GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH

MINISTRY OF WATER RESOURCES

BANGLADESH WATER DEVELOPMENT BOARD

Terms of Reference

for

Consultancy service for **"Study for Rehabilitation of Low Lift Pump Irrigation Projects in Dinajpur, Thakurgaon and Panchagarh District"**

(Package No. LLPIP-PS01/23-24)

March 2025

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1. Background

The strategic objectives for water resources management in the 8th five year plan includes increasing water use efficiency in crop production and enhance the utilization of surface water irrigation. To attain the objective, Bangladesh Water Development Board (BWDB) emphasizes to implement irrigation projects for which feasibility study proposal has been formulated. **"Feasibility Study for Updating Previous Study of North Rajshahi Irrigation Project and Feasibility Study for Rehabilitation of Low Lift Pump Irrigation Projects in Dinajpur, Thakurgaon and Panchagarh District"** has been approved by Bangladesh Planning Commission on 18/04/2024. Thereafter, the administrative order regarding this project has been published on 02/05/2024 by Ministry of Water Resources.

In order to boost agricultural productivity, Bangladesh Water Development Board (BWDB) has established 41 (forty one) low lift pump irrigation projects in the year 1962-63 and 6 (six) electric block projects in 1965-67 in Dinajpur, Thakurgaon and Panchagarh districts by using the water of Karatoya, Senua, Tangon, Nagar, Kulik, Shuk, Atrai, Kakra, Punarbhaba etc rivers. 21 (twenty one) of the 47 (forty-seven) projects were located in Dinajpur, 11 in Thakurgaon, and the other 15 in Panchagarh disctrict. The total area covered by the projects was 3778.24 hectares. However, due to the changed land use pattern, urbanization, inadequacy of water and morphological changes in the rivers, lack of proper maintenance the irrigation capacity has come down to only 89.60 hectares and only Eight (4- low lift pump and 4-electric block) numbers of projects are partially active presently. Farmers in the area depend on rainfall and groundwater to cultivate rice, boro, and aman crops. During boro season, the farmers irrigate the boro crops using groundwater from Deep Tube Wells (DTW). However, insufficient rainfall over the year hampers groundwater recharge, leading to a gradual depletion of the groundwater table. Thus, irrigation coverage is declining. Tube-well irrigation is used as a supplemental source, but this is insufficient. As per Bangladesh Delta Plan 2100 (BDP 2100), boro yields have decreases by about 50 percent. Furthermore, climate change will affect the demand as well as the availability of water. Changes in rainfall patterns and intensity strongly influence agriculture. Therefore, it is essential to incorporate climate change adaptation strategies within the agricultural sector, particularly in the planning and execution of irrigation systems.

To address this, out of the 47 projects, 34 (thirty four) low lift pump irrigation projects need to be rehabilitated considering the availability of irrigation water in the rivers and irrigable land. However, all of the 47 projects would be studied to analyse how many of these are feasible for rehabilitation. Some measures that need be taken are extension of irrigation using the surface water, regulating ground water extraction, water retention for the dry season usage, reclaiming encroached river banks etc.

It is anticipated that the annual production of 16282 metric tons of rice and 4411 metric tons of other food grains will increase if these 34 projects are rehabilitated. If the project is implemented successfully, it would result in environmental balance and agricultural expansion. Also dependency on the surface water will be reduced and ground water will be recharged. Moreover, the project seeks to contribute towards the achievement of the Goals 2,3, and 4 of BDP 2100.

2. Study Area

The project is located in "Barind and Drought Prone Areas" which is one of the hotspots of BDP 2100. The main strategy for development of the area as specified in the Delta Plan is balancing supply and demand for sustainable and inclusive growth, minimizing losses due to floods and drainage congestion and ensuring water supply and sanitation. The proposed project is aimed for rehabilitation of low lift

irrigation projects in Dinajpur, Thakurgaon and Panchagarh District. Tentative study area is shown in the Figure1 which may be expanded considering the water availability and potential for providing irrigation

