KHYBER PAKHTUNKHWA (KP)
P176780- Rural Investment and Institutional Support Project (RIISP)
Terms of Reference for Consultants

For

"Comprehensive Master Plan for Integrated Irrigation Infra-structure development & Water Resource Management Plan in Merged Districts/Sub-Divisions with Feasibility Studies, Detailed Designs and Construction Supervision of high priority schemes"

1. BACKGROUND OF THE PROJECT

Khyber Pakhtunkhwa (KP), the third most populous province in Pakistan, has achieved significant strides in reducing poverty in recent years. Despite this progress, certain areas within the province continue to face vulnerabilities. The poverty rate in KP decreased from 73.8 percent in the fiscal year 2002 to 27 percent in the fiscal year 2014, marking the most substantial decline among all provinces in Pakistan. However, a considerable portion of KP's 30.5 million residents, as well as three-quarters of the five million inhabitants in the former Federally Administered Tribal Areas (FATA, now referred to as Newly Merged Areas or NMA), still grapple with multidimensional poverty.

With over 30 percent of the population falling between the ages of 15 and 29, the youth face limited opportunities, and the unemployment rate stands at 11%. The majority of KP's population, approximately 85 percent, resides in rural areas where access to public services is not only inferior but also deteriorating. In rural areas, only two-thirds of the population have access to improved water sources, compared to 94 percent in urban areas. Additionally, the share of rural households with access to piped water sources has declined from 40 to 29 percent between 2005 and 2015 due to crumbling infrastructure.

The challenging conditions, compounded by malnutrition and inadequate access to clean water, sanitation, and hygiene, contribute to childhood stunting. This issue affects 40 to 49 percent of children under five in both KP and NMA. Gender disparities persist across various outcomes, including access to basic services.

1.1. The Newly Merged Areas (NMAs)

The integration of the former Federally Administered Tribal Areas (FATA) into Khyber Pakhtunkhwa in 2018 represents a significant development opportunity for both the province and the nation. The Newly Merged Districts (NMD) encompass a vast area of 27,200 square kilometers, housing a population of approximately 4.8 million. This region consists of eight districts Bajaur, Mohmand, Khyber, Kurram, Orakzai, North Waziristan, and South Waziristan (Upper) and South Waziristan (Lower) that collectively constituted the erstwhile FATA. Additionally, six adjacent tribal areas, previously known as the Frontier Regions (FR) and now termed Sub-Divisions, include Peshawar, Kohat, Bannu, Lakki, Marwat, Tank, and Dera Ismail Khan.

The NMD currently lags behind in various socioeconomic and developmental indicators. During the merger, historical factors, as well as institutional and administrative systems in these areas, contributed to low levels of basic service provision and development outcomes. At that time, these regions exhibited some of the lowest and least developed indicators in the country, as illustrated in Table 1.

Table 1: Selected Comparative Indicators for NMD, KP and Pakistan (2018)

Indicator	NMD	KP (excluding NMD)	Pakistan averages
GNI (per capita) (2018)	US$ 2,509	US$ 4,328	US$ 5,190
Human Development Index	0.216	0.628	0.557
Percent of population below poverty line	52.0%	40.0%	24.3%
Net enrollment rate (primary)	52.1%	59.0%	73.8%
Maternal Mortality Rate (per 100,000)	395	275	140
Immunization of children (%)	33.9%	40.0%	60.6%
Population with access to improved drinking water	46.7%	91.3%	92.6%

1.2. Institutional development

A crucial factor contributing to the limited development outcomes in the merged areas is the enduring absence of significant state presence. Historically, the FATA region operated under a political, administrative, and judicial system designed during the colonial era, effectively isolating its residents from the prevailing systems in the rest of the country. This administrative and political framework persisted into the formation of Pakistan, where tribal areas adhered to Rewaj (customs), a tribal code governing dispute resolution through Jirga, collective responsibility imposition, and mutual restraint and revenge.

Remaining outside the jurisdiction of provincial administration systems, the tribal areas were overseen by a FATA Secretariat (established in 2006), responsible for planning, implementing, and monitoring development activities in the region. In 2018, the Newly Merged Areas (NMA) were brought under the legal and governmental authority of the Government of Khyber Pakhtunkhwa (GoKP). Following this merger, residents of NMA expressed heightened expectations for improved service delivery, particularly in essential areas such as clean water, food security, education, and health.

The Tribal Decade Strategy (2020-2030) emphasizes the expansion of administrative and service delivery systems as a crucial prerequisite for enhancing development outcomes in regions grappling with some of the highest poverty rates in Pakistan.

1.3. The Project

The Government of Khyber Pakhtunkhwa (GoKP) has formally sought the assistance of the World Bank, requesting a US$300 million IDA Credit. This financial support will be provided in two successive phases over an eight-year duration. The primary goal is to enhance access to resilient and dependable basic services for households situated in the newly merged areas of Khyber Pakhtunkhwa. The Khyber Pakhtunkhwa Rural Investment and Institutional Strengthening Project (KPRIISP), constituting the first phase of the program, aims to fortify state capabilities in delivering basic services and constructing climate-resilient infrastructure within the project areas, with a specific focus on aiding the poor and vulnerable populations. The initial phase involves a funding commitment of US$200 million spanning six years. This allocation addresses a crucial financing gap within the province's objectives, facilitating the effective management of the transition toward local governance and the enhancement of development outcomes in the recently merged districts.

1.3.1. Project Components

The project encompasses support for five key components:

Component A: Multisectoral Investments and Improved Service Delivery (US$90 million)

This component aims to finance multisectoral infrastructure investments in water supply, sanitation, rural roads, and agriculture sectors within the newly merged districts and frontier regions of the province. It involves the establishment, refurbishment, or expansion of service delivery centers and facilities at district and sub-divisional levels. This ensures the extension and presence of administrative and sectoral systems and services.

Component B: Institutional Development of Merged Areas (US$55 million)

Focused on bolstering state responsiveness to citizens, this component finances investments in lower tiers of government and service delivery. It includes institutional strengthening and capacity building of village councils and communities for participatory planning, budgeting, monitoring, social accountability systems strengthening, community development, and behavioral change outreach. Conditional grants are provided to village councils for local infrastructure priorities aligned with community preferences. Local public service delivery centers at the tehsil level facilitate access to services, particularly civil and vital records.

