GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH

MINISTRY OF WATER RESOURCES

BANGLADESH WATER DEVELOPMENT BOARD

Terms of Reference

for

Study on social and environmental impacts after implementation of the project

October, 2023

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1. Background

Meghna-Dhonagoda Irrigation Project (MDIP) is located at norther part of Chandpur district near the confluence of the Padma and the Meghna river. Before 1988s, almost whole the Meghna-Dhonagoda Irrigation Project (MDIP) area used to remain submerged under water. The MDIP area has been a part of deltaic land formed by the deposition of sediments of vast river system of the Meghna with tributary named as the Dhonagoda river. The livelihood in this area used to suffer the threats of floods, drainage congestion and riverbank erosions.

In 1988, BWDB completed implementation of the MDIP with the aim to protect the area from floods, improve the drainage congestion and provide irrigation to boost-up agricultural production, MDIP was devised in different components such as pump house, flood control embankment, irrigation canal, drainage canal and water management structure etc. The project became one of the most successful irrigation projects of the country. After implementation of the project the cropping intensity has risen from 146% to 181%, crop production has increased from 27136 MT to 55880 MT. The project was implemented under the financial assistance of Asian Development Bank (ADB) and Government of Bangladesh (GoB). Due to implementation of the project, about 17584 ha area has been protected from flood and drainage congestion, and about 6700 ha area was getting irrigation from surface water.

Since implementation, the project has been functioning efficiently at a stretch for more than 35 years. Meanwhile, the project has crossed its anticipated lifetime of providing service. Different components of the project have lost either their workability or efficiency. Deterioration of the project components has also increased the risk of failure of flood embankment, prolonged drainage congestion than planned, insufficient irrigation etc.

In the above context, a proper and secured functioning of the project is realized necessary to protect the life, property and livelihood of the area. Hence, BWDB undertook a project titled ***"Rehabilitation of Meghna-Dhonagoda Irrigation Project and River Bank Protection"*** for rehabilitating and upgrading different components of the Meghna-Dhonagoda Irrigation Project (MDIP) to restore its functionality and performance. In this regard, a DPP costing BDT 34765.69 lakhs under funding of GoB has been formulated and planned for implementation during January 2023 to June 2025. This DPP was approved in ECNEC meeting held on 12.03.2025 and Ministry of Water Resources issued a letter of administrative approval on 06.04.2023. While approving in ECNEC meeting, specific decision has been taken that is "A study needs to be conducted by considering all the relevant issues such as benefits derived from the construction of embankment on the left bank of the Meghna river under the Meghna-Dhonagoda irrigation project, the cost of construction of the embankment, the maintenance cost and the loss due to submergence of a large area on the right bank, whether the production of food grains due to the construction of embankment is commensurate with the construction cost etc". Under above-mentioned project, 50.00 lakhs taka has been sanctioned under this DPP to conduct a technical study regarding this.

Under this circumstances, BWDB formulated a ToR to assess the technical, socio-economic and environmental impact on Meghna-Dhonagoda Irrigation Project (MDIP) and Surrounding Areas of Meghna River.

2. Study Area

The study area consists of Meghna-Dhonagoda Irrigation Project (MDIP) and the surrounding areas upto The Meghna Bridge at north, Chandpur at south and ThePadma Bridge at west.

Mainly the impacts of constructing bank protective works and flood embankment will be analyzed from the reach of Meghna Bridge to the MDIP and Padma Bridge to Chandpur.

The Meghna-Dhonagoda Irrigation Project (MDIP) is located in Matlab (North) Upazila under Chandpur district. It is bounded by the Meghna River along the west and north side and by the Dhonagoda River by the east and south side. The project is situated about 19 km north of Chandpur town and about 40 km south-east of Dhaka. Physiographically the project area is located in Middle Meghna and Lower Meghna River flood plain and Old Meghna Estuarian flood plain. The entire project area is a part of Delta which was formed by the sediment carried by the Padma-Meghna-Jamuna River system over a long-time span. There are numerous rivers/khals inside the project area which drains the area into the Meghna River. The land elevation inside the project area ranges from 1.50 m MSL to 4.5 m MSL. A map of the project is shown in Figure 2.1.

