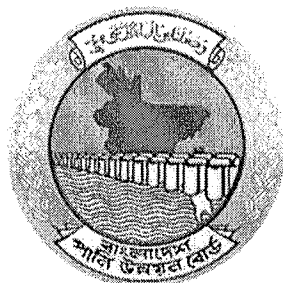


Government of the People's Republic of Bangladesh
Ministry of Water Resources



Bangladesh Water Development Board

PROJECT COMPLETION REPORT: IMED 04/2003
For

**Feasibility Study for Conservation and Use of Rainwater through
Construction of Environment Friendly Water Reservoir at Khoia
Chhara and Govaniya Chhara of Mirsharai Upazila and Kumira
Chhara of Sitakunda Upazila under Chattogram district.**

October, 2023

Government of the People's Republic of Bangladesh
Ministry of Planning
Implementation Monitoring and Evaluation Division
PROJECT COMPLETION REPORT: IMED 04/2003 (Revised)

A. PROJECT DESCRIPTION:

- 01. Name of the Project** : Feasibility Study for Conservation and Use of Rainwater through Construction of Environment Friendly Water Reservoir at Khoia Chhara and Govaniya Chhara of Mirsharai Upazila and Kumira Chhara of Sitakunda Upazila under Chattogram district. (Project Code: 224349100)
- 02. Administrative Ministry** : Ministry of Water Resources (MoWR)
- 03. Executing Agency** : Bangladesh Water Development Board (BWDB)
- 04. Location of the Project** : Dhaka
- 05. Objective of the Project** :

The overall objective of the feasibility study is to assess the viability of conservation of rain water in the suitable Chharas in the study area through construction of eco-friendly structures considering technical, environmental and social aspects. The study will be conducted in two components, hydrological and morphological model study as component-1 and environmental and social impact study as component-2.

The specific objectives (component-wise) of the project are:

Hydrological and Morphological Model Study (Component-1)

- Identification of hilly streams/Chharas suitable for water conservation and future development.
- Catchment area delineation of the Chharas suitable for water conservation.
- Assessment of availability of surface water resources including assessment of suitability for dry season irrigation,
- Assessment of viability of tourism development in the project area;
- Assessment of water demand like agricultural, domestic, industrial etc. including future forecasting.
- Assessment of water quality of the project area.

- Selection of suitable sites of interventions to conserve water in the respective project area considering public demand, land topography, land-use and optimizing water storage capacity.
- Understanding the local water use practices, with emphasis on domestic use, and adaptation strategies under different socio- economic criteria to identify suitability of water treatment plant.
- Assessment of hydraulic design parameters (water level, discharge, length of the dam, scouring depth, reservoir extent etc.) of the proposed interventions.
- Detailed design and cost estimate of proposed Structures.
- Economic analysis of the proposed development plan.
- To assess the project with respect to Environmental Sustainability, Climate Resilience and Disaster Risk and find the ways for reducing/mitigating negative impacts;
- Feasibility assessment including social, technical economic and environmental viability.

Environmental and Social Impact Study (Component-2)

The objective of the ESIA study is to ensure natural water flow & undisturbed environmental flow in the downstream and environment-friendly reservoir to preserve and use rainwater for providing irrigation facility through assessing the impacts of the proposed interventions on the environmental and social components and suggest an environmental management plan for sustainable development of the project. The ESIA would ensure to involve beneficiaries in project conceptualization, Planning and Implementation. The study will assess the biophysical and socio environmental impact with recommendation of appropriate mitigation plan in the project area and to prepare report on EIA to obtain necessary clearances from the Department of Environment (DoE) by the project proponent. The specific objectives of the consultancy service are following:

The main objectives are:

- To provide a consistent and common basis for the application of ESIA to protect environment by ensuring that the project is environmentally sound.
- Identifying, quantifying and evaluating the potential environmental consequences so that the impacts before implementation of the project & impacts of the projects are highlighted. The negative impacts would be addressed in a way conserving the society and environment.
- Ensure that all development with full consideration for economic and environmental optimization, and for a long-term sustainability and equitability of environmental resource conservation.

The ESIA study should specifically include the following:

- Establish the environmental and social baseline conditions of the specified project;
- Obtain information on the proposed interventions;
- Select important environmental and social components presently being impacted and of course likely to be addressed by the proposed interventions;
- Assess environmental and social impacts of proposed project interventions;
- Prepare an Environmental Management Plan (EMP) which should include mitigation measures, enhancement measures, compensation measures and an environmental monitoring plan.



06. Estimated Cost:

(In lakh Taka)

	Original	Latest Revised
(a) Total	489.00	-
(b) Taka	489.00	-
(c) Foreign Currency	-	-
(d) Project Aid	-	-
(e) RPA	-	-

07. Date of Approval :	PCP/PFS	PP
(a) Original :	25/11/2021	-
(b) Latest Revised :	-	-
(c) No cost Time extension :	23/01/2023	-

08. Implementation Period :

	Date of Commencement	Date of Completion
(a) Original	November, 2021	January, 2023
(b) Latest Revised (No cost Time extension)	November, 2021	June, 2023
(c) Actual	November, 2021	June, 2023

09. Financing Arrangement (Source-wise):

9.1 Status of Loan/Grant

a) Foreign Financing :

Source (s)	Currency as per Agreement	Amount in US \$ (Million)	Nature (Loan/Grant / supplier's/ credit)	Date of Agreement	Date of Effectiveness	Date of Closing	
						Original	Revised
1	2	3	4	5	6	7	8
-	-	-	-	-	-	-	-

b) GOB:

(In lakh Taka)

Total amount	Loan	Grant	Cash Foreign Exchange
1	2	3	4
489.00	-	489.00	-

9.2 Utilization of Project Aid: (Source wise)

(In million)

Source (s)	Total Amount		Actual Expenditure		Unutilized Amount	
	In US \$	In Local Currency	In US \$	In Local Currency	In US \$	In Local Currency
1	2	3	4	5	6	7
-	-	-	-	-	-	-

9.3 Re-imbursible Project Aid (RPA) :

(In lakh Taka)

R P A Amount		Amount Spent	Amount Claimed	Amount Re-imbursed	Remarks
As per PP	As per Agreement				
1	2	3	4	5	6
-	-	-	-	-	-

B. IMPLEMENTATION POSITION

01. Implementation Period:

Implementation Period as per PFS		Actual Implementation period	Time Over-run (% of original implementation period)	Remarks
Original	Latest Revised			
1	2	3	4	5
November, 2021 to January, 2023 (15 months)	November, 2021 to June, 2023 (20 months)	November, 2021 to June, 2023 (20 months)	33.33%	Additional Survey work for finalizing the design of proposed interventions took more time than planned for which the consultant could not accomplish the task as scheduled.

