

Terms of Reference (Draft)

Project Management and Technical Consultancy (PMTTC) Services for Proposed Bihar Water Security and Irrigation Modernization Project (BWSIMP)

I. Introduction:

1. The State of Bihar is predominantly agrarian, with the agriculture sector contributing to 24% of the State's Gross Domestic Product (GDP). In the state, the Gross Cultivated Area (GCA) is 7.30 million hectares, and the Net Sown Area (NSA) is 5.08 million hectares, of which major and medium irrigation systems irrigate 2.93 million hectares and minor irrigation systems (Surface and Groundwater) irrigated 2.15 million hectares. Currently, the total Irrigation Potential of constructed Major and Medium Irrigation Schemes is 4.20 million hectares, of which 3.722 million hectares are Irrigation Potential Created (IPC) and 2.82 million hectares are Irrigation Potential Utilized (IPU). The state has set a target of 5.35 million hectares for the Ultimate Irrigation Potential (UIP) for Major and Medium Irrigation Schemes.
2. The State also suffers from recurring natural calamities like floods, drought, and other extreme weather events like cyclones, hailstorms, and heatwaves. About 74% of the geographical area of North Bihar is considered flood-prone. Out of the 38 districts of the state, 28 are flood-prone, with 15 being most affected, resulting in colossal loss of property, human lives, farmlands and infrastructures apart from the loss of human lives. Rivers originating in Nepal, such as Kosi, carry high sediment loads deposited on Bihar Plains. The 2008 Kosi floods affected over 1,40,000 hectares of rice, 7,200 hectares of corn, and 96,000 hectares of other crops, affecting nearly 5,00,000 farmers.
3. In contrast, the southern districts in Bihar, namely Munger, Nawada, Rohtas, Bhojpur, Aurangabad and Gaya, are drought prone. To combat these situations, many people, machines, and financial resources have to be deployed, which ultimately slows down the pace of development. Bihar depends on agriculture and must quickly switch to a modern, water-conserving irrigation system.
4. The department has already created a good number of well-distributed storage reservoirs. Most of them are in drought-prone sub-plateau areas of the South Bihar plains. The availability of sunshine almost year-round also provides an opportunity for developing solar power farms, ensuring a cheaper power source for running irrigation pumps. Thus, the

irrigation sector in Bihar needs a re-assessment considering climate challenges and improving farm income and rural employment.

5. The proposed Bihar Water Security and Irrigation Modernization Project (BWSIMP) will cover the state of Bihar, focusing more on districts impacted by flood, water-logging and drought. As the project title suggests, the GoB has embarked upon a new path of water resources management. This is a comprehensive initiative covers efficient irrigation and flood risk management and drought proofing through multi-stakeholder participation in planning and management, after needed institutional strengthening and capacity building exercise. The project will ensure positive economic and environmental outcomes for the state. It would enable completion of the Kosi Canal Project, restore age-old dams and protect river embankments. Additionally, it includes crucial projects of intra-linking of rivers, not only to control of excess water flow from major rivers to mitigate floods but also to provide irrigation source for drought districts. The project would employ new techniques for long-term protection of river embankments. Furthermore, advanced measures will be implemented in vulnerable areas along rivers to safeguard them for long-term erosion.

II. Project Development Objective (PDO)

6. The Project Development Objective (PDO) of the proposed Bihar Water Security and Irrigation Modernization Project (BWSIMP) is to **“To improve irrigation service delivery and flood resilience in selected project areas of Bihar.”**

III. Project Period and Cost

7. The project is proposed to be implemented over six (6) years at a total estimated cost of 551.88 million USD\$, of which 30% (165.564 million USD\$) will be borne by the Government of Bihar and the remaining 70% (386.316 million USD\$) will be loan assistance from the World Bank.

IV. Project Components

8. The proposed BWSIMP has 4 project components i) Climate Resilient Irrigation Management (CRIM); ii) Flood and Drought Risk Reduction (FDRR); and iii) Stakeholder Partnership and Capacity Building (SPCB); iv) Project Management (PM).
9. **Component 1: Climate Resilient Irrigation Management (CRIM):** This component focuses on adopting a balanced approach between ‘last mile’ and ‘first mile’ service delivery to improve the overall viability of irrigation, especially the canal irrigation. Service delivery encompasses the entire life cycle of investments in the irrigation sector, including planning, design, operation, maintenance, and monitoring. Canal irrigation modernization will develop

strategies to deliver appropriate service levels to water users from head to tail, considering their needs and demands. Asset management will include life-cycle costing for accountability and timely service delivery. Activities will include procuring equipment for topographic, bathymetric, and Light Detection and Ranging (LiDAR) surveys, allied software and hardware, establishing Supervisory Control and Data Acquisition (SCADA) systems, promoting conjunctive water use, micro-irrigation, and climate-resilient agriculture, and facilitating Participatory Irrigation Management (PIM) by Water User Associations (WUAs).

10. Component 2: Flood and Drought Risk Reduction (FDRR): This component aims to enhance the efficiency and responsiveness of flood and drought management, crucial for the well-being of people, land, and infrastructures in vulnerable areas. The project will focus on making the State flood and drought resilient, and equipping institutions to minimize loss of life and property during extreme events. Drought-proofing will involve efficient water use, contingency planning, and possible risk transfer mechanisms. Land reclamation for productive use in waterlogged areas, community-based solar pumping systems for micro-irrigation will also be considered in suitable areas. Activities will inter-alia include procuring sensors and allied systems, Real-Time Data Acquisition Systems (RTDAS), blue-green infrastructure solutions, use of Jute Geo Textile (JGT) for erosion control, bund strengthening, and modernizing flood forecasting systems. The component will draw from the experiences of the Bihar Kosi Basin Development Project (BKBDP).

