

**Short TOR for Consultancy Services for Detail Design, Construction  
Supervision & Project Management Support For CEIP-I for Contract  
Package No.CEIP-1/B2, B3 & C1/S-2**

**1. Background**

The Coastal Zone of Bangladesh has been defined as the area within which the rivers flows are influenced by the tide. Given the high tidal range and the very low river gradients, the tide reaches very far landwards, particularly in the dry season. If the upstream freshwater inflows are reduced in the dry season, salinity can also intrude very far upstream within the river system which comprises a number of very large estuaries. Most of the land in the coastal zone is within 1 to 1.5 meter PWD and gets inundated with saline water during tides. Bangladesh Water Development Board (BWDB), since its inception in 1959 to date, has constructed 139 polders in the coastal zone, of which 49 polders are sea facing. A polder is a designated area that is enclosed on all sides by dykes or embankments, separating them from the main river system and offering protection against tidal floods, salinity intrusion and sedimentation. Polders are equipped by in- and outlets to control the water inside the embanked area. Without embankments the coastal communities would be exposed to diurnal tidal fluctuations. These polders have been planned and designed considering to protecting low lying coastal areas against tidal flooding and salinity intrusion, considering only the tidal effects but ignoring effects of wind wave and cyclonic storm surges. Recent cyclone storms and surges are major features of the Coastal Zone climate of the Bangladesh. Even though earlier records are patchy and not complete, recording goes back to more than 400 years. It is found that in the last 200+ years, the coastal zone was affected by at least 70 such storms, and alarmingly, recent decades have been higher frequency, with 40 storms since 1948. The few worst ones in the past have each killed more than 100,000 people. But only a couple of thousands have been killed by the recent Cyclone Sidr in 2007 & Aila in 2009 and there is a clear evidence that coastal embankment system (CES) along with the properly functioning cyclone warning system, though inadequate in some places, provide an effective buffer during the storm surge and wave attack due to the Cyclone Sidr.

Notwithstanding the security and enhanced resilience brought by polders, the vulnerability of the coastal population is on the rise due to **climate change**. Climate variability will accentuate the intrinsic risks facing coastal Bangladesh. These risks span: (i) cyclones and storm surges (ii) river bank erosion and vulnerability of islands and chars, (iii) sea level rise, (iv) saline water intrusion, and (v) coastal river erosion. A lack of investment to retrofit and upgrade the polders scheme will weaken their capacity to mitigate against natural hazards and protect livelihoods and assets. A recent study identifies that most of the polders will likely be overtopped by intensified storm surges under the climate change scenarios. The study further makes the case that investing in adaptation measures today will provide huge savings in the future by minimizing the damages associated with extreme weather events.

**2. CEIP-I Project**

The Government of Bangladesh (GOB) has obtained an IDA/Credit for Coastal Embankment

Improvement Project, Phase-1(CEIP-1). The overall project development objective is to increase the resilience of coastal population to natural disasters and climate change. More specifically, the project aims at (a) reducing the loss of assets, crops and livestock during natural disasters; (b) reducing the time of recovery after natural disaster such as cyclone; (c) improving agricultural production by reducing saline water intrusion which is expected to worsen due climate change; and (d) improving the Government of Bangladesh's capacity to respond promptly and effectively to an eligible crisis or emergency. This objective will be achieved by rehabilitating and improving the polder system in the contiguous six coastal districts comprising Satkhira, Khulna, Bagerhat, Pirojpur, Barguna and Patuakhali Districts.

The proceeds from this credit would be used for Consultancy Services for Detail Design, Construction Supervision and Project Management Support. Earlier consulting services were conducted for a detailed feasibility studies for first program project of CEIP-I for reconstruction and upgrading of coastal embankments. The recruited team of National and International consultants have prepared detailed Feasibility study for 17 polders and prepared detailed design for 5 polders and feasibility level design for 12 polders. See *Table 1* for the list of the polders considered under CEIP-I and the composition of the batches for phased construction. The completed consultancy has also prepared the EIA and RAP for some polders.

