

# **DEVELOPMENT OF SOLAR POWERED WATER SUPPLY AND IRRIGATION SYSTEMS PROJECT**

## **Terms of Reference for Construction Supervision of Solar Water Supply and Irrigation Systems**

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### **1. INTRODUCTION**

#### **1.1 Background**

H.E the President of Uganda through his letter Ref: PO/10 dated 26th October 2018, directed the Ministry of Finance, Planning and Economic Development and Ministry of Water and Environment to work with M/S Nexus Green Ltd of the United Kingdom to secure financing from UK Export Finance to purchase solar pumps from the latter Company aimed at development of solar powered water supply systems across the country.

This intervention is aimed at addressing the ever-growing demands for water supply countrywide amidst impacts of climate change, on agricultural productivity in particular and on the entire economy as a whole. In 2010, alone, drought accounted for 38% and 36% loss in production for beans and maize respectively. The Development of Solar Powered Water Supply and irrigation Systems Project is, therefore, a response to this, targeting to increase water supply coverage country wide, as well as provide water to support irrigation to contribute to the country's climate resilience and food security. The project shall therefore develop 920No. water supply systems for domestic use and irrigation countrywide, while utilizing solar energy to motorize the water supply as it has previously proved efficient while presenting low costs for operation and maintenance.

#### **1.2 Objective of the Assignment**

The overall objective of the assignment is to undertake review of designs prepared by the Contractor and supervise works through prudent contracts management, ensure conformity and compliance to standards, design specifications, design modifications, quality control and assurance, and performance monitoring for the infrastructure during defects period.

### **2. SCOPE OF WORK**

#### **2.1 Pre-Construction Activities**

During the pre-construction phase, the consultant's task shall include, but not be limited to the following:

- (i) Facilitate Sites Handover for the sites for implementation.
- (ii) Review Contractor's designs and recommend design improvements or modifications, as necessary.
- (iii) Approve designs, in consultation with the Client
- (iv) Review the works programme and method statements while highlighting areas that may pose a risk to works scope, quality and timely completion. Identify the key milestones and the critical path activities.

- (v) Review Contractor's proposed resources (labour/staff, equipment and materials), utilization, deployment, productivity and efficiency. Ensure the detailed works activities schedule presents the resource utilization and deployment for the target outputs and is synchronized with the work programme.
- (vi) Ensure that insurance, performance securities and advance payments guarantees are furnished by the Contractor in time. In liaison with the Employer, should validate these documents and ensure authenticity in order to issue the commencement notice for the construction.
- (vii) Review and make recommendations to the Contractor's procurement schedule.
- (viii) Supervise and ensure that the Contractor's procurement schedule indicates all supplies/materials are from the right source, quality and of sufficient quantities.
- (ix) Advise the Employer on contractual obligations and establish early warning systems to minimise occurrence from potential compensation events and subsequent claims for time extension and/or costs.
- (x) Ensure that the Supplier/Contractor conforms with the legal, health and safety standards.
- (xi) Ensure that the Supplier/Contractor works within the environmental and social frameworks as detailed in the project's environmental management plan and the resettlement action plan, and compliance with the relevant National policy and legal Framework, and with the environment and social safeguard policies of the Bank.
- (xii) Review the Environmental and Social Monitoring Plan (ESMP), if any, outline and disseminate the mitigating/enhancing, monitoring, consultative and institutional measures required to prevent, minimize, mitigate or compensate for adverse environmental impacts or enhance the beneficial impacts.
- (xiii) Review adequacy of mitigation measures and strengthening of compliance to environmental and social safeguards procedures (ESAP).
- (xiv) Prepare minimum safety standards for workers. Ensure tools and guidelines for safeguard procedures specifying minimum safety procedures available and accessible to all sites staff for consultants, Supplier/contractors and workers.
- (xv) Ensure range and nature of safety measures at works sites and their supervision in place.

## **2.2 Construction activities**

During the entire construction process, the consultant shall work in close cooperation with the Employer's project team to perform the following tasks:

- (i) Supervise the Supplier/contractor's actual work progress versus the planned work programme and ensure that delays are being kept to a minimum and, that the Supplier/Contractor at their cost takes measures to make up for time lost and pull the project back to planned schedule. In addition the Consultant is required to keep a monthly updated work program in liaison with Supplier/Contractor.
- (ii) Timely issue to the Supplier/Contractor all the necessary correspondences related to information, instructions, clarifications and suggestions so as to ensure consistency in quality, positive progress and planned costs.

