



REQUEST FOR PROPOSAL (RFP)

(Services)

Date: September 14, 2021

REFERENCE: **UNDP/UGA/RFP/2021/011**

Dear Sir / Madam:

We kindly request you to submit your Proposal for the **Development of an online Groundwater database management system for Transboundary Aquifers in the Nile Basin**

Please be guided by the form attached hereto as Annex 2, in preparing your Proposal.

Proposals may be submitted on or before **Thursday, September 23, 2021** and via email to the address below:

tenders.kampala@undp.org

Your Proposal must be expressed in the English, and valid for a minimum period of 90 days

In the course of preparing your Proposal, it shall remain your responsibility to ensure that it reaches the address above on or before the deadline. Proposals that are received by UNDP after the deadline indicated above, for whatever reason, shall not be considered for evaluation. If you are submitting your Proposal by email, kindly ensure that they are signed and in the .pdf format, and free from any virus or corrupted files.

Services proposed shall be reviewed and evaluated based on completeness and compliance of the Proposal and responsiveness with the requirements of the RFP and all other annexes providing details of UNDP requirements.

The Proposal that complies with all the requirements, meets all the evaluation criteria, and offers the best value for money shall be selected and awarded the contract. Any offer that does not meet the requirements shall be rejected.

Any discrepancy between the unit price and the total price shall be re-computed by UNDP, and the unit price shall prevail, and the total price shall be corrected. If the Service Provider does not accept the final price based on UNDP's re-computation and correction of errors, its Proposal will be rejected.

No price variation due to escalation, inflation, fluctuation in exchange rates, or any other market factors shall be accepted by UNDP after it has received the Proposal. At the time of Award of Contract or Purchase Order, UNDP reserves the right to vary (increase or decrease) the quantity of services and/or goods, by up to a maximum twenty-five per cent (25%) of the total offer, without any change in the unit price or other terms and conditions.

Any Contract or Purchase Order that will be issued as a result of this RFP shall be subject to the General Terms and Conditions attached hereto. The mere act of submission of a Proposal implies that the Service Provider accepts without question the General Terms and Conditions of UNDP, herein attached as Annex 3.

Please be advised that UNDP is not bound to accept any Proposal, nor award a contract or Purchase Order, nor be responsible for any costs associated with a Service Providers preparation and submission of a Proposal, regardless of the outcome or the manner of conducting the selection process.

UNDP's vendor protest procedure is intended to afford an opportunity to appeal for persons or firms not awarded a Purchase Order or Contract in a competitive procurement process. In the event that you believe you have not been fairly treated, you can find detailed information about vendor protest procedures in the following link:

<http://www.undp.org/content/undp/en/home/operations/procurement/business/protest-and-sanctions.html>

UNDP encourages every prospective Service Provider to prevent and avoid conflicts of interest, by disclosing to UNDP if you, or any of your affiliates or personnel, were involved in the preparation of the requirements, design, cost estimates, and other information used in this RFP.

UNDP implements a zero tolerance on fraud and other proscribed practices, and is committed to preventing, identifying, and addressing all such acts and practices against UNDP, as well as third parties involved in UNDP activities. UNDP expects its Service Providers to adhere to the UN Supplier Code of Conduct found in this link :

https://www.un.org/Depts/ptd/sites/www.un.org.Depts.ptd/files/files/attachment/page/pdf/unscc/conduct_english.pdf

Thank you and we look forward to receiving your Proposal.

Sincerely yours,

Abdourahmane Bouacar Dia

Abdourahmane Dia

Head of Procurement a.i.