02. Cost of the Project:

(In lakh Taka)

Description	Estimated Cost		Actual expenditure	Cost over-run (% of original cost)	Remarks
	Original	Latest revised			
1	2	3	4	5	6
TOTAL	489.00	-	467.68	(-) 4.36%	The actual contract with the consultant was less than the estimated cost.
TAKA	489.00	-	467.68		-
PA	-	-	-	-	-

03. Project Personnel:

Sanctioned strength as per PP	Manpower employed during execution	Status of the existing manpower			Manpower Employed	
		Manpower requirement for O&M as per pp	Existing manpower for O & M	Others	Male	Female
1	2	3	4	5	Male	Female
Officer (s)	11	-	-	-	9	2
Staff(s)	8	-	-	-	4	4
Total:	19	Existing manpower of Directorate of Planning-1, BWDB, Dhaka.			13	6

04. Training of Project Personnel (Foreign/Local) : No provision of training in this project

Field of Training /Study tour/workshop/Seminer etc.	Provision as per PP		Actual		Remarks
	Number of persons	Man - months	Number of persons	Man - months	
1	2	3	4	5	6
a. Foreign	-	-	-	-	-
b. Local	-	-	-	-	-

05. Component-wise Progress (As per latest approved PFS):

(In lakh Taka)

Items of work (As per PP)	Unit	Target (as per PFS)		Actual Progress		Reasons for deviation (±)
		Financial	Physical (Quantity)	Financial	Physical (Quantity)	
1	2	3	4	5	6	7
Revenue Expenditure						
Hydrological and Morphological Model Study	Lot	336.82	100.00%	323.81	100.00%	
Environmental and Social Impact Study	Lot	141.22	100.00%	137.40	100.00%	
Honorarium	Lot	4.00	100.00%	1.43	50.00%	
Other stationery	Lot	1.80	100.00%	1.80	100.00%	
Gas & Fuel	Lot	1.51	100.00%	0.0	0.00%	
Domestic travel expenses	Lot	2.00	100.00%	1.61	77.00%	
Sub-Total=		487.35		466.05		
Capital Expenditure						
Furniture	Lot	1.65	100.00%	1.62	100.00%	
Sub-Total=		1.65	100.00%	1.62	100.00%	
Total=		489.00	100.00%	467.68	99.11%	

06. Information regarding Project Director (s):

Name & Designation with pay Scale.	Full time	Part time	Responsible for more than one project	Date of		Remarks
				Joining	Transfer	
1	2	3	4	5	6	7
Dr. Shamal Chandra Das Addl. Chief Engineer (Civil) Planning Former: Superintending Engineer (Civil) Directorate of Planning- 1, BWDB, Dhaka. Grade-4 (50,000 to 71,200)	Full time	-	Yes	22/12/2021	Till date	-

07. Procurement of Transport (in Nos.): Not applicable

Type of transport	Number as per P.P.	Procured with date	Transferred to Transport Pool with date	Transferred to O & M with date	Condemned/damaged with date	Remarks
1	2	3	4	5	6	7
Car	-	-	-	-	-	-
Jeep	-	-	-	-	-	-
Others with name	-	-	-	-	-	-

08. Procurement of Goods, Works and Consultancy Services:

08.1 Goods & Works of the Project costing above Tk. 200.00 lakh. and Consultancy above Tk. 100.00 lakh:

Description of procurement (goods/works/consultancy) as per bid document	Tender/Bid/Proposal Cost (in lakh Taka)		Tender/Bid/Proposal		Date of completion of works/services and supply of goods	
	As per PFS	Contracted value	Invitation date	Contract signing/ L.C opening date	As per contract	Actual
1	2	3	4	5	6	7
Consultancy Service for "Feasibility Study for Conservation and Use of Rainwater through Construction of Environment Friendly Water Reservoir at Khoia Chhara and Govaniya Chhara of Mirsharai Upazila and Kumira Chhara of Sitakunda Upazila under Chattogram district."	336.82	330.42	08/12/2021	27/01/2022	27/01/2023	31/03/2023

Description of procurement (goods/works /consultancy) as per bid document	Tender/Bid/Proposal Cost (in lakh Taka)		Tender/Bid/Proposal		Date of completion of works/services and supply of goods	
	As per PFS	Contracted value	Invitation date	Contract signing/ L.C opening date	As per contract	Actual
1	2	3	4	5	6	7
Consultancy Service for "ESIA Study for Conservation and Use of Rainwater through Construction of Environment Friendly Water Reservoir at Khoia Chhara and Govaniya Chhara of Mirsharai Upazila and Kumira Chhara of Sitakunda Upazila under Chattogram district"	141.22	139.89	08/12/2021	27/01/2022	27/09/2022	26/06/2023

8.2 Use of Project Consultant (s) (Foreign/Local):

Name of the Field	Approved man month		Actual man month utilised	Remarks
	As per PFS	As per contract		
1	2	3	4	5
a) Foreign:	-	-	-	-
b) Local:				
• Mathematical Modelling Study	51.00	51.00	51.00	Conducted by Institute of Water Modelling
• ESIA Study	25.00	25.00	25.00	Conducted by Center for Environmental and Geographic Information Services

09. Construction/Erection/Installation Tools & Equipment:

Description of items	Quantity (as per PP)	Quantity procured with date	Transferred to O & M with date	Disposed off as per rule with date	Balance	Remarks
1	2	3	4	5	6	7
-	-	-	-	-	-	-

C. FINANCIAL AND PHYSICAL PROGRAMME:

01. (a) Original and revised schedule as per PFS:

(In lakh Taka)

Financial Year	Financial provision & physical target as per original PFS				Financial provision & physical target as per latest revised PFS			
	Total	Taka	P.A.	Physical %	Total	Taka	P.A.	Physical %
1	2	3	4	5	6	7	8	9
2021-22	100.00	100.00	-	41.42%	-	-	-	-
2022-23	389.00	389.00	-	58.58%				
Total					-	-	-	-

01. (b) Revised ADP allocation and progress:

(In lakh Taka)