11. Component 3: Stakeholder Partnership and Capacity Building (SPCB): This component reflects bold action and a significant shift from “business as usual,” requiring strong, coordinated institutions, a sound knowledge base, and integrated, long-term planning. The project will develop strong functional linkages between state government departments working in the water sector and create a platform for all water sector stakeholders, from the community to the national government, to plan and implement Joint Action Plans (JAPs). The project will focus on training and capacity building of water users, operators, line departments, and other stakeholders. Activities will include: strengthening WRD wings, upgrading/procuring software/hardware and allied infrastructure, modernizing training infrastructure, developing training modules, conducting thematic trainings/workshops, hiring consultancy services for specialist areas, and implementing inter-departmental JAPs.

12. Component 4: Project Management (PM): This component will ensure effective implementation and monitoring of project activities. Establishing a Project Management Unit (PMU) will be supported under the project, to oversee/coordinate project activities, monitor

operations, finance consultancies, procure equipment, and handle operating costs. A comprehensive Management Information System (MIS) will be developed for data collection and reporting on key performance outputs and impact indicators, based on benchmarking surveys, participatory assessments, reviews and evaluations.

V. Main Objective of the Consultancy Services:

The proposed Project Management and Technical Consultancy services shall include but not limited to the following areas:

- (i) The main objective of this consultancy is to develop a comprehensive project implementation and execution plan, including timelines, budget estimates, and resource requirements etc.
- (ii) To provide support to Water Resources Department (WRD) for implementation of governance, processes, systems and methodologies for carrying out project monitoring including but not limited to:
 - a) Establishing Project Governance Structure this includes defining roles and responsibilities for project team members, stakeholders, and project Implementing Units (PIUs).
 - b) Establishing communication channels and decision-making processes to ensure effective project governance.
 - c) Designing, developing and establishing a Management Information System (MIS) software and populating it with data during the course of the project. The MIS should contain Key Process Indicators (KPI's) for project execution. The reporting feature of the MIS should be able to meet all internal and external reporting obligations. The PMTC will be responsible for maintenance and upgradation of the MIS system.
- (iii) To assist PIUs (Project Implementation Units), established in the field for implementation of the civil works and other related works under the project, in monitoring, evaluation, reporting obligations on all aspects, impact assessment and coordination with various stakeholders in full compliance with the World Bank guidelines and applicable Employer's acts, rules and regulations. The objective is also to ensure compliance to credit agreement covenants and to achieve project result indicators in stipulated time frame.
- (iv) To assist Project Management Unit (PMU) established for the project and head quartered at Patna in the office of WRD. Project Management and Technical Consultancy (PMTC) team shall assist the PMU in project management activities including Institutional

Strengthening of WRD to gradually transform WRD into a modern, high performing, and outcome focused agency using best practices for strategic planning, project delivery, asset management, sector governance, and building its capacity and knowledge base.

- (v) PMTC will be to build up the PMU's capacity on a sustained basis; assist the PMU and PIU in preparation of bidding documents, updating cost estimates, bid invitations and bid evaluations; establish criteria for supervision, coordination and management; and preparation of various reports to be submitted to the World Bank and other agencies.
- (vi) The Project Management and Technical Consultancy will assist the PMU and PIUs in implementing, managing and monitoring Project activities; recommend ways to accelerate Project implementation; assess reasons for delay and identify means for improvement; provide training to the functionaries in project formulation, management, monitoring and evaluation, financial and environmental management aspects, and community participatory approaches of the Project; take a proactive role in advising the PMU and PIUs on all Project related issues, including policy issues, loan covenants, etc.
- (vii) To assist Employer in ensuring compliance with agreed systems and procedures for project Implementation, Cost-effective and efficient management of water resources including periodic maintenance, rehabilitation, modernization and up gradation of the assets.
- (viii) Assistance in monitoring the progress (Physical and Financial) of works/services contracts being undertaken by WRD under BWSIMP.
- (ix) Implementation of various training and capacity building programs under the project including development of a training and capacity building strategy for staff at various levels based on a training needs assessment. This will include capacity building/skill enhancement of stakeholders.
- (x) Assist PMU / Employer in preparation of Terms of References of related Consulting Service likely to be procured under the project, bidding documents / Request for Proposals (RFPs/ RFQs), evaluation of bids / proposals and final procurement of bidders / Consultants.
- (xi) Assist PMU in monitoring the services of other consulting services working in the project: reviewing their reports & outputs and provide feedback to the PMU so that they consistently meet or exceed expectations and requirements.

- (xii) Assist PMU in developing and implementation of sustainability roadmap for interventions made during BWSIMP. The objective is to create a robust framework to maintain the realised objective beyond the lifecycle of the project.
- (xiii) Provide technical support in implementation of project activities, including construction supervision, irrigation/flood asset management and specialized areas like agriculture, pisciculture and community mobilization etc.

The services are to be delivered by a team of experts during the project implementation. The main focus of the services is to support PMU & PIUs to effectively manage and monitor those activities rather than actually implementing those.

VI. Scope of Services:

The main tasks will include but not limited to the following:

Task 1: Assist PMU during the inception phase of project.

- ✓ Preparation of Project implementation Plan (PIP): The consultant would be expected to work in close coordination with PMU to prepare a detailed Project Implementation Plan. This document would contain the project components, outcomes, component scheduling, budget, governance structure, Jobs and responsibilities of each role, Reporting relationships and other required information so that the project could be completed smoothly in the stipulated timeframe.
- ✓ Preparation of Project Procurement Strategy for development (PPSD): The consultant would be expected to work in close coordination with PMU to prepare a detailed Project Procurement Strategy for development (PPSD) as per World Bank guidelines.
- ✓ Preparation of Annual Work Plan (AWP): The consultant in coordination with the PMU and PIU would be expected to prepare annual work plan so that the activities that are to be taken up in a year and the expected completion schedule along with financial commitment can be estimated. This document will also help in evaluation of actual progress against projected progress every year. The PMTC has to evaluate the AWP of the PIUs and create a realistic AWP
- ✓ The PMTC will be required to develop, operate and maintain a MIS platform which will be shared by PMU and PIUs for management of all data related to the project. This tool would help the PMU and PIUs to track their progress. The MIS system will be the only system to meet all internal and external reporting obligation. The consultant is expected to monitor the functioning of the project, through this tool and suggest

suitable actions to be taken in case of progress below projection. Any changes that come up have to be incorporated into the MIS by the PMTC.

