



Bangladesh Water Development Board
Project Management Office
Emergency 2007 Cyclone Recovery & Restoration Project (ECRRP)

Memo. No. : PD/ECRRP/study/RBIP/1775

Dated: 01.03.2012

**Request for Expressions of Interest (EOI) for
Consultancy Services for Technical Feasibility Studies, Detailed
Engineering Design and Supervision for RBIP**

Bangladesh

Emergency 2007 Cyclone Recovery & Restoration Project (ECRRP)

River Bank Improvement Program (RBIP)

Agriculture and Rural Development Sector

Consultancy Services for Technical Feasibility Studies and Detailed Engineering
Design for RBIP (**Contract Package No. BWDB/D2.1/S-2**)

Credit No. 4507- BD

Project ID No.: P111272

The People's Republic of Bangladesh (GOB) has received credit from International Development Association (the Bank) in an amount equivalent to approximately 109 million US\$ towards the cost of the Emergency 2007 Cyclone Recovery & Restoration Project (ECRRP), and intends to apply part of the proceeds to eligible payments under this contract as mentioned above.

The consulting services are divided into two phases: 1) Assignment - A: Technical Feasibility Studies and Detailed Engineering Design; and 2) Assignment – B (B1 and B2): Detail Design of remaining work after Assignment- A and Supervision of River Bank Protection Works. Assignment-A will be over a period of 18 (eighteen) months followed by assignment - B over a period of 0-3 years for Assignment B1 and 0- 6 (six) years for B2. The contract for Assignment - A would be financed from the proceeds of the credit for ECRRP. The contract for Assignment - B would be financed from the RBIP Project after it is approved by the World Bank and the Government of Bangladesh. However, the Technical and Financial Proposals of the Consulting Services should cover Assignment - A as well as Assignment - B. Negotiations of the consultancy contract for Assignment - B will be contingent upon: (i) satisfactory performance by the consultants during Assignment - A; and (ii) clearance from the Bank and the Government to proceed with the contract negotiations for Assignment - B.

The services under assignment-A will include, but not limited to, the detailed project preparation studies involving all necessary aspects covering Technical, Social/ Environmental Assessment, Procurement, O&M, Monitoring& Evaluation, Economic Analysis & Financial Management etc.; and preparation of detailed design and bidding documents for one / two packages for first years' implementation. The services under assignment-B will include, but not limited to, survey, detail design, preparation of resettlement action plan (RAP), construction supervision, project management support and preparation of bidding documents. Details of assignments are furnished in the Terms of Reference (TOR). Interested consulting firm(s) may obtain TOR and further information from the office of the Project Director as well as in the BWDB's official website: www.bwdb.gov.bd. The notice of request for EOI is also available in CPTU's official website: www.cptu.gov.bd.

Bangladesh Water Development Board (BWDB) under the Ministry of Water Resources now invites eligible consulting firm(s) to indicate their interest in providing the above mentioned services. Interested consultants must provide information indicating that they are qualified to perform the services (such as: brochures, description of similar assignments, experience in similar conditions, availability of appropriate skills among staff, etc.). The financial capability should be shown as Financial Turn Over supported by audited financial reports for the last five years.

The consulting firm(s)/consortia should have internationally acclaimed engineering or relevant professional experience and encouraged to have association with qualified local consulting firm(s) of Bangladesh. The form association, if any, should be clearly indicated either “joint venture” or “sub-consultancy”; and all members should have well defined inputs to the assignment. In the case of joint-venture, all firms/entities shall be jointly and severally liable for the entire consultant’s obligations under the contract. In case of sub-consultancy, the lead firm shall sign the contract and shall be liable for the entire consultant’s obligations under the contract. It is preferable to limit the total number of firms including their associates to maximum of four.

The EOIs would be reviewed on the basis of the following aspects to prepare a short list:

1. Registration of firm.
2. Age of firm.
3. Availability of professionals with appropriate skills
4. Availability of resources.
5. Experience of the firm in similar task.
6. Experience of the firm in other works.
7. Support services of the firm.

Selection of the firm will be based on QBS (quality based selection) in accordance with the procedures set out in the World Bank’s *Guidelines: Selection and Employment of Consultants by World Bank Borrowers* published by the Bank in January 2011.

Interested consultants may obtain further information at the address below during regular office time 09:00 to 17:00 hours (GMT+06:00) on all working days.

Expressions of Interest must be delivered to the address below by March 21 2012 in four sets (1 original+ 3 copies) and clearly marked “Expression of Interest” for the “Consultancy Services for Technical Feasibility Studies and Detailed Engineering Design for RBIP (Contract Package No. BWDB/D2.1/S-2)”.

The authority reserves the right to accept or reject any or all the EOIs, or annul the process at any stage without assigning any reason(s) whatsoever and without incurring any liability to the affected applicant(s).

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Government of the People's Republic of Bangladesh

Ministry of Water Resources



Bangladesh Water Development Board

Emergency 2007 Cyclone Recovery & Restoration Project (ECRRP)

Terms of Reference (ToR)

for

**Consulting Firm for “Consultancy Services for Technical Feasibility Studies
and Detailed Engineering Design for River Bank Improvement Programme
(RBIP)**

(Contract Package No. BWDB/D 2.1/S-2)

Dhaka

FEBRUARY- 2012

Terms of Reference

Consulting Firm for “Consultancy Services for Technical Feasibility Studies and Detailed Engineering Design for River Bank Improvement Programme (RBIP)

(Contract Package No. BWDB/D 2.1/S-2)

1. Introduction

1.1 The Government of Bangladesh (GOB) has obtained a IDA Credit for Emergency 2007 Cyclone Recovery and Restoration Project (ECRRP). The proceeds from this credit would be used to prepare the River Bank Improvement Program (RBIP). The main objective of the proposed consultancy services is to prepare a detailed feasibility level RBIP and tender designs in first phase, which would meet the internationally funded project appraisal requirements, and contingent upon the availability of funding and satisfactory outcome of the first phase, the consultant services would be required to continue to the second phase for detailed design and implementation support. The detailed feasibility report includes necessary aspects covering technical, institutional and economic analysis, social/environmental impact assessment, procurement and financial management, etc. required for the project approval by the Government and the World Bank. The consulting services for the preparation of RBIP would be selected following the World Bank Guidelines for the Selection and Employment of the Consultants by the World Bank Borrowers, 2011.

2. Project Description

2.1 Bangladesh is mainly comprised of the fertile alluvial floodplains and the delta of the Ganges-Brahmaputra-Meghna river system. These three rivers combine within the country to form the world's third largest river, the Lower Meghna, which drains into the Bay of Bengal via a constantly changing network of estuaries and tidal creeks. Bangladesh is one of the most vulnerable countries to natural disasters, mainly by upstream river floods during monsoon season and coastal cyclones from the Bay of Bengal. Floods are of recurring phenomena in Bangladesh, and in each year about 22 percent of the country is inundated. Major floods occur when upland flood flows of the three rivers converging to Bangladesh coincide and combine with the heavy monsoon rainfall. It is also difficult to regulate these flood flows as over 90% of their river catchments areas are outside the Bangladesh.

2.2 Brahmaputra is the largest of the three rivers with highest erosion and bank movements. Prior to the construction of BRE, over bank spills along the 220 km stretch of the right bank of the Brahmaputra River used to cause flooding on an area of about 240,000 ha. In early 1960s, the BRE was built to protect from this flooding problem and to foster agricultural growth in the protected area. The original BRE had a setback of about 1.5 km from the Brahmaputra's right bank and it was allowed to have bank erosion life of 25-30 year span. In the 1970s the embankment started to fall under sporadic erosion attacks. During 1980s, the frequency of the BRE breaches by erosion increased rapidly as longer sections came within the range of rapidly eroding river bends which could cause bank-line erosion rates of several hundred meters per year

in early stages of bend formation. To prevent flooding, these breaches were typically closed by local BRE retirements at about 200 meter set-backs. As a result of this minimal set-back distance the BRE has been retired several times in many places and at present perhaps only 50 KM of the original BRE has remained in place. Currently, many long stretches of the BRE are very close to the river-bank line. Hence when embankment is breached at many places it is often left open as closing of such breaching is becoming impossible. Consequently, security of area protected by the BRE has been seriously threatened and large areas of land and cities with large population like Sirajganj are exposed to flooding.

2.3 Under Flood Action Program a Master Plan was prepared in 1993 (River Training Studies of the Brahmaputra River, 1993) for improving the performance of BRE that preparing a revamping program to be implemented over a period of 30 years with identified priority investments in phasing. Based on these studies several hard points were identified and river bank protection revetments were constructed at Sirajganj, Sariakandi, Mathurapar and Kalitola and the embankment sections were improved. These protection works have performed very well in keeping the BRE anchored without much ongoing maintenance. The proposed consulting services are for updating the revamping plan for BRE (220 KM) starting from Nagarbari to the upstream point of BRE via Sirajgonj Kazipur with preparation of detailed design & tender documents for reconstruction and modernization of BRE.

3. Objectives of Consulting Services

3.1 The main objective of the consulting services is to support Government of Bangladesh's Water Development Board (BWDB) in preparation and implementation of the RBIP. The preparation of studies would be carried out according to the international standards, which will form the basis for project appraisal by the World Bank and the Government of Bangladesh in the first phase. Contingent upon the satisfactory outcome of the first phase and project funding availability, the consultants would also be responsible for supervision of project work that would be implemented through international contracting practices after signing of the contract for Assignment B.

4. Scope of Works

Phasing of Consulting Services

4.1 The Consulting Services for the duration seven and a half years which are divided into two phases; **Assignment A:** (1) Technical Feasibility Studies and (2) Assignment-B (B1 and B2): Detail Design of remaining work after Assignment A and Supervision of River Bank Protection Works. Assignment A will be over a period of 15 (fifteen) months followed by Assignment B over a period of 6 years. Assignment B1 (0-3 yrs) and Assignment B2 (0-6 years). The contract for Assignment A would be financed from the proceeds of the credit for ECRRP. The contract for Assignment B would be financed from the RBIP Project after it is approved by the World Bank and the Government of Bangladesh. However, the Technical and Financial Proposals of the Consulting Services should cover Assignment A as well as Assignment B. **Negotiations of the consultancy contract for Assignment B will be contingent upon:** (i) satisfactory performance by the consultants during Assignment A; and (ii) clearance from the

Bank and the Government to proceed with the contract negotiations for Assignment B. The services under assignment- The services under assignment-A will include, but not limited to, the detailed project preparation studies involving overall plan covering Technical Feasibility Study, Economic Analysis, Environmental management, Social Impact Assessment and Resettlement policy framework, Procurement, O&M, Monitoring & Evaluation framework, Financial Management and packaging of contracts and preparation of detailed design and bidding documents for one/ two packages for first years implementation. The services under assignment-B will include, but not limited to, updating of reports from Assignment A and survey –detail design, preparation of Social management plan (SMP) & Environmental Management Plan (EMP), construction supervision, project management support and preparation of bidding documents.

The activities and the scope of work for the assignments will include, but not limited to the following:

4.2 Assignment A: The main tasks of the consultants to be carried out under Assignment A are:

- (a) Review of all related available documents particularly of all the feasibility/ technical studies for the Brahmaputra/ Jamuna river bank protection work and similar studies on other major rivers and recommendations of the previous Master Plan studies and projects carried out in the said BRE area, and discussions with the concerned relevant organizations and World Bank missions covering the concept and options of the tasks.
- (b) Surveys, investigation, analyses and mathematical morphological studies of the Brahmaputra River starting from Nagarbari to the end point of BRE via Sirajgonj Kazipur around 220Km and updating of overall FAP study of 1993. Establishment of baseline physical conditions of the Brahmaputra/Jamuna River including the status of the existing protection work and likely consequences when some of their being damaged.
- (c) Identification of priority investments based on technical, economic, social and environmental consideration starting from the already constructed Sirajganj hard point and proceeding upwards upward to Kazipur to protect the river bank, and to fix the most suitable BRE alignment for effective protection of the area behind the BRE. Thereafter selection of optimal investment option that should be included in the RBIP with an investment cost of about US\$300 million;
- (d) Preparation of detailed feasibility studies for RBIP for the proposed project interventions. The feasibility studies would include technical/engineering studies, hydraulic, morphological and structural analysis, institutional and economical analysis, environmental and social impact assessments and management plans.
- (e) Feasibility level designs of all work proposed to be undertaken under the project considering least cost options for protection work that could perform effectively for a long time with low operation and maintenance (O&M) suitable for the local condition; assistance to BWDB in project preparation and processing the project

- including Government requirements, preparation of the project institutional arrangement and implementation plan, procurement plan, financial management system, specifications and contract management, and construction supervision plans.
- (f) Estimation of O&M plan including necessary institutional set up (based on the existing setup) and recurrent funding requirements for the project facilities.
 - (g) Preparation of the monitoring and evaluation framework along with establishment of baseline for monitoring indicators as well as indicators for the project implementation and assessment methodology for measuring impact. Also, development of a procedure of monitoring mechanism and action taken thereof to evolve adaptive system of river bank protection.
 - (h) Project cost and benefits estimates, investment scheduling, economic and financial analysis including sensitivity analysis through state-of-the-art technology for possible scenarios.
 - (i) Preparation of detailed designs and bidding documents for the first contract covering work of about US\$100 million in value, preparation of the corresponding full social management plan(SMP), river bank erosion management plan (RBEMP) and environmental management plan (EMP) for the identified work along with cost estimates, and institutional and implementation arrangements.
 - (j) Support in procurement of work, bidding procedures, pre-qualification of contractors if necessary and evaluation of tender and preparation of the bid evaluation report.
 - (k) Impart study tour abroad for BWDB & Ministry staff for 15 (fifteen) participants in two or three countries for technology transfer from similar type of works.