Component C: Emergency Flood Response (US$50 million)

This component supports the Government of Khyber Pakhtunkhwa (GoKP) in flood recovery and reconstruction efforts while enhancing climate resilience. Funding is allocated for the reconstruction and rehabilitation of public infrastructure damaged by floods, encompassing roads, bridges, public buildings (especially elementary schools and basic health units), and irrigation and flood protection infrastructure. Design principles prioritize improved standards and climate resilience to ensure building back better and increased protection from climate-related extreme weather events.

Component D: Project Management, M&E and Technical Assistance (US$5.0 million)

Dedicated to supporting the effective implementation of the Project, this component assists the GoKP in coordinating all project-related activities, monitoring, technical assistance, and training.

Component E: Contingent Emergency Response Component (US$0 million)

In the event of an eligible crisis or emergency, this component allows the Borrower to request the Bank to re-allocate project funds to support emergency response and reconstruction.

2. OBJECTIVES OF THE ASSIGNMENT

In the Newly Merged Districts (NMDs), there has not been a systematic assessment of the scope, potential, and availability of water resources. Additionally, the evaluation of the current and prospective water infrastructure, including rivers, irrigation channels, small dams, check/mini dams, tube-wells, dug-wells, and lift irrigation schemes (some powered by solar energy), has not been conducted comprehensively. Flood Management Measures (FMM) encompass structures like Flood Protection Works (FPW), retaining walls, dams, and embankments.

The potential for utilizing subsurface water from natural streams for irrigation purposes, whether through methods like infiltration galleries or underground weirs, and exploring opportunities for recharging ground aquifers remains unexplored. Similarly, numerous irrigation schemes are either non-functional or partially functional due to flood damages, and there is potential for their rehabilitation and improvement.

The primary aim of the consulting services is to support the Irrigation Department in several key tasks:

a) Evaluate water resources and formulate a comprehensive master plan for water resources development in each of the eight merged districts and six sub-divisions frontier regions (FRs).

b) Identify and prioritize schemes with a high level of urgency for implementation, with feasibility studies.

c) Prepare detailed designs and support in preparation of the bidding documents for selected priority schemes (approximately 2-3), including the necessary social and environmental assessments and studies.

d) Oversee the construction of priority schemes through diligent supervision and management.

3. SCOPE OF WORK

The detailed scope of work will include, but is not limited to, the following tasks:

3.1. Task-A: Development of A Master Plan

The primary task for this project is the development of a comprehensive master plan for irrigation assets in the merged areas. The newly merged districts (NMDs) face several pressing challenges related to irrigation, flood management, and water resource development. These challenges necessitate the creation of a strategic framework that addresses the following:

- Efficient water resource management to ensure sustainable agriculture and water availability for the population.
- Effective flood management to mitigate the impact of flood disasters, especially in the context of climate vulnerabilities.
- Infrastructure planning and development to support irrigation and flood control.
- Identification of priority schemes to allocate resources efficiently.

The selected consultant will be responsible for conducting an in-depth analysis and preparing a master plan that addresses the following key components:

- Comprehensive assessment of surface water availability in the main rivers and their major tributaries within the merged areas.
- Detailed assessment of flood discharges and flood limits to aid in flood management and mitigation.
- Identification of water sector projects and flood mitigation proposals in the main rivers and their major tributaries.
- Development of structural and non-structural interventions to manage water resources and mitigate floods.
- Compilation of an inventory of existing irrigation assets including flood protection works and other infrastructure in flood plains.
- Marking of flood limits to prevent encroachments in waterways.
- Assessment of surface water availability to support agriculture and other sectors in the merged areas.

3.1.1. Consultant Activities

The work and activities in this task would include, but not limited to the following:

i. Conduct a comprehensive water resources assessment within the Merged Areas, encompassing districts such as Bajaur, Mohmand, Khyber, Kurram, Orakzai, North Waziristan, South Waziristan Upper, and South Waziristan Lower. This assessment will identify the location, extent, dependability, and quality of water resources.

ii. Gather recent and historical meteorological, hydrological, geological, geo-technical, and agricultural data pertinent to the target areas. This data includes information on precipitation, evaporation, river flow, surface storage, soil moisture, groundwater, and population use. Additionally, assess the projected population growth in the area.

iii. Determine the origin of water resources, particularly examining whether they originate or flow across international boundaries, thus categorizing them as international waterways. Evaluate any international treaties or agreements governing their use.

iv. Develop a water master plan for each of the merged areas, outlining a medium and long-term horizon of 10, 15, 20, and 25 years. This plan should reflect the overall availability of water resources and present a decade strategy for their development. The strategy should propose clear criteria for identifying priority investments and areas, along with a sequencing approach for the merged areas over the next ten to 25 years.

v. Provide rough cost estimates for the identified investments, specifying their implementation period. Offer an optimal investment strategy/plan that considers the available resources for investment.

vi. Identify, based on agreed criteria, investments that need to be undertaken in the short to medium term, including those that can be included in this Project.

vii. Conduct feasibility studies (technical, social, and environmental) for priority investments to be financed by the Project. These investments are derived from the priority list and should not adversely impact the flows of international waterways.

3.1.2. Expected Outputs and Deliverables

i. Taking into consideration the security situation and accessibility challenges in some of the merged districts, the consultant will formulate the master plan on a district-wise basis, with a preference for districts free from security or accessibility issues. The sequence for master planning will be Orakzai, Khyber, Kurram, Mohmand, Bajaur, North Waziristan, South Waziristan (Upper), and South Waziristan (Lower). The consultant will submit interim master planning reports for each district, emphasizing prioritized projects for subsequent design and construction supervision. The steering committee will review and approve the identified projects, which will then undergo design by the consultant. Tender documents will be prepared and advertised for the contract award of construction. These district-wise reports will later be amalgamated to create the final master planning report encompassing the entire Newly Merged Areas (NMAs).