9/14/2021

Description of Requirements Context of the Requirement	<p>The Nile Basin Initiative (NBI) is a cooperative arrangement initiated and led by the Nile riparian countries to promote joint development, protection, and management of the common Nile Basin water resources. One of the key result areas NBI Secretariat implemented Basin Wide Program focuses on trans-boundary groundwater aquifers. With the financial support of the Global Environment Facility (GEF) and in collaboration with the United Nations Development Program (UNDP), the Nile-SEC will implement its first groundwater study project with the objective of enhancing knowledge and capacity for sustainable use and management of trans-boundary aquifers and aquifers of regional significance in the Nile Basin. This project has five components aiming at strengthening the overall water resources management nationally and basin wide.</p> <p>Along the Nile Basin countries, reliance on groundwater is rapidly increasing due to the increased demand over water supply. There is ample evidence that groundwater recharge in the Nile Basin is under threat. This is partly attributed to climate change, high rainfall variability, and land use/land cover changes leading to declining amount of surface/ground water interaction in different areas.</p> <p>The interaction between groundwater and surface water systems (rivers, wetlands, lakes) has not been adequately considered in most trans-boundary river basin management initiatives, including the Nile Basin. The threats on trans-boundary aquifers are more severe because of lack of common groundwater governance and management mechanisms. Therefore, it is of vital importance to build and expand on the understanding of groundwater resources characteristics through detailed investigation, mapping, and assessment of the Nile Basin aquifer systems. The Nile Basin Initiative has received funding from Global Environment Facility (GEF) through UNDP to implement a project entitled “Enhancing conjunctive management of surface and groundwater resources in selected transboundary aquifers: Case study for selected shared groundwater bodies in the Nile Basin”. The project aim is to foster the more effective utilization and protection of selected shared aquifers in the selected sub-basin in the Eastern Nile and the Nile Equatorial Lakes region through further improving the understanding of available groundwater resources and demonstrating ‘conjunctive management that optimizes the joint use of surface and groundwater. The project will also contribute to aid the national achievements and reporting of water-related Sustainable Development Goals; and will be supportive to environmental protection whilst enhancing socio-economic development of the basin’s population.</p> <p>NBI intends to employ the services of a Consultancy Firm to participate in, and support, the design and development of an online Groundwater knowledge and database management system for Transboundary Aquifers in the Nile Basin hereinafter referred to as ‘the Assignment’.</p> <p>The assignment described in the Terms of Reference (ToR) was funded through NBI member country contributions, and Global Environment Facility through United Nations Development Program. This document presents the Terms of Reference for the Assignment. The Consultancy firm shall be selected competitively based on UNDP’s procurement procedures.</p> <p>Because of the nature of the work, the Consultancy firm shall be internationally sourced based on approved criteria.</p>		
Implementing Partner of UNDP	N/A		
Brief Description of the Required Services	A consultancy firm to develop an online Groundwater database management system for Transboundary Aquifers in the Nile Basin		
List and Description of Expected Outputs to be Delivered	Deliverable		Approx. due date from commencement, in weeks
	1: Brief inception report: A document describing the consultant’s understanding of the scope of work and the methodology to be followed including the planned time schedule of activities for the tasks in the assignment		One week after signing contract

	<p>GW database Management System:</p> <ul style="list-style-type: none"> i. Data inventory report: An inventory report of all reviewed data including data resolution, extent and source of data pointing out data requirements needed for Groundwater resources management. ii. A Groundwater data model for raw data and knowledge base with the help of Unified Model Language (UML) developed. <p>GW database management System developed and accessible:</p> <ul style="list-style-type: none"> i. Operational GW database management System developed: An operational and populated database with a complete set of metadata for each dataset developed ii. GW database management system accessible online 	Four and half weeks from the inception report
	<p>3: User Acceptance Report</p> <ul style="list-style-type: none"> i. Conduct user acceptance testing with the client, address feedback and finalise a UAT report for the system <p>Integrate with the Integrated Knowledge Portal</p> <ul style="list-style-type: none"> ii. The Consultant shall develop pages that shall be integrated in the IKP for purposes of information and Knowledge dissemination. 	Five and half weeks after inception
	<p>4: Stakeholders and training workshop</p> <ul style="list-style-type: none"> i. Conduct stakeholder workshop to introduce the system the client's technical team, including advanced training for administering and managing the system 	Six and a half weeks after inception
	See additional information in Annex1 attached	
Person to Supervise the Work/Performance of the Service Provider	The consultancy firm shall report to the Groundwater Project Manager/ Technical Lead with oversight by Deputy Executive Director/Head of Basin-wide Program	
Frequency of Reporting	As needed, based planning of the assignment	
Progress Reporting Requirements	Update on the milestones and detailed plans	
Location of work	<input checked="" type="checkbox"/> Exact Address/es Nile Basin Initiative Secretariat (Nile-SEC) P.O Box 192 Entebbe, Uganda Plot 12 Mpigi Road, Entebbe Tel: +256 (414) 321 424/ +256 (417) 705 000 Email: nbisec@nilebasin.org	
Expected duration of work	2 months	
Target start date	4 th October 2021	
Latest completion date	3rd December 2021	
Travels Expected	The consultant shall work from his/her home venue and partly from the NBI secretariat.	

