2020-21

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 Re-excavation of New Dakatia River in Cumilla and Chandpur District

August, 2021

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 Re-excavation of New Dakatia River in Cumilla and Chandpur District **(Project code- 222010700)**
02.	**Administrative Ministry/Division**	:	Ministry of Water Resources (MoWR)
03.	**Executing Agency**	:	Bangladesh Water Development Board (BWDB)
04.	**Location of the Project**	:	Cumilla and Chandpur district

05. Objective of the Project:

The main objective of the study is to assess the feasibility of the envisaged re-excavation of the New Dakatia River from technical point of view, and find out feasible options for Integrated water resources development including flood management and drainage improvement as well as improvement of navigability in the study area.

The specific objectives of the study are:

- To develop hydro-morphological baseline conditions of the study area;
- To assess water retention capacity of the New Dakatia River;
- To assess availability of surface water resources of the New Dakatia River;
- To protect the project area from flood, and improving drainage situation and navigation facilities.
- To identify the most erosion prone areas and recommend effective measures for improving stability of the river bank.
- To assess requirement of dredging along New Dakatia River to ensure smooth drainage.
- To prepare dredged material management plan.
- To estimate sedimentation rate and plan of future maintenance dredging to maintain natural flow.
- To identify infrastructures those need to be reconstructed.
- To assess water requirement for agriculture, industry and domestic purposes.
- To prepare afforestation plan considering classification of trees.
- To assess social and environment impact as per requirement of DoE.
- To assess impact on agriculture and ecosystem (aquatic/land).
- To prepare environmental monitoring and management Plan (EMPP).
- To develop integrated river management plan for the restoration of New Dakatia River with "no regret" concept (BDP 2100).

06. Estimated Cost :

(In lakh Taka)

	Original	**Latest Revised**
(a) Total	321.00	-
(b) Taka	321.00	-
(c) Foreign Currency	-	-
(d) Project Aid	-	-
(e) RPA	-	-

07.	Date of Approval	:	PCP/PFS	PP
(a) Original		:	18.08.2020	
(b) Latest Revised		:	-	
(c) No Cost Time Extension		:	05.01.2021	

08. Implementation Period :

	Date of Commencement	Date of Completion
(a) Original	August 2020	March 2021
(b) Latest Revised	-	-
(c) Actual	August 2020	June 2021

09. Financing Arrangement (Source-wise):

9.1 Status of Loan/Grant

a) Foreign Financing : *Not Applicable*

Source (s)	Currency as per Agreement	Amount in US $ (Million)	Nature (Loan/Grant/ supplier's/ credit)	Date of Agreement	Date of Effective-ness	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
321.00	-	321.00	-

9.2 Utilization of Project Aid: *Not Applicable*

(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): *Not Applicable*

(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 PP		Actual Implementation period	Time Over-run (% of original implementation period)	Remarks
Original	Latest Revised			
1	2	3	4	5
August 2020-March 2021 (08 months)	-	August 2020-June 2021 (11 months)	37.5 %	Due to covid -19 situation

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	321.00	-	297.42	-	The actual expenditure was less than the estimated cost.
TAKA	321.00	-	297.42	-	
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		
1	2	3	4	5	Male	Female
Officer (s)	11	-	-	-	10	1
Staff(s)	14	-	-	-	8	6
Total :	25	Existing Manpower of Directorate of Planning-1, BWDB			18	7

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 person	Man - months	Number of person	Man - months	
1	2	3	4	5	6
a. Foreign	N/A	N/A	N/A	N/A	
b. Local	N/A	N/A	N/A	N/A	

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

(In lakh Taka)

Items of work (as per PFS)	Unit	Target (as per PFS)		Actual Progress		Reasons for deviation (±)
		Physical	Financial	Physical (%)	Financial	
1	2	3	4	5	6	7
A. Revenue						
1. Feasibility Study (Local Professionals, 43 MM)	Man-Month	43	310.83	43	292.11	
2. Other stationery	LS	100%	1.77	100.00%	1.74	
3. Honorarium	LS	100%	3.80	66.00%	1.59	
4. Domestic travel expenses	LS	100%	0.80	65.00%	0.00	
5. Entertainment Expenses	LS	100%	1.80	10.00%	0.00	
Sub-total (Revenue):			**319.00**	**99.00%**	**295.44**	
B. Capital						
6. Computer and accessories	LS	100%	2.00	100%	1.98	
Sub-total (Capital):		**100%**	**2.00**	**100%**	1.98	
Grand-Total		**100%**	**321.00**	**99.01%**	**297.42**	

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 Superintending Engineer Grade-4; 50,000-71,200	Full time	-	Yes	11.11.2018 (Charge assume date)	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	-	-	-	-	-	
Microbus	-	-	-	-	-	
Minibus	-	-	-	-	-	
Bus	-	-	-	-	-	
Pick-up	-	-	-	-	-	
Truck	-	-	-	-	-	
Motor Cycle	-	-	-	-	-	
By-cycle	-	-	-	-	-	
Speed Boat	-	-	-	-	-	
Launch	-	-	-	-	-	
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	Tender/Bid/Proposal Cost (in lakh Taka)		Tender/Bid/Proposal		Date of completion of works/services and supply of goods	
/consultancy) as per bid document	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 Services for "Feasibility Study for Re-excavation of New Dakatia River in Cumilla and Chandpur District"	310.83	292.11	27.08.2020	28.09.2020	27.03.2021 (Original) 30.06.2021 (Revised)	30.06.2021

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

Name of the Field	Approved man month		Actual man month utilised	Remarks
	As per PP	As per contract		
1	2	3	4	5
a) Foreign :	-	-	-	
b) Local:	43	43	43	

09. Construction/Erection/Installation Tools & Equipment: ***Not Applicable***

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 PP				Financial provision & physical target as per latest revised PP			
	Total	Taka	P.A.	Physical %	Total	Taka	P.A.	Physical %
1	2	3	4	5	6	7	8	9
2020-21	321.00	321.00	-	100.00%	-	-	-	-
Total	**321.00**	**321.00**	**-**	**100.00%**	**-**	**-**	**-**	**-**

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
2019-20	-	-	-	-	-	-	-	-	-
2020-21	321.00	321.00	-	100.00%	302.29	297.42	297.42	-	99.01%
Total	**321.00**	**321.00**	**-**	**100.00%**	**302.29**	**297.42**	**297.42**	**-**	**99.01%**