Table-2: Tentative Schedule of Deliverables Task-A (Will be included in the Contract)

S. No.	Deliverable	Months from Contract Signing
1	Inception Report	One Month
2	District wise Master Plan for Orakzai, Khyber and Kurram and adjoining Sub-divisions	Three Months
2.1	Master Plan for Orakzai	One Month
2.2	Master Plan for Kurram	Two Months
2.3	Master Plan for Khyber	Three Months

3	District Wise Master Plan for Mohmand and Bajaur and adjoining Sub-divisions	Five Months
3.1	Master Plan for Mohmand	Four Months
3.2	Master Plan for Bajaur	Five Months
4	District Wise Master Plan for North Waziristan, South Waziristan (Upper) and South Waziristan (Lower) and adjoining Sub-divisions	Nine Months
4.1	Master Plan for NW	Six Months
4.2	Master Plan for SW (Upper)	Seven Months
4.3	Master Plan for SW(Lower)	Eight Months
5	Final Master Plan for Merged Areas	Ten Months

3.2. Task B: Preparation of Detailed Designs and support in preparation of the Biding documents

The scope of work and activities under this Task would include, but is not limited to, the following:

i. Develop detailed designs for priority schemes, conducting comprehensive designs suitable for the bidding process, and prepare corresponding bidding documents for irrigation water schemes prioritized in the water resources assessment and the water master plan outlined by the consultants for the merged areas as detailed above. In cases where designs for priority schemes are already available, the Consultant will review and suggest any necessary modifications.

ii. The Consultant will conduct essential topographical surveys and other site investigations, including soil and water sampling where necessary, utilizing appropriate ground-based technology, satellite imagery, GIS, and other computerized systems. This data collection process is vital for engineering studies, as mentioned earlier, and for the preparation of detailed designs. The Consultant will employ the necessary studies, geological investigations, and adhere to acceptable standards for geometric and structural designs, ensuring the integration of climate resilience in the proposed designs.

iii. Identify and evaluate land needs, as well as potential requirements for land acquisition for the facilities outlined in each sub-project.

iv. Collaborate with the Irrigation departments to formulate typical designs for the facilities, ensuring they can be easily adapted to specific site conditions during the detailed design stage. Establish criteria based on the availability of local construction materials, functionality, accessibility, usage, topographic conditions, existing communication networks, centrality to the population to be served, demarcation of the target population, minimizing operation and maintenance

(O&M) during operation, and considering possible changes throughout the life of the proposed facilities.

v. Generate estimates for construction quantities, materials, and equipment, and formulate detailed cost estimates based on the prevailing Market Rate Schedule. Present the estimates in a proper engineering format, incorporating suitable physical and price contingencies, and provide a breakdown by major work items.

vi. Develop a bill of quantities, specifications, and detailed engineering drawings illustrating any new construction and rehabilitation works required for existing facilities.

vii. Create cost estimates for the annual operation and maintenance (O&M) of facilities to be constructed under the project. Outline the budgetary requirements, as well as the necessary manpower and resources for effective O&M.

viii. Formulate and recommend the optimal approach to package the development of selected facilities. Propose a procurement strategy, method of procurement, and a timetable with specific timelines for the procurement and construction of each package, including completion and handover for regular use.

ix. Conduct environmental and social assessments, and develop social and environmental management plans for each cluster, package/sub-project, or facilities included in a group.

x. Prepare the Engineer's cost estimate for each contract package in a standardized manner, incorporating appropriate levels of contingencies, taxes, duties, etc.

xi. Undertake the preparation of detailed designs for all construction, equipment, plants, and facilities, covering various work activities, with due consideration to:

   a. Consideration of site conditions, technical standards, usage, aesthetics, and ergonomics.

   b. Exploration of technological innovations to meet requirements with cost-effective solutions, encompassing technology and construction methods.

   c. Conduct geo-technical investigations and laboratory analyses to determine basic design parameters for structures, and identify suitable construction materials (and/or disposal areas as needed) for material and concrete aggregates. The consultants will specifically carry out technical, environmental, and social impact analyses of any materials generated during construction activities, along with preparing detailed designs for their safe disposal.

   d. Establish criteria for detailed designs, including supporting computations for proposed office and administrative structures and/or other infrastructure works according to recognized international standards. Drawings will be prepared to the extent that allows for accurate cost estimates and facilitates contractors in preparing their bids and construction drawings.

   e. Selection of appropriate materials, optimization of designs, and identification of cost-effective options meeting technical requirements. Estimate quantities of construction materials, etc., for the preparation of bidding documents.

f. Conduct hydrological studies to determine water requirements, availability, projected demand, proposed extraction levels, and the upstream and downstream impact of extractions.

g. Analyze water disposal, its impact on water quality and quantity in the disposal area, estimate treatment requirements for proper disposal, etc.

h. Assess the hydrology of the area, drainage, and flood management systems, ensuring facilities are protected from extreme floods, landslides, rock and boulder movements, earthquakes, fires, and other natural calamities and disasters.

i. Develop technical specifications, architecture, and engineering drawings necessary for tender documents, bill of quantities (BOQs), specifications, and bidding documents. The bidding documents will be prepared as per approved procurement plan following the formats and standards defined in the World Bank Procurement Regulations for such works, utilizing World Bank Standard Procurement Documents for contracts to be procured.

j. Prepare engineer's cost estimates for works/contracts, along with requirements for construction supervision, including facilities, material testing labs, on or off-site as needed, equipment, staffing, or any other special requirements.

k. Compile a comprehensive design report, including an Environmental Management Plan, Social Management Plan, Resettlement Action Plan, and any other site-specific plans aligned with the project's Environment and Social Management Framework.

l. Install a web-based electronic live monitoring system on the construction site with sufficient details to facilitate remote construction supervision. The requirements and installation of this system will be incorporated as a requirement in the BOQ as paid items for each contract implemented under the Project.

3.2.1. Operation and Maintenance (O&M)

The consultants are required to:

i. Estimate the operation and maintenance (O&M) requirements for both the sub-project and project facilities throughout the project's life.

ii. Propose effective institutional arrangements and establish water rates/charges to ensure the proper O&M of the irrigation systems within the project area.

iii. Clearly define the roles of users, their informal groups, and formal associates in the O&M of the project facilities. Identify training requirements and develop a corresponding training program.

iv. Identify the necessary equipment, office space, and other facilities required for the effective O&M of the project facilities.