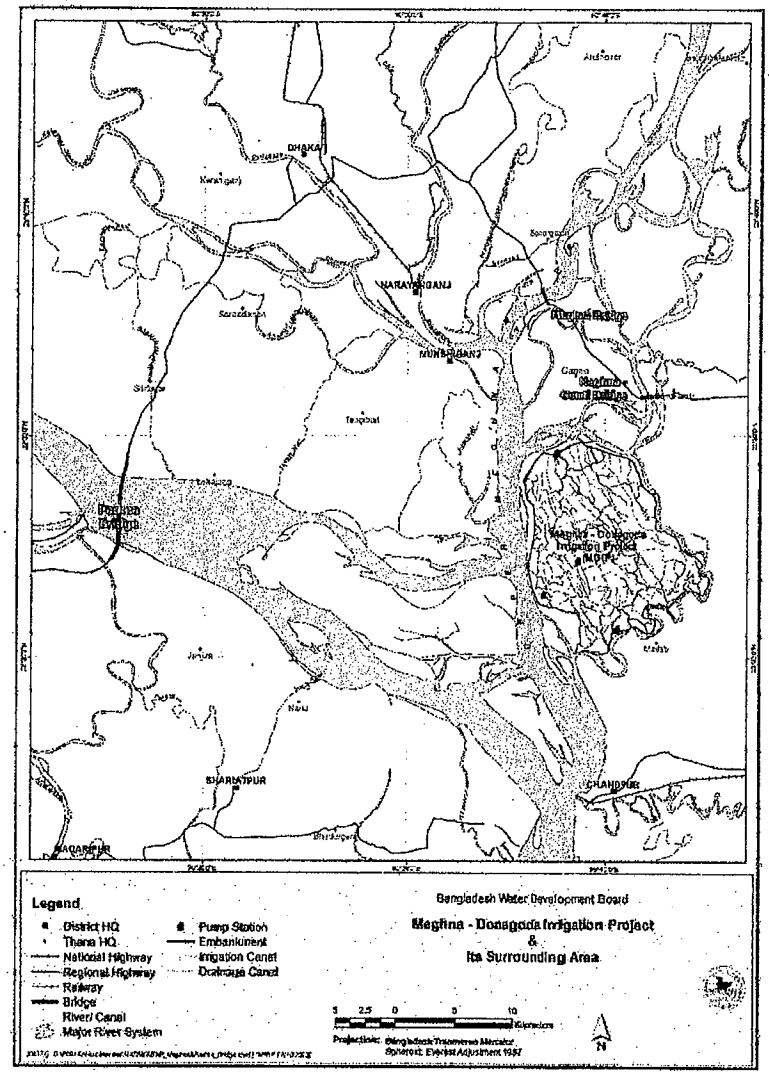

Figure 2.1: Meghna-Dhonagoda Irrigation Project

3. Objectives

The main objective of the study is to assess the hydro-morphological, socio-economic and environmental impacts due to implementation of Meghna-Dhonagoda Irrigation Project (MDIP) and water resources development in surrounding areas in relation with construction & maintenance cost of embankment, advantages of embankment construction, agriculture improvement and livelihood improvement. The specific objectives of the study are:

- To prepare a baseline for the pre-project scenario, identify the indicators for performance evaluation and evaluate the performance for constructing embankment for Meghna-Dhonagoda Irrigation Project (MDIP) from hydro-morphological, socio-economic and environmental perspectives;
- To identify and analyze the impacts of constructing embankment of MDIP on the opposite side of river bank;
- To assess the morphological changes of the Meghna River for implementation of MDIP using readily available mathematical model and satellite images;
- To identify, quantify and evaluate the socio-economic benefits, potential environmental consequences and impacts before & after implementation of the project;
- To assess the contribution of implementing the project to the GDP of Bangladesh.