- ✓ The PMTC will also be expected to help the PIUs in creating a procurement plan, the PMTC should prepare suitable guidelines for PMU and PIUs regarding the preparation and evaluation of procurement documents and necessary approvals (internal and external) for each procurement document.

Task 2: Assistance in monitoring of BWSIMP

- ✓ Monitoring and supporting the progress of DPRs to be submitted by the sub consultants/PIUs with respect to the list of schemes to be taken up under the BWSIMP as per guidelines of the Central Water Commission (CWC), Ganga Flood Control Commission (GFCC), World Bank and Govt. of Bihar etc. as required.
- ✓ Monitoring of physical and financial progress of works, identifying the reasons for slow progress, if any and suggesting and implementing remedial measures.
- ✓ The PMTC will organize stakeholder's workshop and focused discussions with various stakeholders highlighting the areas of further enhancements in the implementation of project in the state of Bihar specifically focusing on the interventions that could be supported under the project to achieve those enhancements.

Task 3: Procurement & Contract Management: The Consultant will assist WRD in the following tasks:

- ✓ Preparation of bidding documents / procurement documents/ terms of reference (TOR)/expression of interest (EOI)/ request for proposal (RFP) etc. related to the projects as per requisite guidelines issued by national and international agencies that are relevant to the project.
- ✓ Assistance in Evaluation and finalization of bids, issuing of letter of award to the selected contractor and signing of contract agreement.
- ✓ Co-ordination of procurement of civil works, goods, services and consultancies under the project and ensuring that the procurement is carried out in compliance with the procedures / project schedule / procurement plan agreed with the World Bank.
- ✓ Advice on contract management as required by PIUs/PMU.

Task-4: Management of Environment and Social Framework:

- ✓ Review the environmental and Social impact assessment carried out for the project to ensure that
 - a) the same is in line of the Environmental and Social Management Framework adopted by the Employer for the Project,
 - b) environmental and social impact assessments have been undertaken as per guidelines of the World Bank and Govt. of Bihar requirements,
 - c) that all necessary clearances and permits have been identified and obtained by the contractors from the concerned authorities.
- ✓ That necessary compliance has been made with reference to the terms of reference, World Bank and Govt. of Bihar requirements and agreed resettlement framework of the project.
- ✓ Integrate Social and Environmental considerations into DPR including the Bill of Quantities. Include measures that would help in resource efficiency, climate resilience etc. into the technical specifications and engineering designs. Emphasize the use of nature based solutions and sustainable engineering practices in the sub-project design
- ✓ Ensure that the Bid Document include the Social and Environmental Management Plan, and other provisions to ensure that the contract carry out the operations in a sustainable manner.
- ✓ Document and prepare the Social and Environmental Assessments for the project including data collection and support to the Engineering team to ensure that the negative impacts are minimized/ mitigated through sustainable design and construction practices. Finalization the EIA in close coordination with the World Bank and ensure that World Bank processes are adhered to.
- ✓ Carry out a risk assessment against the World Bank ESF and lead the preparation of Ensure that the Project activities follow Project Environmental and Social Management Framework (ESMF) including the Bio-diversity Action and Management Plan, Cultural Heritage Plan, etc. as per the World Bank Requirement.
- ✓ Report against all Social risk management actions in the Environmental and Social Commitment Plan (ESCP) of the project
- ✓ Develop an system for managing reporting, auditing of the implementation of social and environmental management measures in the subprojects

- ✓ Review and approve the contractor's implementation plan with the Supervision Consultant for the social and environmental measures as per the environment plan.
- ✓ Liaise with the various central and state government agencies on social and environmental and other regulatory matters.
- ✓ Continuously interact with the NGOs and community groups to be involved in the project (for the maintenance of additional plantations, if any, suggested for the project).
- ✓ Assist the Supervision Consultants in establishing dialogue with the affected communities and ensure that the social and environmental concerns and suggestions from such interactions are incorporated and implemented in the project.
- ✓ Provide support and assistance to the Government Agencies and the WB to supervise the implementation of the social and Environment plans during the construction as well as operation stage of the project.

Task-5: Implementation support to the Asset Management and Institutional Effectiveness Component

1. Asset Management:

- ✓ Preparation of Terms of reference for the procurement of required consultancy services for effective implementation of the activities. This will include but not limited to the following activities:
 - a) Preparation of prioritized plan for capital works and maintenance
 - b) Revision of the existing infrastructure/assets using field verification and remote sensing.
 - c) Development of GIS based application for visualisation and analysis of asset related data.

During implementation, assisting the PMU for the procurement of the consultancy services including preparation of RFQ / RFP, evaluation of proposals and finally selection of the most responsive Consultants.

- ✓ Monitor the output of the Consultants and assisting the PMU in monitoring the progress of the Consultants.
2. Institutional Effectiveness:
- ✓ Identification of need for capacity building in line with project objective, identification of existing gaps in capacity and preparation of training roadmap for bridging the gaps.

- ✓ Preparation of Terms of reference for the procurement of required consultancy services for the different components for capacity building of the WRD including trainings / International Exposure Visits to the appropriate country /ies and its implementation, assisting the PMU for the procurement of the consultancy services including preparation of RFQ / EOI cum RFP, evaluation of proposals and finally selection of the most responsive Consultants.
- ✓ Assist the client in (i) establishing a training and capacity building annual plan covering various categories of staff and its implementation; (ii) effective implementation of various training programs using local and national training institutions, facilitate knowledge exchange and study tours.
- ✓ Cost of training / Exposure Visits will be borne by the Project separately and this cost will not be part of the contract, not even as provisional sum. The PMTC will facilitate overseas training (identify suitable institutions across developing countries, having successfully implemented similar work, and provide technical inputs in developing TORs for such training/ visits). All the logistics costs such as cost towards venue, lodging, boarding, traveling, VISA, etc. shall be directly borne by the Client (WRD). Consultants shall NOT be responsible for payments on these items and will not seek any reimbursement from client.
- ✓ The consultant shall also propose National / International Experts for training the departmental staff in specialized areas. The cost of such experts shall be borne by the client. This will include inviting the expert for developing the capacity of the staff.
- ✓ Monitor the output of the Consultants and assisting the PMU in monitoring the progress of the Consultants.
- ✓ Support WRD in identifying the equipment and instruments required to improve their overall office infrastructure for surveys and investigations, quality assurance, project preparation and implementation, computing capacity and introduction of new technologies and research and development; including the support required for procurement and installations and strengthening of field laboratories.