Financial Year	Revised Allocation & target				Taka release	Expenditure & physical progress			
	Total	Taka	P.A.	Physical %		Total	Taka	P.A.	Physical %
1	2	3	4	5	6	7	8	9	10
2021-22	100.00	100.00	-	41.42%	99.65	64.18	64.18	-	41.42%
2022-23	424.00	424.00		58.58%	417.56	403.50	403.50		57.69%

D. ACHIEVEMENT OF OBJECTIVES OF THE PROJECT:

Objectives as per PFS	Actual achievement	Reasons for shortfall, if any
Objectives of Mathematical Modelling Study:		
Identification of hilly streams/Chharas suitable for water conservation and future development.	Completed- The study has identified 24 hilly Chharas (streams) in this study area. There are two other chharas where BSRM carried out a hydrological study. These Chharas are originated in the nearby eastern hills and finally fall to the Sandwip	-

Objectives as per PFS	Actual achievement	Reasons for shortfall, if any
	Channel of the Bay of Bengal. Out of the 26 Chharas (including 2 chharas added by BSRM), four significant Chharas (streams) in the area are: Govania Chhara and Khoia Chhara of Mirsharai Upazila, Kumira Chhara and Joramtol Khal of Sitakunda Upazila. These four Chharas have been studied in detail to conserve rainwater along with a proposed development plan. In addition, a master plan has been prepared for remaining twenty-two Chharas for future development to conserve rainwater. • Details are given in the Volume-1, chapter-4 under section 4.2.3 & Table 4-2, Section 11.1 of the Final Report, Mathematical Modelling Study (Component-1).	
Catchment area delineation of the Chharas suitable for water conservation.	Completed- Catchment area of the individual Chhara in the study area have been delineated. Sub-catchments of Chharas have been delineated using Digital Elevation Model available (FINMAP) at database of IWM and land terrain data (COPERNICUS) available in public domain. The delineation is carried out with help of the Soil & Water Assessment Tool (SWAT) as well as MIKE HYDRO BASIN Software of DHI. • Details are given in the Volume-1, chapter-4 in section 4.2.5 of the Final Report, Mathematical Modelling Study (Component-1).	-
Assessment of availability of surface water resources including assessment of suitability for dry season irrigation,	Completed- The area is rainfed and the main source of water in the area is flowing water in Chharas/khals. A few of those Chharas are perennial although flow is insignificant during dry months. Annual average water availability in the study area is around 473 Mm³. Monthly average water availability varies from 7 Mm³ in February to 101 Mm³ in July. • Details are given in the Volume-1, chapter/Section-4 in section 4.2.8 of the	-

Objectives as per PFS	Actual achievement	Reasons for shortfall, if any
	Final Report, Mathematical Modelling Study (Component-1)..	
Assessment of viability of tourism development in the project area;	Completed- There are many fountains/waterfalls in the sources of Govania Chhara and Khoia Chhara. The fountains/waterfalls become active in pre-monsoon and monsoon seasons. The tourist from all over the country visits the area to see the fountains/waterfalls. It is thought that after the construction of dam, a reservoir would be created and tourist attraction would be more than the present. • Details are given in the Volume-1, chapter/Section-4 in section 4.2.15 & 4.3.9 of the Final Report, Mathematical Modelling Study (Component-1).	-
Assessment of water demand like agricultural, domestic, industrial etc. including future forecasting.	Completed- It is understood that there exists three different types of water demand (agriculture, domestic, industrial) in the study area. In addition to these three main categories of competing and consumptive users, environmental water demand for the rivers and Chharas is also very important. Water demand has been calculated for the command area taking 1 km land strip on both banks of four major Chharas. Details are given in the Volume-1, chapter/Section-4 in section 4.2.9 of the Final Report, Mathematical Modelling Study (Component-1).	-
Assessment of water quality of the project area.	Completed- Assessment of water quality of the project area has been done. • Details are given in the Volume-1, chapter-4 in section 4.2.19 of the Final Report, Technical Study (Component-1).	-
Selection of suitable sites of interventions to conserve water in the respective project area	Completed- Appropriate site for construction of proposed dam to create Reservoir and conserve water for dry	-

Objectives as per PFS	Actual achievement	Reasons for shortfall, if any
considering public demand, land topography, land-use and optimizing water storage capacity.	season use including other ancillary structures are selected. The sites have been duly visited, and after extensive discussion with local stake holders (including local BWDB officials) and physical investigation, the suitable sites have been identified. Details are given in the Volume-1, chapter-4 in section 4.3.2 and 4.3.3 of the Final Report, Mathematical Modelling Study (Component-1).	
Understanding the local water use practices, with emphasis on domestic use, and adaptation strategies under different socio-economic criteria to identify suitability of water treatment plant.	Completed- There is crisis of water in the area for domestic, agriculture and industrial use. Local people build temporary earthen dams on Chharas to meet their water demand during dry months. Several initiatives have also been taken publicly/privately to reserve rainwater in wet season for use in dry period. Since the area is getting industrialized, the demand of potable water is increasing with days. In the area, rainwater produced in the hilly streams/Chharas is the main source of water since groundwater aquifers are not easily accessible. Details are given in the Volume-1, chapter-4 in section 4.2.13 of the Final Report, Mathematical Modelling Study (Component-1).	-
Assessment of hydraulic design parameters (water level, discharge, length of the dam, scouring depth, reservoir extent etc.) of the proposed interventions.	Completed- Assessment of hydraulic design parameters (water level, discharge, length of the dam, scouring depth, reservoir extent etc.) of the proposed interventions has been done. Detail design of the proposed project components has been prepared following the standard design procedure followed in BWDB Design Manual.. Excavation of Chharas along with cost estimation has been described with design drawing in the Feasibility Study Report (Volume III- Design Report and Volume I (Main Report, Chapter 3 in Section 3.3)- Cost Estimation) Details are given in the Volume-1, chapter-4 in section 4.5 & Volume-III of the Final Report, Mathematical Modelling Study (Component-1).	-