4. Scope of Work

The main scope of services to be rendered by the consultant shall include but not limited to the following:

- Collect and review of existing data, satellite images, maps, information and secondary data.
- Collection and review of previous reports on the MDIP with particular attention to the feasibility report, project completion report, as-built designs and different evaluation report/studies etc.
- Development of Hydrodynamic model and simulation of hydrodynamic conditions and assessment of flow characteristics.
- Assessment of morphological condition by developing morphological model of the study area.
- Assessment of erosion vulnerability of the existing embankment; formulation of erosion mitigation options and examination of effectiveness of the options.
- Discussion with BWDB officials, other field officials and local stakeholders.
- Preparation of base map of the study area.
- Identification of the problems/rehabilitation requirement of the project with emphasis on irrigation, drainage, flood control, bank erosion, siltation.
- Prepare a detail inventory of the hydraulic structures of the project area.
- Check health chart and performance of the different water management components of the project e.g., irrigation and drainage canal system, embankment, regulators, irrigation and drainage conduits, check structures, escape, aqueduct, turn-outs, foot bridge and other water management structures.
- Assessment of the effectiveness of irrigation and drainage canal systems with water management components.
- Analysis of the hydro-morphological changes of the Meghna River reach adjoining the project area using readily available mathematical model.
- Identification of the need for rehabilitation requirement of the irrigation canals.

- Assessment of existing drainage canal system from environmental aspect.
- Collection of socio-economic, agricultural, fisheries, navigation and environmental data/information to formulate/frame the present condition of the project area.
- Assessment of the baseline scenario of the project area on different socio-economic aspects e.g., crop production, fishery, navigation, socio-economic condition and environmental aspects etc.
- Assessment of the likely benefits and drawbacks of the proposed rehabilitation works on agriculture, fishery, navigation, socio-economy, environment etc.
- Assessment of the benefit-cost ratio and contribution to the GDP of Bangladesh for implementing the project in the study area.
- Consultation, discussion, and workshop for dissemination of the project activities.
- Reporting and documentation

5. Expected Outputs

The expected outputs of the study are:

- Comparative statement of hydro-morphological, socio-economic and environmental impacts of constructing embankment along the left bank of Meghna river on MDIP and surrounding areas before and after project implementation;
- Evaluation of pre and post project scenario considering the implementation of the physical project;
- Baseline hydrodynamic and morphological conditions of the project area;
- Morphological and Plan-form changes over the years
- Detail and alternative plans to avoid potential losses;
- Economic and financial analysis considering cost of construction and maintenance of embankment, benefits of embankment construction, enhance in agricultural production.
- Livelihood improvement plan of the project area;
- Assessment report of the contribution to the GDP of Bangladesh;
- Workshop;
- Reports.

All recommendations should be specific and clear.

6. Duration of the Services and Reporting

The duration of the feasibility study is 6 **(Six)** months. The schedules of submission of deliverables are as follows in Table 6.1.

Table 6.1: List of deliverables

Sl. No	Report	Deadline
1.	Inception Report (10 copies)	At the end of 1st month
2.	Draft Final Report (10 copies)	At the end of 3rd month
3.	Final Report (20 copies)	**Two weeks** before the end of the study period incorporating all comments and suggestions received from different concerned offices.

N.B. Hard and Soft copies (along with CD/DVD and Portable Hard Drive) of all the reports, presentations, documents etc. have to be submitted to BWDB. Data and reports will be copyright property of BWDB. No part of this report may be reproduced, distributed, or

The Project Director, BWDB, Dhaka would be representing BWDB and receiving all the deliverables mentioned above. Review meetings with participation of concerned Planning, Design and Field level officials of BWDB would be held on Inception and Draft Final Reports. The office of the Project Director would communicate with other line departments and all concerned for consultation, sharing of ideas and to discuss the findings as well as disputes.