Task-6: Assist the PMU in preparation of Supporting Documentation for the Project.

- ✓ Progress and Result Monitoring: In consultation with WRD, evolve a suitable format for preparing monthly and quarterly progress reports containing physical and financial progress of various project components, results achieved, deviations between the actual vis-a-vis planned progress for each quarter, the reasons and suggested steps

to address any performance shortfalls, and recommendations to improve project outcomes. Prepare the compiled project progress reports and analyzing the information available on project implementation. Assist the WRD in establishing quarterly progress indicators on various project components and monitoring the progress against those indicators.

- ✓ Prepare quarterly progress reports on various components including progress on various project components, disbursements status, progress on implementation of Efficient Irrigation Management (EIM), Effective Flood Risk Management (EFRM) and Institutional Strengthening & Capacity Building (IS&CB) activities, implementation of Environmental & Social impact Management Framework, results framework (agreed for the project), compliance to legal covenants, implementation issues, and recommendations to improve project outcomes to be submitted to the Bank and also required for Bank missions in connection to the Project.

Task -7: Performance Review: The consultant will undertake the following tasks:

- ✓ The Consultant will undertake a performance review of project implementation at least every six months by organizing a stakeholder's meeting; discussions with the field engineers, contractors, and various GOB departments involved in project; and his own implementation experiences. Based on this review, the Consultant will prepare a report containing areas in need of improvement, performance shortfalls, and an action plan to enhance project implementation and outcomes. The report will be discussed with the PMU and also during the World Bank implementation support missions.

Task 8: Project Implementation Arrangements:

- ✓ The consultants shall review the functioning of the project implementation arrangements at the WRD (PMU and PIUs) during the course of his services. Based on his review he will advise PMU from time to time at least at quarterly intervals about the modifications and further strengthening required in the project implementation arrangements including reorientation of the project teams and implementation responsibilities, additional inputs required for effective project implementation, and other recommendations to improve project outcomes.

Task 9: Monitoring and Evaluation (M&E)

- ✓ Assist the client in monitoring and management of the project, this includes, but is not limited to, monitoring physical and financial progress of the project, meeting all internal & external reporting obligations, production of annual performance reports at PIUs and PMU, evaluation and monitoring of the project objectives and reporting any deviation thereof. Suggesting necessary corrective actions as and when required.
- ✓ Assist the client in fully operationalizing the MIS including strengthening the systems ensuring monitoring of regular and accurate data-entry in MIS, generation of customized management reports for the use of senior management of Client, and World Bank, and production of annual performance reports at PIUs and PMU.

Task 10: International Best Practices on project management:

- ✓ The project also includes benchmarking and adoption of best industry practices in project management of water resources sector as applicable to Efficient Irrigation Management (EIM), Effective Flood Risk Management (EFRM) and Institutional Strengthening & Capacity Building (IS&CB) activities. The PMTC will assist the client in identifying such practices including the countries, institutions, and experts who could be visited by the staff of the client or invited on short term basis by the client. The PMTC will provide the Terms of Reference and assist the client to enable them to procure, effectively monitor and manage those services.

Task 11: Sustainability Roadmap for initiatives taken during the course of BWSIMP

For ensuring that the initiatives taken to enhance Irrigation potential, flood management, disaster risk reduction and institutional strengthening continue to deliver their projected objectives beyond the project duration, the PMTC is expected to create a sustainability Roadmap for the same. The indicative road map document may address the following issues or other relevant issues that will help to sustain the outcomes of the project beyond the time period of the project:

- ✓ Develop long-term plans, monitoring and investment strategies for sustaining Integrated Water Management efforts beyond the project lifecycle.
- ✓ Suggest sources or methods to mobilize financial resources from government budgets, development partners, private sector investments, and community contributions.
- ✓ Prioritize investments in infrastructure, technology, and human capital that have long-term sustainability and resilience benefits.

- ✓ Suggest development of supportive policies, regulations, and institutional frameworks that promote Integrated Water Management and sustainability.
- ✓ Suggest ways to facilitate multi-level coordination and collaboration among government agencies, departments, and stakeholders involved in water management.
- ✓ Develop methods to regularly review project outcomes, learn from successes and challenges, and adapt strategies accordingly to improve effectiveness and sustainability.
- ✓ Suggest methods to support community-led initiatives for water management, such as farmer-managed irrigation systems and water user associations.

Task 12: Technical Support:

Part-1: Construction Supervision Support

- ✓ PMTC will provide technical assistance and support to WRD in the procurement, contract management, technical review, and quality assurance for the civil works contracts, which can be adjusted during the PMTC assignment. For riverbank protection/stabilization, embankments and channel linking for attenuation of flood peaks: providing all required services for construction supervision to ensure that the works are implemented as per internationally acceptable standards; periodically assessing supervisory mechanisms and quality control systems of partner agencies and suggesting possible improvements; undertaking periodic site visits where civil works and/or rehabilitation and improvement works are being carried out, and conducting sample material testing of ongoing works; and prepare and submit quarterly, annual and mid-term progress reports on time and prepare completion report.
- ✓ Rehabilitation, Renovation and Modernization of Irrigation Schemes: Rehabilitation work will include re-sectioning of disturbed dam profile (due to rain cuts and other reasons), re-setting of the distributed boulder in the riprap, repair of the drainage system, road, parapet wall, etc.; restoration of the spillway & culverts, remedial measures for seepage problem, bridges for an approach to dam sites and repair/replacement of gates and hoists are part of the activity. Rehabilitation of the Dam and Barrage will ensure its safety, proper operation, and function, thereby increasing the irrigation capacity of the canal system. PMTC will provide technical assistance for renovation and modernization of South Bihar's irrigation schemes, including Panchane and Sone Western Main Canal.