**Table 1: The polders selected under CEIP-I**

| #  | Polder (No) | District            | Location Name of Thana | Indicative Batch # | Feasibility Design | Detailed Design | EIA                     | RAP  |
|----|-------------|---------------------|------------------------|--------------------|--------------------|-----------------|-------------------------|------|
| 1  | 32          | Khulna              | Dacope                 | 1                  | Done               | Done            | Done                    | Done |
| 2  | 33          | Khulna              | Dacope                 | 1                  | Done               | Done            | Done                    | Done |
| 3  | 35/1        | Bagerhat            | Sharankhola            | 1                  | Done               | Done            | Done                    | Done |
| 4  | 35/3        | Bagerhat            | Rampal/Bagerhat        | 1                  | Done               | Done            | Done                    | Done |
| 5  | 14/1        | Khulna              | Koyara                 | 2                  | Done               |                 |                         |      |
| 6  | 15          | Satkhira            | Shymnagar              | 2                  | Done               |                 |                         |      |
| 7  | 16          | Khulna/<br>Satkhira | Paikgacha,<br>Tala     | 2                  | Done               |                 |                         |      |
| 8  | 17/1        | Khulna              | Dumuria                | 2                  | Done               |                 |                         |      |
| 9  | 17/2        | Khulna              | Dumuria                | 2                  | Done               |                 |                         |      |
| 10 | 23          | Khulna              | Paikgacha              | 2                  | Done               |                 |                         |      |
| 11 | 43/2C       | Patuakhali          | Galachipa              | 3                  | Done               |                 |                         |      |
| 12 | 47/2        | Patuakhali          | Kalapara               | 3                  | Done               |                 |                         |      |
| 13 | 48          | Patuakhali          | Kalapara               | 3                  | Done               |                 |                         |      |
| 14 | 34/3        | Bagerhat            | Bagerhat/Sadar         | 4                  | Done               |                 |                         |      |
| 15 | 40/2        | Barguna             | Pathargatha            | 4                  | Done               |                 |                         |      |
| 16 | 41/1        | Barguna             | Barguna<br>Sadar       | 4                  | Done               |                 |                         |      |
| 17 | 39/2C       | Pirojpur            | Matbaria               | 4                  | Done               | Done            | Done(requires updating) | Done |

The selection of polders is not firm and is subject to changes as conditions on the ground dictate. Changes of the polders will have to be approved by CEIP-I Project Director. The composition of the remaining batches is indicative and subject to confirmation as part of this consultancy.

### **3. Objective of Consulting Services:**

The main objectives of the consultancy are to:

- Task A.** Review and update the designs bidding documents and related environmental and social plans (EIAs, EMPs, and RAPs) already prepared;
- Task B.** Prepare detailed designs for all remaining polders and works that would be included in the project, including the Engineering and Environment and Social studies (ie preparation of EIA, EMP and RAP for each remaining polder);
- Task C.** Supervise construction of all works under the project, and do the contract management as the “engineer” in the works contract that would be mostly ICB procured and implemented according to the World Bank Guidelines and using World Bank Standard bidding documents; and
- Task D.** Provide overall project management support to the BWDB and Project Management Unit

The construction works will be executed by BWDB as **Employer** and the Consultant will function as the **Engineer**. The Consultant will administer the civil works contracts and ensure that the project works are constructed in accordance with the provision of the contracts. The Consultant will be required to nominate an engineer’s representative who will be a full-time resident in the project area.

