and towns is low. It will be improved if the project is implemented.

2.7. What are the patterns of transport and communication in the affected area/relocated area?

- Rickshaw, Nosiman, tempo are the main transportation in the affected and relocated area. But, overall transportation and communication facilities are not good.

2.8. What are the patterns for utilizing cultural and religious facilities? Will it generate conflicts in the host community?

- There exists homogeneous religious and cultural scenario both in the affected and relocated area. So, there is no possibility of any sort of social conflict.

2.9. What types of conflicts may arise due to relocation/resettlement?

- There is no possibility of social conflict. However, local allied persons should be involved in the process of relocation the affected people.

Compensation issues

3.1. ADB and GoB policies on involuntary resettlement

- Local people do not know the policies on involuntary resettlement of ADB and GoB

3.2. Discussion on entitlements, compensation rates, income restoration, and grievance redress mechanism

- Compensation should be given on the basis current price land rather than traditional policy
- Ensuring compensated money to the actually affected people

3.3. People's preference on mode of compensation payment and their previous experience

- In case of compensation they prefer money rather than land as they feel freedom of choice

3.4. Cut-off date for listing affected properties

Income restoration and generation

4.1. What are the current income generating activities of APs?

- Agriculture
- Fish culture/capture
- Livestock rearing
- Small entrepreneurship
- Employed
- Business
- Etc.

4.2. Are there possibilities for continuing employment in the project area? Which type of occupation?

- It is possible to continue the current occupation in the project area

4.3. What types of income-generating activities are available at relocation sites? and to be generated?

- Agriculture
- Fish culture/capture
- Livestock rearing
- Small entrepreneurship
- Employed
- Business
- Etc.

4.4. How does relocation of households affect the current market situation (job opportunities, competition, land price and market price situation)

- Labour availability will be increased. There is a chance to be more labor than less work
- Land price will increase

- Social neighbourhood will increase

4.5. How many people can be absorbed?

- About 70 to 75 percent people can be absorbed

4.6. Does this require training for skill development and IGA?

- Skill development training is highly needed for the local people. In addition, training should be given on disaster risk reduction

4.7. How many people need to be trained and for what occupation?

- About 70% people need to be trained up

Training sectors:

- Fish culture
- Farming
- Livestock and poultry

Social Development Support

5.1. Name of NGOs prevailing in the relocation site

- Proshika, BRAC, Grammeen Bank, GKT, BARSIC, Bangladesh Red Crescent Society

5.2. Willingness of NGOs to support the APs for savings and income generation programs, providing capital support for income restoration and poverty reduction.

- Various NGOs showed greater interest to support the affected people through poverty reduction activities

5.3. Social safeguard and safety nets

- At present the coverage of social safety net is quiet good

Outcome (s)

- All livelihood sectors are affected by erosion and flood
- They demanded immediate bank protection
- They showed willingness to be relocated in purpose of protective work
- There is no social conflict regarding relocation
- Prior consultation with local allied persons is highly required before starting work
- Income and employment will be generated
- Compensation should be given in money considering the current market price
- Lifestyle of the local people will be improved

Special Attention

In Dhulshura union 5 schools, 4 mosques, one orphanage, 2 Madrashas and Dhulshura bazaar as well as crop land, homesteads and roadways may be eroded during the next April-May (Boisakh, Bangla month), if the government do not take effective initiative immediately to protect this resources.

Table A8.5: First-Round Meeting Summary, Shibalaya Upazila Complex, Manikgonj

Project/Subproject:**Integrated Flood and Riverbank Erosion Management Investment Program**
Meeting date: **17/04/2013**
Place: **Shibalaya Upazila Complex, Manikgonj**
Attending: **Proponents:**

BWDB, NHC, ADB

Stakeholders:

- ***Primary:*** farmers, fishermen, local business community as well as the households to be displaced, women groups, and caretakers of community properties.
- ***Secondary:*** those who may not be directly affected but have interests that could contribute to the study, play a role in implementation at some stage, or affect decision making on Project aspects. In this Project NGOs, Member of Parliamentarian (MP), concerned government departments, and line agencies are considered.

ported by: Manju Ara, Jr. Professional, CEGIS

Issues, questions, responses, comments

People's perception, opinion and attitude

2.1. Main problems due to erosion and flooding:

- River erosion is main problem of Shibalaya Upazila.
- Flooding and eroding of homesteads, cultivable land, homestead, various institutions such as educational institutions, social and religious institutions as well as all immovable and material resources are evanescing to Jumana and PadmaRiver.
- Due to river erosion, communication system based on embankment has broken down. People cannot carry their goods as a result carrying cost and sufferings become no bounds. It keeps a negative impact on their economy.
- Land erosion in river side areas
- Accommodation problems for livestock
- Spreading of water-borne diseases and resulting health hazards
- Problems in crop cultivation
- Students cannot go to the educational institutions
- Communication and transportation problems
- Problems in various rural infrastructures (educational institutions, religious institutions etc.)
- Losing cultivable land and all resources, they have become unemployed
- Reduce employment opportunities for river erosion

2.2. Peoples' responses to the FRERMIP project:

- People are very much positive to the implementation of this project. Additionally, they added the following suggestions:
- Ensure the use of Geo-bag and CC-Block in protective work
- Construction of new embankment along the river bank

2.3. Impacts of the project

- Both positive and negative impact will be occurring after implementation of the FRERMIP project intervention.
- Positive impact like- agricultural land, crops, homes, hat-bazaar, school, social institutions will be protected from riverbank erosion.
- Negative impact- Agricultural land will reduce due to land acquisition. On the other hands, houses will be needed to shift or migrate.

2.4. Impacts on char lands

- The char area will be protected from river erosion by implementation of the intervention and positive impact will occur in char area. Char area will sustain, as well as more crops will produce.

Resettlement/ Relocation Issues
3.1. Impact of land acquisition on different group of people - Impact will be occurring after Impact of land acquisition of the FRERMIP - Agricultural land will reduce due to land acquisition. - On the other hands, houses will be needed to shift or migrate. - Increases the number of landless of people - loss of market facilities - Some of peoples have no land or not able to purchase land and they take shelter others home stated **3.2. Relocation of houses and other establishments** - There are severe economical effects on different professional due to migration of homes, school, and various social institution of this area - Landless people will be rehabilitated - People will be economically benefited - Price of adjacent land might be increased - Relocation should be ensured through the consultation with local allied persons **3.3. Choice of relocation site, availability of land and its current price** - There is availability of land for relocation. The local people prefer both side of Utholy-Aricha highway's space as rehabilitation. The price of land is almost BDT 50,000. Per decimal for homesteads land. - People suggested that in compensation process, prices should be fixed by the consultation with the local people rather than the average price of sub-registered office. **3.4. Present community social services the affected areas and relocated areas** - There is no opportunity in river erosion area of Hat- Bazar as well as health and education services where relocation area has better facilities. - Presently, there is inadequacy of social services both in the affected and relocated area. **3.5. Will this situation be improved or deteriorated after relocation?** - The present situation must be improved if the concerned authority manage it effectively and relocate them in desired locations **3.6. Present level of access to market centers and towns/future level of access to market centers and towns after relocation** - At present, access level of local people to markets and towns is low. But, it will be improved if the project is implemented. **3.7. What are the patterns of transport and communication in the affected area/relocated area?** - The dwellers normally use rickshaw, van, Auto van etc to go to nearest place such as hat, bazaar in village. On the other hand, in upzilla people use CNG, Auto van, Motor cycle etc. same kind of vehicles will be used. There are street facilities for communication. Overall transportation and communication facilities are not good. **3.8. What are the patterns for utilizing cultural and religious facilities? Will it generate conflicts in the host community?** - Simply socio-religious and cultural facilities are equally enjoyed by the local people and there is no major conflict about it. If it is needed due to project implementation, conflict might not be happened. **3.9. What types of conflicts may arise due to relocation/ resettlement?** - There is no possibility of social conflict. In spite of this, local allied persons should be involved in the process of relocation the affected people.

Compensation issues

4.1. ADB and GoB policies on involuntary resettlement

- Local people do not know the policies on involuntary resettlement of ADB and GoB

4.2. Discussion on entitlements, compensation rates, income restoration, and grievance redress mechanism

- The local people have preferred to have compensation by Union Parishad or Bank. Some people believe that hard cash might create predicament. Sometimes landowner does get money. In that case, land can be provided as replace of land.
- Compensation should be given on the basis current price land rather than traditional policy
- Ensuring compensated money to the actually affected people

4.3. People's preference on mode of compensation payment and their previous experience

- In case of compensation they prefer money rather land as they feel freedom of choice

4.4. Cut-off date for listing affected properties

Income restoration and generation

4.1. What are the current income generating activities of APs?

- The main sources of income of this area are agriculture and handloom. But there are also have a little range of fisher men, business men, job holder and other professionals.

4.2. Are there possibilities for continuing employment in the project area? Which type of occupation?

- Many of them will bound to change their occupation due to changed environment and situation. However, being migrated if population, present income generating source could be sustained.

4.3. What types of income-generating activities are available at relocation sites? and to be generated?

- There are almost same in income generating source between affected area and project relocated area. Nevertheless, in project relocated area has predominance of handloom occupation.

4.4. How does relocation of households affect the current market situation (job opportunities, competition, land price and market price situation)

- Due to migration process, Abundance of labour force might be seen in newly relocated area, which might influence on local labour market. As a result, labour competition might increase and might lessen wage.
- Labour availability will be increased. There is a chance to be more labor than less work
- Land price will be increased
- Social neighborhood will increased

4.5. How many people can be absorbed?

- Almost affected people could be people can be absorbed.

4.6. Does this require training for skill development and IGA?

- Livestock roaring training
- Swinging training
- Health training
- Fish culture training
- Agricultural training etc
- Skill development training is highly needed for the local people. In addition, training should be given on disaster risk reduction

4.7. How many people need to be trained and for what occupation?

- By proper providing proper training, a great development of handloom will be brought

and will create more employment opportunities. Related with handloom should provide proper training and better opportunities by govt. and NGOs. Almost half of total people should be trained up.
Social Development Support
5.1. Name of NGOs prevailing in the relocation site - BRAC, CEDIA, Grameen Bank, ASA, Paribar Unnoyn Samajik Sangasta, Pard, ASEA - CODAC and many other NGOs are working in this area. **5.2. Willingness of NGOs to support the APs for savings and income generation programs, providing capital support for income restoration and poverty reduction.** - NGOs worker are working in Savings, Income generating activities, financial assistance in re-settlement of income and in eradicating poverty. NGOs could expand their activities if they get financial assistance. **5.3. Social safeguard and safety nets** - The opportunities of social safety net are moderate. They need adequate financial assistance is needed. They also need training related to awareness. Employment generating activities should be increased.
Outcome (s)
- All livelihood sectors are affected by erosion and flood - They demanded immediate bank protection - They show willingness to be relocated in purpose of protective work - There is no major social conflict regarding relocation - Prior consultation with local allied persons is highly required before starting work - Income and employment will be generated - Compensation should be given in money considering the current market price - Lifestyle of the local people will be improved
Special Attention
quirements of new embankment and protect work

Table A8.5: First-Round Meeting Summary, Shibalaya Upazila Complex, Manikgonj

Project/Subproject:**Integrated Flood and Riverbank Erosion Management Investment Program**
Meeting date: **27.02.2013**
Place: **Shahzadpur Upazila Complex, Sirajganj**
Attending: **Proponents:** BWDB, NHC, ADB **Stakeholders:** • ***Primary:*** Farmers, fishermen, local business community as well as the households to be displaced, women groups, and caretakers of community properties. • ***Secondary:*** Those who may not be directly affected but have interests that could contribute to the study, play a role in implementation at some stage, or affect decision making on Project

aspects. In this Project NGOs, concerned government departments, and line agencies are considered.

ported by: Mobasher Bin Ansari, Professional, CEGIS

Issues, questions, responses, comments:

1.1. People's perception, opinion and attitude

- Major problems relating to flood and riverbank erosion,
- Attitude of the people towards the project (FRERMIP) and its proper completion,
- Impact (positive and negative) of the project and mitigation measures against negative impact,
- Unanticipated Impacts on Charlands

1.2. Resettlement/ Relocation issues

- Impact of land acquisition on different group of people (farmer, fisherman, vulnerable people, and others),
- Relocation of houses and other establishments,
- Choice of relocation site, availability of land (agricultural, homestead, etc.) and its current price,
- Present community social services (eg health care, education) in the affected areas and relocated areas,
- Will this situation be improved or deteriorated after relocation?
- Present level of access to market centers and towns/future level of access to market centers and towns after relocation,
- What are the patterns of transport and communication in the affected area/relocated area?
- What are the patterns for utilizing cultural and religious facilities? Will it generate conflicts in the host community?
- What types of conflicts may arise due to relocation/resettlement?

1.3. Compensation issues

- ADB and GoB policies on involuntary resettlement,
- Discussion on entitlements, compensation rates, income restoration, and grievance redress mechanism,
- People's preference on mode of compensation payment and their previous experience,
- Cut-off date for listing affected properties

1.4. Income restoration and generation

- What are the current income generating activities of APs?
- Are there possibilities for continuing employment in the project area? Which type of occupation?
- What types of income-generating activities are available at relocation sites? and to be generated?
- How does relocation of households affect the current market situation (job opportunities, competition, land price and market price situation)?
- How many people can be absorbed?
- Does this require training for skill development and IGA?
- How many people need to be trained and for what occupation?

1.5. Social Development Support

- Name of NGOs prevailing in the relocation site,
- Willingness of NGOs to support the APs for savings and income generation programs, providing capital support for income restoration and poverty reduction.
- Social safeguard and safety nets

Outcomes (s)
People's perception, opinion and attitude
2.1. Main problems due to erosion and flooding: - Flooding - river bank erosion - Damage of households and assets - Damage of bridge, culvert and livestock etc. **2.2. Peoples' responses to the FRERMIP project:** - Participants expressed positive attitude to the project implementation and demanded its early implementation adjacent villages of Padma River bank; **2.3. Impacts of the project** - People opined that this project must bring immense socio-economic benefits for them
Resettlement/ Relocation issues
3.1. Negative impact of land acquisition on different group of people - Bank erosion will increase due to unplanned river management program - Lack of permanent protection work will not be enough to save households and agricultural and in project area.
3.2. Positive impact of land acquisition on different group of people: - To save agricultural land, households, bridges and culvert from river bank erosion and flood. - Increase agricultural production - The stone base construction work from gravel layer will ensure its longevity. **3.3. Unanticipated Impacts on Charlands** - No unanticipated impacts will observe on Charlands people rather this activities will ensure more food production and safety for them. **3.4. Impact of land acquisition on different group of people (farmer, fisherman, vulnerable people, and others),** - The farmers and local people will lose their agricultural and homestead land due to land acquisition; - They demanded adequate compensation and other benefits for the loss of their assets and livelihood, as well as alternative place for relocation of their houses and business. **3.5. Relocation of houses and other establishments,** - Relocation of houses and other establishments will possible in new Charlands, **3.6. Choice of relocation site, availability of land (agricultural, homestead, etc.) and its current price,** - Government can decide best for relocation of site - There are available land for relocation - Current land price is now: - Agricultural land is 20,000BDT for each decimal. - Homestead land is 30,000BDT for each decimal. **3.7. Present community social services (eg health care, education) in the affected areas and relocated areas,** - The present health and education services in project area not satisfactory - Lack of health centres and schools in both project and relocated areas **3.8. Will this situation be improved or deteriorated after relocation?** - After relocation this situation may not improve as high but definitely improve after few years **3.9. Present level of access to market centers and towns/future level of access to market centers and towns after relocation,**

- At present access to market is not satisfactory.

3.10. What are the patterns of transport and communication in the affected area/relocated area?

- Modes of transportations in the project area are Rickshaw and van. Most of the people communicate through foot.

3.11. What are the patterns for utilizing cultural and religious facilities? Will it generate conflicts in the host community?

- People of these areas are practicing homogenous cultural practices for 100 of years. No social conflicts are exists in whole project area

3.12. What types of conflicts may arise due to relocation/resettlement?

- According to local people, no conflicts will happen due to relocation/resettlement. If any will rise, local power holder can solve this problem easily.

Compensation issues, income restoration and generation

4.1. ADB and GoB policies on involuntary resettlement

- Local people are totally unknown about ADB and GoB policies on involuntary resettlement issues.

4.2. Discussion on entitlements, compensation rates, income restoration, and grievance redress mechanism,

- Compensation should be paid to actual people who are affected by land acquisition.
- Land compensation should be given on the basis of present land price.

4.3. People's preference and previous experience on mode of compensation payment

- People's preferences on mode of compensation payment only through money.

4.4. Cut-off date for listing affected properties

- **N/A**

4.8. What are the current income generating activities of APs?

- Agricultural farming
- Fishing (culture/capture)
- Livestock rearing
- Small cottage/Handicraft
- Employed/service
- Small business

4.9. Are there possibilities for continuing employment in the project area? Which type of occupation?

- The mentions above occupations are possible for continuing in the project area.

4.10. What types of income-generating activities are available at relocation sites? And to be generated?

- Agricultural farming
- Fishing (culture/capture)
- Livestock rearing
- Small cottage/Handicraft
- Employed/service
- Small business

4.11. How does relocation of households affect the current market situation (job opportunities, competition, land price and market price situation)?

- Land price will be increased
- Development of agriculture
- Development of communication system
- Improvement of livestock rearing practice etc.

4.12. How many people can be absorbed?

- About 50 percent people can be absorbed

4.13. Does this require training for skill development and IGA?

- It is highly needed training programs on agriculture farming, livestock rearing and small cottage for the betterment of local people.

4.14. How many people need to be trained and for what occupation?

- People identified at least 80% of local are needed to trained up on these particular occupation as:
- Improve agricultural farming
- Fishing (culture/capture)
- Small cottage/handicraft etc.

Social Development Support

5.1. Name of NGOs prevailing in the relocation site

- BRAC, Grameen Bank, PPD, Manab Mukti, UNDP, ASA

5.2. Willingness of NGOs to support the APs for savings and income generation programs, providing capital support for income restoration and poverty reduction.

- These NGOs are interested to support the APS for savings and income generation programs, providing capital for income restoration and poverty reduction.

5.3. Social safeguard and safety nets

- At present, the social safeguard and safety nets activities in the project area are not good. Local people argued more initiatives should have taken by government in this regard such as:
- Old allowances
- Maternity allowances
- Widow allowances etc

Overall Findings

Overall:

- The local people desired for quick implementation of this project as they believe that the communication infrastructure and other facilities of the study area will be improved as well in the aftermath.
- The land owners stated that they want higher prices of land than anticipated but still they agreed that the project would change the socio-economical condition of the area as well as of the country.
- People demanded that the village cross road which run beside the river bank should be made as metalled road for the convenience of local people, contractor and the BWDB.

Specific:

- Participants expressed positive attitude to the project implementation and demanded its early implementation.
- Local people expect employment opportunities during and after project implementation;
- People suggested for the development of road communication network which in a sense would create income generating sources for the villagers;
- The compensation should be fixed in conformity with the market value of the land; and
- People strongly demanded a plan which will not affect the local development with an excuse of national development.

Photo A8.5: First Round Meeting Sign-in Sheet, Chauhali, Sirajganj

"প্রধান প্রধান নদীর বন্যা ও ভাঙ্গন কবলিত অঞ্চলের ঝুঁকি মোকাবেলা" প্রকল্পের জন্য মতবিনিময় সভার উপস্থিতির তালিকা "

স্থান : চৌহালী উপজেলা পরিষদ সিরাজগঞ্জ তারিখ: ২২/০৬/২০১৬

ক্রমিক নং	নাম	পেশা/পদবী	মোবাইল নম্বর	স্বাক্ষর
২	[illegible]	[illegible]	01727[illegible]	
২	মোঃ আবদুল্লাহ ইসলাম	UNO	01716-099773	
৩	মোঃ কামরুল হাসান (মুন্না)	চেয়ারম্যান	01716-716699	
৪	[illegible]	[illegible]	01712-785891	
৫	[illegible]	[illegible]	01716-219174	
৬	[illegible]	[illegible]	01918-226294	
৭	[illegible]	[illegible]	01719256550	
৮	[illegible]	[illegible]	01720366022	
৯	[illegible]	U.N.D.O	01711-935010	
১০	[illegible]	[illegible]	0172-242487	
১১	মোঃ আবদুল [illegible]	U.E.O.	01719260292	
১২	মোঃ [illegible]	[illegible]	01729[illegible]	
১৩	মোঃ [illegible]	[illegible]	01730[illegible]	
১৪	মোঃ জাকারিয়া	ব্যাংক চৌহালী	01740998791	12-03-13
১৫	মোঃ [illegible]	গ্রামীন ব্যাংক	01730[illegible]	12-03-13

আয়োজনে "সেন্টার ফর এনভায়রনমেন্টাল এন্ড জিওগ্রাফিক ইনফরমেশন সার্ভিসেস" (CEGIS)

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"প্রধান প্রধান নদীর বন্যা ও ভাঙ্গন কবলিত অঞ্চলের ঝুঁকি মোকাবেলা" প্রকল্পের জন্য মতবিনিময় সভার উপস্থিতির তালিকা "

স্থান : চৌহালী উপজেলা পরিষদ সিরাজগঞ্জ তারিখ: ২২/০৬/২০১৬

ক্রমিক নং	নাম	পেশা/পদবী	মোবাইল নম্বর	স্বাক্ষর
০১	মোঃ রফিকুল ইসলাম	চাকুরী	01712884965	
০২	মোঃ সাইফুল ইসলাম	ইউ পি সদস্য	01929-320453	
০৩	মোঃ আবদুল	ইউ পি	01749365461	
০৪	মোঃ মোস্তফা	ইউ পি	01731804042	
০৫	মোঃ মোঃ হোসেন	ইউ পি	01912660855	
০৬	মোঃ আবু নছর	ইউ, পি সদস্য	0176-022165	
০৭	" ইউনুস আলী	" " চেয়ারম্যান	01719-616774	
০৮	তাহমিনা বেগম	ইউপি সদস্য	01721078057	
০৯	মোঃ সাহাবুদ্দিন	ইউ, পি সদস্য	01725337030	
১০	মোঃ মোকতার হোসেন	চেয়ারম্যান ও সেক্রেটারী	01730955120	২২.৬.১৬
১১	মোঃ হাবিবুর রহমান	সমাজ সেবক	01711107664	২২/৬/১৬
১২	আঃ ফিরোজ	কৃষক		ফিরোজ
	নবীর	কৃষক		নবীর
	মোঃ মাহবুবুর	কৃষি		মোঃ মাহবুবুর
	বাশার	কৃষি		বাশার

আয়োজনে "সেন্টার ফর এনভায়রনমেন্টাল এন্ড জিওগ্রাফিক ইনফরমেশন সার্ভিসেস" (CEGIS)

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Photo A8.6: First Round Meeting Sign-In Sheet, Harirampur, Sirajganj

"প্রধান প্রধান নদীর বন্যা ও ভাঙ্গন কবলিত অঞ্চলের ঝুঁকি মোকাবেলা" প্রকল্পের জন্য মতবিনিময় সভার উপস্থিতির তালিকা "

