

I. TERMS OF REFERENCE FOR PROJECT MANAGEMENT AND DESIGN CONSULTANTS

A. Background

1. In Bangladesh, agricultural development and sustainable natural resource management are critical for poverty reduction, as the majority of the poor (85%) live in rural areas and depend on agriculture for their livelihood. Agriculture generates 50% of employment, contributes 20% of gross domestic product, and provides a secure food supply for the whole population. Major causes of poverty are recurrent floods and riverbank erosion, as well as drainage congestion, salinity, cyclones and tidal surges, arsenic contamination, over-exploitation of groundwater, chemical and biological contamination of surface water, and drought. Climate change is expected to affect the future incidence and severity of disasters, necessitating more attention to managing disaster risk and adapting to change.

2 Extensive irrigation facilities have been constructed that include privately owned and operated groundwater abstraction technologies, and publicly owned and financed large surface water irrigation schemes.¹ The large irrigation schemes suffer from inefficient water utilization, inadequate maintenance, and a large backlog of needed repairs. More effort is required to foster community participation in sustainable management, and to include women and the private sector. The productivity of these schemes continues to be weakened by inadequate management, operation and maintenance (MOM), and now the infrastructure of most large schemes requires rehabilitation. This weakness is due to inadequate financing,² lack of beneficiary participation in management, and poor service delivery. The present low performance may be aggravated in future by changes in temperature and rainfall patterns owing to climate change. Such risks need to be considered when rehabilitating the infrastructure and modernizing system operations.

3 Government provides distribution systems down to secondary or tertiary levels for 15 existing large irrigation schemes, with a total command area of around 550,000 hectares (ha).³ For the period 1996-98, only about 46% of their net command area was irrigated from BWDB sources in the main irrigation season, and there is little evidence of improvement since then. Increasing the areas irrigated and recovering fees would assist economic growth through increased production and reduced subsidies. Also, developing sustainable approaches for MOM of the existing schemes would provide a sound basis for developing new schemes: the National Water Management Plan (2001) identified an additional 1 million ha that could be irrigated with new surface water schemes in areas where groundwater resources are limited.

4 Enhancing land, water and labour productivity is a high priority under the Government of Bangladesh's (the Government) Sixth Five-Year Plan, FY2011–FY2015.⁴ Robust and well managed irrigation systems are central to boosting productivity and contributing to food security. Agriculture growth is driven by a shift from subsistence rice-based cultivation to commercial high-value agriculture commodities, which is instrumental in advancing rural economic growth and contributing to long-term food security. The Government promotes diversification in

¹ In Bangladesh, large irrigation schemes are classified as be larger than 2,000 hectares.

² Funds provided by Government for maintenance of these schemes is less than 50% of requirement and irrigation service charges collected from end-users amounts to only about 10% of the assessed amount.

³ 2000. National Water Management Plan. Volume No 3: Investment Portfolio. Ref AW001

⁴ Government of Bangladesh, Planning Commission, Ministry of Planning. 2011. Sixth Five-Year Plan: FY2011–FY2015. Dhaka.

agriculture by encouraging private agribusiness as well as providing access and improvements to rural infrastructure. The Government's objectives for surface irrigation are, among others: (i) promote peoples participation in conformity with Integrated Water Resources Management principles; (ii) achieving food security of food grains through ensuring year-round sustainable irrigation; (iii) ensuring climate change resilience; (iv) strengthening and capacity building of water resource institutions; (v) command area development and irrigation expansion; (vi) increase beneficiary participation and, where possible, transfer management to beneficiary organizations, local government and the private sector; (vii) introduction of public-private partnerships (PPPs) to provide support to agriculture and for selected-services; and (viii) provide agricultural extension services including irrigation technology and on-farm water management.

5 Following the completion of the First Command Area Development (CAD-I) Project in 2003, the Government requested the Asian Development Bank (ADB) to provide assistance with preparing a Second Command Area Development Project (CAD-II) aimed at improving the performance of large flood control drainage and irrigation schemes (FCDI) schemes.⁵ During preparation of CAD-II two principal constraints to sustainable performance of major water schemes emerged: (i) limited capacity and resources of public agencies in effective maintenance of public agencies in effective MOM of large irrigation schemes; and (ii) chronic system deterioration as a result of inadequate operation and maintenance planning and financing mechanisms. The CAD-II investment project did not proceed and instead, the ADB supported the Government with capacity development TA 7260-BAN: Developing Innovative Approaches to Management of Major Irrigation Schemes (DIAMMIS).⁶ DIAMMIS investigated the potential for alternative service delivery agreement and management arrangements including using independent entities that would better manage and operate the systems. DIAMMIS developed innovative MOM approaches for the Muhuri Irrigation Project (MIP) based on establishing an independent entity to operate and maintain the scheme.

6 Subsequently, the Government and ADB agreed to a \$150 million multi-tranche financing facility (MFF) to support the \$245.2 million Irrigation Management Improvement Investment Program (IMIIP, the "Program"). IMIIP will improve the management, infrastructure and productivity of the following three large surface irrigation projects ("projects"): (i) MIP in the first tranche; and (ii) the Teesta Irrigation Project (TIP), and Ganges-Kobadak Irrigation Project (GKIP) in the second tranche.⁷ These terms of reference are for engaging an international consulting firm to support design and implementation of the Program as the Project Management and Design Consultant (PMDC).

B. The Overall Program

7 The impact of the Program will be sustained high growth in irrigated agriculture. The Program's outcome will be efficient and sustainable management for large scale irrigation schemes producing higher yields, with expanded irrigated areas, and with a higher cropping intensification including diversification into higher value crops. The Program will be implemented

⁵ ADB. 2005. *Technical Assistance to Bangladesh for Preparing the Second Command Area Development Project*. Manila (ADB TA No. 4740-BAN).

⁶ ADB. 2009. *Technical Assistance to Bangladesh for Developing Innovative Approaches for Management of Major Irrigation Systems*. Manila (ADB TA No. 7260-BAN)

⁷ The Program will directly improve the productivity of about 172,000ha of dry season irrigation (comprising: MIP 17,000ha, TIK 60,000ha and GKIP 95,000ha) and supplementing wet season irrigation to about 451,000ha (comprising: MIP 23,000ha, TIK 286,000ha and GKIP 142,000ha).

over 10 years from 2014 to 2023, with Tranche 1 implemented over five years 2014 to 2018. The Program will have the following three key outputs:

8 Output 1: Performance based irrigation management and agriculture support services are established for 3 large irrigation schemes including: (i) establishing third-party Irrigation Management Operators (IMOs) at each project that will supervise rehabilitation and modernization works and provide long-term sustainable MOM; (ii) establishing efficient management and cost-recovery systems to maximise water use efficiencies and develop sustainable and reliable cost-effective service delivery of irrigation water supply that meets farmer's needs and improves their productivity; (iii) providing agricultural support services through the IMOs that promote efficient water use, crop diversification through sustainable practices, and developing opportunities for more commercial farming or agribusiness; and (iv) assisting with government reforms and institutional strengthening for long-term support of IMOs including: (a) the establishment of a PPP cell within the Bangladesh Water Development Board (BWDB); (b) the establishment of Implementation Coordination Committees (ICCs) for each project that will guide and support the establishment of sustainable and effective management; and (c) assisting with drafting of policy documents to support third-party management of medium and large irrigation schemes including provisions for improving cost recovery.