Objectives as per PFS	Actual achievement	Reasons for shortfall, if any
Detailed design and cost estimate of proposed Structures.	Completed- The main benefit of the project is to make available fresh water during dry months. The Financial and Economic capital cost of the project are 34939.4 Lakh Tk. and 26891.34 Lakh Tk. respectively. The O & M costs of the same are 2009.86 Lakh Tk. and 1602.46 Lakh Tk. respectively. Details are given in the Volume-1, chapter/Section-6 in section 6.1 & 6.2 of the Final Report, Mathematical Modelling Study (Component-1).	-
Economic analysis of the proposed development plan.	Completed- The Internal Rate of Return (IRR) of economic has been calculated which are found to be 14.70%. A sensitivity and switching value analysis have been carried out assuming 10% increase in investment cost, 10% decrease in benefit, however sensitivity analysis has been also carried out with costs being increased by 10% together with benefits being decreased by 10% which eventually indicates that the EIRR in most of the cases is better to opportunity cost of capital 12%. The Economic Benefit Cost Ratio (BCR @ 12%) is 1.28, Economic Net Present Value (ENPV @ 12%) is 8164.09 Lakh Tk. and Economic Internal Rate Return (EIRR %) is 14.7. Details are given in the Volume-1, chapter-6 in section 6.2 of the Final Report, Mathematical Modelling Study (Component-1).	-
To assess the project with respect to Environmental Sustainability, Climate Resilience and Disaster Risk and find the ways for reducing/mitigating negative impacts;	Completed- The socio-economic effects, environmental impacts, disaster and climate change impacts due to implementation of aforementioned project has been assessed. Details are given in the Volume-1, chapter-5 of the Final Report, Mathematical Modelling Study (Component-1).	
Feasibility assessment including social, technical	Completed- The analysis of the interventions and impact is that project is technically feasible, economically	

Objectives as per PFS	Actual achievement	Reasons for shortfall, if any
economic and environmental viability.	viable, socially acceptable and environmental-friendly. Details are given in the Volume-1, chapter-6 under section 6.2 of the Final Report, Mathematical Modelling Study (Component-1).	
Obejectives of ESIA Study:		
To provide a consistent and common basis for the application of ESIA to protect environment by ensuring that the project is environmentally sound.	Completed- The project objectives and relevant interventions to fulfill the objectives were disseminated through a public consultation, FGD etc. and provided in Chapter 6. Received suggestions from them to improve /modify interventions for socio-economic upgradation and environmental sustainability. Overall ESIA study was conducted following the Guideline for Environmental Assessment of Water Management Projects (WARPO, 2005), of which detail methodology is described in Chapter 2 of the Final Report, ESIA Study (Component-2).	-
Identifying, quantifying and evaluating the potential environmental consequences so that the impacts before implementation of the project & impacts of the projects are highlighted. The negative impacts would be addressed in a way conserving the society and environment.	Completed- Environmental and social impacts for both before and after the implementation of the project have been identified and provided in Chapter 8. In the Chapter 9 of the Final Report, ESIA Study (Component-2), mitigation measures are suggested to mitigate negative impacts; whereas an enhancement plan is provided for the positive impact.	-
Ensure that all development with full consideration for economic and environmental optimization, and for a long-term sustainability and equitability of environmental resource conservation.	Completed- All development plans are formulated by considering economic and environmental optimization, and long-term sustainability and equitability of environmental resource conservation.	-
Establish the environmental and social baseline conditions of the specified project;	Completed- In the Chapter 5 of the Final Report, ESIA Study (Component-2), The environmental and social	-

Objectives as per PFS	Actual achievement	Reasons for shortfall, if any
	baseline conditions of the specified project have been prepared based on primary and secondary data collection.	
Obtain information on the proposed interventions;	Completed- Detailed information for proposed interventions has been collected from Technical Study Team (IWM) Chapter 4.	-
Select important environmental and social components presently being impacted and of course likely to be addressed by the proposed interventions;	Completed- Important environmental and social components presently being impacted and are likely to be impacted by the proposed interventions have been selected and provided in Chapter 7 of the Final Report, ESIA Study (Component-2).	-
Assess environmental and social impacts of proposed project interventions;	Completed- Environmental and social impacts have been assessed and provided in Chapter 8 of the Final Report, ESIA Study (Component-2).	-
Prepare an Environmental Management Plan (EMP) which should include mitigation measures, enhancement measures, compensation measures and an environmental monitoring plan;	Completed- Environmental Management Plan (EMP) including mitigation measures, enhancement measures, compensation measures, and an environmental monitoring plan for different resources based on positive or negative impacts have been prepared considering the proposed interventions provided by Technical Study Team (IWM) (Chapter 09 (Table 9.1 and Table 9.2) of the Final Report, ESIA Study (Component-2)	



E. BENEFIT ANALYSIS

01. Annual Out-put: Not applicable for the Study Project

Items of out-put	Unit	Estimated quantity expected at full capacity	actual quantity of out-put during the 1st year of operation at full capacity (or during, real production for newly completed project).
-	-	-	-

02. Cost / Benefit: Not Applicable for the Study Project

Item	Estimated	Actual
(1) Benefit cost ratio of the project (i) Financial (ii) Economic	-	-
(2) Internal Rate of Return (i) Financial (ii) Economic		

03. Please give reasons for shortfall, if any, between the estimated and actual benefit: N/A

F. MONITORING AND AUDITING

Monitoring: Nil

Name & designation of the inspecting official	Date of Inspection	Identified Problems	Recommendations
1	2	3	4
(a) Ministry / Agency: (b) IMED: (c) Others: (Please specify)	-	-	-

2. Auditing during and after Implementation:

2.1. Internal Audit: No audit conducted.

Period of Audit	Date of submission of Audit Report	Major findings/ objections	Whether objections resolved or not.
1	2	3	4
-	-	-	-



2.2. External Audit:

Audit period	Date of submission of Audit Report	Major findings/ objections	Whether objections resolved or not.
1	2	3	4
	-		-

G. DESCRIPTIVE REPORT

1. General Observations/Remarks of the Project on:

1.1 Background

Bangladesh Water Development Board is the mandated organization to administer Flood Control, Drainage improvement and Irrigation (FCDI) of the country. Food security is a vital issue for Bangladesh. To enhance food production for the huge population of the country, it is required to explore new technologies in irrigation sector to bring more lands under irrigable area. BWDB has already implemented several major and minor irrigation projects in South East and Eastern Hilly region to store water for irrigation development. Some of the projects are- Muhuri Irrigation Project, Muhuri Kahua FCDI Project, Mohamaya Chhara Irrigation Project, LaxmiChhara Irrigation Project, Hinguli Chhara Irrigation Project, etc. There are some local initiatives of earthen dam construction in small extent to feed local house hold consumption and irrigation water to the adjacent area. Eastern hilly region is facing a lot due to the scarcity of water in dry season. There is opportunity to utilize the huge quantity of rain water which passes away through khals by constructing dams and reservoirs.