4.3 Assignment B: The Assignment B is consists of two components Assignment B1 and B2.

The tasks of the consultants to be carried out under the Assignment B are:

Assignment B1

- (a) Review and update all reports and data from Assignment A, conduct survey work and review the feasibility level design of the remaining project for which detailing was not done under the Assignment A and design of remaining project work not designed under the Assignment A, and preparation of the corresponding bidding documents;

Assignment B2

- (b) Construction supervision of all work to be implemented under the Project. The consultant would will be designated as the "Engineer" under civil works contracts, and
- (c) 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.

- d) Implementation of the river bank erosion management plan, environmental management plan and social management plan.

Detailed Scope of Work for Assignment A

- 4.4 The activities and scope of work for the Assignment A will include, but not limited to the following:

Task 1: Detailed Feasibility Study including Planning, Design of all Engineering Aspects

- 4.5 **Review and Use of Existing Information:** The consultants will review and make use of all the existing information available and in particular data, tools and models used for the Master Plan of 1993 and implementation of the River Bank Protection Project under which several hard points were constructed for protecting BRE. The consultants will also review other studies and work carried out for river bank protection around the country. The feasibility study should be based on all the studies, analysis and experience in construction of flood protection, management of embankments and hard points in Bangladesh and other countries with similar environment and working conditions.
- 4.6 **Definition of the Project Area, Data Collection and Review:**
 - (a) In consultation with the BWDB and other concerned agencies and stakeholders delineate the project area i.e. the area which the project would have impact. The first priority would be the stretch of BRE starting from Sirajganj upwards that could be included in RBIP within the available resources allocated for the Project.
 - (b) Develop a database on the hydro-morphology, satellite and model outputs data for BWDB field office to take decision
 - (c) Description and analysis of the physical resources (that is soils, climate, surface water, ground water resources, etc.) land use and vegetative features, rural areas, urban areas, major assets and infrastructure in the project area that should be protected.
 - (d) Documentation of location, extent of existing infrastructure (roads, utilities, market, storage and processing facilities of agricultural produce, roads, schools, and health facilities).
 - (e) Determination of human resources, farm size, tenure arrangements, cropping patterns and intensities, input use and availability (both water and non-water), crop yields, income and employment. Socio-economic surveys of appropriately selected samples of household may be carried out to estimate representative parameters for the project area.
 - (f) Detailed inventory of existing and damaged or partially damaged river training/bank protection works including their design, bank position and set-back distance from BRE, historical records of water level and discharge of the Jamuna River, historical hydrographic survey data and sediment data.
 - (g) Impact of floods on the project area, return period, type and extent of damages and losses of lives and losses to various sectors, agriculture, industrial, health, education, power and telecommunication, public and private infrastructure, loss of production during floods, etc.

(h) Review and evaluate the performance of ongoing and completed projects in the sector for the purpose of coordinating their inputs to the proposed project and/or incorporating lessons learned such as (i) design and cost of the constructed protection work (ii) achievements in increasing protection, changes in employment and incomes, and technologies used, (iii) effectiveness of institutional arrangements and role of project beneficiaries; (iv) accomplishments in improving water management; (v) Performance of implementing agencies, design and supervision arrangements, and contractors; and (vi) O&M and project sustainability.

4.7 **Preparation of Detailed Feasibility Level Designs.** Carry out detailed feasibility level designs for river bank protection work to stabilize the BRE starting from Sirajganj upwards that would include new construction and reconstruction or strengthening of the existing structure or embankments in tendon with the new construction. The Master Plan of 1993 and work implemented so far show that a combination of hard points and linking such hard points to earthen embankment is the best and optimal strategy to provide river bank protection. The consultants will validate this concept and use this strategy for coming up with the scheme of protection system for BRE.

4.8 **For Preparing Detailed Design,** the consultants will carry out, but not limited to the following:

(a) Carry out hydrologic/hydraulic, sediment transport, erosion-deposition and plan form and morphological analysis for determining appropriate alignment of BRE in the study area and sections to be included in the Project;

(b) Develop typical designs of hard points that can easily be customized for specific site conditions during the detailed design stage, and determine criteria for placing the hard points and for setback distance of embankment, etc. and optimal spacing between the hard points to minimize the cost and performance requiring least amount of O&M during operation;

(c) Develop typical design for the embankment considering availability of local materials for construction, functionality, access and use of the embankment as road for improving communication in the area, ease in O&M, suitable for local O&M institution etc. Determine optimal criteria for setback from the river bank at various locations and appropriate mix of hard points and linking embankment to reach to a best solution i.e., least cost solution that will be sustainable in long run with minimum O&M requirement;

(d) Identify the permanent chars that are relatively stable and inhabited and ascertain the safety level of char people based on char erosion forecast. Keep provision for the char people in the Social Management Plan (SMP) to be resettled as and when necessary

(e) Prepare estimates of quantities of construction, materials, equipment, and prepare cost estimates (financial and economic) with appropriate physical and price contingencies, and breakdown by major work items;

(f) Prepare bill of quantities and proper engineering drawings showing the rehabilitation work that need to be carried out in each subproject;

- (g) Prepare guidelines (draft manual) for O&M of hard points and BRE if necessary;
- (h) Prepare guidelines for field inspection of embankment section or protection work at stake by integrating with the flood forecasting information on daily basis and planning for Emergency Flood Action Plan (EFAP);
- (i) Prepare guidelines for overall River Bank Erosion Management Plan (REBMP) along the BRE;
- (j) Carry out environmental and social assessments in each hard point area and lining embankment which may form the basis for assessments for the whole project area; and
- (k) Identify the need for improving other services in the project area to achieve the objectives of the project performance of BRE, etc.

Task 2-Hydrological, Hydraulic and Morphological Studies Numerical Modeling : In order to develop best strategy for improving the performance of BRE in a sustainable way with minimum O&M requirements the consultants would carry out necessary hydrologic, hydraulic, river plan-form dynamics, river bank erosion, sediment transport and morphological studies according to the best international practices such as hydrodynamic and morphological modeling. In doing that the consultants would consider various changes that have been taken place in the river morphology between now and then in 1993 when the Master Plan was formulated. The consultant will use field information, mathematical modeling technology, satellite imagery and appropriate one dimensional (1-D) and two dimensional (2-D) models that would be made available and updated during the project implementation period in order to examine and reassess the river bank protection strategy and mechanisms to improve the performance of BRE in accordance to the future changes in river morphology in short, medium and long-term considering the impacts of possible climate change on the Ganges-Brahmaputra –Meghna (GBM) basin due to global warming. Strategy and mechanisms of riverbank protection should be based on evaluation of different potential options integrating proposed protection work with existing ones.

- (b) Specialized hydro-morphological and hydro-meteorological data of the river stretches to be collected using state-of-the-art survey equipments to provide useful data for modeling and overall study.
- (c) Carry out necessary topographical, bathymetric and other survey and site investigations using appropriate technology on the ground and satellite imagery, GIS and other computerized systems to gather data necessary for morphological and river engineering studies as mentioned above and for calibrating necessary models to test for various strategies and alignments of BRE to provide most optimal solution for improving its performance considering technical, economic, social and environmental aspects.
- (d) Maintaining and regular updating of the mathematical models developed under Assignment A to validate design of RTW and performance of BRE work considering prevailing/changing future conditions;
- (e) The consultants will provide technical assistance and training to the project staff for on-the-job training and technical assistance needs for the BWDB for implementation of the Project and other

programs. The training programs are likely to cover the transfer of hydrologic/hydraulic models.

(f) Propose a strategy for use of numerical modeling tools to assist in O&M of BRE and protection work to have prior indication of the areas where proper maintenance is needed.

(g) Develop and update numerical models for site or reach based assessment of erosion problems and devise appropriate protection measures through analysis of performance of a number of feasible options and also taking into account all relevant issues.

The assignment will require support from various modeling tools. From early nineties hydraulic and environmental models have been developed for different projects. The models are updated periodically and maintained by specialized institutes/agencies for use of others. Given time line for the assignment the bidder may consider association with those specialized institutes.

Task 3: Social Impact Assessment and Preparation of Social Management Plan (SMP)

4.10 The consultants will carry out Social Impact Assessment following the GOB Laws and World Bank Guidelines for various project activities/works included in the feasibility study. Based on the findings of the Social Impact Assessment, if land or property is to be acquired permanently or temporarily or people are affected in a significant way, the consultants will prepare a Social Impact Management Framework (SIMF) for the area and activities under the RBIP project and include in the feasibility study. For the works to be included in first year's contract for which detailed designs would be prepared, a Social Management Plan (SMP) would be necessary. In this context major activities to be carried out will include, but not limited to the following (RAP prepared for other projects in particular River Bank Protection Project would be a good reference document):

- (i) Review project concept, active laws on land acquisition in Bangladesh including the law regulating bank line of shifting rivers, and the World Bank guidelines on social safeguards and social safeguard planning documents of similar previous projects;
- (ii) Design and carry out surveys and consultation for Poverty and Social Impact Assessment (PSIA) of the Program including Participatory Rapid Appraisal (PRA) and Socioeconomic Household Survey in respect of impact of the program interventions and facilities during and after construction and furnish the findings and recommendations in a comprehensive PSIA report;
- (iii) Based on findings and recommendations, prepare a Social Impact Management Framework (SIMF) for the program as a tool for preparation and implementation Social Management Plan (SMP) including Resettlement Action Plan (RAP), Indigenous Peoples Plan (IPP) and Gender Action Plan (GAP);
- (iv) Review detail design of the first year program, assess the social impacts following the SIMF and prepare an SMP for implementation;
- (v) Collect basic data needed for preparation of SMP; this would include: (a) full census of affected persons-landowners (resident and non-resident), family members; (b) full inventory of assets affected-land, structures, crops, productive trees; (c) estimate of impact of loss on income of each household; (d) census of those who have already been compensated for lost assets and left the immediate area (if any); (e) assessment

of impact on income/standard of living of those who have already been compensated for lost assets and left the immediate area (if any); (f) compilation and analysis of laws pertaining to land valuation, acquisition and expropriation; (g) analysis of standard practices for land valuation, acquisition and expropriation; (h) documentation of efforts made to minimize land acquisition/resettlement; (i) PRA; and (j) fully articulated options available to affected persons;

- (vi) Prepare alternatives to minimize the resettlement and displacement, during project design as well as during implementation. Prepare alternatives to minimize the amount of impact of resettlement by selecting relocation sites, which are suitable and acceptable to the communities;
- (vii) Design and implement a program to involve beneficiaries in project conceptualization, planning and implementation and to facilitate public awareness of the project; and to enhance its ownership;
- (viii) Develop a method of early intelligence for BWDB field engineers to identify likely section of the embankment that may be breached despite all possible efforts and likely extent of eventually flooded area and to devise an emergency evacuation plan for district administration.
- (ix) Identify sites for relocation, involve PAPs in preparing alternatives for relocation sites, and preparing strategy for site and housing replacement.
- (x) Describe legal framework for RAP, relevant local laws, customs that apply to resettlement; describe entitlement policies for each category of impact and specify that resettlement implementation will be based on specific provisions of agreed RAP; describe method of valuation used for affected structures, land, trees, and other assets; and prepare entitlement matrix; describe suggestions and complains mechanism (SCM) including grievance redress procedures for registering complaints and suggestions; describe mechanisms for screening of suggestions for feeding into project design and implementation, and management and resolution of complaints;
- (xi) In respect of social impact and SMP preparation:
 - a) carry out socio-economic surveys and identify project affected peoples (PAPs) and extent of the adverse impact on the socio-economic conditions due to the project facilities during construction as well as after completion;
 - b) prepare a resettlement plan entitlement and policy matrix.
 - c) establish a bench mark situation, sketch out property, houses and other structures, trees and vegetation, and geo-profile in a map covered by the project works. Video-taping may be used to support the bench mark situation;
 - d) carry out gender analysis and public health implication due to program interventions during and after construction;
 - e) propose institutional and organizational arrangement for preparation and implementation of SMPs including linkages with the project implementing agencies, local administration, Non Governmental Organizations (NGOs) and other related organizations;

- f) prepare cost estimates of SMP implementation separately identifying the administrative costs, consulting services, equipment, and compensation under major categories, such as land, houses, trees, other property, cost of preparation of alternative sites, etc;
- g) prepare SMP implementation arrangements and identify critical path actions for timely implementation of the project;
- h) Conduct surveys to determine any "cultural property" (according to definition of GOB and United Nations) including sites having archeological, paleontological, historic, religious, and unique natural values in the project area and prepare proper documentation for such a cultural property; determine effect, if any, the project may have on the cultural project and develop plan for its preservation.
- i) The SMP would be updated and modified time to time and once a year showing the status of its implementation, changes in the SMP implementation that would be necessary due to changes on ground over the previous period; and
- j) Provide support in implementation of SMP activities during the project implementation, including support to purchase of properties, for that purpose, preparation of documentation to help in negotiations with the beneficiaries, in obtaining of local permits, etc. This may also include identification of alternative sites for resettling people and related assets and cultural properties, development of the sites, including planning, infrastructure, utilities, and replacement houses/apartments/quarters etc

For the assignment the bidder may consider association with specialized institutes.

Task 4. Environmental Assessment, Environmental Management Plan, EIAs etc.