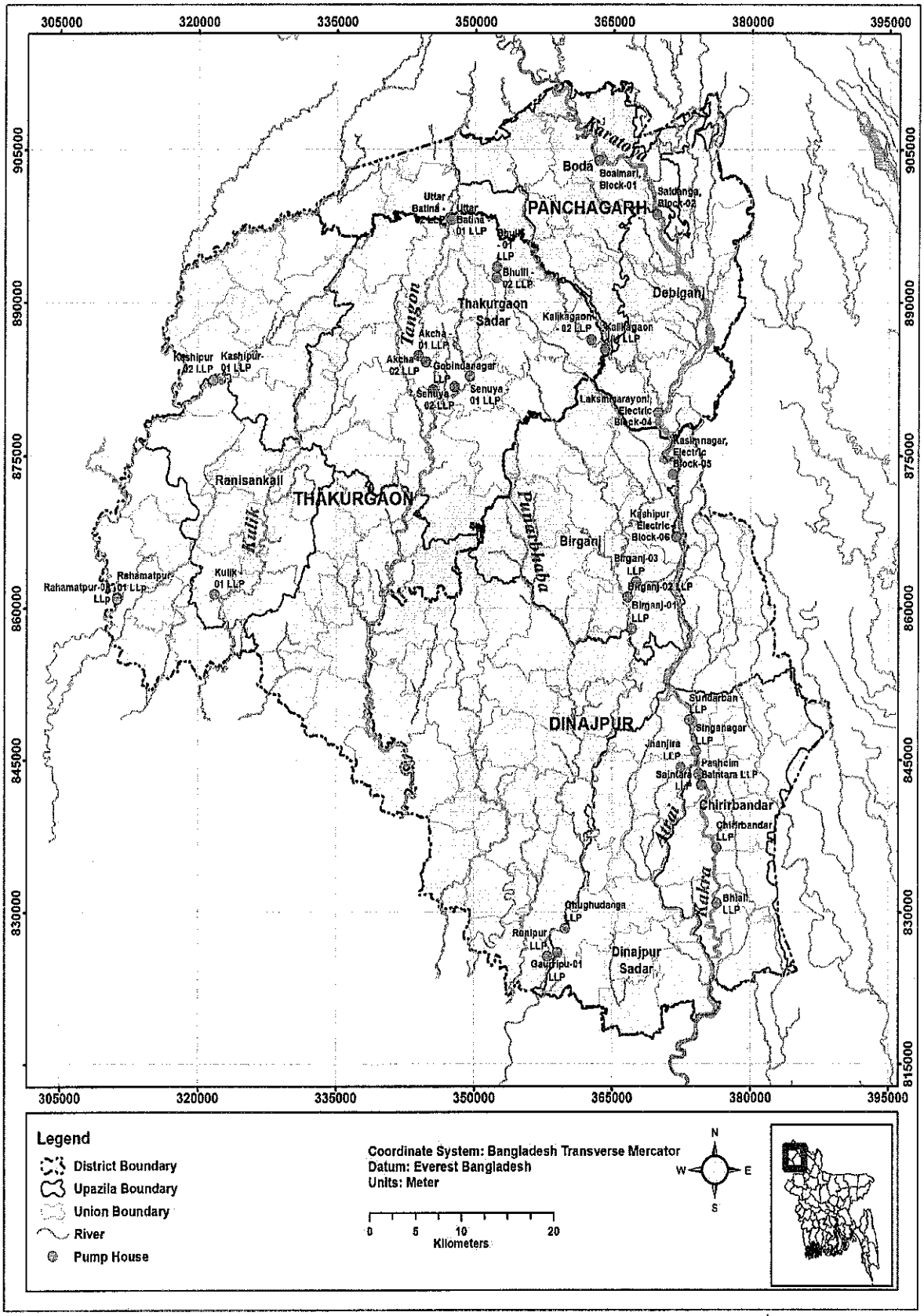

Figure 1: Tentative Study Area Map

3. Objectives

The overall objective of the study is the agricultural development and integrated agricultural water resource management of the study area which would ultimately contribute to the country's economic growth and upgrade the living standard of the people in the project area.

Specific Objectives:

- Conducting a detailed feasibility study to rehabilitate the low lift pump irrigation projects in Dinajpur, Thakurgaon and Panchagarh districts;
- Review and Re-delineate the possible technology for irrigation network in order to improve the efficiency of water use;
- Explore existing problem and recommend rehabilitation plan with subsequent expansion of irrigation command area considering water availability and possibility of new LLP irrigation project;
- Development of detailed drainage network Map to ensure connectivity with the natural drainage canal/river within the canal network system;
- Development of River, canal and natural water bodies to ensure connectivity and conserve water;
- Develop Irrigation Management Plan with Scheduling supplementary irrigation in rainy season and full irrigation in dry season;
- Development and planning for necessary structural intervention;
- Prepare Drought Management Plan;
- Environmental and Social Impact Assessment (ESIA) for proposed interventions

4. Brief outline and scope of the study:

The study will investigate the suitable solutions considering hydro-morphological change, future economic, social and environmental aspects of the study area.

Scope of the Study:

The activities and the scope of work for the assignment are as follows (but not limited to):

Data collection, survey and analysis:

- Collection and review of existing maps, information, relevant available study/technical/project reports, papers/journals and data (topographic, hydrometric, hydro-meteorological, land use, crop calendar, cropping pattern, water use, structural interventions etc.) from primary and secondary sources;
- Cross sectional survey of rivers/canals and topographic survey as per requirement of the study;
- Review the existing canal network and location of LLP pump location;
- Primary data collection on water level, discharge, sediment concentration and bed material sampling;
- Incorporation of all relevant data and information of the study project titled "Feasibility Study for Sustainable River Management in Panchagarh and Thakurgaon District";
  Preparation of Base map and Area Elevation Curve;

Assessment of hydro-morphologic characteristics and model development:

- Identification of present drawbacks for the development of irrigation system.

- Identification of the historical erosion trend and extent of erosion prone/ vulnerable locations at the concerned rivers through analysis of historical satellite images;
- Application of appropriate hydrological and hydrodynamic analysis of the of relevant rivers/canals of the study area;
- Determining the availability of water based on each pump station capacity;
- Determining Irrigation Command area of each Pump station for the existing condition;
- Preparation of irrigation requirement and irrigation network for the changed condition;
- Assessment of possibility for connectivity between the surrounding irrigation systems with proposed irrigation system;
- Digitize river networks and identify significant streams/river connectivity and flood plain channels;
- Development of appropriate model for Rainfall-Runoff and Drought of the study area;
- Identify drought prone area and period and prepare Drought Management Plan accordingly;
- Development of appropriate Ground water Modeling of the study area;
- Assessment of surface water and ground water availability in the study area;
- Development of Irrigation and Drainage model of the study area, assess the availability of surface water and required water for dry season irrigation as well as supplementary irrigation of the study area;
- Assessment of drain water recycling or reuse;
- Assessment of impact on groundwater due to the intervention of surface water-based irrigation practices using existing mathematical modelling techniques;
- Explore and recommend the possible technology for improving irrigation water supply technology and water use efficiency;
- Water loss calculation at different stage including percolation, seepage, evaporation etc
- Analyze possibility of Solar Panel system introduction for water distribution;
- Line diagram for water flow distribution;
  Options Selection through multicriteria analysis considering climate change;