স্থান : হরিরামপুর উপজেলা পরিষদ মিলনায়তন তারিখ: ২৫/০২/২০১৬

ক্রমিক নং	নাম	পেশা/পদবী	মোবাইল নম্বর	স্বাক্ষর
১	[illegible]	[illegible]	[illegible]	[illegible]
২	এস, এম, সাইদ হাসান	সহঃ উপজেলা মাধ্যমিক শিক্ষা কর্মকর্তা	০২৭২৪-৫৮৪৮২	[illegible]
৩	হারুন-অর-রশিদ	উপজেলা সমবায় কর্মকর্তা	০২৭২৬-২৪৭০৫৮	[illegible]
৪	[illegible]	[illegible]	[illegible]	[illegible]
৫	Md. Lutfar Rahman	Upa Agri officer	01938822567	[illegible]
৬	Md. Nazrul Islam Bhuiyan.	Upa-zila Engineer.	01715593154	[illegible]
৭	A.K.M. MIZANUR RAHMAN	U.L.O. Hemayetpur Manikganj	01716637536	[illegible]
৮	Abubakar Siddik	UEO(C)	01815844456	[illegible]
৯	Mohsinuzzaman Khan	SAE/PHE	01732681242	[illegible]
১০	Mursalima Begum	UWAO	01719615360	[illegible]
১১	MD. JANNAT-UL-FERDOUSH	ULO	01199-060326	[illegible]
১২	[illegible]	[illegible]	[illegible]	[illegible]
১৩	[illegible]	[illegible]	01925[illegible]316	[illegible]
১৪	[illegible]	[illegible]	[illegible]	[illegible]
১৫	[illegible]	[illegible]	[illegible]	[illegible]

আয়োজনে "সেন্টার ফর এনভায়রনমেন্টাল এন্ড জিওগ্রাফিক ইনফরমেশন সার্ভিসেস" (CEGIS)

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“প্রধান প্রধান নদীর বন্যা ও ভাঙ্গন কবলিত অঞ্চলের ঝুঁকি মোকাবেলা” প্রকল্পের জন্য মতবিনিময় সভার উপস্থিতির তালিকা ”

স্থান : হরিরামপুর উপজেলা পরিষদ মিলনায়তন তারিখ: ২৬/০২/২০১৬

ক্রমিক নং	নাম	পেশা/পদবী	মোবাইল নম্বর	স্বাক্ষর
১৬	আমিনুল হক শাহ	শাখা ব্যবস্থাপক ব্র্যাক হরিরামপুর	০১৯২৫ ১১০৬১৫	[illegible]
১৭	সত্যরঞ্জন সাহা	ব্যবসায়ী হরিরামপুর	01717353901	সত্যসাহা
১৮	বোমা জিয়াসমীন	শাখা ব্যবস্থাপক মানবকল্যাণ ট্রাস্ট	01733076026	[illegible]
১৯	মোঃ [illegible]	UP সদস্য		মোঃ [illegible]
২০	[illegible]	UP সদস্য	01736621694	[illegible]
২১	[illegible]	কৃষি কাজ	০১৭ ২৮৯৬৯২৯১	[illegible]
২২	মো: আজাহারুল হোসেন	ছাত্র	01762562292	[illegible]
২৩	মো: [illegible]	কৃষি	017[illegible]474198	PANIVOIYOUD
২৪	শেখ হালিম	ইউনিয়ন সমাজ [illegible]	01727602153	Sheikh হালিম
২৫	মো: হাবিবুর	ব্যবসা	01772365667	Habibur
২৬	মো: মাসুম মিয়া	ব্যবসা	01922000454	Masum
২৭	মো: রনি [illegible]	ছাত্র	01963-848908	Roni
২৮	মো: মোশাররফ হোসেন	কর্মসূচি ব্যবস্থাপক [illegible]	01712516628	[illegible]
২৯	সুকুমার দে	সহ (যোগ) [illegible] ব্যবস্থাপক প্রশিক্ষ হরিরামপুর	01715448580	[illegible]
৩০	হরিদাস রায়	ইউ.পি সদস্য	01741181464	[illegible]

আয়োজনে “সেন্টার ফর এনভায়রনমেন্টাল এন্ড জিওগ্রাফিক ইনফরমেশন সার্ভিসেস” (CEGIS)

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স্থান : তারিখ:

ক্রমিক নং	নাম	পেশা/পদবী	মোবাইল নম্বর	স্বাক্ষর
৩১	[illegible]	UNO	01752843866	[illegible]
৩২	[illegible]	[illegible]	01746148851	[illegible]
৩৩	[illegible]	[illegible]	01715867749	[illegible]
৩৪	[illegible]	[illegible]	0199-296066	[illegible]
৩৫	[illegible]	[illegible]	01715853088	[illegible]
৩৬	[illegible]	Value chain Specialist	01712505733	[illegible]
৩৭	[illegible]	[illegible]	01912076322	[illegible]
৩৮	[illegible]	[illegible]	01720821359	[illegible]
৩৯	[illegible]	মেম্বার	01750213466	[illegible]
৪০	[illegible]	ব্যবসা	01712026085	[illegible]
৪১	[illegible]	[illegible]	01731724142	[illegible]
৪২	[illegible]	ব্যবসায়ী	01740818 367	[illegible]
৪৩	[illegible]	[illegible]	01747251040	[illegible]
৪৪	[illegible]	ব্যবসায়ী	01740331156	[illegible]
৪৫	[illegible]	[illegible]	01719210?0	[illegible]

আয়োজনে "সেন্টার ফর এনভায়রনমেন্টাল এন্ড জিওগ্রাফিক ইনফরমেশন সার্ভিসেস" (CEGIS)

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স্থান :

তারিখ:

ক্রমিক নং	নাম	পেশা/পদবী	মোবাইল নম্বর	স্বাক্ষর
৪৬	মোঃ [illegible]	[illegible]	01732805172	[illegible]
৪৭	[illegible] হোসেন	ব্যবসা	01778183185	[illegible]
৪৮	মোঃ বাহের আলী	ব্যবসা	01715792537	বাহের আলী
৪৯	[illegible] খানম	চাকুরী	01775245777	[illegible]
৫০	মুহাম্মদ [illegible]	Job	01710000923	[illegible]
৫১	মোঃ কামাল হোসেন	চেয়ারম্যান, রামকৃষ্ণপুর ইউপি	01711060719	[illegible]
৫২	[illegible]	[illegible]	01778904906	[illegible]
৫৩	[illegible]	[illegible]		[illegible]
৫৪	মোঃ [illegible]		01731548641	মোঃ [illegible]
৫৫.	[illegible]	[illegible]	01719210702	[illegible]
৫৬.	[illegible]	[illegible]	01768/8623	[illegible]
৫৭.	এম. এম. এ. [illegible]	উপজেলা প্রকল্প বাস্তবায়ন কর্মকর্তা	01734-747084	[illegible]

আয়োজনে "সেন্টার ফর এনভায়রনমেন্টাল এন্ড জিওগ্রাফিক ইনফরমেশন সার্ভিসেস" (CEGIS)

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Photo A8.7: First Round Meeting Sign-In Sheet, Shahjadpur, Sirajganj

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স্থান : শাহজাদপুর উপজেলা পরিষদ সিরাজগঞ্জ তারিখ: ২৭.০২.১৬

ক্রমিক নং	নাম	পেশা/পদবী	মোবাইল নম্বর	স্বাক্ষর
১	[illegible]	[illegible]	[illegible]	[illegible]
২	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	01716213475	[illegible]

আয়োজনে "সেন্টার ফর এনভায়রনমেন্টাল এন্ড জিওগ্রাফিক ইনফরমেশন সার্ভিসেস" (CEGIS)

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স্থান : শাহজাদপুর উপজেলা পরিষদ মিলনায়তন

তারিখ: ২৭.০২.১৬

ক্রমিক নং	নাম	পেশা/পদবী	মোবাইল নম্বর	স্বাক্ষর
০১	মো: হারুন অর রশিদ	চাকুরী ম্যানেজার UDPS	01197 415814	[illegible] 29/2/16
০২	রঘুনাথ সরকার	চাকুরী	01722306757	[illegible]
০৩	মোঃ আবু সাঈদ	উ:স: প্রকৌ: জনস্বাস্থ্য প্রকৌ:	01715319039	[illegible] 29/2/16
০৪	[illegible] রহমান আলী	চাকুরী	01730187807	[illegible] 29/2/16
০৫	সন্তোষ কুমার বিশ্বাস	চাকুরী	01720526230	[illegible] 29/2/16
০৬	মো: আব্দুর রহমান	চাকুরী [illegible]	01917-965266	[illegible]
০৭	[illegible] সাহা	চাকুরী ক্লিনিক ম্যানেজার, [illegible]	01727-023923	[illegible] 27.2.13
০৮	মোঃ আবু নঈম	শাখা ব্যবস্থাপক [illegible]	01730025453	[illegible]
০৯	মো: [illegible]	[illegible]	01712953351	[illegible] 29.2.13
১০	মো: খলিলুর রহমান	ইউ. পি. ও	01719765995	[illegible] 29.2.16
১১	মোঃ আব্দুল কাদের	ইউ. এ. ও.	01710-865555	[illegible] 27.2.13
১২	মো: আব্দুল [illegible]	ইউ. পি. ও BRDB	01719-856207	[illegible] 29.2.13
১৩	এস. এম. [illegible]	U. S. O	01718-841866	[illegible] 29/02/16
১৪	এ. কে. এম আজাদ চৌধুরী	চেয়ারম্যান [illegible]	01712-554837	[illegible]
১৫	মো: [illegible]	[illegible]	0292292 [illegible]	[illegible] 29/2/16

আয়োজনে "সেন্টার ফর এনভায়রনমেন্টাল এন্ড জিওগ্রাফিক ইনফরমেশন সার্ভিসেস" (CEGIS)

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স্থান : শাহজাদপুর উপজেলা পরিষদ মিলনায়তন

তারিখ: ২৭.০২.১৬

ক্রমিক নং	নাম	পেশা/পদবী	মোবাইল নম্বর	স্বাক্ষর
	মোঃ [illegible]	চেয়ারম্যান	01710-609299	[illegible]
	মোঃ [illegible]	ভাঃ চেয়ারম্যান	01711-246258	[illegible]
	রুকসানা জামান কনিকা	CEP ব্র্যাক	01734168336	[illegible]
	কে.এম. মামুনুর রহমান	খাদ্য পরিদর্শক	01190555776	[illegible]
	মোঃ আখতারুজ্জামান	উপজেলা শিক্ষা অফিসার.	01712-635894	[illegible]
	মোঃ শাহজাহান আলি	উপজেলা [illegible] কর্মকর্তা	01714-723187	[illegible] 29/2/16
	মোঃ সাব্বির আহমেদ	[illegible]	01710-609317	[illegible] 29/2/2016

আয়োজনে "সেন্টার ফর এনভায়রনমেন্টাল এন্ড জিওগ্রাফিক ইনফরমেশন সার্ভিসেস" (CEGIS)

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Photo A8.8: First Round Meeting Sign-In Sheet, Shibalaya, Manikganj

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স্থান: শিবালয় উপজেলা পরিষদ মিলনায়তন তারিখ: ১৭/০৪/২০১৩

ক্রমিক নং	নাম	পেশা/পদবী	মোবাইল নম্বর	স্বাক্ষর
১	[illegible]	[illegible]	০১৭১১-৫১২৬৮৫	[illegible] ১৭/০৪/১৩
২	[illegible]	[illegible]	০১৭১৩০০১১৩৬৭	[illegible] ১৭-৪-১৩
৩	[illegible]	UNO,	01711067411	[illegible] 17.4.13
৪	মো: [illegible]	[illegible]	01713373381	[illegible] 17.4.13
৫	মো: আতিকুর রহমান	[illegible]	01717919614	[illegible]
৬	[illegible]	[illegible]	০১৭১১-২৮৪২৯২	[illegible]
৭	[illegible]	[illegible]	০১৭২৩৫৬৩০৮৯	[illegible] 17/04/2013
৮	কে. এম. [illegible]	[illegible]	০১৭১২২২৮৬৭০	[illegible]
৯	[illegible]	[illegible]	01711-019186	[illegible]
১০	মো: [illegible]	[illegible]	01720-575395	[illegible]
১১	[illegible]	[illegible]	01711-285635	[illegible]
১২	মো: নুরে আলম সিদ্দিকী	[illegible]	01678-700514	[illegible]
১৩	[illegible]	[illegible]	7716118	[illegible]
১৪	মো: [illegible]	[illegible]	01191337409	[illegible]
১৫	মো: [illegible]	[illegible]	01711386285	[illegible]

আয়োজনে "সেন্টার ফর এনভায়রনমেন্টাল এন্ড জিওগ্রাফিক ইনফরমেশন সার্ভিসেস" (CEGIS)

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স্থান : [illegible] তারিখ: ১৭/০৪/২০১৩

ক্রমিক নং	নাম	পেশা/পদবী	মোবাইল নম্বর	স্বাক্ষর
১৬.	[illegible]	[illegible]	01730351251	
১৭.	[illegible]	[illegible]	01719187480	
১৮.	[illegible]	[illegible]	01711310507	
১৯.	[illegible]	[illegible]	01713577299	
২০.	[illegible]	[illegible]	01736520651	
২১	[illegible]	[illegible]	01714-747038	
২২	[illegible]	[illegible]	01712-152410	
২৩	[illegible]	[illegible]	01711-107079	
২৪	[illegible]	[illegible]	018 38106398	
২৫	[illegible]	UH & FP.O	01712-544911	17.4.13
২৬	[illegible]	AC (L)	01716986369	17.04.13
২৭	[illegible]	[illegible]	01713-520478	
২৮	[illegible]	[illegible]	01758438909	
২৯	[illegible]	[illegible]	01796 [illegible]	
৩০	[illegible]	[illegible]	01749513 16	১৭/৪

আয়োজনে "সেন্টার ফর এনভায়রনমেন্টাল এন্ড জিওগ্রাফিক ইনফরমেশন সার্ভিসেস" (CEGIS)

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স্থান : শিবালয় উপজেলা পরিষদ মিলনায়তন তারিখ: ১৭/০৪/২০১৬

ক্রমিক নং	নাম	পেশা/পদবী	মোবাইল নম্বর	স্বাক্ষর
৩১.	মো: আব্দুল লতিফ	উপজেলা প্রকৌশলী	০১৭১১-১৮৪৭৮১	[signature] 17.04.13
৩২.	মো: আব্দুল লতিফ	উ: স্বা: প: ক:	০১৪১১২১৯২৭১	[signature] ১৭/০৪/১৬
৩৩.	রিক্তা বেগম	উপজেলা মহিলা বিষয়ক অফিসার	০১৮১১৪৫৪৩৮৮	[signature] ১৭/০৪/১৬
৩৪.	হাসলিনা হক	উপজেলা শিক্ষা অফিসার	01711978085	[signature] ১৭/৪/১৬
৩৫	হামিদা আহমেদ	উপজেলা পল্লী উন্নয়ন অফিসার	01714648980	[signature] ১৭/৪/১৬
৩৬	আ.ত.ম. নুরুজ্জামান	উপজেলা জনস্বাস্থ্য প্রকৌশল অধিদপ্তর	01776682081	[signature] ১৭/৪/১৬
৩৭	মো: আব্দুস সবুর	দারিদ্র বিমোচন কর্মকর্তা	01766578115	[signature] ১৭/৪/১৬
৩৮	মফিজুল হক	উপজেলা পরিবার পরিকল্পনা অফিস	01712292993	[signature] ১৭/৪/১৬
৩৯	মোসা: মামুনুন্নাহার	উপজেলা সমবায় কর্মকর্তা	01761796 31	[signature] ১৭/৪/১৬
৪০	মোহাম্মদ আনোয়ারুল করীম	সিনিয়র উপজেলা মৎস্য কর্মকর্তা	01712502213	[signature] ১৭/৪/১৬
৪১	মো: মামুনুল হক	ব্র্যাক অফিস	01722845182	[signature]
৪২	আয়েশা আক্তার	শিক্ষক	—	আয়েশা আক্তার
৪৩	মো: আব্দুল্লাহ	পেশ ইমাম	01672626523	[signature]
৪৪	সাজেদুল হক	ব্যবসায়ী	01935982456	[signature]
৪৫				

আয়োজনে "সেন্টার ফর এনভায়রনমেন্টাল এন্ড জিওগ্রাফিক ইনফরমেশন সার্ভিসেস" (CEGIS)

Center for Environmental and Geographic Information Services
(A Public Trust under The Ministry of Water Resources)
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Photo A8.9: Questionnaire, Public Consultation Meeting

মত বিনিময় সভার আলোচ্য বিষয়

১। প্রকল্পের প্রভাব

১.১ নদী ভাঙ্গন ও বন্যা সম্পর্কিত প্রধান প্রধান সমস্যা কি কি?

১.২ এম,আর,পি প্রকল্প বাস্তবায়ন সম্পর্কে জনগণের অভিমত কি?

১.৩ এম,আর,পি প্রকল্পের সম্ভাব্য প্রভাব (ইতিবাচক নেতিবাচক) কি?

১.৪ নেতিবাচক প্রভাব প্রশমনে প্রয়োজনীয় পদক্ষেপ গুলো কি কি?

১.৫ প্রকল্প বাস্তবায়িত হলে চর অঞ্চলের ওপর প্রভাব পড়বে কি? পড়লে, তা কি ধরনের?

২। পুনর্বসতি/স্হানান্তর

২.১ জমি অধিগ্রহণের ফলে ঘর-বাড়ী ও অন্যান্য স্হাপনা সমূহের স্হানান্তরের প্রয়োজন হলে বিভিন্ন পেশাজীবী গোষ্ঠীর (কৃষক, জেলে, বিপদাপন্ন/ঝুঁকিগ্রস্ত) ওপর কি প্রভাব পড়তে পারে তা বর্ণনা করুন।

২.২ স্হানান্তরের জন্য আপনাদের পছন্দের স্হান কোনটি? যে স্হানে যেতে চান সেখানে পর্যাপ্ত জমি পাওয়া যাবে কি? সেখানে জমির (বসতবাড়ী, ভিটা, কৃষি ইত্যাদি) দাম কত?

২.৩ ক্ষতিগ্রস্ত এলাকায় এবং স্হানান্তরকৃত স্হানে বিদ্যমান সামাজিক সেবা সমূহ (যেমন: স্বাস্হ্য সেবা, শিক্ষা, ইত্যাদি) সম্পর্কে বলুন।

২.৪ স্হানান্তরকৃত স্হানে বিদ্যমান সামাজিক সেবা সমূহের উন্নতি বা অবনতি হবে কিনা।

২.৫ শহরে/বাজারে যাওয়ার জন্য বর্তমান স্হানের (ক্ষতিগ্রস্ত স্হানের) যাতায়াত ব্যবস্হা (সড়ক, ইত্যাদি) কেমন, কি ধরণের যানবাহন ব্যবহার করা হয় এবং স্হানান্তরকৃত স্হান থেকে শহরে/বাজারে যাওয়ার জন্য যাতায়াত ব্যবস্হা কেমন, কি ধরণের যানবাহন ব্যবহার করা হয়?

২.৬ বর্তমান স্হানের (ক্ষতিগ্রস্ত স্হানের) সাংস্কৃতিক সুযোগ সুবিধা, আচার আচরণ, প্রথা, কি এবং কেমন? আপনাদের আচার আচরণ, প্রথা স্হানান্তরকৃত স্হানে পূর্ব থেকে বসবাসরত জনগোষ্ঠীর সাথে কোন দ্বন্দ্ব/কলহ সৃষ্টির সম্ভাবনা আছে কি?

২.৭ দ্বন্দ্ব/কলহ হলে, তা কি ধরনের হতে পারে?

২.৮ ক্ষতিগ্রস্ত জনগণ কিভাবে ক্ষতিপূরণ পেতে চান তা বলুন।

৩ আয়-উপার্জনের পূন:সংস্হান:

৩.১ ক্ষতিগ্রস্ত জনগণের আয়ের উৎস সমূহ কি কি?

৩.২ স্হানান্তরিত হওয়ার পরেও বর্তমান স্হানে (ক্ষতিগ্রস্ত স্হানে) আয়ের উৎস সমূহ টিকিয়ে রাখা সম্ভব কিনা; যদি সম্ভব হয়, তাহলে সে উৎস সমূহ কি কি?

৩.৩ স্হানান্তরকৃত স্হানে আয়ের বর্তমান উৎস সমূহ কি কি?

৩.৪ স্হানান্তর বর্তমান বাজার ব্যবস্হাকে (যেমন: কর্ম সংস্হানের সম্ভাবনা এবং প্রতিযোগিতা, জমির দাম, ইত্যাদি) কি ভাবে প্রভাবিত করবে?

৩.৫ স্হানান্তরকৃত স্হানে কত সংখ্যক মানুষের কর্ম সংস্হান হতে পারে?

৩.৬ কর্ম সংস্হানের জন্য স্হানান্তরকৃত জনগোষ্ঠীর দক্ষতা অর্জনে প্রশিক্ষণের প্রয়োজন আছে কি?

৩.৭ কত লোকের প্রশিক্ষণ প্রয়োজন এবং কি কি পেশার প্রশিক্ষণ প্রয়োজন?

৪ সামাজিক উন্নয়ন সহায়তা:

৪.১ স্হানান্তরকৃত স্হানে বর্তমানে কোন কোন এনজিও কাজ করছে?

৪.২ ক্ষতিগ্রস্ত জনগণের সঞ্চয়, উপার্জন মূলক কর্মকান্ড, আয় পূন:সংস্হানে আর্থিক সহায়তা প্রদান এবং দারিদ্র নিরসনে বিদ্যমান এনজিও সমূহ আগ্রহী কিনা।

৪.৩ সামাজিক নিরাপত্তা বেষ্ঠনী সুযোগ সুবিধা কেমন?

Annex 4: Public Consultation Meeting, Second Round

A. Overview of Meetings

Four second-round meetings were conducted at Chowhali, Harirampur, and Shahjadpur and Shibalaya, attended by 157 participants. Locations, dates, numbers and types of participants, and meeting photos are provided in Tables A9.1 and A9.2, and Photos A9.1 to A9.4.

B. Stakeholder Concerns and Meeting Documentation

Summaries of stakeholder concerns expressed in the meetings are provided in Sections A9.C and A9.D. Copies of the meeting sign-in sheets are shown in Photos A9.5 to A9.8.

Table A9.1: Meeting Venues, First Round Public Consultation Meetings

District	Upazila	Union	Meeting venue	Meeting date	Time
Manikganj	Shibalay	Sadar	UZ conference room	02/07/2013	11:00 am
Sirajganj	Shahjadpur	Sadar	UZ conference room	04/07/2013	11:30 am
Sirajganj	Chouhali	Sadar	UZ conference room	07/07/2013	11:00 am
Manikganj	Harirampur	Sadar	UZ conference room	09/07/2013	11:00 am

Table A9.2: Public Consultation Meeting Participant Details

Meeting venue	Type of Participants	No. participants
Shibalaya (JLB-2)	BWDB staff, ADB consultants, Upazila Nirbahi Officer, teachers, UP Chairman, UP members (Male/Female), farmer, Fishermen, local notable persons, healthcare assistants, businessmen, traders, and NGO staff	69
Shahjadpur (JRB-1)	BWDB staff, PPTA consultants, UP Nirbahi Officer, teachers, UP Chairperson, UP members (male and female), farmer, fishermen, local notable persons, healthcare assistants, businessmen, traders, and NGO staff	37
Chouhali (JLB-2)	BWDB representatives, ADB consultants, Upazila Nirbahi Officer, teachers, UP Chairman, UP members (Male/Female), farmer, Fishermen, local notable persons, healthcare assistants, businessmen, traders, and NGO staff	56
Harirampur (PLB-1)	BWDB representatives, ADB consultants, Upazila Nirbahi Officer, teachers, UP Chairman, UP members (Male/Female), farmer, Fishermen, local notable persons, healthcare assistants, businessmen, traders, and NGO staff	85

Photo A9.1: PCM at Chouhali

Photo A9.2: PCM at Harirampur

Photo A9.3: PCM at Shahjadpur

Photo A9.4: PCM at Shibalya (JLB-2 area)

C. Summary of Concerns, All Meetings

Erosion. Stakeholders were informed of average annual rates of land, homestead, and infrastructure loss to erosion in each subproject area, and that the proposed bank protection is expected to reduce these losses. Participants emphasized the need to ensure that construction work is of high quality.