4.11 Carry out an overall Environmental Assessment (EA) and prepare Environmental Management Framework (EMF) for the project area covered under the feasibility study. For the area covered under the detailed designs prepare full Environmental Management Plan (EMP). EA, EMF and EMPs would be prepared according to the World Bank Guidelines and Operational Policies (Operational Policies 4.01) and the GOB procedures. The consultants would update the EMPs as the project implementation proceeds (during Assignment B).

4.12 The consultants would gather necessary data and information and prepare all the environment related documents for all works to be implemented under the project that may be necessary for acquiring location, obtaining construction and other permits for constructing works and approval of the Project by the World Bank and GOB.

4.13 The consultants would help to operationalize the finding of the EAs and EIAs and implementation of Environment Management Plan (EMP) for any adverse impact by the construction activities and operation of the project may have on the environment. EMP would consist of mitigation measures, monitoring program and institutional development/strengthening program for implementation of EMP. Prepare cost estimates for implementation of EMP, scope of work, terms of reference and a plan of how various mitigating measures would be implemented either through modification of construction contracts for project facilities or through additional works for which consultants would prepare designs or through technical assistance and training which the consultants would carry out for operation of the project facilities.

4.14 The consultants would help in capacity building of BWDB officials and staffs concerned

for implementation of EMP through training and transfer of knowledge.

For the assignment the bidder may consider association with specialized institutes.

Task 5: Feasibility Report, Project Implementation Plan, Procurement Packaging, Economic Analysis, and Financial Management System etc.

4.15 Project Implementation Planning and Procurement Packaging etc.

(a) Considering the availability and performance of the contractors, and the construction industry as a whole, size and nature of work based on the detailed designs, and available technology, propose suitable construction scenarios for the project. In this context, identify packages of work which are to be implemented on the basis of international competitive bidding (ICB), national competitive bidding (NCB) or through other appropriate methods;

(b) For each type of package identified above, outline the basis for engineering supervision and administrative arrangements including implementation arrangements for RBEMP, EMP and SMP etc.;

(c) Prepare an overall implementation plan, and plans for each component of the project as well as operation plan for the project consulting services for supervision and administration, and monitoring and evaluation of the project impact; civil works; equipment, vehicles and other goods required for the project implementation;

(d) Propose project implementation arrangements including institutional structure clearly defining the role of the BWDB, Ministry of Water Resources (MOWR), Finance, Planning, district level authorities, potential need for a special Project Management Unit (PMU), field offices, contractors, and supervisory engineers. Layout an appropriate work flow using the proposed institutional setup such as technical approvals, approvals for technical design, approval for changes in technical designs during construction, for effective implementation, measurements and verification of works undertaken, payments procedure, flow of funds, etc. Also prepare a staffing plan for the PMU and other staff required for the project implementation; and

(e) Prepare cost estimates for project management, detailed designs, supervision services and other services required for project implementation.

4.16 Project Cost Estimates, Benefits and Economic Analysis.

(a) Based on the detailed analysis for projects and using appropriate methods to extrapolate various parameters for preparing an overall project design, prepare project cost estimates. These cost estimates would include cost of all components of the project, namely: (i) civil works for revamping the BRE and ancillary work; (ii) other services, and equipment that are proposed to be provided under the project; (iii) monitoring and evaluation of the project implementation and project impact in long run; and (iv) surveys and detailed design of the work, construction supervision and contract management, field engineers requirement, operation of the project offices etc.

(b) Provide estimates of project benefits, impact of agriculture production, reduction in damage and losses to various sectors of the economy such as housing including contents of houses, industry, health, education, transportation, communication, power and telecommunication, other public and private infrastructure. Under alternative scenarios (such as present, future-without-project and future-with-project) and in financial and economic prices, prepare rate of returns to the investment, impact on income, and employment;

(c) Estimate total project cost, benefits & economic and financial returns for the total project. Identify project risk & carry out sensitivity analysis, switching value & impact on the economic rate of return &

(d) Propose optimal project design considering economic returns to varying level strengthening of BRE and areas to focus the reconstruction with level of priority based on economic returns;

4.17 Operation and Maintenance (O&M)

(a) Estimate O&M requirements of the project facilities over the project life, estimate materials required implementation arrangements and cost estimates. Consider participation of local administration in O&M of the project facilities, of the project beneficiaries and develop mechanisms to ensure their participation, etc.

(b) Propose effective institutional arrangements, for ensuring the proper O&M of project facilities, including performance based contracting for O&M, define the role of public and private institutions in O&M of the project facilities and identify training requirements and develop a training program;

(c) Prepare a detailed O&M manual reflecting the above; and

(d) Identify equipment, office and other facilities required for O&M of the project facilities.

4.18 Monitoring and Evaluation.

Develop framework for:

(a) Monitoring and evaluation of project implementation performance, mechanisms for feedback to the implementing agencies, mechanisms for ensuring that the lessons learned are accounted for, and for development of management information systems to monitor the project performance effectively;

(b) Assessing the impact of the project on the physical i.e. sedimentation, erosion, flow distribution, channel development etc., economic and other environmental and social aspects, monitoring indicators and establish baseline for the indicators;

(c) Monitoring and supervision of the environment, social, and resettlement action plans;

(d) Monitoring of the river response during implementation of Priority River training/bank protection work in order to suggest for adaptive and corrective measures by evaluating monitoring results;

(e) Preparing required cost estimates for continuous monitoring and evaluation during project implementation and terms of reference for an independent consultancy services for M&E and supervision of EMP and SMP, etc,

- 4.19 **International Waterway Aspects:** The project is located on the Jamuna (Brahmaputra) River, which is an international waterway, and therefore Bank Operations Policy for 7.50 would apply. The consultants should determine the impact of the project outside the national boundaries, if any, and to the extent possible quantify the potential impact in accordance with the international procedures for use for projects on international waterways. Prepare a framework and assist the Government in processing project on international waterways.
- 4.20 **Development of a Financial Management System:** Assess the financial management capacity of the institutions proposed for implementation of the project. Prepare terms of reference and cost estimates for developing a computerized project financial management system, which is appropriate for the size and scope of the project. The computerized project financial management system should be capable of generating periodic progress reports required for project management. The Financial Management System would be documented in a Project Financial Management Manual which would include the following: (a) flow of funds process; (b) accounting system including internal controls; (c) financial and accounting policies; (d) planning and budgeting system; (e) financial forecasting system; (f) procurement and control of administration monitoring system; (g) financial reporting (quarterly reports and annual financial statements); (h) auditing arrangements; and (i) organization, staffing, training and technical support for financial management.

Task 6: Detailed Design and Preparation of Bidding Documents

- 4.21 **Detailed Design and Preparation of Bidding Documents:** The feasibility study would form the basis for overall design of the Project. These works would be implemented mostly under ICB contract packages. The consultants would prepare detailed designs and bidding documents for first package preferably covering works starting from Sirajganj upwards and estimated to the cost of about US\$100 million. For preparing detailed designs and bidding document, the consultant would carry out, but not limited to, the following activities:
- (a) Prepare detailed designs and for that purpose carry out field surveys, site investigations, analysis of field data, physical and mathematical model investigations and prepare detailed designs reports for function and use design covering the contracting agency's requirements with respect to the procurement, in particular requirements related to the following:
- site conditions and circumstances;
 - technical standard and use;
 - technological innovation to meet the requirements with least cost solutions including technology and construction methods;
 - architectural and aesthetic;
 - functionality, durability and sustainability; and
 - services according to the acceptable standards,

- (b) Carry out a comprehensive site examination and collect all information required for the evaluation of the present field conditions;
- (c) Carry out topographic and hydrographic surveys and hydrometric data collection to an extent sufficient to select the optimum alignment, grade and level of the embankment/dikes/ hydraulic structures, to select the optimum location, and to facilitate the adequate determination of required quantities for the construction of the works;
- (d) Carry out geo-technical field investigations, which may be additionally required to determine the basic design parameter for the construction of embankment/structures and sluices, and to locate appropriate borrow areas (and/or disposal areas as needed) for material and concrete aggregates. In particular consultants will carry out technical, environmental and social impact analysis of any dredged material that may be generated during the construction activities and prepare detailed design for safe disposal of such materials;
- (e) Prepare design criteria for the detailed designs including supporting computations for the proposed embankment/structures, sluices, coffer dikes and other related works according to recognized international standards. Drawings will be prepared to the extent that adequate cost estimates will be possible, and to facilitate contractors to prepare their bids and construction drawings;
- (f) Choose appropriate materials, optimize the designs and select least cost options that meet technical requirements and estimate quantities of construction, material, etc. for preparation of bidding documents;
- (g) Prepare technical specifications, engineering drawings needed for tender documents, bill of quantities (BOQs) and bidding documents. The bidding documents would be prepared in accordance with the formats and standards defined in the World Bank Project Appraisal Document (February 2007) for procurement of such works. For large contracts to be procured under International Competitive Bidding (ICB) procedure, the Bidding Documents would be prepared using World Bank Standard Bidding Documents for ICB, which are based on Standard FIDIC documents;
- (h) Prepare engineer's cost estimates for the works/contracts, and requirements for construction supervision, including facilities, material testing labs, on or off site as needed, equipment and staffing or any other special requirements; and
- (i) For works included in the first package, prepare a full design report, and Environmental Management Plan and Resettlement action Plan.

Detailed Scope of Work Assignment B:

Assignment B1

Undertaking of remaining task or a part of task (Task1 to 5) of Assignment A

Detailed Scope of Work for Assignment B1:

Task 7: Detailed Design and Preparation of Bidding Documents of Remaining Work

4.22 **Detailed Designs and Bidding Documents.** This would cover reviewing the designs and preparation of bidding documents for remaining works/activities that are approved to be included

in the Project. The consultant will review the design with respect to present situation. This design report would be prepared for each contract package consisting of engineering, environment and social with appropriate RBEMPs, EMPs and SMPs.

4.23 Preparation of RBEMP. The consultant prepares a river bank erosion management plan for total work which would be a part of design report mentioned above. During implementation stage the consultants would update the plan according to the field requirements.

4.24 Social Impact Assessment and Preparation of SMP. Prior to starting detailed design of various contracts, the consultants would prepare a SMP for the works covered under each contract package (each Package would be about US\$100 million). The SMP would form part of the design report mentioned above. The SMP would be prepared in accordance with the scope and activities under Task 3 above. The consultations for the SMP would be carried out in the Project area and all procedure would be followed according to the existing GoB and World Bank guidelines. The SMP would be updated and modified from time to time but not less than once a year showing the status of its implementation, changes in the SMP implementation that would be necessary due to changes on the ground over the previous period. The consultant would provide support in implementation of SMP during the project implementation.

4.25 Environmental Assessment, Environmental Management Plan, EIAs etc. The consultants prepare an Environmental Assessment and EMP for each package of works under the project. This updated EA/EMP would form part of the design report mentioned above. During implementation stage the consultants would update the EA/EMP and provide support in their implementation according to the requirements and procedures defined above.

4.26 Implementation of EMP and SMP. The consultants would provide support in implementation of *EMP/SMP* activities during the project implementation, including support in purchase of properties, and for that purpose, preparation of documentation, help in negotiations with the beneficiaries, obtaining local permits, discussions with local authorities and preparation of documents for that purpose, resolution of issues, preparation of documents for making payments, relocation of beneficiaries, including any special assistance that may be required, in such relocations, etc.

4.27 The consultant will provide support in identification of alternative sites for resettling people and related assets and cultural properties. They would prepare plans for development of the site (s), including planning, and development of infrastructure, utilities, and replacement houses/apartments/quarters etc, They would help in meeting architectural requirements of location and construction permits, carry out designs for settlement's infrastructure, roads, connectivity, utilities etc. and prepare bidding documents and carry out construction supervision of the development and houses as needed upon the instruction of the BWDB.

Assignment B2

Construction Supervision, Review Design, Project Management and Implementation Support

4.28 The activities and scope of work for the Assignment B will include, but not limited to the following:

Task 9: Contract Management and Administration and role as Engineer

4.29 The consultants would be responsible for all construction supervision contracts (covering Assignment A and Assignment B above) and in that context, would carry out, but not limited to the following activities:

- (a) being designated as the Engineer for the civil works, goods, and equipment supply and installation contracts and they would be responsible for inspection and supervision of the construction works, installation of equipment and testing of construction material, in order to 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. As mentioned above, the consultants would 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.
- (b) In the context of contract management they would carry out, but not limited to, the following activities
- Assist Project Director for contract administration and management;
 - Inspection of construction activities
 - Testing of materials on site and off-site testing when needed, if necessary, in-factory testing during manufacturing and inspection of goods and materials
 - Review of contractor's submittals, verification of progress and interim payment request.
 - Assist Project Director in determination of final construction quantities and contract period evaluation of each contract
 - Preparation of monthly progress reports
 - Maintenance of records
 - Assist Project Director in Contract/works or goods acceptance and close of contract, issuance of completion certificates, and preparation of documents as required for acceptance of works/goods by the investor (BWDB);
 - Preparation of operation, maintenance and management manuals for the facilities constructed under the project
 - Assurance for proper demobilization and restoration of the construction sites after completion of O&M during warranty period by the contractors
 - Carry out all obligations provided for the Engineer in the Civil Works contracts. In the event of contractual dispute which may result in legal action, adjudication or arbitration between the contractor and the employer, and on the instruction, will collate and prepare factual documentation which describes the circumstances of the dispute, and if required the Consultants would attend hearings.