Option development, Planning and designing:

- Selection of suitable location for pump house, if necessary;
- Necessary soil boring and data analysis (SPT, c, Φ, liquidity limit, plasticity limit, d_{50} and other data related to study.) for the design of proposed interventions;
- Preparation of inundation map showing extent and depth of inundation;
- Collection and review of existing data, maps, information and past relevant studies from the secondary sources;
- Conduct KII, FGD, workshop and discussion session for communicating with local beneficiaries and disseminating the study outputs;
- Conduction of socio-environmental survey through appropriate tools & process to establish important environmental issues and to identify important environmental components;
- Plan for community-based approach for internal water management and institutional development;
- Assessment of the quality of the surface water, ground water and soil sample of the study area;

- Assessment of crop suitability for available water;
- Preparation of detailed engineering design & drawing of proposed interventions. The prepared designs and drawings should be duly vetted by concerned Design circle of BWDB;
- Selection of valued environmental and social components impacted by the existing and proposed interventions in the project area; Identification of actual need-based requirements for the study area and formulation of different options to attain the project objectives and recommendation about the best option as per multi criteria analysis considering technical, economical, social and environmental sustainability;
- Identification of important ecosystem (land/aquatic) and measures for conservation/restoring of those ecosystem;

Environmental and Social Impact Assessment

- Identification of rare species within the project area and propose community based ecosystem management plan for ecological equilibrium and preparation of environmental enhancement and conservation plan;
- Preparation of Terms of References (ToR) for EIA and getting approval of the ToR from Department of Environment (DoE).
- Preparation of Environmental Impact Assessment (EIA) report following approved format of DoE, and presentation of EIA report at the DoE in getting requisite clearance certificate thereof;
- Preparation of Environmental Management Plan (EMP) for conservation of wetland, aquatic resources, fisheries resources, bird sanctuaries etc.;
- Preparation of Land Acquisition Plan (LAP) and Resettlement Action Plan(RAP) as well as identification of illegal establishment in the canal system;
- Incorporating the Delta Appraisal Framework (DAF) to align with the goals of BDP 2100 and principles of Adaptive Delta Management (ADM)
- Using the DAF tool to assess potential environmental and socio- economic impacts under present and future climate change and socio-economic uncertainties including demographic changes;
- Analysis of the demand of the project components as well as identification of the strength, weakness, opportunities and threat of the proposed interventions;
- Investigate the institutional and legal requirement during implementation of the proposed interventions.
- Analysis of the alignment of the project with the existing Policy, Plan and Act;
- Preparation of dredged material management plan (if required) in consultation with local stakeholders;

Economic and Financial Analysis

- Identification and quantification of population, ratio of male and female, children, person with special needs, excluded groups, poverty situation, livelihood, regional disparity etc. of the project area;
- Identification and quantification of the employment status, income generation, changes of living standard of the people in the project area during pre-construction, construction and post-construction phase;
- Joint local stakeholder consultation regarding proposed irrigation network;

- Financial & Economic analysis i.e. Net Present Value (NPV), Benefit Cost Ratio (BCR), Internal Rate of Return (IRR) of each option;
- Preparation of cost estimate of the project works proposed in each option as per DPP format on the basis of recent actual schedule of rates of concerned circle of BWDB;

Project Assessment with respect to Environmental Sustainability, Climate Resilience, and Disaster Risk Analysis

- Analysis for Environmental Sustainability, Climate and Disaster Resilience as well as Disaster Impact Assessment (DIA);
- Risk (uncertainty) and sensitivity analysis of the proposed interventions

5. Output and Outcome of the Project:

Output:

- Feasibility study report as per Prescribed format of Planning Commission by following the indicators of DAF
- Base map with inventory of existing structures and Project Map;
- Recommend rehabilitation plan with subsequent expansion of irrigation command area considering water availability Estimated irrigation requirement and irrigation network for the changed condition;
- Data set containing collected/surveyed cross-section information and others;
- Calibrated and Validated Model results of the project along with the simulation results of base condition and various developed options;
- Surface water availability at different locations for dry period in the study area;
- Impact on groundwater due to the intervention of surface water-based irrigation practices.
- Identify drought prone area and period to prepare Drought Management Plan;
- Detailed design, drawings and cost estimate of proposed interventions;
- Economic analysis i.e. IRR, BCR, NPV;
- Environmental and Social baseline condition of the project and ESIA of proposed interventions;
- Land acquisition plan and resettlement action plan with identification of illegal establishment and costing of land acquisition with all kinds of compensation.
- Legal and administrative framework for land acquisition.
- Existing crop pattern and water requirement;
- Availability of water quality based on crop pattern;
- Environmental Management Plan (EMP) including:
    - Mitigation Plan;
    - Enhancement Plan;
    - Compensation Plan;
    - Environmental Monitoring Plan
- Environmental enhancement and conservation plan;
- Risk analysis for environmental sustainability, climate resilience and disaster;
- Legal requirements during implementation of the proposed project intervention;
- Approval of ESIA ToR from DoE and make reports based on ToR and take necessary measures to collect Environmental Clearance Certificate from DoE;
- Report format for EIA applicable to projects sponsored by the Doner agency such as World Bank and Asian Development Bank (ADB) ;
- Resettlement action plan (RAP) and Land Acquisition Plan (LAP);

- Investment cost with year-wise break-up as per DPP requirement;
- Costing with phasing and economic analysis considering agriculture, industry, fisheries, shipping, and city development/urbanization sector for the forecasting year 2041 and to achieve Sustainable Development Goals (SDGs) and implement Bangladesh Delta Plan (BDP)-2100.
- Project implementation plan.