3.2.2. Cost Recovery

Evaluate the existing system for recovering capital and operation and maintenance (O&M) costs. Suggest approaches to enhance user participation in implementation and recommend the most efficient method for cost sharing and recovery.

3.2.3. Project Cost Estimates, Benefits and Economic Analysis

i. based on the detailed analysis of each subprojects determine the cost estimate for each subproject. These cost estimates would include cost of all components of the project (i) civil works systems in the whole project area; (ii) equipment, and machinery that are proposed to be provided under the project; (iii) monitoring and evaluation of the project implementation and project impact in the long run; and (iv) surveys and detailed design, construction supervision and contract management, field engineers, operation of the project offices etc.

ii. provide estimates of project benefits. Under alternative scenarios (such as present, future-without-project and future-with-project) and in financial and economic prices, carry out the financial and economic analysis.

iii. estimate cost & benefits and economic and financial Internal Rates of Returns for the sub-project/contract and the Project overall. Identify project risks and carry out sensitivity analysis and impact on the economic rate of return; and

iv. propose optimal project design considering economic returns to varying level construction.

3.2.4. Environment and Social Impact Assessments, Occupational health and safety plans and preparation of Plans

Prior to commencing the detailed design of various contracts, the Consultants will undertake a comprehensive Environmental and Social Impact Assessment (ESIA). This process will involve identifying land requirements, ownership, and potential environmental and social issues associated with the construction of infrastructure, facilities, and the approach roads to be constructed. Initially, it is anticipated that the government will provide the necessary land for these facilities, and this will be confirmed during the environmental and social assessments. The required social management plan, as well as the land acquisition and detailed Resettlement Action Plan (RAP), will be prepared, if necessary, in accordance with World Bank Guidelines for works covering each contract. The ESIA will identify and provide a management plan for environmental and social issues (ESMP), developed in consultation with the project area, following World Bank guidelines and adhering to the procedures and guidelines of the KP Government. The project ESMPs and other documents would be prepared in line with the project Environment and Social Management Framework (ESMF), available on https://pndkp.gov.pk/2022/12/13/khyber-pakhtunkhwa-rural-investment-and-institutional-support-project/.

The Consultant will offer support in identifying alternative sites for resettling people and related assets and cultural properties. They will prepare plans for the development of these sites, including infrastructure planning, utilities, replacement housing, etc. The Consultants will assist in meeting architectural requirements for each location and obtaining

construction permits to complete the works. Additionally, they will support the design of critical infrastructure for any settlement, including approach roads, connectivity, utilities, prepare bidding documents, and conduct construction supervision for development and housing as needed, upon instruction from the GoKP. The RAP will be updated and modified periodically but no less than once a year, reflecting the status of implementation changes on the ground during the implementation period.

3.2.5. Environmental Assessment, Environmental Management Plan, EIAs

The Consultants will prepare an Environmental Assessment and EMP for each package of work under the Project. This EA/EMP will be integrated into the design report, cleared by the World Bank and KP EPA, and updated during implementation according to the defined requirements and procedures. The Consultants will provide support in implementing EMP activities during project implementation, including document preparation, obtaining local permits, discussions with local authorities, resolution of issues, etc.

Conduct hydrological studies to determine the upstream and downstream impact of water extraction. Similarly, carry out an environmental impact assessment of water disposal into the streams, including water quality impact and the required treatment of the water to be disposed of.

3.2.6. International Waterway Aspects

Assess whether a sub-project or a set of sub-projects is situated on an international waterway. The consultants should analyze the potential impact of the sub-project beyond national boundaries, if any, and endeavor to quantify such potential impacts in accordance with international procedures commonly employed for projects on international waterways. Develop a framework and support the government in engaging in dialogues with other riparian states about the project's impact, facilitating the attainment of a shared understanding of these impacts.

3.2.7. Occupational Health and Safety Plans (OHS) and Labor Management Plans (LMP)

The consultant would prepare OHS and LMP for each contract package.

Table-3: Schedule of Deliverables Task-B

S. No.	Deliverable	Months from Contract Signing
1	Approval of priority schemes in District Orakzai, Khyber and Kurram and adjoining Sub-divisions from Steering Committee	Orakzai (2nd Month) Kurram (3rd Month) Khyber (4th Month)
2	Draft engineering design of priority schemes approved at S. No. 1	Orakzai (2nd Month) Kurram (3rd Month)

		Khyber (4th Month)
3	Final Detailed Design Report for S. No. 1	Orakzai (3rd Month) Kurram (4th Month) Khyber (5th Month)
4	PC1s & Bidding Documents (BOQs, Specifications and Tender Drawings)	Orakzai (4th Month) Kurram (5th Month) Khyber (6th Month)
5	Approval of priority schemes for Mohmand, Bajaur and adjoining Sub-divisions from Steering Committee	Mohmand (5th Month) Bajaur (6th Month)
6	Draft engineering design of priority schemes for S. No. 5	Mohmand (6th Month) Bajaur (7th Month)
7	Final Detailed Design Report for S. No. 5	Mohmand (7th Month) Bajaur (8th Month)
8	PC1s & Bidding Documents (BOQs, Specifications and Tender Drawings) for S. No. 5	Mohmand (8th Month) Bajaur (9th Month)
9	Approval of priority schemes for North Waziristan, South Waziristan (Upper) and South Waziristan (Lower) and adjoining Sub-divisions from Steering Committee	NW (7th Month) NW(Upper) (8th Month) NW (Lower) (9th Month)
10	Draft engineering design of priority schemes for S. No. 9	NW (8th Month) NW(Upper) (9th Month) NW (Lower) (10th Month)
	Final Detailed Design Report for S. No. 9	NW (8th Month) NW(Upper) (9th Month) NW (Lower) (10th Month)
	PC1s & Bidding Documents (BOQs, Specifications and Tender Drawings) for S. No. 9	NW (9th Month) NW(Upper) (10th Month) NW (Lower) (11th Month)

