REPUBLIC OF UGANDA

MINISTRY OF WATER AND ENVIRONMENT

WATER FOR PRODUCTION DEPARTMENT

IRRIGATION FOR CLIMATE RESILIENCE PROJECT

TERMS OF REFERENCE

FOR

DETAIL DESIGN OF AMAGORO IRRIGATION SCHEME

DECEMBER 2024

1. PROJECT BACKGROUND

Uganda's total population is estimated at 45.9 million (National Census, 2024) with an annual growth rate of 2.9% per annum. Between 85% and 90% of the population live in rural areas and derive their livelihood from agricultural related activities. The incidence on poverty if highest among the food crop producing category in the rural areas due to low income, with 31.1% living below the poverty line. Since majority of the population living in rural areas earn their living from agriculture, efforts to reduce poverty need to take in account increasing agricultural growth rates, diversifying agricultural production, and expanding non-farm employment, without jeopardizing the dynamic stability of the agricultural ecosystems that ensures sustainability of the agricultural production. This concept is in consistent with the National Development Plan and vision 2040 whose main goal is to eradicate poverty through appropriate investments and policies for agricultural sector transformation.

About 40% of the population is food insecure due to unsustainable production methods especially in water stressed areas. This is not likely to change unless more attention and more resources are allocated to agricultural services and research. Seasonal changes and variations have become more common and are significantly affecting the rain-fed agriculture.

The Government of Uganda is dedicated to addressing the aforementioned challenges by prioritizing irrigation development. This involves providing formal irrigation systems across the country and enhancing the functionality of both new and existing schemes. To support these efforts, with financial backing from the World Bank, the Government plans to undertake the Detail Design for the Amagoro Irrigation Scheme in Tororo District. This initiative aligns with the Government's broader program to modernize agriculture, aiming to boost incomes and improve the quality of life for poor subsistence farmers and their households. It also seeks to ensure food security and create employment opportunities through the development of agricultural enterprises and the promotion of sustainable land use and natural resource management. The project design emphasizes community-based participation, with districts and sub-counties as key implementation areas, and the private sector serving as the primary technical service providers.

The Detail Design for which these terms of reference are formulated will cover assessment of available water resources, estimates of irrigation and other water demands, water source option assessment, dam/reservoir development for multi-purpose uses, irrigation and drainage infrastructure development, flood management within the command area, upstream watersheds management as well as water supply system development for livestock use; essential agricultural support services to enable maximizing the irrigation investment benefits for agricultural production and productivity increase with transformational effects; and institutional development and capacity building for sustainable delivery of irrigation services. The studies and designs will ensure that the project is:

(i) technically sound and the best of the alternatives considered and analysed,
(ii) attractive to and acceptable by the intended beneficiaries,
(iii) operationally and managerially workable,
(iv) economically and financially viable compared to without the project scenario, and
(v) sustainable and environmentally sound

Scheme Site Details

Scheme	River system	Targeted Irrigable Area (Ha)	Possible Crop enterprises	Required	Documents available
Amagoro	R. Malaba	5,000	Rice, Vegetables, Fruits, Bananas, Maize, Beans	Detail Design	Feasibility Report

The design of the above scheme is to be considered for financing by the World Bank under the Uganda Irrigation for Climate Resilience Project in Fiscal Year 2024/2025. The goal of the project is to improve financially sustainable irrigation and drainage services, and increase farmers' agricultural revenue in the project areas. **The option of a multi-purpose structure to supply a micro-hydropower station is either validated or abandoned.**

It will have three main components as follows:

Component 1. Irrigation infrastructure development: The objective of this component is to develop the irrigation and drainage infrastructure primarily for supplementally gravity irrigation services. It will finance construction and equipment for the dam or diversion weir and storage reservoir, related catchment management interventions, irrigation systems (including main canals, pipelines and drainage system, cross structures, on-farm works, and operation and maintenance (O&M) facilities), and associated resettlement and environmental management costs. It will also finance consultancies for scheme feasibility studies, designs and safeguards assessments including for the follow-up investments. The schemes are likely to concentrate on 1-2 regions. This is in view of the promising commercial production prospect (southwestern) and high drought-vulnerability and severe food insecurity (eastern), and very importantly implementation readiness for a successful first phase.

Component 2. Essential support services for agricultural production and value-chain development: This component aims at filling critical gaps in provision of essential support services for crop production and value-chain development. The proposed irrigation infrastructure development is aimed at providing water for production that would improve agricultural production, productivity and profitability of the agricultural enterprises benefiting from this investment. These enterprises should be able to produce agricultural products that are competitive both in the local and regional markets in order to generate enough revenue that would enable them to support the operations and maintenance of the infrastructure services sustainably while at the same time improving the farmers profitability for improved livelihoods. In order to achieve this, farmers in the command area will require essential support services that include strengthening their groups/cooperatives for better access to quality inputs and appropriate technologies or agronomic practices with the aim of improving production and productivity.

This component may also support selected critical interventions to increase the marketed volumes and value of traded items for better economic gains to the target population. The interventions will largely involve retooling extension officers for diagnostic assessments and for imparting knowledge and skills to the participating farmer groups; promoting access to quality agricultural inputs from registered agro-input dealers; and financial support in form of credit or matching grants towards investment in produce storage facilities and value addition technologies.

Interventions under this component will be complementary to ongoing agricultural development operations by the government and other development partners, such as the Bank-financed Agricultural Cluster Development Project (ACDP), the Millennium Villages Project (MVP), and the EU-funded Common Market for East and Southern Africa (COMESA) initiative. The approach to be adopted for this component would be consistent with that followed by the ACDP for improving farmer access to quality agricultural inputs and post-harvest handling. It is envisaged that this component would contribute to the transition from the current subsistence production system to a vibrant, commercially oriented and economically viable agricultural enterprises that will generate sufficient revenue commensurate of the proposed investment.

Component 3. Institutional Strengthening and Implementation Support: This component is intended to support development and strengthening irrigation management institutions through technical assistance, capacity building and implementation support. The institutional strengthening will finance: (a) consultancies for irrigation regulation and guidelines development, and necessary supporting studies (e.g. irrigation water tariff) for implementing the national irrigation policy; (b) consultancies and training for formulation and capacity building of irrigation management organizations for irrigation service delivery and system O&M , including management entities and farmer irrigation water users associations (WUAs); and (c) training and consultancies for skills development for staff at national, district and scheme levels including beneficiary communities and farmers, in irrigation policy and regulations, irrigation technology and management, and agricultural water management. Implementation support will include technical and project management consultancies, necessary facilities (goods) and incremental operating costs for project implementation management.

2. OBJECTIVE OF THE ASSIGNMENT

The overall objective of the study is to develop the Detail Design of Amagoro irrigation scheme into a bankable multipurpose development project which meets the appraisal requirements for World Bank financing. All studies and designs should consider multipurpose development opportunities and ensure they are technically feasible, economically and financially viable, socially acceptable and environmentally sustainable.

The specific objectives of the assignment is to carry out relevant technical investigations and studies comprising of water resources (hydrologic and hydro-geologic) assessment, agricultural soils and agronomic studies, irrigation water requirements, topographical surveys, geotechnical investigations, hydraulic studies and design and undertake the Detail Design for Amagoro irrigation scheme in Tororo District. Finally, the consultants will prepare cost estimates and perform financial and economic analysis which will form the basis for project appraisal, investment finance mobilization and project implementation for the project.