Outcome:
Agricultural development and economic growth of the project area.

6. Duration of the Services and Reporting

The duration of the feasibility study is 15 months. The schedules of submission of deliverables are as follows:

Sl. No.	Report	No of copies	Schedule (with reference to consultancy period)
1.	Inception Report	20 copies	At the end of 1st month
2.	Progress Report	5 copies	With 5th day of the next month of every quarter
3.	Interim Report	20 copies	Within 8th month
4.	Progress Report	10 copies	At the end of 10th month
5.	Progress Report	10 copies	At the end of 12th month
6.	Draft Final Report with detailed design. * Detailed design should be submitted with DFR duly vetted by concerned Design office of BWDB.	20 copies	Within 15th day of 15th month
7.	Final Report	20 copies	Within 15th month from the date of commencement of the study. Incorporating all comments and suggestions received from different concerned offices.

It is noted that all models developed/ updated under this project, hard and soft copies of the reports, all sorts of data (cross sections, .shp files, documents, etc) and all other relevant information have to be submitted with Final Report. All the reports should be submitted in book binding format with name of the project on the shoulder, maps on A3 papers & colored reports.

The Project Director (PD) will represent BWDB and receive all the deliverables mentioned above. Review meetings with participation of concerned Planning, Design and Field level officials of BWDB will be held on Inception, Interim and Draft Final Reports.

7. Dissemination of Study Results

Field workshop shall be arranged to share the study results with the local stakeholders before finalization of the study report. Consultants will arrange the field workshop in close consultation with the Project Director, BWDB, Dhaka and will make arrangement to share the results of the study.

The findings and recommendations of the study should be mentioned and acceptable feedbacks from the participants would be incorporated, as required, in the Final Report.

8. Seminar/Conference/Workshop

One workshop would be arranged within the study area to disseminate the study results among stakeholders, different government and non-government officials working on water sector, local administration, local beneficiaries, local intellectuals etc. The Study team would arrange the workshops with cooperation from PD office. Besides, regular progress review meetings would be arranged as and when required to monitor the study progress.

9. Key Personnel and Qualification

9.1 Key Personnel

It is expected that 60 man-months (MM) of 25 professionals will be required for the study as shown as follows:

Table 1: List of Key Professionals

Sl. No	Professionals	Nos.	Month	Man-Month
1	*2*	*3*	*4*	*5*
1	Team Leader	1	5	5
2	River Engineer cum Morphologist	1	3	3
3	Hydrologist cum Hydrologic Modeler	2	2	4
4	Survey Specialist	1	2	2
5	Irrigation and Drainage Management Specialist cum Modeler	2	3	6
6	Groundwater Modeler	1	2	2
7	Senior Design Engineer (Civil)	1	2	2
8	Design Engineer (Civil)	2	4	8
9	Design Engineer (Mechanical)	1	1	1
10	Design Engineer (Electrical)	1	1	1
11	GIS Specialist	1	3	3
12	Environmentalist	1	2	2
13	Sociologist	1	2	2
14	Agriculturist	1	1	1
15	Fisheries and Ecological Expert	1	1	1
16	Economist	1	2	2
17	Land Acquisition and Resettlement Expert	1	2	2
18	Climate Change & Disaster Management Expert	1	1	1
19	Data Analyst	4	3	12
Total		25		60

9.2 Qualifications, Experience and Task of the Key Personnel

Discipline	Qualifications and Tasks
1. Team Leader	***Qualification:*** He/She should have Bachelor's Degree in Civil Engineering/Water Resources Engineering/ Agricultural Engineering. He/she should have 20 years or more professional experience. He/she Should have 15 or more years experiences in river engineering and water resources engineering including leading and managing a multidisciplinary consultancy team for irrigation and drainage management, water resources planning, irrigation and drainage structure design, disaster management, river hydraulics, bank protective works, river morphology, FCD & FCDI projects particularly in Bangladesh. Advanced academic/professional qualifications will be preferred. ***Tasks:*** His/her major responsibilities shall include but not necessarily be limited to the following: • Take full responsibility for all aspects of planning, liaison and reporting of the study; • Guide and supervise the survey, modeling and design activities; • Coordinate the study activities; • Take necessary steps to collect existing data from external sources if available and required; • Arrange interaction meeting with BWDB personal to disseminate the study results; • Attend meeting as and when required by the dseignated responsibility of BWDB; • Take reponsibility for the quality of the model upgrading and development of tool; • Analyze and interpret different type of mathematical modeling results required for the study for techanical and economical justification; • Maintain liaison with BWDB and other related agencies; • Review previous investigation and studies related to this study; • Quality control of the analysis of erosion, river characteristics and drainage condition and modeling; • Irrigation and drainage management, water resources planning, irrigation and disaster management, • Carry out overall co-ordination and top supervision of the different study activities and maintain close liaison with the