3.3. Task C: Supervision of Construction and Administration of Contracts, Including the Role as "The Engineer and/or Project Manager"

The Consultants will oversee the construction of all the works mentioned under this component of the Project. In this capacity, the consultant will undertake the following activities:

a. Designated as the "Engineer" (and/or Project Manager) for civil works, goods, equipment supply, and installation contracts, as well as other goods contracts, the Consultants will assume responsibility for inspecting and supervising construction works. This includes overseeing equipment installation and testing construction materials to ensure that the implemented works and supplied construction goods adhere to the designs, specifications, and terms and conditions outlined in the relevant contracts and standards. The Consultants will ensure that the procurement of construction goods, services, and civil works contracts aligns with World Bank Policies and Regulations. Additionally, they will ensure that the contracts are signed and managed appropriately, incorporating any necessary changes or variation orders during implementation.

b. In the realm of contract management, the Consultant will undertake, but not be limited to, the following activities:

   i. Administration and management of contracts.

   ii. Thorough supervision of construction activities, measurement of quantities, certification of contractor payments, and ensuring adherence to specifications.

   iii. Testing of materials both on- and off-site, and, when necessary, conducting in-factory testing during manufacturing, along with the inspection of goods and materials.

   iv. Conducting soil testing for quality verification of pay items following standard testing procedures.

   v. Reviewing contractors' submissions, verifying progress, and certifying interim payment certificates.

   vi. Assisting clients in identifying variances in work, when necessary, and making revisions to designs and costs accordingly based on the specific needs of ongoing contracts.

   vii. Determining final construction quantities.

   viii. Preparing monthly progress reports, as well as quarterly, mid-term, and final reports.

   ix. Maintaining records for all activities related to the assignment.

   x. Acceptance of contracts/works or goods and closure of contracts, issuance of completion certificates in consultation with the client, and preparation of documents required for the acceptance of works/goods by the investor (GoKP).

xi. Preparing operation, maintenance, and management manuals for the facilities constructed under the project.

xii. Ensuring proper demobilization and restoration of construction sites after completion, and overseeing operation and maintenance during the warranty period by the contractors.

xiii. In the event of contractual disputes that may lead to legal action, adjudication, or arbitration between the contractor and the Employer, and upon the instruction of the Employer, the Consultant will compile and prepare factual documentation describing the circumstances of the dispute, and if required, attend hearings.

xiv. Fulfilling all obligations provided for the Engineer/Project Manager in Civil Works Contracts including the E&S aspects.

c. The Consultants will ensure that all data collected through the platform complies with data privacy standards.

3.3.1. Project Management Support

i The Consultants will assist the employer in comprehensive project management throughout the project implementation stage. This involves activities such as formulating project implementation plans, annual expenditure planning, budgeting, and financing forecasts and plans. Monthly, quarterly, and annual reports or work programs and presentations, as required by the Irrigation Department for respective project components and financiers, will be prepared with their support. They will also contribute to the development of procurement plans, contract management, and financial management, creating a system that can be linked with the Project Management or field units responsible for overall financial management of the project. These plans will be regularly updated as needed by the employer.

ii The Consultants will support in obtaining necessary permits, including site permits and construction permits, and act on behalf of the Owner as designated. They will also assist the employer in the procurement of works and equipment under the project, preparing bidding documents for such procurement, supporting bid evaluation, preparing bid evaluation reports, managing contracts, and implementing Environmental Impact Assessments (EIAs), Environmental Management Plans (EMPs), Livelihood Management Plans (LMPs), Resettlement Action Plans (RAPs), and addressing day-to-day management issues.

iii The Consultants will support all procurement activities under the Project, including preparing documents for the pre/post qualification of contractors and establishing pre/post qualification criteria where required. They will assist the employer in any pre/post qualification processes, such as issuing invitations to pre-qualification, evaluating pre-qualification applications, preparing pre-qualification reports, and handling post-qualification procedures.

iv The Consultants will support the employer in drafting terms of reference for any additional work to be conducted under the project that requires additional services. They will identify and provide technical assistance and training to project staff, developing an overall training program for on-the-job training and possible study tours based on the assessment of training and technical assistance needs for the employer's implementation of the project and other programs. The training

programs are likely to cover, but not be limited to: (a) on-the-job training for data systems and digital platforms management; (b) project management, project planning, expenditure planning, and budgeting; (c) preparation of detailed designs according to international standards, EIAs, RAPs; and (d) procurement and contract management following the World Bank Procurement Regulations and any other applicable local rules and guidelines. The Consultant will assist the employer in meeting all audit requirements.

Table-4: Schedule of Deliverables Task-C

S. No.	Deliverable	Months from Contract Signing
1	Monthly Progress Report	Monthly
2	Quarterly Progress Report	Quarterly
3	Mid Term Report of the project's status and performance	After Two year since commencement of Construction supervision phase
4	Any other report as desired by the Client	According to the agreed schedule
5	Final Report	On completion

3.4. Task-D: Integrated Irrigation Asset Management System for Merged Areas (IIAMS-MA)

The consultant will spearhead the development of the "Integrated Irrigation Asset Management System for Merged Areas (IIAMS-MA)," a comprehensive digital platform aimed at cataloging and managing both existing and new irrigation assets in the merged areas. This initiative not only focuses on efficient information management but also seeks to enhance the capacity of the Irrigation Department for improved planning and the prevention of duplication of efforts.