Mirsharai and Sitakunda upazila of Chattogram district are surrounded by hills to the east and sea to the west. The area is located in hilly region, and there is tremendous crisis of necessary potable water in the area for domestic use of hilly people, industrial use of the industries located in the foot hills, and irrigation water for agriculture. Thus, inhabitants of the locality, distinguished people and owners of the industries have been demanding to make available potable water for long days through conservation of water in the Chharas. The people of Sitakunda and Mirsarai Upazilas are suffering from the scarcity of fresh drinking water due to lack of water conservation during the monsoon season and lack of water during the dry season.

Originating from hills located in the east of Kumira Union of Sitakunda Upazila in Chattogram District, the Kumira Chhara flows in a meandered way through GPHIspat and other industries and falls into the Bay of Bengal at Ghoramara. The Chhara is flashy but perennial. The area is located in hilly region, and there is tremendous crisis of required potable water in the area for domestic use of hilly people, industrial use of the industries located in the foot hills, and irrigation water for agriculture. Thus, inhabitants of the locality, distinguished people, and owners of the industries have been demanding to make available potable water for long days through conservation of water in the Chhara.

The Govania Chhara flows in the east of Mirsharai Upazila. After meeting the Boalia Spring at Boalia, the Govania Chhara crosses Uttar Ambaria and Dakkhin Ambaria area. Flowing beside Mirsharai Upazila and travelling around fifteen kilometers, it meets the Mogadia Khal and Shaher Khali Khal.

Later on, it falls into the Bay of Bengal travelling another seven kilometers. Water coming from several springs: Hurmara Spring, Uthan Spring, Andamanik Spring and Luita Spring is also added in the course of Govania Chhara. So, the Govania Chhara is a potential source of potable water. Many people live in hills and foot hills located in the east of Mirsharai Upazila. These people live in a distress condition due to lack of required potable water. The people living in the plain land of foot hills as well as Bangali and tribal people living in hills have been demanding for long days to make available water for domestic and irrigation uses through development of reservoir by building dams on the Chhara. It is to be noted that installation of either Shallow Tube Well (STW) or Deep Tube Well (DTW) is not feasible in the area due to existence of rocks underneath the hills. Thus, people of the area are suffering a lot from scarcity of potable water. According to the local people, the then British Government made potable water available through building earthen dams constructed by the land lords. Later on, no step was taken to maintain those earthen dams.

The Khoia Chhara Spring originates at the place "Khoia Chhara" of the hill located in the north-east of Mirsharai Upazila. Traversing about three kilometers meandered course and flowing over plain land, the Khoia Chhara meets Bamansundar Khal via Mogadia Khal. Later on it travels nine kilometers and falls into the Bay of Bengal. People residing on hills and plain lands in both sides of the Chhara live in distress condition due to scarcity of potable water. Either digging well or installation of tube well is not feasible as it is a hilly area. Rain water and spring water are directly falling into the sea due to lack of any conservation facility. It is a long standing demand of the people in locality to make available potable water for drinking as well as irrigation water for agriculture by creating a reservoir and conserving of rainwater and spring water through building dam and water control structure on the Chhara.

BWDB intends to implement a project to utilize the rain water which eventually flows down to the sea. In this connection, in view of the long standing demand of the people in the said areas, a technical committee was formed by BWDB to Prepare a DPP to solve the said problem.

Members of the technical committee submitted a technical report recommending construction of Earthen dam at Khoia Chhara and Govaniya Chhara of Mirsharai Upazila and at Kumira Chhara of Shitakunda Upazila. They also recommended for construction of retention structure at Joramotol khal of Shitakunda Upazila.

According to the recommendation of the technical committee a development project proposal(DPP) was prepared in connection with construction of Environment Friendly Water Reservoir at Sitakunda and Mirsharai Upazila in Chattogram district. In the light of the opinion and recommendations of the technical committee, a proposal with a cost of 21,652.93 lakh was formulated. Construction of 3 nos of Earthen Dam, 3 nos of Intake Structure, 1 nos of 2 vent regulator, Spillway and re-excavation of 3km khal was included under the DPP.

Following the suggestions of the Technical Committee, the prepared DPP was submitted to BWDB. Later on, the DPP was placed in Ministry of Water Resources and an evaluation meeting of the project was held on 11 March, 2021. The meeting was chaired by the honourable Senior Secretary, Ministry of Water Resources. One of the decisions of the meeting minutes was "Feasibility study has to be completed as per the recent instructions of the Planning Commission on the project. In order to

determine the scope of work of the project, 2 Proposals for Feasibility Study (PFS) might be submitted to the Ministry for Hydrological Study and EIA and SIA in the project area.”

1.2 Justification/Adequacy

Sitakund Upazila of Chattogram district is a industry rich area which is playing vital role in national economy. There are many industries here: GPH Ispat Group, BSRM Group, Abul Khair Group, KSRM Group, TK Group, SA Group and so on. Recently an Investment Agreement of amounting 2000 crore has been signed between GPH Ispat Group and Austria Pray Metal Technology (GMBH) to develop modern and environment friendly industrial area in Kumira of Sitakund.

The proposed project area is very important in consideration of geographic location. The project is located in hilly area, and it is not possible to meet the demand of necessary potable water of hilly inhabitants and required water of industries of the area. If a reservoir of potable water is developed through construction of dams on flowing hilly streams, then irrigation potential would be created, environmental balance would be preserved, and socio-economic condition would be improved. Some expected benefits but not limited to of the projects are:

- Potable water would be available to the people living in hilly and plain land areas.
- Irrigation facilities would be enhanced.
- Water demand of industries located in the area would be met up.
- Tourism industry would be flourished.
- Communication system would be improved.
- Employment would be increased.
- Socio-economic condition would be improved.
- Fishery production would be enhanced.
- Forestry would be extended.
- Ecological balance would be preserved.

At this situation it has been decided to take the project based on the state-of-the-art features of public amenities and facilities including flood and drainage management and ecosystem restoration activities. Under these circumstances, a comprehensive Feasibility Study is required of the area supported by detail design of planned infrastructures for the preparation of DPP.

To meet Sustainable Development Goals, it is essential to protect and restore water related ecosystems such as wetlands and khalss. Urgent action must be taken to reduce the loss of natural habitats and biodiversity which are part of our common heritage. Besides, National Water Policy (NWPo-1999) indicates priorities for different multi-sectoral needs to be ensured in planning & development of water management projects. Development of reservoirs in the area is required to improve conservation of fresh water, facilitate development of industries, preserving natural habitats of fishes and other aquatic life thereby improving socio-economic and environmental condition of the country.