Flooding. Stakeholders were informed that the proposed embankment will help to protect from flooding.Stakeholders stated that the embankment will not control flood without river dredging, and therefore dredging should be incorporatedin the project.

Land use. Stakeholders were advised that the project would induce significant changesin land type, land use, and increased food production.

Fish habitat. Stakeholders were informed that the project is expected to have negative impacts on fish and other aquatic fauna due to reduction of wetland by the proposed interventions. Local participants suggested restoring fisheries habitat through pilot dredging of channels in the Tranche 1area.

Pollution. Stakeholders were advised that the construction phase would cause temporary air pollution and noise. Almost all stakeholders present consented to accept these impacts during construction.

Resettlement. Participants were informed that, at the time of the meetings, 1726 households in Horirampur of Manikgonj and Chouhali of Sirajgonj district would require relocation to suitable alternate sites before the beginning of construction, per Tranche 1 resettlement plans.

Improved road transportation. Participants were informed thatflood embanbkments would be provided with appropriate road facilities.

Employment.Participants were informed that the subproject's reduction of the areas' vulnerability will improve conditions for trade and commerce. Project construction will provide temporary employment opportunities to local people.

Contingency funding to begin revetment construction this year (2013). Almost all participants mentionedlocaitons threatened by erosion, and that If the construction does not start for one year,

erosion will proceed in this areas and the subproject designswill have to be changed. They requested contingency funds to be arranged now so that protection work can begin in 2013.

Addition of dredging to subproject designs. River dredging has not been included in subproject designs. Participants strongly recommended that it be added, as they believe flood and erosion control cannot be achieved in these areas without it. Some participants suggested capital dredging from Jamuna Bridge to Brahmankanda of Horirampur upazia under Manikgonj district.

Successful implementation. Participants are concerned that development projects initiated by the ruling party will lose priority if/when the opposition party is in power. Participants strongly urge a 2013 construction start avoid future problems.

Flood protection plans. Participants expressed concerned about the effectiveness of the subprojects in controlling flooding. They stated that flood protection plansshould be developed based on an assessment of water levels. Proposed interventions should be designed to provide protection from the highest monsoon water levels.

D. Notes of Specific Meetings

Shibalay, Manikganj (JLB-2 area)

The upazila areasmost affected by erosion are Zafargonj and Bachamara. Local MP Mr. A.B.M Anwerul Haq stated that over last five years, more than 9000 affluent households of Zafargonj area were forced by erosion to leave the area and now live in difficult circumstances in Dhaka city.

Participants recommend that construction should start from November in the dry season.

The northern part of Zafargonj Bazar is very much threatened by erosion this year. To protect this area,participants suggested seeking preparatory fundsfrom Asian Development Bank (ABD) and Water Development Board.

The subproject area needs access to contingency fundsfor emergency work.

Participants believe permanent protection works are required in the Padma and Jamuna Rivers as temporary erosion protection works are not viable there.

River dredging is essential to the success of the subproject and should be started in order to prevent erosion and flooding.

River bank protections from Koijuri to Baghabari are essential this year as these areas are vulnerable.

During construction, transparency should be ensured through BWDB monitoring of work quality.

A reservoir to hold water for rice cultivation and fish culture should be added to thesubproject.

Shahjadpur, Sirajganj

Co-ordination among involved departments should be ensured during subproject implementation.

Eroding locations should be properly identified and protection works provided there.

Participants requested adding construction of a water reservoir to the project, to hold water for rice cultivation and aquaculture and immediate repair of the existing upazila embankment and revetment.

Participants stated that a flood action plan was needed to improve flood proofing and response given the high flood levels in the subproject area.

Participants favor pilot dredging in area channels to increase fish production and maintain fish habitat.

Chouhali, Sirajganj

The area of Chouhali upazila most vulnerable to erosion is the upazila sadar, where 40 to 50 per cent of the area has already eroded away. BWDB has been using sandbags in attempt to control the erosion, but these have been ineffective given the intensity of the erosive attack. Participants stated that sandbag revetments are ineffective in the Jamuna due to its erosion intensity.

Participants urged BWDB to appeal to ADB to allocate preparatory funds for emergency work. Construction of riverbank protection works should commence in the dry season, otherwise adequate work quality will not be achieved.

Most participants stated that capital dredging should be undertaken from the Jamuna Bridge to Aricha. River dredging is required to ensure the survival of any future embankment works. An embankment built in this upazila at a cost of BDT 38 crore was already destroyed by erosion.

A flow divider should be incorporated in the project design.

Participants expressed frustration that the the subproject design does not reflect the concerns and suggestions of local people, even though these have been expressed repeatedly in meetings with the Project Implementation Officer (PIO).

Harirampur, Manikganj

The 5 km riverbank protection proposed in this upazila should be extended an additional 2 km up to Dhulsura. Bahadurpur union should be included with the project.

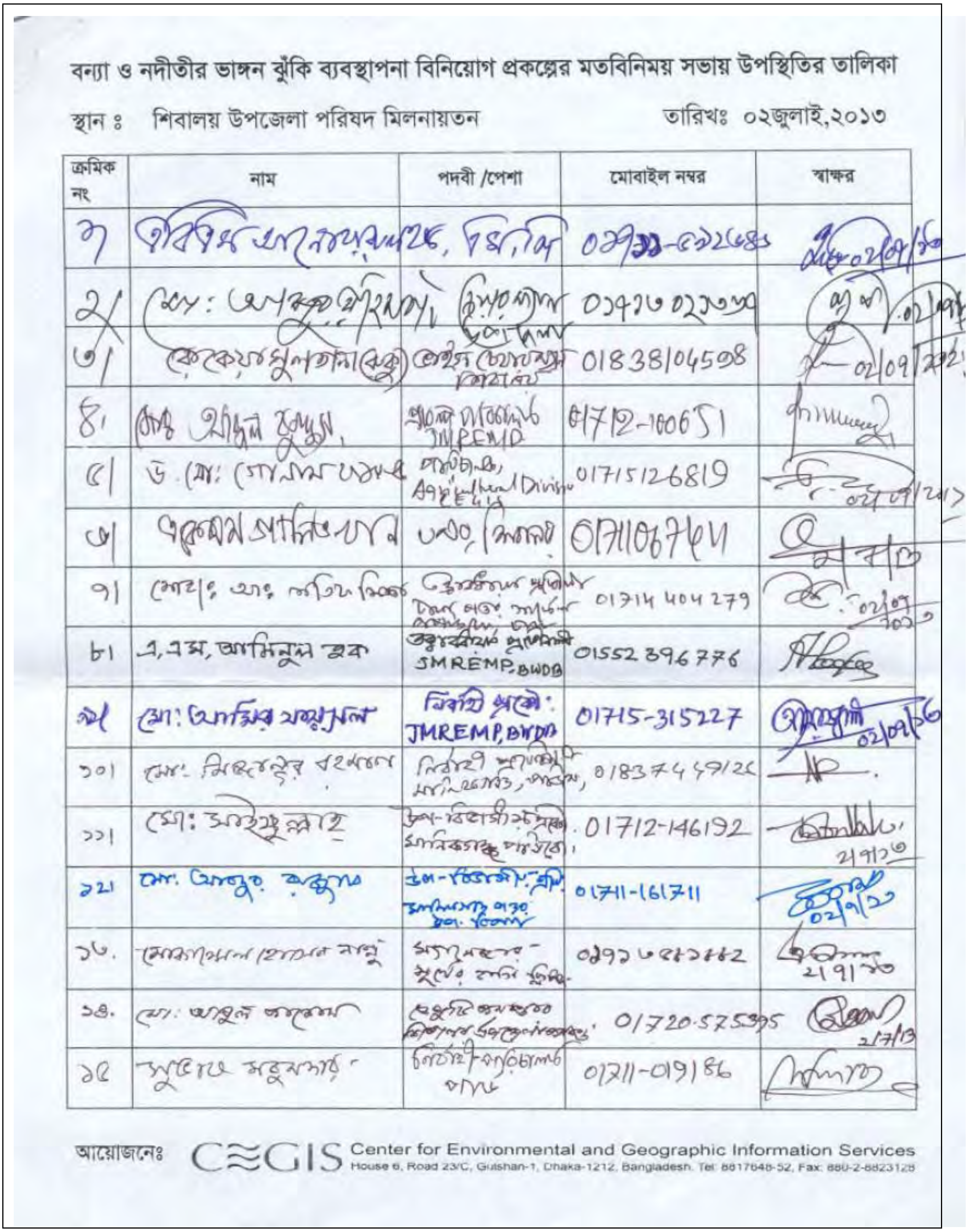
Participants were concerned about the successful implementation of the project. They think that projects initiated by the ruling party will have lower priority if and when the opposition is in power. Participants hope the subproject will be implemented in 2013 and agreed to make whatever sacrifices would be required to expedite this.

Participants stated that the priority should be to protect Harirampur before providing protection to Manikgonj town. Priority work should start as soon as possible.

A quality control committee should be struck to ensure quality construction work.

Local stakeholders should be involved in regular embankment maintenance.

Photo A9.5: Second Round Meeting Sign-in Sheet, Shibalaya, Manikganj



বন্যা ও নদীতীর ভাঙ্গন ঝুঁকি ব্যবস্থাপনা বিনিয়োগ প্রকল্পের মতবিনিময় সভায় উপস্থিতির তালিকা

স্থান : শিবালয় উপজেলা পরিষদ মিলনায়তন তারিখঃ ০২জুলাই,২০১৩

ক্রমিক নং	নাম	পদবী /পেশা	মোবাইল নম্বর	স্বাক্ষর
১	[illegible]	[illegible]	[illegible]	[illegible]
২	মো: [illegible]	[illegible]	[illegible]	[illegible]
৩	[illegible]	[illegible]	01838104598	[illegible]
৪	[illegible]	[illegible] JMREMP	01712-100651	[illegible]
৫	ড. মো: [illegible]	[illegible] Agricultural Division	01715126819	[illegible]
৬	[illegible]	[illegible]	[illegible]	[illegible]
৭	[illegible]	[illegible]	01714 404279	[illegible]
৮	এ,এম, আমিনুল হক	উপসহকারী প্রকৌশলী SMREMP, BWDB	01552 396776	[illegible]
৯	মো: [illegible]	নির্বাহী প্রকৌ: JMREMP, BWDB	01715-315227	[illegible]
১০	মো: [illegible]	নির্বাহী প্রকৌশলী [illegible]	[illegible]	[illegible]
১১	মো: [illegible]	[illegible]	01712-146192	[illegible]
১২	মো: [illegible]	[illegible]	01711-161711	[illegible]
১৩	[illegible]	[illegible]	[illegible]	[illegible]
১৪	মো: [illegible]	[illegible]	01720-575395	[illegible]
১৫	[illegible]	[illegible]	01711-019186	[illegible]

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বন্যা ও নদীতীর ভাঙ্গন ঝুঁকি ব্যবস্থাপনা বিনিয়োগ প্রকল্পের মতবিনিময় সভায় উপস্থিতির তালিকা

স্থান ঃ শিবালয় উপজেলা পরিষদ মিলনায়তন তারিখঃ ০২জুলাই,২০১৩

ক্রমিক নং	নাম	পদবী /পেশা	মোবাইল নম্বর	স্বাক্ষর
১৩	[illegible]	[illegible]	01758438909	[illegible]
১৪	[illegible]	[illegible]	01191337409	[illegible]
১৫	[illegible]	[illegible]	01819434386	[illegible]
১৬	[illegible]	[illegible]	01718187480	[illegible]
১৭	[illegible]	[illegible]	01720039634	[illegible]
১৮	[illegible]	[illegible]	01742083855	[illegible]
১৯	[illegible]	[illegible]	01776682081	[illegible]
২০	ডাঃ নুরজাহান বেগম	[illegible]	01717-926888	[illegible]
২১	[illegible]	[illegible]	01717-745043	[illegible]
২২	[illegible]	[illegible]	01221842054	[illegible]
২৩	[illegible]	[illegible]	01718888036	[illegible]
২৪	[illegible]	[illegible]	01711386285	[illegible]
২৫	[illegible]	[illegible]	01741191939	[illegible]
২৬	[illegible]	[illegible]	01938879349	[illegible]
২৭	[illegible]	[illegible]	01711-285635	[illegible]

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স্থান ঃ শিবালয় উপজেলা পরিষদ মিলনায়তন তারিখঃ ০২জুলাই,২০১৩

ক্রমিক নং	নাম	পদবী /পেশা	মোবাইল নম্বর	স্বাক্ষর
৩১	মো: আব্দুল ওয়াদুদ	সাংবাদিক	01764014074	[illegible] 2/7/13
৩২	মো: আব্দুর রাজ্জাক	চেয়ারম্যান [illegible]	017179196[illegible]4	[illegible]
৩৩	[illegible]	[illegible]	01711107079	[illegible] 02/7/13
৩৪	[illegible]	[illegible]	01711467888	[illegible] 2/7/13
৩৫	[illegible]	UFPO.	01712292993	[illegible] 02/7/13
৩৬	[illegible]	URDO	01714648980	[illegible] 02/7/13
৩৭	[illegible]	UCO.	01716179631	[illegible] 2/7/13
৩৮	মো: [illegible]	[illegible]	01713-520478	[illegible]
৩৯	[illegible]	[illegible]	01711-203230	[illegible]
৪০	[illegible]	[illegible]	01711-258272	[illegible]
৪১	[illegible]	Zonal Co-ordinator	01715 622159	[illegible] 2/7/13
৪২	[illegible]	[illegible]	01711347324	[illegible]
৪৩	মো: [illegible]	[illegible]	01711905860	[illegible] 2/7/13
৪৪	মো: [illegible]	[illegible]	01711977744	[illegible] 2/07/13
৪৫	মো: [illegible]	[illegible]	01722613299	[illegible] 2/07/13

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স্থান ঃ শিবালয় উপজেলা পরিষদ মিলনায়তন তারিখঃ ০২জুলাই,২০১৩

ক্রমিক নং	নাম	পদবী /পেশা	মোবাইল নম্বর	স্বাক্ষর
৪৬	মো: [illegible] রহমান	ব্যবসা	01673468585	[illegible]
৪৭	মো: লোকমান	কৃষি কাজ	০১৭৪৯৭৩৬৮৪২	লোকমান
৪৮	মো: [illegible]	ব্যবসায়ী	০১৭১৪৫০৫৬০৪	[illegible]
৪৯	আব্দুল [illegible]	[illegible]	০১৭১০২০০৬৪৪	[illegible]
৫০	[illegible]	[illegible]	01730916980	[illegible]
৫১	মো: [illegible]	[illegible]	01712-014547	[illegible]
৫২	শফিকুল ইসলাম	সাংবাদিক	01716210110	শফিকুল
৫৩	[illegible]	কৃষি	01835815691	[illegible]
৫৪	মোবাশ্বের বিন আনসারী	চাকুরী	01718 244298	Mobasher
৫৫	মো: মকবুল হোসেন	[illegible]	0171138472	[illegible]
৫৬	মঞ্জু আরা	Jr. Professional CEGIS		Monja Ara
৫৭	[illegible]	সদস্য জেলা পরিষদ	০১৭০৪৬৩৯০৩৯	[illegible]
৫৮	মো: আজিজুর রহমান	চাকুরী	01716351379	[illegible]
৫৯	মো: আহমেদ আলী	কৃষক		[illegible]
৬০	মো: ইদ্রিস	কৃষক		ইদ্রিস

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স্থান ঃ শিবালয় উপজেলা পরিষদ মিলনায়তন তারিখঃ ০২জুলাই,২০১৩

ক্রমিক নং	নাম	পদবী /পেশা	মোবাইল নম্বর	স্বাক্ষর
৬১	মোহাম্মদ ইউনুস আলম	সাংবাদিক	01712754064	[illegible]
৬২	[illegible]	[illegible]	[illegible]	[illegible]
৬৩	মো: আব্দুল মালেক	[illegible]	01715438362	[illegible]
৬৪	মীর আসাদ হোসেন	পরিচালক ESAA (এসা)	01718-027199	[illegible]
৬৫	রতন কুমার দেব	[illegible]	01717-176114	[illegible]
৬৬	মো: আব্দুল লতিফ	[illegible]	01711-184381	[illegible] 02.07.13
৬৭	মো: রহমান	[illegible]	01712-959836	[illegible] 2-7-13
৬৮	মো: [illegible]	[illegible]	01713577299	[illegible]
৬৯	মাহফুজ রহমান	[illegible]	01736526651	[illegible]

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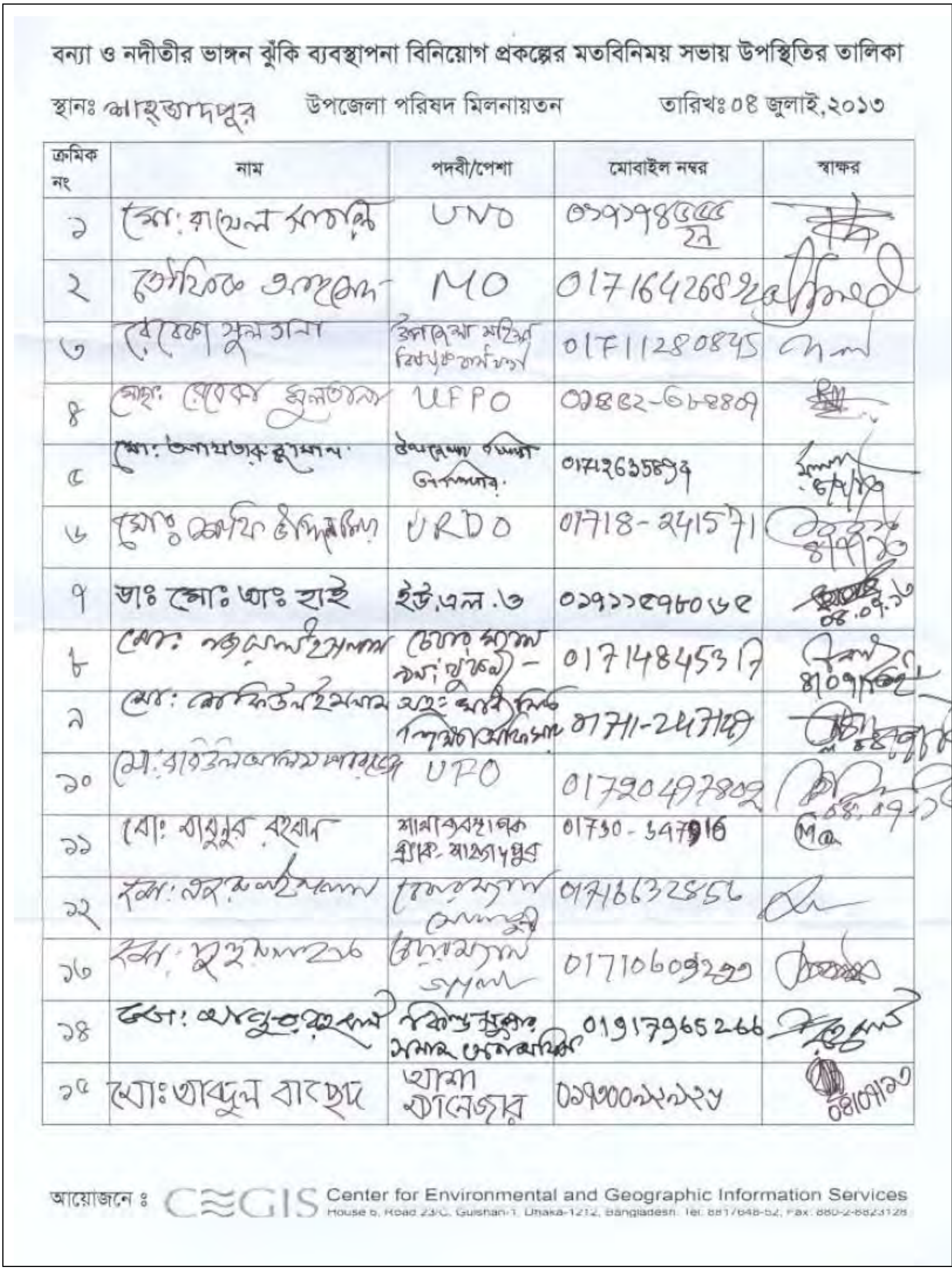
Photo A9.6: Second Round Meeting Sign-in Sheet, Shahjadpur, Sirajganj



বন্যা ও নদীতীর ভাঙ্গন ঝুঁকি ব্যবস্থাপনা বিনিয়োগ প্রকল্পের মতবিনিময় সভায় উপস্থিতির তালিকা

স্থানঃ শাহজাদপুর উপজেলা পরিষদ মিলনায়তন তারিখঃ ০৪ জুলাই,২০১৩

ক্রমিক নং	নাম	পদবী/পেশা	মোবাইল নম্বর	স্বাক্ষর
১	[illegible]	UNO	[illegible]	[illegible]
২	[illegible]	MO	01716426882	[illegible]
৩	[illegible]	উপজেলা মহিলা বিষয়ক কর্মকর্তা	01711280845	[illegible]
৪	[illegible]	UFPO	[illegible]	[illegible]
৫	[illegible]	উপজেলা শিক্ষা অফিসার	01712635894	[illegible]
৬	[illegible]	URDO	01718-241571	[illegible]
৭	ডাঃ মোঃ আঃ হাই	ইউ.এল.ও	[illegible]	[illegible] 04.07.13
৮	[illegible]	[illegible]	0171484537	[illegible]
৯	[illegible]	[illegible]	01711-247182	[illegible]
১০	[illegible]	UPO	01720497802	[illegible]
১১	[illegible]	শাখা ব্যবস্থাপক ব্র্যাক, শাহজাদপুর	01730-547916	[illegible]
১২	[illegible]	[illegible]	01716632856	[illegible]
১৩	[illegible]	[illegible]	01710609299	[illegible]
১৪	[illegible]	[illegible]	01917965266	[illegible]
১৫	মোঃ আব্দুল বারেক	শাখা ম্যানেজার	[illegible]	[illegible]

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স্থানঃ শাহজাদপুর উপজেলা পরিষদ মিলনায়তন তারিখঃ ০৪ জুলাই,২০১৩