D. ACHIEVEMENT OF OBJECTIVES OF THE PROJECT:

Objectives as per PP/PFS	Actual achievement	Reasons for shortfall, if any
Technical Feasibility Study		
• To develop hydro-morphological baseline conditions of the study area;	Hydro-morphological baseline condition of the study area is developed by collection and analysis of relevant data e.g. water level, discharge, rainfall, climate, sediment, cross section of rivers and khals etc. Necessary data were collected both from primary and secondary sources, reviewed and analyzed as required to achieve the study objectives, and presented in Chapter-3, Chapter-4 and Chapter-5, Vol-I	N/A
• To assess water retention capacity of the New Dakatia River;	No water retention infrastructure is proposed under the present study. However, a dead storage of 1 m depth in the full re-excavation reach of 37.40 km would be created, details are provided in Ch-6, Vol-I	N/A
• To assess availability of surface water resources of the New Dakatia River;	Monthly average flow of New Dakatia river at two locations, namely Laksam and Hajiganj, is presented in Chapter-6, Vol-I	N/A
• To protect the project area from flood, and improving drainage situation and navigation facilities.	Flood, drainage and navigational condition of the area is reviewed, analyzed, and necessary suggestion for improvement has been provided. Re-excavation/ dredging of New Dakatia river would improve the flood, drainage and navigational condition of the area. Details are discussed in Ch-2, Ch-5 and Ch-6, Vol-I	N/A
• To identify the most erosion prone areas and recommend effective measures for improving stability of the river bank.	Erosion prone locations have been identified through extensive field visit, discussion with field officials, reviewed by analysis of past cross-sections and satellite images, and finally necessary protective measures recommended. Details are discussed in Ch-6, Vol-I	N/A
• To assess requirement of dredging along New Dakatia River to ensure smooth drainage.	Dredging requirement of New Dakatia River has been assessed with due consideration to flood, drainage and navigation. Details are discussed in Ch-6, Vol-I	N/A

Objectives as per PP/PFS	Actual achievement	Reasons for shortfall, if any
• To prepare dredged material management plan.	Dredge material management plan is discussed in detail in Ch-6, Vol-I	N/A
• To estimate sedimentation rate and plan of future maintenance dredging to maintain natural flow.	Sedimentation rate is discussed in Ch-5 and maintenance dredging is presented in Ch-6, Vol-I	N/A
• To identify infrastructures those need to be reconstructed.	Reconstruction/ rehabilitation of bridges/ regulators are discussed in Ch-6, Vol-I	N/A
• To assess water requirement for agriculture, industry and domestic purposes.	Water requirement for agriculture, industry and domestic purposes is presented in Ch-4, Vol-I	N/A
• To prepare afforestation plan considering classification of trees.	Afforestation plan is discussed in Ch-6, Vol-I	N/A
• To assess social and environment impact as per requirement of DoE.	Social and environmental impact assessment has been performed following the DoE requirement, details are presented in Ch-9 & 10, Vol-I, and Vol-III	N/A
• To assess impact on agriculture and ecosystem (aquatic/land).	Post project impact on agriculture and ecosystem in presented Ch-7 & 10, Vol-I	N/A
• To prepare environmental monitoring and management Plan (EMPP).	Environmental monitoring and management plan is discussed in Ch-10, Vol-I	N/A
• To develop integrated river management plan for the restoration of New Dakatia River with **"no regret"** concept (BDP 2100).	The study has been conducted with due consideration to the prevailing water related issues in the study area that includes flood, drainage, bank erosion, water quality, environment, agriculture, fishery, navigation etc. Collectively the proposed development interventions constitute the 'integrated river management plan', narrated in detail in Ch-6, Vol-I	N/A

**** According to all objectives & ToR, The study has addressed all the scope of Works.**

E. BENEFIT ANALYSIS

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

The project is a 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).
(a) (b) (c) (d)			

02. Cost / Benefit: ***Not Applicable*** **(It is not an investment project, hence** ***not applicable*****)**

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:
Not Applicable

F. MONITORING AND AUDITING

Monitoring: ***Not Applicable***

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)**

0.2. Auditing during and after Implementation:

2.1. Internal Audit: ***No audit conducted yet.***

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: ***No audit conducted yet.***

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

The new Dakatia river starts from Tongir Par of Cumilla Sadar South Upazila and flows through Sadar South, Lalmai, Lakhsham and Manaharganjupazilaof Cumilla district and Shahrasti, Haziganj and Sadarupazila of Chandpur district and falls into the Meghna river near the old market of Chandpur. The length of the river is about 122 km. The river is about 5 km in Cumilla part and the rest of the river is in Chandpur district.

The Dakatia River was once a blessing to the people of several upazilas of Chandpur including South Cumilla.The river was the route of large launch and freight trawler. During the dry season, farmers got enough water from this river during cultivation of crop. The Dakatia River was the main source of livelihood for many people in the area. Various structures have been constructed by illegally occupying and filling the river.The river is poisoned by contaminated waste and garbage from the mill factories etc. In addition, due to not being excavated for ages, the river has lost its navigability. As a result, the two banks of the river washes away with little rain.

The re-excavation of this river is in progress under the "Old Dakatia-New Dakatia River Irrigation and Drainage Project" in Cumilla District from 11.00 km to 23.20 km (from Baghmara of LalmaiUpazilla to Kunta Bridge of LakhshamUpazilla) total 12.20 km of the river. During the briefing to the Water Development Board officials, Secretary of the Ministry of Water Resources, emphasized that the new Dakatia River should be completely rehabilitated under a project and to identify the places prone to erosion along the river and instructed to take protective measures, including the views of the local people and the people's representatives.At the same time, asked for the removal/re-construction of the culverts/bridges identifying the hazardous and narrow ones, for the purpose of cultivating and navigation facilities and accordingly, he directed to take the project. Hence, for the re-excavation of the new Dakatia River, it is solely necessary to carry out a feasibility study with detailed survey for the preparation of DPP.

1.2 Justification/Adequacy

The Dakatia River was once a blessing to the people of several upazilas of Chandpur including South Cumilla. The river was the route of large launch and freight trawler. During the dry season, farmers got enough water from this river during cultivation of crop. The Dakatia River was the main source of livelihood for many people in the area. Various structures have been constructed illegally occupying and filling the river. The river is poisoned by contaminated waste and garbage from the mill factories. In addition, due to not being excavated for ages, the river has lost its navigability. As a result, the two banks of the river washes away with little rain. During irrigation or in the Boro season, river becomes dusk-shelf. During the monsoon, the river becomes the main cause of floods in the surrounding areas including South Cumilla. At that time, the river's water crosses the danger line and floods hundreds of villages. At present, the river is occupied by miles and miles of sand dunes at the bottom of the river due to occupation and pollution.

Hence, to meet Sustainable Development Goals, restoration of Dakatia river is the demand of time for the conservation of aquatic resources, fisheries resources and bird sanctuaries etc. and socio-economic development. Senior Secretary of the Ministry of Water Resources, emphasized that the new Dakatia river should be completely rehabilitated under a project and it has been decided to undertake project on Dakatia river restoration for the sake of people and environment as well. Under this circumstances, a comprehensive study is required on Dakatia river with detailed survey for the preparation of DPP.

To meet Sustainable Development Goals, it is essential to protect and restore water related ecosystems such as wetlands and rivers. 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. Re-excavating of New Dakatia River is required to improve water retention capacity, providing irrigation facilities, preserving natural habitats of fishes and other aquatic life thereby improving socio-economic and environmental condition of the country.

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 strategies and sub-strategies:
- This project are allotted in the investment plan of BDP 2100 for an " Integrated Jamuna-Padma Rivers Stabilization and land reclamation Project (MR 1.46 of investment of BDP)".

Strategy at National Level

- Strategy FR 1: Protecting Economic Strongholds and Critical Infrastructure.
- Strategy FR 2: Equipping the FMD Schemes for the Future

- Sub-strategy FR 2.5: River management, excavation and smart dredging preceded by appropriate feasibility study
- Strategy FR 3: Safeguarding Livelihoods of Vulnerable Communities
- Sub-strategy FR 3.7: River management as well as improved flood management, drainage, O&M and flow management

Hotspot Specific Strategies

5) River Systems and Estuaries

- Improvement of the conveyance capacity as well as stabilize the rivers
- Strategy for sediment management including a strong capital dredging and maintenance programme.
- Necessary arrangements for capital and maintenance dredging in important rivers such as the Padma, Meghna, Jamuna, Brahmaputra, Dharala, Arial Khan, Kushiyara, Gorai, Monu, etc.