9 Output 2: Irrigation system infrastructure is rehabilitated and modernized: The Program will rehabilitate and modernize irrigation infrastructure including repair of head and cross regulators, canals, ancillary facilities, flood embankments and associated drainage structures. The prime focus will be to provide more efficient and equitable irrigation distribution systems through appropriate technologies including provision of systems for cost recovery such as pre-paid metering systems, where appropriate.

10 Output 3: The Program is efficiently managed with effective institutional Development including: (i) program management at all levels to ensure the effective and timely delivery of the project outputs, including the highest possible standards of quality control; (ii) planning, feasibility assessment and detailed engineering design for Output 2; and (iii) Undertaking institutional strengthening, enhancing awareness, and providing training of key stakeholders including: (a) working with BWDB, water users associations (WUAs) and local government to redefine their role in the context of a new and changed approach to MOM of the upgraded projects; (b) working with farmers to ensure clear understanding of the new irrigation management strategies including requirements for cost recovery; and (c) training for farmers in irrigation water management for more efficient water use.

C. Implementation Arrangements

11 The Executing Agency for the Program is the Bangladesh Water Development Board (BWDB) in which a Program Management Unit (PMU) will be established and led by the MFF Director (MD). The PMDC will support the PMU and MD. The PMU will manage the implementation of both tranches of the MFF. For each project, the PMU will assign a Project Director (PD) to manage design and implementation works, and manage the Irrigation Management Operator (IMO). Each PD will be supported by a team of planning, design and construction, procurement, accounts and administration staff. A Program Steering Committee (PSC) will be established within the Ministry of Water Resources (MOWR) to provide overall coordination of the Program and facilitate inter-ministerial coordination. The PSC will be chaired by the Secretary, MOWR. The MD will be the PSC's secretary and all concerned ministries and agencies will be represented.

12 Also supporting the PMU will be a new PPP Cell that will provide guidance on tendering, private public partnerships, contract management, negotiating, legal, and communication. BWDB's Monitoring Division will be supported with a new Monitoring Cell that will provide independent verification of the performance of various stakeholders as well as assessing impacts associated with Program's objectives. A Safeguards Desk will also be established to support the Monitoring Division with safeguard compliance management.

13 An Implementation Coordination Committee (ICC) will be established for each project to manage field implementation issues that arise related to conflicts, safeguards, security, and more generally concerns about the performance of the implementing parties. The ICC will be chaired by the project's BWDB Zonal Chief Engineer and committee members will comprise representatives from the offices of the Deputy Commissioner, the Water Users Associations and the IMO.

14 The EA will provide appropriate, furnished and air conditioned offices in Dhaka and two field offices in TIP and GKIP to accommodate the consulting team. The EA will also provide counterpart staff, equipment, maps and other necessary information, if it is available.

D. Purpose of Consulting Services

15 The PMDC will support the PMU over a five year period during Tranche 1. It will: (i) design and support the procurement of the Tranche 1 civil works not included in the advance packages; (ii) prepare feasibility studies, detailed engineering designs, and civil works bid documents for Tranche 2 projects; (iii) support and supervise the Irrigation Management Operators (IMOs); (iv) monitor construction and related activities (construction supervision would be by the IMO); (v) plan and implement training for the PMU on ADB's MFF lending modality, managing public-private partnership (PPP) contracts, and other technical issues as required; and (vi) prepare a review of the performance of the Muhuri IMO and support the development of a PPP pursuant to which the long-term management, operation and maintenance (MOM) for MIP will be transferred to a third-party IMO, including preparation of bidding and contract documents. Immediately following completion of the consulting services the new Program Management Consultant will be engaged to support the PMU during Tranche 2.

E. Scope of Services

16 The PMDC will support implementation of all three outputs and provide the following four main services:

1. Strengthened Program Management

17 The consultant will provide overall support to the PMU to ensure the effective and timely delivery of the program work including:

- (i) Working with the MD and PDs to identify the project management needs, planning, strategies and schedules for execution.
- (ii) The design and establishment of a project performance management system (PPMS) that will allow the PMU to monitor and evaluate implementation of the project, identify performance constraints, and formulate and implement practical measures to address shortcomings. Annual performance evaluations will be carried out based on assessment of the projects. Outputs of the PPMS will be supplied to the PSC and ADB.

- (iii) Establish a project financial management and accounting system within the PMU.
- (iv) Facilitating the PSC establishment and preparation of briefing materials on progress and issues.
- (v) Develop the projects through participative and integrated planning and management.
- (vi) Assisting the PMU and the PSC prepare the periodic financing request (PFR) for Tranche 2.
- (vii) Ensuring the implementation schedules reflect the envisaged integrated approach with phasing of all the inter-related activities.
- (viii) Assisting the PMU to manage the program implementation schedule including giving special attention to items on the critical path, and ensuring these are given particular attention. Assisting with project administration, performance and monitoring and preparation of project reports.
- (ix) Assisting the PMU with preparing tender documents and support the tender processes for the construction/rehabilitation programs as well as the procurement of IMOs.⁸

2. Rehabilitation and Modernization of Large Irrigation Projects

18 Improving the sustainability and productivity of large irrigation schemes under the Program will include: preparing feasibility studies, detailed engineering designs and bid documents as summarised below:

- (i) Undertake system assessments for TIP and GKIP to identify the strengths, weaknesses, opportunities and constraints for improving their productivity.
- (ii) Identify outstanding infrastructure investments required at MIP.
- (iii) For the above, prepare feasibility studies including sustainable MOM strategies, preliminary costs, safeguard assessments, and economic and financial assessments. These will be presented to the PSC and PMU for approval.
- (iv) Prepare detailed engineering designs, engineering cost estimates and specifications of agreed improvement works along with civil works contract bidding documents.
- (v) Assist the PMU with the bidding and procurement process to verify compliance, transparency of bidding as well as ensure the quality and price selection parameters.
- (vi) Identify and organize the implementation of supporting technical, management, institutional and social studies as required for all projects under Tranches 1 and 2.

3. Support Improved Irrigation Management of Large Irrigation Projects

19 The MOM of IMIIP projects will be assigned to third-party IMOs initially through five-year fixed-term performance-based management contracts. During this period, the PMU, the IMOs and the Implementation Coordination Committee established for an IMIIP Project ("ICC") shall jointly undertake a public consultation program to understand the service delivery requirements of the beneficiaries of that IMIIP Project. Following such consultation program, the PMU, the

⁸ IMOs would be selected and contracted based on their capacities and skills to deliver key outputs, keeping the water tariff at a reasonable and acceptable level for the water users.

IMO and the ICC shall collaborate with PMDC to develop a PPP pursuant to which the long-term management, operation and maintenance (MOM) for MIP will be transferred to a third-party IMO. In undertaking this task, the PMDC will:

- (i) Build capacity of the PMU to monitor IMO management contracts.
- (ii) Together with the IMO, provide support for the public consultation program and, more generally, for communication to assist the transition processes and ensure stakeholder understanding and support.
- (iii) Support the establishment of a PPP Cell within BWDB to monitor and manage the PPP contracts.
- (iv) Support the establishment of ICCs for each project.
- (v) Prepare reservoir operating guidelines for MIP in agreement with BWDB and Muhuri IMO
- (vi) Assist PMU with evaluating the performance of MIP's first-term IMO.
- (vii) Assist the PMU with development of a 2nd stage public-private partnership modality, suitable for the irrigation scheme concerned, that (a) allocates risks and responsibilities among the stakeholders in the irrigation scheme in accordance with sound international practice; and (b) includes a transparent, objective and comprehensive water service tariff regulation mechanism that is aimed at cost recovery and provides for a reasonable return on equity for the IMO concerned in accordance with sound international practice.
- (viii) Assist PMU with the preparation of the contract and bidding documents and conduct of the bidding procedures pursuant to which the PPP will be tendered.
- (ix) Develop, prepare and support the endorsement of guidelines to support the long-term delegation of MOM activities for large irrigation projects to private sector operators including strategies for cost recovery.