ক্রমিক নং	নাম	পদবী/পেশা	মোবাইল নম্বর	স্বাক্ষর
০১	হালেহা	ইউপি সদস্য	০১৭৪৮৬০৮৪২১	হালেহা
০২	মো: রুপচাঁদ আলী	গ্রাম পুলিশ	০১৭২৫৫৫৩৪৪১১	রুপচাঁদ
০৩	মো: আমিরাজ	চাকুরী		আকবরদিন
০৪	মো: গোলাম	কৃষক		গোলাম
০৫	মো: লিটন	সাংবাদিক		লিটন
০৬	মো: সামসুল হক	সাধারণ সম্পাদক	০১৭২৯৬৭৪৮৯৩	[signature]
০৭	মো: রফিকুল ইসলাম	নির্বাহী সদস্য [illegible]	০১৭২৮৫৫৩৯২৭	[illegible]

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স্থানঃ আহম্মদপুর উপজেলা পরিষদ মিলনায়তন তারিখঃ ০৪ জুলাই,২০১৩

ক্রমিক নং	নাম	পদবী/পেশা	মোবাইল নম্বর	স্বাক্ষর
১৬	মো: [illegible]	ব্যবসা	[illegible]	[illegible]
১৭	মো: আব্দুল কাদের UAO	চাকুরী	01710-865553	[illegible]
১৮	মো: নজরুল ইসলাম	ইউ পি সদস্য	[illegible]	[illegible]
১৯	আবু তাহের	[illegible]	[illegible]	[illegible]
২০	মো: [illegible]	[illegible]	[illegible]	[illegible]
২১	মো: শুকুর	[illegible]	01839209025	Shukur
২২	মো: মোস্তফা	ইউ,পি-সদস্য	01725-679157	মোস্তফা
২৩	মো: খলিলুর সরকার	সচিব [illegible]	01725-441898	[illegible]
২৪	মো: রেকাব আলী	সচিব [illegible] UP	01718-811511	Rekab
২৫	মো: আবুল হোসেন	সচিব ৮ নং [illegible]	01718-087749	[illegible]
২৬	মো: [illegible] আলী	[illegible]	[illegible]	[illegible]
২৭	এম.এম. [illegible] আলী	CA উপজেলা পরিষদ	01737-103506	[illegible]
২৮	মো: ইসমাইল আলী	ইউ পি সদস্য	01721886392	ইসমাইল
২৯	মো: আমির হোসেন	ইউপি সদস্য	[illegible]	[illegible]
৩০	মো: [illegible] বিরবাহাদুর [illegible]	ইউ পি সদস্য	[illegible]	[illegible]

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Photo A9.7: Second Round Meeting Sign-in Sheet, Chouhali, Sirajganj

বন্যা ও নদীতীর ভাঙ্গন ঝুঁকি ব্যবস্থাপনা বিনিয়োগ প্রকল্পের মতবিনিময় সভায় উপস্থিতির তালিকা

স্থানঃ চৌহালী উপজেলা পরিষদ মিলনায়তন তারিখঃ০৭ জুলাই,২০১৩

ক্রমিক নং	নাম	পদবী/পেশা	মোবাইল নম্বর	স্বাক্ষর
১।	মোহাম্মদ আবদুল্লাহ	UNO, চৌহালী	01718364050	
২।	[illegible]	চেয়ারম্যান	01711955433	
৩।	[illegible]	U.W.A.O	01927-313560	
৪।	[illegible]	U.E.O.	01714260242	
৫।	[illegible]	[illegible]	01720366022	
৬।	[illegible]	[illegible]	01711384729	
৭।	[illegible]	[illegible]	01712007617	
৮।	[illegible]	[illegible]	01822814764	
৯।	[illegible]	UFO.	01212-242487	
১০	[illegible]	উপজেলা প্রকৌশলী (চৌহালী)	01712-231353	
১১	[illegible]	[illegible]	01718341804	
১২	[illegible]	[illegible]	01730955120	
১৩	[illegible]	[illegible]	[illegible]	
১৪	[illegible]	[illegible]	[illegible]	
১৫	[illegible]	[illegible]	01554631678	

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স্থানঃ চৌহালী উপজেলা পরিষদ মিলনায়তন তারিখঃ ০৭ জুলাই,২০১৩

ক্রমিক নং	নাম	পদবী/পেশা	মোবাইল নম্বর	স্বাক্ষর
১৬	মো: হাই মিয়া	শিক্ষক	01746368529	[illegible]
১৭	মো: আতাউর রহমান	শিক্ষক	01715-782942	[illegible]
১৮	মো: মো: রহমান	শিক্ষক	01773096107	[illegible]
১৯	পি, এম, হাবীব	সাংবাদিক	01735850323	[illegible]
২০	মো: সাইফুল ইসলাম	প্রভাষক	01727501799	[illegible]
২১	মো: মামুন শিকদার	সমাজসেবক	01712-378364	[illegible]
২২	মো: ইদ্রিস আলী	শিক্ষক ও সমাজ সেবক	01718 308665	[illegible]
২৩	মো: আমিনুল হক	পরিচালক চৌহালী	০১৭১২-৭২০৬৩ -৭১	[illegible]
২৪	মো: মিজানুর রহমান	উপসহকারী প্রকৌশলী	01726-177649	[illegible] ৭।৭।১৩
২৫	মো: জাহাঙ্গীর আলম	মানব মুক্তি সংস্থা UDRRC	01740-652555	[illegible] ৭।৭।১৩
২৬	জীবন কুমার দে	উপজেলা মাধ্য: শি: অফি: AUSEO	01716137630	[illegible] ০৭.০৭.১৩
২৭	মো: আবু মোসা মোল্যা	সিনিয়র শাখা ব্যবস্থাপক, ব্যাংক	01730346476	[illegible] 07.7.13
২৮	মো: এম, আলম	সমাজ সেবক	01752581061	[illegible]
২৯	মো: হযরত আলী	সাংবাদিক	01964816758	[illegible]
৩০	মো: হাফিজুর রহমান	সচিব ৬ নং খোরদালাম ইউপি	01739825527	[illegible]

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স্থানঃ চৌহালী উপজেলা পরিষদ মিলনায়তন তারিখঃ০৭ জুলাই,২০১৩

ক্রমিক নং	নাম	পদবী/পেশা	মোবাইল নম্বর	স্বাক্ষর
০১	Dr. M. Mahmudul [illegible]	ULO, Chowhali	01712-735878	[illegible]
০২	মোঃ আব্দুল্লাহ	উপজেলা কৃষি অফিসার	01710961398	[illegible]
০৩	[illegible]	[illegible]	01711102114	[illegible]
০৪	[illegible]	[illegible]	01717100585	[illegible]
০৫	[illegible]	[illegible]	01727593681	[illegible]
০৬	[illegible]	[illegible]	01771546195	[illegible]
০৭	[illegible]	[illegible]	01726201737	
০৮	নুর মোহাম্মদ চৌধুরী [illegible]	[illegible]	01712-720515	[illegible]
০৯	[illegible]	[illegible]	01718236455	[illegible]
৪০	[illegible]	[illegible]	01716-219179	[illegible]
৪১	মোঃ [illegible]	[illegible]	01712062548	[illegible]
৪২	মোঃ [illegible]	[illegible]	01711-269016	[illegible]
৪৩	মোঃ [illegible]	[illegible]	017307910	[illegible]
৪৪	[illegible]	[illegible]	01724713857	[illegible]
৪৫	[illegible]	[illegible]	01721286404	[illegible] ৭/৭/১৩

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স্থানঃ চৌহালী উপজেলা পরিষদ মিলনায়তন তারিখঃ ০৭ জুলাই,২০১৩

ক্রমিক নং	নাম	পদবী/পেশা	মোবাইল নম্বর	স্বাক্ষর
৪৬	মো: আ: ছত্তার	কৃষি		ছত্তার
৪৭	[illegible]	কৃষি		[illegible]
৪৮	মো: আব্দুল [illegible]	চাকুরী		[illegible]
৪৯	মো: [illegible] আলী	অব: শিক্ষক		[illegible]
৫০	মোবাশ্বেরা বিন-আনসারী	Professional	01718 244298	Mobashera
৫১	মনজু আরা	Jr. Professional		Monju Ara
৫২	মো: হযরত আলী বাদশা	চেয়ারম্যান [illegible]	01722-090219	[illegible]
৫৩	মো: [illegible]	[illegible]	01712-881696	[illegible]
৫৪	মো: আবুল কালাম	শিক্ষক	01712-024633	[illegible]
৫৫	মো: ইসমাইল হোসেন	ব্যবসায়ী		[illegible]
৫৬	আনোয়ারুল [illegible]	[illegible]		[illegible]

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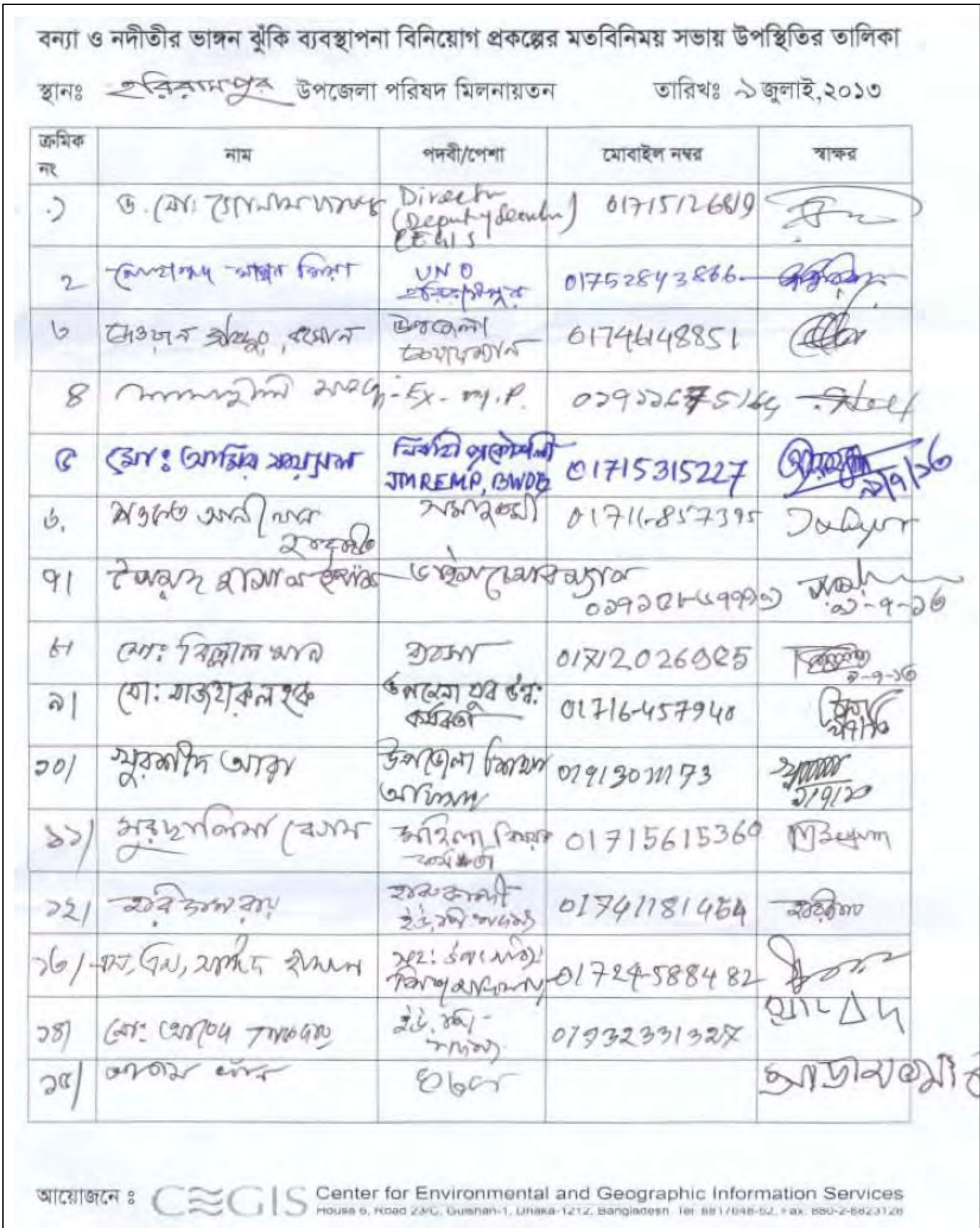
Photo A9.8: Second Round Meeting Sign-in Sheet, Harirampur, Manikganj



বন্যা ও নদীতীর ভাঙ্গন ঝুঁকি ব্যবস্থাপনা বিনিয়োগ প্রকল্পের মতবিনিময় সভায় উপস্থিতির তালিকা

স্থানঃ হরিরামপুর উপজেলা পরিষদ মিলনায়তন তারিখঃ ৯ জুলাই,২০১৩

ক্রমিক নং	নাম	পদবী/পেশা	মোবাইল নম্বর	স্বাক্ষর
১	[illegible]	Director (Deputy Secretary) CEGIS	01715126819	[illegible]
2	[illegible]	UNO হরিরামপুর	01752843866	[illegible]
৩	[illegible]	উপজেলা চেয়ারম্যান	01746448851	[illegible]
8	[illegible]	Ex-M.P.	[illegible]	[illegible]
৫	[illegible]	নির্বাহী প্রকৌশলী JMREMP, BWDB	01715315227	[illegible]
৬.	[illegible]	[illegible]	01711-857395	[illegible]
৭।	[illegible]	[illegible]	[illegible]	[illegible]
৮।	মো: [illegible]	[illegible]	01712026925	[illegible]
৯।	মো: মাজহারুল হক	উপজেলা মৎস্য কর্মকর্তা	01716-457940	[illegible]
১০।	[illegible]	উপজেলা [illegible]	[illegible]	[illegible]
১১।	[illegible]	[illegible]	01715615369	[illegible]
১২।	[illegible]	[illegible]	01741181464	[illegible]
১৩।	[illegible]	[illegible]	01724-588482	[illegible]
১৪।	মো: [illegible]	[illegible]	01932331327	[illegible]
১৫।	[illegible]	[illegible]		[illegible]

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ক্রমিক নং	নাম	পদবী/পেশা	মোবাইল নম্বর	স্বাক্ষর
১৬.	[illegible]	[illegible]	01713 23312 69	[illegible]
১৭.	মো: মুস্তাফিজুর রহমান	উ: কৃষি অফিসার	01727705907	[illegible]
১৮.	[illegible]	কৃষি অফিসার	01723811651	[illegible]
১৯.	[illegible]	SAE/PHE	01732681242	[illegible]
২০.	মোঃ [illegible] আলী (চেয়ারম্যান)	উপজেলা ভাইস চেয়ারম্যান	01715657766	[illegible]
২১.	মো: [illegible] রহমান [illegible]	[illegible] (AAO)	01713565974, 01827300956	[illegible] ৯/৭/১৩
২২.	মো: [illegible]	[illegible]	01715593154	[illegible] ৯/৭/০১৩
২৩.	[illegible]	[illegible]	01711-290066	[illegible]
২৪.	মো: [illegible]	[illegible]	01710-988025	[illegible]
২৫.	[illegible]	[illegible]	01712-591098	[illegible]
২৬.	[illegible]	[illegible]	01720828536	[illegible]
২৭.	[illegible]	[illegible]	01719094607	[illegible]
২৮.	[illegible]	[illegible]	01719228620	[illegible] ৯/৭/২০১৩
২৯.	মো: [illegible]	[illegible]	[illegible]	[illegible] ৯/৭/১৩
৩০.	আবুল হাসেম [illegible]	[illegible]	0172117585	আবুল হাসেম

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ক্রমিক নং	নাম	পদবী/পেশা	মোবাইল নম্বর	স্বাক্ষর
৩১।	আঃ হক খান	চেয়ারম্যান	01925784316	
৩২।	[illegible]	[illegible]	01715120453	
৩৩।	[illegible]	[illegible]	01731548641	
৩৪।	আঃ রাজ্জাক	গ্রামপুলিশ		
৩৫।	[illegible]	কৃষক		
৩৬।	মোঃ [illegible]	কৃষক		
৩৭।	মোঃ [illegible]	কৃষক		
৩৮।	মোঃ জহির হোসেন	চেয়ারম্যান ইউনিয়ন	01912062204	
৩৯।	মোঃ [illegible]	কৃষি	01729630902	
৪০।	মোঃ ইউনুস মোল্লা	কৃষি	01714328465	
৪১।	মোঃ [illegible]	ঠিকাদারী ব্যবসা	01918630479	
৪২।	মিঃ [illegible]	ইউ.পি. সদস্য	01825555873	
৪৩।	[illegible]	ইউপি সদস্য	01731791795	
৪৪।	মোঃ [illegible]	মুদি ব্যবসা	01469854 12	
৪৫।	[illegible]	কৃষক	01716302442	

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স্থানঃ হরিরামপুর উপজেলা পরিষদ মিলনায়তন তারিখঃ ৯ জুলাই,২০১৩

ক্রমিক নং	নাম	পদবী/পেশা	মোবাইল নম্বর	স্বাক্ষর
৪৫	[illegible]	[illegible]	01712276439	[illegible] ৯/৭/১৩
৪৬	[illegible]	[illegible]	01732708478	[illegible]
৪৭	[illegible]	বার্তিক Ass. P.O.	01717353901	[illegible]
৪৮	[illegible]	[illegible]	01735581028	[illegible]
৫০	[illegible]	[illegible]	01776685652	[illegible] ৯/৭/১৩
৫১	[illegible]	[illegible]	01778192550	[illegible] ৯/৭/১৩
৫২	[illegible]	[illegible]	01727604153	[illegible]
৫৩	রোকেয়া বেগম ইউনিয়ন পরিষদ	সদস্য ৭.৮.৯	01720821359	রোকেয়া
৫৪	[illegible]	সদস্য ১.২.৩	01781805149	[illegible]
৫৫	[illegible]	সদস্য ০৭	01731766392	[illegible]
৫৬	[illegible]	০২ সদস্য	0175833087	[illegible]
৫৭	[illegible]	[illegible]	01759243390	[illegible]
৫৮	হামিদা ইয়াসমিন (সহঃ শিক্ষিকা) [illegible]	সহঃ শিক্ষিকা [illegible]	01712585939	[illegible]
৫৯	মোঃ [illegible]	[illegible]	01822502841	[illegible]
৬০	[illegible]	[illegible]	[illegible]	[illegible]

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৬১	মোঃ আক্তার হোসেন	ব্যবসা	01718099520	মো: আক্তার হোসেন
৬২	রোকেয়া বেগম	সদস্য ইউপি	01720821359	রোকেয়া বেগম
৬৩	মো: হাসানুল বান্না মান	শিক্ষক	01922920220	[illegible]
৬৪	মো: আয়নাল হোসেন	সদস্য ইউপি		[illegible]
৬৫	মো: হাতেম আলী	কৃষক		মো: হাতেম আলী
৬৬	আকেদ	কৃষক		মো: আকেদ
৬৭	মো: রুবেল মিয়া	চাকুরি	01715960253	রুবেল
৬৮	আনোয়ার হোসেন	ব্যবসায়ী	01778183185	[illegible]

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ক্রমিক নং	নাম	পদবী/পেশা	মোবাইল নম্বর	স্বাক্ষর
৬৯	MD Kamal Hossain	J.S.A	01481 510104	Kamal
৭০	[illegible]	UP সদস্য	01731124142	[illegible]
৭১	[illegible]	UP সদস্য	01710824530	[illegible]
৭২	মো: [illegible]	কৃষক		মো: [illegible]
৭৩	মো: কামাল হোসেন	প্রধান শিক্ষক [illegible]	01834765491	Kamal
৭৪	[illegible]	কৃষক	01715812237	[illegible]
৭৫	মো: [illegible]	কৃষক	01[illegible]	[illegible]
৭৬	মুক্তিযোদ্ধা হাবিবুর রহমান	মুক্তিযোদ্ধা	01723-369069	[illegible]
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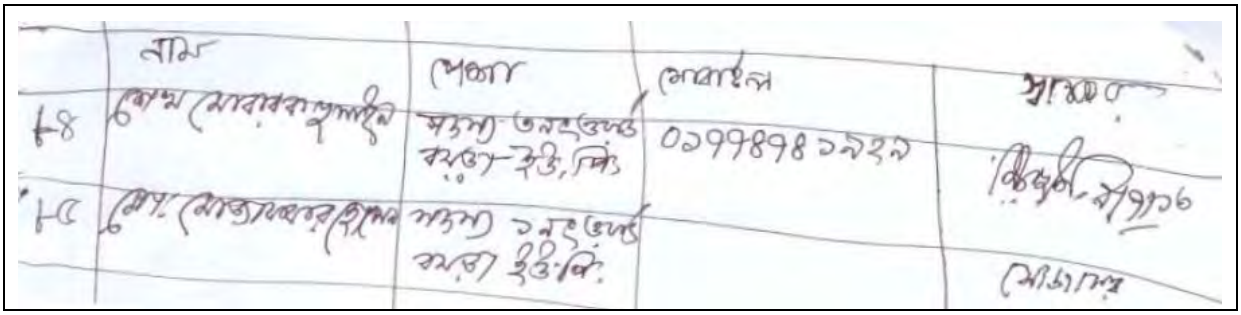

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Annex 5: Standard Construction Contract Environmental Safeguard Clauses

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 6: Project Implementation Arrangements

A. Steering and Guidance of Executing and Implementing Agencies

The program is suggested to be implemented under the lead of BWDB (executing agency) with close relationships to DDM (implementing agency). Other associated organizations are WARPO, LGED and BIWTA. The participating organizations require clearly defined procedures of when, where, and how to coordinate their activities. To this end BWDB has a number of Memoranda of Understanding (MoU) in place, which will be suitably updated for the purpose of the program during the first year of the program.

In line with government principles program activities are regularly reviewed and discussed through annual inter-ministerial steering committee meetings. Given the complexities of the program, a Panel of Experts is expected to provide guidance related to key questions:

(i) River morphology, engineering, and stabilization
(ii) Flood Risk Management at regional and community level
(iii) Institutional and capacity development at regional and community level

B. Integrated Program Management Office (PMO)

The PMO will be integrated into the administrative setup of BWDB and placed at a high level given the importance and relevance of the program. The key features are:

(i) Headed by an Additional Chief Engineer, similar in rank as the zonal Chief Engineers and supported by two Superintending Engineers
(ii) Initially identical and later closely associated with the CE River Management, once the post gets approved. This is a vital element to activate the new river management wing and to institutionalize the broad river stabilization approach.
(iii) Supported by an individual design office, exclusively dealing with river stabilization measures.
(iv) Conducting river management activities of larger national importance, such as procuring materials for works and strategic stockpiling for emergencies, and guiding char reclamation activities
(v) Implementing work through existing zonal division. These divisions already build embankments and riverbank protection, and will be strengthened in terms of staff during the implementation of the works.

Figure A3.1 depicts the program management principles agreed during discussion with the BWDB management, namely ADG and Chief Planning in early 2013.

C. Advisory Support

The program will be supported by consultants and NGOs at different level. This addresses the program management requirements of ADB and supports BWDB during the current period of staff shortage, specifically of junior staff. An Institutional Strengthening and Project Management Consultant (ISPMC) will provide the main support in a number of different areas. The advisory support scope of work includes the services of a specialist organization to conduct environmental assessment and planning. Additional details regarding the financing and potential scope of work of the advisory support are provided in Section 15 of the Final Report, Main Volume.