Discipline	Qualifications and Tasks
	client; • Preparation of cost estimates for the project; • Preparation of all reports as needed under the contract; • Coperation in DPP preparation; • Disseminate monitoring results to all stakeholders.
2. River Engineer cum Morphologist	***Qualification:*** He/She should have Bachelor's Degree in Civil Engineering/Water Resource Engineering. He/she should have 10 years or more working experience. He/she should have 8 years or more experience in the field of river morphology, river hydraulics, sediment transportation, bank protective works, morphological modeling of rivers. Advanced academic/professional qualifications will be preferred. ***Tasks:*** His/her major responsibilities shall include but not necessarily be limited to: • Detailed analysis of time series satellite images and bathymetric/ hydrographic charts and other surveyed data to ascertain river bankline movement, erosion-deposition pattern and sediment transport characteristics; • Analyze and interpret historical data as well as surveyed data of the river; • Analyze the model result and establish morphological characteristics of the river and identification of erosion vulnerable area; • Analysis of the impact on river morphology after withdrawal of water for irrigation; • Prepare offtake management plan; • Participation in meetings with BWDB as and when required; • Prepare reports to a standard format acceptable to BWDB; • Collect and incorporate comments on final report; • Assist the team leader in coordinating the study.
3. Hydrologist cum Hydrologic Modeler	***Qualification:*** He/She should have BSc in Civil Engineering/Water Resources Engineering. Preferance will be given to higher degree He/she should have overall 10 years working experience in the field of river hydraulics, river engineering and morphology including 8 years' experience in mathematical modeling of river hydraulics. Advanced academic/professional qualifications will be preferred. ***Tasks:*** His/her major responsibilities shall include but not necessarily be limited to: • Establish the baseline hydraulic condition of the study area;

Discipline	Qualifications and Tasks
	• Development of appropriate model for Rainfall-Runoff and Drought of the study area; • Set-up, calibration and verification of 1D/2D hydraulic model according to the necessity of the project; • Review and identify the need of updating and upgrading the available models; • Re-calibrate and validate the available models according to the necessity; • Assessment of the existing hydrodynamic conditions; • Assessment of surface water availability; • Simulation of different options; • Interpret model results in accordance with the requirement; • Participation in meetings with BWDB as and when required; • Provide the hydraulic design parameters for the proposed interventions; • Preparation of different reports as required for the proposed study. • Assist the team leader in coordinating the study.
4. Survey Specialist	***Qualification:*** He/ She should have BSc in Civil Engineering/Water Resources Engineering. Preferance will be given to higher degree. He/she should have 8 years of overall experience in water sector including 5 years' experience in state-of-the-art Survey Techniques. Advanced academic/professional qualifications will be preferred. ***Tasks:*** His/her major responsibilities shall include but not necessarily be limited to: • Formulate realistic field data collection plan & schedule; • Lead and supervise the field data collection team with necessary safety measures; • Maintain close and intensive co-ordination with the field officials of BWDB and the local people; • Participate in the survey work to be conducted for field data collection; • Inform the status and progress of the data collection activities regularly to the BWDB and other concerned; • Responsible for timely completion of data acquisition in accordance with the specification mentioned in the ToR; • Share all survey data with the Client for preserving those in BWDB; • Assist in the preparation of Reports.

Discipline	Qualifications and Tasks
5. Irrigation and Drainage Management Specialist cum Modeler	***Qualification:*** He/ She should have BSc in Civil Engineering/Water Resources Engineering/Agricultural Engineering. Preferance will be given to higher degree. He/she should have 10 years of overall experience in water sector including minimum 8 years' experience in the field of irrigation and drainage related project. Advanced academic/professional qualifications will be preferred. ***Tasks:*** His/her major responsibilities shall include but not necessarily be limited to: • Carry out irrigation related data collection; • Development of Irrigation and Drainage model of the study area, assess the availability of surface water and required water for dry season irrigation as well as supplementary irrigation of the study area; • Explore and recommend the possible technology for improving irrigation water use efficiency; • Analysis of hydrological, meteorological and agricultural drought considering climate change impact and assessment of irrigation demand on the basis of drought analysis; • Determining Irrigation Command area of each Pump station for the existing condition; • Preparation of irrigation requirement and irrigation network for the changed condition; • Identification of present drawbacks for the development of irrigation system; • Determining the availability of water based on each pump station capacity; • Assessment of the possibility to connect the existing natural canals/ surrounding irrigation systems with proposed irrigation system; • Preparation of Irrigation Network Map showing proposed Irrigation Infrastructures; • Water loss calculation at different stage including percolation, seepage, evaporation etc • Considering the water availability and physical constrains, suggest future cropping pattern; • Assessment of total irrigation requirement; • Contribute in report writing and review milestone report.
6. Groundwater Modeler	***Qualification:*** He/She should have Bachelor's Degree in Civil Engineering/Water Resources. He/she should have 5 years' or more working experience with 3 years' or more working experience in water sector including groundwater hydraulics,

Discipline	Qualifications and Tasks
	river hydraulics and groundwater modelling. Advanced academic/professional qualifications will be preferred. ***Tasks:*** His/her major responsibilities shall include but not necessarily be limited to: • Responsible for the development, calibration and validation of surface water groundwater interaction model; • Assessment of impact on groundwater due to the intervention of surface water-based irrigation practices using mathematical modelling techniques; • Model simulations for various option scenarios; • Analyze the impacts on groundwater due to existing practices related to groundwater; • Analyze and interpret model results; • Attend meetings as and when required; • Report writing. • Assist the team leader in coordinating the study.
7. **Senior Design Engineer (Civil)**	***Qualification:*** Bachelor's degree in Civil engineering/Water Resources Engineering, preferably a postgraduate degree in relevant field. He/she should have 12 years or more professional experience with 10 year's or more working experience in water sector including design of hydraulic structures, bank protective works and other structural design related to irrigation project. Advanced academic/professional qualifications will be preferred. ***Tasks:*** His/her major responsibilities shall include but not necessarily be limited to the following: • Establish the criteria for hydraulic design of the proposed irrigation structures and drainage structures protective works using different design guidelines; • Designing of different irrigation structures, drainage structures, protection work and other structures (if required); • Formulate and design of the alternative structures recommended for the river training works; • Identify the locations of sub soil investigation for proposed infrastructures; • Preparation of cost estimate of the structures on the basis of recent actual schedule of rates including annual expenditure schedules; • Comparison of the alternatives and find out the suitable solution; • Developed design specifications and drawing; • Finalize cost estimate of different protective measures;