### **4. Scope of Work**

Various studies have already been completed to support coastal management in Bangladesh. Before work commencement the Consultant should undertake a comprehensive **review of all earlier** studies covering the area, such as Coastal Embankment Improvement Program, CEIP (2012), Integrated Coastal Zone Management Program - ICZMP (2006), Rehabilitation of seven high risk coastal polders 2004, etc. the project completion report of BWDB's Coastal Embankment Rehabilitation Project (2002). The consultants will have to cover the following tasks:

**Task A:** Review and Update Designs already prepared

**Task B:** Prepare Detailed Design and Environment and Social Studies

**Task B1:**Hydrological, Hydraulic and Morphological study and Mathematical Modeling for Detail Design

**Task B2:** Preparation of Detailed Design and Bidding Documents

**Task B3:** Preparation of EIA and EMP

**Task B4:** Preparation of RAPs-The objective of this task is to prepare a RAP for each remaining polder. The RAP shall be prepared in accordance with the GOB policies, and the World Bank Operational Policy (OP) 4.12 in Involuntary Resettlement.

**Task C1:** Construction Supervision, Contract Managements and Administration and Role as Engineer

**Task C2:** Monitoring the Implementation of the EMP

**Task C3:** Implementation of RAPs -Activities will cover implementation of RAPs.

**Task D:** Project Management Support.

The **broad tasks** will include:

- **A. Review and Updating of the Designs already prepared.** The Consultants will review and update the designs already prepared for 5 polders. The Consultants will use the standard as described in Task B and the best practices in the field to update these design. They will also updated and carry out any additional engineering studies, investigations and social and environmental studies needed. They would update the bidding documents so that they can be used for ICB bidding according to the World Bank Guidelines. This would be the first priority task for the Consultants after mobilization. BWDB will provide all existing documents and studies related to this task in paper and in electronic form.
- **B. Prepare Detailed Design and Environment and Social Studies.** This task will cover the preparation of detailed designs and bidding documents for remaining polders that are approved to be included in the Project. The design report would be prepared for each contract package consisting of engineering, environment and social with appropriate Environment Impact Assessment (EIA), EMP and RAP. This task will also focus on modeling aspects of flooding dynamics, hydrodynamics, geomorphology, and implication of climate change, among others and engineering design of the polders that builds on the modeling results.
- **B.1Update Modeling for Detailed Design. Hydrological, Hydraulic and Morphological study and Mathematical Modeling for remaining Polders:** In order to develop best strategy for improving the performance of coastal embankment in a sustainable way with minimum O&M requirements, the Consultants shall carry out necessary hydrologic, hydraulic, river and estuarine dynamics, sediment transport, and morphological modeling according to the best international practices in the sector. In doing that, the Consultants would consider the changes that have been taken place in the coastal area morphology. The Consultant will use satellite imagery and storm surge modeling. the Consultant undertake a regular updating of the mathematical models developed under during CEIP preparation against prevailing and changing conditions, as such the Consultants will carry out the following tasks:
  - ✓ **Update the hydrological, hydraulic, morphological, climatological, and mathematical modeling framework** taking into account the reasonable projections of impact local subsidence of climate change on sea level rise and storm surges extent, magnitude, and frequency.
  - ✓ **Optimize embankment design criteria to provide best cost-effectiveness for protection of the hinterland** taking into consideration economical values and vulnerability of the hinterland and embankment considering combined effect of cyclone storm surge, wind waves, subsidence, climate change and sea level rise. Develop cost-effective methods for embankment and foreshore erosion control combining engineering and vegetative methods based on storm surge modeling. The reduced freshwater flows from upstream and salt water intrusion from downstream due to sea level rise could change the temporal and spatial variation of salinity.
  - ✓ **Assess internal water management risks of the remaining polders:** The coastal region is characterized by numerous morphologically active tidal rivers and creeks,

which provide drainage network for a system of embanked hydrological units /polders. These peripheral rivers of the coastal polders have been experiencing siltation that is contributing to drainage congestions. The Consultant should assess the likely sedimentation rate in the peripheral rivers in short and medium term. The Consultant will assess the present drainage performance of the remaining polders and devise the improved drainage plan for the polders considering potential impact of climate change.