This project phase will result in in-depth technical reports of the project that would include: storage reservoirs, a community-based irrigation scheme and improvement in the productivity and management of the upstream watersheds and other multipurpose infrastructures. The designs and feasibility studies will provide sufficiently accurate estimates of costs and expected results to enable decisions to be made on project financing and preparation of bidding documents for the scheme using World Bank Guidelines. Accordingly, the consultant should take into consideration

the World Bank policies, guidelines and safeguards requirements, especially those for environmental and social impact assessment as well as dam safety to prepare final designs.

In addition, the definition of the project components, organizational arrangements and procedures will be detailed enough to permit the executing agencies to use the study as guidance on project implementation.

3. SCOPE OF THE STUDY

3.1 Project Description

Amagoro Irrigation Scheme project is intended to serve Tororo, Bugiri and Busia districts.

Feasibility studies were prepared by M/s SGI Studio Galli Ingegneria S.r.l in association with Z&A Consulting Engineers. The project foreseen includes the construction of an earth dam and auxiliary work across the Malaba River at coordinates (UTM 36N 620236 mE, Longitude: 64602 mN) and a gravity Irrigation network covering 5,000 Ha. The Malaba River, is a perennial river. The drainage area up to the dam site is 1,480.2sq.km. There is a Gauge and Discharge site (Station ID: 82218) at Jinja - Tororo road on the downstream side of the dam site. The drainage area up to the Gauge and Discharge station is 1,603.04sq.km. The irrigation scheme foreseen is a gravity system of main canals supplying secondary pipes as appropriate.

The Consultant will **critically** review the feasibility study report and evaluate its conclusions, and limitation to be addressed, and prepare an Interim Report which addresses these findings including but not limited to the following:

- Expanding the irrigated area beyond the current 5,000 ha without raising the dam and inundating across the Kenya border,
- Maximizing the area that can be irrigated without a dam by stream diversion only,
- Not considering the pipeline only option with a high cost of $36k/ha, rather, consider a modified canal option to improve water management and reduce spills by including a regulating reservoir on each main canal located at 2/3 of the command area with a pipe network downstream of each reservoir,
- Separating the hillside irrigation system (canals, pipes & hydrants) with the marshland system (canals for surface irrigation).

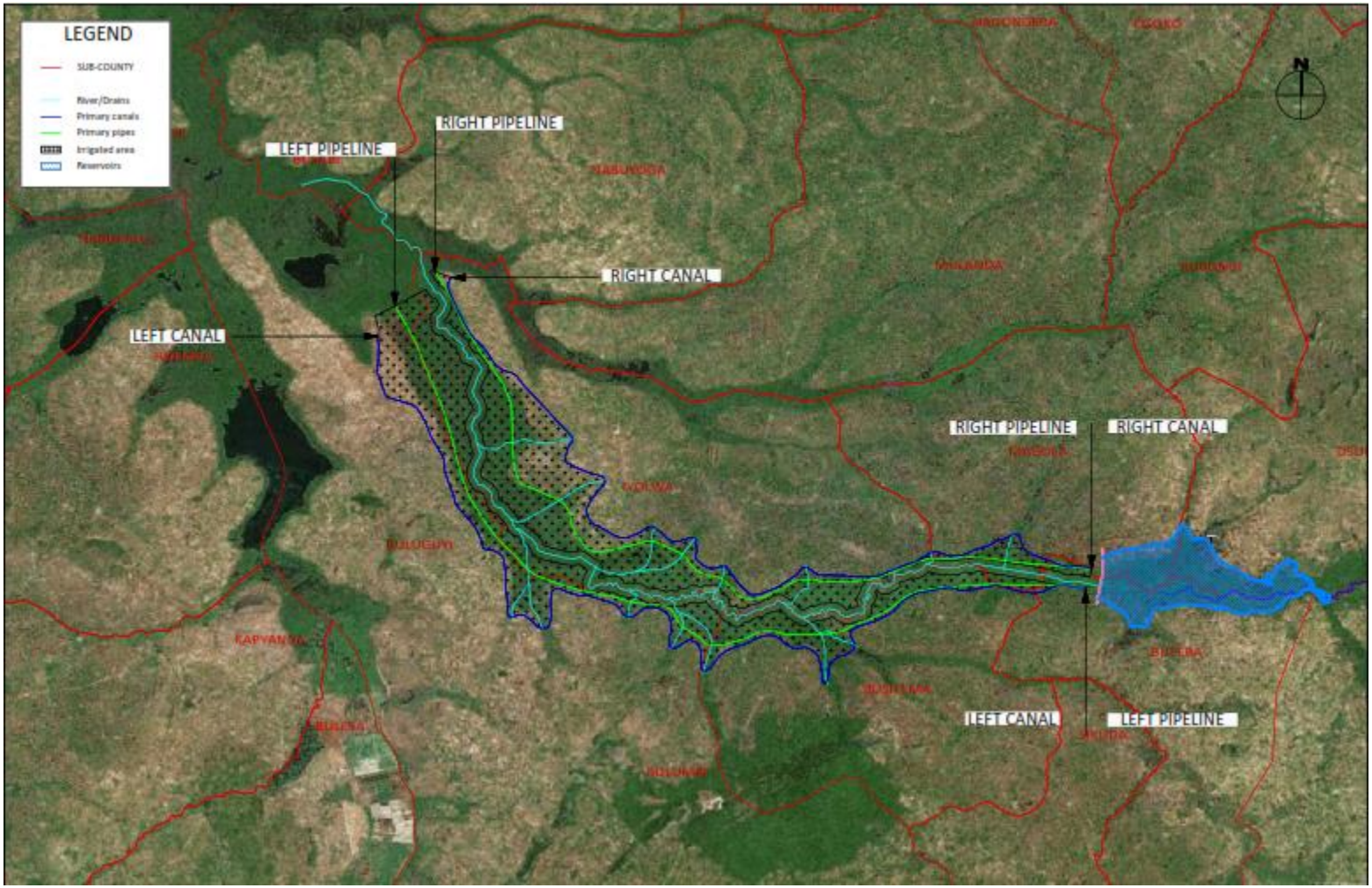
The Interim Report will provide design and cost information needed for a clear comparison to guide the client in selecting the alternative to be carried forward for Detail Design.

The project is composed of the following main works:

- earth fill dam with about 18m height above sub grade and a crest length of approximately 1,770m, or a river diversion structure for the “no dam” option;
- free overflow ogee shape frontal spillway located on the right bank of the dam,
- control building;

- irrigation network consisting of:
    - main and secondary distribution canals and/or pipelines reaching the different zones in the command area:
    - tertiary lines distributing water directly to the irrigation units and relevant hydrants;
    - hydrants, each serving one irrigation unit of about 20 hectares;
- drainage network composed of primary, secondary, and tertiary drainage canals designed in order to convey adequately drainage water from each irrigation unit to existing hydrographic network.