Task 10: Project Management Support

- 4.30 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, quarterly reports and annual reports or work programs as required by the Government of Bangladesh and financiers of the project. They will also help in development of the procurement plans, contract management, financial management for which they would develop a system that can be linked with the Project Management or field units responsible for over financial management of the project. The plans would be updated on a regular basis as required by the BWDB.
- 4.31 The consultants will support in obtaining site permits, construction permits, or any other

permits or paper work, which are necessary for the project and will act on behalf of the Owner as and when designated. The consultants will support BWDB in procurement of works, goods and services under the project, preparation of bidding documents for such procurement, evaluation of bids, preparation of bid evaluation reports, contract management, and implementation of EIAs, EMPs, SMPs and day to day management issues.

- 4.32 The Consultants will prepare documents for the pre-qualification of the contractors and the prequalification criteria. The consultants would also help the BWDB in pre-qualification process such as invitation to pre-qualify, evaluation of the pre-qualification applications, preparation of pre-qualification reports etc.
- 4.33 The consultants will write terms of reference for any additional work that are to be carried out under the project for which additional services would be required and identified during project implementation. The consultants will also provide technical assistance and training to the project staff and for that purpose prepare an overall training program for on-the-job training and possibly study tours based on the assessment of the training and technical assistance needs for the BWDB for implementation of the Project and other programs. The training programs are likely to cover: (a) transfer of hydrologic/hydraulic models and on-the-job training as mentioned above; (b) project management, project planning, expenditures planning, budgeting; (c) preparation of detailed designs according to international standards, EIAs, RAPs; and (d) procurement and contract management

5. Implementation Arrangements

- 5.1 The consultants will work closely with the PD, ECRRP (BWDB part) and coordinate their work with other relevant units of BWDB, Ministry of Water Resources, local administration and relevant Ministries and agencies. The consultant will establish their main office close to the Project Director's office and the field office at convenient location to implement the work properly.
- 5.2 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 updated throughout the Project duration.
- 5.3 Director General, BWDB would be representative of the client and a Project Director would be designated as Head of the Project Implementation Unit (PIU) to coordinate all interfaces with the Consultants. Head of PIU with support from the Director General would also assist the Consultants in resolving various administrative issues, which may arise during the study duration. The Consultants' Project Manager will be the principal contact and will be expected to be readily available during project implementation.
- 5.4 The Consultants shall be responsible for all aspects of performance of services as set forth in the preceding sections of this TOR. This TOR will be supplemented by another two TOR (Annexure-1& 2) for Model, Social and Environmental study. For these two types of studies specialized organizations experienced in specific field at national level may be associated by nominating sub-consultant to the main consultant as support services. BWDB would be responsible for providing the existing data and information including all reports prepared so far for the project.

6. Selection Procedure and Form of Contract

6.1 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.

7. Duration of the Assignment

Duration of the contract would be 18 (eighteen) months for Assignment A though most of the work would be completed by the consultants during the first 12 months. The Assignment B would cover a period of 0-3 years for assignment B1 and 0-6(six) years for B2. The Project implementation period will also covering the warranty period of the works to be implemented under the project.

8. Key Professionals with Qualification and Task

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 comprehensive team composition with task assignments by key staff along with sufficient support staffs to meet the objectives and scope of the services. The key skills experts (national and international) may not be available within the consulting firms then they are encouraged to make Association either in the form of Joint Ventures or Sub-Consultant with other firms. Following is an indicative list of the positions of the experts for the **assignment A & B** where the firms will propose the person-month/position numbers required but not limited to carrying out the assignment. It may be noted that Sl. No. 1 to 6 of international consultants and Sl. No. 1 to 9 of national consultant will be considered for evaluation and for Assignment A. Sl. No. 1 to 6 of international consultant and Sl. No. 1 to 7 of national consultant for Assignment B1 and Sl. No. 1 to 4 of international and national consultants for Assignment B2 will be considered for evaluation:

(A) For Assignment –A

International

Sl. No.	Position
1	Team Leader/ River Training Engineer
2	River Engineer/River Morphologist
3	Design Engineer
4	Environmental Specialist
5	Sociologist/Resettlement Specialist
6	Economist
7	Hydraulic/ River Modeling Specialist
8	Geo-Technical Engineer
9	Procurement Specialist
10	Planning Engineer
11	O & M Specialist
12	Any other short term Specialist

National

Sl. No.	Position
1	Deputy Team Leader/ River Engineer
2	Morphological Modeler
3	River Engineer- RTW
4	River Morphologist
5	Hydrodynamic Modeling Specialist
6	Hydrologist
7	Data Analyst- Hydrology & Hydraulic Data
8	Senior Planning and Design Specialist
9	Sr. Design Engineer
10	Drainage and Flood Management Specialist
11	Survey Specialist- Hydrographic and Topography
12	Hydraulic Structural Engineer
13	Senior Estimator
14	Geo-technical Engineer
15	Economist/ Financial Specialist
16	Environmental Specialist/Ecologist
17	Resettlement Specialist/Sociologist
18	Procurement Specialist
19	GIS Expert
20	Training co ordinator
21	Jr. Survey Engineer
22	Jr. Design Engineer
23	Jr. Planning Engineer
24	Auto Cad specialist
25	Office Engineer
26	Support Staff

Assignment B1 (Design Consultant)

International Consultants

Sl. No.	Position
1	River Training Engineer
2	Design Engineer
3	Environmental Specialist
4	Morphological Modeler
5	Sociologist/Resettlement Specialist
6	Survey Specialist
7	Geo-Technical Engineer
8	Procurement Specialist
9	M & E Specialist
10	Any other short term Specialist

National Consultant

Sl. No.	Position
1	Deputy Team Leader/Design Engineer
2	Geo-Technical Engineer
3	Environmentalism
4	Sociologist/Resettlement Specialist
5	Geographical Information System Expert
6	Procurement Specialist
7	Sr. Estimator
8	Jr. Planning Engineer (s)
9	Jr. Design Engineer
10	Auto CAD Specialist
11	Office Engineers
12	Any other short term Specialist
13	Support Staff

Assignment B2 (Supervision Consultant)

International Consultant

Sl. No.	Position
1	Team Leader/ River Training Engineer
2	Construction Engineer(s)
3	Quality Control Specialist
4	ContractProcurement Specialist
5	O&M Specialist

National Consultant

Sl. No.	Position
1	Deputy Team Leader/ River Engineer
2	Sr. Construction Engineers
3	Sr. Quality Control Specialists
4	Contract /Procurement Specialist
5	Economist
6	O&M Specialist
7	Monitoring & Evaluation Specialist
8	Quantity Survey Specialist
9	Community Development Specialist
10	Training co ordinator
11	Project Management Specialist
12	Mid Level Construction Engineers
13	Material Engineer
14	Jr. construction Engineers
15	Laboratory Technician
16	Auto CAD Specialist
17	Office Engineers
18	Any other short term Specialist
19	Support Staff

Workshops/ Seminars and Trainings

9.1 One of the prime objectives of workshops and trainings is to disseminate of the study findings and results in project areas among various interest groups. Moreover it is needed to transfer of technology to the implementing agency (BWDB). And hence, training and field and central level workshops and closing workshops are to be organized. The trainings and the workshops will be organized with close discussion and taking suggestions from the implementing agency.

10.0 Reporting Requirement

10.1 The schedule for various reports to be issued by the consultants is given below. Though the duration of the contract is 15 months but the consultant will have to complete the work substantially by first 12 months. The consultant would prepare reports in English and provide twenty five copies of the key reports to the Government and the World Bank. The EA/SMP summaries would also be prepared in Bengali for dissemination and disclosure in the project area according to the guidelines.

Assignment A.	Months from Start of Assignment A
1. Inception Report	3 rd Month
2. Draft Feasibility Report/Mid Term Report , giving the overall project, project components, feasibility level designs, project cost estimates, environmental and social analysis institutional arrangements for implementation, etc.	6 th Month
3. Final Feasibility Report along with engineering, economic analysis, implementation arrangements, Environmental and social frameworks, and full EMP and SMP for first package of works	8 th Month
4. Full Project Implementation plan providing all aspects of project scope, assessments, implementation etc, according to the standard format.	10 th Month
5. Detailed Designs, and bidding documents for the first package	12 th month and/or as agreed by BWDB
6. Contracting for first package, bid evaluation report, etc,	According to the agreed schedule
Assignment B	Months from Start of the Assignment B.
B1	
1. Draft Project Preparation Report , giving final project description, cost estimates, economic analysis EAJEMP, institutional arrangements, etc .	4 th Month of the Assignment B
2. Design Report	24 th Month
3. Bidding documents , for remaining project works included in the	30 th Month

project, along with overall and full EMP and SMPs for each contract package.	
B2	Proposed 72 Months
4. Construction reports, monthly report, quarterly reports, annual work plans,	Regular basis
5. Bid evaluation reports, pre-qualification reports, etc.	According to the agreed time schedule

11.0 Responsibilities of BWDB

11.1 The consultant shall work under the direct supervision of the Project Director, ECRRP (BWDB Part), Dhaka. The concerned offices of BWDB shall assist the study team as required, particularly with regard to the hydrological, morphological, environmental, social and institutional aspect of the study. 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 between BWDB, PD-ECRRP and the consultants. Any unresolved issue, technical or otherwise, would be taken up with BWDB through the Project Director and BWDB, Dhaka.

For smooth completion of the study; the ECRRP shall assist the consultant, as far as possible, in collection of the following data, services and facilities:

- Available hydrological, meteorological, morphological data and records on irrigation and drainage systems.
- Available maps such as planning map, project index maps, contour maps, mouza maps etc.
- Available studies carried out by different study partners in relation to this study for generation of secondary information and future plans.
- Available agricultural and environmental data.
- Make available the input from the design office of the BWDB.

Physical monitoring data done by BWDB

QUALIFICATION AND TASK OF PROFESSIONALS

a) International Consultant

Discipline	Qualifications and Tasks
Team Leader/ River Training Engineer (Assignment A)	He/She should have Graduate in Civil/Water Resources Engineering. Higher degree is preferable. He should have specialist in Riverine Engineering/Water Resources Engineering/Hydraulic Engineering. He/ she should have minimum 15 years of overall professional experiences in water resources management out of which at least 5-years experience in river bank erosion protection measures including leading and managing a study team for water resources planning and design, river bank erosion protection management. He/She should have experience in risk assessment, risk management and devising mitigation measures for risk reduction in the riverine area. Some experience in bank protection as well as River training works under aided or any other project in Bangladesh. Tasks: His/her major responsibilities shall include but not necessarily be limited to the following : • Formulate strategy for stabilizing Brahmaputra Right embankment • Devising erosion protection measures on the basis of changed morphological features, sedimentation & erosion process of the Jamuna River, characteristic of bank line migration • Prepare project work plans, schedules • Maintain liaison with BWDB and other related agencies • Guide and supervise the project team & their activities, • Comparison of the alternative plans and find out the suitable solutions • Formulation of implementation and O&M plan • Guide preparation of different reports as required for the study • Preparation of Final Report satisfying the requirements under the Contract.
River Engineer/ River Morphologist	He/She should have Graduate in Civil / Water Resources Engineering specified field in Hydrology/ Riverine Engineering having a minimum of 12 years of professional experience with catchments discharge analysis, flood analysis and 5 years experience in hydrological data analysis, hydrological modeling/hydrodynamic modeling for large rivers. Previous experience in similar working environment will be preferred. Tasks: His/her major responsibilities shall include but not necessarily be limited to: • Review of all hydrological data relevant to this study. • Developing baseline condition of hydrological features of the study area, establish the drainage pattern, re-delineation of catchments boundary. Carry out hydrological and hydrodynamic modelling of the study area. • Review of climate change scenario and available reports on climate change. • Rainfall-runoff analysis for the study area • Hydrological analysis and establishment of design flood event • Assessment of potential impacts of climate change and sea level rise

Design Engineer

Minimum Graduate in Civil / Water Resources Engineering having a minimum of 12 years of professional experience with at least 5 years experience in design hydraulic structures & bank protection works in major rivers. He/She should have experience in the design of bank protection work. Previous experience in similar condition will be preferred.

Tasks:

The Design Specialist shall be responsible for design of the alternative structures suitable for the solutions of the bank protection works. He/she will calculate the cost estimate and compare the alternatives. His/her major responsibilities shall include but not necessarily be limited to the following :

- Design of the alternative structures recommended for the solutions of the protection of bank erosion.
- Preparation of cost estimates 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 solutions
- Preparation of different reports as required for the proposed study
- Maintain liaison with BWDB and other related agencies

Assist in preparation of Final report containing all the requirement of BWDB for the study

Planning Engineer

Minimum Graduate in Civil / Water Resources Engineering having a minimum of 12 years of professional experience with at least 5 years experience in planning of River Bank Protection Project. Previous experience in similar working environment will be preferred.

Tasks:

The Planning Engineer shall be responsible for planning of the alternative structures/measures suitable for the solutions of the drainage and flood management problem of the Brahmaputra-Jamuna river. His major responsibilities shall include but not necessarily be limited to the following :

- Planning of the alternative structures recommended for the solutions of the drainage and flood problem
- Planning of the alternative structures recommended for the solutions of the river bank protection of major river.
- Planning of link canal, peripheral embankment and other ancillary structures
- Assist in preparation of different reports as required for the proposed study

Geo-Technical Engineer

Bachelor degree in Civil /Geo-technical engineering/Geology having a minimum of 12 years of professional experience with at least 5 years experience in soil-boring and other geological aspects.

Tasks:

His major responsibilities shall include but not necessarily be limited to the following :

- Assess and need based Geo-technical information
- Data collection, Quality control, analysis and compilation.
- Soil-boring & other geological aspects.