4. Institutional Development Awareness and Training

20 The PMDC will provide support for a broad program of institutional development as well as informal and formal training of key stakeholders. The tasks will include:

- (i) Prepare an institutional review and assessment of the capacities and needs for sustainable MOM of large irrigation projects.
- (ii) Undertake training and resource needs assessments for the Government, WUAs and other organizations to manage and support IMOs achieve sustain MOM of large irrigation schemes. This applies to all relevant institutions at Central, District, Upazilla and community levels.
- (iii) Prepare a detailed training plan, schedule and budget for training to be implemented under the Program.
- (iv) Working with the PMU and the IMO for each project, develop and implement the training program, including programming, scheduling and implementation of the training, institutional development and awareness programs.

F. Consulting Services

21 The Program Management and Design Consultancy will be for a period of five years to be provided during Tranche-1 implementation. Recruitment will be undertaken in accordance with ADB's *Procurement Guidelines* (2013, as amended from time to time)⁹ and ADB's

⁹ Available at: <http://www.adb.org/Documents/Guidelines/Procurement/Guidelines-Procurement.pdf>

Guidelines on the Use of Consultants (2013, as amended from time to time).¹⁰ Firms will be recruited using quality and cost-based selection with a 90:10 quality to cost ratio. This ratio is justified as the priorities for the PMBC are high quality outputs including designing and preparing innovative and modern infrastructure and management improvements for TIP and GKIP. A full technical proposal will also be required. The total international input will be for 84 person-months (pm) and 498 pm for national consultants. The overall requirement is 582 pm. Outline terms of reference for individual PMDC specialists are given below and a summary of specialist inputs is shown in Table 1.

Table1: Summary of consulting services inputs

Position	Person-Months	
	International	National
Irrigation Management Specialist / Team Leader	34	
Irrigation Specialist / Deputy Team Leader		53
Irrigation Planning and Design Engineer(s)	15	50
Irrigated Agricultural Specialist	6	21
Irrigation Design Engineer(s)		84
Junior Irrigation Design Engineers		168
Mechanical and Electrical Engineer		4
Hydrologist	2	4
Hydro-geologist	2	
Groundwater Modeller		22
River Morphologist	1	
Agricultural Economist	4	8
Public-Private Partnership Transaction Specialist	8	
Commercial Lawyer		3
Participatory Irrigation Management Specialists		56
Procurement Specialist	3	6
Financial Specialist	3	
Resettlement and Social Development Specialist	2	
Resettlement Specialist		10
Gender and Social Development Specialist		6
Environmental Safeguard Specialist	2	6
Communications Specialist	2	
Overall Total	84	498

G. International Consultants (total: 97 person-months [p-m])

a. Irrigation Management Specialist / Team Leader (34 p-m)

22 The Irrigation Management Specialist / Team Leader will be required to work closely with PMU and will be responsible overall management of the consulting team to achieve the Program's outputs including providing the four main services described above. The specialist will have a Master's degree in water resource management or equivalent, or a related field, and will have at least 20 years of technical project experience with at least 5 of those years leading the implementation of the projects. Experience of working in irrigation and water resources development in South Asia on major irrigation systems is highly desirable. The specialist will be responsible for:

¹⁰ Available at: <http://www.adb.org/Documents/Guidelines/Consulting/Guidelines-Consultants.pdf>

- (i) Overall direction of the TA team, coordination of inputs, and management of individual specialists.
- (ii) Ensuring the timely progress of the project implementation including planning, design, construction and institutional development.
- (iii) Ensuring timely delivery of all TA outputs as listed under Table 4 including the various progress reports.
- (iv) To support the necessary approval processes of deliverables including BWDB, ADB and stakeholders.
- (v) Guide the management and coordination with the government, and other stakeholders including the facilitation of regular management dialogue between the EA, other associated agencies and stakeholders at central and project levels.
- (vi) Support the establishment and guide the activities of the Project Management Unit (PMU), the Implementation Coordination Committees (ICC), the PPP Cell, the Safeguards Cell and other proposed institutional arrangements.
- (vii) Support the development of the PPP models for irrigation management including maintaining close liaison with the Muhuri IMO, and defining the roles for the proposed management operators for the Tranche 2 projects.
- (viii) Lead policy dialogue with the Government and support the development of the sector roadmap including refining the policy frameworks and overall MFF investment strategies and plans.
- (ix) Support the PMU in the liaison and coordination and supervision of the Muhuri IMO including the implementation of the Muhuri Management Review.
- (x) Support the Irrigation Planning and Design Engineer to assess the feasibility and prepare the detailed engineering designs for Tranche 2 irrigation scheme modernization.
- (xi) Undertake a review of other large irrigation schemes and outline tailored infrastructure modernization and management models incorporating early lessons learnt from Project 1.

b. Irrigation Planning and Design Engineer (15 p-m)

23 The Irrigation Planning and Design Engineer will be responsible for the overall preparation of feasibility studies and the detailed engineering design for the Tranche 2 projects. The Engineer will have at least a Master's degree in Civil Engineering, be a chartered, professional engineer, and have at least 15 years of experience in planning and designing irrigation schemes, preferably in South Asia or other geographically similarly regions. The Engineer's tasks will include:

- (i) Reviewing previous studies and understand the current norms for irrigation planning and design in Bangladesh and within the region.
- (ii) Leading and supporting the design team with: (a) assessing cropping and water use patterns; (b) review of the current water use, water allocations and water use efficiencies for surface and groundwater; (c) prepare water balances for the current water and cropping systems including surface and groundwater; (d) develop strategies to increase the water use efficiencies through modernised water management systems and infrastructure, reduction of losses, improved water allocations, and scheduling of planting; (e) develop water balances for alternative future investment and management options; and (f) assess the investment costs and management implications.

- (iii) Leading the preparation of feasibility studies and detailed designs, including working with the team to prepare the engineering cost estimates, and economic and financial appraisals.
- (iv) Preparing and managing the trial survey of using remote sensing / satellite imagery to: (a) support activities of the PMDC; (b) define water use by surface and groundwater; (c) benchmark key irrigation production and management performance indicators; and (d) assess continued use of remote sensing to assist scheme operation and facilitate improving productivity of water (POW) and water conservation at the scheme level, including its financial viability.
- (v) Compiling the technical aspects of the feasibility studies for the Tranche 2 projects including the investment and management interventions to improve the sustainability and efficiency of the Teesta and GK schemes.

c. Irrigated Agriculture Specialist (6 p-m)

24 The Irrigated Agriculture Specialist will have at least a Master's degree in agricultural sciences (preferably agronomy) or related subjects, with at least 15 years of experience of planning and implementing agriculture programmes, preferably within South Asia or other geographically similar regions. The Specialist will:

- (i) Engage with farmers and stakeholders to identify the main constraints to crop production in TIP and GKIP.
- (ii) Assess the scope and capacities of the existing agricultural extension services and other related organizations working in the project area. Identify gaps and possible areas of support from the project.
- (iii) Review the requirements and propose strategies for increasing agricultural productivity, increasing POW, improving farm water application efficiencies and overall scheme efficiencies, reducing water use, and assessing potentials and strategies for crop diversification for TIP and GKIP. The review will assess the irrigation needs for the main boro crop as well as supplementary irrigation during other seasons.
- (iv) From lessons learnt from MIP and other international projects, assess how new initiatives for modern irrigated agriculture could be applied in TIP and GKIP. Liaise and support the planning and implementation of the agricultural support pilots for MIP.
- (v) Identify the key requirements for efficient irrigation to meet the needs of crop productivity including: timely water availabilities, crop diversification, scheduling of planting, reduced water use. Discuss with stakeholders to identify irrigation management strategies to help meet requirements to meet targets for increased productivity.
- (vi) Work with the other specialists to develop strategies for investment and management of TIP and GKIP, and show how these strategies can incorporate the requirements and help meet the needs and full potentials of irrigated agriculture.
- (vii) Develop a plan and costs for agricultural support services to be implemented by the IMO's for TIP and GKIP. The plan should build on the existing agriculture extension and support programmes within those areas.

d. Irrigation Design Engineer (15 p-m)

25 The Irrigation Design Engineer will have at least a Degree in Civil Engineering, or an equivalent qualification, with at least 15 years of irrigation design and implementation experience, preferably on large irrigation schemes within South Asia or other geographically similar regions. The Engineer will support the Irrigation Planning and Design Engineer with leading the preparation of the feasibility studies and detailed engineering designs for the Tranche 2 projects. Specific tasks will include:

- (i) Review the original design standards of TIP and GKIP, the current state of the schemes, and identify key areas for attention.
- (ii) Develop design proposals for the modernization of the two projects with the objectives of: (a) improving equity of water availability for each farmer; (b) overall scheme efficiencies; and (c) conserving overall water use.
- (iii) Working with the other specialists develop proposals for adjustments changes in the design standards incorporating international best practices for canal design, structure design, gate and measurement facilities.
- (iv) Develop the design criteria for the rehabilitation and modernization of the projects. Present the criteria to the BWDB and obtain theirs and other necessary government approvals.
- (v) Plan, prepare and manage all necessary surveys and investigations for the design for rehabilitation and modernization of infrastructure including surveys, geotechnical investigations, and structural analysis.
- (vi) With the hydrologists, prepare reservoir management operating guidelines for the Muhuri reservoir including planning and preparing the detailed engineering designs of flow and reservoir monitoring system for MIP.
- (vii) Identify outstanding infrastructure investments required for MIP to be implemented under Tranche 2 and, with support from the design team, prepare feasibility studies, detailed engineering designs, cost estimates, and specifications.
- (viii) Prepare design systems and standards to ensure consistency throughout all outputs from the design teams.
- (ix) Work with the procurement specialist and design team to prepare civil works packages, prepare bidding documents and assist BWDB to evaluate and award contracts.
- (x) Supervise the national design engineers.

e. Hydrologist (2 p-m)

26 The Hydrologist will be responsible for the assessment of surface water availability and leading the assessment of crop water requirements for the MIP and the Tranche 2 projects. The specialist will have at least a Master's degree in Earth Sciences or equivalent, with at least 15 years of experience in assessing and modelling meteorological and hydrological regimes, preferably in South Asia. Ideally the specialist will have direct experience and practical knowledge of the hydrological regimes within the Ganges and Teesta Rivers, and their respective international water sharing agreements. The main tasks of the specialist are:

- (i) Compile and analyse rainfall and river flow information for all three projects.
- (ii) Review and assess current and future international water sharing agreements, previous hydrological studies, and assessments of upstream water use.

- (iii) Assess the quality of all hydro-meteorological data and identify the needs for improving to support planned water and scheme management arrangements of the projects.
- (iv) Review recently prepared local climate change studies and assess how they will impact on future water availability and crop water requirements, with support from the Agricultural Specialists.
- (v) Using best practices, estimate average, reliable and extreme statistics for seasonal water resource availability. Assess the probability of various dry season flood events including the maximum and average flow and the period of flow.
- (vi) With the Agricultural Specialists, assess the present and future water demands at the field level and scheme level including assessments of the losses, using FAO Cropwat 8 (or other approved) and other assessment tools, based on the current and planned cropping information.
- (vii) Prepare a comparative assessment of the theoretical current crop water requirements with actual water use over the last five years.
- (viii) Assess the potential role of tubewells to support water deficits in coordination with the Hydro-geologist and Groundwater Modeller.
- (ix) Compile long-term records for water level and gate operations at the Feni Regulator to assess the water balance of the Muhuri Reservoir. If necessary use appropriate hydraulic formula to calculate water passing through and over the regulator taking note of the times, duration and numbers of gates open.
- (x) Within MIP assess the potential additional storage that could be obtained in each khal by provision of (minor) regulator gates inside the khal. These minor storage regulators would be located to provide higher level storage than the Feni regulator through conservation of small flood flows during the boro season. Assess the potential future irrigable area of the Muhuri scheme from surface water.

f. Hydro-geologist (2 p-m)

27 The Hydro-geologist will have at least a Master's degree in Earth Sciences, or equivalent, and have 15 years of experience in assessing, modelling, and developing groundwater resources, preferably with working experience of the lower Ganges Plains. The specialist will be responsible for the assessment and development of strategies for the conjunctive use of surface and groundwater at TIP and GKIP. Specific tasks will include:

- (i) Review existing geological and hydro-geological information and groundwater studies relating to hydrogeology.
- (ii) Check the conditions in the field to assess typical yields from tubewells, water quality and possible issues.
- (iii) Define the requirements for feasibility level studies including data collection and groundwater modelling to assess sustainable levels of groundwater withdrawals.
- (iv) Prepare proposal for groundwater modelling and assessment and work with the national Groundwater Modeller to implement the groundwater studies including the development of groundwater models.
- (v) Assess the current recharge to the aquifers and identify the contribution from irrigation. Assess the potentials to improve the recharge through surface water management and other methods.
- (vi) Prepare an interpretation of the models and, in collaboration with the other specialists, prepare a development strategy for conjunctive surface and groundwater management.

g. River Morphologist (1 p-m)

28 The River Morphologist will have at least a Master's degree in Earth Sciences, or equivalent, with at least 15 years of experience of studying fluvial morphology and assessing, modelling and designing river revetment projects. Preferably the specialist will have working knowledge of the fluvial morphology of the Padma River. The tasks of the specialist will include:

- (i) Compiling information on previous morphological studies and archived aerial/satellite imagery of the Teesta and Padma River, particularly in the vicinity of the intakes to the TIP and GKIP, and assess long-term period changes in the river's thalweg and likely drivers for the changes.
- (ii) Assess the general river morphology of the Teesta and Padma Rivers and identify fluvial issues affecting the intakes of TIP and GKIP.
- (iii) Prepare an assessment report of the requirements for investment in river works, assessment of OM requirements and other management measures.
- (iv) Identify the requirements for further investigations.
- (v) Prepare preliminary designs for possible river investments.

h. Agricultural Economist (4 p-m)

29 The Agricultural Economist will have at a least of Master's degree in Agriculture or Economics with at least 15 years of experience of undertaking economic appraisals in the agricultural sector, preferably with experience of working in South Asia or similar geographical regions. Specific tasks for the specialist include:

- (i) Prepare detailed cost tables and investment plan for Tranche 2.
- (ii) Analyse the current and future farm budgets for the Tranche 2 projects.
- (iii) Review project benefits and undertake economic appraisals for the Tranche 2 projects including estimated cash flows and economic internal rate of returns, in accordance with ADB's Guidelines for the Economic Analysis of Projects (1997).
- (iv) Identify the economic and financial risks associated with the projects and carry out sensitivity and risk analyses.
- (v) With the support of the Social Specialists, identify the beneficiaries and undertake a distribution analysis of project benefits and a poverty impact analysis of the projects consistent with ADB guidelines.

i. Public Private Partnership Transaction Specialist (6 p-m)

30 The Public Private Partnership Transaction Specialist will have at least a Master's degree in law or finance, with at least 15 years of experience in planning and implementing PPP transactions generally, and at least [] years of experience in planning and implementing PPP transactions in the water sector specifically. The specialist will:

- (i) Support the establishment and provide guidance to the new PPP Cell within the PMU.
- (ii) Engage with the stakeholders to identify the key issues, causes and identify potential opportunities to improve the irrigation management systems generally and the Muhuri MIP and the tranche 2 project specifically.
- (iii) Review the performance of the Muhuri IMO and the findings of the public consultation program for service delivery standards of the Muhuri MIP and assist

in the development of a PPP pursuant to which the long-term management, operation and maintenance (MOM) for MIP will be transferred to a third-party IMO, including preparation of bidding and contract documents and support for the conduct of the bidding process.