MAP OF AMAGORO IRRIGATION SCHEME



3.2 Tasks to be performed for the Inception Report

Task 1: Critical review of the feasibility study[1] **After a thorough review of the Feasibility Study, the Consultant shall:**

(i) summarize the findings of the Feasibility Study;

(ii) list and describe the shortcomings of the Study that will be improved for the Interim Report;

(iii) clearly describe the alternatives, as described above in the Project Description section, or propose different alternatives, to be analyzed and presented in the Interim Report such that the Client will be able to make a well-informed decision on which alternative to carry forward for Detail Design.

3.3 Tasks to be performed for the Interim Report

Task 2: Water Resources Assessment and Sediment Studies

Task 2-1: Assessment of Water Resources Availability

The task objective is to assess the water resources availability to satisfy the estimated uses and demands and to match the water availability at monthly time segment with the demands.

The Consultant shall:

(i) determine the current and potential future water uses and demands for the identified water uses at the sub-project areas, together with their seasonality, levels of services, priority of use and cumulative effects;

(ii) assess and quantify any upstream water uses (abstractions/diversions) and their impacts to the proposed project;

(iii) assess the quantity and quality of both the surface and groundwater potential and availability and examine potential for conjunctive use of available surface and ground water resources in an environmentally sustainable manner; and

(iv) estimate optimal demands for the various water uses with the available water resources, without adversely affecting more downstream users.

Based on the analysis, the consultant will match the water availability for each time segment with the irrigation needs and other demands at different levels of probability using appropriate hydrological techniques.

With respect to groundwater, the Consultant should also assess:

(i) the future ground water regime and behavior after the development of irrigation in the project area;

(1) The feasibility study can be refined with more site-specific solutions.

(ii) impacts on the ground water table due to seepage and percolation and drainage from the irrigation canals; and

(iii) drainage control, groundwater table, and ground water quality control measures that need to be incorporated later into the Detail Design of the project.

Task 2-2: Hydrological Analysis

The hydrological studies of an embankment dam consist of assessing the design flood, the extreme flood, the construction flood(s), the water and sediment contributions of the watershed.

It should be remembered that an embankment dam is not overflowing and that its submersion leads to the failure very quickly.

Estimating the design flood and the extreme flood (PMF) of a dam intended to size the spillway poses specific problems related to the small number and type of available data that are provided by nature following a random process.

The construction flood and the estimation of liquid contributions will make it possible to size the ancillary works and the water intake. The sediment contributions will make it possible to set the drainage organ at altitude and to ensure that the reservoir has sufficient available volume in order to irrigate the command area.

This study is very important for a non-overtopping embankment dam because it concerns the SAFETY of the structure. The Consultant will have to justify the periodicity chosen to size the design flood.

Progress of the study:

After a phase of searching for available data, we distinguish the case where hydrometric data are available near the site to be studied from that where the data are insufficient or non-existent. In the first case, it will be possible to carry out an estimate of reference floods, by using information on flow rates and tools based on knowledge of the processes of transformation of rain into flow. A regional analysis is desirable even in the case where the data are available on the site because it reinforces the reliability of the study.

In the second case, it is necessary to use spatial transfer approaches to estimate the reference hydrological hazard on an ungauged site, or with reduced information.

Dataset creation

In order to create a data set, it is necessary to retrieve the flow record from the nearest site and from neighboring sites; to check the existence of data on old floods with the competent department.

Rainfall data:

In the absence of being able to collect all the daily observations at the stations in the study area, monthly and annual totals and maxima of daily rainfall are collected at the rain gauges in the study area, daily rainfall above a threshold during the flood observation period (at the rain gauges useful for the rainfall-flow study). Rainfall records of heavy downpours are possibly added.

Critical analysis of the data

Visualization of the flow record; examination of the rating curves and the point cloud of the gauges, examination of the station file, field visit and validation of the extrapolation of the rating curve;

If the flood basin reaction time is a few hours, it is essential to directly exploit rainfall data or to use intensity-duration-frequency curves;

The Consultant may use the following methods:

- Methods based on modeling of rainfall-flow transformation processes;
- Deterministic hydrological models;
- Probabilistic rainfall-flow models (Gradex method or other method);
- Methods of transfer to an ungauged site;
- Regional formulas.

Estimation of the PMF and the Check Flood [1]

(1) The check flood is the one capable of being evacuated by the dam with a level of the highest waters (MWL) reached equal to that of the crest; it is the most penalizing flood that the structure can undergo without affecting its sustainability.

The Consultant shall:

(i)determine the flow duration curves to facilitate the design of hydraulic structures; the IDF (Intensity–Duration–Frequency) curves represent the evolution of the intensity of the rain iT(d) as a function of the duration d of the rain (generally from a few minutes to a few hours) and the frequency of the rain expressed in return period T (often a few values sampled between 2 and 10,000 years).

(iii) assess the effects of the proposed storage on existing uses; and

(i) undertake flood routing through the downstream channel and floodplain to enable evaluation of effects in the event of excessive spills or dam break (hydrological dam safety considerations)

(ii) Assess the **impact of climate change** on hydrological estimates using Uganda-specific parameters; the existence of a large upstream dam project on the watershed (Angololo dam) will be taken into account in terms of its possible releases or the flows generated in the event of a failure.

Task 2-3: Sediment Analysis

In view of the existing concerns of land degradation and erosion within the project areas, the Consultant will assess the sediment regime and total sediment transport of the river system in the project areas. This will include determination of the sediment (suspended and bedload) yield. Additional sediment data shall be collected during the course of the consultancy, from the existing hydrological stations, forecasting of dead storage volume and the future rate of reduction of the live storage and reservoir trap efficiency, which will require limited sediment sampling to the extent possible.

Other than design against the storage depletion, this analysis should also aid the subsequent design against increased loads on the dam, abrasion of outlet structures and blockage of outlets which could cause interruption water uses and reducing the ability of the dam to pass floods safely. It will also help to determine dead storage and sediment flushing outlet levels.

Sediment load estimates should include projections of changes in upstream sediment release, based on upstream development plans. It will also take account of climate change and the Angololo upstream dam project.

Task 2-4: Water Quality and Quantity Assessment

The Consultant will provide a detailed assessment and evaluation of the direct and indirect effects of water quality and water quantity change on downstream ecosystems dependent on periodic natural flooding, water quality during low flow periods, turbidity due to changes in sediment transport regime, social considerations (like loss of water access and livelihoods), cumulative effects and any potential riparian issues (in the river catchment and downstream of the proposed irrigation schemes) due to the proposed developments to inform devising of mitigation measures.

Task 3: Irrigable Command Area Design

Task 3-1: Irrigation Potential Assessment

The objective of this task is to evaluate and physically delineate the areas that can be potentially developed for irrigated crop farming. The area which can potentially be irrigated depends on the availability and suitability of soil/land and water, combined with the irrigation water requirements, crops and cropping patterns that are feasible, and the local climatic factors. This task will thus include:

(i) evaluation of potential crops and cropping patterns;

(ii) assessment of land suitability for irrigation;

(iii) evaluation of irrigation water requirements; and

(iv) assessment of water resources availability and options for developing water resources in the locality to meet the irrigation demand.