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

1.3 Objectives

The main objective of the study is to assess the feasibility of the envisaged re-excavation of the New Dakatia River from technical point of view and find out feasible options for integrated water resources development including flood management and drainage improvement as well as improvement of navigability in the study area.The specific objectives of the study are:

- To develop hydro-morphological baseline conditions of the study area;
- To assess water retention capacity of the New Dakatia River;
- To assess availability of surface water resources of the New Dakatia River;
- To protect the project area from flood and improving drainage situation andproviding navigation facilities;
- To identify the most erosion prone areas and recommend effective measures for improving stability of the river bank;
- To assess requirement of dredging along New Dakatia River to ensure smooth drainage;
- To prepare dredged material management plan;
- To estimate sedimentation rate and plan of future maintenance dredging to maintain natural flow;
- To identify infrastructures those need to be reconstructed;
- To provide detail design of the proposed interventions;
- To assess water requirement for agriculture, industry and domestic purposes;
- To prepare afforestation plan considering classification of trees;
- To assess social and environment impact as per requirement of DoE;
- To assess impact on agriculture and ecosystem (aquatic/land) after post project condition;
- To estimate the detail cost of the project with economic and financial analysis against the proposed interventions.
- To prepare environmental monitoring and management Plan (EMPP).
- To develop integrated river management plan for the restoration of New Dakatia River with "no regret" concept (BDP 2100).

1.4 Project revision with reasons: Not Applicable

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

The Dakatia River was once a blessing to the people of several upazilas of Chandpur including South Cumilla. The river was the route of large launch and freight trawler. During the dry season, farmers got enough water from this river during cultivation of crop. The Dakatia River was the main source of livelihood for many people in the area. Various structures have been constructed illegally occupying and filling the river. The river is poisoned by contaminated waste and garbage from the mill factories. In addition, due to not being excavated for ages, the river has lost its navigability.

As a result, the two banks of the river wash away with little rain. During irrigation or in the Boro season, river becomes dusk-shelf. During the monsoon, the river becomes the main cause of floods in the surrounding areas including South Cumilla. At that time, the river's water crosses the danger line and floods hundreds of villages. At present, the river is occupied by miles and miles of sand dunes at the bottom of the river due to occupation and pollution.

Hence, to meet Sustainable Development Goals, restoration of Dakatia river is the demand of time for the conservation of aquatic resources, fisheries resources and bird sanctuaries etc. and socio-economic development. Secretary of the Ministry of Water Resources, emphasized that the new Dakatia river should be completely rehabilitated under a project and it has been decided to undertake project on Dakatia river restoration for the sake of people and environment as well. Under these circumstances, a comprehensive study is required on Dakatia river with detailed survey for the preparation of DPP.

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

- **Project Identification**

Many structures have been constructed illegally occupying and filling the Dakatia river which once was the main source of livelihood for many people in the area. In addition, the river is poisoned by contaminated waste and garbage from the mill factories etc. To meet Sustainable Development Goals, it is essential to protect and restore water related ecosystems such as wetlands and rivers. Urgent action must be taken to reduce the loss of natural habitats and biodiversity which are part of our common heritage.

Besides, re-excavating of New Dakatia River is required to improve water retention capacity, providing irrigation facilities, preserving natural habitats of fishes and other aquatic life thereby improving socio-economic and environmental condition of the country. Senior Secretary of the Ministry of Water Resources, emphasized that the new Dakatia river should be completely rehabilitated under a project and it has been decided to undertake project on Dakatia river restoration for the sake of people and environment as well. Under these circumstances, a comprehensive study is required on Dakatia river with detailed survey for the preparation of DPP.

- **Project Preparation**

In view of the above, BWDB decides to carry out a Feasibility Study including EIA for Re-excavation of New Dakatia River in Cumilla and Chandpur District. The Dakatia River was once a blessing to the people of several upazilas of Chandpur including South Cumilla. The river was the route of large launch and freight trawler. During the dry season, farmers got enough water from this river during cultivation of crop.

The Dakatia River was the main source of livelihood for many people in the area. Various structures have been constructed illegally occupying and filling the river. The river is poisoned by contaminated waste and garbage from the mill factories. Not only that, this two rivers falls in one

hotspot (River Systems and Estuaries) zone identified by Bangladesh Delta Plan 2100. At this circumstance, a holistic approach is required to complete the study on Dakatia river so that the goal of Bangladesh Delta Plan can be achieved.

Appraisal

DPEC Meeting Date: 06.08.2020

Credit Negotiation

- **Credit Agreement**
- **Credit Effectiveness**
- **Loan Disbursement**
- **Loan Conditionalities**
- **Project Approval.**
- **Others (if any).**

Applicable for Investment Project

The project was approved by the Honorable State Minister, MoWR on 18.08.2020

4. **Analysis of the Post-Implementation situation and result of the project:** ***Not Applicable***

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)***

5.1 **Project Management**
5.2 **Project Director**
5.3 **Land Acquisition**
5.12 **Project aid disbursement and re-imbursment**
5.13 **Mission of the development partners.**

5.4	**Procurement**	5.14	**Time & Cost Over-run**
5.5	**Consultancy**	5.15	**Project Supervision/Inspection**
5.6	**Contractor**	5.16	**Delay in Decision**
5.7	**Manpower**	5.17	**Transport**
5.8	**law & Order**	5.18	**Training**
5.9	**Natural clamity**	5.19	**Approval**
5.10	**Project financing, allocation and release.**	5.20	**Others.**
5.11	**Design formulation/approval**		

It is a contract base consultancy project. The above problems don't occur

6. Remarks & Recommendations of the Project Director:

"Feasibility Study for Re-excavation of New Dakatia River in Cumilla and Chandpur District" was sanctioned in administrative approval from Ministry of Water Resources given vide memo no-42.00.0000.040.014.007.2020-233, dated: 18/08/2020. Originally the project was planned to be completed by 31/03/2021. Due to covid-19 pandemic situation the duration of the study was extended (no cost extension) upto 30/06/2021 by MOWR vide memo no-42.00.0000.043.014.017.2020-10, dated: 05/01/2021. Project has been completed successfully on 30/06/2021.

The main objective of the study is to assess the feasibility of the envisaged re-excavation of the river from technical point of view, and find out feasible options for integrated water resources development including flood management and drainage improvement as well as improvement of navigability in the study area. The study area is located in the New Dakatia River basin which is located in the Southeast Region of Bangladesh. Topography of the New Dakatia River basin area is not uniform rather there prevails a co-existence of most prominent physical features i.e. hilly terrain and flood plain.

The project has been formulated with due attention to the main objective of the study i.e. to restore the surrounding 'Environment' and conveying capacity (flash flood) of the new Dakatia river. The project main physical work components include re-excavation of new Dakatia river (0.25 km to 37.40 km) and protection of riverbanks (from erosion) from 0.25 km to 124.40 km. The implementation period is proposed to 3 years and to be completed by 3 consecutive years.