- ✓ New Irrigation Sources: This involves transferring Ganga water to Morway, Baskund, and Anjan reservoirs via appropriate physical infrastructure that can also support future transfers of water to other reservoirs such as Jalkund, Garhi, and others. PMTC will provide the needed technical support to prepare and execute such new irrigation projects.
- ✓ Reclamation of water-logged areas: About 1.5 lakh ha of wetlands is proposed to be converted into economically productive zones, including long-term development of chaur or waterlogged areas for agricultural land reclamation in order to ensure sugarcane and makhana cultivation. Waterlogged areas will be developed in a graded pattern, with lower elevations used for aquaculture and higher elevations used to cultivate appropriate crops/vegetables. PMTC will provide the needed technical support to prepare and execute such reclamation of water-logged areas.
- ✓ Creation of a dashboard is contemplated in the project, that will provide information about (a) all reliable water supply sources in a given basin; (b) all the minor irrigation tanks / Smaller Water Bodies / Summer Storage tanks in the drought-prone area need to be filled with water transferred from other supply positive water sources; (c) the optimal route for transporting the water from the reliable water sources to the Minor Irrigation (MI) tanks along with suggestions for the cascade of tanks that can be filled with gravity, etc. The Preparation of the required DPR for the execution of physical infrastructure needed to transfer water from surplus to deficit areas is also part of this assignment. PMTC will provide technical assistance to WRD in fulfilling these tasks.

Part-2: Modernization of Assets

- ✓ Assist WRD to improve maintenance of existing flood and erosion risk management assets: WRD, through construction companies, will implement river works in selected sub-basins. These works consist primarily of river erosion works and upgrading of existing levees. WRD will take primary responsibility for supervision of these river works contracts. The PMTC is tasked with i) supporting WRD in the procurement process, which is currently underway, and contract management; ii) supporting WRD's site supervision experts in the supervision of the construction works, which involves amongst others the supervision of compliance to the Environmental and Social Management Plans (ESMPs); iii) undertaking regular site visits and meetings with the contractors, supporting WRD in issuing payment and completion certificates; and iv) building capacity of mid-level WRD staff in conduction supervision. In

addition to the pre-identified river works, WRD may also undertake limited investments for emergency river works during the course of the project and the PMTC will support this activity in a similar manner.

- ✓ Development of a SCADA System in reservoirs and other storage/diversion structures and canal distribution networks: The assignment will include installing a SCADA system in reservoirs, other storage/diversion structures, and distribution networks; linking SCADA system to a central control station; collecting and analyzing water demand and availability data; development of a Digital Elevation Models to analyze and simulate water availability at various sources under all monsoon scenarios; and development of a Decision Support System (DSS) based on water availability and demand, including generation of reports and advisories.
- ✓ Conceptualizing and undertaking a set of activities, implemented by other consultant firms or organizations, including: acquisition of Topography/Bathymetry/LiDAR Surveys, High Performance Computers (HPCs); River cross section and stage-discharge survey; and acquisition and installation of Real-Time Data Acquisition System (RTDAS) for hydro-meteorological forecasting, Real Time Stream Flow Forecasting System (RTSFFS), including assessment of equipment installed for data acquisition, its working, data fetching ability, hardware and software applications deployed in the data center, scope for upgradation considering the World's Best practices and Technologies available.

Task-3: Specialist Technical Services

- ✓ Climate Smart Agriculture (CSA): PMTC will facilitate building of functional linkages between WUAs and Farmer Producer Organizations (FPO) on the one side and Research and Extension institutions promoting CSA in the state on the other. This will include encouraging the farmers to shift agricultural practices from traditional to climate smart (soil moisture conservation, use of heat/salt resistant crops and crop varieties, shifting to solar power for pumping irrigation water, and giving up practices such as stub burning).
- ✓ Conjunctive Water Use: It would be prudent to state that northern districts of the state with shallow post-monsoon water levels will be irrigated solely with groundwater. Thus, surface water irrigation could be used in areas with medium post-monsoon water levels in one season and groundwater irrigation in another. All sites with deep post-monsoon water levels, i.e., southern districts, can be kept under surface water

irrigation indefinitely. PMTC will provide technical support to NGOs and WUAs to promote conjunctive use of surface and groundwater in Irrigation Schemes of South Bihar.

- ✓ Micro-irrigation: Water efficiency in most irrigation systems in the state is only 30-40 percent. Many arid and semi-arid regions worldwide have begun to use drip and sprinkler irrigation systems to grow crops with medium to high nutritional and economic value. Low-cost grain crops can still be grown using traditional canal and tube well irrigation. At the same time, micro-irrigation will be rapidly adopted by vegetables, spices, fruits, greens, and floriculture. As part of efficient water use, a study will be conducted through a consultancy to assess the status and performance of existing irrigation facilities in various scenarios and to identify sites suitable for micro-irrigation schemes. The task will also include the creation of a DPR for micro-irrigation schemes as well as an execution plan for optimizing implementation. PMTC will provide guidance to NGOs and WUAs to sensitize farmers about the benefits of implementing micro-irrigation schemes.
- ✓ Sediment management: PMTC will provide technical support for integrating sediment management into a river basin management plan, including: regular sediment budgeting for all basins, particularly those affected by heavy siltation; and establishment of dredging and other infrastructure facilities for cost-effective silt management (including procurement of infrastructure and dredging services).
- ✓ Multi-stakeholder Partnerships: PMTC shall help ensure the overall smooth operation of the BWSIMP by supporting activities: smooth communication and workflow between WRD, JEEViKA and other relevant organizations; Fit-for-purpose BWSIMP websites; Dialogue, information exchange, and experience sharing on water resources and irrigation management and flood risk management with other states of India; communication with the World Bank, including supporting Bank mission's and preparing supporting documentation; and Any other activity as directed/requested from time to time by WRD, JEEViKA and other organizations in line with the overall objectives of this assignment. The project also focuses on enhancing technical capabilities of WRD by strengthening state's capacity for multi-sectoral planning. PMTC will facilitate inter-departmental coordination to forge multi-sectoral partnerships in Integrated Water Resources Management (IWRM).