Linkage with Sustainable Development Goal (SDG), 2100

SDGs' targets	Integrated Issues (Development Targets) with Government 8 FYP
SDG 6. Ensure availability and sustainable management of water and sanitation for all	i) Safe drinking water to be made available for all rural and urban population.
Achievement of Targets due to implementation of the project	
• Groundwater table would be richer in Mirsharai and Sitakund areas. • Crisis of water would be reduced. • Different educational institutions, Universities, Industries located in the area would utilize the reservoir as source of water.	

Linkage With Bangladesh Delta Plan (BDP), 2100

- The Project will contribute to the implementation of the Bangladesh Delta Plan 2100 from technical aspect.
- The concept of the project is in line with BDP2100. Particularly, the Project contributes to the following Goal, strategies and sub-strategies:

BDP 2100 Specific Goals

Goal 2: Enhance water security and efficiency of water usages.

Goal 6: Achieve optimal and integrated use of land and water resources.

Strategy at National Level

- Strategy FW 1: Ensure water Availability by Balancing Supply and Demand for Sustainable and inclusive Growth
- Strategy FW 2: Maintaining water Quality for Health, Livelihoods and Ecosystem.
- Sub-strategy FW 1.6: restoration of natural reservoir and water bodies along their biodiversity conservation

Hotspot Specific Strategies

4) Chattogram Hill Tracts

- Ensure water security
- Maintain ecological balance and values (assets)

At this circumstance, a holistic approach is required to complete the study on the stated Chharas so that the goal of Bangladesh Delta Plan can be achieved.



1.3 Objectives

The overall objective of the feasibility study is to assess the viability of conservation of rain water in the suitable Chharas in the study area through construction of eco-friendly structures considering technical, environmental and social aspects. The study will be conducted in two components, hydrological and morphological model study as component-1 and environmental and social impact study as component-2.

The specific objectives (component-wise) of the project are:

Hydrological and Morphological Model Study (Component-1)

- Identification of hilly streams/Chharas suitable for water conservation and future development.
- Catchment area delineation of the Chharas suitable for water conservation.
- Assessment of availability of surface water resources including assessment of suitability for dry season irrigation,
- Assessment of viability of tourism development in the project area;
- Assessment of water demand like agricultural, domestic, industrial etc. including future forecasting.
- Assessment of water quality of the project area.
- Selection of suitable sites of interventions to conserve water in the respective project area considering public demand, land topography, land-use and optimizing water storage capacity.
- Understanding the local water use practices, with emphasis on domestic use, and adaptation strategies under different socio- economic criteria to identify suitability of water treatment plant.
- Assessment of hydraulic design parameters (water level, discharge, length of the dam, scouring depth, reservoir extent etc.) of the proposed interventions.
- Detailed design and cost estimate of proposed Structures.
- Economic analysis of the proposed development plan.
- To assess the project with respect to Environmental Sustainability, Climate Resilience and Disaster Risk and find the ways for reducing/mitigating negative impacts;
- Feasibility assessment including social, technical economic and environmental viability.

Environmental and Social Impact Study (Component-2)

The objective of the ESIA study is to ensure natural water flow & undisturbed environmental flow in the downstream and environment-friendly reservoir to preserve and use rainwater for providing irrigation facility through assessing the impacts of the proposed interventions on the environmental and social components and suggest an environmental management plan for sustainable development of the project. The ESIA would ensure to involve beneficiaries in project conceptualization, Planning and Implementation. The study will assess the biophysical and socio environmental impact with recommendation of appropriate mitigation plan in the project area and to prepare report on EIA to obtain necessary clearances from the Department of Environment (DoE) by the project proponent. The specific objectives of the consultancy service are following:



The main objectives are:

- To provide a consistent and common basis for the application of ESIA to protect environment by ensuring that the project is environmentally sound.
- Identifying, quantifying and evaluating the potential environmental consequences so that the impacts before implementation of the project & impacts of the projects are highlighted. The negative impacts would be addressed in a way conserving the society and environment.
- Ensure that all development with full consideration for economic and environmental optimization, and for a long-term sustainability and equitability of environmental resource conservation.

The ESIA study should specifically include the following:

- Establish the environmental and social baseline conditions of the specified project;
- Obtain information on the proposed interventions;
- Select important environmental and social components presently being impacted and of course likely to be addressed by the proposed interventions;
- Assess environmental and social impacts of proposed project interventions;

Prepare an Environmental Management Plan (EMP) which should include mitigation measures, enhancement measures, compensation measures and an environmental monitoring plan;

1.4 Project revision with reasons: Not applicable

2. Rationale of the project in respect of Concept, Design, Location and Timing:

Sitakunda and Mirsharai upazilas under Chattagram district is surrounded by hills in the east and sea in the west. There is scarcity of sweet water in the area. The ground water of the area is not easily accessible and not suitable (saline) for domestic and other uses. Moreover, the area is an industrial belt and there is huge demand of sweet water in the area. There are many industries already established in the area, out of which GPH ISPAT Group, BSRM Group, PHP Family, Abul Khair Group, KSRM Group, TK Group, SA Group are prominent.

The project is located in hilly area, given the topography and geological characteristics, it is not possible to meet the demand of domestic and other water needs from the available water sources. If rainwater is harvested by constructing reservoir through construction of dams on flowing hilly streams, significant water could be conserved between hills. This conserved water could be made available for drinking and other uses.

Under these circumstances, it has been decided to carry out a Feasibility Study of the project based on the state-of-the-art technology and investigate the possibility of construction of reservoir through construction of dam and allied structural and non-structural measures.



It is anticipated that implementation of the project would help socio-economic development in the area through making water available for domestic, industrial and agricultural uses, which otherwise would be difficult to achieve.

Given this, the project seems appropriate when considered in respect of areal extent or location, time and technical concept.

3. Brief description on planning and financing of the project and its applicability.

◆ Project Identification:

Mirsharai and Sitakunda Upazilas of Chattogram district are surrounded by hills to the east and sea in the west. There is crisis of necessary potable water in the area for domestic use. The hilly people demand water for irrigation in the dry season to grow crops. Besides, a large number of small and big industries are growing in the area which also need water. A number of Chharas (creeks) are originated from hilltop (Figure 1), and flow downstream to the Sandwip Channel. Most of the Chharas become live in monsoon due to rainfall in the upper catchment area but hold very insignificant water in dry months. There is an opportunity to harvest significant quantity of rainwater generated in hilly catchment area. These stream water available during monsoon could be used for domestic, industrial, and environmental use including irrigation during dry months.