Estimated cost for the proposed development project is Tk. 11,343.40 lakh (financial) and Tk. 8,432.50 lakh (economic). EIRR, NPV and B/C Ratio are 21.60%, 5564.06 lac Tk. and 1.71 respectively. The project is economically feasible to implement based on the financial and economic analysis.

All the major activities have been accomplished under this study project. The detailed design, cost estimate and ESIA have been prepared through this study. The DPP of the investment project would be finalized based on the findings of this study project.

29.08.2021

Date : .....

Signature and seal of the Project Director/Manager

(Dr. Shamal Chandra Das)
Superintending Engineer (Civil)
Directorate of Planning-1
BWDB, Dhaka.

7. Remarks/Comments of Agency Head

The people resided along the New Dakatia River course are enthusiastically demanding restoration of the New Dakatia River. The riverbanks are occupied and constricted by construction of illegal establishments at many places. As a result, the riverbanks are eroding at several places and conveying capacity of the river has decreased. Water quality deterioration is one of the identified concerns for the project area. An integrated measure is needed to be adopted by participation of people from all spheres in the New Dakatia River basin area. This study suggested some development measures for restoration to mitigate the identified problems against sustainability of the river. The significant proposed measures include re-excavation/dredging of the river/khal, bank protection work at vulnerable locations, construct footpath/walkway along the riverbank. All of the proposed measures and interventions have been prepared with cost estimation and detailed design drawings under this feasibility study. With the concent from MOWR, BWDB will soon take necessary steps to prepare the DPP of the implementation project as soon as possible.

07/07/2020

(FAZLUR RASHID)
Director General
BWDB, Dhaka.

Date : .....

Signature and Seal

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

Date :

Signature and Seal

GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH

MINISTRY OF WATER RESOURCE

APPROVED

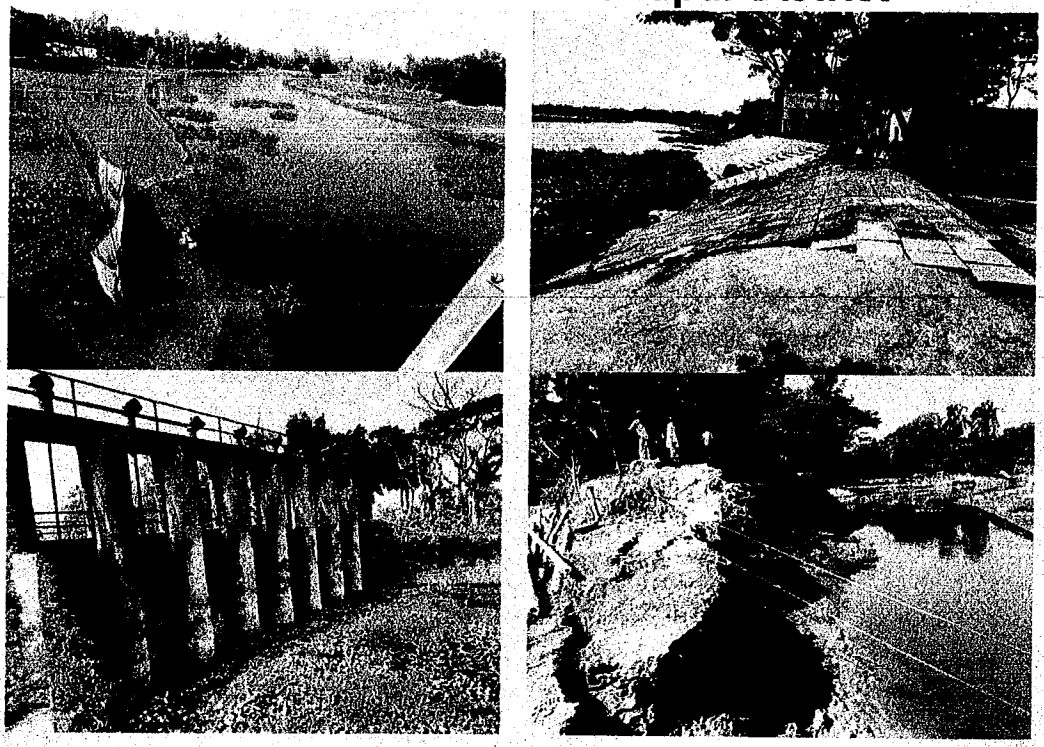
30-6-2021

(A K M Wahed Uddin Chowdhury)
Director General
BWDB, Dhaka.

FR/FL REPORT APPROVED BY DG, BWDB
Memo U.O. No. 5298 -DG
Dated 30/06/2021

BANGLADESH WATER DEVELOPMENT BOARD

Feasibility Study for Re-excavation of New Dakatia River in Cumilla and Chandpur District



Final Report
Volume I: Main Report
June 2021

IWM
Water, Environment & Climate

Executive Summary

E.1 General

The re-excavation of New Dakatia River is an ongoing work under the "Old Dakatia-New Dakatia River Irrigation and Drainage Project" in Cumilla District from Km. 11.00 to Km. 23.20 (from Bagmara of Lalmai Upazila to Kunta Bridge of Laksam Upazila) total 12.20 km of the river. During briefing to the Water Development Board officials and Secretary of the Ministry of Water Resources, it was emphasized in the meeting that the river should be completely rehabilitated under a project and to identify the places prone to erosion of both banks and instructed to take protective measures against the vulnerable reaches. In addition, it was asked in the meeting to identify the unspecified bridges over the river and suggest for removal/re-construction of unspecified structures to avoid hazard in navigability of the area. In the meeting, BWDB was asked to take a detail study under a separate project and it was also decided that during formulation of project, the views of the local people and the people's representatives should be duly considered.

As per directives of the Secretary, MOWR, considering the above situation BWDB has decided to carry out a feasibility study titled **"Feasibility Study for Re-excavation of New Dakatia River in Cumilla and Chandpur District".** Accordingly, a contract has been signed with IWM on 28th September 2020 to carry out the Feasibility study within a time frame of six months. The main objective of the study is to assess the feasibility of the envisaged re-excavation of the river from technical point of view and find out feasible options for Integrated water resources development including flood management and drainage improvement as well as improvement of navigability in the study area.

The key specific objectives of the study are:

- Assessment of requirement of dredging along the New Dakatia River to ensure smooth drainage;
- Protection of the project area from flood, and improving drainage situation and navigation facilities;
- Identification of the most erosion prone areas and recommend effective measures for improving stability of the riverbank;
- Preparation of detail design of the proposed interventions;
- Assessment of social and environment impact as per requirement of DoE;
- Estimation of the detail cost of the project with economic and financial analysis against the proposed interventions;
- Preparation of environmental monitoring and management Plan (EMPP);

E.2 Study Area

The study area is located in the New Dakatia River basin which is located in the Southeast Region of Bangladesh. Earlier the New Dakatia River originated from the bifurcation of Kakri River at Kashinagar of Chauddagram Upazila of Cumilla district and sailed northwesterly towards Pipulia Bazar of Sadar South Upazila of Cumilla district. Sonaichhari Khal and Boaljor Khal joined the New Dakatia River in this reach. At present, the said reach of the New Dakatia River has almost lost its connectivity with the Kakri River. The river is a seasonal tidal river, remains almost dry in the winter season (January-April) and mostly active in the monsoon season. The length of the river is about 124.65 km and the width varies from 30 m to 140 m. The average

width is about 70 m. The longitudinal slope of the river is about 5 cm/km. Sonaichhari Khal, Hooljor Khal, Laksam Khal, Polya Khal, Curzon Khal, Hajiganj Khal etc. are significant tributaries of the New Dakatia River. There is only one distributary of the river, a branch of new Dakatia river at Char Bagadi. It flows through Chandpur Irrigation Project. There are several existing projects in the nearby vicinity of the present study area, they are Chandpur Irrigation Project (CIP), Meghna Dhonagoda Irrigation Project (MDIP), Sonaichhari Project, Noakhali Drainage Project, Karaiya Sub-project of BWDB. Figure 1.1 given in Chapter 1 shows the New Dakatia River system.