- ✓ Participatory Irrigation Management (PIM) will be an essential part of the project implementation in selected Irrigation Schemes. Farmers' and water users' associations play an essential role in efforts to manage local systems. The PIM approach to irrigation water provision envisions these local institutions (WUAs) developing and strengthening their capacity to take responsibility for the irrigation system under their control, monitor its current status, and actively participate in system planning with WRD. WUAs will take on farm development work as needed, self-manage local water distribution, plan and implement water supply schedules, and promote surface and groundwater sharing for a more intensive and sustainable irrigation system. These organizations require constant attention and support to function effectively. The knowledge gained from the ongoing JEEVIKA (on-farm productivity) program will aid in the production of long-term agricultural productivity gains. The emphasis will be on increasing farmers' capacity to implement practices for better water management, increased farm productivity, and equitable water distribution. During the overall project preparation, this component will be detailed with interaction with the Department of Agriculture (DoA) and JEEVIKA. PMTC will provide support to Command Area Development and Water Management (CADWM) (part of WRD) and JEEVIKA in: hiring of Non-Governmental Organizations (NGOs) for community mobilization in target schemes; provide back-stopping to NGOs in community capacity building and training; facilitate inter-departmental (RD, AD and KVKs) linkages for strengthening on-farm water management, including micro-irrigation.
- ✓ Augment Capacity for Disaster and Emergency Preparedness and Response (ACDEPR): (i) strengthening the state's disaster response systems and mechanisms; (ii) strengthening the emergency response and communication systems of state agencies such as the fire department, the state disaster response force, and other immediate key response agencies in responding adequately to disaster situations through better search and rescue equipment, wireless communications; and (iii) strengthening the BSDMA's capacity to perform its core functions. Support BSDMA in conceptualizing and undertaking set of activities, implemented by other consultant firms, organization, and works and suppliers, in the following activities: i) developing a new EOC with state-of-art technology that cover all relevant hazards, including and especially flood and weather-related hazards; and ii) improving the flood early warning dissemination system to ensure timely and actionable information to

impacted population. PMTC will ensure close coordination between WRD (flood forecasting) and BSDMA (flood warnings).

Task 13: Other Tasks:

- ✓ Assist in preparing various reports as and when required by the World Bank and other government organisation.
- ✓ Assist in preparing Terms of Reference and defining the scope of services, and procuring additional support as required during project implementation to implement consultants own recommendations as well as the actions emerging from various reviews and feed-back information.
- ✓ Any other managerial support deemed necessary to support PMU during the course of implementation of the project that could be accommodated by the PMTC without deploying additional manpower and incurring additional costs, to ensure effective implementation of new initiative of the Government and World Bank agencies.

VII. Reporting Requirements

The Consultant will submit the following Reports:

- a) Inception Report: to be submitted within thirty days after the date of award the contract. The Inception Report shall specify the detailed methodology, staffing schedule, expected timeline for tasks, and the inputs required from WRD to deliver the services.
- b) Quarterly project progress reports as per task narrated above.
- c) Reports to be discussed during the various implementation support mission of the World Bank. These reports should include the findings of the stakeholder's workshops, areas needing improvements, and recommendations to enhance project outcomes.
- d) Final Report: Upon completion of the services containing the main lessons learnt from the assignment and sustainability roadmap of the initiative taken during the project.

VIII. Quantity:

Eight (8) hard copies in English and Electronic copy in PDF format. The Consultant shall discuss and agree with WRD about the contents of the reports.

IX. Consultant's Team:

The project will finance a Project Management and Technical Consultancy to support high quality and timely implementation of the project. As a result of the project funding, levels of work outputs are expected to increase significantly. The services of the PMTC are expected to provide the required management support to achieve the planned outputs. Particular attention will be given in the evaluation of proposals on how the consultant team mobilizes to provide support to the WRD. The Consultants are encouraged to propose a staffing plan and mobilization plan that best suits the needs of the project. The Consultants shall make the provision accordingly in their financial proposals.

The core team of the PMTC key personnel will consist of:

#	Position	Suggestive Man-months	Key tasks
1)	Team Leader	24	<ul style="list-style-type: none"> • Manage and guide the team of experts and consultants • Implement the tasks mentioned in the scope of work of the project. • Coordinate and consult with Project Director and the department regularly • Review and monitor the project preparation's progress in alignment with meeting the desired outcome and outputs. • Advise and assist the PMU in preparing a detailed project implementation plan and Annual Plans of Operation, which will include capacity building and training activities, outreach activities • Technical leadership, especially in fields of hydrology, IWRM, water resources development • Report writing, engagement with all PIUs, PMU and World Bank • Project management and Monitoring & Evaluation (M&E) reporting.

#	Position	Suggestive Man-months	Key tasks
2)	Procurement & Contract Management Specialist	24	<ul style="list-style-type: none"> • Providing expert advice on all procurement & Contract management matters to PIUs and PMU • Help prepare standard bidding documents for procurement of goods, works and services. • Help prepare guidelines and benchmarks for procurement system management. • Review sample contracts and assess gaps and help address systemic issues • Liaison with World Bank procurement specialists • Advice to PIUs on procurement matters • Support / training of PIU/PMU in procurement • To enable the team to achieve the requirement of negotiation with DEA, GoI
3)	Environmental Safeguard Specialist	24	<ul style="list-style-type: none"> • Prepare standard environmental safeguard document meeting all regulatory compliances by nation agencies and World Bank • Ensure compliance of environmental safeguard in bidding documents / procurement documents related to the projects • Liaise with World bank/Nation agencies for environmental safeguard clearances
4)	Social Safeguard Specialist	24	<ul style="list-style-type: none"> • Prepare standard social safeguard document meeting all regulatory compliances by nation agencies and World Bank • Ensure compliance of social safeguard in bidding documents / procurement documents related to the projects • Liaise with World bank/Nation agencies for social safeguard clearances
5)	Hydrologist and Hydrological Modelling Expert	24	<ul style="list-style-type: none"> • Monitor & support the PIUs/PMU in hydrology, IWRM, flood modelling, reservoir operation, water resources development etc. at all stages starting from planning, procurement, implementation and post implementation phases.
6)	Flood Management Expert	24	<ul style="list-style-type: none"> • Monitor & support the PIUs/PMU in IWRM, embankment & structural interventions, interlinking of rivers etc. for effective flood management and water resources development at all stages starting from planning, procurement, implementation and post implementation phases