Task 632: Soil Surveys and Land Suitability Studies

The Consultant shall:

(i) undertake a detailed soil survey for the delineated irrigable command area, using appropriate sampling and observations in conformity with guidelines for soil surveys of Food and Agriculture Organization (FAO);

(ii) prepare soil maps on an appropriate scale based on the soil surveys;

(iii) collect and analyze soil samples required for the determination of standard physical and chemical properties of the soils required for evaluation of irrigation water requirements and soil suitability for the proposed crops as well as establish proper drainage modules for the project to affect the design of the drainage system for the command area. The Consultant

shall take appropriate measures to verify and ensure the quality and reliability of laboratory test results.

(iv) develop a suitable land classification system for assessment of irrigability and drainability within the proposed irrigation development areas;

(v) critically evaluate and analyze findings of the topographic, soil surveys and land characteristics of the proposed project areas; and

(vi) identify and delineate irrigation blocks and areas in terms of suitability for irrigated agriculture development.

Task 633: Evaluation of Crops, Cropping Patterns and Markets

The consultants shall collect baseline information on the type of soils, topography and land-use patterns; analyze water-use patterns (rain-fed crops, irrigated crops, drainage, surface and groundwater extraction); examine existing field-crop production and soil management practices, establish and delineate major cropping pattern zones (considering types of irrigated crops grown, crop calendar and cropping intensity); propose schedules of crops for consideration, estimate expected yields and crop water requirements for alternative cropping programs, and examine the existing Agricultural Support Services. The assessment will cover:

(i) the production and performance of the existing crops based on the current cropping patterns

(ii) the potential of commercially oriented production system based on the available markets in the surrounding shopping centres, other urban markets such as Kampala and the neighboring countries in the region,

(iii) the most profitable value chains that can be developed or upscaled in the proposed irrigation schemes,

(iv) availability of competent service providers for technical advisory services, agro-input dealers, financial services (savings and credit/loans), agro-processors, traders/aggregators and warehousing among others which will be needed for extension support to the project's producer organizations;

(v) the margins of the top five commodity value chains in the Amagoro area.

(vi) Potential market for the top five commodity value chain in terms of the volumes and monetary value.

(vii) determination of as to whether a supplementary or major irrigation (for all crops or combination for selected crops);

(viii) the ownership structure of farms including consulting the potential irrigation farmers;

(ix) constraints on farm productivity;

(x) the market potential of the possible crops within and around the project areas;

(xi) the potential for increased competitiveness of its products including an analysis of the comparative advantage of the project areas;

(xii) availability of and accessibility to input supplies, storage, technology, finance, input markets, transport, and distribution networks;

(xiii) option for farm mechanization, product storage, handling and transportation,

(xiv) availability of output market (incl. potential for grower/out-grower linkages) and

(xv) Value chain and Climate Smart agriculture.

The Consultant shall also analyze the gender division of labour in irrigated agricultural production for each socio-economic group, identify the needs of both women and men related to proposed agricultural activities. Based on the analysis, the Consultant shall formulate the cropping and irrigated agriculture development plans for the proposed scheme including the potential distribution of land areas between the small scale individual farms and large scale commercial farms. The Consultant shall further identify suitable and appropriate cropping patterns for each type, estimate farm level crop production volumes, input and production costs, and gross and net returns, and generate incremental benefit estimations for use in the design stage economic and financial analyses.

Task 3-4: Determination of Irrigation Water Requirement

The aim of this task is to evaluate irrigation water demand for the basic design parameters generated by task 3-3 above. The Consultant shall:

(i) collect all the existing available agro-meteorological data for the project areas required for estimation of crop water requirements and irrigation water requirements of the scheme;

(ii) verify the reliability and accuracy of data, and make corrections as necessary before use. Quality analysis of collected data and gap filling of missing data using appropriate standard approaches and techniques is necessary.

(iii) carry out "Agro-climatological assessment" where the Consultant shall: review available climatic data and make estimates of farm and project level irrigation requirements for viable crops, cropping patterns and crop rotations and irrigation technologies to be adopted, using all available agro-meteorological data for the project area;

(iv) deduce the peak irrigation water demand supported by analysis of different cropping patterns in the respective project areas for purposes of fixing pipe/canal design and

(v) deduce irrigation water requirements at salient intervals for deciding the cropping pattern in order to compare with water availability.

Task 3-5: Command Area Development

The scope for command area development will include the following:

(i) analysis of flood protection, land reclamation and drainage works required to ensure sustained economic operation of the command areas

(ii) determination of access road requirement both to and within the project area

(iii) preparation of general layout plans showing the location and principal features of main works required for the most suitable irrigation supply and drainage system.

The consultant shall examine the reliability of water supply, considering the various existing and future water uses and identify appropriate water conveyance system to supply water to all parts of the land to be developed and recommend appropriate irrigation methods best suited for the command area.

The consultant shall locate suitable irrigation water diversion structures in the command area and investigate pumping, storage or diversion requirement and reservoir operations required for irrigation with due consideration of floods and siltation in the command area.

Task 4: Alternatives analysis and comparison

The Consultant shall prepare detailed analyses and cost estimates with all information needed for the Client to make a well-informed decision on which alternative to carry forward for Detail Design for at least the following alternatives:

(i) Expand and maximize the irrigated area beyond the 5,000 ha presented in the Feasibility Study without raising the dam and inundating across the Kenya border;

(ii) For a "no dam" option, maximize the area that can be irrigated by stream diversion with and without a reduction in the environmental flows;

(iii) For the main canal do not consider a pipeline only option (due to high cost), rather consider a modified canal option to improve water management and reduce spills by including a regulating reservoir on each main canal located at 2/3 of the command area with a pipe network downstream of each reservoir,

(iv) Consider separating the hillside irrigation system (lined main canals, secondary pipes & hydrants) with the marshland system (earth canals for surface irrigation).

The irrigated areas for the above alternatives shall be selected based on the results of the Land Suitability Study described above. Satellite based topography (DTM) may be used for the alternatives analyses in addition to the topographic survey carried out for the Feasibility Study.

3.4 Tasks to be performed for the Detail Design

The Consultant will need to develop Detail Designs and construction contract bidding documents, which meet the requirements of a bankable irrigation development project following international good practices. The design report should include assumptions, analyses, conclusions, and recommendations for the Detail Designs, as well as calculations and justification of the methods used for design, detailed organizational charts and schedules for implementation, drawings, bill of quantities, contract specifications, contract packages etc. Relevant annexure including the Geotechnical baseline report (described under the feasibility study) should be included.
A synoptic sheet inserted in the main report, listing the main characteristics of the dam:
Type, height, crest width, slope of embankments, catchment area, design flood, maxi water level(MWL), normal water level(NWL), dead level(DL), various freeboard, type of spillway, effective reservoir volume, water surface area to the NWL, summary geology, etc., will enable the main features of the project to be visualized at a glance.

Task 5: Detailed Topographic Surveys

The Consultant shall:

(i) undertake detailed surveying works both at the dam/diversion site and irrigable command area, and prepare a topographic map of the scheme area to scale;

(ii) prepare a topographic map of the dam/diversion at a scale not more than 1:500 and at a contour interval of not more than 0.5 m, showing all the features upstream and downstream, right and left of the proposed site, including observation pits and material source areas where appropriate; a minimum of 4 fixed, stable concrete markers will be installed on the site in order to locate the future dam and its ancillary structures, and to monitor the topography of the embankment.