The New Dakatia River basin area is about 1543 sq. km. which includes total 115 Nos. of unions (partially/full) out of which 43 Nos. unions (503.49 sq. km) are located in Chandpur district, 54 Nos. of unions (838.91 sq. km) are located in Cumilla district, 7 Nos. of unions (73.13 sq. km) are located in Lakshmipur district and the remaining 11 Nos. (127.32 sq. km) are in Noakhali district. But as per ToR, the project influence area would be much less than the study area. The influence area has been demarcated considering a band of 2.00-3.00 km width along both bank of New Dakatia river and the flood prone areas. Detail investigation e.g. socio-economic investigation, agricultural, fishery, environmental investigation, public consultation etc. have been conducted in this influence area, which covers an area of 319.72 sq. km in 9 upazilas (Chandpur Sadar, Faridganj, Hajiganj and Shahrasti upazilas under Chandpur district and Chauddagram, Cumilla Sadar (Kotwali), Laksam, Lalmai and Manoharganj upazila under Cumilla district).

Topography of the New Dakatia River basin area is not uniform rather there prevails a co-existence of most prominent physical features i.e. hilly terrain and flood plain. While it progresses towards the East, the elevation rises gradually. The north-east part is the highest area and the most low-lying area is in the west part in the basin. Land elevation of most of the area ranges from 2.0 m PWD to 12.0 m PWD inside the study area. From the DEM it is seen that the high elevation area is located along the north and eastern fringe of the basin which is characteristics of the north-eastern hills and in the western side is the Old Meghna Estuarine Floodplain.

There are different types of water management structures constructed by different agencies in the project area. They mainly include bridges, culvers and regulators. Significant infrastructures include 41 RCC bridges over the New Dakatia river and 11 regulators in the study area.

There are a large number of khals that are connected to the New Dakatia River and drains to it. Among them, the New Dakatia River is the most prominent. Other prominent khals are Sonaichari Khal, Shalik Khal,Paglir Khal, Ruhita Khal, Gungaijuri Khal, Polya Khal (Mellar Khal), Noagaon Khal, Motlab Khal (Zamzam Khal), Mohendra Khal, Laksam Khal, Gazaria Khal, Dhamra Khal, Curzon Khal, Boaljuri Khal, Krisnapur Khal, Khilla Khal, Sonapur Khal, Kamta Khal etc.

E.3 Problems and Issues

There is one 8-vent regulator so far constructed over New Dakatia River and Old Dakatia River junction point at Tongirpar, Pipulia. The regulator is in operation and is located 250 meter down stream of the confluence of Old Dakatia River and Sonaichuri Khal. The length of New Dakatia River counts 124.65 km from Chainage 0.00 up to its outfall at Chandpur, Meghna River. The first 50 km (demarcation line is Chitoshi bailey bridge at Monohargonj) of New Dakatia River falls under jurisdiction of Cumilla O&M Division and rest (downstream of Chitoshi bridge to

outfall at Chandpur, Meghna) about 74.40 km falls under jurisdiction of Chandpur O&M Division.

Once the New Dakatia River was a blessing to the people of several Upazila of both Cumilla and Chandpur districts and was the main source of livelihood of the area. The people would travel by large launch and could carry their goods through river route. In dry season, there was adequate water in the river and people could irrigate their land to grow both paddy and vegetables. Presently, the upstream flush flood flow is mostly controlled by the afore-mentioned 8 vent regulator and existing topography of the upper catchment area. Moreover, the river is silted up and narrowed down at many places due to unplanned interventions and dropping of debris and wastewater disposal at different locations. This may be mentioned that the Pourashava and EPZ untreated disposals are throwing to the adjacent khals. The Gungaijuri and Sonaichari Khal water is totally contaminated and flowing to new Dakatia river. As a result, the surface irrigation of Sonaichari, Gungaijuri and part of new Dakatia river dependent area has been jeopardized. Presently, in dry season, the farmers are dependent on ground water only. In addition, the riverbanks are occupied and constricted by construction of illegal establishments at many places. As a result, the riverbanks are eroding at several places and has lost its conveying capacity. The people of the area demand for restoration of New Dakatia River through appropriate dredging, bank revetment at vulnerable locations and re-modeling/re-construction of bridges with adequate openings.

E.4 Mathematical Model Development and Application

Three types of mathematical models have been developed and applied to carry out this study which include a Rainfall-Runoff Model, a one-dimensional hydrodynamic model, and a two-dimensional morphological model. Rainfall-Runoff model together with one dimensional hydrodynamic model has been used for flood and drainage study where two-dimensional morphological model has been used for morphological simulation. Four modules: MIKE11 NAM, MIKE11 HD, MIKE 21 FM and MIKE 21C MIKE ZERO Software package of Danish Hydraulic Institute (DHI) has been used for developing the stated models. The flood and drainage model (Rainfall-Runoff & One-dimensional hydrodynamic model) has been developed using hydrometeorological and cross-section data made available from BWDB and supplemented by field data campaign. The model has been calibrated for hydrological event of 2019, and validation has been checked for hydrological event of 2018 and 2020. The calibrated model has been simulated for historical period of 40 years (1981-2020). Based on historical simulated model results, flood frequency analysis has been carried out to determine flood level as well flood flow under different return flood. Hydrological parameters of different proposed structures: design flood level, design flood discharge, design flood velocity, flood inundation, etc. have also been determined using flood and drainage model.

The New Dakatia River comprises cohesive sediment throughout bulk of its reaches except a small outfall reach at Chandpur where non-cohesive sediment is observed. It is to be noted that morphological modeling of rivers with cohesive sediment is quite complex, requires wide range data, and thus is not exercised widely. However, under this study the entire New Dakatia River has been divided into two reaches for morphological model. Morphological model considering cohesive sediment has been developed for the upper 37 km reach (Pipulia-Monoharganj) where the same has developed considering non-cohesive sediment for the remaining 87 km reach (Monoharganj-Chandpur).

E.5 Project Planning and interventions

The New Dakatia River is about 124.40 km long from Tongirpar (8 vent regulator) to outl (Bail mouth to Lower Meghna) at Chandpur. The length of the river from Tongirpar (8 ve regulator) to Amtoli bridge (Monoharganj) is about 37.40 km long and this reach is termed Segment-1. The remaining part of the river from Amtoli bridge, Monoharganj to Chandp about 87 km is termed as Segment-2. BIWTA is dredging the length of the river (Segment from Chandpur to Monoharganj (87 km) for development of navigation route, and the work ongoing. As such, this part (length) of the river has been excluded from planning and design dredging component under the present study. But the adequacy of the section to accommod flash flood has been checked in the model. [illegible] following the whole river length.