- ✓ **Model calibration and data collection.** In order to complete the above and validate and calibrate the modeling framework the Consultant shall conduct topographical bathymetric, river and khal's cross-section, hydrometric survey and site investigation using total station, DGPS, high frequency eco-sounder, ADCP and satellite imagery, GIS and other computerized systems to gather data necessary for morphological and river engineering studies as mentioned above and for improving and calibrating available hydrodynamic, storm surge, and morphological models to test for various strategies and alignments and design for coastal embankment system to provide most optimal solution for improving its performance considering technical, economic, social and environmental aspects;
- **B.2 Preparation of Detailed Design and Bidding Documents.** This task will cover the preparation of detailed design of internal link canal, peripheral embankment and other ancillary structures needed and bidding documents for the remaining polders. Task will also cover the preparation of detailed design of bank protection and slope protection works for embankment stretches that require such protection and detailed design of river closure with improved protection to avoid breaches associated with hurricanes landfalls. It is important that the design of the polder scheme follows the most up to date standards and codes and be fully based on ground information and modeling results. The consultant shall also identify the footprint of the embankment (existing and proposed additional areas) in terms of land ownership (private, BWDB owned, Khash etc) and land use and location of environmental importance.
- **B.2 Preparation of EIA and EMP.** BWDB has already developed an Environmental Management Framework (EMF) for the Project. The EMF provides the guidelines to comply with national legislation and World Bank safeguards policies, and defines all environmental requirements and management plans needed for the reconstruction/rehabilitation of all polders as well as for the afforestation program. This task will cover the preparation of EIA/EMP for each remaining polder. This EIA/EMP would form part of the design report mentioned above. For the preparation of the EIA/EMP the Consultant will follow the guidelines of the EMF.
- **B.3 Preparation of RAPs.** This task will include the preparation of RAP for all remaining polders; The RAPs shall be prepared in accordance with the GOB policies, and the World Bank Operational Policy (OP) 4.12 in Involuntary Resettlement and the Social Management and Resettlement Policy Framework (SMRPF) already developed for this project. The SMRPF will guide the preparation of RAPs for all remaining polders. The SMRPF includes a resettlement policy framework and a social inclusion/gender framework. The Consultant shall update the SMRPF if there is a need as situation on the ground might necessitate. This task will also include the Preparation of Land Acquisition (LA) Plan and LA Proposal for remaining polders.

- **C. Construction Supervision, Contract Managements and Administration and Role as Engineer and implementation of EMP and RAP.** The Consultants would be responsible for all construction supervision contracts (covering CEIP-I works) including supervising the implementation of the EMP and implementing the RAP in each polder.
- **C.1. Construction Supervision.** Being designated as the Engineer for the civil works, goods, and equipment supply and installation, the Consultant would be responsible for inspection and supervision of the construction works, installation of equipment and testing of construction material. The Consultant will ensure that the works implemented and goods supplied are in accordance with the designs, specifications and terms and conditions of the relevant contracts and standards. The Consultants would assist Project Director to ensure that procurement of goods, services, civil works contracts is in accordance with the World Bank Policies and guidelines, the contract are signed, and managed properly including any changes or variation orders necessary during implementation.
- **C.2 Monitoring the Implementation of the EMP.** The Contractor will be responsible for supervising the implementation of the EMP. The EMP is expected to be implemented by the Contractor responsible for the works. The Consultants will be responsible for overseeing the proper implementation of the EMP on the ground and for implementing any part that is not handled by the Contractor.
- **C.3 Implementation of RAPs.** Major activities to be carried out for implementation of RAPs will include review available Inventory of Losses (IOL) in each polder against the current design and land acquisition plan, update the IOL, compensation and entitlement rates, where necessary, and **update** the land acquisition and resettlement budget with up-to-date data and review the SIA, land acquisition status and civil works schedule and develop all inclusive RAP implementation plan in agreement with the BWDB, the civil works contractors and the PAPs.