Preparation of different reports as required for the proposed study

Hydraulic/
River Modeling Specialist

He/She should have minimum graduate in Civil / Water Resources Engineering. Higher degree is preferable. He should be specialist in Hydrology/River Modeling work having a minimum of 12 years of professional experience with catchments discharge analysis, flood analysis and 5 years experience in hydrological data analysis. Previous experience in similar working environment will be preferred.

Tasks:

His/her major responsibilities shall include but not necessarily be limited to:

- Review of all hydrological data relevant to river modeling study.
- Developing baseline condition of hydrological features of the study area, establish the drainage pattern, re-delineation of catchments boundary. Carry out hydrological and hydro metrological analysis of the study area.
- Review of climate change scenario and available reports on climate change.
- Rainfall-runoff analysis for the study area
- Hydrological analysis and establishment of design flood event

Assessment of potential impacts of climate change and sea level rise

Environmental Specialist

Minimum Masters' degree in Environmental Science/Engineering/ or Water Resources Engineering/Geography with special training on preparation of Environmental Impact Assessment/Env Mgt Plan. He/she should have minimum 10 years professional experience having at least 5 years working experience in Environmental Impact Assessment.

Tasks:

His/her major responsibilities shall include but not necessarily be limited to:

- Prepare an Environmental Assessment and EMP for each package of work under the project.
- Assess the baseline environmental condition

Assess the potential impacts of the project activity on surrounding environment

Sociologist /
Resettlement specialist

Minimum Masters' degree in sociology/ economics/social welfare and any other social sciences. He/she should have minimum 10 years professional experience having at least 5 years working experience in the works of social impact assessment, public participation and resettlement of affected people.

Tasks:

His/her major responsibilities shall include but not necessarily be limited to:

- Design methodology for social impact assessment of project interventions, identification of social issues, and framework for consultation with beneficiaries and affected persons.
- Design methodology for assessment of affected assets, loss of land and migrated people and project affected persons (PAPs) with the loss of assets, physical displacement and loss of income and livelihoods.
- Design methodology for determining current market price and replacement cost of assets to be acquired for project purpose.

- Carry out field surveys for social impact assessment, market survey, and consultation with beneficiaries and affected persons of all categories (economic and social groups) for collecting local information on social condition, cultural values etc.
- Review relevant GoB laws and World Bank guidelines and design the project policy framework for social impact management and beneficiary participation, and design methodologies of social impact assessment, market survey and consultation process.
- Prepare Social Impact Management Framework (SIMF) for the program as a guide for social impact assessment, beneficiary participation, and preparation and implementation of resettlement action plans based on reviews, field level social surveys and consultation with stakeholders.
- Prepare Social Management Plan (SMP) for the first year construction and subsequent each phase of project design and implementation in association with the national Consultant.

Procurement Specialist

Graduate in Engineering or higher degree in any financial management and procurement related field. He/she should have minimum 10 years professional experience having at least 5 years working experience in preparing contract document for infrastructure, following WB and GOB guidelines.

Tasks:

- Identify packages of work which are to be implemented on the basis of international competitive bidding (ICB), national competitive bidding (NCB) or through other appropriate methods;
- Prepare documents for the pre-qualification of the contractors and the pre-qualification criteria.

Evaluate pre-qualification process such as invitation to pre-qualify, evaluation of the pre-qualification applications, preparation of pre-qualification reports etc. Prepare bid document for works and goods contract packages for first year program.

Economist

He/she should have at least Masters' degree in economics with minimum 12 years professional experience including at least 5 years experience in economic appraisal of water resources projects. A significant portion of this experience may also include natural resources management, physical and monetary valuation of possible environmental impacts. Higher Degree & experience in relevant field will be preferred.

Tasks:

The Economist will assist mainly by appraisal of project worthiness in terms of economic viability. His/her major responsibilities shall include but not necessarily be limited to the following:

- Elaboration of the feasibility level cost estimates; administration costs and tax and duties shown as separate line items and the method of calculation of these costs
- Estimates for BCR, EIRR and NPV; benefits and costs of each planning option will be estimated based on the with and without project situation
- Assessment of risk to the projects viability; this will include social risks as well as traditional benefits and implementation schedule assumptions
- 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 a whole

Assist Team Leader in drafting / preparation of reports.

O & M Specialist:

He shall have at least a Graduate in Civil Engineering/Water Resources Engineering with at least 12 years working experience and shall have minimum 10 years of experience in a work of similar nature of project. His tasks and responsibilities shall include but not be limited to the followings:

- Estimate O&M requirements of the project facilities over the project life.
- Propose effective institutional arrangements, for ensuring the proper O&M of project facilities, including performance based contracting for O&M, define the role of public and private institutions in O&M of the project facilities and identify training requirements and develop a training program;
- Prepare a detailed O&M manual reflecting the above; and
- Identify equipment, office and other facilities required for O&M of the project facilities.

Any other short-term specialists

As and when it will be required.

b) National Consultant

Discipline	Qualifications and Tasks
Deputy Team Leader/ River Engineer	He/She should have graduate in Civil/Water Resources Engineering. Higher degree is preferred He/ she should have 15 years of overall professional experiences in water resources management, including leading and managing a study team for water resources planning and design, drainage out of which at least 5 years experience in river bank erosion management . He/She should have experience in risk assessment and devising mitigation measures for risk reduction in the riverine area is preferred. Tasks: His/her major responsibilities shall include but not necessarily be limited to the following : • Coordinate all the component of the study • Review the available reports on damage assessment and study reports in the Jamuna River • Prepare work plans, schedules • Maintain liaison with BWDB and other related agencies • Assist the team leader in guiding and supervising the project team and their activities, • Devise potential options for river bank erosion management and risk assessment • Formulation of implementation and O&M plan • Preparation of inception, progress and other reports • Preparation of Final Report satisfying all the requirement of BWDB for the study
Morphological Modeler	He/She should have Graduate in Civil / Water Resources Engineering specified field in Hydrology/Riverine Engineering having a minimum of 10 years of professional experience with catchments discharge analysis, flood analysis and 5 years experience in hydrological data analysis, hydrological modeling/hydrodynamic modeling for large rivers. Previous experience in similar working environment will be preferred. Tasks: His/her major responsibilities shall include but not necessarily be limited to: • Review of all hydrological data relevant to this study. • Developing baseline condition of hydrological features of the study area, establish the drainage pattern, re-delineation of catchments boundary. Carry out hydrological and hydrodynamic modeling of the study area. • Review of climate change scenario and available reports on climate change. • Rainfall-runoff analysis for the study area • Hydrological analysis and establishment of design flood event • Assessment of potential impacts of climate change and sea level rise
River Engineer- RTW	He/She should have Graduate in Civil / Water Resources Engineering specified field in Hydrology/Riverine Engineering having a minimum of 10 years of professional experience with catchments discharge analysis, flood analysis and 5 years experience in hydrological data analysis, hydrological modeling/hydrodynamic modeling for large rivers. Previous experience in similar working environment will be preferred.

Tasks:

His/her major responsibilities shall include but not necessarily be limited to:

- Review of all hydrological data relevant to this study.
- Developing baseline condition of hydrological features of the study area, establish the drainage pattern, re-delineation of catchments boundary. Carry out hydrological and hydrodynamic modeling of the study area.
- Review of climate change scenario and available reports on climate change.
- Rainfall-runoff analysis for the study area
- Hydrological analysis and establishment of design flood event
- Assessment of potential impacts of climate change and sea level rise

River Morphologist

He/She should have Graduate in Civil / Water Resources Engineering specified field in Hydrology/Morphology having a minimum of 10 years of professional experience with river morphology and 5 years experience in morphological data analysis. Previous experience in similar working environment will be preferred.

Tasks:

His/her major responsibilities shall include but not necessarily be limited to:

- Review of all hydrological data relevant to this study.
- Developing baseline condition of hydrological features of the study area, establish the river morphological pattern. Carry out hydrological and hydrodynamic modeling of the study area.
- Review of climate change scenario and river morphological change due to climate change.
- Design of river morphological change scenario by the morphological data analysis.
- Assessment of potential impacts of river morphology as well as climate change and sea level rise

Hydrodynamic
Modeling Specialist

He/She should have minimum graduate degree in Civil / Water Resources Engineering/Riverine Engineering having a minimum of 10 years of professional experience in river engineering practices with at least 5 years experience in hydrodynamic, sediment transport and morphological modeling for riverine area. Previous experience in similar working environment will be preferred

Tasks:

His/her major responsibilities shall include but not necessarily be limited to the following :

- Develop and update the numerical morphological model of the Jamuna River, hindcasting of historical morphological features of the Jamuna River;
- Devising option for protective measures by assessing risk and design parameters of BRE;
- Analyze the probable erosion mitigation measures, river flow pattern at different location of the Jamuna River.

Assess the risk of river erosion considering set back distance of embankment.

Hydrologist

Masters' degree in Civil / Water Resources Engineering/Hydrology having a minimum of 12 years of professional experience with catchments discharge analysis and 5 years experience in hydrological data analysis, hydrological modeling for the riverine environment. Previous experience in similar working environment will be preferred.

Tasks:

His/her major responsibilities shall include but not necessarily be limited to:

- Developing baseline condition of hydrological features of the study area, establish the drainage pattern, re-delineation of catchments boundary. Develop hydrological model of the study area.
- Review of climate change scenario and link up hydrological model.
- Rainfall-runoff analysis for the study area
- Hydrological analysis and establishment of design flood event
- Assessment of potential impacts of climate change and sea level rise
- Assist drainage and flood modeling specialist and tide and wave specialist

**Data Analyst –
Hydrology & Hydraulic
Data**

Graduate in Water Resources/Civil Engineering/Computer science and Technology and he should have minimum 10 years professional experience and at least 5 years working experienced in Database and MIS related project management and development.

Tasks

His/her major responsibilities shall include but not necessarily be limited to:

Knowledge and experience about the status, scenarios and possibility of available data

- Planning and design of database
- Provide technical advice for GIS/Database building
- Design protocol for the work
- Develop the database hierarchy, protocol, tools and web portal of the database

**Senior Planning and
Design Specialist**

Minimum Graduate in Civil / Water Resources Engineering having a minimum of 10 years of professional experience with at least 5 years experience in planning of water Resources Project. Experience of design work for the bank protection of the river Brahmaputra-Jamuna will be preferred. Previous experience in similar condition will also be preferred.

Tasks:

The planning Engineer shall be responsible for planning of the alternative structures suitable for the solutions of the protection of bank erosion. His/her major responsibilities shall include but not necessarily be limited to the following :

- Planning of the alternative structures recommended for the solutions of the drainage and flooding problems
- Comparison of the alternatives and find out the suitable solutions
- Preparation of different reports as required for the proposed study
- Maintain liaison with BWDB and other related agencies
- Assist in preparation of Final report containing all the requirement of BWDB for the study.

Sr. Design Engineer Minimum Graduate in Civil / Water Resources Engineering having a minimum of 10 years of professional experience with at least 5 years experience in design hydraulic structures & bank protection works in major rivers. He/She should have experience in the design of bank protection work. Previous experience in similar condition will be preferred.

Tasks:

The Design Specialist shall be responsible for design of the alternative structures suitable for the solutions of the bank protection works. He/she will calculate the cost estimate and compare the alternatives. His/her major responsibilities shall include but not necessarily be limited to the following :

- Design of the alternative structures recommended for the solutions of the protection of bank erosion.
- Preparation of cost estimates 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 solutions
- Preparation of different reports as required for the proposed study
- Maintain liaison with BWDB and other related agencies

Assist in preparation of Final report containing all the requirement of BWDB for the study

Drainage and Flood Management Specialist

Minimum Masters' degree in Civil /Water Resources Engineering/Hydrology. He/she should have at least 10 years working experience including 5 years in hydrological analysis, development of drainage & flood models and application of drainage models in flood control and drainage management in riverine environment.

Tasks:

His/her major responsibilities shall include but not necessarily be limited to:

- Hydrological analysis and establishment of design flood event
- Development of drainage model for different scenarios to find out design parameters for the interventions
- Assess the drainage performance of the drainage systems under different scenarios using numerical model
- Find the design parameters for hydraulic structure
- Contribute in preparing the report of the study and workshop materials
- Attend meeting as and when required

Survey Specialist – Hydrographic and Topography

Bachelor Degree in Civil Engineering/Water Resources Engineering. He should have at least 10 years experience in hydrographic, topographic and hydrometric survey and knowledge on using DGPS, ADCP, hydrpro, Arcview, and other technology like Terra model for processing surveyed data.

Tasks:

- Preparing detailed specification for all field survey activities
- Supervise the survey activities
- Ensure the quality of the survey
- Guide in processing and analyzing the data
- Preparation of Survey Report

Hydraulic Structural Engineer

Minimum Masters degree in Civil/Water Resources Engineering having a minimum of 10 years of professional experience with at least 5 years experience in design of hydraulic structures, embankment/dyke and river bank protection work. Previous experience in similar working environment will be preferred.

Tasks:

The Hydraulic Structural Engineer shall be responsible for design of the alternative structures/measures suitable for the solutions of river bank erosion considering the risk of storm surge, waves etc. His major responsibilities shall include but not necessarily be limited to the following.

- Design of the alternative structures recommended for the solutions of the drainage and flood problem.
- Preparation of cost estimates of the structures on the basis of recent actual schedule of rates, including annual expenditures schedules.
- Assist in preparation of different reports as required for the proposed study.

Sr. Estimator

Minimum Graduation degree in Civil/Water Resources Engineering having a minimum of 8 years of professional experience with at least 3 years experience in estimating and quantity surveying. Previous experience in similar working environment will be preferred.