In Segment-1, the New Dakatia river [illegible] badly contaminated due to disposal of untrea waste of Cumilla Pourashava and EPZ. In wet season, the contaminated water is flushed to t downstream. But, in dry season, the contamination of water is physically visible up to Laksa about 26 km from Tangirpar 8 vent regulator. As a result, agriculture, fish culture a surrounding environment is badly affected. This environmental issue has been duly conside in the study.

Considering the study ToR and the present condition of the study area, the following developme activities and associated works are ide [illegible]

- ✓ Re-excavation of new Dakatia [illegible]
- ✓ Bank revetment works,
- ✓ To identify the unspecified bri [illegible]
- ✓ Dredge material management [illegible]
- ✓ Operation and Maintenance.

The study area suffers from seasonal flash flood that occurs generally in June-July due continuous rainfall in the upper catchment area in Arakan mountains. It creates drain congestion in the downstream flat and lowlands adjacent to the new Dakatia riverbanks and st for several days. On the other hand, Gungaijuri Khal, Ruhita Khal and Sonaichari Khal ca wastewater along with solid waste from Cumilla Pourashava, [illegible] EPZ area and finally drains to New D[illegible] in the khals as well as in the New Da[illegible] area. Presently, it is affecting both cu[illegible] lands respectively.

After thorough review of present project implementation status, prevailing problems, potentials of development opportunities [illegible] alternative development plans (except base condition) have been selected for study. I informed that the ongoing dredging works of BIWTA [illegible] would continued next several years. As such, [illegible] as the 'Base Condition/Without Project Condition' of the project. In addition, the vulnerable reaches for erosion of new Dakatia river has been brought under bank revetment works.

Base Condition: (Pre-Project Condition)

In this option, the project is thought to be run as of field conditions of December 2020. This option basically represents the pre-project condition considering the ongoing re-excavation works of New Dakatia River so far carried out both by BWDB and BIWTA within December 2020. Partial re-excavation of the river is done by BWDB (km 11 to km 23) & BIWTA. Bathymetry of other adjacent khals carried out in 2020 would be used accordingly. This option is to be considered the pre-project status of New Dakatia River Project.

Option-1: Intermediate Condition-BWDBs Design Section

In this option, the New Dakatia River from Tongirpara to Amtoli, bridge (Km. 0.25 to Km. 37.40), the existing BWDB design section and prevailing longitudinal slope (4.5 cm/km) of the river would be followed all through. It is meant that same BWDB design section and longitudinal slope has been attained along the length from Tongipara to Amtoli (bridge). In addition, from Amtoli to Chandpur, the ongoing re-excavation works of New Dakaia River so far carried out by BIWTA within December 2020, would be inserted in the model. Other conditions (khals) would remain unchanged (no re-excavation of khal).

Option-2: Dredge Condition (incorporating proposed design section)

In this option, the New Dakatia River from Tongipara to Amtoli bridge (Km 0.25 to Km 37.40), the proposed new design section and longitudinal slope (6 cm per km) would be incorporated all through. In addition, from Amtoli (bridge) to outfall at Chandpur, the existing design section and prevailing longitudinal slope, which is being followed by BIWTA, would be incorporated in the model. No re-excavation of khal would be incorporated.

Option-3: Dredging of New Dakatia River with 1 m Dead Storage

In this option, the new Dakatia river from Tongipara to Amtoli,bridge (Km. 0.25 to Km. 37.40), the proposed new design section as mentioned in Option-2 with an additional dead storage of 1 m in between existing bridges and all through longitudinal slope, 6 cm per km would be followed. In addition, from Amtoli,bridge to outfall at Chandpur, the existing design section and prevailing longitudinal slope, which is being followed by BIWTA, would be incorporated in the model. It is presumed that the above-mentioned works has been duly completed. Other conditions (khals) would be remaining same but no re-excavation of some khals would be incorporated. A layout plan of this option is shown below.

Summary of the Options

Sl. No	Option	Features
1.	Option-0: Base Condition	Bathymetric condition of new Dakatia river , December 2020
2	Option-1: Intermediate Condition	The existing BWDB design sections and longitudinal slope 4.5 cm/km followed up to 37.40 km length and remaining part river section, December 2021 condition (Bathymetry) was followed.
3	Option-2: Dredge Condition (incorporating proposed design section)	• Design bed level at Km. 0.25 = 1.88 mPWD (0.90 m below the 8-V regulator sill level of 2.78 mPWD) • Design bed level at Km. 37.65 = (-)0.52 mPWD

		• Longitudinal slope = 6 cm/km • Bedwidth ➢ Km. 0.25 – Km.15.00 = 15 m ➢ Km. 15.00 – Km.27.00 = 16 m ➢ Km. 27.00 – Km.37.40 = 17 m
4	Option-3: Dredging of New Dakatia River with 1 m Dead Storage.	Same as Option-2, and 1 m dead storage in between the bridges.

Capital dredging/Re-excavation:

BWDB part of dredging/re-excavation of new Dakatia River, the earth work calculation of capital dredging would be limited to from Chainage 0.25 km (just down of 8 vent regulator Tongirpar) to 37.40 km (Amtoli RCC bridge) as Segment-1. This part of the river of length 37.40 km has been divided to following three sub segments:

- ✓ Segment 1A: Length from 0.25 km to 15.00 km
- ✓ Segment 1B: Length from 15.00 km to 27.00 km
- ✓ Segment 1C: Length from 27.00 km to 37.40 km

Capital dredge/re-excavation detail under Sement-1A ,1B and 1C:

The length of the segment 1A, 1B and 1C is 14.75 km, 12 km and 10.40 km respectively. The dead storage of 1 m has been included in the re-excavation plan. The dead storage would be planned after 20 meter from the regulator. The overall side slope maintained is 1:2. The total earth work volume of the cutting sections is as follows.

Re-excavation detail of Segments

Segment	Length, km	Number of bridges	Number of ditches (Pond)	Earthwork volume, cum	Total Cost (lakh Tk.)
1A	14.75	10	8	274868	524.46
1B	12.00	10	9	107168	245.80
1C	10.40	5	4	103245	229.47
Total :	37.15	25	21	485281	999.73

Crop Compensation of Land for Placing Dredged Materials

It is presumed that the dredged/re-excavated materials deposited over the land would be taken away by the interested person within a period of maximum three years and the land would be ready for cultivation from fourth year. It is learnt from the locality that landowners allow 'Borga Chasi' for producing crops with a yearly rent of around Tk. 10,000 to Tk. 12,000 per bigha (33 decimals). Assuming the higher rate @ of Tk.12, 000 per bigha, cost for using the land per year. The work would be implemented in 3 consecutive years. So, total land would be required (10 m wide along the banks, assuming average dumping height 2 m) to about 56 ha (along both banks of the river, where available) that cost is about Tk. 176.50 lakh. The crop compensation cost of new Dakatia River for placing the dredged/re-excavated materials within 37.40 km.

Identification of unspecified bridges over New Dakatia River

During the field investigation, 3 nos. unspecified bridges has been identified over the New Dakatia river and it is observed that these bridges are being re-constructed by LGRD.

Re-excavation of Khals

Paglir Khal has been proposed for re-excavation about 2.30 km (leftover work). Gungaijuri, Ruhita and Sonaichari Khal has been proposed for cleaning industrial garbage and water hyacinth.