**D. Project Management Support.** This task will include project management support, assistance to BWDB in institutional setup for project implementation, technical assistance, training, setting up of project office if needed, support in project implementation and procurement planning, carrying out procurement, financial management, contract management, etc. The Consultants will provide support to BWDB in overall project management in activities such as preparation of project implementation plans, annual expenditure planning budgeting and financing forecast and plans, monthly reports and annual reports or work programs as required by the Government of Bangladesh and financiers of the project.

## 5. Reporting:

The Consulting Firms will prepare and submit Inception Report, draft project preparation report, full project implementation plan, monthly progress report, midterm report, final report etc.

## 6. Implementation Arrangements

BWDB will be responsible for the implementation of CEIP-I. The Consultants will work closely with the Project Director (PD) of the Project Management Unit (PMU) set up for the CEIP Project. The Consultant will establish their office in Dhaka and the field at convenient location from BWDB

offices to whom they will be reporting on a day to day basis. After the inception stage the Consultants shall prepare a detailed schedule and task-flow diagram, which depicts the interrelationship of various tasks in the assignment which lead to the completion works and mechanism of coordination with the client and other related entities. This would be kept and update throughout the Project duration.

BWDB will set up a PMU to oversee the development and management of the project. The PMU will be led by a PD appointed by BWDB. It will have a central project office located at the headquarters of BWDB in Dhaka. The PD will have the rank of Chief Engineer/Addl. Chief Engineer, and will report directly to the Director General (DG). The DG would be representative of the client and PD will coordinate all interfaces with the Consultants. The PD with support from the DG would also assist the Consultants in resolving various administrative issues which may arise during the implementation. The Consultants' **Team Leader** will be the principal contact and will be expected to be readily available during project implementation. At the site, **Resident Engineers**, appointed by the Construction Consultants with a team of specialists and inspectors will supervise the Contractor. The PD will also coordinate their work with other relevant units of BWDB, Ministry of Water Resources, local administration and relevant ministries and agencies. S/he will prepare and send to the PSC/World Bank annual and quarterly work plans, budgets, all progress and financial reports; and various other reports and information requested by the WB and the M&E Consultants from time to time.

The Consultants shall be responsible for all aspects of performance of services as set forth in the preceding sections of this TOR. BWDB would be responsible for providing the existing data and information including all reports prepared so far for the project.

**Responsibilities of BWDB:** The Consultant shall work under the direct supervision of the PD, PMU keeping liaison with the DG of BWDB. PMU office of BWDB shall assist the Consultancy Team as required, particularly with regard to the hydrological, morphological, environmental, social and institutional aspect of the services. In case of any unforeseen events, be it in terms of physical or social obstacles at field levels; the BWDB concerned field offices will take initiatives to solve them and ensure good working environment.

Technical and project management issues shall be discussed in tri-partite meeting among BWDB, PD-PMU and the Consultants. Any unresolved issue, technical or otherwise, would be taken up with BWDB through the Project Director and BWDB, Dhaka or Director General, BWDB, Dhaka.

**Selection Procedure and Form of Contract.** The Consultants would be selected following Quality Based Selection (QBS) criteria under the World Bank Guidelines for selection of consultants and form of contract would be Complex Time Based Contract.

**Duration of the Assignment.** Duration of the contract would be **6 (six) years**. Last but not least is the undertaking of the Consultants (standard) on obligatory responses to any technical related query

arising from time to time after the implementation of the project but during the first year after closure (post warranty period).

**Staffing Requirements.** A team of international and national consultants will be needed for the implementation of the project. It is expected that the Consultants will propose their required person-months both international and national, to carry out the task as per TOR. The Consultants are encouraged to use the expertise available in Bangladesh to the extent possible. However, international experience and experience with the World Bank Financed projects are necessary to carry out the assignment. The Consultants are free to propose a staffing plan and skill mix necessary to meet the objectives and scope of the services. If all the required skills are not available within the consulting firms, they are encouraged to make joint ventures with other equivalent firms.