Tasks:

His major responsibilities shall include but not necessarily be limited to the following :

- To prepare estimates of infrastructures as designed by Design Engineer.
- To prepare BOQ.

Geo-technical Engineer

Bachelor degree in Civil /Geo-technical engineering/Geology having a minimum of 10 years of professional experience with at least 5 years experience in soil-boring and other geological aspects.

Tasks:

His major responsibilities shall include but not necessarily be limited to the following :

- Assess and need based Geo-technical information
- Data collection, Quality control, analysis and compilation.
- Soil-boring & other geological aspects.
- Preparation of different reports as required for the proposed study

Economist/
Financial Specialist

He/she should have at least Masters' degree in economics with minimum 10 years experience including at least 5 years research experience in economic appraisal of agriculture sector projects. A significant portion of this experience may also include natural resources management, physical and monetary valuation of possible environmental impacts. Higher Degree & experience in relevant field will be preferred

Tasks

The Economist will assist mainly by appraisal of project worthiness in terms of economic viability. His major responsibilities shall include but not necessarily be limited to the following:

- Elaboration of the feasibility level cost estimates, contingency amounts, detailed price escalation estimates on the expected implementation schedule; administration costs and tax and duties shown as separate line items and the method of calculation of these costs
- Estimation of Benefits; the benefits will include profits from extra agriculture production as a result from reduce flood damage and drainage congestion, higher cropping intensities and use of high yielding varieties based on the cropping prepared by agronomist
- Estimates for BCR, EIRR and NPV; benefits and costs of each planning option will be estimated based on the with and without project situation
- Assessment of risk to the projects viability; this will include social risks as well as traditional benefits and implementation schedule assumptions
- Assessment of costs arising out of mitigation measures.
- Conclusion of socio-economic viability of each planning option and the project as a whole

Assist Team Leader in drafting / preparation of reports

Environmental
Specialist/ Ecologist

Minimum Masters' degree in Science/Environmental Engineering/or Water Resources Engineering/Geography with training on preparing EIA/EMP. He/she should have minimum 10 years professional experience with at least 5 years working experience in Environmental Impact Assessment.

Tasks:

His/her major responsibilities shall include but not necessarily be limited to:

- Prepare an Environmental Assessment and EMP for each package of works under the project.
- Assess the baseline environmental condition

Assess the potential impacts of the project activity on surrounding environment

Resettlement specialist/
Sociologist

Minimum Masters' degree in sociology/ economics/social welfare and any other social sciences. He/she should have minimum 10 years professional experience with at least 5 years working experience in social surveys, preparation of resettlement plans for affected people due to involuntary resettlement, identification of the displaced persons, and assessment of their loss of assets and income.

Tasks:

His/her major responsibilities shall include but not necessarily be limited to:

- Participate in design and carry out social impact assessment of project interventions including market survey and consultation with beneficiaries and affected persons at the field level.
- Carry out assessment of affected assets, loss of land and migrated people and project affected persons (PAPs) with the loss of assets, physical displacement and loss of income and livelihoods.
- Assist the international consultant in review of relevant GoB laws and participate in review of World Bank guidelines in connection with designing the project policy framework for social impact management and beneficiary participation.
- Participate with the international consultant in preparation of Social Impact Management Framework (SIMF) for the program and Social Management Plan (SMP) for the first year construction and subsequent each phase of project design and implementation.

Procurement Specialist	Bachelor degree in Engineering with special training on procurement aspects. He/she should have minimum 10 years professional experience with at least 5 years working experience in procurement goods, services and works, preparing bidding/contract document for infrastructure, following WB and GOB procurement policies and guidelines. Tasks: His/her major responsibilities will be similar to the international Procurement Specialist.
Geographical Information System Expert	Minimum B. Sc. Degree in Civil Engineering/Water Resources Engineering/Urban and Rural Planning/Hydrology / Masters in Geography. He/She should have minimum 10 years professional experience with at least 5 years experience in producing GIS coverage, contour map, Digital Elevation Model. Tasks: • Preparation of Arc view based contour maps of the study area, inundation depth map • Remote sensing analysis for extracting data • Analyze satellite images to find the past accretion and erosion rate • Preparation of project map showing existing and proposed infrastructures • Preparation of maps for workshops and reports Assist the study team
Training Coordinator	He should be minimum post graduate degree with 10 years program coordination experience including implementing of overseas study tours relate task in any project. Tasks: • Contact and make tentative arrangement for overseas study tour with relevant institutions / organizations; • Prepare proposals for each package of study tour and submit the same to the Project Director, for final selection. • Provide the detailed information of the proposed training institutions / organizations which should include their history, facilities for training / trainers, accommodation arrangement and execution facilities, transportation and internal travel facilities; • Organize field oriented and class room based programs as deemed appropriate and coordinate the visit; • Organize travel visa; • Organize air-tickets (in business / economic class as admissible to the participants as per government rules) and confirm flights, departure and arrival. • Organize suitable accommodation; • Provide land transport to and from program venue; • Arrange a full time guide / welfare person during the entire period of overseas tour; • Monitor the study tour and follow-up with the institutions / organizations abroad on progress of assignment on behalf of the Project Director and attend to matters during the continuation of the tour on his behalf;
Jr. Survey Engineer	Bachelor Degree in Civil Engineering/Water Resources Engineering. He should have minimum 8 years professional experience with at least 5 years experience in hydrographic, topographic and hydrometric survey and knowledge on using DGPS, ADCP, hydrpro, Arcview, and other technology like Tearra model for processing surveyed data.

Tasks:

- Preparing detailed specification for all field survey activities
- Supervise the survey activities
- Ensure the quality of the survey
- Guide in processing and analyzing the data
- Preparation of Survey Report

Jr. Design Engineer

Minimum Graduate in Civil / Water Resources Engineering having a minimum of 8 years of professional experience with at least 5 years experience in design hydraulic structures & bank protection works in major rivers. He/She should have experience in the design of bank protection work. Previous experience in similar condition will be preferred.

Tasks:

The Design Specialist shall be responsible for design of the alternative structures suitable for the solutions of the bank protection works. He/she will calculate the cost estimate and compare the alternatives. His/her major responsibilities shall include but not necessarily be limited to the following :

- Design of the alternative structures recommended for the solutions of the protection of bank erosion.
- Preparation of cost estimates 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 solutions
- Preparation of different reports as required for the proposed study
- Maintain liaison with BWDB and other related agencies

Assist in preparation of Final report containing all the requirement of BWDB for the study

Jr. Planning Engineer

Minimum Graduate in Civil / Water Resources Engineering having a minimum of 8 years of professional experience with at least 5 years experience in planning of water Resources Project. Experience of design work for the bank protection of the river Brahmaputra-Jamuna will be preferred. Previous experience in similar condition will also be preferred.

Tasks:

The planning Engineer shall be responsible for planning of the alternative structures suitable for the solutions of the protection of bank erosion. His/her major responsibilities shall include but not necessarily be limited to the following :

- Planning of the alternative structures recommended for the solutions of the drainage and flooding problems
- Comparison of the alternatives and find out the suitable solutions
- Preparation of different reports as required for the proposed study
- Maintain liaison with BWDB and other related agencies
- Assist in preparation of Final report containing all the requirement of BWDB for the study.

AutoCAD Specialist

Graduate in Water Resources/Civil Engineering/Computer science and Technology and 8 years working experienced in Database and upgraded AutoCAD software operation.

Tasks

His/her major responsibilities shall include but not necessarily be limited to:

Knowledge and experience about the status, scenarios and possibility of available data

- Planning and design of database
- Provide technical advice for AutoCAD/Database building
- Design protocol for the work

Develop the database hierarchy, protocol, tools and web portal of the database

Office Engineer

Minimum Graduate in Civil / Water Resources Engineering having a minimum of 10 years of professional experience with at least 5 years experience in Office Engineer/Manager. Previous experience in similar condition will also be preferred.

Tasks

His/her major responsibilities shall include but not necessarily be limited to:

- Reviews daily field data collection reports.
- Assists in identifying deficiencies and the preparation of non-conformance reports.
- Assists in maintaining Project files and recording information in project logs.
- Uses personal computers and other electronic means to input project information into quantity verification and schedule systems to analyze and produce management informational reports.
- Interprets maps, environmental monitoring, land and hydrographic survey data and uses the information in preparation of analysis, reports and maps.
- Performs other responsibilities associated with this position as may be appropriate.

Support Staff

Assessment B1 (Design Consultant)

International Consultant

River Training Engineer (Assignment B (B2))

He/She should have Graduate in Civil/Water Resources Engineering. Higher degree is preferable. He should have specialist in Riverine Engineering/Water Resources Engineering/Hydraulic Engineering. He/ she should have minimum 15 years of overall professional experiences in water resources management out of which at least 5-years experience in river bank erosion protection measures including leading and managing a study team for water resources planning and design, river bank erosion protection management. He/She should have experience in risk assessment, risk management and devising mitigation measures for risk reduction in the riverine area with good construction supervision and construction management back ground. Some experience in bank protection as well as River training works under aided or any other project in Bangladesh will be advantageous.

Tasks:

His/her major responsibilities shall include but not necessarily be limited to the following :

- Formulate strategy for construction supervision and monitoring of the whole project.
- Design, review and monitor project work plans, schedules
- Maintain liaison with BWDB and other related agencies
- Guide and supervise the project team & their activities,
- Comparison of the alternative plans and find out the suitable solutions
- Formulation of implementation and O&M plan
- Guide preparation of different reports as required for the study

Preparation of Final Report satisfying the requirements under the Contract

Design Engineer

Minimum Graduate in Civil / Water Resources Engineering having a minimum of 10 years of professional experience with at least 5 years experience in design hydraulic structures & bank protection works in major rivers. He/She should have experience in the design of bank protection work. Previous experience in similar condition will be preferred.

Tasks:

The Design Specialist shall be responsible for design of the alternative structures suitable for the solutions of the bank protection works. He/she will calculate the cost estimate and compare the alternatives. His/her major responsibilities shall include but not necessarily be limited to the following :

- Design of the alternative structures recommended for the solutions of the protection of bank erosion.
- Preparation of cost estimates 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 solutions
- Preparation of different reports as required for the proposed study
- Maintain liaison with BWDB and other related agencies

Assist in preparation of Final report containing all the requirement of BWDB for the study

Survey Specialist	Bachelor Degree in Civil Engineering/Water Resources Engineering. He should have at least 8 years experience in hydrographic, topographic and hydrometric survey and knowledge on using DGPS, ADCP, hydrpro, Arcview, and other technology like Terra model for processing surveyed data. Tasks: • Preparing detailed specification for all field survey activities • Supervise the survey activities • Ensure the quality of the survey • Guide in processing and analyzing the data Preparation of Survey Report
Morphological Modeler	Masters' degree in Civil / Water Resources Engineering/Riverine Engineering having a minimum of 10 years of professional experience in river engineering practices with at least 5 years experience in hydrodynamic, sediment transport and morphological modeling for riverine area. Previous experience in similar working environment will be preferred Tasks: His/her major responsibilities shall include but not necessarily be limited to the following : • Develop and update the numerical morphological model of the Jamuna River, hindcasting of historical morphological features of the Jamuna River; • Devising option for protective measures by assessing risk and design parameters of BRE; • Analyze the probable erosion mitigation measures, river flow pattern at different location of the Jamuna River. Assess the risk of river erosion considering set back distance of embankment.
Geo-technical Engineer	Bachelor degree in Civil /Geo-technical engineering/Geology having a minimum of 10 years of professional experience with at least 5 years experience in soil-boring and other geological aspects. Tasks: His major responsibilities shall include but not necessarily be limited to the following : • Assess and need based Geo-technical information • Data collection, Quality control, analysis and compilation. • Soil-boring & other geological aspects. • Preparation of different reports as required for the proposed study
Environmental Specialist	Minimum Masters' degree in Science/Environmental Engineering/or Water Resources Engineering/Geography with training on preparing EIA/EMP. He/she should have at least 10 years working experience in Environmental Impact Assessment. Tasks: His/her major responsibilities shall include but not necessarily be limited to: • Prepare an Environmental Assessment and EMP for each package of works under the project. • Assess the baseline environmental condition Assess the potential impacts of the project activity on surrounding environment

Sociologist /Resettlement specialist	Minimum Masters' degree in sociology/ economics/social welfare and any other social sciences. He/she should have at least 10 years working experience in social surveys, preparation of resettlement plans for affected people due to involuntary resettlement, identification of the displaced persons, and assessment of their loss of assets and income. Tasks: His/her major responsibilities shall include but not necessarily be limited to: • Participate in design and carry out social impact assessment of project interventions including market survey and consultation with beneficiaries and affected persons at the field level. • Carry out assessment of affected assets, loss of land and migrated people and project affected persons (PAPs) with the loss of assets, physical displacement and loss of income and livelihoods. • Assist the international consultant in review of relevant GoB laws and participate in review of World Bank guidelines in connection with designing the project policy framework for social impact management and beneficiary participation. • Participate with the international consultant in preparation of Social Impact Management Framework (SIMF) for the program and Social Management Plan (SMP) for the first year construction and subsequent each phase of project design and implementation.
Procurement Specialist	Bachelor degree in Engineering with special training on procurement aspects. He/she should have at least 10 years working experience in procurement goods, services and works, preparing bidding/contract document for infrastructure, following WB and GOB procurement policies and guidelines. Tasks: His/her major responsibilities will be similar to the international Procurement Specialist.
M &E Specialist:	He shall have at least a Graduate in Civil Engineering/Water Resources Engineering with at least 10 years working experience and shall have minimum 5 years of experience in a work of similar nature of project. His tasks and responsibilities shall include but not be limited to the followings: • Monitoring and evaluation of project implementation performance, for development of management information systems to monitor the project performance effectively; • Assessing the impact of the project on the physical other environmental and social aspects, monitoring indicators and establish baseline for the indicators; • Monitoring and supervision of the environment, social, and resettlement action plans; • Monitoring of the river response during implementation of Priority River training/bank protection work in order to suggest for adaptive and corrective measures by evaluating monitoring results; • Preparing required cost estimates for continuous monitoring and evaluation during project implementation and terms of reference for an independent consultancy services for M&E and supervision of EMP and SMP, etc,
Any other short term Specialist	As and when it will be required.