Bank Revetment Works

Type		Description of the type	Suitable places for construction	Cost (Lakh Tk/ meter)	Total length, m	Total cost lakh taka
A		U type Sheet Pile- 10 locations	Hat/bazar in the riverbank area, where both side of banks are occupied by authorized building and needs to be protected before starting re-excavation works.	1.962	1050	2060.10
B	B1	Bank revetment works with necessary toe protections, at 5 locations	Bank protections at concave bends of the river or eroded banks where there are valuable establishments, height of bank<= 3.0 m, toe protection 1.00 cum per meter.	1.073	960	1030.08
	B2	Bank revetment works with necessary toe protections, at 8 locations	Bank protections at concave bends of the river or eroded banks where there are valuable establishments, height of bank> 3.0 m, toe protection 5.00 cum per meter.	2.184	1310	2861.04
	B3	Bank revetment works with necessary toe protections, at 3 locations.	Bank protections at straight reach (less vulnerable) of the river or eroded banks where there are valuable establishments, height of bank<= 3.0 m, toe protection 3.00 cum per meter.	0.950	385	365.75

Type	Description of the type	Suitable places for construction	Cost (Lakh Tk/ meter)	Total length, m	Total cost lakh taka
C	Bank revetment works with protection of land sliding only, at 2 locations	Bank protections at straight part of the riverbanks or minor eroded banks where there are valuable establishments.	0.775	395	306.13
		Total :		4100	6623.10

Operation and Maintenance

The project includes about 37.40 km of new Dakatia river and 10 regulators (up to Chandpur including one abandoned regulator).The maintenance module should be A. Routine maintenance and B. Periodic maintenance. The Routine maintenance is required for 9 regulators every year and the Periodic maintenance is essential for both regulators and re-excavation of silted up reaches of New Dakatia river. The periodic maintenance should be carried out once in every 4-5 years. The maintenance of the project would be carried out after 4~5 years of the completion of the project. This maintenance of earthwork includes the following:

- ✓ Bathymetric survey of new Dakatia river, 37.40 km and major link khals.
- ✓ Estimation of Re-excavation of new Dakatia river and major link khals.
- ✓ Assessment of need-based estimate for each of the regulators.
- ✓ Existing design should be followed.

The budget of Periodic maintenance should be determined on the basis of proposed bathymetric survey as mentioned above. The probable periodic maintenance earth work volume and maintenance cost of regulators are furnished below.

Sl no	**Item of work**	**Unit**	**Quantity**	**Estimated cost in lakh taka**
01	Re-excavation of new Dakatia river (after 4~5 years)	cum	450000	900.00
02	Re-excavation and clearing of debris of Gungaijuri, Ruhita and Sonaichari Khal (after 4~5 years)	cum	250000	500.00
03.	Re-habilitation of regulators (after 4~5 years)	Item	LS	250.00
			Total :	1650.00

E.6 Agriculture Study

The project area falls under AEZ-19: Old Meghna Estuarine Floodplain and AEZ-17:Lower Meghna River Floodplain. Soils of AEZ 17 are relatively uniform. Silt loams occupy relatively higher areas and clay loams occupy the depressions. Non-calcareous Dark Grey Floodplain and Calcareous Grey Floodplain soils are major components of general soil types. Top soils are sl ightly acidic to slightly alkaline in medium high land and medium low land, and the sub-soils are neutral in reaction. In areas under AEZ 19, silt loam soils predominate in high lands and silty clay to clay in low land. Non-calcareous Dark Grey Floodplain soils are only general soil type of the area. Organic matter content of the soils is

Bangladesh, 27.24% of population aged seven years and above (BBS, 2011, HIES-2010) are illiterate.

Agricultural is the main profession of this project area, the livelihood of 43.68% people depends on agricultural activities. The second sector goes to Business which is 15.95% and the few number (13.89%) of people engaged in service sector in government and private.
The sanitation system in the study area is moderately good compared to other part of the country. The people of the study area using 70.7% percent Sanitary Latrine (With Water Seal and None-Water Seal) which is much higher than national figure (35.1%) and it is unfortunate 4% people use open toilet in the modern day. Only 22.3% people are using non-Sanitary latrine in the study area.

In the study area, about 89.4% percent households' member drinks tube-well water (deep tube-well and shallow tube-well). A few (5% households drinks tap water and another 5.6% household drinks water from other sources in the study area.

The local people express their opinion that if the ongoing project is implemented as stated by the consultant, then irrigation facility will be increased, flood will be controlled as well as river erosion will be decrease. Consequently, the local people can restore their livelihood as well as living standard.

E.9 Environmental Study

During conducting KIIs, it was revealed that domestic, medical and industrial (EPZ) wastes including raw sewage, pesticides are directly or indirectly causing pollution of the New Dakatia river water from Cumilla Sadar, Laksam Upazila, Hajiganj, Sharasti, Kachua, Faridganj and Chandpur pourashavas. The riverbed is filled with wastes. River doesn't have that much flow at its upstream in the dry season, as such pollution is identifiable even with necked eyes and hardly any biological life can survive due to low Oxygen concentration. The carrying capacity of water of the river is reduced due to illegal capture and unplanned construction around the riverbank. The main khal in Cumilla Sadar are Sonaichuri Khal, Gungajuri Khal, Ruhita Khal, EPZ Khal, Race course Khal, Tomson bridge Khal, Agricultural Institute Khal and Saya Bitan Khal etc. These khals are polluting the water of New Dakatia river.

Analysis of data collected from the study area indicates that ground water quality in the project area is within normal range of drinking water quality except that in two cases (67%) out of tested samples iron and manganese are more also pH is less. Along the entire reach of the 124.65 km of the New Dakatia river the pH level is below 7, BOD between 2.3-118 mg/l, COD 18-112 mg/l and DO 1.2-5.7 mg/l meaning that water is not suitable for domestic, irrigation and fishery uses as it is severely contaminated by sewage and industrial pollution.

E.10 Proposed Project Components

After due investigation and analysis, the following project components are identified:

a) Re-excavation of New Dakatia River from Tongirpar upto Amtoli bridge covering a length of 37.40 km
b) Re-excavation ofPaglir Khal: The lower reach of the khal covering a length of 2.30 km.
c) Bank protection works at 26 locations along the bank of New Dakatia River covering the full reach of the New Dakatia River starting from Tongirpar upto Chandpur. It is

Market survey was conducted to made inventory of fish species of New Dakatia and adjoining areas during the study period December 20 to March 21. In total 73 species of which river water and cultured water belong to 25 families and 12 orders registered. It is evident that the common fish in all survey sites are Shing, Rui, and Tilapia. The dominant species are Deshi Koi, Fali, Sarputi, Puti, Taki, Mrigal, Catal, Bighead, Kalibaos, Gonia, Carpio, Bele, Golsha Tengra, Baim and Chela fish. Endangered fish species identified in the area are Pabda, Modhu pabda, Chital, Rita, River Pangas, Ghaura, Bacha, Silon, Boal, Veda, Titputi, Baim, Aor, Guzzia aor, Chapila, Foli, Baghair etc.

The estimated fish production in the study area is 103.79 ton. Chauddagram upazila registered the highest amount of fish production (45.11 ton) followed by Monohargan upazila (35 ton) and Laksam upazila (20 ton).