(iii) prepare dam/diversion site cross-sections at vertical and horizontal scales of 1:100 indicating pertinent features to the head works;

(iv) prepare topographic map of the irrigation command area at a longitudinal scale of not more than 1:1,000 at a contour interval of not more than 1 m for steep areas and not more than 0.5 m for areas proposed for surface irrigation: the topographic map should also show major features in the irrigable area, i.e. including canals, water fetching points, settlements, cattle crossings, hills, roads, water and electric utilities, burial grounds etc;

(v) prepare cross-sections at vertical and horizontal scales of 1:100 for the irrigation structures, indicating pertinent features to the head works;

(vi) establish at least one benchmark for every 200 ha and connect them to national grid stations and benchmarks of the proposed head works;

(vii) undertake cadastral surveys at the dam reservoir and along the main, secondary and tertiary pipelines/ canals and at other irrigation facilities in the irrigation scheme command area. This completed survey should be documented on cadastral maps

(viii) prepare longitudinal profiles of the scheme roads, main, secondary, and tertiary canals, main and secondary drain, at a scale of vertical 1:100 and horizontal 1:500. Grid survey of the irrigation plots at the recommended and specified grid interval whenever as required for land leveling work.

The structures shall be presented on appropriate design drawings. The structures shall include but not be limited to access roads, foundation excavation and treatment works, embankment zoning, dam instrumentation, concrete outlines and placement details, reinforcement details, construction and expansion joint details, block-outs for mechanical installations and second stage concrete.

Task 6: Detailed Cadastral Surveys

The cadastral survey shall cover selected gross command area and shall be used to establish the actual boundaries and areas of the plots for the community members within the irrigation command area.

This shall include but not limited to:

(i) Where feasible, the consultant shall obtain copies of the deed plans and all other available documents and maps of the adjoining properties or any records of the irrigation command area from the Project area districts, utility maps, and any records of surveys. After this data is gathered and analyzed, the field survey shall commence.

(ii) Where title deeds are unavailable, the consultant shall work with the local leaders to establish the extents of each property.

(iii) The initial survey operations shall concentrate on locating monuments or existing reference points.

(iv) Using appropriate survey equipment to establish the plot dimensions and areas. For each plot/owner, the property corners shall be marked by iron pins, metal survey markers, iron pipes, and other features possibly establishing a line of possession as agreed with the community members

(v) The consulate shall collect all information in appropriate digital format for subsequent plotting and processing using CAD programs.

Task 7: Detailed Geological and Geotechnical considerations

(i) The Consultant, a geologist/geotechnical specializing in dams, will carry out detailed geological and geotechnical studies to determine or develop the geological model of the foundation and the geotechnical model of the dam. He/she will draw up a map and cross-sections of the site and its reservoir: the general geologic and tectonic setting of the site area by analysis of the lithology, stratigraphy, structural geology, and tectonic history a scale of between 1/500 and 1/1000 (that of the topographic survey); rock outcrops, their dip and geological accidents (faults) will be shown on the geological plan.

(ii) the geologic conditions related to selection of the dam/diversion site like rock type, overburden, fractures, bedding which have a strong influence on the need for foundation treatment and costs;

(iii) the geotechnical characteristics of the soils and foundation rocks, leading to the development of the geotechnical model used in the stability calculations for the structure, which will include the “conservative” characteristics of the different zones of material making up the fill (bulk density, dry density ds, moisture content, soil grain size, soil cohesion, soil angle of internal friction, etc.) and the rock foundation; other geologic conditions such as faults that may influence design, construction, and long term operation;

(iv) seismicity and earthquake intensity of the project area; and

sources or hydrogeological conditions, properties and quantification of construction materials, respecting the “practical” rule that recommends recognizing 1.5 to 2 times the quantities strictly necessary to build the fill. The Consultant shall: identify and geo-reference crucial soil and rock features, establish the engineering properties of rocks and soils (including construction materials), surficial deposits, and tectonic-structural patterns. The extent, depth, and type of exploration will depend on the complexity of the geology and size and type of dam/diversion as conceptualized by the consultant.

Field Investigations will include but not be limited to:

(i) exploratory boreholes and trial pits for soil sampling and testing for engineering properties relevant for project design. The Consultant will propose the type of boreholes (cored or not), the number of boreholes recommended and their depth, as well as the tests to be carried out on these boreholes (water-permeability test, RQD; logging, etc.). Their lithographic section will enable the geophysical campaign to be calibrated.

(ii) study of the foundations of the dam, the diversion axis, including the spillway and those of the ancillary structures (spillway, water intake and temporary diversion) will be undertaken thanks to a geophysical campaign based on a critical examination of that carried out in the feasibility study. The aim is to produce a realistic geological model of the foundations. This geophysical survey, carried out at selected and justified intervals, will provide data on the stratification around energy dissipation zones, water intake zones, river diversion works and construction material borrow areas. It will also specify the most appropriate location for the dam axis assessment of uncertainties arising from interpretation of geophysical results and their possible impacts on costs and site viability;

(iii) preparation of geological profiles for the dam foundation, abutments, reservoir rim area and potential project command areas, showing all the geological structures in place and inducing the potential permeability and stability;

(iv) preparation of geological map of the reservoir floor and rim, drawn to sufficient detail commensurate with the feasibility level to permit identification and assessment of potential leakage paths;

(v) geo-reference possible sources of construction materials such as concrete aggregates, and carry out tests to assess their engineering properties. The suitability of the dam fill materials shall be tested for compaction and permeability. Aggregates shall be tested on the likelihood of developing Alkali Aggregate Reactions when applied to concrete structures;

(vi) analysis of the tectonic / seismic intensity of the area and recommend safety design measures (against sliding of dam slopes, settlements, sliding of abutments, liquefaction of foundations, cracking of dam body, loss of filter zones). Additional boreholes may be required to develop geologic correlations and to determine the type of dams suitable for the site. The consultant could consider topping up selected boreholes with open type piezometers for monitoring pore water pressure and permeability.

The final output of this task will be a detailed report on the project geology/geotechnical aspects, with engineering properties for further use in the hydraulic and structural design of the dam/diversion, irrigation and appurtenant structures.

The final axis chosen for the embarquement will be justified in relation to other possible axes.

(1) Soil and rock characteristics: Identification tests (grain size distribution, density, moisture content, etc.), mechanical tests (friction angle, cohesion), compaction tests, permeability, etc. and rock classification (wear and abrasion tests), density, drop- test, crushing test, Rock Quality Designation, Lugeon test, etc.

Task 8: Design of the Dam/Diversion and Appurtenant Structures

For design of the dam or diversion the Consultant shall:

(i) prepare detailed structural and hydraulic designs for the dam site and various dam components such as the foundations and abutments, spillway, intakes, bottom outlet, gates, energy dissipating mechanisms, seepage control and internal drainage systems and other appurtenant structures with respect to maximum flood estimates and maximum scour depth, and with consideration of both structural and hydraulic safety;

(ii) carry out detailed structural and hydraulic designs for the diversion structures with respect to maximum flood estimates keeping the geologic and geotechnical information into consideration; the flood evacuation structure design must be examined taking into account the foundation grounds and the high values, even those marked by uncertainty, of the flows to be evacuated. The shape, nature and geometry of this bulky organ must adapt to the natural terrain in order to limit the volume of earthworks. For optimization reasons, the Consultant could propose:

- A service spillway with an ogee threshold intended to operate frequently and designed with durable materials such as concrete for example;
- An emergency spillway designed with flexible and durable materials; a system of fuse gates to increase the SAFETY of the structure and to store an additional tranch of water (safety with regard to needs) could be considered by the Consultant.