Discipline	Qualifications and Tasks
	• Participation in meetings with BWDB as and when required; • Preparation of different reports as required for the proposed study; • Assist the team leader in coordinating the study.
8. Design Engineer (Civil)	***Qualification:*** He/She should have BSc in Civil Engineering/Water Resources Engineering. Preference will be given to higher degree in relevant field. He/she should have 8 years overall professional experience in water sector including minimum 5 years' experience in hydraulic structure design and bank protective work design. Previous experience in designing bank protective works using the result of mathematical model output is preferred. Advanced academic/professional qualifications will be preferred. ***Tasks:*** His/her major responsibilities shall include but not necessarily be limited to: • Assist in designing of proposed irrigation and drainage structures; • Assist in preparation of cost estimate of the structures on the basis of recent actual schedule of rates including annual expenditure schedules; • Assist in developing design specifications and drawing; • Cost estimate of different protective measures; • Participation in meetings with BWDB as and when required; • Preparation of different reports as required for the proposed study; • Assisting team leader/Senior Design Engineer in co-ordinating the study.
9. Design Engineer (Mechanical)	***Qualification*** He/ She should have Bachelor degree in Mechanical Engineering having 8 years or more professional experience with 5 year's or more working experience in relevant design sector. Advanced academic/professional qualifications will be preferred. ***Tasks:*** His/her major responsibilities shall include but not necessarily be limited to the following: • Review of the existing irrigation and drainage gate, identification of problems if any; • Review of all previous studies and relevant mechanical design if any; • Prepare design criteria for mechanical works;

Discipline	Qualifications and Tasks
	• Design specification of pumps and allied structures following the codes and rules of both the national and international standards; • Design and drawing of Gates; • Prepare specifications and cost estimate of all mechanical works; • Prepare necessary design drawings and report of mechanical works including design criteria, all calculation and drawing; • Design, specification and cost estimate of appropriate fire fighting system; • Participating in meetings and workshop when and where required. • Assisting team leader/Senior Design Engineer in co-ordinating the study.
10. Design Engineer (Electrical)	***Qualification:*** He/She should have Bachelor's degree in Electrical Engineering having 8 years or more professional experience with 5 year's or more working experience in relevant design sector. Advanced academic/professional qualifications will be preferred. ***Tasks:*** His/her major responsibilities shall include but not necessarily be limited to the following: • Prepare design criteria for Electrical works related with desired pump; • Prepare Specifications & Detail cost estimate of all Electrical works; • Prepare necessary Substation Design, Single Line drawings, Transmission line diagram design and specification and report of electrical works including design criteria, data, all calculation, Specification etc; • Design and specification of pump operation and protection systems; • Identification of power source/sources including solar and other renewable energy of all pumping stations and related equipment if necessary; • Participating in meetings and workshop when and where required. • Assisting Team Leader/Senior Design Engineer in coordinating the study.
11. GIS Specialist	***Qualification:*** He/ She should have Bachelor's degree in Civil Engineering/Water Resources Engineer/ Urban and Rural

Discipline	Qualifications and Tasks
	Planning/Geography. He/she should have 5 years or more professional experience with 3 year's or more working experience in producing GIS coverage, Contour map, Digital Elevation Model in water sector including irrigation project. Advanced academic/professional qualifications will be preferred. ***Tasks:*** His/her major responsibilities shall include but not necessarily be limited to the following: • Make GIS layer for location, river, road, settlements and other different features; • GIS analysis of river bank locations as GIS layer; • Prepare study area map based on recent satellite imagery; • Prepare GIS based maps for erosion and depositions and digitize coastlines from historical satellite imagery; • Preparation of ArcView based contour maps of basins, difference maps of basin bed topography; • Identify the important features such as existing embankment, khals, hill, wetland, regulators, bridges of the proposed area and preparation the map showing all the features; • Assist the study team in coastline migration analysis, • Preparing maps, charts in connection with the reports.
12. Environmentalist	***Qualification:*** Bachelor's Degree in Civil/Water Resources Engineering/ Masters' degree in Geography/Masters' in Environmental Study or in any relevant field. He/she should have professional experience of 10 years or more in water sector with 8 years or more experience in the field of EIA in water sector. Advanced academic/professional qualifications will be preferred. ***Tasks:*** His/her major responsibilities shall include but not necessarily be limited to: • Make inventory of present environmental situation; • Carry out Environmental Impact Assessment; • Preparation of Environmental Monitoring & Management Plan; • Co-ordinate relevant activities and assist the Team leader; • Attend meeting as and when required; • Assist in preparation of Final Report with EIA
13. Sociologist	***Qualification:*** He/ She should have Masters in Sociology. He/she should have 10 years or more experience including 8 years or more experience in