Bangladesh Water Development Board (BWDB) has already implemented several major and minor irrigation projects in Southeast and Eastern Hilly regions to store water for irrigation development. Some of the existing projects are: Muhuri Irrigation Project, Muhuri Kahua FCDI Project, Mohamaya Chhara Irrigation Project, Laxmi Chhara Irrigation Project, Hinguli Chhara Irrigation Project, etc. Local Government Engineering Department (LGED) has also implemented several projects to conserve water in the area. Some private industries have implemented structures or reservoirs to conserve water for their use. There are some initiatives of local people where they have constructed earthen dam in small-scale to facilitate local household consumption and irrigation demand to the adjacent area.

In view of the long-standing demand of the people, BWDB decided to carry out a feasibility study to conserve rainwater in Govania Chhara, Khoia Chhara (a tributary of Govania Chhara) in Mirsharai Upazila and Kumira Chhara and Joramtol Khal in Sitakunda Upazila.

The main objective of this Feasibility Study is to assess the viability of conservation of rainwater in the suitable Chharas in the study area through construction of eco-friendly structures considering technical, environmental and social aspects.



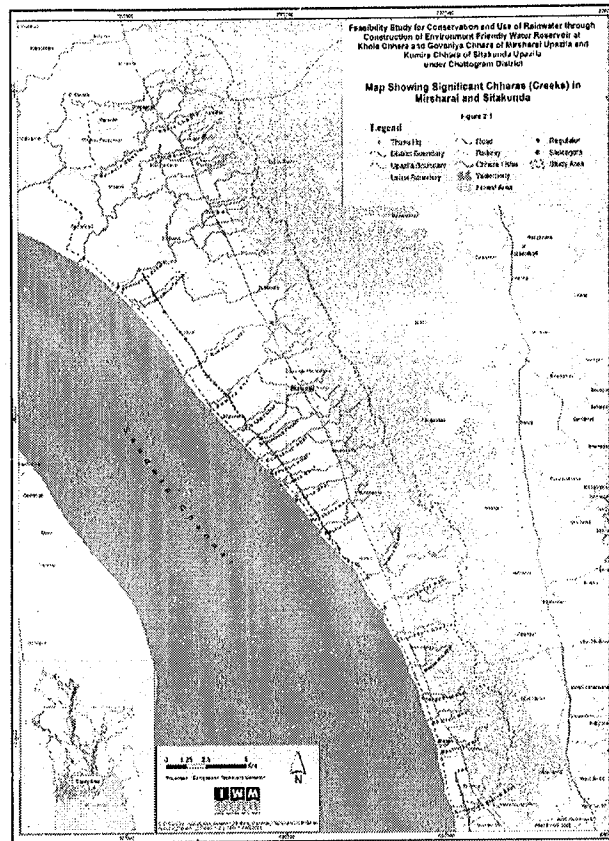


Figure 1: Map showing significant Chharas (creeks) in Mirsharai and Sitakunda

◆ Project Preparation:

In view of the long-standing demand of the people in the areas, a technical committee was formed by BWDB to explore potential to conserve water in the area to mitigate the acute crisis of water during dry months.

According to the recommendation of the technical committee, a development project proposal (DPP) was prepared in connection with construction of Environment Friendly Water Reservoir at Sitakunda and Mirsharai Upazilas in Chattogram district.

Following the suggestions of the Technical Committee, the DPP was submitted to Ministry of Water Resources (MOWR) and an evaluation meeting was held on the proposed project on 11 March, 2021. The meeting was chaired by the Senior Secretary, Ministry of Water Resources. In the meeting it was decided to carry out a Feasibility Study following the instructions of the Planning Commission. Therefore, the study project was prepared accordingly.

◆ **Appraisal:**

Appraised on Departmental Project Evaluation (DPEC) meeting held on 04/10/2021 at Ministry of Water Resources

◆ **Credit Negotiation:** N/A

◆ **Credit Agreement:** N/A

◆ **Credit Effectiveness:** N/A

◆ **Loan Disbursement:** N/A

◆ **Loan Conditionalities:** N/A

◆ **Project Approval:** Approved by Honorable State Minister, MoWR on 25/11/2021.

◆ **Others (if any):** N/A

4. Analysis of the Post-Implementation situation and result of the project: Not applicable for this study project

- 4.1 Whether the beneficiaries of the project have clear knowledge about the Target/ Objectives of the project.
- 4.2 Programme for use of created facilities of the project
- 4.3 O & M programme of the project.
- 4.4 Impact of the project -
 - 4.4.1 Direct
 - 4.4.2 Indirect
- 4.5 Transfer of Technology and Institutional Building through the project
- 4.6 Employment generation through the project.
- 4.7 Possibility of Self employment
- 4.8 Possibility of women-employment opportunity
- 4.9 Women's participation in development
- 4.10 Probable Impact on Socio-Economic activity.
- 4.11 Impact on environment
- 4.12 Sustainability of the project
- 4.13 Contribution to poverty alleviation/reduction
- 4.14 Opinion of the public representatives, local elite, local administration, teachers, religious leaders, women's representatives etc.
- 4.15 Contribution of Micro-credit programmes and Comments on overlapping with any NGO activities.



5. **Problems encountered during Implementation (with duration & steps taken to remove those):** It is a consultancy service procurement project. The below mentioned problems do not occur.

- | | |
|---|---|
| 5.1 Project Management | 5.12 Project aid disbursement and re-imbursment |
| 5.2 Project Director | 5.13 Mission of the development partners. |
| 5.3 Land Acquisition | 5.14 Time & Cost Over-run |
| 5.4 Procurement | 5.15 Project Supervision/Inspection |
| 5.5 Consultancy | 5.16 Delay in Decision |
| 5.6 Contractor | 5.17 Transport |
| 5.7 Manpower | 5.18 Training |
| 5.8 law & Order | 5.19 Approval |
| 5.9 Natural calamity | 5.20 Others. |
| 5.10 Project financing, allocation and release. | |
| 5.11 Design formulation/approval | |
- 

6. Remarks & Recommendations of the Project Director

Necessary administrative approval for conduction the '*Feasibility Study for Conservation and Use of Rainwater through Construction of Environment Friendly Water Reservoir at Khoia Chhara and Govaniya Chhara of Mirsharai Upazila and Kumira Chhara of Sitakunda Upazila under Chattogram district*' was accorded from Ministry of Water Resources vide memo no: 42.00.0000.042.14.005.21-228, dated: 25/11/2021.