Key Tasks of the Consultant:

i. Asset Inventory Assessment:
   a. Conduct a thorough assessment of existing irrigation assets, capturing essential details such as location, type, capacity, and condition.
   b. Identify and document any new irrigation assets that have been or will be introduced in the merged areas.

ii. Data Standardization:
   a. Develop a standardized framework for organizing and categorizing irrigation asset data.
   b. Ensure consistency in data formats, nomenclature, and key attributes to facilitate seamless integration into the digital system.

iii. Digital Platform Development:

a. Design and create a user-friendly digital platform for storing and managing irrigation asset information.
b. Implement features for easy data input, retrieval, and update by authorized personnel.

iv. Geospatial Integration:
a. Integrate geospatial data to provide a visual representation of the irrigation assets on maps.
b. Utilize GIS technology to enhance the accuracy and effectiveness of asset location tracking.

v. Information Security:
a. Implement robust security measures to safeguard sensitive irrigation asset data.
b. Establish user access controls and authentication protocols to ensure data integrity and prevent unauthorized access.

vi. Compatibility and Scalability:
a. Ensure compatibility of the digital system with various devices and operating systems.
b. Design the system with scalability in mind, allowing for the seamless addition of new assets and functionalities in the future.

vii. Training and Capacity Building:
a. Provide training sessions to relevant stakeholders on how to use the digital system effectively.
b. Offer ongoing support and capacity-building initiatives to ensure the continued success of the system.

viii. Data Migration:
a. Develop a strategy for migrating existing data into the new digital system.
b. Execute a smooth transition process, minimizing disruptions to ongoing irrigation operations.

ix. Reporting and Analysis:
a. Implement reporting tools to generate insightful analytics and reports on irrigation asset performance, maintenance needs, and overall functionality.
b. Enable stakeholders to make informed decisions based on the data collected.

x. Monitoring and Evaluation:
a. Establish a monitoring and evaluation framework to assess the effectiveness of the digital system.
b. Gather feedback from users to identify areas for improvement and implement enhancements as needed.

Table-5: Schedule of Deliverables Task-D

S. No.	Deliverable	Months from Contract Signing
I	Prototype of the System	Five Months

2	Beta Version of the System	Nine Months
3	Final Version of the System	One year
4	Training and Capacity Building of the Users	13 Months
5	Monitoring and Evaluation of the system for enhancement and Improvements	Till completion of the project

4. FORMAT OF DELIVERABLES

All outputs are to be issued in electronic format along with paper copies to be submitted to Client/Employer. The EA/RAP summaries should also be prepared in local language for dissemination and disclosure in the Project area according to the World Bank guidelines.

5. INSTITUTIONAL ARRANGEMENTS

a. The Project Implementation Unit (PIU) established within the Irrigation Department, led by the Project Director, will oversee project monitoring. The PIU's responsibilities encompass project management, fostering communication and coordination with the donor (World Bank), engaging with the provincial government, conducting periodic reviews of both the physical and financial progress, ensuring the implementation of decisions made by the Project Steering Committee, and devising a transparent mechanism for monitoring project activities.

b. The Consultants will carry out project execution in collaboration with the Irrigation Department Merged Area, which includes the Chief Engineer (Merged Areas), Three Superintending Engineers (North & South), Director Ground Water, and seven Executive Engineers (Bajaur, Mohmand, Khyber, Kurram, Orakzai, North & South Waziristan).

c. Following the inception stage, the Consultants will develop a comprehensive schedule and task-flow diagram. This document will outline the specific tasks outlined in these Terms of Reference, elucidating the interdependencies between tasks. The schedule is designed to ensure the timely implementation of actions specified in the assignment, facilitating the prompt completion of works. It will also delineate coordination mechanisms with the client and other relevant entities. Regular updates to the schedule will be made throughout the project to provide current guidance on work activities and schedules.

6. DURATION OF THE ASSIGNMENT

The service duration spans six (06) years, with the master planning, feasibility, and detailed design work anticipated to conclude within the initial year of the assignment. Construction supervision of the schemes is scheduled to commence upon the conclusion of the design phase. The contract extends for the entire project duration, depending on satisfactory performance, and encompasses the warranty/defect notification period for the works carried out under the Project. Following project closure, the Consultants will be

accountable for addressing any technical queries that may arise intermittently, particularly during the initial year post-closure (during the defect notification/warranty period).

7. RESPONSIBILITIES OF CONSULTANTS

The Consultants are tasked with the comprehensive performance of services outlined in the preceding sections of this TOR. The Project Director of the Irrigation Department will assist by providing existing data and information, including all reports prepared thus far for the Project. Additionally, the GoKP will offer support in obtaining relevant clearances and permissions necessary for undertaking work in the Newly Merged Districts (NMD).

The Consultant bears full responsibility for securing and maintaining the office space and accommodation essential for its Project-related activities. Furthermore, the Consultant is required to provide the necessary transport for its staff to carry out these activities. The anticipated setup involves the Consultant maintaining an office in Peshawar throughout the assignment's duration, along with field offices as per the implementation and supervision requirements for civil works and other contract packages. The equipment to be provided by the Consultant encompasses, but is not limited to:

- All desks, chairs, and storage facilities;
- Computers equipped with necessary software, including AUTOCAD, Autodesk Civil 3D and standard word-processing, data analysis, and spreadsheet software;
- Printers, copiers, plotters, and scanners for various-sized maps;
- Telephones;
- Projector for presentations;
- Surveying equipment and software; and
- All consumables (paper, stationary, ink, toner, etc.)

The consultancy cost and consultants' proposals are expected to cover all associated expenses, including surveys, investigations, technical studies, system development, environmental studies, social assessments, RAP, as well as transport costs and office facilities.

8. QUALIFICATION OF FIRM AND EXPERTS

The consulting firm must have a minimum of 10 years of registration in a related business and should have successfully executed at least three comparable assignments of equivalent scale and complexity. The firm's track record should demonstrate a documented history of producing high-quality reports that are both concise and comprehensive, facilitating informed policy and technical decisions.

The key staff team members are required to possess relevant expertise and skills necessary for validation. It is recommended that this team be inclusive of resources with a blend of skills encompassing project management, digitization, data collection, data entry, data verification, data analysis, and reporting, in accordance with the specified requirements.

8.1. Staffing Requirements

The consultants are advised to leverage expertise available in Pakistan whenever feasible. Having experience with World Bank-financed projects or other multilateral development banks is desirable for successfully executing the assignment. In cases where essential skills and expertise are not internally available, the consultants are encouraged to form associations with other firms, either through Joint Venture or Sub-Consultant arrangements. The proposed team composition by the consultants should be comprehensive, outlining task assignments for each key staff member and ensuring adequate support staff to effectively fulfill the objectives and scope of services outlined in these Terms of Reference.