National Consultant

Deputy Team Leader/ Design Engineer

He/She should have graduate in Civil/Water Resources Engineering. Higher degree is preferred He/ she should have 15 years of overall professional experiences in water resources management, including leading and managing a study team for water resources planning and design, drainage, river bank erosion management. He/She should have experience in risk assessment and devising mitigation measures for risk reduction in the riverine area is preferred.

Tasks:

His/her major responsibilities shall include but not necessarily be limited to the following :

- Coordinate all the component of the study
- Review the available reports on damage assessment and study reports in the Jamuna River
- Prepare work plans, schedules
- Maintain liaison with BWDB and other related agencies
- Assist the team leader in guiding and supervising the project team and their activities,
- Devise potential options for river bank erosion management and risk assessment
- Formulation of implementation and O&M plan
- Preparation of inception, progress and other reports
- Preparation of Final Report satisfying all the requirement of BWDB for the study

Geo-technical Engineer

Bachelor degree in Civil /Geo-technical engineering/Geology having a minimum of 10 years of professional experience with at least 5 years experience in soil-boring and other geological aspects.

Tasks:

His major responsibilities shall include but not necessarily be limited to the following :

- Assess and need based Geo-technical information
- Data collection, Quality control, analysis and compilation.
- Soil-boring & other geological aspects.
- Preparation of different reports as required for the proposed study

Environmentalist

Minimum Graduate degree in Science/Environmental Engineering/or Water Resources Engineering/Geography with training on preparing EIA/EMP. He/she should have minimum of 10 years of professional experience with at least 5 years experience in Environmental Impact Assessment.

Tasks:

His/her major responsibilities shall include but not necessarily be limited to:

- Prepare an Environmental Assessment and EMP for each package of works under the project.
- Assess the baseline environmental condition

Assess the potential impacts of the project activity on surrounding environment

Sociologist/
Resettlement specialist

Minimum Bachelor degree in sociology/ economics/social welfare and any other social sciences. He/she should have minimum of 10 years of professional experience with at least 5 years experience in social surveys, preparation of resettlement plans for affected people due to involuntary resettlement, identification of the displaced persons, and assessment of their loss of assets and income.

Tasks:

His/her major responsibilities shall include but not necessarily be limited to:

- Participate in design and carry out social impact assessment of project interventions including market survey and consultation with beneficiaries and affected persons at the field level.
- Carry out assessment of affected assets, loss of land and migrated people and project affected persons (PAPs) with the loss of assets, physical displacement and loss of income and livelihoods.
- Assist the international consultant in review of relevant GoB laws and participate in review of World Bank guidelines in connection with designing the project policy framework for social impact management and beneficiary participation.
- Participate with the international consultant in preparation of Social Impact Management Framework (SIMF) for the program and Social Management Plan (SMP) for the first year construction and subsequent each phase of project design and implementation.

Geographical
Information System
Expert

Minimum B. Sc. Degree in Civil Engineering/Water Resources Engineering/Urban and Rural Planning/Hydrology / Masters in Geography. He/She should have minimum of 10 years of professional experience with at least 5 years experience in producing GIS coverage, contour map, Digital Elevation Model.

Tasks:

- Preparation of Arc view based contour maps of the study area, inundation depth map
- Remote sensing analysis for extracting data
- Analyze satellite images to find the past accretion and erosion rate
- Preparation of project map showing existing and proposed infrastructures
- Preparation of maps for workshops and reports

Assist the study team

Procurement Specialist

Graduate degree in Engineering with special training on procurement aspects. He/she should have minimum of 10 years of professional experience with at least 5 years experience in procurement goods, services and works, preparing bidding/contract document for infrastructure, following WB and GOB procurement policies and guidelines.

Tasks: His/her major responsibilities will be similar to the international Procurement Specialist.

Sr. Estimator Minimum Graduation degree in Civil/Water Resources Engineering having a minimum of 8 years of professional experience with at least 3 years experience in estimating and quantity surveying. Previous experience in similar working environment will be preferred.

Tasks:

His major responsibilities shall include but not necessarily be limited to the following :

- To prepare estimates of infrastructures as designed by Design Engineer.
- To prepare BOQ.

Jr. Planning Engineer Minimum Graduate in Civil / Water Resources Engineering having a minimum of 5 years of professional experience with at least 3 years experience in planning of water Resources Project. Experience of design work for the bank protection of the river Brahmaputra-Jamuna will be preferred.. Previous experience in similar condition will also be preferred.

Tasks:

The planning Engineer shall be responsible for planning of the alternative structures suitable for the solutions of the protection of bank erosion. His/her major responsibilities shall include but not necessarily be limited to the following :

- Planning of the alternative structures recommended for the solutions of the drainage and flooding problems
- Comparison of the alternatives and find out the suitable solutions
- Preparation of different reports as required for the proposed study
- Maintain liaison with BWDB and other related agencies
- Assist in preparation of Final report containing all the requirement of BWDB for the study.

Jr. Design Engineer Minimum Graduate in Civil / Water Resources Engineering having a minimum of 5 years of professional experience with at least 3 years experience in design hydraulic structures & bank protection works in major rivers. He/She should have experience in the design of bank protection work. Previous experience in similar condition will be preferred.

Tasks:

The Design Specialist shall be responsible for design of the alternative structures suitable for the solutions of the bank protection works. He/she will calculate the cost estimate and compare the alternatives. His/her major responsibilities shall include but not necessarily be limited to the following :

- Design of the alternative structures recommended for the solutions of the protection of bank erosion.
- Preparation of cost estimates 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 solutions
- Preparation of different reports as required for the proposed study
- Maintain liaison with BWDB and other related agencies

Assist in preparation of Final report containing all the requirement of BWDB for the study

AutoCAD Specialist Graduate in Water Resources/Civil Engineering/Computer science and Technology and 8 years working experienced in Database and upgraded AutoCAD software operation.

Tasks

His/her major responsibilities shall include but not necessarily be limited to:

Knowledge and experience about the status, scenarios and possibility of available data

- Planning and design of database
- Provide technical advice for AutoCAD/Database building
- Design protocol for the work

Office Engineer

Develop the database hierarchy, protocol, tools and web portal of the database
Minimum Graduate in Civil / Water Resources Engineering having a minimum of 10 years of professional experience with at least 5 years experience in Office Engineer/Manager. Previous experience in similar condition will also be preferred.

Tasks

His/her major responsibilities shall include but not necessarily be limited to:

- Reviews daily field data collection reports.
- Assists in identifying deficiencies and the preparation of non-conformance reports.
- Assists in maintaining Project files and recording information in project logs.
- Uses personal computers and other electronic means to input project information into quantity verification and schedule systems to analyze and produce management informational reports.
- Interprets maps, environmental monitoring, land and hydrographic survey data and uses the information in preparation of analysis, reports and maps.
- Performs other responsibilities associated with this position as may be appropriate.

Any Other Short Term Specialist

As and when it will be required.

Support Staff

Assessment B2 (Supervision Consultant) International Consultant

Team Leader/
River Training Engineer

He/She should have Graduate in Civil/Water Resources Engineering. Higher degree is preferable. He should be specialist in River Engineering/Water Resources Engineering/Hydraulic Engineering. He/ she should have minimum 15 years of overall professional experiences in water resources management out of which at least 5-years experience in river bank erosion protection measures including leading and managing a study team for water resources planning and design, river bank erosion protection management. He/She should have experience in risk assessment, risk management and devising mitigation measures for risk reduction in the riverine area..

Tasks:

His/her major responsibilities shall include but not necessarily be limited to the following :

- Formulate strategy for stabilizing Brahmaputra Right embankment
- Devising erosion protection measures on the basis of changed morphological features, sedimentation & erosion process of the Jamuna River, characteristic of bank line migration
- Prepare project work plans, schedules
- Maintain liaison with BWDB and other related agencies
- Guide and supervise the project team & their activities,
- Comparison of the alternative plans and find out the suitable solutions
- Formulation of implementation and O&M plan
- Guide preparation of different reports as required for the study.
- Preparation of Final Report satisfying the requirements under the Contract.
- Verify necessary documentation for withdrawals from IDA.
- Prepare a monitoring and evaluation plan to supervise construction quality for the civil works.
- Advise, guide and coordinate activities pertaining to the planning, designing and construction of the works.
- Ensure timely submission of progress reports, completion report and other reports as per contract.

Construction Engineer:

He/she shall have at least a Graduate in Civil Engineering/Water Resources Engineering with at least 12 years working experience and shall have minimum 5 years of experience in a work of similar nature of project. His tasks and responsibilities shall include but not be limited to the followings:

- Assist Project Director for Contract administration and management;
- Inspection of construction activities
- Testing of materials on site and off-site testing when needed, if necessary, in-factory testing during manufacturing and inspection of goods and materials
- Review of contractor's submittals, verification of progress and interim payment requests
- Determination of final construction quantities and contract period evaluation
- Preparation of monthly progress reports
- Maintenance of records

- Assist Project Director in Contract/works or goods acceptance and close of contract, issuance of completion certificates, and preparation of documents as required for acceptance of works/goods by the investor (BWDB);
- Preparation of operation, maintenance and management manuals for the facilities constructed under the project
- Assurance for proper demobilization and restoration of the construction sites after Completion of O&M during warranty period by the contractors.
- Handover the completed work to the client.
- Carry out all obligations provided for the Engineer in the Civil Works contracts. In the event of contractual dispute which may result in legal action, adjudication or arbitration between the contractor and the employer, and on the instruction, will collate and prepare factual documentation which describes the circumstances of the dispute, and if required the Consultants would attend hearing.

Quality Control Specialist

He shall have at least a Graduate in Civil Engineering/Water Resources Engineering with at least 10 years working experience and shall have minimum 5 years of experience in a work of similar nature of project. The Quality Control Engineer will be generally responsible for construction supervision, quality control and monitoring of physical works. The tasks of QCS include, but not are limited to the following:

- Provide direction and supervision of the work of the Regional/Sub-Regional Construction Supervision Engineers;
- Undertake pre-work field survey along embankment/river bank protection and submit report to the Project Monitoring Office (PMO);
- Monitor construction activities ensuring that the Consultants field staff are conducting regular spot-checks and that the Works Supervisors are on site and the contractor a capable manager on site;
- Spot-check that proper construction practices and design are being followed;
- Assist the PMO in construction monitoring and quality control, check and certify to final contract bills;
- Sign off on completed structures and verify reimbursement for the final payment can be made;
- Carry out technical audit of the completed works and certify payment for the completed works for reimbursement;
- Spot-check construction works before completion and ensure that the completed works comply with conditions of contract and technical specifications, and
- Assist the Team Leader in performing his responsibilities

Contract Specialist

Graduate degree in Engineering with special training on procurement aspects. He/she should have at least 12 years working experience in procurement goods, services and works, preparing bidding/contract document for infrastructure, following WB and GOB procurement policies and guidelines.

Tasks: His/her major responsibilities will be similar to the international Procurement Specialist.

O & M Specialist:

He shall have at least a Graduate in Civil Engineering/Water Resources Engineering

with at least 12 years working experience and shall have minimum 5 years of experience in a work of similar nature of project. His tasks and responsibilities shall include but not be limited to the followings:

Tasks:

- Estimate O&M requirements of the project facilities over the project life.
- Propose effective institutional arrangements, for ensuring the proper O&M of project facilities, including performance based contracting for O&M, define the role of public and private institutions in O&M of the project facilities and identify training requirements and develop a training program;
- Prepare a detailed O&M manual reflecting the above; and
- Identify equipment, office and other facilities required for O&M of the project facilities.

National Consultant

Deputy Team Leader/
River Engineer

He/She should have graduate in Civil/Water Resources Engineering. Higher degree is preferred He/ she should have 15 years of overall professional experiences in water resources management, including leading and managing a study team for water resources planning and design, drainage, river bank erosion management. He/She should have experience in risk assessment and devising mitigation measures for risk reduction in the riverine area is preferred.

Tasks:

His/her major responsibilities shall include but not necessarily be limited to the following :

- Coordinate all the component of the study
- Review the available reports on Bank protection and study reports in the Jamuna River
- Prepare work plans, schedules
- Maintain liaison with BWDB and other related agencies
- Assist the team leader in guiding and supervising the project team and their activities,
- Devise potential options for river bank erosion management and risk assessment
- Formulation of implementation and O&M plan
- Preparation of inception, progress and other reports
- Assist Team leader Preparation of Final Report satisfying all the requirement of BWDB for the study
- Assist team leader in finalizing Quality Assurance Plan for RBIP works.
- S/He will lead the team of construction supervision engineers and train them if needed for the purpose of quality management including reporting and documentation.
- S/He will mainly focus on assisting the construction quality control engineer in performing his/her assigned tasks.
- establish a quality management system.
- Oversee the functioning the system for construction supervision.