The main objective of the study is to assess the viability of conservation of rainwater in the suitable Chharas in the study area through construction of eco-friendly structures considering technical, environmental and social aspects.

The study area is located in Mirsharai and Sitakunda Upazilas of Chattogram district and surrounded by hills to the east and sea in the west. A lot of Chharas (creeks) are originated from hilltop, and flow downstream to the Sandwip Channel. Most of the Chharas become live in monsoon due to rainfall in the upper catchment areas but hold very insignificant water in dry months. There is tremendous crisis of necessary fresh water in the area for various uses e.g. domestic, agricultural and industrial uses. As a result economic development in the area is hampere. The hilly people demand water for irrigation in the dry season to grow crops. A large number of industries are growing in the area which also need water. Several rainwater conservation measures have been developed by both private and public initiatives in the area. Bangladesh Water Development Board (BWDB) has already implemented several major and minor irrigation projects in the nearby areas to store water for irrigation development. Some of the projects are Mohamaya Chhara Irrigation Project, Laxmi Chhara Irrigation Project, Hinguli Chhara Irrigation Project, etc. Local Government Engineering Department (LGED) has also implemented several projects to conserve water in the area. Some private industries have implemented structures or reservoirs to conserve water for their use. There are some initiatives of local people where they have constructed earthen dam to small extent to facilitate local household consumption and irrigation demand to the adjacent area. Realizing the necessity of water conservation and its potential, BWDB decided to conduct the Study.

The study has identified 26 hilly Chharas (streams) in this study area. Out of the 26 Chharas (including 2 chharas added by BSRM), four significant Chharas (streams) in the area are: Govania Chhara and Khoia Chhara of Mirsharai Upazila, Kumira Chhara and Joramtol Khal of Sitakunda Upazila. These four Chharas have been studied in detail to conserve rainwater along with a proposed development plan. In addition, a master plan has been prepared for remaining twenty two Chharas for future development to conserve rainwater.

A detailed investigation has been conducted under the study supported by field investigation, survey and data collection, discussion with local stakeholders and necessary technical analysis using mathematical modelling technique. After detail analysis the Feasibility Study recommended the following measures:

- Construction of earthen dams including intake structures and spillways: 3 Nos. (479 meter)
- Construction of approach roads: 3 Nos. (2.27 km)



- Construction of box culverts: 8 Nos.
- Construction of regulator: 4 Nos.
- River bank protection: 2 Nos. (400 meter)
- Re-excavation of Chhara: 3 Nos. Chharas (11 km)
- Rehabilitation of existing regulators: 5 Nos.
- Construction tourism facilities: 3 items

Out of 22 small Chharas, water conservation measures have already been implemented by public, private, and local people initiatives in six Chharas. Based on field investigation and preliminary assessment carried out using secondary data and information it is understood that there is potential to conserve rainwater in seven Chharas which are: Napita Chhara, Sonaichari Chhara, Boro Komoldaho/Ruposhi Chhara, Zarzari Chhara, Suptadhara Chhara, Konailla Chhara, and Hinguli Chhara. It is proposed to develop water conservation measures including earthen dams and ancillary structures in the stated seven Chharas. Detail Feasibility study supported by adequate field survey data and information, stakeholder consultation, hydro-morphological analysis including carrying out detail design of proposed structures is necessary before implementation. There is no potential to conserve water in the rest nine small Chharas.

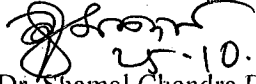
It is understood that installation of hydropower is not commercially viable even after development of reservoir in the area. If the suggested development plan is implemented, about 11.6 Mm³ (against estimated demand about 9.75 Mm³) of rainwater will be conserved to be used in dry months (November-May). The conserved rainwater is planned to be used for domestic, agriculture and industrial use in the study area.

It is anticipated that implementation of the project would help in socio-economic development in the area by making fresh water available to different users. The estimated Financial and Economic capital cost of the project are 34939.4 Lakh Tk. and 26891.34 Lakh Tk. respectively. The Internal Rate of Return (IRR) of economic has been calculated which are found to be 14.70%. The project is found to be technically viable, socially acceptable economically feasible and environmentally sustainable.

It is strongly recommended to implement the proposed interventions to meet the water demand in the area thereby contributing socio-economic development of the local people.

Date:

Signature and seal of the Project Director


(Dr. Shamal Chandra Das)

Addl. Chief Engineer (Civil) Planning

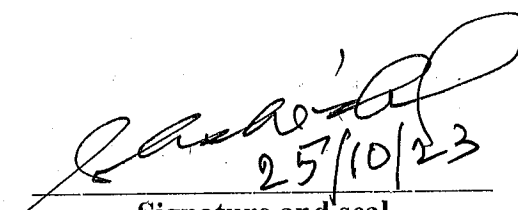
Former: Superintending Engineer (Civil)
Directorate of Planning-1, BWDB, Dhaka.



7. Remarks/Comments of Agency Head

The study focused on rainwater conservation measures to meet different types of water demand (agriculture, domestic and industrial) in the study area. Depending on the local need, hydrological and topographical conditions, different interventions have been proposed to conserve and make use of the stored water. In this consultancy service detail study have been done on 4 nos. of Chharas (Khoia Chhara, Govaniya Chhara, Kumira Chhara and Joramtol khal) to conserve rainwater. A development plan has been developed under this study. In addition, a master plan has been prepared for the remaining Chharas of the project area for future development to conserve rainwater. The concept of the project is in line with BDP2100. The proposed interventions also have close relevance to the SDG 6 and the 8th FYP. The project will help to meet domestic water needs to some extent, to increase agricultural productivity and to meet industrial demand to some extent. It is expected that implementation of the project would help mitigate water crisis and contribute to socio-economic development in the area. Under the circumstances, it is recommended to implement the project.

Date: 25/10/2023


25/10/23
Signature and seal
(S.M. Shahidul Islam)
ID NO: 650307001
Director General
BWDB, Dhaka.

8. Remarks/Comments of the officer in- charge of the Ministry/Division

The study project has been done successfully and subsequent investment project will be taken as per recommendations of the study.

Date:

Signature and seal