Discipline	Qualifications and Tasks
	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, Land Acquisition Plan (LAP) and Resettlement Action Plan (RAP) and to disseminate the results of the study. Advanced academic/professional qualifications will be preferred. ***Tasks:*** His/her major responsibilities shall include but not necessarily be limited to: • His/her major responsibilities shall include but not necessarily be limited to: • Intensive Field visit for collecting views of the local people, their present socio-economic activities and problems including present situation in the vicinity of Project Area; • Holding interaction meeting with the stakeholders at field level holding Focus Group Discussion (FGD), Target Group Discussion (TGD) and workshops/seminars at field level to find out the desired goal of the study and to disseminate the results; • Find-out the conflicting issues, conduct motivational works among the stakeholders against any negative issue and to suggest mitigation measures; • Point out the functional structure and institutional capacity of BWDB (in terms of both Technical and Financial) required for implementation and operational stages of the project; • Identify whether the project matches with the allocation of business or mandate of the project entity; • Illustrate the legal restrictions (if any) that may obstruct or impede the project during its implementation and functional stage of the project outputs; • Identify the challenges of cross – cutting issues and suggest its mitigation strategy during implementation and functional stage of the project outputs; • Formulate optimum Land Acquisition Plan (LAP) and Resettlement Action Plan (RAP) for project components; • Supervise Land acquisition and resettlement plan activities for the project area; • Assist the study team in holding seminars, workshops.
14. Agriculturist	***Qualification:*** He/ She should have M.Sc. degree in Agriculture/Crop Science. Preferance will be given to higher degree in relevant field. He/she

Discipline	Qualifications and Tasks
	should have 10 years or more working experience including 8 years or more experience in field survey, evaluation of agricultural benefits of a project between pre & post project condition by introducing improved agricultural practices. Advanced academic/professional qualifications will be preferred. ***Tasks:*** • 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; • Design crop calendar, cropping pattern and irrigation water use; • Assist in the preparation of ESIA • Assist the Team Leader in coordinating the study.
15. Fisheries and Ecological Expert	***Qualification:*** He/She should have Masters' degree in Fisheries with 10 years or more experience with 8 years or more experience in fisheries appraisal in water sector. Advanced academic/professional qualifications will be preferred. ***Tasks:*** His/her major responsibilities shall include but not necessarily be limited to the following: • Studying the possible impact for the construction of embankment and dredging; • Preparation of Fisheries Management Plan if necessary; • Miscellaneous task as and when required; • Fisheries and ecological management implementation work schedule; • Also, he/she will support the Environmental and Social Impact Assessment. • Assist the Team Leader in coordinating the study.
16. Economist	***Qualification:*** He/ She should have Masters' degree in Economics. He/ She should have professional experience of 10 years or more with 8 years or more experience in economic analysis in water sector

Discipline	Qualifications and Tasks
	including irrigation projects. Advanced academic/professional qualifications will be preferred. ***Tasks:*** • Collect, compute analyze and evaluate the agro-socio-economic data of the project. • Appraisal of Project worthiness in terms of economic viability; • Assessment changes of living standard post project phase and project contribution to the National and regional level in term of Monetary value; • Evaluate post project GDP Contribution; • Elaboration of the feasibility level cost estimates, contingency amounts, detail price escalation estimates on the expected implementation schedule, administration cost and tax and duties shown as separate line items and the method of calculation of these costs; • Assessment of costs arising out of mitigation measures (or external dis-benefits); • Conclusion of socio-economic viability of each planning option and the Project as whole; • Assist the Team Leader in preparation of Final Report containing all the requirements of BWDB for the DPP.
17. Land Acquisition and Resettlement Expert	***Qualification:*** He/She should have Master's degree in Social Welfare/Sociology. He/ She should have 5 years or more professional experience with 3 years' experience in land acquisition and resettlement in water sector including irrigation project. Advanced academic/professional qualifications will be preferred. ***Tasks:*** His/her major responsibilities shall include but not necessarily be limited to: • Demarcation of the existing acquired land/disputed land (if any) on CS/RS map under this project; • Formulate Land Acquisition Plan (LAP) and Resettlement Action Plan (RAP) as well as identification of illegal establishment in the canal system with sociologist; • Analysing and interpreting the data on CS/RS map; • Attending meeting as and where required; • Maintain liaison with required other agencies; • Assisting team leader in co-ordinating the study.

Discipline	Qualifications and Tasks
18. Climate Change & Disaster Management Expert	***Qualification:*** He/ She should have Master's Degree in Disaster Management/Water Resources Engineering or relevant natural sciences. He/ She should have 10 years overall experience in similar nature of works including 8 year professional experience in the field of climate change and disaster management. Advanced academic/professional qualifications will be preferred. ***Tasks:*** His/her major responsibilities shall include but not necessarily be limited to: • Identify the environmental, disaster and climate change impacts or risks from the project; • Assessment of disaster resilience of the project which should include contingency plan for emergency disaster management, business continuity plan, time of recovery and reporting of residual risk; • Co-ordinate relevant activities and assist the Team leader; • Attend meeting as and when required; • Assist in preparation of DIA and EIA part of Final Report as per the format of feasibility study.
19. Data Analyst	***Qualification:*** He/ She should have Bachelor's degree in Civil Engineering/ Water Resources Engineering. He/she should have 3 years or more professional experience with 1 year or more experience in the analysis of different types of data including sediment, discharge, water level, flow velocity etc. Advanced academic/professional qualifications will be preferred. ***Tasks:*** His/her major responsibilities shall include but not necessarily be limited to the following: • Responsible for the collection of field data and data from different organizations; • Ensure data quality and prepare data needed for hydrological and morphological modelling and analysis; • Provided necessary support with data for other task required for performance by the Study Team; • Analyse of all the surveyed data; • Assist the study team for the preparation of different reports.