Recommendation for enhancement of Fisheries development:

- Dredging/re-excavation will resolve raised problems of flash Flood, loss of fish habitat, and Fish migration.
- Introduction effluents treatment plant of industries, and sewage discharge canals.
- Chemical and biological treatment can remove the congestion of water hyacinth.
- Establishment of Fish feed industries, set up ice plant, Construction of Cold storage, develop hygienic landing centers /Arat will mitigate fisheries related all difficulties.
- Good Aquaculture Practice (GAP) should be properly initiated in the project areas. Some places like Shahrasti Upazila, started to aware farmers on GAP.
- Farmer should avoid application of Poultry liter, Cow-dung, Antibiotics, Probates (growth hormones) and use of chemicals in the pond.
- Training, and technology transfer under Cumilla Fisheries Development project should be implemented in the project areas.

It is anticipated that after implementation of the project activities fish production in the area would increase to about 115.97 ton.

E.8 Socio-economic Study

There are about 305,584 households in 47 unions and 2 Municipalities in the study area. The total population is about 1,477,159 out of which 704,423 male and 772,736 female and sex ratio (number of males per 100 females) 90 and the national figure is 100.3. The population density per sq km is 1,676 in Cumilla and 1,468 in Chandpur District which is higher to national average of 976. The average HH size is 4.6 and national figure is 4.44.

It is observed that highest percentage of population belongs to the age group of 30-49 (20.3%) followed by the age group 5-9 (13.8%) and 10-14 (13.2%). It seems that percentage of working group of people is higher in this area than that of children and old age population.

The literacy rate in the study area is about 57.8 percent (Male 57.8, Female 57.7) whereas national figure is 51.8 percent. The higher (65.6%) literacy rate found in Hajiganj Upazila followed by Shahrasti Upazila (62.6%) of Chandpur District, Chauddagram Upazila (57.0%) and Lalmai Upazila (56.8%) of Cumilla District. Male are ahead of literacy rate in Chauddagram. Comilla Sadar Dakshin, Lalmai and Hajiganj Upazila while female is ahead of literacy rate in Laksam, Laksam, Manoharganj, Chandpur Sadar, Faridganj and Shahrasti Upazila. In

increased by 10% together with benefits being decreased by 10% which eventually indicates that the EIRR in all the cases is higher compared to opportunity cost of capital 12 %.

E.12 Recommendations

The project has been formulated with due attention to the main objective of the study i.e. to restore the surrounding 'Environment' and conveying capacity (flash flood) of the new Dakatia river. In consideration of the on-going dredging activities in the New Dakatia River by BIWTA and to avoid duplication of activites, planning for dredging of New Dakatia river considered the upper segment of the river i.e. the river reach from Tongirpar to Amtoli under Monohorganj upazila. However, for planning of other activities, the whole reach of New Dakatia river (124.65 km) was considered.

The project main physical work components include re-excavation of new Dakatia river (0.25 km to 37.40 km) and protection of riverbanks (from erosion) from 0,25 km to 124.40 km. The implementation period is proposed to 3 years and to be completed by 3 consecutive years.
The wastewater disposal and debris throwing to adjacent khals and river has to be stopped by taking appropriate measure (by the respective authorities i.e. city corporation/pouroshovas and EPZs) and should be regularly monitored by district 'Water Resources Management Committee" headed by district commissioner (DC), Cumilla.

The implementation support service consultant has to be deployed as early as possible so that the demarcation of banks of the river could be done preferably prior to start of the project activities.

The land along the banks of the river should be organized (contracted) through providing 'compensation' to landowners (following all procedures) in the first year of implementation for dredge material accommodation.

The (Maintenance dredging/re-excavation) re-excavation of existing river and khals are proposed to be re-excavated after every 4~5 years of completion of the project.
'Walkway' provision has been kept both in Laksam and Chandpur township area separately. The appropriate sites along the banks of the river has to be identified just after demarcation of riverbank lines by Outsourcing Consultant. The setback distance is proposed to at least 1 meter.
The water hyacinth of Gungaijuri Khal, Ruhita Khal and Sonaichari Khal has to be periodically cleaned (including debris) to restore the surrounding environment of Cumilla city.

It is recommended that Department of Environment along with other organizations would intensively monitor the environmental issues of the New Dakatia River.

estimated that about 4100 m protective work is required in the vulnerable location to save the assets located in and around of the erosion prone location.

d) Construction of Walkways: Walkway is proposed at suitable locations along the bank of New Dakatia river in Chandpur and Laksam township area. The length of the proposed walkways is 2.00 km.

e) Rehabilitation of existing Regulators: 11 nos. existing regulators have been thoroughly investigated in the field. After detail review two regulators are found non-functional, could be abandoned and dismantled. Another 9 nos. regulators need various levels of rehabilitation to make them fully functional.

f) Removal of Water Hyacinth: Excessive growth of water hyacinth in New Dakatia river is a nuisance from different perspectives e.g. deterioration of the aquatic environment, development of fishery, navigation, growth of mosquito etc. Although complete and permanent annihilation of water hyacinth is not desirable, removal of it is necessary to restore the aquatic environment to its normal state. In consideration of that, removal of water hyacinth is proposed for about 584000 sq.m of the river area.

E.11 Economic Analysis

Economic analysis of the project has been carried to evaluate and compare the project cost with the multi-sectoral benefits expected to be achieved. The Costab Program introduced by the ADB and the World Bank has been used both for the analysis of project costs and for generating project economic costs. Expected agricultural benefits of the project have been analyzed using Farmod Program. The economic life of the project has been assumed for 30 years from the start of project construction. Cumulative project impacts beyond 30 years were also considered in Multi–Criteria Analysis. Implementation period of the project is assumed to be 3 (three) financial years. The full benefits are assumed to be achieved after one years of the completion of the proposed investment program. It is assumed that partial benefits will start from the 1st year of the project completion. To estimate benefit-build-up based on practical experience; a curvilinear trend is considered. Discount rate of 12 % is used for computation of BCR & NPV following the "Guidelines for Project Assessment" of FAP, May 1992.

The total Investment cost includes the cost of civil works, crop compensation, O & M cost during implementation, EMP monitoring, implementation support services, survey and investigation, procurement of vehicle and equipment, project management cost etc. The estimated total investment cost of the project is about Tk. 11,343.40 lakh (financial) and Tk. 8,432.50 lakh (economic).

The agricultural financial and economic benefits are Tk. 1615.02 lac and Tk. 1670.82 lac respectively. The Fisheries financial and economic benefits BDT 215.33 lakh and BDT 194.44 lakh respectively. The annual riverbank protection benefits have been considered due to Savings of Land, Infrastructures and others from the erosion, is estimated as BDT 897.50 lakh in financial and BDT 810.45 lakh in economic.

The estimated FIRR, NPV and B/C ration are 16.19%, 2985.14 lac Tk. and 1.00:1.28 respectively. On the other hand, EIRR, NPV and B/C Ratio are 21.60%, 5564.06 lac Tk. and 1.00:1.71 respectively. The economic and financial calculations have been carried out considering a standard opportunity cost of capital 12 %.

A sensitivity and switching value analysis were carried out assuming 10% increase in investment cost, 10 % decrease in benefit, However sensitivity analysis was also carried out with costs being