#	Position	Suggestive Man-months	Key tasks
7)	Irrigation Management Expert	24	<ul style="list-style-type: none"> • Monitor & support the PIUs/PMU in IWRM, efficient irrigation management, reservoir operation, irrigation potential development, On-farm water management, participatory irrigation management etc. at all stages starting from planning, procurement, implementation and post implementation phases
8)	Disaster Management Expert	12	<ul style="list-style-type: none"> • Preparation of planning documents, procurement document and monitoring and management framework for strengthening the state's disaster response systems and mechanisms, strengthening the emergency response and communication systems of state agencies such as the fire department, the state disaster response force, and other immediate key response agencies in responding adequately to disaster situations through better search and rescue equipment, wireless communications and strengthening the BSDMA's capacity to perform its core functions. • Improve preparedness and strengthen the disaster risk reduction plan with particular emphasis on flooding.
9)	Instrumentation Expert	12	<ul style="list-style-type: none"> • Selection of equipment • Specification of equipment • Advice on telemetry • Advise the PIUs & PMU on technologies available for SCADA system. • Guide the PIUs in designing systems, the specifications, communication protocols and preparation of ToR and bid documents. • Site visits and review performance of the SCADA/ hydromet systems
10)	Monitoring and Evaluation (M&E) Specialist	24	Support PMU in putting up a robust Monitoring and Evaluation (M&E) System for the project, in consultation with other subject experts, in compliance to national and World Bank norms.

#	Position	Suggestive Man-months	Key tasks
11)	Digital development specialist	24	<ul style="list-style-type: none"> • Designing & development of MIS, data entry and reporting systems for efficient monitoring and administration of program activities of the BWSIMP project. • Training and technical support for the application and use of MIS systems by implementing and executing agencies to facilitate timely progress reporting. Any other work related to ICT services as required by BWSIMP Project
12)	Maintenances Engineer-cum-Programmer	24	
13)	Participatory Irrigation Management (PIM) Expert	18	Support PMU in enlisting Non-Governmental Organizations and monitor their work, including formation/strengthening of WUAs (including legal registration), their training and capacity building; facilitating handing over of and operations to WUAs, including transfer of O&M funds; and any other necessary support to PMU/NGOs for setting up PIM in Irrigation Schemes taken up under the project.
14)	Drainage and Silt Management Expert	12	Support PMU in planning, execution and evaluation of all drainage management activities (including channel linking and reclamation of water-logged areas) in the project; and help in putting up an in-house (WRD) Silt Management Unit, including procurement of equipment, human resources and any other required input.
15)	Agriculture Expert	12	Monitor and support the PIUs/PMU in all stages Agriculture related activities (including Pisciculture), starting from planning, procurement, implementation and post implementation phases
16)	Training and Communications Specialist	12	Support PMU in planning, implementation, monitoring and evaluation of all training and capacity building activities (for both staff and farmers) of the project; and coordinate with other PMTC staff to develop and implement a comprehensive communication strategy for furtherance of project ideas at all levels (from village to international level).

Experience and qualification of the key personnel would be as under.

SN	Position	Professional Experience	Educational Qualification	Specific Expertise
1	Team Leader	Minimum 15 years of working experience in design, planning and management of water resource projects /Irrigation project.	<ul style="list-style-type: none"> • Master's degree in Hydrology/ Hydraulics /Water Resources Engineering or equivalent from any recognised university. 	<ul style="list-style-type: none"> • Should have minimum 5 years of experience as Team Leader in similar nature of project and, • Should have minimum 5 years of experience in externally aided project.
2	Procurement & Contract Management Specialist	Minimum 10 years of working experience in Procurement Management for engineering/Infrastructural projects.	Post-graduation in Engineering/MBA (Finance) from any recognised University.	Should have at least 2 years of experience as Procurement Management Specialist or equivalent in externally aided project.
3	Environmental Specialist	Minimum 10 years of experience in Related field.	Master's Degree in Environmental Engineering /Environmental Science or equivalent from any recognised University	Should have at least 2 years of experience as an Environmental Expert in Water Resources/Irrigation Project in externally aided projects.
4	Disaster Management Expert	Minimum 10 years of experience in Handling disaster management related activities, relief reconstruction and preparedness measure.	Master's degree in Disaster Management from any recognised University	Should have at least 2 years of experience in disaster management projects in externally aided projects.

SN	Position	Professional Experience	Educational Qualification	Specific Expertise
5	Social Safeguard Specialist	Minimum 10 years of experience in related field.	Post Graduate Degree in concerned field from any recognised University	Should have at least 2 years of experience in formulating social protection and community development strategies in externally aided projects.
6	Hydrologist and Hydrological Modelling Expert	Minimum 10 years of experience in the field of hydrological modelling in water resources / hydrology projects.	Post-graduate qualification in hydrology or equivalent from any recognised University	Should have at least 2 years of experience in field of hydrological modelling in externally aided water resources projects.
7	Flood Management Expert	Minimum 10 years of experience in Flood management projects.	Post-graduate qualification in water resources or similar from any recognised University	Should have at least 2 years of experience in flood management in externally aided water resources projects.
8	Irrigation Management Expert	Minimum 10 years of experience in irrigation management projects.	Post-graduate qualification in water resources or similar from any recognised University	Should have at least 2 years of experience in irrigation management in externally aided water resources projects.
9	Instrumentation Expert	Minimum 10 years of experience in an instrumentation expert role, with good experience in hydromet instrumentation and telemetry systems	Post-graduate in relevant science or engineering from any recognised University	Should have proven record of planning & implementation of hydromet & SCADA systems.