10. Study Organization, Duties and Responsibilities

BWDB's responsibilities

The Consultant will work under the direct supervision of the Project Director (PD). H/She will ensure that the objectives of the study as detailed in the ToR would be achieved within agreed time schedule and that the contents of the report are acceptable to GoB. H/She will direct the planning process and work program and supervise the study and monitor progress according to the objectives set in ToR. BWDB will only bear the cost of the items that were mentioned in the reimbursable cost. Other unspecified costs won't be borne by BWDB.

The hydrology departments of BWDB shall cooperate the Project Team as required, particularly with regard to the hydrological aspect of the study. It shall also ensure the involvement of respective design and field offices in survey works, field data collection and modelling activities. The concerned Design Circle of BWDB shall provide guidance in the design of major structures as required. The design office will vet the drawings prepared by the consultants so that the drawings can be used in the preparation of DPP. Field survey and field data collection will be done by the respective Consultants in close consultation with the concerned field Executive Engineer under the guidance of the Superintending Engineer, Thakurgaon WD Circle, BWDB, Thakurgaon.

The PD will arrange regular meetings between the consultants and BWDB professional to discuss technical and project management issues. Any unresolved issue either technical or otherwise should be consulted with the high officials of BWDB (Chief Engineer (Civil) Planning; concerned Zonal Chief Engineer; Chief Engineer, Hydrology; Chief Engineer, Design) or other GoB agencies as required.

BWDB should 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 concerned rivers;
- Available relevant contour maps and previous study reports;
- Any other support, available with BWDB, to help the consultants to carry out the data collection program as per ToR.
- Duty station and institutional arrangement of consultants should be in Dhaka and no office space or rent will be provided by the Project office.
- Selection of consultancy service will be done by QCBS method following the GoB procurement guideline PPA-2006 and PPR-2008.

Any unresolved issues either technical or otherwise shall be taken up with BWDB senior technical personnel and will be met amicably.

Consultant's responsibilities

The consultant should carry out the services as detailed in "Objectives, Scope of Works, Expected outputs and ToR" in the best interest of the Government with reasonable care, skill and diligence with sound engineering, administrative and financial practices. The Consultants will be responsible to BWDB for discharge of responsibilities. All the primary and secondary data, developed and updated models, maps, consultation information, notes on the interviews and other relevant audio and video

clips collected during the evaluation process would be handed over under the rights of BWDB. In response to that, the consultant should-

- Make available all developed/updated models, primary and secondary data (entire set of information involving audio-visual recordings) to BWDB as and when required. Data and information should be submitted to BWDB both in hard and soft copies;
- Make necessary arrangements for site investigation, environmental and social survey & data collection as required for performance of the assigned task and evaluation thereby;
- Provide all support for the effective delivery of the services as stipulated in the objectives, scope of works, expected outputs and ToR;
- All types of technical support (like preparation of maps on necessity of BWDB and any other information related to the task the consultant is assigned with) should be provided to BWDB;
- Consult regularly with the concerned field office and design circle of BWDB during field survey and design preparation;
- All the stakeholder consultation sessions should be recorded for future documentation. Video recording would be done and the clips should be handed over BWDB. 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;
- Provide necessary assistance during DPP preparation of the subsequent implementation project.

11. Payment Schedule

Payments shall be made in line with agreed-on outputs according to the following schedule:

- **Inception Report:** Twenty (20) percent of the lump-sum Contract Price shall be paid upon submission of the Inception Report duly accepted by the Client.
- **Interim Report:** Twenty (20) percent of the lump-sum Contract Price shall be paid upon submission of the Interim Report duly accepted by the Client.
- **Draft Final Report:** Thirty (30) percent of the lump-sum Contract Price shall be paid upon submission of the Draft Final Report duly accepted by the Client.
- **Final Report:** Thirty (30) percent of the lump-sum Contract Price shall be paid upon submission of the Final Report duly accepted by the Client.

The ToR/RFP Review Committee which has been formulated as per memo no. 42.01.0000.005.22.002.18-42 dated 25/03/24 has reviewed the ToR and recommended for kind approval of the competent authority. Thus, the ToR is hereby forwarded for kind approval.

02/03/25
(Oli Afaz Chowdhury)
Executive Engineer (Civil)
Negotiation Cell, Office of the Chief Engineer(Civil) Planning, BWDB, Dhaka
& Member, ToR/RFP Review Committee

02/03/2025
(Md. Abdul Malek)
Executive Engineer (Civil)
Contract & Procurement Cell, BWDB, Dhaka
& Member, ToR/RFP Review Committee

02.03.25
(Md. Shariful Alam)
Executive Engineer (Civil)
Directorate of Planning-1, BWDB, Dhaka
& Member, ToR/RFP Review Committee

02.03.25
(Umme Mahfuza Haque)
Superintending Engineer (Civil)
Design Circle-6, BWDB, Dhaka
& Co-opt Member, ToR/RFP Review Committee

2/3/25
(Dr. Robin Kumar Biswas)
Superintending Engineer (Civil)
Directorate of Planning-1, BWDB, Dhaka
& Member-Secretary, ToR/RFP Review Committee

02.03.2025
(Dr. Shamal Chandra Das)
Additional Chief Engineer (Civil)
Planning, BWDB, Dhaka
& Convener, ToR/RFP Review Committee

Approved
27.03.25
(A.K.M. Tahmidul Islam)
ID No. 660715001
Director General
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