- Assist PD in putting in place a system of effective supervision of construction work carried out by contractors.
- Undertake random spot check of all survey work and submit report to PD.
- Monitor construction activities ensuring that the construction supervisor is on site and the contractor has a capable manager in site, proper construction practices and design are being followed.
- assist PD in construction monitoring and quality control.
- Check works during construction on a periodical basis following quality assurance plan and ensure that the completed works comply with the conditions of contract and technical specifications.
- Check and certify the quantity and the quality for each of the invoices for payment to the contractors.

Sr. Construction Engineer:

He shall have at least a Graduate in Civil Engineering/Water Resources Engineering with at least 12 years working experience and shall have minimum 5 years of experience in a work of similar nature of project. His tasks and responsibilities shall include but not be limited to the followings:

Tasks:

- Assist Engineer for contract administration and management;
- Inspection of construction activities
- Testing of materials on site and off-site testing when needed, if necessary, in-factory testing during manufacturing and inspection of goods and materials
- Review of contractor's submittals, verification of progress and interim payment requests
- Assist Project Director in determination of final construction quantities
- Preparation of monthly progress reports
- Maintenance of records
- Assist Project Director in Contract/works or goods acceptance and close of contract, issuance of completion certificates, and preparation of documents as required for acceptance of works/goods by the investor (BWDB);
- Preparation of operation, maintenance and management manuals for the facilities constructed under the project
- Assurance for proper demobilization and restoration of the construction sites after completion of O&M during warranty period by the contractors

Carry out all obligations provided for the Engineer in the Civil Works contracts. In the event of contractual dispute which may result in legal action, adjudication or arbitration between the contractor and the employer, and on the instruction, will collate and prepare factual documentation which describes the circumstances of the dispute, and if required the Consultants would attend hearings

Sr. Quality Control Specialist

He shall have at least a Graduate in Civil Engineering/Water Resources Engineering with at least 12 years working experience and shall have minimum 5 years of experience in a work of similar nature of project. The Quality Control Engineer will be generally responsible for construction supervision, quality control and monitoring of physical works. The tasks of QCE include, but not are limited to the following:

Tasks:

- Provide direction and supervision of the work of the Regional/Sub-Regional Construction Supervision Engineers;
- Undertake pre-work field survey along embankment/river bank protection and submit report to the Project Monitoring Office (PMO);
- Monitor construction activities ensuring that the Consultants field staff are conducting regular spot-checks and that the Works Supervisors are on site and the contractor a capable manager on site;
- Spot-check that proper construction practices and design are being followed;
- Assist the PMO in construction monitoring and quality control, check and certify to final contract bills;
- Sign off on completed structures and verify reimbursement for the final payment can be made;
- Carry out technical audit of the completed works and certify payment for the completed works for reimbursement;
- Spot-check construction works before completion and ensure that the completed works comply with conditions of contract and technical specifications, and
- Assist the Team Leader in performing his responsibilities

Contract Specialist

Graduate degree in Engineering with special training on procurement aspects. He/she should have minimum of 12 years of professional experience with at least 5 years experience in procurement goods, services and works, preparing bidding/contract document for infrastructure, following WB and GOB procurement policies and guidelines.

Tasks: His/her major responsibilities will be similar to the international Procurement Specialist.

Economist

He/she should have at least Masters' degree in economics with minimum 10 years experience including at least 5 years research experience in economic appraisal of agriculture sector projects. A significant portion of this experience may also include natural resources management, physical and monetary valuation of possible environmental impacts. Higher Degree & experience in relevant field will be preferred

Tasks

The Economist will assist mainly by appraisal of project worthiness in terms of economic viability. His major responsibilities shall include but not necessarily be limited to the following:

- Elaboration of the feasibility level cost estimates, contingency amounts, detailed price escalation estimates on the expected implementation schedule; administration costs and tax and duties shown as separate line items and the method of calculation of these costs
- Estimation of Benefits; the benefits will include profits from extra agriculture production as a result from reduce flood damage and drainage congestion, higher cropping intensities and use of high yielding varieties based on the cropping prepared by agronomist
- Estimates for BCR, EIRR and NPV; benefits and costs of each planning option will be estimated based on the with and without project situation

- Assessment of risk to the projects viability; this will include social risks as well as traditional benefits and implementation schedule assumptions
- Assessment of costs arising out of mitigation measures.
- Conclusion of socio-economic viability of each planning option and the project as a whole

Assist Team Leader in drafting / preparation of reports

O &M Specialist:

He shall have at least a Graduate in Civil Engineering/Water Resources Engineering with at least 12 years working experience and shall have minimum 5 years of experience in a work of similar nature of project. His tasks and responsibilities shall include but not be limited to the followings:

Tasks:

- Estimate O&M requirements of the project facilities over the project life,.
- Propose effective institutional arrangements, for ensuring the proper O&M of project facilities, including performance based contracting for O&M, define the role of public and private institutions in O&M of the project facilities and identify training requirements and develop a training program;
- Prepare a detailed O&M manual reflecting the above; and
- Identify equipment, office and other facilities required for O&M of the project facilities.

Monitoring &Evaluation Specialist

He shall have at least a Graduate in Civil Engineering/Water Resources Engineering with at least 12 years working experience and shall have minimum 5 years of experience in a work of similar nature of project. His tasks and responsibilities shall include but not be limited to the followings:

Tasks:

- Monitoring and evaluation of project implementation performance, for development of management information systems to monitor the project performance effectively;
- Assessing the impact of the project on the physical other environmental and social aspects, monitoring indicators and establish baseline for the indicators;
- Monitoring and supervision of the environment, social, and resettlement action plans;
- Monitoring of the river response during implementation of Priority River training/bank protection work in order to suggest for adaptive and corrective measures by evaluating monitoring results;
- Preparing required cost estimates for continuous monitoring and evaluation during project implementation and terms of reference for an independent consultancy services for M&E and supervision of EMP and SMP, etc,

Quantity Survey

Minimum Graduation degree in Civil/Water Resources Engineering having a

Specialist	minimum of 10 years of professional experience with at least 3 years experience in estimating and quantity surveying. Previous experience in similar working environment will be preferred. Tasks: His major responsibilities shall include but not necessarily be limited to the following : • To prepare estimates of infrastructures as designed by Design Engineer. • To prepare BOQ.
Community Development Specialist	Minimum Masters' in Sociology/Social Science/ Mass or Development Communications. He/She should have at least 15 years experience with at least 5 years experience in informational campaign and development communications. Previous experience in coordinating the study and workshops of development projects will be preferred. Tasks: The People's participation specialist will assist the study mainly by formulating the social impacts and social imbalance (if any) for the proposed intervention as a solution of the drainage problem of the area. His /her major responsibilities shall include but not necessarily be limited to the following: • Field visit for identifying the views of the local peoples, their present socio-economic activities, problems including present land-use patterns in the study areas • Identification of future probable social negative impacts of the project and possible social impact • Consultation with local people about the potential scenarios of drainage improvement
Training Coordinator	He should be minimum post graduate degree with 10 years program coordination experience including implementing of overseas study tours relate task in any project. Tasks: • Contact and make tentative arrangement for overseas study tour with relevant institutions / organizations; • Prepare proposals for each package of study tour and submit the same to the Project Director, for final selection. • Provide the detailed information of the proposed training institutions / organizations which should include their history, facilities for training / trainers, accommodation arrangement and execution facilities, transportation and internal travel facilities; • Organize field oriented and class room based programs as deemed appropriate and coordinate the visit; • Organize travel visa; • Organize air-tickets (in business / economic class as admissible to the participants as per government rules) and confirm flights, departure and arrival. • Organize suitable accommodation; • Provide land transport to and from program venue; • Arrange a full time guide / welfare person during the entire period of overseas tour; • Monitor the study tour and follow-up with the institutions / organizations abroad on

progress of assignment on behalf of the Project Director and attend to matters during the continuation of the tour on his behalf;

Project Management Specialist

Minimum Graduation degree in Civil/Water Resources Engineering having a minimum of 12 years of professional experience with at least 5 years experience in Project Management. Previous experience in similar working environment will be preferred. His tasks and responsibilities shall include but not be limited to the followings:

Tasks:

- Determines appropriate services with clients to define project scope, requirements, and deliverables;
- Develops, modifies, or provides input to project plans;
- Implements project plans to meet objectives;
- Coordinates and integrates project activities;
- Manages, leads, or administers project resources;
- Monitors project activities and resources to mitigate risk;
- Implements or maintains quality assurance processes;
- Makes improvements, solves problems, or takes corrective action when problems arise;
- Gives presentations or briefings on all aspects of the project;
- Participates in phase, milestone, and final project reviews;
- Identifies project documentation requirements or procedures; and
- Develops and implements product release plan.

Mid Level Construction Engineer

He shall have at least a Graduate in Civil Engineering/Water Resources Engineering with at least 12 years working experience and shall have minimum 5 years of experience in a work of similar nature of project. His tasks and responsibilities shall include but not be limited to the followings:

Tasks:

- Inspection of construction activities
- Testing of materials on site and off-site testing when needed, if necessary, in-factory testing during manufacturing and inspection of goods and materials
- Review of contractor's submittals, verification of progress and interim payment requests
- Assist Engineer in determination of final construction quantities
- Preparation of monthly progress reports.

Material Engineer

Minimum Graduation degree in Civil/Water Resources Engineering having a minimum of 12 years of professional experience with at least 5 years experience in Material Engineering. Previous experience in similar working environment will be preferred. His tasks and responsibilities shall include but not be limited to the followings:

Tasks:

- Analyze product failure data and laboratory test results in order to determine causes of problems and develop solutions.
- Conduct or supervise tests on raw materials or finished products in order to ensure their quality.
- Design and direct the testing and/or control of processing procedures.
- Evaluate technical specifications and economic factors relating to process or product design objectives.
- Monitor material performance and evaluate material deterioration.
- Solve problems in a number of engineering fields, such as mechanical, chemical, electrical and civil.
- Supervise production and testing processes in industrial settings such as metal refining facilities, smelting or foundry operations, or non-metallic materials production operations.
- Conduct training sessions on new material products, applications, or manufacturing methods for customers and their employees.
- Design processing plants and equipment.
- Guide technical staff engaged in developing materials for specific uses in projected products or devices.
- Perform managerial functions such as preparing proposals and budgets, analyzing labor costs, and writing reports.
- Plan and evaluate new projects, consulting with other engineers and corporate executives as necessary.
- Replicate the characteristics of materials and their components with computers.
- Supervise the work of technologists, technicians and other engineers and scientists.

Jr. Construction
Engineer:

He/she shall have at least a Graduate in Civil Engineering/Water Resources Engineering with at least 8 years working experience and shall have minimum 5 years of experience in a work of similar nature of project. His tasks and responsibilities shall include but not be limited to the followings:

Tasks:

- Inspection of construction activities
- Testing of materials on site and off-site testing when needed, if necessary, in-factory testing during manufacturing and inspection of goods and materials
- Review of contractor's submittals, verification of progress and interim payment requests
- Determination of final construction quantities and contract period evaluation
- Preparation of monthly progress reports
- Maintenance of records
- Assist Engineer in Contract/works or goods acceptance and close of contract, issuance of completion certificates, and preparation of documents as required for acceptance of works/goods by the investor (BWDB);
- Preparation of operation, maintenance and management manuals for the facilities constructed under the project
- Assurance for proper demobilization and restoration of the construction sites after Completion of O&M during warranty period by the contractors.
- Handover the completed work to the client.

- Carry out all obligations provided for the Engineer in the Civil Works contracts. In the event of contractual dispute which may result in legal action, adjudication or arbitration between the contractor and the employer, and on the instruction, will collate and prepare factual documentation which describes the circumstances of the dispute, and if required the Consultants would attend hearing.

Laboratory Technician Minimum Diploma in Civil/Mining/Chemical Engineering or B.Sc having a minimum of 8 years of professional experience with at least 3 years experience in Laboratory Technician. Previous experience in similar working environment will be preferred. His tasks and responsibilities shall include but not be limited to the followings:

Tasks:

- Experience in relevant laboratory testing preferred;
- Excellent computer skills, especially Word and Excel;
- Familiarity with ASTM test procedures and material handling requirements;
- Familiarity with maintenance and troubleshooting of laboratory test equipment;
- Good written and verbal communication skills;
- Ability to work in a collegial environment;
- Willingness to travel; and,
- Be a team player with strong people skills.

AutoCAD Specialist Graduate in Water Resources/Civil Engineering/Computer science and Technology and 8 years working experienced in Database and upgraded AutoCAD software operation.

Tasks

His/her major responsibilities shall include but not necessarily be limited to:

Knowledge and experience about the status, scenarios and possibility of available data

- Planning and design of database
- Provide technical advice for AutoCAD/Database building
- Design protocol for the work
- Develop the database hierarchy, protocol, tools and web portal of the database

Office Engineer Minimum Graduate in Civil / Water Resources Engineering having a minimum of 8 years of professional experience with at least 5 years experience in Office Engineer/Manager. Previous experience in similar condition will also be preferred.

Tasks

His/her major responsibilities shall include but not necessarily be limited to:

- Reviews daily field data collection reports.
- Assists in identifying deficiencies and the preparation of non-conformance reports.
- Assists in maintaining Project files and recording information in project logs.
- Uses personal computers and other electronic means to input project information into

quantity verification and schedule systems to analyze and produce management informational reports.

- Interprets maps, environmental monitoring, land and hydrographic survey data and uses the information in preparation of analysis, reports and maps.
- Performs other responsibilities associated with this position as may be appropriate.

Any Other Short Term
Specialist
Support Staff

As and when it will be required.