(iii) the layouts and drawings of the different project components using AutoCAD software;

a schedule of quantities in line with Civil Engineering Standard Methods of Measurement (CESMM), and the cost estimates for use in the economic and financial analysis). For design of the dam only the Consultant shall:

(i) propose dam safety monitoring [1] and management systems;

(1) The dam monitoring system will have to be simple and "rustic"; for an LHSD, it will be limited to measuring embankment deformation (settlement), Interstitial pressures in the embankment and leaks at the structure outlet.

(ii) develop reservoir operating rules based on the assessment of multi-purpose benefits of the storage. A reservoir simulation model shall be developed to assess different combinations of multipurpose uses and project scenarios so as to derive an optimum water allocation solution, and to calculate the benefits in the economic analysis for each project scenario. Specifically, the Consultant shall determine:

- the optimum reservoir size and operational rules;
- efficient and economic uses of the reservoirs; and
- the lifespan of the reservoir based on the assessment of multi-purpose benefits of the storage; and
- prepare and participate in the international dam safety review panel (DSRP) reviews of the studies/designs, and take follow-up actions as required.

The operating rules should maximize the returns on investment in storage. The Consultant shall consider the prioritized multipurpose uses of the reservoir and environmental flows. The study should also explore the impact of climate change on the proposed projects and its intended outcomes.

Task 9: Irrigation System Engineering Design

The Consultant will:

(i) carry out Detail Design and layout of the irrigation system and the associated hydraulic structures considering the total demand, economy, and base flow availability. The designs will be compatible with the local management system conditions and/or capability and should include pipe/canals, drains, regulating reservoirs, and road alignments, canal size, slope and lengths, location of structures, and water profiles along canals and drains, which is most economical, easily manageable and aligned with topographic features and geological investigations; due attention should be given to the possibilities of crossing irrigation and drainage canals by human and livestock movements;

(ii) establish flood protection requirements for the command area and design the respective drainage system accordingly;

(iii) design the canal-lining requirements using the inputs from the engineering geology assessments;

(iv) divide the irrigation area into blocks based on property ownership boundaries and in close collaboration with the Client. Provide a hydrant with a control valve and flow meter at the high point of each block.

(v) prepare general plans and drawings for the dam site and all irrigation infrastructure;

(vi) design access roads, which will give easy access to all the irrigation blocks;

(vii) prepare specifications and priced bill of quantities and construction schedules accordingly. The work items and construction schedules will be presented to the Client and other stakeholders, for discussion and approval;

(viii) prepare operating and maintenance manual (including rule curves) for irrigation release outlet structures (gates).

The consultant shall take into consideration intensive labour engagement and use of local construction capability and materials during the design as necessary. Monthly and annual diversion and farm requirements of water should be estimated, on the basis of crop water requirements. The Consultant shall prepare the layouts and drawings of the different project components using AutoCAD software. The Consultant shall also prepare a schedule of quantities in line with the latest Civil Engineering Standard Methods of Measurement (CESMM), for use in cost estimates and the economic and financial analysis.

Task 10: Infrastructure Design for Auxiliary works

Task 10-1: Design for Flood Mitigation Developments

The sub-task objective is to assess the risk of flooding from both the river and tributaries in the project area, potential damages from future flooding to the proposed project infrastructure, to irrigation and drainage system, hydraulic structures, and crops. The Consultant should:

(i) collect all information available in records and with local communities on the history of flooding, severity and damage caused by floods in the project areas;

(ii) analyze hydro-meteorological records to assess the risk of flooding in the project areas with project situation;

(iii) evaluate the flood risk in upstream areas consequent to new water storage facilities;

(iv) identify major structural and non-structural measures to prevent adverse impacts to communities, irrigation system infrastructure and crops in the project area and

(v) prepare design of structural measures, layouts and cost estimates which can be taken to avert floods under the planned project.

Task 10-2: Design of Access and Scheme Roads

The sub-task objective is to undertake design of the access and scheme road network to take into account marketing and social opportunities, within the framework of government road programs. Studies will include the survey and design of the rural road network as well as stream crossings within the project area. The consultant will further prepare layouts and cost estimates for the proposed structural measures.

Task 11: Preparation of Engineer's Cost Estimates

The Consultant shall prepare the costed bills of quantities for implementation of the works. All cost estimates must show the foreign and local currency requirements; taxes, subsidies shall be identified and their implications analyzed; physical and price contingency allowances should be quantified appropriately for each component/activity of the project. This will inform the Client on the reasonable cost implications for implementing the project.

Task 12: Construction Plans and Implementation Scheduling

The Consultant shall establish construction schedules for the implementation of the dam, irrigation system, and outlet works as well as for other project components. Apart from the construction items of the earthworks and concrete works for the main structures these schedules shall include mobilization, construction of access roads as well as routes to borrow areas, mapping and information on quantity and quality of borrow areas, establishment of the construction camp, provision of housing and transport facilities for supervising staff, construction packaging, work methods and preliminary labor force requirements. In the schedules the Critical Path Method shall be applied. Based on this the disbursement schedule of the project main components will be estimated as an input for the financial and economic analysis.

Task 13: Documentation Requirements

Task 13–1: Preparation of Final Design Report

The Consultant will prepare a Detail Design report for Amagoro Irrigation scheme, which shall document Detailed Engineering designs for the agreed Engineering works comprising of the dam/diversion, irrigation infrastructure, livestock watering, farm and access roads. Prepare scheme layout, technical drawings, specifications, bill of quantities, etc. as required for tendering construction.

Task 13–2: Preparation of Dam Safety Plans -

With reference to World Bank OP 4.37 on dam safety, the consultant will prepare the following Dam Safety Plans and broad framework plans:

(i) Dam construction supervision and quality assurance plan, per World Bank safety of dams policy requirements;

(ii) Operation & Maintenance (O&M) Plans (containing: General Information; Salient Project Features; Operation Guidelines and Procedures; Monitoring Programme; Safety Inspections; Directory of Drawings, Records, Suppliers and Vendor Manuals and Appendices) covering the different project components namely; storage dam infrastructure, irrigation system, livestock, aquaculture, mini hydropower and domestic water supply.

(iii) Instrumentation Plan: including the dam monitoring instrumentation design/plan, and monitoring and data processing and analysis requirements, etc.

(iv) Emergency Preparedness Plan for the dam containing:

a. issues of organization, communication, procedure for evacuation, local facilities, etc. and

b. Dam break analysis, Inundation map, emergency warning system and plan, safety equipment, warning levels and response matrix for different deficiency levels and other information specific to the reservoir).