7. Dissemination of Study Results

The study would apply a professional approach to communicate and disseminate the study findings. Emphasis shall be given towards documenting and dissemination of information about the project findings and major recommendations. After submission of the Inception Report, its contents should be presented in a meeting where an understanding of the issues concerned and methodology of accomplishing different tasks to be discussed in getting feedback from the stakeholders and project officials of BWDB. After submission of the Draft Final Report (DFR), the study findings should be presented in a meeting. The findings and recommendations of the study should be spelt out, and feedback of the participants would be incorporated as required in the Final Report.

8. Key Personnel and Qualification

8.1 Key Personnel

It is estimated that to carry out the study with the stated objectives, it will require 12 man-months of 09 professionals of different discipline. The composition of the team, their man-months and relevant qualification is given in Table 8.1 and Table 8.2 below.

Table 8.1: List of key professionals

SL	Professionals	No. of Persons	Quantity (Man-Month)
A-1	Team Leader	1	2
A-2	Morphologist	1	1
A-3	Economist	1	1
A-4	Environmental cum Ecology Specialist	1	1
A-5	Sociologist	1	1
A-6	Agriculture Specialist	1	1
A-7	Fishery Specialist	1	1
A-8	GIS Specialist	1	1
A-9	Field Engineer	1	3
Sub-total (A)		**9**	**12**

8.2 Qualifications, Experience and Task of the Key Personnel

Discipline	Qualifications and Tasks
1. **Team Leader**	He/she should possess minimum Masters' Degree in Civil Engineering/Water Resources Engineering/Hydraulic Engineering having 15 years of professional experience and at least 10 years of working experience in river, and estuarine hydraulics, water resources development and

Discipline	Qualifications and Tasks
	management projects including leading and managing a study team engaged in dealing with river engineering, leading and managing a multidisciplinary consultancy team for water resources planning, project management for flood control, drainage and irrigation projects, mathematical modelling & planning and environmental and social impact assessment. His/her major responsibilities shall include but not necessarily be limited to the following: • Review of past studies on flood control, drainage management, water resource assessment and related activities under the assignment. • Formulate strategy and action plan for the study. • Guide and supervise the project activities and coordinate study team members. • Participate in devising alternative development plans. • Carry out overall co-ordination and top supervision of the different study activities and maintain close liaison with the client; • Maintain liaison with BWDB and related agencies. • Preparation of different reports as per requirement of the study. • Presentation of different study observations or reports before the client as and when required. • Attend in meetings, workshops, etc. organized under the study.
2. Morphologist	He/she should possess a minimum master's degree in civil /Water Resources Engineering having 12 years of professional experience and at least 08 years of working experience in morphological studies of river course changes, bank erosion, bank protection and numerical modelling. His/ her major responsibilities shall include but not necessarily be limited to the following: • Collection of morphological data need, their collection plan from sources, building a database, etc.; • Data preparation for assessment of the present morphological status of the study area; • Interpret the morphological status of the study area to the team leader and water resource planners; • Establish a morphological baseline condition of the study area; • Ascertain the morphological characteristics of the rivers and probable impacts based on analysis of proposed intervention following analytic approach and experience. • Analyzing historical satellite imageries to find the past changes of the river morphology in the study area and critical river courses. • Writing relevant portion/parts of the reports at various stages of the study. • Assist the team leader in making due progress of the study; • Miscellaneous task as and when required.