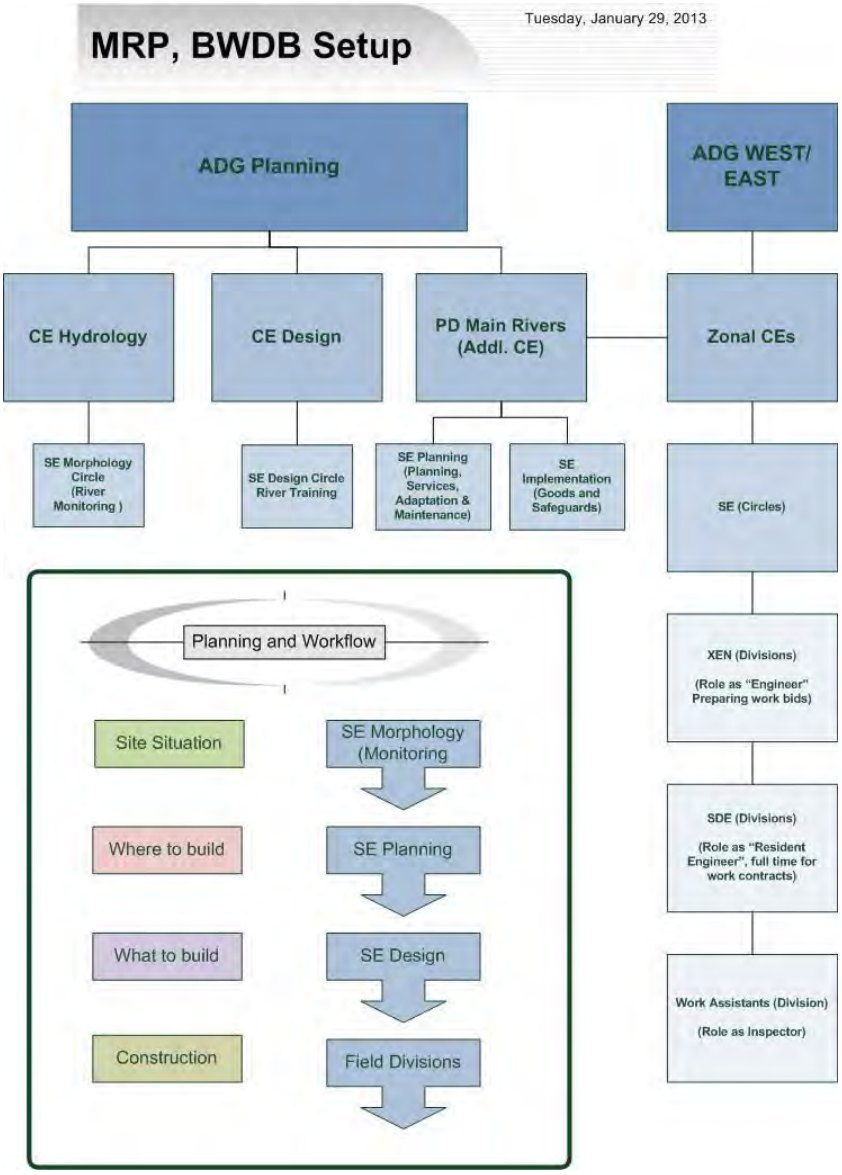
D. Management Information and Reporting

The program requires data management at different levels for different purposes:

(i) Baseline data for benefit assessment
(ii) Project management data for progress documentation
(iii) Asset information for BWDB operation, namely maintenance

A suitable MIS system for above three elements was outlined for AFRERMIP (Individual Consultants, 2012). Component (iii) has been developed further for the purpose of BWDB and forms part of the institutional report. The reporting requirements form also part of ADB's project implementation memorandum.

Figure A3.1 Organization chart for BWDB program management



Annex 7: Project Description, Jamuna Right Bank 1[41]

Project Name	ID	Upazilas (Unions)	Area	River Area	Population
Jamuna Right Bank 1	JRB1	3 (24)	582 km²	24 %	1,052,600

Bankline length	Average Erosion (1973-2010/2007-2012)	Flood extent (1998 / 2007)	Area Boro/Aman	Population Density (total/floodplain)
37 km	1.52 km / 0.13 km	69% / 56%	65% / 37%	1810/2370

A. Situation

The JRB-1 subreach extends from from Jamuna Bridge to Shahjadpur on the right bank of the Jamuna. The Jamuna Bridge guide bunds impose a straight channel downstream of the bridge for about 15 km along the left bank of the braided belt (Sarker et al. 2011). As a consequence, a stable attached char about 15 km long and 5 km wide has formed along the right bank, south of the western guide bund.

This straight channel bifurcates into a western and eastern branch at about Enayetpur. The eastern channel is presently dominant. While the location of this bifurcation appears to be quite stable, discharges vary in the two downstream channels. During the early 2000s, very little dry-season flow occurred along the right bank. Recently most dry season flow has occurred along this bank.

Historically, the western floodplain was protected by the Brahmaputra Right Embankment (BRE) as far as the Hurashagar/Baral River, which is upstream of the Pabna Integrated Rural Development Project (PIRDP). The last 10 km or so of the BRE, from Kaijuri to the Hurashagar/Baral outfall, part of the Hurashagar FCD Project embankment, eroded during the 1990s (Figure A4.1 and Figure A4.2). This erosion brought once-protected areas back to the natural cycle of flooding and erosion, accompanied by substantial deposition of sand along the riverbanks (sand casting). It rendered the Hurashagar FCD project completely inoperational (FAP 2).

Riverbank protection constructed in 2010 and 2011 from Kaijuri to Benotia stabilized the riverbank (Figure A4.3) and as such induced cluster settlements along the derelict BRE. It also stabilized the larger channel pattern and substantially reduced the dredging volume (Figure A4.4) required to maintain navigation access to the important Bagabari Port (see Annex D of January 2013 report).

B. Future Scenarios

During the 2012 dry season the Enayetpur area came under erosional attack. The existing riverbank protection (spur) in this area allowed the the Enayetpur spur to be eroded to the brink of collapse (Figure A4.5; note the absence of toe protection; Figure A4.6). Other infrastructure is at risk from

[41] Project descriptions were adapted from Final Report Annex A, 16 July 2013 version.

erosion at this location, notably the large Enayetpur hospital complex and the BRE which if breached will allow flooding of the adjacent area. The situation is comparable to that of PIRDP in the early 2000s, when the embankment was at risk of immediate erosion.

Future channel planforms downstream of the bifurcation at Enayetpur can consist of one or two channels. The initial morphological study for the lower Jamuna reach (Annex C, January Pre-Feasibility Report) indicates that the present two-channel system with one large char affords the most pragmatic future river stabilization approach.

C. Existing Works

BWDB has built two RCC spurs at Betil and Enayetpur, which were rehabilitated two times from ADB flood damage repair funds (after the 2004 and 2007 flood), but which are not stable for major river attack as experienced at this moment.

BWDB, under JMREMP, has built 10 km of riverbank protection from Kaijuri towards the Hurashagar River. Some of this work shows local geotechnical failure (slip circles) and is presently (dry season 2013) repaired at cost of 1.5 Crore.

Three LGED small scale projects are situated in this area.

D. Project Concept

This sub-project incorporates three BWDB priority projects: (i) riverbank protection along the right bank of the bifurcating channel from upstream of Enayetpur towards Kaijuri, (ii) riverbank protection upstream of the Hurasagar to close an existing gap, and (iii) reconstruction of the BRE and Hurashagar FCD embankment from Kaijuri to Shahjadpur

The Tranche 1 interventions are:

- Embankment reconstruction, of the BRE with road facilities for 12.5 km, and along the Hurashagar/Baral for 9.5 km
- 1 km of riverbank protection, from the existing protection downstream towards the Hurashagar/Baral
- Regulators for water management including rehabilitation of existing structures
- Immediate stabilization of the Enayetpur spur.

Tranche 1 will reinstate much of the flood protection afforded by the original BRE. Benefits will include reduction of overall flood levels, and in particular flood reductions in Hurashagar FCD (Figure A4.7 shows flood extent in 1987 when Hurashagar was still functioning vs in 1998 after the BRE breach had compromised it). The BRE reconstruction will complete the road connection along the Jamuna right bank, connecting the densely populated area along the bank with the Jamuna Bridge and with Shahjadpur via Kaijuri.

The Tranche 2 interventions are:

- Rehabilitation of the remaining 4 km of embankment from Bagabari to Shazadpur along the Kortoa River, and construction of a road from the Jamuna embankment to Bagabari and Shahjadpur
- About 11 km of priority riverbank protection from the upstream bifurcation towards Kaijuri to protect Enayetpur from erosion and flooding and to stabilize the off-take of the western Jamuna channel which is the main access to Bagabari Port.

- Potentially construction of the upstream riverbank protection will require excavation or dredging through some distance of low-lying charland. Excavated/dredged material created in this process can be used to fill in (create reclaimed land in) the bankline channel between Enayetpur and Betil.
- Existing riverbank protection may be adapted to greater river depth as needed.

The Tranche 2 benefits include:

- Rendering the Hurashagar FCD project fully operational with full flood benefits.
- Provising a road connection to Bagabari (via ferry) and Shahjadpur.
- Mitigation of Enayetpur area erosion risks, including the risk to Enayetpur hospital.

Optional work in this area, depending on morphological study, economic feasibility, and availability of funds, includes:

- Protection of char head for bifurcation stabilization (depending on morphological confirmation) so as to create an all-year-round navigable channel towards Jamuna Bridge.
- Future BRE construction over the attached char from Jamuna Bridge to Enayetpur. This has the potential to reclaim around 50 km² of land. Catkin plantation may be used to accelerate sedimentation and soil fertility.
- Construction of an additional 5 km of riverbank protection, and adaptation of the existing 10 km to the greater river depth expected for a more stable channel.

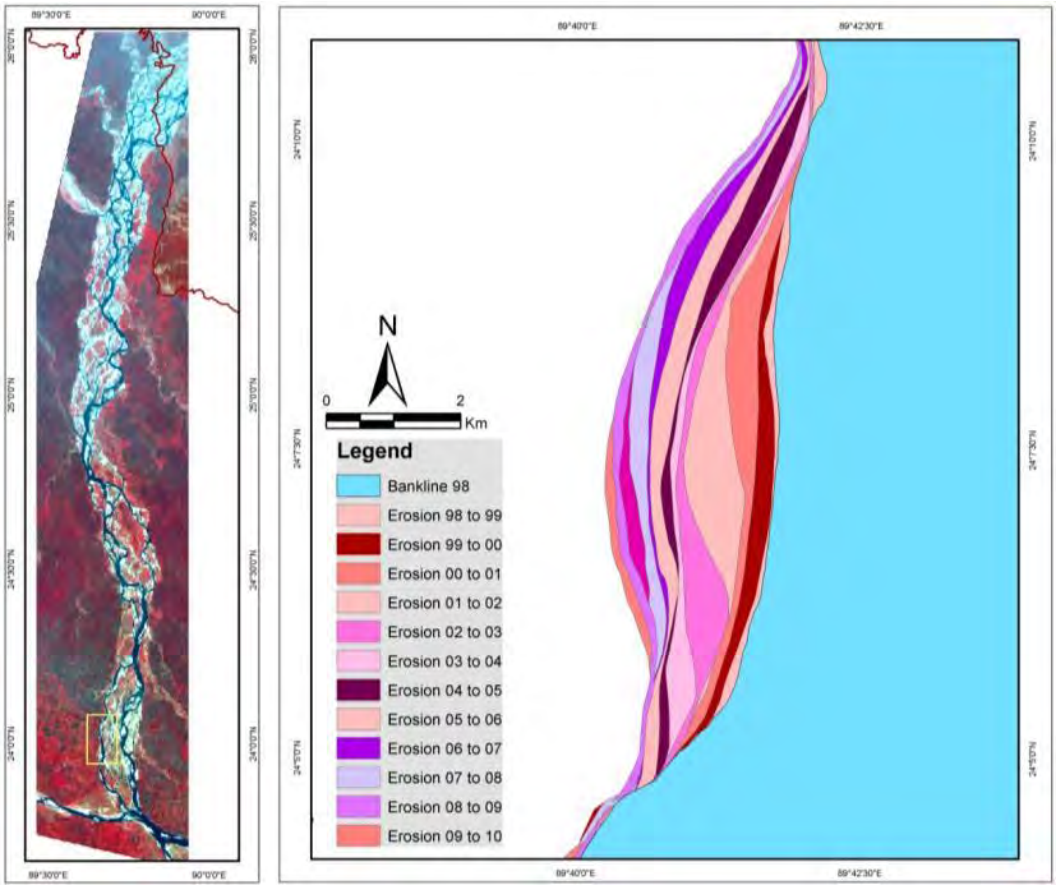
Intervention Elements	
List by type	***Description*** *(Location, dimensions or quantity)*
Infrastructure	**TRANCHE 1**
1.RBP	1 km at Benotia Adaptation and Enayetpur spur stabilization
2. EMB	23 km for reconstruction of BRE and Hurashagar FCD scheme
3. Other	4 new regulators with 11 vents in total (1*1 vent, 1*4 vent, 1*6 vent) and rehabilitation of 2 existing 4 vent regulators
Infrastructure	**TRANCHE 2**
1.RBP	11 km at Enayetpur for protection and stabilization of the bifurcation LS adaptation work to greater river depth
2. EMB	4 km along Kortoa river. 13 km of road construction from Jamuna to Shahzadpur.
3. Other	Buoys for navigation and fish protection along revetment work

Intended Benefits (+) and Potential Adverse Impacts (-)		
Type	***+ - ?***	***Description*** *(impacted location, activity or asset; timing, extent or magnitude)*

Intended Benefits (+) and Potential Adverse Impacts (-)		
Reduced flood damage	**+**	Whole area from (i) Rehabilitated embankments (BRE and Hurashagar FCD project) (ii) Securing BRE at the Enayetpur area
Reduced erosion	+	Whole bankline through stabilized river course
Navigation	+	More stable channel along protected bank with increased draught Dramatically reduced dredging cost
Land reclamation	+	Downstream part of Enayetpur char secured
Water Management	+	Improved conditions for HY aman and dry season irrigation after reconstruction of BRE
Communication	+	Improved access in case a dedicated national highway standar road is built along the embankment from Beira to Nagarbari and beyond
Land acquisition/loss	-	Associated with original BRE embankment – about 1 km² (20km*50m) floodplain land
Resettlement	-	To be confirmed
Fisheries	?	Geotextile bag revetments provide shelter, attached chars potential spawning ground, protection from floating nets Improved operation of regulators following GIZ biodiversity project (at Pabna)

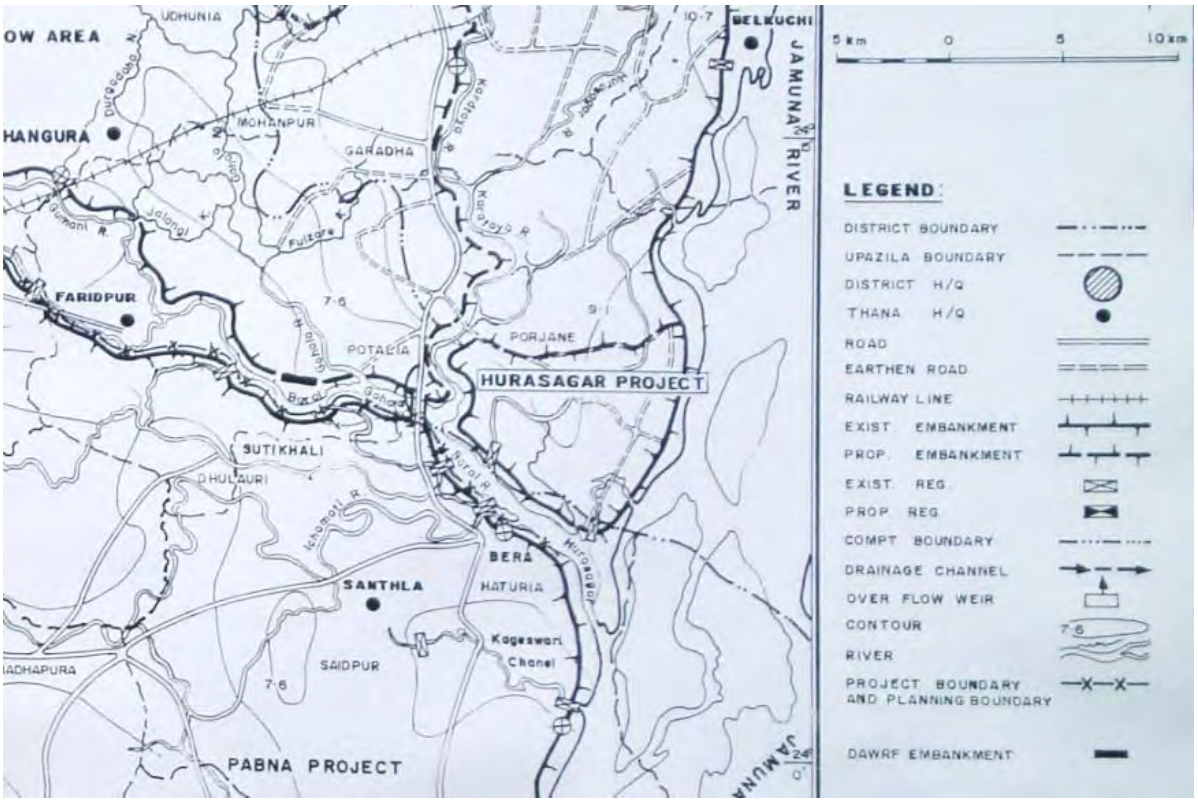
Supporting Studies	
Surveys	River surveys by BWDB and the PPTA team Flood plain surveys along the Hurashagar and Kaijuri to Shariatpur
Char-land Study	Investigation of deposition rates of the char opposite of the Hurashagar/Baral outfall and upstream between Enayetpur and Jamuna Bridge
River Modeling & Analytical Approach	1-D HEC RAS modeling of flow patterns to determine the minimum width of a single channel river solution
Flood Modeling	Scenario 1: restoration of Hurashagar FCD embankment from Kaijuri to Benatia along the Jamuna, Benotia to Bagabari along the Hurashagar/Baral, and Bagabari to Shahjadpur along the Karatoa River Scenario 2: loss of flood protection in the Enayetpur area due to erosion and breach of the embankment
EIA/SIA	Environmental baseline and impacts of above works
Resettlement	100% census and IOL, 20% SES for embankment and 2 km of riverbank protection

Figure A4.1: Jamuna Right Bank 1 – Bankline 1998-2010



Source: CEGIS. 2007. JMREMP Morphology Study.

Figure A4.2: Jamuna Right Bank 1 Historic Area Map



Source: FAP 2 report.

Figure A4.3: Jamuna Right Bank 1 - Channel Variability, 2007-9 vs. 2010-12

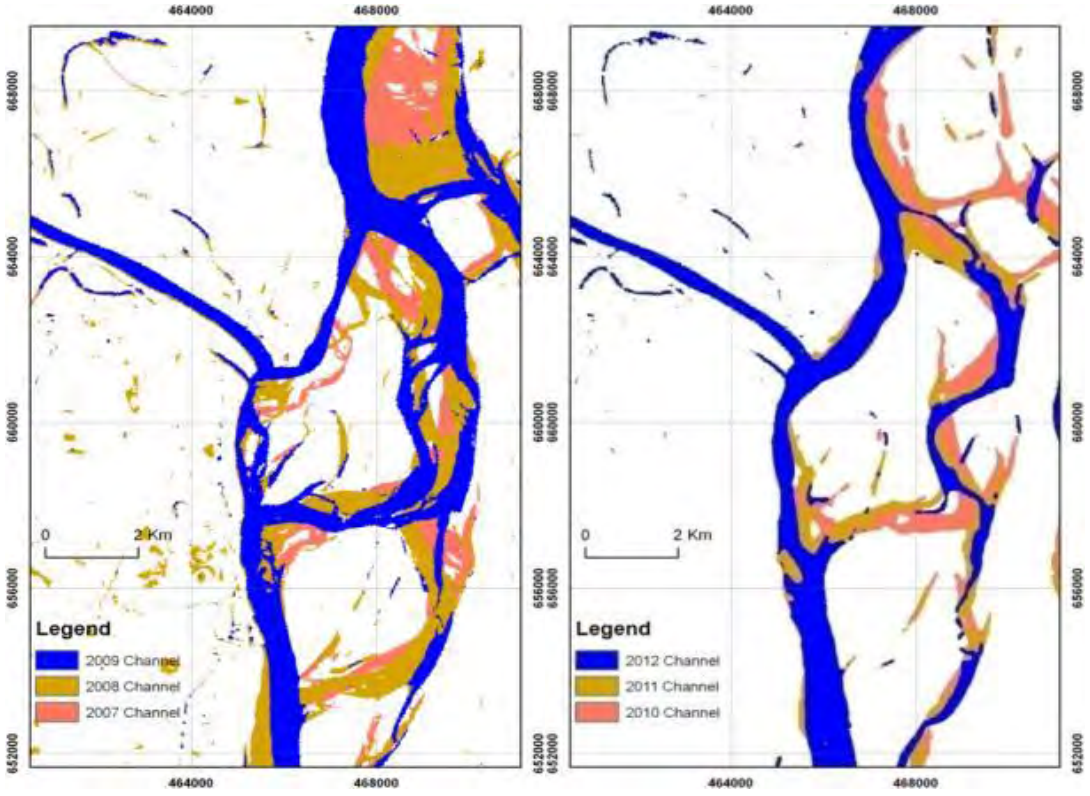


Figure A4.4: Jamuna Right Bank 1 – Dredging Volume, 2007-9 vs. 2010-12

(m^3)