SN	Position	Professional Experience	Educational Qualification	Specific Expertise
10	Digital development specialist	Minimum 10 years of experience in designing MIS applications and developing a dashboard and using data analytics for decision-making for government projects.	Bachelor degree in Computer Science or IT from any recognised University.	Should have at least one project experience in which he/she has successfully designed, developed and implemented MIS in externally aided projects.
11	Maintenances Engineer-cum-Programmer	Minimum 7 years of experience in development, troubleshooting and maintenance of IT systems/MIS application/websites. Conversant with web technologies/databases technologies	Bachelor degree in IT/Computer Science Engineering from any recognised University	Hands-on experience in development, maintenance, and troubleshooting of application in related technologies.
12	Participatory Irrigation Management (PIM) Expert	Minimum 10 years of experience in PIM	Masters degree in Rural Management or Sociology or Social Work from any recognized University	Hands-on experience in implementation of PIM activities is a must.
13	Monitoring and Evaluation (M&E) Specialist	Minimum 10 years of experience in Monitoring and Evaluation (M&E)	Post-graduate in Management or similar subject from any recognized University	Well versed with modern equipment and methods of M&E (including MIS); hands-on experience in M&E; and familiarity with M&E system of the World Bank or any other UN agency.

SN	Position	Professional Experience	Educational Qualification	Specific Expertise
14	Drainage and Silt Management Expert	Minimum 10 years of experience in Drainage Planning/Management and Silt Management	Masters degree in Civil or Water Resources Engineering from any recognized university	Well versed with modern equipment and methods of drainage and silt management; and hands-on experience in drainage planning and designing
15	Agriculture Expert	Minimum 10 years of experience in Agriculture related activities	Post-graduate in Agriculture from any recognized University	Hands on experience in Climate Smart Agriculture, improved agronomic practices, water use efficiency pisciculture and other agriculture related Technologies; familiarity with the work of ICAR institutions and UNFAO
16	Training and Communications Specialist	Minimum 10 years of experience in Communications and Training	Post-graduate in Communications or similar subject from any recognized University	Well versed with modern equipment and methods of training and mass communication; and hands-on experience with conduct of training and capacity building activities with a reputed training institute

X. Important points regarding key experts & staffs:

- ❖ Age of the team leaders, key experts, specialist and other staff proposed should not be more than 55 (fifty five) years on the last day of submission of the proposal.
- ❖ Team leaders, key experts, specialist and other staff should be preferably of Indian nationality and should have proficiency in English and Hindi.
- ❖ The client reserves the right to ask for details regarding the proof of age, qualification, experience certificate along with salary slips of each key experts,

specialists, team leader and other staffs must be attached as a proof of experience, and association of the key experts.

- ❖ The team leaders, key experts, specialist and other staff proposed by the Consultant should be available in person for presentations/discussions/ meetings with the client.
- ❖ Curriculum Vitae for each key expert to be provided in the proposal with a summary of experiences
- ❖ The team leader, key experts, specialist and other staffs should not be replaced without prior consent of the client. Any replacement of staffs should be done on the basis of proper justification, if the justification for replacement not found proper by WRD then last six-month remuneration paid to that replaced key personnel will be deducted from the next bill and the decision regarding this, taken by WRD will be final and bound to the consultant.
- ❖ If the performance of the team leader, key experts, specialist and other staffs is not found satisfactory by WRD then it would be immediately replaced with person having equivalent or better qualifications and experience, and at the same rate of remuneration.
- ❖ WRD reserves the right to exclude any of the key personal during the implementation and execution of the project as per requirement.

In addition, the WRD may ask the PMTC to engage any other expert as per requirement during implementation & execution of the project at mutually agreed terms. The payment for additional experts will be done separately.

XI. Inputs by the WRD / PMU

- 1) The WRD has created a dedicated Project Management Unit headed by Chief Engineer, Planning and Monitoring, WRD, Bihar for the implementation of the project, as Project Director. The Consultant's Team shall support the PMU Project Director and his dedicated Project Team in fulfilment of the tasks assigned.
- 2) The Consultant will work as part of the PMU office and WRD will provide access to the required relevant information and data as required to effectively undertake this assignment. Any relevant document available with the WRD would be shared with the Consultant's team for limited purposes of the assignment.

Other than mentioned in above point 1 & 2 no any other facility would be provided to the consultant by the department.

XII. Deliverables:

- 1) Inception Report: to be submitted within thirty days after the date of award the contract. The Inception Report shall specify the detailed methodology, staffing schedule, expected timeline for tasks, and the inputs required from WRD to deliver the services
- 2) Monthly Progress Report by the 10th day of every month;
- 3) Quarterly Progress Report by the 10th day of the month of submission;
The Progress Reports (Monthly and Quarterly) shall contain details of all meetings, decisions taken therein, mobilization of resources (Consultant's and the Contractor's), physical and financial progress and the projected progress for the forthcoming periods. The Report shall clearly bring out the delays, if any, reasons for such delay(s) and the recommendations for corrective measures. The Report shall also contain the performance data for Contractor's plant and equipment.
- 4) Project Implementation Plan (PIP), Project Procurement Strategy for Development (PPSD), Financial Management (FM) manuals and Annual Work Plan (AWP). (Within Three months after award of contract)
- 5) Designing MIS applications and developing a dashboard. (Within Six months after award of contract)
- 6) Terms of Reference, RFPs, EoIs, bid document etc., for the works, goods and consultancy services related to the project. (As and when directed)
- 7) Final Report at the completion of services and sustainability roadmap of the initiative taken during the project.

XIII. Schedule of Completion of Tasks of Consultant:

The duration of proposed Bihar Water Security and Irrigation Modernization Project (BWSIMP) would be for seventy-two (72) months. Initially PMTC would be hired for 24 months, but extensions may be granted based on their satisfactory performance till the completion of the project.