Task 13–3: Bidding Documents Preparation

Once the final designs are approved by the Client, the tender documents for the civil works and for the supply and installation of electromechanical equipment should be prepared for the scheme. The text of the Conditions of Contract universally recognized (and generally adopted by the international Development Banks) is the FIDIC (Federation Internationale Des Ingenieurs Conseils)'s appropriate "book". The bidding documents should follow World Bank standard documents.

The following information will constitute the Tender Documentation.

(i) Drawings, Bills of Quantities (BoQ) and all tender documents (including engineering cost estimates) prepared in accordance with the Civil Engineering Standard Method of Measurement (CESMM). The BoQ should be accompanied by details showing how the

quantities of the works have been arrived at. It is expected that the proposal shall state the number of drawings to be produced with description of the purpose of each drawing.

(ii) Specifications for workmanship and materials, which shall have been agreed upon in consultation with the Client.

(iii) Special conditions of undertaking the supervision of construction works based on the FIDIC Contract for Works of Civil Engineering Construction.

The Tender documents shall include a provisional schedule, based on the Consultant's experience, framing the aimed duration of the construction Works. Such program shall include key dates (usually related to meteorological constraints or delivery planning of equipment), and be based on reasonable productions of main items (excavations, filling, concrete, etc.).

The Consultant will prepare specifications for workmanship and materials, which shall have been agreed upon in consultation with the Client. The Consultant will provide the security coefficients assumed for the stability studies; the hypotheses to take into consideration, justifying his choice for the seismic design of structures; and the standards intended to refer in the design of structures and equipment.

Tender Documents shall include:

(a) Instructions to Bidders

(b) Convention

(c) Special Papers of Technical Requirements for Civil Works:

- Description of the structures and work
- Provenance, quality, preparation of materials,
- Mode works,
- Mode of assessment work,
- Special clauses.
- Environmental and Social Safeguards
- Environmental Health and Safety

(d) Special Technical Requirements/Specification for equipment

- Definition and consistency of work
- Specification of supplies,
- Conditions of contract, controls and fixtures.

(a) General Conditions of Contract

- Bidding work, Execution of works, Payment of expenses, Tax, Payments, Various clauses and Submission template.

4. TRANSFER OF KNOWLEDGE AND TECHNOLOGY PROGRAMME

The consultant in his technical proposal shall describe its proposed knowledge transfer program.

Throughout the assignment, the consultant will be required to involve counterpart staff seconded to the project by the Client. The assigned staff may consist of but not limited to Engineers, Environmental officers, Social Scientists/Community Development Officers, Land Surveyors and Agricultural Officers.

The programme should address the following areas of knowledge and technology transfer:

(i) Engineering; formal courses and on-the-job training (on appropriate specialized software packages and integration of the counterparts with the Consultant' team).

(ii) Agriculture; formal courses and training on-the-job (on design and implementation of irrigation, agriculture marketing and extension/outreach programs, appropriate specialized software packages and integration of the counterparts with the Consultant' team).

(iii) Environmental and Social Impact Issues and occupational Health and Safety; formal training courses and on-the-job training (on compliance awareness of environmental and social issues according to ESMP and RAP and occupational health and safety).

(iv) Assess and recommend appropriate training courses that could be provided by the Contractors within the framework of their contracts.

5. METHODOLOGY AND STANDARDS

The Consultant will be expected to employ the most effective methodology and standards to achieve results with optimal national stakeholder involvement. In addition the Consultant will be expected to:

(i) collect most data from review and analysis of existing secondary sources of information such as Sector development plans, Draft irrigation master plan, assessment reports, feasibility study reports and various other regional and relevant global publications;

(ii) prepare clear, concise and focused reports; and

(iii) ensure reports are delivered on time as per the agreement. British/American Standards shall be used for the Detail Designs, and their application shall be appropriately referenced. ICOLD dam design criteria shall be used to guide the definition of design floods, earthquakes, sediment management etc.

(iv) (iv) The Consultant will note that the Amagoro dam can be considered as a Low Hazard Small Dam (LHSD) within the meaning of the ICOLD and that the recommendations of this international organization for this type of dam are applicable and recommended.

6. DELIVERABLES AND PERIOD OF PERFORMANCE

The Consultant will produce the following reports and make presentations of the same to the Client:

Report	Description	No of Copies
Inception Report **(1 month)**	Contains a summary and shortcomings of the Feasibility Study, description of alternatives to be analyzed for the Interim Report, an updated work plan, state of mobilization, refined work methodology and understanding of assignment, specify submission dates for each of the required technical reports in draft form, issues identified for Client's attention, proposed content, and structure of the various reports. The proposed project schedule shall be broken down by tasks and sub-tasks and presented in Gantt chart form. A presentation shall be made by the Consultant after 1 month to review and approve the report.	5
Interim Report **(Month 5)**	The report shall contain progress made, including details of the project area, links with existing institutions, lessons from similar projects, an assessment of constraints and opportunities, preliminary results from field investigations and surveys, preliminary findings of the various water use/water demand assessments, preliminary scheme layout with design alternatives, and relevant annexes. A presentation shall be made by the Consultant after month 3 months to review and approve the report and to be given direction on which alternative to carry forward to Detail Design.	5
Draft Detailed Final Design Reports **(Month 8)**	Details will include Detailed Engineering designs with calculations (raw data) for the agreed Engineering works (dam/ head works, irrigation infrastructure, livestock watering and municipal water supply abstractions, system layout and farm and access roads) and technical drawings. The report will also comprise the cadastral survey report for the scheme and a geotechnical baseline report. A review meeting will be held after month 5 to discuss this report and stakeholders' comments raised incorporated after the presentation.	5
Final Design Reports **(Month 10)**	The Final Design reports shall incorporate stakeholders' comments raised after the presentation.	5
Tender documents **(Month 12)**	Includes preparation of Tender document in accordance with World Bank requirements to enable soliciting of construction bids for the works. They will include: bills of quantities,	5

Report	Description	No of Copies
	construction drawings and specifications for construction materials and workmanship, in addition to the conditions of particular application. Construction Supervision Manuals for all levels of parties who will be involved in supervision of the construction works shall also be presented at this stage.	
Monthly progress reports **(1st week of every month)**	A Brief report comprising a narrative and bar charts or other graphic presentation, showing details of the Consultant's progress, changes in the assignment schedule, impediments and proposed remedies will be submitted monthly. Reports should include a financial summary, indicating amounts invoiced, amounts disbursed, and any other pertinent financial details.	5

A workshop will be organized to discuss the Draft Detail Design Report. The workshop will be facilitated by the Client, and the Consultant will make a PowerPoint presentation and provide concise reports for discussion.

Note: *The above mentioned workshop is different from the expected stakeholder public consultative meetings and/or workshops to be organized and facilitated by the Consultant in the project-affected areas for information gathering (as part of Consultant's fieldwork) and stakeholder review and comment on draft documents during the course of the assignment.*

7. QUALIFICATION OF THE FIRM AND KEY PERSONNEL

The consultancy firm should demonstrate experience in carrying out at least two (2) similar assignments in the last 10 years. The similarity of the projects shall be based on the design and/or construction supervision of irrigation schemes with command area of not less than 1,000 ha with either dams (earthfill, rockfill, RCC or gravity dams) or weirs/barrages and with experience in similar conditions with at least one (1) assignment in Sub-Saharan Africa or other countries in the world at similar level of development as Sub-Saharan Africa.