8.2. Indicative team structure

A tentative list of key professional staff/experts positions, subject to evaluation during the technical assessment process for the assignment, is provided in the table below. The Consultant is required to propose suitable individuals for these key positions, considering the tentative required number of person-months for each role to align with the scope of services. Alongside these key positions, the Consultant should also suggest other experts and support professionals (non-key experts) with sufficient experience in relevant fields. During the technical evaluation process, individual assessment of these non-key experts will not take place; instead, they will be collectively considered, along with other support staff, if any, under the "Organization and Staffing" criteria of evaluation. Deployment of these professionals will be contingent upon client approval and satisfaction.

Table-6: Indicative List of Key Experts for Task A (Master Planning) & Task B (Detailed Design)

S/No	Description
1	Project Manager / Team Leader
2	Senior Hydrologist
3	Senior Structural Engineer
4	Senior Geotechnical Engineer
5	Procurement and Contracts Specialist
6	Environmental Specialist
7	Social and Resettlement Specialist
8	Senior ICT Specialist

Table-7: Indicative List of Key Experts (Task C i.e. Construction Supervision)

S/No	Description
1	Project Manager / Team Leader
2	Senior Hydrologist
3	Senior Structural Engineer
4	Senior Geotechnical Engineer
5	Procurement and Contracts Specialist
6	Environmental Specialist
7	Social and Resettlement Specialist
8	Senior ICT Specialist
9	Chief Resident Engineer

10	Deputy Project Manager (DPM)
11	Resident Engineers

Table-8: Key Experts Qualifications and Experience

S.No	Position	Minimum Qualification / Experience
1	Project Manager/Team Leader (Water Resources Engineer)	1. **Educational Background**: A relevant advanced degree in Civil Engineering, Water Resources Management, or a related field. Professional certifications in project management would be advantageous. 2. **Professional Experience**: A minimum of 15 years of proven experience in successfully managing large-scale projects from inception to completion. 3. **Sector Experience/Knowledge**: In-depth understanding of irrigation systems, water resource management, and associated infrastructure development. Min 10 years of sector experience. 4. **World Bank or Multilateral Project Experience**: Previous experience working on projects funded by international organizations, particularly the World Bank or other multilateral development banks will be an added advantage.
2	Chief Resident Engineer	1. **Educational Background**: Bachelor's or Master's degree in Civil Engineering, Water Resources Management, or a related field. 2. **Professional Experience**: Minimum of 10 years of practical experience in resident engineering roles, specifically overseeing irrigation projects. 3. **Construction Supervision**: Proven track record in supervising the construction of irrigation infrastructure, ensuring compliance with design specifications and quality standards. 4. **Master Planning Exposure**: Familiarity with the master planning phase of irrigation projects, understanding the integration of engineering solutions into broader development strategies. 5. **Design Expertise**: Proficient in reviewing and providing input on detailed designs for irrigation systems, including channels, dams, and related infrastructure. 6. **Construction Management**: Experience in managing construction activities, coordinating with contractors, and addressing on-site technical challenges.

		7. **Quality Control**: Understanding of quality control processes to ensure the delivered infrastructure meets the required standards.
3	Senior Hydrologist	1. **Educational Background**: Master's or Ph.D. degree in Hydrology, Water Resources Engineering, or a related field. 2. **Professional Experience**: - **Hydrological Expertise**: Minimum of 10 years of comprehensive experience in hydrology, with a focus on irrigation projects. - **Master Planning**: Proven track record in contributing to the hydrological aspects of irrigation master planning, including water availability assessments and demand projections. - **Construction Phase Involvement**: Previous involvement in the construction phase, providing hydrological input for the design and implementation of irrigation infrastructure. 3. **Technical Proficiency**: - **Hydrological Modeling**: Proficient in hydrological modeling tools and software for simulating river flow, precipitation, and groundwater interactions. - **Water Balance Studies**: Capability to conduct water balance studies to assess available water resources and requirements for irrigation systems.
4	Senior Structural Engineer	1. Educational Background: Master's or Ph.D. degree in Civil or Structural Engineering from a recognized institution. 2. **Professional Experience**: - **Structural Engineering Expertise**: Minimum of 10 years of comprehensive experience in structural engineering, with a focus on water infrastructure projects. - **Irrigation Projects**: Proven track record in contributing to the structural design and construction supervision of irrigation systems, including dams, canals, and water distribution structures. - **Construction Phase Involvement**: Previous involvement in overseeing the construction phase and ensuring the structural integrity of irrigation assets. 3. Technical Proficiency: - **Structural Analysis**: Proficient in structural analysis and design software for ensuring the stability and safety of irrigation structures.

		- **Material Knowledge**: In-depth knowledge of materials used in water infrastructure construction, including concrete, steel, and other relevant materials. 4. **Field Experience**: - **Site Inspections**: Extensive experience in conducting site inspections to assess the structural conditions of existing irrigation assets. - **Quality Control**: Skill in implementing quality control measures during construction to ensure adherence to structural design specifications.
5	Senior Geotechnical Engineer	1. **Educational Background**: Master's or Ph.D. degree in Geotechnical Engineering or a related field from a recognized institution. 2. **Professional Experience**: - **Geotechnical Engineering Expertise**: Minimum of 10 years of comprehensive experience in geotechnical engineering, with a focus on water infrastructure projects. - **Irrigation Projects**: Proven track record in contributing to the geotechnical aspects of master planning, design, and construction supervision of irrigation systems, including dams, canals, and embankments. 3. **Technical Proficiency**: - **Geotechnical Analysis**: Proficient in geotechnical analysis and design software for assessing soil-structure interaction in irrigation projects. - **Soil Mechanics**: In-depth knowledge of soil mechanics, foundation engineering, and geotechnical investigations related to water infrastructure. 4. **Field Experience**: - **Site Investigations**: Extensive experience in conducting geotechnical site investigations to assess soil properties and conditions. - **Slope Stability Analysis**: Skill in performing slope stability analyses and providing recommendations for mitigating geotechnical risks. 5. **Material Knowledge**: - **Ground Improvement Techniques**: Familiarity with various ground improvement techniques relevant to irrigation projects, such as soil stabilization and reinforcement.