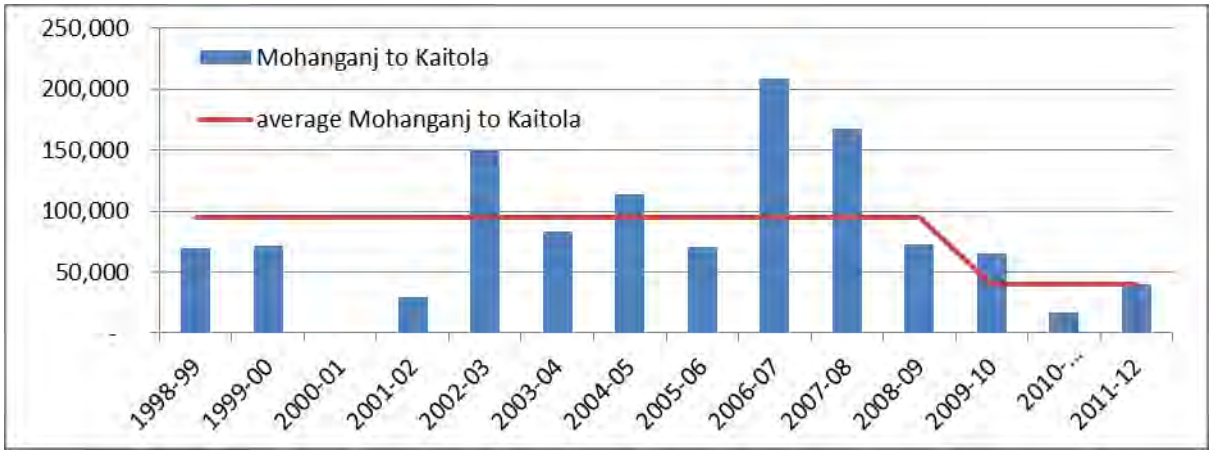
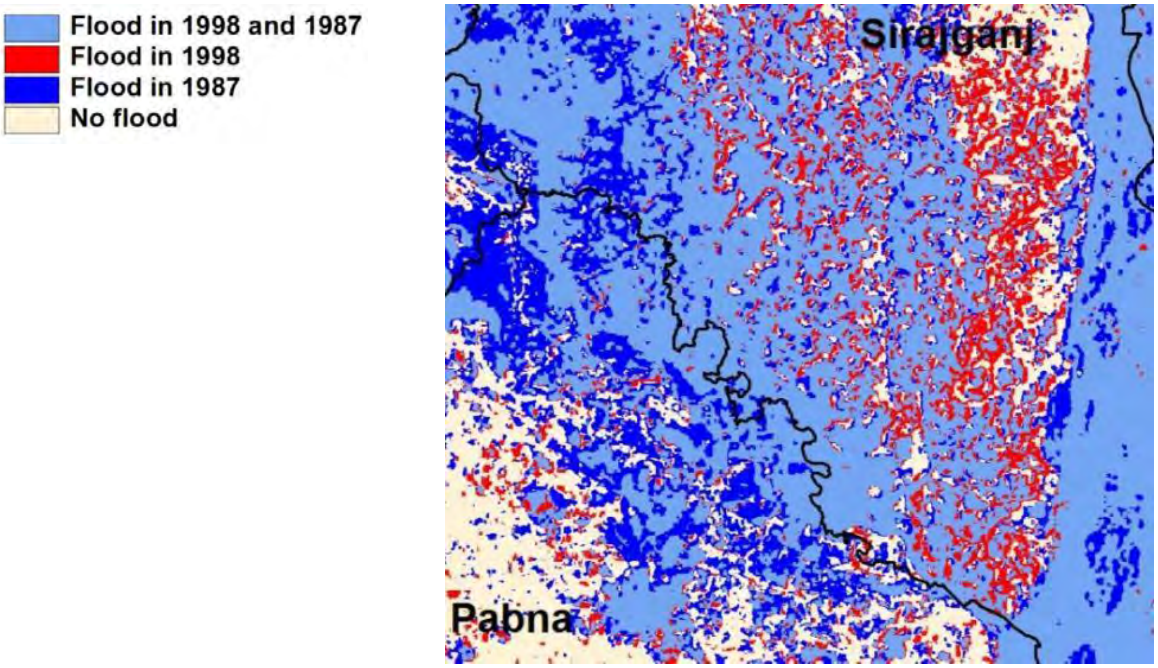


Figure A4.5: Enayetpur Spur Erosion Damage, Post-2012

Figure A4.6: Erosion Damage Upstream of Enayetpur, Post-2012

Figure A4.7: Hurushagar Flood Control Project Area – 1987 vs 1998 Flooding



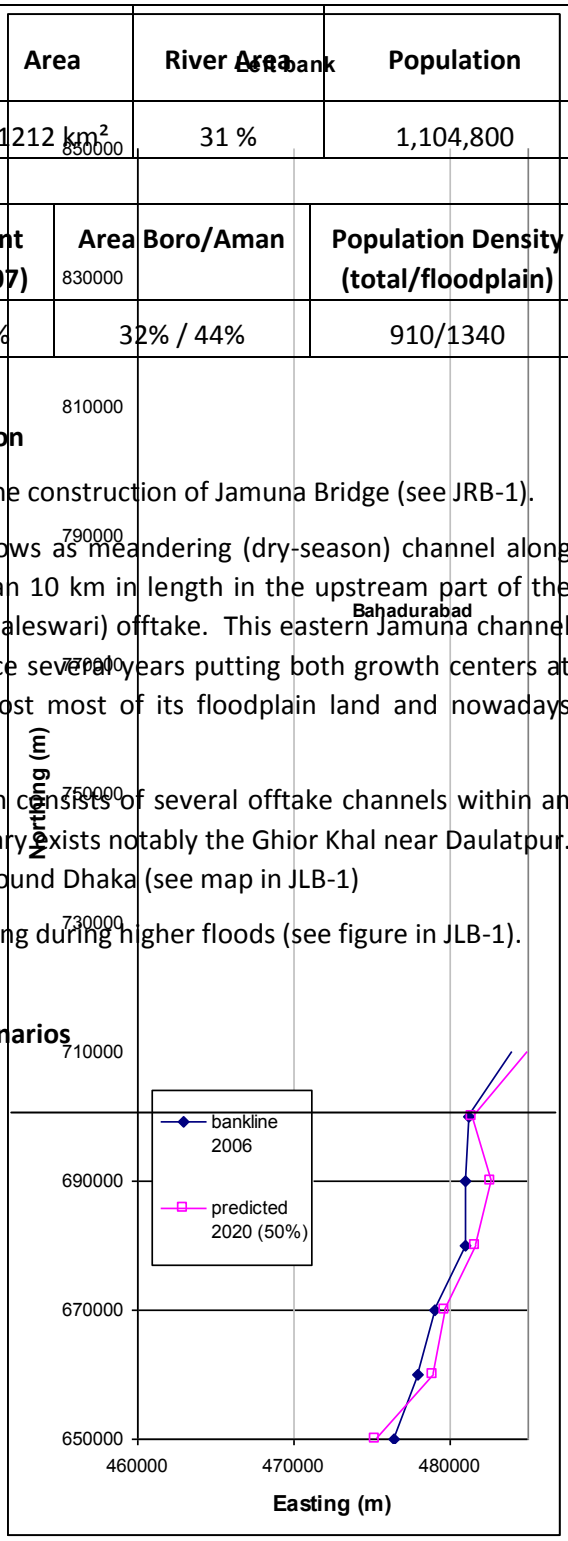
Source: CEGIS.

Annex8: Project Description, Jamuna Left Bank 2

Jamuna Left Bank 2 – Aricha PRIORITY

Project Name	ID	Upazilas (Unions)	Area	River Area	Population
Jamuna Left Bank 2	JL2	6 (48)	1212 km²	31 %	1,104,800

Bankline length	Average Erosion (1973-2010/2007-2012)	Flood extent (1998 / 2007)	Area Boro/Aman	Population Density (total/floodplain)
56 km	2.59 km / 0.12 km	62% / 58%	32% / 44%	910/1340



Situation

The east bank of the Jamuna is erosion prone since the construction of Jamuna Bridge (see JRB-1).

The presently dominant eastern Jamuna channel flows as meandering (dry-season) channel along the bank leaving a larger attached char of more than 10 km in length in the upstream part of the project, between Dhaleswari and Ghior Khal (old Dhaleswari) offtake. This eastern Jamuna channel erodes its riverbanks at Chauhali and Zafferganj since several years putting both growth centers at the risk of extinction. The upazilla Chauhali has lost most of its floodplain land and nowadays consists mostly of a river and char environment.

Apart from the main Dhaleswari river offtake, which consists of several offtake channels within an approximately 5 km bankline reachanother distributary exists notably the Ghior Khal near Daulatpur. Both are vital to provide water to the river system around Dhaka (see map in JLB-1)

The flood plain is lower and prone to excessive flooding during higher floods (see figure in JLB-1).

Future Scenarios

It can be expected that eastern and western Jamuna channel will be separated by a more stable char in future, however, it is not clear if either channel can break through the char to join the other channel.

Both channels experienced alternating times of nearly no dry season flow with the eastern channel presently carrying the majority of the water. During the flood season, however the discharge appears to be much more evenly distributed. The dry season variability results from the changing bifurcation morphology upstream of the Dhaleswari and has implications on the dry season navigation.

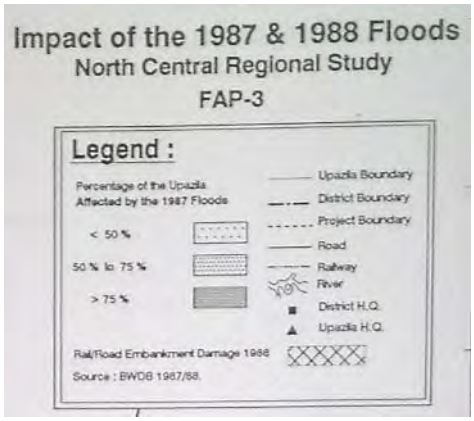
Given that little riverbank protection was built in this area, the future scenario without protective

measures predicts quite substantial riverbank erosion the order of kilometers (see next figure from CEGIS, 2007).

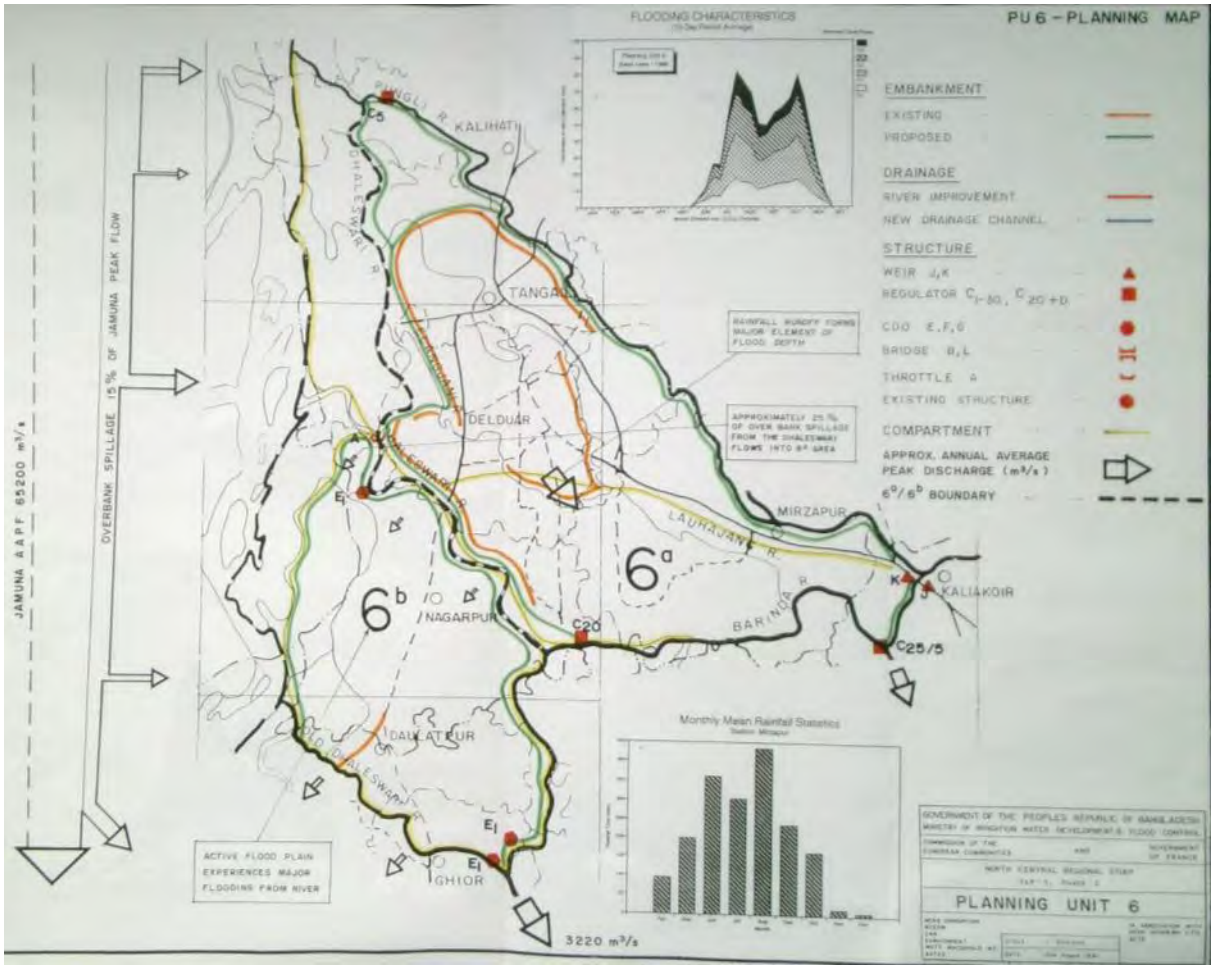
Existing and Planned Works

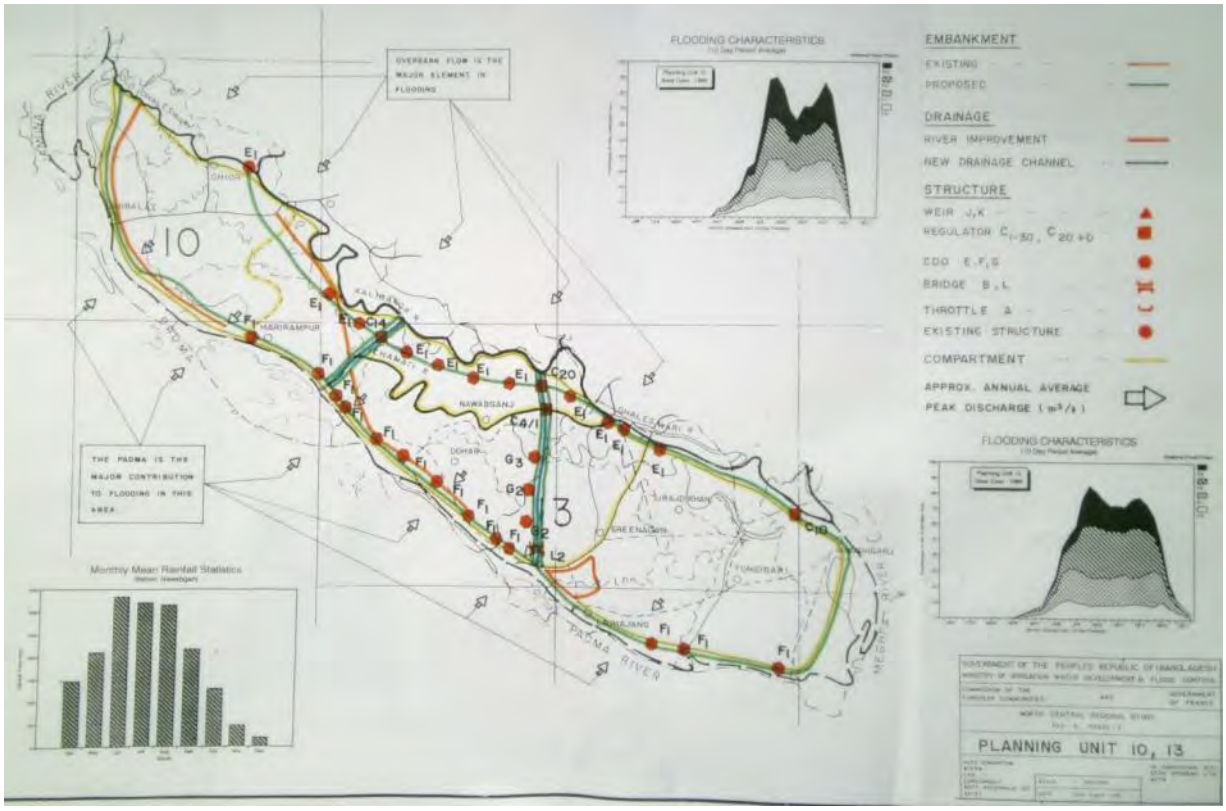
BWDB has provided 2 km of riverbank protection at Chauhali in 2011/12, which was largely destroyed during the 2012 flood.

BWDB plans an about 35 km long embankment along the riverbank from the Dhaleswari (Nagarpur upazila) to Aricha for two FCD projects, namely the Nagarpur-Chauhali and the Jamuna-Padma left bank Project (shown in the following figures, from FAP-3 documents). These two projects go back to the FAP-3 planning in the early 1990s recognizing the vulnerability of the area to flooding and flood damages



figures from FAP-3 report





Three LGED small scale projects are situated in this area.

The areas at Chauhail and Zafferganj were identified by BWDB as priority areas for riverbank stabilization during the preparatory phase of this FRERMIP PPTA in 2011.

Project Concept

This subproject incorporates three BWDB priority projects: (i) riverbank protection along vulnerable reaches with a view to work towards river stabilization, (ii) strengthening of the existing 12 km long embankment from Aricha to Zionpur via Zaffarganj and extension to the Dhaleswari, (iii) provision of defined Dhaleswari and Ghior Khal offtake for dry and flood season flow including navigation. The central char is intended to be left unprotected to maintain natural river processes and to not disturb the established char societies. The project concept depends on further studies during Tranche 1.

Tranche 1

- Priority riverbank protection at Chauhali (about 5 km) and Zafferganj (about 2 km) to stabilize critically eroding reaches along the upazilla headquarters
- Pilot testing of guided, accelerated charland accretion of a suitable attached char through catkin plantation

Tranche 2

- Extension of existing riverbank protection in upstream and downstream direction
  Chauhali including Dhaleswari offtake (around 3km) with the purpose of stabilizing the attached char in that area
  Zafferganj area (2 km)
- Stabilization of attached char through guided, accelerated siltation (plantation of catkin as piloted in Bhuapur in the 1990s and other measures) with the purpose of reclaiming around 30km² of lost floodplain land
- Rehabilitation of 12 km of existing embankment

Tranche 3

- Extension of existing riverbank protection in upstream and downstream direction
  Chauhali including Dhaleswari offtake (around 5km) with the purpose of stabilizing the attached char in that area

  Zafferganj area (2 km)

- Optional offtake geometry of Dhaleswari likely distinguishing dry season and flood season offtake
- Offtake geometry at Ghior Khal
- Embankment rehabilitation and link embankment from Dhaleswari to Aricha (total length around 17km)
- Local placement of navigation buoys with combined navigation / fish protection purpose

Intervention Elements	
List by type	***Description*** *(Location, dimensions or quantity)*
Infrastructure	**TRANCHE 1**
1.RBP	Around 7 km initial left bank stabilization: 5km at and 2 km at Zaffarganj
2. Other	Pilot test of guided, accelerated charland siltation (catkin and supporting

Intervention Elements	
	measures)
Infrastructure	**TRANCHE 2**
1.RBP	Extension of existing protection Around 3 km at Chauhali, Around 2 km at Zaffarganj
2. EMB	Rehabilitation of 12 km of embankment from Aricha to Zionpur
3. Other	Guided accelerated siltation of charland Placement of buoys along the protected bank
Infrastructure	**TRANCHE 3**
1.RBP	Around 5 km at Chauhali, Around 2 km at Zaffarganj Adaptation and maintenance
2. EMB	offtake geometry for Dhaleswari offtake geometry for the Ghior Khal Around 23 km new embankment
3. Other	Regulators, Fish passes Placement of buoys along the protected bank

Intended Benefits (+) and Known Potential Adverse Impacts (-)		
Type	**+ - ?**	**Description** (impacted location, activity or asset; timing, extent or magnitude)
Reduced flood damage	**+**	Whole area
Reduced erosion	+	Whole bankline
Navigation	+	More stable channel along protected bank with increased draught
Land reclamation	+	30 km²
Water Management	+	Improved dry season flow in Dhaleswari for boro irrigation and cleaning the rivers around Dhaka
Communication	+	Improved access in case a dedicated national highway standard road is built along the embankment from Dhaleswari to Aricha and beyond
Land acquisition/loss	-	Associated with embankment – about 2 km² (40km*50m) floodplain land
Resettlement	-	To be confirmed

Fisheries	?	Geotextile bag revetments provide shelter, attached chars potential spawning ground, protection from floating nets Improved river fish diversity due to dry season flow in distributaries and protection from floating nets (buoys)

Supporting Studies	
Surveys	River surveys by BWDB and the PPTA team Flood plain surveys along the Hurashagar and Kaijuri to Shariatpur
Char-land Study	Investigation of deposition rates of the char opposite of the Hurashagar/Baral outfall and upstream between Enayetpur and Jamuna Bridge
River Flow Modeling & Analytical Approach	1-D HEC RAS modeling of flow patterns to determine the minimum width of a single channel river solution
Flood Modeling	Scenario 1: restoration of Hurashagar FCD embankment from Kaijuri to Benatia along the Jamuna, Benotia to Bagabari along the Hurashagar/Baral, and Bagabari to Shahjadpur along the Karatoa River Scenario 2: loss of flood protection in the Enayetpur area due to erosion and breach of the embankment
EIA/SIA	Environmental baseline and impacts of above works
Resettlement	100% census and IOL, 20% SES for embankment and 2 km of riverbank protection

Version change log (latest first)		
Change date	**Version created by change**	**Changes made + reasons for changes**
10 May 2013	5.0	Updated for final report - ko
1 March 2013	4.0	Expanded description – ko
3 Oct 2012	2.0	Full description entered – ko
25 Sep 2012	1.0	Initial version of project description – slb

Annex9: Project Description, Padma Left Bank 1

PadmaLeft Bank 1 –Paturia – Harirampur PRIORITY

Project Name	ID	Upazilas (Unions)	Area	River Area	Population
Padma Left Bank 1	PLB1	3 (35)	682 km²	22%	736,000

Bankline length	Average Erosion (1973-2009/2004-2009)	Flood extent (1998 / 2007)	Area Boro/Aman	Population Density (total/floodplain)
25 km	3.35 km / 0.03 km	62% / 46%	18% / 34%	1080/1400

Situation

The Padma starts as single channel after the confluence of Jamuna and Ganges. 10 km downstream of the confluence it bifurcates into two channels, carrying different percentages of its flow over time and enclosing an around 25 km long and up to 10 km wide char. Presently the southern channel is declining.

At the downstream boundary of this subproject reach, about 25 km downstream of the confluence, a more erosion resistant clay forms the northern (left) bank (marked in figure below). Upstream of this clay the Padma tends to erode substantial amounts of floodplains through outflanking channels, which periodically close (see following figure with bankline development). At this moment a historic, extreme meander loop is filled in and the river is flowing rather straight. The filled in area is around 30 km² (3000 ha) in size. The historic Dhaka Southwest Project embankment in this area is eroded and was not rebuild (also refer to JLB-2 maps from FAP 3). The char age map (1973-2009, Padma Bridge report) indicates that the anabranch between Harirampur and Faridpur is presently contracting in width with substantial areas along both banks recently silted in.