The study team should comprise experienced professionals which will include national/regional/international consultants as necessary to ensure study relevance and effectiveness in light of prevailing local conditions. The team should reflect an appropriate mix of disciplines, education, skills and experience, an understanding of underlying development issues, and regional experience. The team should be made up of specialists each with relevant qualifications in the corresponding disciplines and experience in undertaking studies related to irrigation development and watershed management.

The areas of expertise required include: irrigation engineering and agriculture development, watershed management, rural development, civil/infrastructure/hydraulic engineering, hydrology, financial and economic analysis, geotechnical engineering, institutional analysis and environmental and social impact assessment. The Consultant may optimize their personnel to demonstrate the competences required for the assignment. The time input and qualifications of the key experts are as follows:

Position	**Person -Months**	**Competences**
Dam Design/ Hydraulic Engineer (Team Leader)	10	Bachelor's degree in Civil/Irrigation/Hydraulic Engineering and postgraduate degree Hydraulic Engineering or Environmental Engineering, with a minimum of 15 years' experience in water resources planning and design and construction supervision of hydraulic structures such as dams, hydropower projects and irrigation systems; Must be a registered Engineer with a relevant professional body; and has experiences in designing projects of similar nature and size, preferably funded by International financing Institutions in the last 10 years.
Hydrologist	4	Bachelor's degree in Civil/Agricultural/Water Resources Engineering and postgraduate degree in Water Resources Engineering /Hydrology, and at least 10 years' experience in Hydrological analysis and use of water resources models for surface assessments as well as experience in use of GIS/remote sensing in river basins. *The Hydrologist will review the water resources assessment and sediment transport in the feasibility report and update accordingly*.

Position	Person -Months	Competences
Irrigation and Drainage Specialist	6	Bachelor's degree in Civil/Irrigation/Hydraulic Engineering and postgraduate degree in Irrigation Engineering, with 10 years' experience in the planning studies, design and construction supervision of irrigation and drainage projects of similar nature and size. *The Irrigation and Drainage Specialist will review the feasibility reports and perform design of the irrigation infrastructure.*
Agricultural Planner/ Agronomist	6	Bachelor's degree in Agriculture or Agronomy and postgraduate degree in Agronomy or related sciences with at least 10 years of work experience in commercially oriented irrigation or irrigated agriculture development projects. *The Agricultural Planner/Agronomist will review the feasibility report (Irrigable command area design - irrigation potential assessment, soil surveys and land suitability studies, evaluation of crops, cropping patterns and markets, determination of irrigation water requirement and command area development) and update accordingly.*
Geotechnical/ Structural Engineer/geol ogist	6	Bachelor's degree in Civil/Geotechnical/Structural Engineering and postgraduate degree in Geology/ Geotechnics/Structural Engineering and at least 10 years' experience in Geotechnical/Geotechnics studies, design, and construction supervision of hydraulic infrastructure projects of similar nature and size (ICOLD LHSD dam).
Engineering geologist	5	Bachelor's degree in Geology/Geotechnical/Civil Engineering and postgraduate degree in Geology/Engineering Geology and at least 10 years' experience in Geological/Geotechnics studies, design, and construction supervision of hydraulic infrastructure projects of similar nature and size.
Soil Specialist/ Pedologist	5	Bachelor's degree in Agriculture/Crop Science/Soil Science, Landuse Planning/Management and postgraduate degree in Geoinformation Science and Systems, Crop Science/Soil Science, Land Evaluation and at least 10 years' experience in soil investigation for irrigation and watershed projects.
Land Surveyor	5	Bachelor's degree in Land Surveying and postgraduate qualifications in Land Surveying or Geographical

Position	Person -Months	Competences
		Information Systems with demonstrated experience in use of remote sensing/GIS applications. Minimum of 10 years' experience in engineering surveys.
Social Development Specialist	6	Bachelor's degree in Social Sciences/ Social Development/ Social Work and Social Administration and postgraduate degree in Sociology, Development Studies, or related fields with 10 years of work experience with projects of similar nature and size. The Specialist will ensure that socio-economic and gender issues are appropriately during the design stage.
Environmental Specialist	4	Bachelor's degree in Environmental Sciences or Natural Sciences and postgraduate degree in Environment studies or related fields and at least 10 years work experience in Environmental studies for projects of similar nature and size. Knowledge of World Bank Social and environmental safeguards is a must.
Irrigation Institution/ management specialist	4	Undergraduate majoring in irrigation, agriculture, or related subject with over 10 years experiences working in the irrigation/irrigated agriculture sector. Familiar with Uganda's irrigation and agriculture sectors and institutions, as well as international good practices in irrigation institutions and service delivery, management reforms; and have good knowledge of irrigation water user associations (WUAs) and farmer producers' organizations (FOs) development and capacity building.
Total Man-Months	**61**	

8. DATA AND SERVICES TO BE PROVIDED BY THE CLIENT

The Feasibility Study, data and documentation on hydrological, meteorological, water quality and other relevant aspects of the river basins which the Client may have will be availed to the consultant; however, the consultant has the ultimate responsibility for collecting the required data and documentation which cannot be made available by the Client from official sources. The Client will:

(i) Facilitate in establishing communication with the relevant institutions

(ii) Liaise and assist the consultant in obtaining any other information and documents required from other government agencies and which the Client considers essential for conducting of the assignment

(iii) Provide assistance to obtain work permits for staff of the Consultant

(iv) Provide assistance in obtaining Customs and Tax Exemptions, where applicable, as detailed in Special Conditions of the Consultancy Agreement and General Conditions of Service

(v) Arrange consultative meetings and ensure linkage with relevant stakeholders and district authorities and

(vi) Provide any document like the feasibility study report, on request that the consultant may require either for purposes of preparing bid documents or in the course of performing final designs.

The Consultant shall operate their own project office and shall bear all accommodation, local transportation, visas, and other costs necessary to carry out the assignment.

9. COSTS AND CONTRACT DETAILS

It is estimated that the work will commence in June 2025. Proposals should indicate how the funds will be best utilized to achieve the objectives of the assignment. Whilst all of the Consultant' costs incurred in their participation, supporting the arrangement and running of national and district workshops must be included in the consultant's financial proposal, the costs of holding the workshops themselves (costs of venue, participants' expenses such as transport and accommodation, materials etc.) will be met by the Client and should not be included in the Consultant's financial proposals. The costs of all other consultations, meetings etc. required by the Consultant to adequately complete the assignment must be included in the financial proposals.

10. REPORTING AND SUPERVISION ARRANGEMENTS

The Client is the Ministry of Water and Environment. The Consultant will be directly supervised by the Water for Production Department on behalf of the Client. The Water for Production Department will ensure close coordination and participation of other Government Agencies to ensure information exchange.

The Client will hold discussions with the Consultant at various stages of the consultancy to assess work progress, discuss constraints and possible interventions to ensure quality and meet deadlines.

11. QUALITY MANAGEMENT REQUIREMENTS.

The Consultant will be required to demonstrate in their proposal evidence of adoption of the use of a Quality Assurance System (ISO 9001 or equivalent), as well as describe how quality control will be implemented in the course of the project.