- (iii) Inspect, determine and approve the part of works before, during and after construction of part and, or whole of the works to ensure all time compliance with the specifications and standards.
- (iv) Supervise the Supplier/Contractor's procurements, ensuring that all materials are from the right source, quality and of sufficient quantities.
- (v) Review Supplier/Contractor's proposed resources (labour/staff, equipment and materials), utilization, deployment, productivity and efficiency. Ensure the detailed works activities schedule presents the resource utilization and deployment for the target outputs and is synchronized with the work programme, and updated on a monthly basis.
- (vi) Supervise the Supplier/Contractor's construction activities, ensuring that all construction is undertaken as designed, or in accordance with client approved variations to the original design, and that all quality standards are met.
- (vii) Ensure that the Supplier/Contractor has issued insurance of all personnel for accidents liabilities during construction.
- (viii) Inspect and certify all completed works. Certify payment certificates for payments of completed works or parts thereof. And measure and certify all quantities invoiced by the Supplier/Contractor. Prepare the Supplier/contractor's payment statement including final certificate in accordance with General Conditions of Contract and Conditions of Particular application.
- (ix) Ensure that the Supplier/Contractor performs tests and provide reports from approved laboratories according to approved and agreed upon quality standards to the client and approves the materials procured by the Supplier/contractor for the works to ensure that they comply with standards and specifications.
- (x) Periodically review the status of the Supplier/Contractor's real versus required staffing, equipment, insurance, status of performance securities, advance payment guarantees and recommend appropriate actions to the Client. In addition the Consultant will check the status of expiry of the performance bond and advance payment guarantee and recommend appropriate actions (if applicable) to the Employer.
- (xi) State all methods and procedures that are intended to ensure robust quality control, execute all procedures accordingly, and report on all quality control undertakings and their results to the Client.
- (xii) In addition to continuous construction supervision, schedule and organise a weekly formal inspection of activities with the Supplier/Contractor's representative and agree on the progress made.
- (xiii) Develop and maintain a project progress reporting format that is both, concise and in accordance with the Employer's requirements.
- (xiv) Prepare Monthly progress reporting to the Client, and immediate reporting should any issues be identified that could impact on the project completion schedule. This should include arrangement for site meetings as and when they may be required.
- (xv) Monitor the value of works executed against payments made to the Supplier/Contractor and report to the Employer monthly consistency against programme of expenditure and works giving reasons and recommendations.
- (xvi) In consultation with the Client, and if necessary, prepare variation orders.

- (xvii) Schedule and organise witness testing events, including contractual tests for the completed works.
- (xviii) Maintain daily site records on prevailing weather conditions, labour productivity, availability and operational condition of key plant, plant productivity, daily activity outputs, and disputes between employers and staff as well as between Supplier/contractor and local residents, and all other observations that may be of importance in case of any arbitration or legal disputes.
- (xix) Carry out the preparation and updating of Environmental and Social Safeguards Procedures (ESAP), Occupational Health and Safety (OHS), including the preparation and updating of tools, formats/manuals and procedures and the review of environmental and social safeguards procedures. Ensure that all safeguard issues (OHS, Environment, Gender and HIV and AIDS) are mainstreamed in the project works execution.
- (xx) Ensure that there is timely and coordinated response to environmental and social issues – a functional system of reporting safeguard issues in place and issues of concern by different stakeholders regularly discussed and responded to.
- (xxi) Document the responses to environmental and social issues of concern raised by different stakeholders.
- (xxii) Ensure quality and timely environmental and social reports on regular monthly basis.
- (xxiii) Guide the Supplier/Contractor on compiling an Operation and Maintenance Manual and forward copies of the Manual to the Client as provided for in the Works Contract.
- (xxiv) Commission and approve completed systems and facilitate hand over to Employer.
- (xxv) Prepare snag lists after substantial completion of works.
- (xxvi) Prepare environmental and social audits and certification with regulatory authority.
- (xxvii) Prepare the ‘substantial completion report’ prior to technical handover.
- (xxviii) Facilitate technical commissioning.
- (xxix) Prepare the Project Completion Report

### **2.3 Defects Liability Period**

The Consultant shall ensure and maintain low intensity supervision and monitoring during the defects liability period. During the entire period, the consultant shall work in close cooperation with relevant operational staff, as nominated by the local authorities, communities and Employer. During the defects liability period, the consultant’s task shall include, but not be limited to the following:

- (i) Supervise and update the Supplier/Contractor’s snag list, as agreed and contained in the substantial completion report.
- (ii) Monitor the performance of works and equipment, notify both the Supplier/contractor and the client on defects identified, and recommend remedial actions.
- (iii) Supervise and certify the remedying of any defects that become apparent during the defects liability phase.
- (iv) Review and supervise the agreed upon ‘on the job’ training programme of operational staff by the Supplier/Contractor.

- (v) Ensure that the Supplier/Contractor supplies complete sets of all works manuals, drawings, models, warranties, and other relevant documentation to the Employer. Point out all items missing and recommend actions to be taken to the Employer.
- (vi) Review, approve, and certify 'As-Built' drawings.
- (vii) Review and certify the Final Statement of Accounts.
- (viii) Develop and maintain a Defects Liability reporting format that is both, concise and in accordance with the Employer's requirements.
- (ix) Hold regular scheduled meetings with the Supplier/Contractor and Employer where all defects identified are recorded and a time schedule for remedying these shall be agreed.
- (x) Prepare monthly progress reporting to the Employer on the operational status of systems.
- (xi) Prepare Final Completion Report, including the design modifications (detailed analysis).
- (xii) Assist the Employer in the final handover and acceptance process, including all associated administrative work, such as the discharge certificate (Defects Liability Certificate) for the Supplier/Contractor.
- (xiii) Update Asset Register.