- (iv) Carry out a review of the current management arrangements of the Teesta and the GK schemes and identify how lessons learnt from Muhuri could be applied to the planned IMO's for Tranche 2 projects.
- (v) Support the team leader and other members of the team in the design of the institutional management arrangements and the management contract for the Tranche 2 projects as well the necessary the necessary institutional linkages
- (vi) Prepare a training needs assessment programme and prepare an overall training, awareness and communication plan to: (a) support institutionalisation .of PPP management of large irrigation schemes within MOWR and BWDB; and (b) raise BWDB's awareness and knowledge of managing modernized irrigation schemes as proposed under IMIIP.
- (vii) Support the national Institutional Specialists to implement the needs assessment, training and awareness program.

j. Procurement Specialist (3 p-m)

31 The Procurement Specialist will have at least a Degree in Civil Engineering or equivalent, with at least 15 years of experience on similar development projects in Asia, preferably South Asia, and should have demonstrated experience with procurement processes for externally financed projects, mainly those funded by ADB or World Bank. The specialist's main tasks include:

- (i) Assist PMU with procurement of Tranche 1 outstanding contracts, review their progress, recommend adjustments, and identify lessons learnt that can be applied to procurement under Tranche 2.
- (ii) Undertake capacity assessment of the EA and PMU to assess what requirements are required for the procurement activities and what supplementary personnel and resources need to be provided
- (iii) Together with the Team Leader and the national Procurement Specialist, prepare of a procurement plan for Tranche 2 incorporating the procurement requirements for the various works packages and engagement of private sector IMOs.
- (iv) Carry out an examination of the national and/or international market capacity in the relevant sectors and recommend technically and economically sound procurement packaging.
- (v) With the national Procurement Specialist, prepare tender documents for civil works and consultancies to be contracted through advance contracting or during project start-up phase, in accordance with ADB's Guidelines on the Use of Consultants and ADB's Guidelines on Procurement.
- (vi) Advise on procurement strategies in accordance with the Government's and ADB's procurement guidelines and identify areas of discrepancy between the two if any; advise on appropriate procurement for PPP projects;
- (vii) Advise on the timelines for procurement and develop strategies to ensure the optimum phasing of the start up of the various packages.
- (viii) Work with the national Procurement specialist and the EA to prepare and review the necessary procurement notices.

- (ix) Assist the PMU prepare the procurement documents for the Muhuri Stage 2 lease contract IMO.
- (x) The specialist will also provide specific actions for integrity, ease of fund flow, and transparency.

k. Financial Specialist (3 p-m)

32 The Financial Consultant will have, at minimum, an advanced degree in accounting, or equivalent, with at least 15 years of experience in undertaking financial evaluations of commercial entities. The tasks of the Specialist are:

- (i) Support the EA and PMU in establishing and using proper project financial management and accounting systems to support financial management of the Program and adopting the financial management improvement proposed in the FAM
- (ii) Support the PPP expert in assessing the financial viability of the irrigation scheme to be placed under PPP. Including:
 - (a) Development of the financial model for the PPP transaction models : the model will have to provide results such as:
 - Simulating the distribution of public and private sector funding (and, if applicable, user funding if the users are required to make a contribution to investment funding),
 - Measuring the consequences for the price that has to be charged to the users for the water.
 - Review farmers willingness to pay the irrigation fee (including higher fee) and design/supervise necessary additional surveys as per requirement
 - (b) The financial model will be built with:
 - Estimate of CAPEX (capital expenditures) in constant and current prices,
 - Estimate of Operation and Maintenance costs (staff, energy, maintenance, renewals, etc.),
 - Estimate of volume of water to be sold by the private operator (based on water requirements and efficiency of the irrigation system),
 - Definition of main assumptions like: minimum Internal rate of Return for private operator, exchange rate, inflation, insurance, financial interests, taxes, dividends, depreciation of assets, etc.
 - To build his model the financial expert will have to receive support from the irrigation expert to provide CAPEX and O&M costs, volume of water to be sold by the private operator, etc

I. Resettlement and Social Development Specialist (2 p-m)

33 The Resettlement and Social Development Specialist will have at least a degree in social sciences with at least 10 years of experience undertaking similar assignments, preferably in South Asian countries. The specialist will work closely with the national safeguards and social development specialists to assess and incorporate adequate and workable measures to ensure the needs of resettlement and social development are properly provided for. Other main tasks will include:

- (i) Design, commission, and supervise the implementation of appropriate socio-economic surveys on selected sample subprojects selected for the project and provide inputs for the preparation of the project, safeguard documents, summary poverty reduction and social strategy (SPRSS) and the gender action plan (GAP).
- (ii) Update the resettlement framework, if necessary, for Project 2 according to ADB's Safeguard Policy Statement (2009).
- (iii) Prepare subproject safeguards assessments that include resettlement plans.
- (iv) Draw lessons to be learned from comparable projects and propose practical and implementable options for improvement in resettlement implementation.
- (v) Prepare BWDB's capacity assessment and involuntary resettlement training program if gaps are identified.
- (vi) Assist BWDB in: (a) identifying the affected persons and the impact of the project; (b) making a detailed inventory of assets for compensation; (c) making swift payments, along with other relevant agencies; and (d) keeping detailed records of progress on resettlement.
- (vii) Provide or organize training program or other support for income restoration.
- (viii) Plan and implement consultations with the affected people in accordance with the participation plan.

m. Environmental Safeguards Specialist (2 p-m)

34 The Environment Specialist will have at least a Master's degree in environmental sciences, environmental engineering, or similar, and have at least 10 years of experience undertaking similar assignments, preferably in South Asia. The main tasks of the specialist will be:

- (i) Taking the lead in preparing the environmental assessments for Tranche 2 to meet ADB's and GOB's environmental safeguard requirements.
- (ii) Supporting the national environmental consultant in: (a) training and capacity building of BWDB staff on environmental management, supervision, reporting and monitoring of implementation of environmental management plans (EMP); and (b) orienting contractors on implementation of EMP.
- (iii) Guiding BWDB on reporting requirements on environmental monitoring to ADB and BWDB.
- (iv) Recommending any corrective actions on any unforeseen environmental impacts.

n. Communications Specialist (2 p-m)

35 The Communications Specialist will have master degree in communication or equivalent with at least 10 years successful experience in development communication. The main task will consist in supporting the implementation of the participation and communication plan of the program.