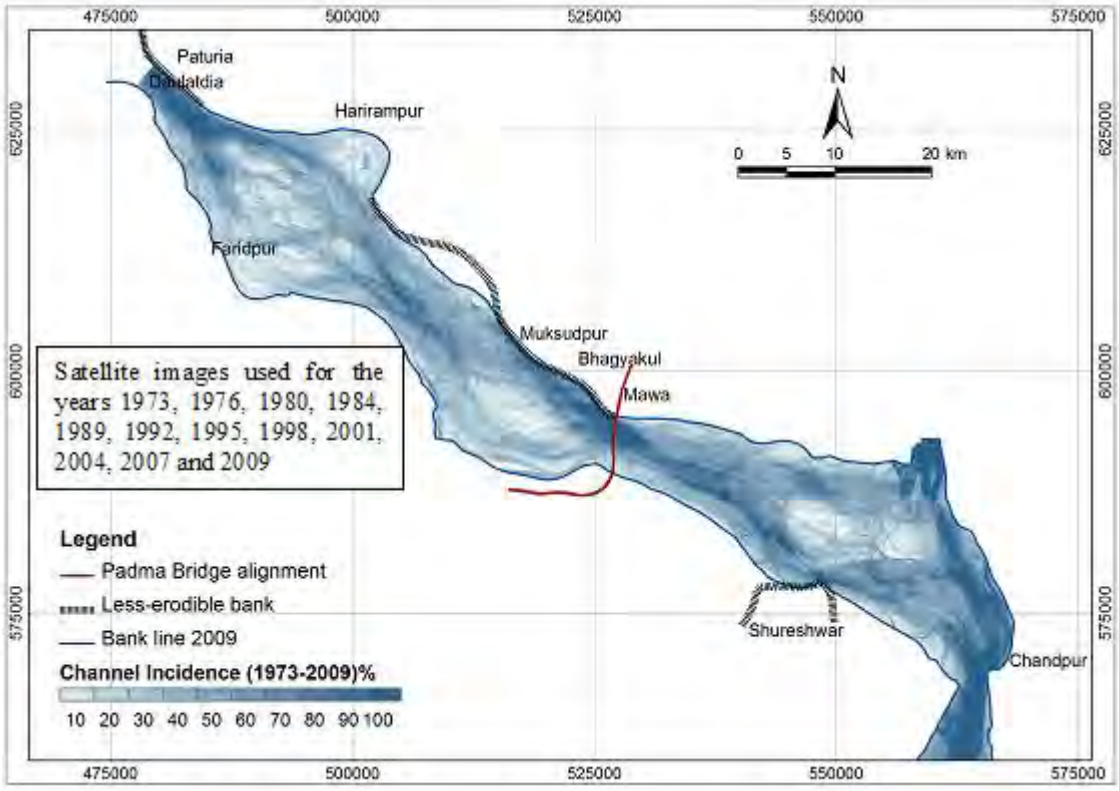
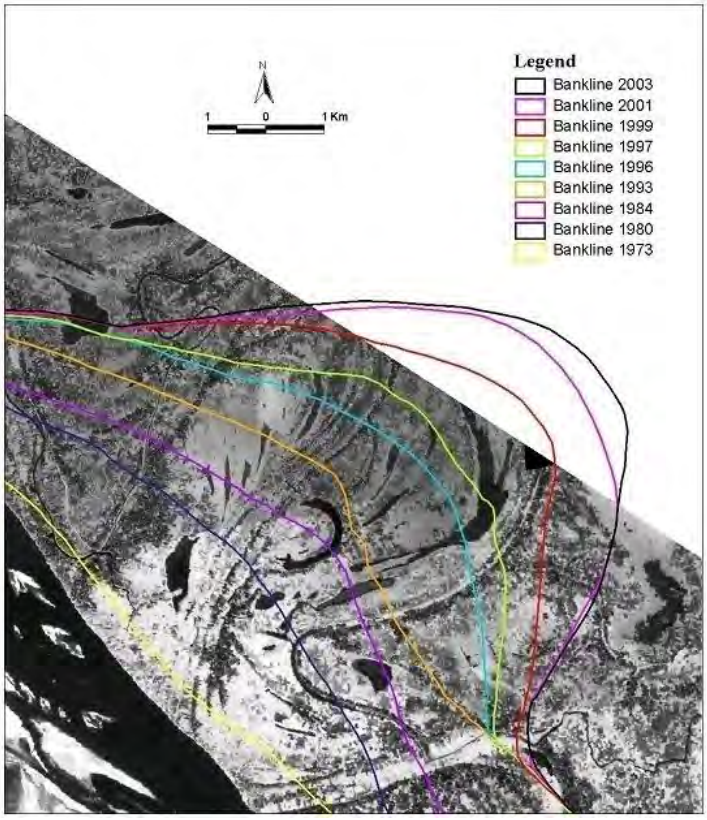
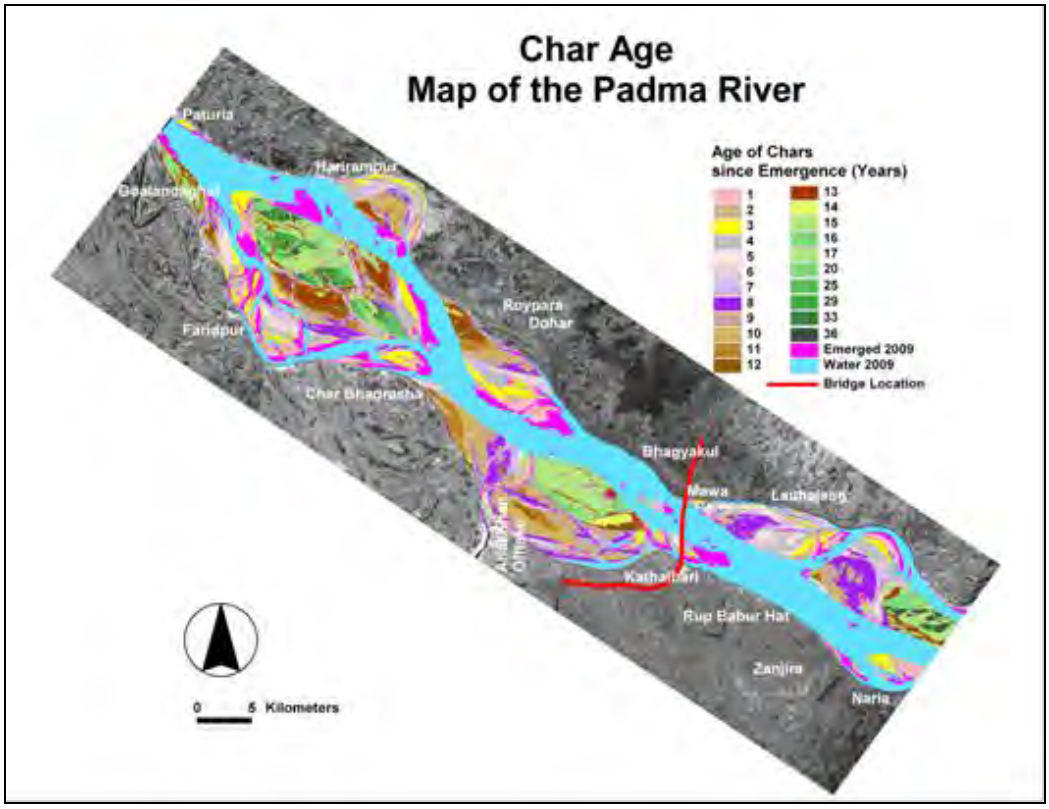


Figure from Padma Bridge design report



Erosion at Harirampur



Figures from Padma Bridge design report

Future Scenarios

Future channel planforms downstream of the bifurcation can consist of one or two channels. The initial morphological study for the upper Padma reach (Annex C, January 2013 PPTA report) indicates that the present two-channel system with one large char provides an overall acceptable solution and in terms of future river management (or stabilization) efforts the most pragmatic approach.

It is expected that the Padma exhibits the currently straighter alignment along the north bank near Harirampur and continues building the recently deposited land to greater height. The field trip in December confirmed that roughly the upstream half has reached substantial height, while the downstream part is still low lying.

BWDB pursues some plans of the Nagarpur-Chauhali and the Jamuna-Padma left bank Project in this area going back to the FAP 3 recommendations (also refer to JLB-2). This project basically addresses the flooding issue in this area, providing drainage facilities and improved irrigation opportunities in addition.

Existing Works

The Paturia ferry ghat is located at the upstream end of this subreach. For dry season ferry operation a navigation channel is dredged regularly.

Two LGED small scale projects are situated in this area.

Project Concept
This area incorporates two BWDB priority projects: (i) riverbank protection along the left bank upstream of Harirampur to protect the large meander bend from forming again, and (ii) reconstruction of the Dhaka Southwest Project embankment from Paturia to Harirampur. The PPTA recognizes the opportunity of reclaiming around 3000 ha of lost flood plain land due to the present favorable morphological situation. Tranche 1 • 7 km of riverbank protection at Harirampur covering the upstream of the old meander erosion, only geobag part • Pilot plantation of catkin for accelerated char growth Tranche 2 • 7 km of riverbank protection at Harirampur covering the upstream of the old meander erosion, only wave protection part • Reconstruction of the embankment from Paturia towards Mawa • Sluice gates for water management (including rehabilitation of existing sluice gates) Tranche 3 • About 5 km of riverbank protection in continuation of tranche 1 works • Sluice gates for water management (including rehabilitation of existing sluice gates)

Intervention Elements	
List by type	***Description*** *(Location, dimensions or quantity)*
Infrastructure	**TRANCHE - 1**
1.RBP	Around 7 km with temporary wave protection
2. EMB	none
3. Other	Pilot plantation of catkin and monitoring of vertical char growth (up to floodplain level)
1.	Buoys for navigation and fish protection along revetment work
Infrastructure	**TRANCHE –2**
1.RBP	Around 7 km of permanent wave protection
2. EMB	Around 17 km of rehabilitation with 8 km new embankment
3. Other	Plantation of catkin for vertical char growth (up to floodplain level)
Infrastructure	**TRANCHE – 3**
1.RBP	Around 5 km of riverbank protection
2. EMB	None
3. Other	Buoys for navigation and fish protection along revetment work

Intended Benefits (+) and Known Potential Adverse Impacts (-)		
Type	***+ - ?***	***Description*** *(impacted location, activity or asset; timing, extent or magnitude)*
Reduced flood damage	**+**	Whole area
Reduced erosion	+	Whole bankline
Navigation	+	More stable channel along protected bank with increased draught
Land reclamation	+	Potential flood protected area around30km²
Water Management	+	Improved conditions for dry season irrigation after reconstruction of embankment
Communication	+	Improved access in case a dedicated national highway standard road is built along the embankment from Aricha to Dohar and beyond
Land acquisition/loss	-	Associated with embankment strengthening– about 1 km² (20km*50m – assumption that existing land can be used)
Resettlement	-	To be confirmed
Fisheries	?	Geotextile bag revetments provide shelter, attached chars potential spawning ground Improved river fish diversity due to protection from floating nets (buoys)

Version change log *(latest first)*		
Change date	***Version created by change***	***Changes made + reasons for changes***
30 May 2013	5.0	Updated for final report - ko
1 Mar 2013	4.0	Expanded description – ko
6 Feb2013	3.0	Finalization with more detailed work layouts – ko
25 Sep 2012	1.0	Initial version of project description – slb

Annex 10: Selection of Subreaches

A. Multi-Criteria Assessment (MCA) of Tranche 1 Interventions

1. Approach and Key Criteria

MCA is an appropriate approach when comparing quantitative and qualitative data that are otherwise incomparable. This is especially true for prefeasibility level assessment, when not all data are quantified or quantifiable.

In this PPTA, an MCA is used to select the sub-reaches to be brought forward for feasibility assessment and potential inclusion in Tranche 1. The MCA is the first step to identify three suitable sub-reaches, to which, in a second step, a simplified economic feasibility analysis will be applied for confirmation of their suitability. The purpose is to arrive at two or three sub-reaches to be covered by Tranche 1 subprojects.

We have identified issues and criteria in two categories, means-ends and impacts (Table 0-1). Issues in the means-ends group are vulnerability and planning-engineering aspects, and relate to the identification of priority sites suitable for MRP interventions. Issues in the impact group are safeguards and cost-benefit, and relate to acceptability of the potential impacts of the interventions. Criteria were then identified for each issue, nine criteria in total, each of which can have up to three sub-criteria. In addition, we assess if the identified priority interventions conflict with other planned major interventions. An example would be the Padma Bridge construction, which impacts on two sub-reaches directly and has the potential to affect four sub-reaches downstream.

Each of the following subsections systematically describes each criterion. In order to be transparent, we follow the same structure throughout. Starting with a short justification of the criterion we provide details about how we classify the criterion and how we arrived at the values used for the classification. The latter is important as we are using primary, qualitative data, and quantitative data, based on a more general assessment of an overall situation. Finally, we conclude with detailed tables explaining each sub-criterion. When there are measured data, this contains ranking and definition of limits, while for qualtitative assessment detailed descriptions of the considerations leading to the ranking are provided for each sub-reach.

Table 0-1: Grouping of criteria

Broad Category	Main Issues	Criterion
Means and ends	Vulnerability	Riverbank erosion Flooding Social fabric
	Planning and engineering	Ease of engineering interventions Complements existing work/schemes Is consistent with predicted/expected future planform ("no regret")
Impacts	Safeguards	Social and environmental
	Cost and benefits	Cost deviation from average low-cost work Expected benefits for different sectors

1. Criteria

a) River bank erosion

JUSTIFICATION:

Riverbank erosion along the main rivers has resulted in substantial land losses in Bangladesh and impacts on the development of the floodplains bordering the main rivers.

DETAILS FOR EACH SUB-CRITERION:

Historic Riverbank Erosion

This sub-criterion is based on primary data. Riverbank erosion is expressed as erosion per km of bankline. It is the result of the total loss of land in one sub-reach divided by the length of riverbank in this sub-reach. The reference lines are the 1973 and the 2010 bankline.

Recent Riverbank Erosion

This sub-criterion follows the same process as for historic riverbank erosion, only for the period 2007 to 2012.

Future Riverbank Erosion

This sub-criterion cannot be based on primary data. Given the uncertainties the most likely scenario for the future around 10 - 15 years has been developed. The timeframe of 10 – 15 years is relevant as the PPTA prepares an MFF with around 10 years implementation period. Consequently, future developments are highly relevant for any interventions that target the reduction of river instability and maximization of reclamation of land lost during the erosion process of the last 30 years. The criteria selected were expected substantial erosion, coded "1", no substantial erosion or accretion, coded "0", and likely accretion, coded "-1".

DETAILED TABLES:

CATEGORY	SUB-CATEGORY	Unit	JRB1	JRB2	JLB1	JLB2	PLB1	PLB2	PLB3	PRB1	PRB2	PRB3	MRB1	MLB1	MLB2
Area		sq km	580.4	914.6	787.5	1,211.8	681.7	789.5	440.9	876.3	1,055.2	801.4	435.1	277.5	440.5
floodplain		ha	44,416.0	72,178.0	71,812.0	82,520.0	52,491.0	69,239.0	29,738.0	74,638.0	75,454.0	55,890.0	33,099.0	20,026.0	27,981.0
bank length		km	36.7	66.0	21.2	56.3	24.8	30.4	47.6	55.4	50.3	46.5	34.1	21.4	24.4
erosion	total (1973-2010)	ha	5,561.4	2,053.5	5,224.2	14,579.7	8,312.9	2,048.0	6,042.9	7,673.6	9,125.9	8,356.6	6,313.4	2,022.0	1,096.1
	recent (2007-2012)	ha	478.7	427.4	125.3	694.4	70.8	182.2	390.2	1,027.2	597.2	857.5	875.1	115.6	256.2

ABSOLUTE FIGURES

CATEGORY	SUB-CATEGORY	Unit	JRB1	JRB2	JLB1	JLB2	PLB1	PLB2	PLB3	PRB1	PRB2	PRB3	MRB1	MLB1	MLB2
erosion	total (1973-2010)	km/km	1.52	0.31	2.46	2.59	3.35	0.67	1.27	1.39	1.81	1.80	1.85	0.94	0.45
	recent (2007-2012)	km/km	0.13	0.06	0.06	0.12	0.03	0.06	0.08	0.19	0.12	0.18	0.26	0.05	0.11
	future (2012-2020)	+/-	0	0	1	1	1	-1	1	1	1	1	1	0	0

RANK

erosion	total (1973-2010)		7	13	3	2	1	11	9	8	5	6	4	10	12
	recent (2007-2012)		4	9	11	5	13	10	8	2	6	3	1	12	7
	future (2012-2020)		9	9	1	1	1	13	1	1	1	1	1	9	9

a) Flooding

JUSTIFICATION:

Flooding is a major development impediment as it causes sporadic, unpredictable but substantial damages affecting the life on the floodplains in multiple negative ways.

DETAILS FOR EACH SUB-CRITERION:

Average Flood

This sub-criterion is based on primary data. The analysis of Radarsat flood season images allows the determination of areas in each sub-reach flooded during a flood with a 2-year return period, or an average flood. As such this sub-criterion reflects on the amount of land potentially taken from agriculture during normal flood years.

Mean Flood

Same as before this criterion is based on primary data, however for a higher return period. The range chosen lies between return periods of 5 to 15 years. This represents roughly the boundary between good flood and bad flood and could be considered to be the amount of flooded land that is accepted as an off-set of the beneficial fertilization of fields.

High Flood

Following along the same lines, as the other two sub-criteria, this flood represents areas flooded during some of the highest floods observed in Bangladesh during the recent past, namely 1998, 2004, and 2007. These were damaging floods and flooding to this extent is unwelcome.

DETAILED TABLES:

CATEGORY	SUB-CATEGORY	Unit	JRB1	JRB2	JLB1	JLB2	PLB1	PLB2	PLB3	PRB1	PRB2	PRB3	MRB1	MLB1	MLB2
Area		sq km	580.39	914.56	787.5	1211.82	681.68	789.46	440.87	876.27	1055.15	801.43	435.14	277.53	440.48
floodplain		ha	44,416	72,178	71,812	82,520	52,491	69,239	29,738	74,638	75,454	55,890	33,099	20,026	27,981
Total Area without River		ha	44,417	72,179	71,813	82,561	52,492	69,242	29,740	74,640	75,456	55,891	33,100	20,026	27,983
Flooded Area 1998		ha	31,946	33,138	45,807	60,399	32,617	42,054	8,860	25,829	38,738	31,054	21,683	7,396	6,522
approximate return period		year	20	40	20	40	40	40	40	40	40	40	40	40	40
1998		%	72%	46%	64%	73%	62%	61%	30%	35%	51%	56%	66%	37%	23%
Flooded Area 2000		ha	19,982	15,383	17,098	28,194	19,041	27,692	3,990	4,339	10,010	12,904	6,038	1,699	4,795
approximate return period		year	3	3	3	3	3	3	3	3	3	3	3	3	3
2000		%	45%	21%	24%	34%	36%	40%	13%	6%	13%	23%	18%	8%	17%
Flooded Area 2001		ha	20,175	10,583	1,627	1,652	1,692	8,682	1,533	1,692	4,028	2,653	523	732	2,349
approximate return period		year	2	2	2	2	2	2	2	2	2	2	2	2	2
2001		%	45%	15%	2%	2%	3%	13%	5%	2%	5%	5%	2%	4%	8%
Flooded Area 2002		ha	21,816	17,238	20,657	36,710	16,279	21,348	2,136	8,012	14,923	12,387	3,243	1,410	3,304
approximate return period		year	6	10	6	10	10	5	5	10	5	5	5	5	5
2002floode		%	49%	24%	29%	44%	31%	31%	7%	11%	20%	22%	10%	7%	12%
Flooded Area 2003		ha	21,065	16,125	9,969	27,250	12,202	20,229	2,080	7,189	9,313	13,215	2,564	1,627	2,579
approximate return period		year	7	6	7	6	6	6	6	6	6	6	5	5	5
2004		%	47%	22%	14%	33%	23%	29%	7%	10%	12%	24%	8%	8%	9%
Flooded Area 2004		ha	26,020	15,137	30,880	48,384	23,764	30,750	5,328	9,127	21,929	18,904	7,097	3,096	4,942
approximate return period		year	25	15	25	15	15	15	15	15	15	15	15	15	15
2004		%	59%	21%	43%	59%	45%	44%	18%	12%	29%	34%	21%	15%	18%
Flooded Area 2007		ha	24,652	23,761	29,579	48,145	23,926	30,370	3,650	11,642	22,688	20,487	5,110	1,326	4,759
approximate return period		year	30	30	30	30	30	30	30	30	30	30	30	30	30
2007		%	56%	33%	41%	58%	46%	44%	12%	16%	30%	37%	15%	7%	17%
average 2 year event			45%	18%	13%	18%	20%	26%	9%	4%	9%	14%	10%	6%	13%
moderate (5-15year)			48%	23%	21%	39%	27%	30%	9%	10%	16%	23%	10%	8%	11%
severe (>15yr)			62%	33%	49%	63%	51%	50%	20%	21%	37%	42%	34%	20%	19%
RANK															
flooding	% flooded 2-yr event		1	5	7	4	3	2	11	13	10	6	9	12	8
	% flooded 5-15-yr event		1	5	7	2	4	3	12	10	8	6	11	13	9
	% flooded >15-yr event		2	9	5	1	3	4	11	10	7	6	8	12	13

a) Social Fabric

JUSTIFICATION:

ADB's overarching goal is to fight poverty and consequently poverty incidence is an important criterion for any interventions. In addition, the envisaged MFF comes with some focus on the primary sector, not at last as agriculture provides the expected main benefits while employing still the majority of the Bangladeshi population.

DETAILS FOR EACH SUB-CRITERION:

Poverty Level

The poverty level is based on primary data from the earlier quoted (Chapter 3) BBS census. We are using the upper limit for the lower poverty line based on the cost of basic needs (upper poverty line). This reflects how many people are poor. The group of hard-core poor is included in this figure and a subset.

Dependency on the Primary Sector

The analysis is based on primary data from 2010 Household Income and Expenditure Survey (HIES). The reference unit is a dwelling unit. The primary sector dependency is expressed in

three categories: agriculture/forestry/livestock, agricultural labor, fishery. The total number is expressed as percentage of the total number of dwelling units.

DETAILED TABLES:

CATEGORY	SUB-CATEGORY	Unit	JRB1	JRB2	JLB1	JLB2	PLB1	PLB2	PLB3	PRB1	PRB2	PRB3	MRB1	MLB1	MLB2
UPoverty		%	49% - 60%	49% - 60%	37% - 48%	37% - 48%	37% - 48%	37% - 48%	21% - 36%	37% - 48%	37% - 48%	21% - 36%	21% - 36%	21% - 36%	21% - 36%
Lpoverty		%	11% - 22%	23% - 32%	23% - 32%	23% - 32%	23% - 32%	23% - 32%	11% - 22%	23% - 32%	23% - 32%	11% - 22%	% or great	11% - 22%	11% - 22%
Total Dwelling Unit		no	177,316	159,245	209,784	218,324	144,721	183,163	132,133	153,375	180,137	146,039	140,190	57,543	124,381
Dwelling Unit of Agriculture/ Forestry/Livestock		no	35,319	55,643	53,760	81,967	40,967	31,471	23,393	51,558	54,475	48,051	51,060	15,089	15,411
Dwelling Unit of Agri labour		no	28,129	32,333	32,864	47,092	29,811	25,803	23,807	35,693	35,587	38,824	42,176	12,178	26,570
Dwelling Unit of FISHERY		no	1,783	2,645	3,064	3,804	3,123	3,712	2,340	2,172	2,117	1,997	3,506	1,741	5,487
U Poverty Level		%	60%	60%	48%	48%	48%	48%	36%	48%	48%	36%	36%	36%	36%
Dependency on Primary Sector (% total dwelling		%	37%	57%	43%	61%	51%	33%	37%	58%	51%	61%	69%	50%	38%
RANK															
poverty level			1	1	3	3	3	3	9	3	3	9	9	9	9
primary sector			12	5	9	2	7	13	11	4	6	3	1	8	10
CLASSIFICATION (POINTAGE)															
lower	upper boundary														
0.45	0.58		3	3	2	2	2	2	1	2	2	1	1	1	1
0.4	0.6		1	2	2	3	2	1	1	2	2	3	3	2	1

a) Ease of engineering

JUSTIFICATION:

Initial interventions need to be based on simple, straight forward engineering interventions for a number of reasons. Firstly, riverbank protection design can follow existing guidelines, while embankment design can be based on present best-practice, such as established in the International Levee Handbook (ILH, 2012). Secondly, easy implementation supports the quick initial success of a future program. Thirdly, initial implementation of riverbank protection does work during an emerging final planform and it is easier to accept some future adjustments to recently build low-cost work. Fourthly, the limited resources and time scale of a PPTA do not allow complicated design processes depending on costly, long supporting studies.