The Consultant is expected to provide in his proposal a work breakdown and schedule, which will enable him to accomplish the above among other requirements of the assignment.

### **3. OUTPUTS**

The following outputs are expected from the Consultant:

- (i) Revised Designs or modifications (with detailed drawings, analysis and calculations)
- (ii) Approved Work Program at commencement
- (iii) Approved updated Work Programs for the Supplier/Contractor.
- (iv) Site Records; including weather, labour productivity, plant operational condition and availability and productivity, stores/materials availability and usage, personnel/workforce, and security/theft incidents. Daily outputs and resource utilization.
- (v) Minutes of Site Meetings and Special Management Meetings
- (vi) Site Instructions to Contractor.
- (vii) Monthly Progress Reports.
- (viii) Payment Certificates
- (ix) Final Construction Supervision Report.

### **4. CONSULTANCY INPUT REQUIREMENTS**

The Consultant is expected to set up a supervision team, of permanent staff, with expertise in major areas, namely: Water Resources Engineering, Irrigation, Civil Engineering Construction and any other specialists that the Consultant may deem relevant for execution of this assignment. Computer literacy and fluency in English are a must for any of the proposed personnel. Experience in the region will be an added advantage.

The estimated man-months for the consultants' key personnel are as follows:

<b>Designation</b>	<b>No. staff</b>	<b>Man-months</b>
Project Manager/Team Leader	1	36
Design Water Engineer	1	36
Irrigation Engineer	1	36
Resident Engineer	1	36
Assistant Resident Engineer	2	72
Clerk of Works	4	144
<b>TOTAL</b>		<b>360</b>

The Consultant will organize all relevant inputs: finances, logistics: offices, vehicles, equipment and tools etc., as required to accomplish the assignment and is expected to have an office within Uganda, well equipped for the work.

The firm is expected to provide all facilities for executing the assignment, including office and field equipment, vehicles and office accommodation. It is also expected that the consultant will be responsible for the collection of all literature, information and data required for the assignment at own cost. The Consultant is expected to have fully fledged offices in Kampala, but there may be need to establish appropriately manned and equipped satellite offices within the project area.

## **5. QUALIFICATION OF THE CONSULTANT**

The Consultants team should comprise experienced professionals which will include national/regional/international consultants as necessary to ensure 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 water supply and irrigation development and watershed management.

The areas of expertise required include: irrigation engineering and agriculture development, watershed management, civil/infrastructure/hydraulic engineering. 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:

<b>Position</b>	<b>Qualification and Competences</b>
Project Manager/Team Leader)	Bachelor's degree in Civil Engineering and Postgraduate qualifications in Civil/Water/Irrigation/Hydraulic Engineering, with a minimum of 10 years' experience in water resources planning, design and construction supervision of water supply and sanitation or irrigation infrastructure projects including water treatment. Experience as Project Manager or Team Leader on not less than 3 previous projects similar in scale and content to the proposed project. Must be a registered Engineer with a relevant professional body.
Design Water Engineer	Bachelor's degree in Civil Engineering and Masters Degree in Water Supply and Sanitation Engineering with a minimum of 10 years' experience in design and construction supervision of water supply and sanitation infrastructure

<b>Position</b>	<b>Qualification and Competences</b>
	projects including water treatment. Experience as a Design Engineer on not less than 5 previous projects similar in scale and content to this one.
Irrigation Engineer	Bachelor's degree in Civil Engineering and Masters degree in Irrigation Engineering with a minimum of 10 years' experience in design and construction supervision of irrigation and drainage systems. Experience as a Design Engineer on not less than 5 previous projects similar in scale and content to this one.
Resident Engineer	Bachelor's degree in Civil Engineering and Master's degree in construction management with 10 years' experience in construction supervision of water supply and irrigation infrastructure including similar conventional water treatment plants and pipe networks. Experience as Resident Engineer on not less than 5 previous projects similar in scale and content to this one.
Assistant Resident Engineer	Bachelor's degree in Civil Engineering and Postgraduate qualification in construction management or Project Management with 10 years' experience in construction supervision of water supply and irrigation infrastructure including similar conventional water treatment plants and pipe networks. Experience as Resident Engineer/Assistant Resident Engineer on at least 2 previous projects (similar in scale and content to this one) in the East Africa region.
Clerk of Works	Bachelor's degree in Civil Engineering with 5 years' experience in construction supervision of water supply and irrigation infrastructure including similar conventional water treatment plants and pipe networks. Experience as Clerk of Works on at least 2 previous projects (similar in scale and content to this one) in the East Africa region.

## **6. DATA AND SERVICES TO BE PROVIDED BY THE CLIENT**

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 on request that the consultant may require either for purposes of preparing bid documents or in the course of the feasibility studies.

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.

## **7. COSTS AND CONTRACT DETAILS**

It is estimated that the work will commence in July 2020 and will take 36 calendar months. Proposals should indicate how the funds will be best utilized to achieve the objectives of the assignment. Whilst all of the Consultant's 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.

## **8. 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.

## **9. 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.