- (i) Review and improve the program communication and participation plan objectives, proposed approach and deliverables
- (ii) Identify Media, NGOs or other communications agencies that can efficiently support the project communications
- (iii) Supervise the preparation of the project communications campaigns and communications materials

- (iv) Supervise the design of the project website
- (v) Train PMU communication specialists

H. National Consultants (total: 498 p-m)

a. Deputy Team Leader / Irrigation Specialist (53 p-m)

36 The Deputy Team Leader / Irrigation Specialist will support the Team Leader with overall management duties of the team, help lead the design process, and liaise with the main government and project stakeholders. The specialist will have at least a Master's in Civil Engineering or Agricultural Sciences, with at least 15 years of experience in preparing and implementing irrigation projects. Preferably the specialist will have previously co-led international donor-funded development projects. The main tasks of the specialist will be:

- (i) Support the Team Leader in managing the overall assignment and be responsible for the national consultants' outputs.
- (ii) Collect and compile all relevant studies including designs, drawings, survey information and data for all projects under Tranches 1 and 2.
- (iii) To support the timely submission of the deliverables.
- (iv) To support the necessary approval processes of deliverables including BWDB, ADB and stakeholders.
- (v) Work closely with the Team Leader to guide the management and coordination with the government, and other stakeholders including the facilitation of regular management dialogue between the EA, other associated agencies and stakeholders at central and project levels.
- (vi) Support the establishment and guide the activities of the Project Management Unit (PMU), the Implementation Coordination Committees (ICC), the PPP Cell, the Safeguards Cell and other proposed institutional arrangements.
- (vii) Lead policy dialogue with the Government and support the development of the sector roadmap including refining the policy frameworks and overall MFF investment strategies and plans.
- (viii) Support the PMU in the liaising, coordinating and supervising the Muhuri IMO including supporting the implementation of the Muhuri Management Review.
- (ix) Support irrigation scheme modernization analyses, and review technical design outputs and costing estimates.

b. Irrigation Planning Engineers (2 positions, total 50 p-m)

37 The Irrigation Planning Engineers will have at least civil engineering degrees, or equivalent, and have at least 15 years of relevant experience. The engineer's will work closely with the international Irrigation Planning and Design Engineer to support the overall planning and preparation of feasibility studies and detail designs. Their tasks will include:

- (i) Collect and compile all relevant data for the project.
- (ii) Review of previous studies and current norms for irrigation planning and design.
- (iii) Assess current patterns of water use and cropping including the application of satellite imagery to define water use by surface and groundwater.
- (iv) Support the international Hydrologist with assessing crop water requirements.
- (v) Work with other specialists to develop a review of the current water use, water allocations and water use efficiencies for surface and groundwater.

- (vi) Prepare a water balance for the current water and cropping systems including surface and groundwater.
- (vii) Working with the various specialists to develop strategies to increase the water use efficiencies through reduction of losses, improved water allocations, scheduling of planting.
- (viii) Develop water balances for alternative future investment and management options. Assess the investment costs and management implications.
- (ix) Compile the technical aspects of the feasibility studies for the Tranche 2 projects including the investment and management interventions to improve the sustainability and efficiency of TIP and GKIP.
- (x) Prepare specific water management guidelines for TIP and GKIP to guide the respective IMOs on improved water management systems and procedures accounting for investment works implemented under Tranche 2.

c. Irrigated Agriculture Specialists (19 p-m)

38 The Irrigated Agriculture Specialists will have at least advanced degrees in agricultural sciences and at least 15 years of experience in working on similar projects. The specialist's will closely with the international specialist including:

- (i) Undertaking rural appraisal and engaging with farmers in TIP and GKIP to identify the main constraints to their crop productions.
- (ii) Assess the scope and capacities of existing agricultural extension services and other related organizations working in the project areas. Identify gaps and possible areas of support under Tranche 2.
- (iii) Review the requirements and propose strategies for increasing agricultural productivity, reducing water use and assessing potentials and strategies for crop diversification for TIP and GKIP. The review will assess the irrigation needs for the main boro crop as well as supplementary irrigation during other seasons for all crop types and varieties.
- (iv) Review progress and lessons learned from MIP and other projects internationally and assess how these could be applied in TIP and GKIP. Liaise and support the planning and implementation of agricultural support pilots for MIP.
- (v) Identify the key requirements for efficient irrigation to meet the needs of crop productivity including: timely water availabilities, crop diversification, scheduling of planting, reduced water use. Discuss with stakeholders and to identify irrigation management strategies to help meet requirements to meet targets for increased productivity.
- (vi) Work with other specialists to develop strategies for investment and management of TIP and GKIP, and show how these can incorporate the requirements and meet the full potential needs of irrigated agriculture.
- (vii) Develop a plan and costs for agricultural support services to be implemented by the Irrigation Management Operators for Teesta and GK projects. The plan should build on the existing agriculture extension and support.

d. Irrigation Design Engineers (4 positions, total 84 p-m)

39 The Irrigation Design Engineers will have civil engineering degrees, or equivalent, at least 10 years of experience designing irrigation schemes and similar hydraulic structures, and practical experience of using AutoCAD design software. They will support the senior international and national irrigation design engineers. Their main tasks will include:

- (i) Review the original design standards of TIP and GKIP, the current status of the schemes.
- (ii) With the other specialists, develop proposals for adjustments changes in the design standards incorporating international best practices for modernizing canal designs, hydraulic structure designs, gate systems, and measurement facilities.
- (iii) Develop the design criteria for the rehabilitation and modernization of the projects. Present the criteria to the BWDB and obtain their and other government agency's approvals.
- (iv) Plan the necessary surveys and investigations for the design for rehabilitation and modernization including remote sensing surveys, topographical surveys, geotechnical investigations, and structural condition assessments.
- (v) Assess the potential for conjunctive use of groundwater in TIP and GKIP and prepare structural and water management proposals that can integrate tubewells into the existing system layouts.
- (vi) Prepare the feasibility studies, detailed engineering designs, bill of quantities, engineering cost estimates and specifications for rehabilitation and modernization of TIP and GKIP.

e. Participatory Irrigation Management Specialists (2 positions, 56 p-m)

40 The Participatory Irrigation Management Specialists will have at least degrees social sciences or civil engineering and at least 10 years of experience on PIM/IMT projects. They will be responsible for consulting with farmers and stakeholders during project and design preparations and ensuring their requests are appropriately addressed by the project. The main tasks of the specialist's will include:

- (i) Review the performance status of WUAs, WMOs and their federal structure of GK and Teesta irrigation schemes.
- (ii) Identify training and support measures required to strengthen the organizational capacity of the WUAs
- (iii) Identify specific institutional arrangement required to facilitate the working collaboration between the WUAs and the future IMOs
- (iv) Undertake necessary dialogue and training with WUAs of MIP, GK and Teesta to facilitate the transition from public MOM to private MOM
- (v) Support the formation of MIP, GK and Teesta Implementation Coordination committee and assist the organization of the quarterly meetings.
- (vi) Support design team in implementing participatory design with the farmers
- (vii) Support the works supervision team and IMO in implementing participatory works supervision with the farmers
- (viii) Support conflict resolutions between the farmers and IMOs
- (ix) Support the establishment and review the performance of the customer's support services of the IMO
- (x) Support the implementation of the Program communication and participation plan at field level.

f. Commercial lawyer (3 p-m) [intermittently]

41 The lawyer will be a partner or senior lawyer with a commercial law firm and have at least 10 years of experience in structuring, negotiating and drafting bidding and/or contract documentation for PPP transactions, including relevant experience in PPP transactions or regulatory matters involving the water sector. The lawyer will:

- (i) Work closely with the Public Private Partnership Transaction Specialist and the PMU on the structuring of a PPP transaction pursuant to which the long-term management, operation and maintenance (MOM) for MIP will be transferred to a third-party IMO.
- (ii) Identify and advise on any legal issues and risks arising from the proposed PPP transaction.
- (iii) Prepare, draft, negotiate and finalize all contract documents required for the PPP transaction and work with the international and national procurement specialists to incorporate these in bidding documents, as required;
- (iv) Identify all governmental or regulatory approvals, third party approvals, consents, registrations or permits required in connection with the PPP transaction and assist in obtaining any such approvals, consents, registrations or permits;
- (v) Advise and assist in all legal and documentary arrangements required for completion of the PPP transaction, including the satisfaction of conditions precedent to the effectiveness of the PPP transaction.

g. Junior Design Engineers (8 positions, total 168 p-m)

42 The Junior Design Engineers will have civil engineering degrees, or equivalent, with at least 2 years of post-graduation experience including practical experience with using AutoCAD design software. They will support the Irrigation Design Engineers.

h. AutoCAD and GIS Specialist (2 positions, total 55 p-m)

43 The AutoCAD and GIS Specialists will be suitably qualified with a graduate degree and have more than 5 years of professional experience. They will support the irrigation design engineers with preparing design drawings and preparing project GIS databases.

i. Hydrologist (4 p-m)

44 The Hydrologist will support the International Hydrologist with assessing surface water availability for all three projects. The specialist will have at least a Master's degree in Earth Sciences or equivalent, with at least 15 years of experience in assessing and modelling meteorological and hydrological regimes. Ideally the specialist will have direct experience and practical knowledge of the hydrological regimes within the Padma and Teesta Rivers, and the international water sharing agreements of these rivers and those affecting MIP.

j. Groundwater Modeller (22 p-m)

45 The Groundwater Modeller will work closely with the Hydro-geologist to prepare the groundwater models for all three projects under the Program. The specialist will have an advanced qualification in earth sciences, or equivalent, and at least 15 years of experience in assessing and modelling groundwater reservoirs. Ideally the specialist will have experience in assessing groundwater within the lower Ganges Plains. The main tasks of the specialist will include:

- (i) Review existing information geological and hydro-geological and groundwater studies relating to hydrogeology of the Muhuri area
- (ii) Check the conditions in the field to assess typical yields from tubewells, water quality and possible issues.

- (iii) Define the requirements for feasibility level studies, including data collection and groundwater modelling to assess sustainable groundwater abstraction levels.
- (iv) Develop and undertake groundwater modelling and assessment for MIP, TIP and GKIP areas.
- (v) Assess the current recharge to the aquifer and identify the contribution from irrigation. Assess the potential to improve the recharge through surface water management and other methods.
- (vi) Prepare an interpretation of the model and workings with the other specialists prepare a development strategy for conjunctive surface and groundwater management for TIP and GKIP.

k. Mechanical and Electrical Engineer (8 p-m)

46 The Mechanical and Electrical Engineer will have at least an advanced degree in mechanical engineering, or equivalent, and at least 15 years of experience in designing and implementing similar projects. The main tasks of the Engineer will include:

- (i) Support the planning and design for the electrical aspects of all three projects under the Program.
- (ii) For MIP, coordinate with the REB Central Office and the REBs Feni and Mirsheraï to keep them informed and engage support for the proposed expansion of the electrical distribution system to energize the pumps and pre-paid smartcard systems. Prepare the associated detailed engineering designs, bill of quantities, engineering cost estimate, specifications and contract documents.
- (iii) Liaise and support the Muhuri IMO with the electrification of the low lift pumps and operating systems.
- (iv) For TIP and GKIP, support the assessment, feasibility studies and detailed engineering designs of electrical aspects of the project rehabilitation including: electrical control systems for the gates, rehabilitation of the pumping units, electrical requirements for flow measurement, telemetry etc.
- (v) Support the assessment of the requirements for gate and pump rehabilitation and modernization.
- (vi) Prepare detailed engineering designs, specifications, bill of quantities, and cost estimates for rehabilitation and modernization of mechanical equipment including transport, dredgers and other requirements.

l. Resettlement Specialist (8 p-m)

47 The Resettlement Specialist will have an appropriate social sciences qualification and at least 10 years of relevant work experience, preferably with at least 5 years of experience working on international donor-funded projects. The Specialist will work closely with the international Resettlement and Social Development Specialist to assess and incorporate adequate and workable measures to ensure resettlement needs are properly addressed. The main tasks will include assisting the international resettlement specialist with:

- (i) Updating the resettlement framework, if necessary, for Project 2 according to ADB's Safeguard Policy Statement (2009);
- (ii) Preparing subproject safeguards assessments that will include resettlement plans.
- (iii) Drawing lessons to be learned from comparable projects and propose practical and implementable options for improvement in resettlement implementation.

- (iv) Prepare BWDB's capacity assessment and involuntary resettlement training program if gaps are identified.
- (v) Assist BWDB in: (a) identifying the affected persons and the impact of the project; (b) making a detailed inventory of assets for compensation; (c) making swift payments, along with other relevant agencies; and (d) keeping detailed records of progress on resettlement.
- (vi) Provide or organize training program or other support for income restoration.
- (vii) Plan and implement consultations with the affected people in accordance with the participation plan.

m. Gender and Social Development Specialist (8 p-m)

48 The Gender and Social Safeguards Specialist will have at least an advanced social sciences degree or equivalent, with at least 10 years of experience working international development projects. The main tasks of the specialist will include:

- (i) Take the prime responsibility for analyzing the proposed Tranche 2 projects from a gender perspective (with reference to the relevant ADB gender sector checklists) and developing project components and implementation mechanisms to ensure women's and girl's participation in the project.
- (ii) Designing, commissioning, and supervising the implementation of appropriate socio-economic surveys on selected sample subprojects selected for the project and provide inputs for the preparation of the project, safeguard documents, summary poverty reduction and social strategy (SPRSS) and the gender action plan (GAP).
- (iii) Conduct a social impact assessment through a combination of field appraisal, stakeholder consultation and review of existing studies/projects to collect sex disaggregated data with which to inform the Project Poverty Reduction and Social Strategy.
- (iv) Contribute a gender perspective to the activities and outputs of other team members, particularly the institution and resettlement specialists.
- (v) Undertake a comprehensive review of gender and women's development opportunities that may be considered for inclusion under the project.
- (vi) Monitor the implementation of the GAP under MIP

n. Environmental Safeguards Specialist (6 p-m)

49 The Environment Specialist will have a Master's degree in environmental sciences, engineering or a related field, and at least 10 years of relevant work experience, preferably with at least 5 years of experience working on international donor-funded projects. The Specialist will work closely with the international Environment Specialist to: (i) prepare environmental assessments for Tranche-2; (ii) train BWDB on supervision and management and contractors on implementation of EMP; (iii) carry out periodic monitoring on implementation of EMP; and (iv) support the BWDB in its reporting requirements on environmental monitoring to ADB and GOB.

o. Agricultural Economist (8 p-m)

50 The Agricultural Economist will have at least an advanced degree in Economics or Agriculture Sciences and have at least 10 years of appropriate work experience. The specialist will support the international Agricultural Economist.

p. Procurement Specialist (6 p-m)

51 The Procurement Specialists will have at least a civil engineering degree or equivalent, with at least 10 years of experience on similar development projects. Preferably the specialist will have demonstrated experience with procurement processes for externally financed projects, mainly those funded by ADB or World Bank. The specialist will support the international Procurement Specialist.