DETAILS FOR EACH SUB-CRITERION:

Riverbank Protection

Work in a sub-reach, contributing to large scale stabilization shall not depend on complicated engineering work. While long guiding geotextile bag revetments form the standard, offtake structures for distributaries are out of the ordinary. As example, the design for the Gorai offtake took multiple years and substantial resources. The ordinary construction receives one point, while out of the ordinary structures receive zero points.

Embankments

The standard is an embankment incorporating a road on the land side and a berm for temporary settlement towards the river. In addition, simple sluice gates for local drainage are considered. Complicated embankments would incorporate a number of offtakes or a large number of openings to let flow pass for example along the right bank of the Padma towards the coastal area. Points are awarded as above.

Other Difficult Structures

Difficult structures relate mostly to the offtake regulators which requires specific structural designs. The work associated with a specific intake geometry is considered under riverbank protection. No additional structures are awarded one point, whereas additional difficult structures do not get any points.

DETAILED TABLES:

	riverbank protection	embankment	other difficult structure	riverbank protection	embankment	other difficult structure
JRB1	y	y	y	normal conditions	Kaijuri to Bagabari, potential u/s char	regulator / fish pass
JRB2	n	n	y	confluence issues	reclamation at confluence on loose char soils	potential additional regulator / fish pass
JLB1	n	n	y	number of distributary offtake geometries	number of offtake geometries	offtake old Dhaleswari and Dhaleswari
JLB2	y	y	y	largely normal conditions	largely normal floodplain	offtake old Ichamutti
PLB1	y	y	n	normal conditions	normal conditions	no
PLB2	n	y	n	erosion resistant area, deep	existing road, higher - check	no
PLB3	n	y	n	stabilization of confluence	normal conditions	no
PRB1	n	y	n	Ganges barrage and confluence	normal conditions	no
PRB2	n	n	y	additional measures along long reclaimed bank,	around Faridpur, rest open for overland flow to south,	Arial Khan offtake
PRB3	n	n	y	response to Padma Bridge RTW with higher v	open for overland flow to south,	regulator / fish pass
MRB1	n	y	y	stabilization of confluence	open for overland flow to south,	regulator / fish pass
MLB1	y	y	y	conducive existing conditions	normal conditions	existing embankment
MLB2	n	y	y	Chandpur protection	normal conditions	regulator / fish pass

a) Complements existing work

JUSTIFICATION:
Completion of existing work means less efforts and higher potential rewards. This is the more true in economic terms, as existing work is treated as sunken cost, which do not reduce the economic feasibility.

Details for each Sub-criterion:

Riverbank Protection

Riverbank Protection of several kilometers in length is considered existing work. This could, for example, provide the backbone for reconstruction of embankments. In case there is existing work, one point is awarded, otherwise none.

Embankments

Existing embankments provide potentially higher benefits at lower cost, if riverbank protection should be required. Consequently, existing embankments are awarded one point, while the non-existence of embankments receives none.

DETAILED TABLES:

	riverbank protection	embankment	riverbank protection	embankment
JRB1	y	y	existing work at Kaijuri, 10 km	existing BRE
JRB2	y	y	existing work at Kaitola, 7 km	PIRDP ring embankment is complete
JLB1	n	n	no work, offtakes uncertain due to fund shortage	no embankment
JLB2	n	n	marginal work at Chauhali	no major embankment
PLB1	n	y	no work	Dhaka SW embankment
PLB2	y	y	natural protection	some existing road close to bankline
PLB3	n	n	marginal work at Munshiganj	no embankment
PRB1	y	n	existing work at Rajbari	no embankment
PRB2	n	n	existing work at Faridpur useless if land reclaimed	no embankment
PRB3	y	n	Padma Bridge 12 km revetment	no embankment
MRB1	n	n	no work	no embankment
MLB1	y	y	existing work at Eklashpur, 4.5 km	MDIP ring embankment complete
MLB2	y	n	existing work at Chandpur, about 1.5 km	no embankment

a) "No regret"

JUSTIFICATION:

Any work that does not match with a future planform results in a potential waste of funds.

DETAILS FOR EACH SUB-CRITERION:

The only sub criterion is the assessment if there is a potential wastage as work built during the next decade (under an MFF program) could risk not match with the future desired planform.

DETAILED TABLES:

	no regret	no regret
JRB1	y	existing straight channel and bifurcation to be maintained
JRB2	y	existing western bankline channel for navigation
JLB1	y	existing straight channel and bifurcation to be maintained
JLB2	y	existing eastern bankline channel dominant
PLB1	y	reclamation of land due to favourable planform
PLB2	n	potential char development alongside Mawa left bank
PLB3	n	downstream consequence of Padma Bridge uncertain
PRB1	n	unclear due to confluence
PRB2	n	river planform not yet developed for reclamation
PRB3	n	downstream consequence of Padma Bridge uncertain
MRB1	n	not clear with confluence
MLB1	y	bankline stable
MLB2	n	not clear with confluence

a) Safeguards

JUSTIFICATION:

Safeguards play an important role in the densely populated and highly exploited deltaic environment. Any major implications could stop interventions as planned. On a somewhat lower level, complicated interventions could require more time than available for PPTA preparation and as such also need to be avoided during the initial PPTA.

DETAILS FOR EACH SUB-CRITERION:

Land Acquisition and Resettlement

Land acquisition and resettlement in Bangladesh is complex due to the fractured small landholdings often with unclear land titles. This problem is unavoidable and required to be addressed for any construction work. We consider three levels of complexity, also depending on the extent of the work: low, medium, high, with points in descending order from 3 to 1. Normal resettlement involves a 50 m wide strip along the bankline and a 50 m wide strip for embankment construction. If the embankment length is limited to less than 20 km and runs through less populated areas, and if there is only limited riverbank protection the impact is low. Medium impact relates to longer embankments and/or riverbank protection. High impact relates to areas that require embankment works and riverbank protection, both of substantial length.

Environment

There are no environmental sensitive areas in the areas under consideration. Consequently, environmental aspects focus also on potential effects beyond the boundaries. This is

especially true for the southern sub-reaches, with contribute substantial fresh water to the coastal area and as such restrict salinity intrusion.

DETAILED TABLES:

	land acquisition and resettlement	environment	land acquisition and resettlement	environment
JRB1	m	m	embankment and limited riverbank protection	existing embankment, char implications
JRB2	l	l	no embankment work, only limited riverbank protection	low impacts due to largely existing work
JLB1	h	h	both required	distributary effects
JLB2	h	m	both required	normal impacts
PLB1	m	m	full embankment but limited riverbank proteciton	normal impacts
PLB2	l	l	limited embankment work, no revetment	limited impacts as no riverbank protection
PLB3	h	m	both required	normal impacts
PRB1	h	m	both required	normal impacts
PRB2	h	h	both required	flow to south impacted
PRB3	h	h	both required	flow to south impacted
MRB1	h	h	both required	flow to south impacted
MLB1	l	l	existing work, minimal impacts	existing work, minimal impacts
MLB2	h	m	both required	normal impacts

a) Cost

JUSTIFICATION:

Individual tranches have only limited total budgets. This is required for not overloading the implementing agency but also from budgetary considerations of ADB's pipeline.

DETAILS FOR EACH SUB-CRITERION:

Riverbank Protection

Addressing two or three sub-areas is potentially more beneficial for achieving the overall goal than putting all investment of one tranche into one area. For this reason high investment is less beneficial than lower investment. As such points are given for low, medium, and high investment in descending order, starting with three points for low.

Embankments

The same holds true for embankments.

DETAILED TABLES:

	riverbank protection	embankment	riverbank protection	embankment
JRB1	l	l	normal new revetment, 10 km already existing	normal new embankment, partly existing
JRB2	l	l	normal new revetment, 7 km already existing	existing embankment
JLB1	h	m	substantial offtake work	new embankment
JLB2	m	m	limited offtake work	new embankment
PLB1	m	m	normal new revetment	new embankment
PLB2	l	l	erosion resistant area	existing road can be converted to embankment
PLB3	h	m	higher requirement revet-ment d/s of Padma Bridge	new embankment
PRB1	m	m	normal new revetment	new embankment
PRB2	h	m	normal new revetment, but offtake of Arial Khan	new embankment
PRB3	h	h	higher requirement revet-ment d/s of Padma Bridge	new embankment with many openings
MRB1	h	h	deep confluence with high velocities and weak soils	new embankment with many openings
MLB1	l	l	existing work, no revetment	existing work, no embankment
MLB2	h	m	deep confluence with high velocities	new embankment

a) Benefits

JUSTIFICATION:

High benefits provide attractive investments.

Details for each Sub-criterion:

Directly

A main consideration is that work in already protected areas is less likely to achieve lower incremental benefits than work in previously unprotected areas. As such this sub-criterion filters the potential for new investment. Direct benefits largely focus on the primary sector. The classification is only yes or no gaining one point for yes and zero points for no.

Additional

Apart from primary sector benefits obvious additional benefits where visible were identified. Again points were given for yes and no.

DETAILED TABLES:

	directly	additional	directly	additional
JRB1	y	y	restoration of BRE	flow along west bank for navigation, reclamation of charland
JRB2	n	n	existing scheme	existing scheme
JLB1	n	y	higher area	dry season flow due to offtakes
JLB2	y	y	increased due to reduced flood losses and incremental agri increases	dry season flow due to offtakes, additional reclamation of charland
PLB1	y	y	increased due to reduced flood losses and incremental agri increases	reclamation of charland
PLB2	y	n	increased due to reduced flood losses and incremental agri increases	reclamation likely only after ten years
PLB3	y	n	increased due to reduced flood losses and incremental agri increases	none
PRB1	y	n	increased due to reduced flood losses and incremental agri increases	none
PRB2	y	n	improvement of Faridpur flood situation	none
PRB3	n	n	open floodplain, reduced benefits	none
MRB1	n	n	open floodplain, reduced benefits	none
MLB1	n	n	existing scheme	existing scheme
MLB2	y	n	increased due to reduced flood losses and incremental agri increases	none

1. MCA WEIGHTING AND SCOREBOARD

The MCA combines all above criteria, and applies weighing factors to each criterion. We applied weighing factors at two levels: (i) primary interest and (ii) evening out of the number of sub-criteria. Firstly, the three vulnerability criteria (riverbank erosion, flooding, social fabric) were set to obtain higher marks, in order to allow addressing these more urgent problems at higher priority. Secondly, we applied weighing factors, so that each group of sub-criteria (primary interest and others) obtains the same maximum marks. In combination this means that the vulnerability criteria get a maximum of 90 marks. If there are three classification groups, for example high, medium, low, the weighing factor applied was 10 (3 sub-criteria * 3 points * 10 weighing factor = 90), if there are two classification groups (for example yes - no) the weighing factor is 15 (3 sub-criteria * 2 points * 15 weighing factor = 90). For the second group, the same weighing factors apply, only with the goal to reach a maximum of 30 points. The result is presented in (Table 0-2).

A sensitivity run, setting all criteria equal, confirms the same selection as obtained by above method. Furthermore, a very similar result was obtained during an initial discussion with ADB, BWDB and members of the PPTA team in September, however with less refinement and quantification of sub-criteria.

Table 0-2: MCA scorecard

CATEGORY	SUB-CATEGORY	Unit	JRB1	JRB2	JLB1	JLB2	PLB1	PLB2	PLB3	PRB1	PRB2	PRB3	MRB1	MLB1	MLB2
EROSION	total (1973-2010)	km²	2	1	2	3	3	1	2	2	2	2	2	1	1
	recent (2007-2012)	km²	2	2	1	2	1	1	2	3	2	3	3	1	2
	future (2012-2020)	km²	2	2	3	3	3	1	3	3	3	3	3	2	2
	WEIGHT	10	60	50	60	80	70	30	70	80	70	80	80	40	50
FLOODING	average (2-year)	%	3	3	2	3	3	3	1	1	1	2	1	1	2
based on radarsat	mean (5-15 year)	%	3	2	2	3	2	3	1	1	2	2	1	1	1
images	high(>15 years)	%	3	2	3	3	3	3	1	1	2	2	2	1	1
	WEIGHT	10	90	70	70	90	80	90	30	30	50	60	40	30	40
SOCIAL FABRIC	poverty	%	3	3	2	2	2	2	1	2	2	1	1	1	1
	employment in agriculture	%	1	2	2	3	2	1	1	2	2	3	3	2	1
	WEIGHT	15	60	75	60	75	60	45	30	60	60	60	60	45	30
	Subtotal		***210***	***195***	***190***	***245***	***210***	***165***	***130***	***170***	***180***	***200***	***180***	***115***	***120***
ENGINEERING	riverbank protection first?	yes/no	1	0	0	1	1	0	0	0	0	0	0	1	0
INTERVENTION	existing embankment	yes/no	1	0	0	1	1	1	1	1	0	0	1	1	1
	complicated structures	yes/no	0	0	0	0	1	1	1	1	0	0	0	0	0
	WEIGHT	10	20	0	0	20	30	20	20	20	0	0	10	20	10
COMPLEMENTS	riverbank protection	yes/no	1	1	0	0	0	1	0	1	0	1	0	1	1
EXSITING SCHEME	embankment	yes/no	1	1	0	0	1	1	0	0	0	0	0	1	0
	WEIGHT	15	30	30	0	0	15	30	0	15	0	15	0	30	15
"NO REGRET"	consist. w future planform	yes/no	1	1	1	1	1	0	0	0	0	0	0	1	0
	WEIGHT	30	30	30	30	30	30	0	0	0	0	0	0	30	0
EXPECTED COST	riverbank protection (2.5M)	l/m/h	3	3	1	2	2	3	1	2	1	1	1	3	1
	embankment (0.5M)	l/m/h	3	3	2	2	2	3	2	2	2	1	1	3	2
	WEIGHT	5	30	30	15	20	20	30	15	20	15	10	10	30	15
SAFEGUARD	expected social impact	l/m/h	2	3	1	1	2	3	1	1	1	1	1	3	1
IMPLICATIONS	expected environm. impact	l/m/h	2	3	1	2	2	3	2	2	1	1	1	3	2
	WEIGHT	5	20	30	10	15	20	30	15	15	10	10	10	30	15
EXPECTED BENEFITS	primary sector (agriculture)	high/low	2	1	1	2	2	2	2	2	2	1	1	1	2
	other (land-river transport)	high/low	2	1	2	2	2	1	1	1	1	1	1	1	1
	WEIGHT	7.5	30	15	22.5	30	30	22.5	22.5	22.5	22.5	15	15	15	22.5
	Subtotal		***160***	***135***	***77.5***	***115***	***145***	***132.5***	***72.5***	***92.5***	***47.5***	***50***	***45***	***155***	***77.5***
GRAND TOTAL	SUMMARY WEIGHT	107.5	370	330	237.5	330	325	297.5	202.5	262.5	257.5	250	255	330	197.5
		Rank	1	2	11	2	5	6	12	7	8	10	9	2	13
			winner	winner		winner	winner	winner						winner	

In conclusion the MCA indicates the following sub-reaches for potential initial investments (Table 0-3):

Table 0-3: Sub-reaches suitable for potential investment

River	Sub-reach	Division
Jamuna	Jamuna Right Bank 1 and 2	North West
	Jamuna Left Bank 2	North Central
Padma	Padma Left Bank 1 and 2	
Meghna	Meghna Left Bank 1	South East

1. Final Selection

The final selection considers the relevance of the findings of the MCA. There are two main criteria to be considered: (i) overlap or conflict with existing or planned schemes, and (ii) "nothing to protect" during Tranche 1. With the focus of ongoing or planned investments, there are three sub-reaches that might be affected: (i) Rajbari where BWDB is building riverbank protection, and the Padma Bridge river training works planned at Mawa and Char Janajat. This means the PLB2 and PRB 2 sites will overlap with Padma Bridge river training works. "Nothing to protect" holds true for two of the winning sub-reaches: (i) JRB2, where there is little erosion at the PIRDP this moment and embankment set-back distances are quite large along unprotected banklines, and (ii) MLB1, where there is no erosion along the

MDIP. Notwithstanding the lack of urgent protection, both sub-reaches should be covered under contingency measures during the first tranche, as their high ranking indicates the vulnerability and potentially viable investments. While the JRB2 site will have a clear focus on riverbank protection in support of an existing embankment line, MLB1 will have a clear focus on strengthening the flood embankment, which regularly is affected by "boiling" or seepage indicating a structural weakness.

Considering the relevance of immediate interventions, the most attractive projects are listed in Table 0-4.

Table 0-4: Winning sub-reaches

River	Sub-reach	Division
Jamuna	JRB1	North West
	JLB 2	North Central
Padma	PLB 1	

Annex 11: DOE Approved Terms of Referrence

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

Memo No: DoE/Clearance/5215/2013/ 154 Date: 10 /07/2013

Subject: Terms of Reference for EIA of the Proposed Flood and Riverbank Erosion Risk Management Programme (FRERMP).

Ref: Your Application dated 06/05/2013.

With reference to the above, the undersigned is directed to convey the approval of the Terms of Reference (TOR) for Environmental Impact Assessment (EIA) of the proposed Flood and Riverbank Erosion Risk Management Programme (FRERMP).

I. The project authority shall submit a comprehensive Environmental Impact Assessment (EIA) considering the overall activity of the proposed Project in accordance with the TOR and time schedule submitted to the Department of Environment (DOE).

II. The EIA report should be prepared in accordance with following indicative outlines:

Executive Summary
1.0 Introduction
- 1.1 Background
- 1.2 Rationale of the Project
- 1.3 Objective of the Study
- 1.4 Scope of Study/Work
- 1.5 Approach and Methodology
- 1.6 The EIA Team
- 1.7 Structure of the Report/Report Format

2.0 Legal, Policy and Administrative Framework
- 2.1 Introduction
- 2.2 Relevant National Policies and Legislations
- 2.3 Compliance with DOE EIA Guidelines

3.0 Project Description
- 3.1 Introduction
- 3.2 Project Objective
- 3.3 Project Options
- 3.4 Interventions under Selected Options
- 3.5 Project Plan, Design, Standard, Specification, Quantification, etc.

4.0 Environmental and Social Baseline
- 4.1 Meteorology
  - 4.1.1 Temperature
  - 4.1.2 Humidity
  - 4.1.3 Rainfall
  - 4.1.4 Evaporation
  - 4.1.5 Wind Speed
  - 4.1.6 Sun Shine Hours
- 4.2 Water Resources
  - 4.2.1 Surface Water System
  - 4.2.2 Tropical Cyclones and Tidal Flooding
  - 4.2.3 Salinity
  - 4.2.4 Drainage Congestion and Water Logging
  - 4.2.5 Erosion and Sedimentation
  - 4.2.6 River Morphology
  - 4.2.7 Navigation
  - 4.2.8 Ground Water System

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4.3 Land Resources
- 4.3.1 Agroecological Regions
- 4.3.2 Land Types
- 4.3.3 Soil Texture
- 4.3.4 Land Use

4.4 Agriculture Resources
- 4.4.1 Farming Practice
- 4.4.2 Cropping Pattern and Intensity
- 4.4.3 Cropped Area
- 4.4.4 Crop Production
- 4.4.5 Crop Damage
- 4.4.6 Main Constraints of Crop Production

4.5 Livestock and Poultry
- 4.5.1 Feed and Fodder Shortage
- 4.5.2 Livestock/Poultry Diseases

4.6 Fisheries
- 4.6.1 Introduction
- 4.6.2 Problem and Issues
- 4.6.3 Habitat Description
- 4.6.4 Fish Production and Effort
- 4.6.5 Brakish Water and Pond Aquaculture
- 4.6.6 Fish Migration
- 4.6.7 Fish Biodiversity
- 4.6.8 Fisheries Management

4.7 Ecological Resources
- 4.7.1 Bio-ecological Zone
- 4.7.2 Common Flora and Fauna
- 4.7.3 Ecosystem Services and Function

4.8 Socio Economic Condition
- 4.8.1 Socio Economic Condition
- 4.8.2 Quality of Life Indicators
- 4.8.3 Income and Poverty
- 4.8.4 Gender and Women
- 4.8.5 Common Property Resources
- 4.8.6 Conflict of Interest and Law and Order Situation
- 4.8.7 Historical, Cultural and Archaeological Sites

4.9 Ecological Resources
- 4.9.1 Bio-ecological Zone
- 4.9.2 Common Flora and Fauna
- 4.9.3 Ecosystem Services and Function

5.0 Identification and Analysis of Key Environmental Issues (Analysis shall be presented with Scenarios, Maps, Graphics, etc. for the Case of Anticipated Impacts on Baseline)
- 5.1 Environmental Sensitivity Investigation
- 5.2 Environmental Asset
- 5.3 Environmental Hot Spots
- 5.4 Likely Beneficial Impacts
- 5.5 Community Recommendations
- 5.6 Alternate Analysis

6.0 Environmental and Social Impacts
- 6.1 Introduction
- 6.2 Impact on Water Resources
  - 6.2.1 Pre-Construction Phase
  - 6.2.2 Construction Phase
  - 6.2.3 Post-Construction Phase
- 6.3 Impact on Land Resources
  - 6.3.1 Pre-Construction Phase
  - 6.3.2 Construction Phase
  - 6.3.3 Post-Construction Phase

6.4 Impact on Agriculture Resources
- 6.4.1 Pre-Construction Phase
- 6.4.2 Construction Phase
- 6.4.3 Post-Construction Phase

6.5 Impact on Fisheries
- 6.5.1 Pre-Construction Phase
- 6.5.2 Construction Phase
- 6.5.3 Post-Construction Phase

6.6 Impact on Eco System
- 6.6.1 Pre-Construction Phase
- 6.6.2 Construction Phase
- 6.6.3 Post-Construction Phase

6.7 Socio Economic Impact
- 6.7.1 Pre-Construction Phase
- 6.7.2 Construction Phase
- 6.7.3 Post-Construction Phase

7.0 Public Consultation and Disclosure
- 7.1 Introduction
- 7.2 Objectives of Public Consultation and Disclosure Meeting
- 7.3 Approach and Methodology of Public Consultation and Disclosure Meeting
- 7.4 Public Consultation Meetings (PCMs)
- 7.5 Public Disclosure Meetings (PDMs)

8.0 Environmental Management Plan and Monitoring Indicators
- 8.1 Introduction
- 8.2 Mitigation Plan
- 8.3 Enhancement Plan
- 8.4 Contingency Plan
- 8.5 Compensation Plan
- 8.6 Monitoring Plan
- 8.7 Monitoring Indicators

9.0 Cost Estimation for Environmental Mitigation Measures and Monitoring

10.0 Conclusions and Recommendations

III. Without approval of EIA report by the Department of Environment, the project authority shall not be able to open L/C in favor of importable machineries.

IV. Without obtaining Environmental Clearance, the project authority shall not be able to start the physical activity of the project.

V. The project authority shall submit the EIA along with a filled-in application for Environmental Clearance in prescribed form, the applicable fee in a treasury Chalan, the no objection certificates (NOCs) from the local authority, NOCs from forest department (if it is required in case of cutting any forested plant, private or public) and NOC from other relevant agencies for operational activity etc. to the Head Office of DOE in Dhaka with a copy to the concerned Divisional Office of DOE.

10.07.2013

(Syed Nazmul Ahsan)
Deputy Director (Environmental Clearance)
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1) Assistant Director, Office of the Director General, Department of Environment, Head Office, Dhaka.