		- **Materials Testing**: Experience in overseeing geotechnical materials testing during construction for quality assurance.
6	Procurement and Contracts Specialist	1. **Educational Background**: Bachelor's or Master's degree in Business Administration, Procurement, Contract Management, Engineering, or a related field. 2. **Professional Certifications**: Certification in procurement or contract management (e.g., CIPS, CSCP, PMP) is highly desirable. 3. **Professional Experience**: - **Procurement Expertise**: Minimum of 8-10 years of hands-on experience in procurement and contracts management, preferably with a focus on infrastructure projects. - **Irrigation Project Experience**: Proven track record in managing procurement processes and contracts for large-scale irrigation projects. 4. **Legal Knowledge**: In-depth understanding of contract law, procurement regulations, and guidelines related to public infrastructure projects e.g. KPPRA. Familiarity with procurement processes and requirements of multilateral development banks (e.g., World Bank) will be an added advantage.
7	Environmental Specialist	1. **Educational Background**: Master's degree in Environmental Science, Environmental Engineering, or a related field or A relevant bachelor's degree with extensive experience. 2. **Professional Certifications**: Certification in environmental management or a related field is advantageous. 3. **Professional Experience**: - **Environmental Expertise**: Minimum of 8-10 years of professional experience in environmental management, with a focus on large-scale infrastructure projects, preferably in the field of irrigation. - **Irrigation Project Experience**: Proven track record in managing environmental aspects of irrigation projects, including master planning, design, and construction phases. 4. **Regulatory Compliance**: In-depth knowledge of local and international environmental regulations and standards related to infrastructure development.

		5. **Impact Assessment**: Extensive experience in conducting Environmental Impact Assessments (EIAs) and managing the associated environmental risks. 6. **Biodiversity Conservation**: Familiarity with biodiversity conservation principles and practices, especially in the context of irrigation projects.
8	Social and Resettlement Specialist	1. **Educational Background**: Master's degree in Social Sciences, Sociology, Anthropology, or a related field or a relevant bachelor's degree with extensive experience. 2. **Professional Certifications**: Certification in social impact assessment, resettlement planning, or related fields is advantageous. 3. **Social Safeguards Expertise**: Minimum of 8-10 years of professional experience in social safeguards, social impact assessment, and resettlement planning, with a focus on large-scale infrastructure projects, preferably in irrigation. 4. **Irrigation Project Experience**: Proven track record in managing social and resettlement aspects of irrigation projects, including master planning, design, and construction phases.
9	Senior ICT Specialist	1. **Educational Background**: Master's degree in Information Technology, Computer Science, or a related field. 2. **Professional Certifications**: Certifications in ICT Project Management is an aided advantage. 3. **Professional Experience**: A minimum of 15 years of professional experience overseeing ICT projects within the public sector and collaborating with international donors such as the World Bank, USAID, and UN Agencies. Proven expertise in devising and executing ICT solutions, evaluating ICT preparedness, and formulating strategies to address identified gaps. 4. **Irrigation Project Experience**: A comprehensive understanding of the ICT capabilities within the irrigation department is essential.
10	Deputy Project Manager (DPM)	1. **Educational Background**: A relevant advanced degree in Civil Engineering, Water Resources Management, or a related field. Professional certifications in project management would be advantageous. 2. **Professional Experience**: A minimum of 10 years of proven experience in successfully managing similar nature projects from inception to completion.

		3. **Sector Experience/Knowledge**: In-depth understanding of irrigation systems, water resource management, and associated infrastructure development. Min 10 years of sector experience.
11	Resident Engineer	1. **Educational Background**: Bachelor's or Master's degree in Civil Engineering. 2. **Professional Experience**: Minimum of 10 years of practical experience in resident engineering roles, specifically overseeing irrigation projects. 3. **Construction Supervision**: Proven track record in supervising the construction of irrigation infrastructure, ensuring compliance with design specifications and quality standards. 4. **Master Planning Exposure**: Familiarity with the master planning phase of irrigation projects, understanding the integration of engineering solutions into broader development strategies. 5. **Design Expertise**: Proficient in reviewing and providing input on detailed designs for irrigation systems, including channels, dams, and related infrastructure. 6. **Construction Management**: Experience in managing construction activities, coordinating with contractors, and addressing on-site technical challenges. **Quality Control**: Understanding of quality control processes to ensure the delivered infrastructure meets the required standards.

Table-9: Indicative List of Non-Key Staff (Task A (Master Plan) & Task B (Detailed Design))

S. No.	Description
1	Junior Design Engineer (Civil /Structure)
2	Junior Water Resources Management Engineer
3	Hydraulic/Irrigation Engineer
4	Junior Geotech /Material Engineer
5	Quantity Estimation Engineer
6	Junior Social & Resettlement Specialist
7	Gender Specialist
8	Environmental Specialist
9	Junior Procurement and contract Manager

10	Geologist
11	Chief Surveyor
12	Support Staff including surveyors, survey helpers, document controllers, office managers, office boys, cooks, etc.

Table-10: Indicative List of Non-Key Staff (Task C i.e. Construction Supervision)

S. No.	Description
1	Assistant Resident Engineers
2	Junior Design Engineer (Civil /Structure)
3	Junior Water Resources Management Engineer
4	Hydraulic/Irrigation Engineer
5	Junior Geotech /Material Engineer
6	Quantity Estimation Engineer
7	Junior Social & Resettlement Specialist
8	Gender Specialist
9	Environmental Specialist
10	Junior Procurement and contract Manager
11	Health & Safety Inspectors
12	Geologist
13	Chief Surveyor
14	Support Staff including site inspectors, surveyors, survey helpers, lab assistants, document controllers, office managers, office boys, cooks, etc.

9. SELECTION METHOD

The Consultants will be selected following Quality and Cost Based Selection (QCBS) method stipulated in Section VII of the World Bank Procurement Regulation for Investment Project Financing Goods, Works, Non-Consulting and Consulting Services" (July 2016) revised November 2017, August 2018, and November 2020. The Task A & B (Master Planning & Detailed Design) will be on deliverable based and Task C (Construction Supervision) will be based on Time Based contract modality.