I. Supporting Office Staff

52 PMDC will also provide adequate office support staff to meet the needs of the central office as well as the establishment of field offices in TIP and GKIP. Suggested positions are shown in Table 2.

Table 2: Project Support Staff

Position	No.	Qualification /experience	Tasks
Office Manager	1	At least 10 years of good office management experience preferably with an international company for international development projects	Office management, team logistics, support for field trips, preparation of workshops, etc
Accountant	1	Degree in accounting, or equivalent with 5 years book keeping experience	Maintaining project accounts and submission of invoices and payment requests to the PMU according to government and ADB's standards.

Assistant Office Manager / Secretary	3	Good English and computing skills (with appropriate certificate)	Office support, data entry, preparing letters, organising printing. There will be one position in each office.
Computer Operators Office Assistants	3	Good English and computing skills (with appropriate certificate)	Support the Office Manager, Secretary and Accountant. There will be one position in each office.
Office Caretaker / Messengers / Guard	3		Maintaining the office, carrying messages, and other minor tasks. There will be one position in each office.

J. Procurement of Additional Studies, Equipment and Training

53 Provisional sums have been included in the consultancy agreement for the procurement of various requirements to support the project. The exact implementation arrangements, specifications and detailed costs estimates of the procurement will be approved by the Project Director of each project and procurement procedures will follow ADB Procurement Guidelines. The tentative scopes of works for the additional studies are summarized in Table 3.

Table 3: Additional Procurement

Name	Tasks
Surveys and studies	Supporting surveys and specific studies including topographic surveys, geotechnical investigations, flow monitoring, and resettlement and socio-economic surveys.
Remote Sensing	Trialling remote sensing systems for assessing crop growth, yields and water consumption for TIP and GKIP. The results will be used for supporting feasibility studies and designs. The long-term viability for using remote sensing for managing these projects will be assessed with the aim of lowering pumping needs and improving crop rotations to increase command areas.
Procurement of office equipment	Procurement of office equipment including computers, printers, photocopiers, GPS power inverter, etc. for central and field offices.
Training and awareness	Costs for the implementation of the training and awareness program including workshops.
Muhuri Management Review	Recruit independent panel of experts to review the performance of Muhuri IMO after its fourth year of operation, to identify issues and recommend improvements, and to support drafting of lease contract documents for Stage 2 lease contract IMO.

K. Reporting and Other Deliverables

54 The list of main deliverables by PMDC is summarized in Table 4. Other occasional deliverables maybe required from time to time on an informal basis.

Table 4: List of Deliverables

No	Output	Description	Due Date ^{7a}
A	Program Management and Institutional Development		
1	Inception Report	(i) Confirmation, elaboration and adjustment of the consultants approach and methodology based on information received during the inception phase. (ii) Detailed plan of the consultant's activities and confirmation and adjustment to the tasks of each expert with further elaboration as required. (iii) Detailed implementation plan for the project's activities. (iv) Issues identified during the inception phase.	3
2	Mid-Term Report	Scheduled approximately half way through the consultancy period and should be produced prior to the ADB mid-term mission. The contents would include: (i) summary of the progress including issues, confirmation elaboration and/adjustments to the consultants program; and (ii) detailed implementation plan.	30
3	Draft Final Report	Summary of the project progress and other aspects to be agreed.	55
4	Final Report	Not later than the completion of the consultants contract.	60
5	Monthly Reports	Concise mainly tabular report with 2 page maximum summarizing monthly progress of the project, implementation status and highlighting any critical issues that require government or ADB support with resolving.	1-60
6	Quarterly Reports	Concise reports giving more details of the project and key issues. For every year, the first three reports will be incremental reports detailing activities, progress and issues during the previous quarter, and planned activities for the next quarter. The fourth report (which will become the Annual Report) will also be cumulative for the full year period.	Every 3 months
7	Briefing Reports	Special briefing reports as requested by the EA and/or ADB	As required
8	Periodic Financing Request (PFR) for Tranche 2	Periodic Financing Request for Tranche 2 based on standard ADB format	15
9	Environmental Monitoring Reports	Annually after start of construction to meet ADB requirements and as and when required by GOB	Once every 12 months/ as required by GOB
10	Training and awareness plan	Institutional review and training needs assessment of MOWR and BWDB to support their needs for managing IMOs and improving MOM for large scale irrigation. Prepare a training and awareness plan for IMIIP which should be based on the integrated roles of IMOs working in coordination with the Government and WUAs.	12
11	Implementation of the training	Working closely with the PMU to support the implementation of the training and awareness program, including programming,	15 onwards

No	Output	Description	Due Date ^{/a}
	and awareness program	scheduling and implementation of the training program.	

B	Planning and Design for Rehabilitation and Modernization		
1	Detailed feasibility studies for TIP and GKIP	Feasibility studies including: (i) surface and groundwater availability; (ii) cropping assessments and water requirements; (iii) studies and proposals for rehabilitation, modernization, and strategies for increased efficiency and productivity; (iv) economic and financial assessments; (v) institutional assessments including proposals for the PPP management model; (vi) assessment of cost recovery and generating methods; and (vii) environmental, gender, social and resettlement safeguard frameworks and documents.	12
2	DED for MIP	For outstanding works to be implemented under Tranche 1, prepare DED including geotechnical investigations, specifications, bills of quantities, and engineering cost estimates for new and rehabilitated structures, river protection works, upgrading of electrification system, and building rehabilitation for MIP (excludes pipe design which is being undertaken by the Muhuri IMO). Prepare detailed resettlement plans and assist BWDB obtain the necessary design approvals.	6
3	DED for TIP and GKIP.	Prepare DED including geotechnical investigations, specifications, bills of quantities, and engineering cost estimates for investment works selected for TIK and GKIP. Assist BWDB to obtain the necessary design clearances and prepare detailed resettlement plans.	24
4	Preparation of bid documents for Tranche 1 works	Prepare bid documents according to Government and ADB guidelines for Tranche 1 outstanding works. Assist BWDB with bidding and selection process, and approval procedures.	12
5	Preparation of bid documents for Tranche 2 works Bidders contracted	Prepare bid documents according to Government and ADB guidelines for Tranche 2 works. Assist BWDB with bidding and selection process, and approval procedures.	24
C			
1	Institutional frameworks and strategies for PPP for large scale irrigation.	Based on current Government policy and lessons learnt under the IMIIP, prepare a review and recommendations for third-party MOM of large irrigation projects by private sector. Develop a strategy document for official endorsement by MOWR and BWDB.	18
2	Establishment of the PPP Cell	Facilitate establishment and provide support for the PPP cell to monitor and supervise the activities of the IMOs.	6
3	Establishment of the ICCs	Facilitate the establishment and support strengthening and activities of the ICC for each project.	MIP: 6 TIP and GKIP: 30
4	Review of Muhuri IMO	Working BWDB, an independent panel of experts, and other stakeholders including the ICC, undertake a review of the Muhuri IMO's performance. Recommend improvements and prepare	36

options and preferred strategies for the Stage 2 lease contract.

5	IMO Management Contracts for TIP and GKIP	With the PPP Cell, assist PMU with preparation of bid documents, tendering and approval processes for the TIP and GKIP IMO management contracts.	Bid Docs: 18 IMO engaged: 24
6	IMO Lease Contract for MIP	With the PPP Cell, assist PMU with preparation of the bid documents for the Muhuri Stage 2 IMO lease contract. Support the bidding processes and award process.	Bid Docs: 40 IMO engaged: 60

Notes: a/ months from project start date