Discipline	Qualifications and Tasks
3. Economist	He/she should possess a minimum master's degree in Social science/ Economics having 10 years of professional experience and at least 7 years' of working experience in analyses of development projects. His/her major responsibilities shall include but not necessarily be limited to: • To assess economic impacts, suggest mitigation measures due to the proposed development works under the project. • Elaboration of the feasibility level cost estimates, contingency amounts, detailed price escalation etc. • Perform economic analysis e.g., BCR, EIRR/FIRR, NPV, Sensitivity analysis etc. of the proposed interventions. • Conclusion on socio-economic viability of each planning option and the project as a whole. • Assist in preparing cost estimate following the DPP format. • Contribute in report writing. • Attend in the meetings, workshops as and when required. • Assist team leader and planning engineer as and when required.
4. Environmental cum Ecology Specialist	He/she should possess a minimum bachelor's degree in Civil engineering/ Water Resource Engineering/Environmental Engineering/Environmental Science/Ecology/Botany/Zoology having 10 years of professional experience and at least 7 years' of working experience in preparing ESIA, IEE, EMP. His/her major responsibilities shall include but not necessarily be limited to the following: • Carry out field visit, consult with stakeholders, and understand the project area. • Prepare environmental data collection plan and guide team leader to collect them. • Collect socio-economic, fishery, agriculture, ecology and other relevant data and information from respective professionals of the study team. • Scope and identify of zones of importance for ecosystem functions of key species such as areas of feeding, breeding, calving, and spawning of these species; • Design and develop methodology along with collection, compilation and analysis of data related to biological resources in rivers; • Establish baseline condition of ecological resources and aquatic resources; • Contributing in the report writing. • Assist team leader as and when required regarding environmental issues. • Attend meeting, workshops, etc. as and when required;
5. Sociologist	He/she should possess a minimum master's degree in Sociology/Social science/Social Studies having 10 years of professional experience and at least 7 years' of working experience in sociological activities & field survey, i.e interaction with the stakeholders, holding Focus Group Discussion (FGD), Target Group Discussion (TGD) and work-shops/seminars at field level to find out the desired goal of the study and

Discipline	Qualifications and Tasks
	to disseminate the results of the study. His/her major responsibilities shall include but not necessarily be limited to: • Field visit and understand the socio-economy of the study area. • Design socio-economic survey tools and methodology; • Conduct focus group discussions (FGD), public consultation and Key Informant Interview (KII) for collecting primary data on social condition, cultural values, etc. • Collect and analyze social baseline data. • Assess social impacts, suggest mitigation measures due to the proposed project. • Contribute in preparing the ESIA/SIA report of the study. • Attend in the meetings, workshops as and when required. • Assist team leader and planning engineer as and when required.
6. **Agriculture Specialist**	He/she should possess minimum master's degree in Agriculture/Crop Science/Agriculture Engineering having 10 years of professional experience and at least 7 years' of working experience in field survey, evaluation of agricultural benefits of a project between pre & post project condition by introducing improved agricultural practices. His/her major responsibilities shall include but not necessarily be limited to the following: • Field visit and understand the study area. • Analysis of the existing conditions of the agricultural practices and production. • Suggest improved agricultural method with respect to time, land, cropping pattern, cropping inputs & agricultural practices. • Evaluate the agricultural benefits after post project condition. • Help design crop calendar, cropping pattern and irrigation water use. • Contribute in the ESIA and other relevant report preparation. • Attend the meetings and workshops as and when required. • Assist team leader and planning engineer as and when required.
7. **Fishery specialist**	He/she should possess minimum master's degree in Fisheries/ having 10 years of professional experience and at least 7 years' of working experience in fisheries sector projects, adverse impact assessment of different development project intervention on fisheries resources, preparation of EIA or IEE, preferably for water resources management projects. His/her major responsibilities shall include but not necessarily be limited to the following: • Field visit to understand the project area. • Establish baseline information on existing fishing activities and resources. • Conduct field survey to collect data on fishery aspect. • Evaluate potential and threat in fishery resources. • Carry impact study and suggest mitigation measures due to proposed project.

Discipline	Qualifications and Tasks
	• Contribute in the ESIA and other relevant report preparation. • Attend the meetings and workshops as and when required. • Assist team leader and planning engineer as and when required.
8. GIS Specialist	He/she should possess minimum bachelor degree in Urban and Rural Planning/Geography/GIS having 07 years of professional experience and at least 04 years' of working experience in producing GIS coverage, contour map, Digital Elevation Model. His/her major responsibilities shall include but not necessarily be limited to the following: • Preparation of ArcGIS based base map, contour maps of project area, difference maps of bed topography. • Preparation of project map showing existing khals, khals, lakes and other important features. • Preparation of maps for reports. • Assist the study team in report writing. • Assist team leader and planning engineer as and when required.
9. Field Engineer	He/she should possess minimum bachelor degree in Civil/ Water Resources Engineering having 05 years of professional experience and at least 03 years' of working experience in collection, analysis of field data including experience in stakeholders' consultation, His/her major responsibilities shall include but not necessarily be limited to the following: • Field visits as and when required by the team members or project professionals. • Carry out field investigations, sampling, etc. • Assist team leader and planning engineer as and when required.

9. Study Organization, Duties and Responsibilities

9.1 BWDB's Responsibilities

The Consultant shall work under the direct supervision of the Project Director, BWDB, Dhaka. Different functional wings/directorates of BWDB shall assist the project team as required, particularly with regard to the hydrological, morphological and flood management etc. aspects of the study. The Project Director will also ensure the involvement of concerned officials of BWDB in survey works, field data collection activities as and when required by the consultant. Field survey and field data collection will be done by the consultant in close consultation with the concerned field Executive Engineers of BWDB.

The Project Director, BWDB, Dhaka will ensure that the objective of the study as detailed in the ToR is achieved within all agreed time schedule and that the contents of the report are acceptable to GoB. He will direct the planning process, work program and supervise the Study progress according to the objectives set in ToR.

The Project Director, BWDB, Dhaka will arrange regular meetings between the consultant and BWDB professionals to discuss technical and project management issues. Any unresolved issue either technical or otherwise shall be taken up with Chief Engineer (Civil), Planning, BWDB or as required.

BWDB shall provide or make available the following data, services and facilities to the consultants, as per existing rules of BWDB:

- Available hydrological, morphological, meteorological data and records on rivers/khals of the Study Area following existing BWDB data dissemination rules.
- Available contour maps, aerial photographs, mosaics, maps and previous study reports of the Study Area, if required.
- Any other services and information available with BWDB, to help the consultants to carry out the assigned task as per ToR.
- Any clarification required about this assignment.

9.2 Consultant's Responsibilities

The consultant should carry out the services as detailed in "Objectives, Scope of Works and Expected outputs" in the best interest of the Government with reasonable care, skill and diligence with sound engineering, administrative and financial practices. The consultant will keep close contact with concerned BWDB field offices (CE, SE and EE of the concerned BWBD field office) for achieving the objectives of the study. All primary and secondary data, maps, consultation information, relevant audio and video clips collected during the study process would be handed over to BWDB. In response to that, the consultant should-

- Make available all primary and secondary data (entire set of information involving audio-visual recordings) to BWDB as and when required. Data and information would be submitted to the client both in hard and soft copies.
- Make necessary arrangements for site investigation and data collection as needed for performance of the assigned task.
- Provide all support for the effective delivery of the services as stipulated in the objectives, scope of works and expected outputs written in the ToR.
- Actively join the workshops with regard to the purpose of the study in presence of the BWDB officials and other stakeholders in the project area.
- All types of technical support (like preparation of maps on necessity of the client and any other information related to the task the consultant is assigned with) would be provided to the client.

All stakeholder consultation sessions would be recorded for future documentation. Video recording would have to be done and the clips should be handed over to the client. Discussants would be introduced with necessary introductory information and mobile phone number duly incorporated in the reports. Discussion points should be focused properly and addressed accordingly. The consultant shall return Total Station, computers along with printers and accessories to the client after completing the study