Requirements										
Facilities to be Provided by UNDP (i.e., must be excluded from Price Proposal)	<input checked="" type="checkbox"/> Access to information relevant to assignment All costs needed to achieve the deliverables set forth in this RFP are to be included in the financial proposals from the offerors (professional fees, software, hardware, communication, consumables, etc.)									
Implementation Schedule indicating breakdown and timing of activities/sub-activities	<input checked="" type="checkbox"/> Required. To be included in the Technical proposal									
Names and curriculum vitae of individuals who will be involved in completing the services	<input checked="" type="checkbox"/> Required. Technical proposals must identify who in the organization would be taking the role of Team Leader and specify the roles of the different staff proposed.									
Currency of Proposal	<input checked="" type="checkbox"/> Local Currency (UGX)									
Value Added Tax on Price Proposal	<input checked="" type="checkbox"/> must be exclusive of VAT and other applicable indirect taxes									
Validity Period of Proposals (<i>Counting for the last day of submission of quotes</i>)	<input checked="" type="checkbox"/> 90 days In exceptional circumstances, UNDP may request the Proposer to extend the validity of the Proposal beyond what has been initially indicated in this RFP. The Proposal shall then confirm the extension in writing, without any modification whatsoever on the Proposal.									
Partial Quotes	<input checked="" type="checkbox"/> Not permitted									
Payment Terms	The selected firm shall receive service fees upon certification of the completed tasks satisfactorily, as per the following payment schedule: <table border="1" data-bbox="418 1451 1511 1711"> <thead> <tr> <th>No.</th><th>Deliverables</th><th>Payment percentage</th></tr> </thead> <tbody> <tr> <td>1</td><td>Payment upon submission of inception & Final work plan.</td><td>20%</td></tr> <tr> <td>2</td><td>Analysis and Design report with a GW database management System developed and accessible</td><td>30%</td></tr> </tbody> </table>	No.	Deliverables	Payment percentage	1	Payment upon submission of inception & Final work plan.	20%	2	Analysis and Design report with a GW database management System developed and accessible	30%
No.	Deliverables	Payment percentage								
1	Payment upon submission of inception & Final work plan.	20%								
2	Analysis and Design report with a GW database management System developed and accessible	30%								

	3	User Acceptance Report; Integrated with the Integrated Knowledge Portal.	30%
	4	Design and holding of Stakeholders and training workshop	20%
Person(s) to review/inspect/ approve outputs/completed services and authorize the disbursement of payment	UNDP Team Leader NCER and overall reporting to UNDP Resident Representative		
Type of Contract to be Signed	<input checked="" type="checkbox"/> Contract for Professional services		
Criteria for Contract Award	<input checked="" type="checkbox"/> Highest Combined Score (based on the 70% technical offer and 30% price weight distribution) <input checked="" type="checkbox"/> Full acceptance of the UNDP Contract General Terms and Conditions (GTC). This is a mandatory criterion and cannot be deleted regardless of the nature of services required. Non-acceptance of the GTC may be grounds for the rejection of the Proposal.		
Criteria for the Assessment of Proposal	<p><u>Technical Proposal (70%) – 1000 points</u></p> <input checked="" type="checkbox"/> Expertise of the Firm 300 points <input checked="" type="checkbox"/> Methodology, Its Appropriateness to the Condition and Timeliness of the Implementation Plan 400 points <input checked="" type="checkbox"/> Management Structure and Qualification of Key Personnel 300 points <p><u>Financial Proposal (30%)</u></p> To be computed as a ratio of the Proposal's offer to the lowest price among the proposals received by UNDP.		
UNDP will award the contract to:	<input checked="" type="checkbox"/> One and only one Service Provider		
Contract General Terms and Conditions	<input checked="" type="checkbox"/> General Terms and Conditions for de minimis contracts (services only, less than \$50,000) Applicable Terms and Conditions are available at: http://www.undp.org/content/undp/en/home/procurement/business/how-we-buy.html		
Annexes to this RFP	<input checked="" type="checkbox"/> Form for Submission of Proposal (Annex 2) <input checked="" type="checkbox"/> Technical criteria scoring table (Annex 3) <input checked="" type="checkbox"/> Detailed Technical Specifications (Annex 4)		

Contact Person for Inquiries (Written inquiries only)	ug.procurement@undp.org Any delay in UNDP's response shall be not used as a reason for extending the deadline for submission, unless UNDP determines that such an extension is necessary and communicates a new deadline to the Proposers.
Other Information	<ul style="list-style-type: none">• Technical proposal consisting of background information about the company other similar projects handled and CVs of the persons who will be engaged in this assignment; A section explaining the organization's competence and experience in handling similar assignments; Proposed strategy / methodology, work plan, timeline, and training plan; Personal CVs of the Team leader and the support team indicating all experience as well as the contact details (email and telephone number) of the team members and at least three (3) professional references.• Financial proposal that indicates the all-inclusive fixed total contract price, supported by a breakdown of costs, and the budget for the assignment.

FORM FOR SUBMITTING SERVICE PROVIDER'S PROPOSAL

(This Form must be submitted only using the Service Provider's Official Letterhead/Stationery)

[insert: Location].

[insert: Date]

To: [insert: Name and Address of UNDP focal point]

Dear Sir/Madam:

We, the undersigned, hereby offer to render the following services to UNDP in conformity with the requirements defined in the RFP dated [specify date] , and all its attachments, as well as the provisions of the UNDP General Contract Terms and Conditions:

A. Qualifications of the Service Provider

The Service Provider must describe and explain how and why they are the best entity that can deliver the requirements of UNDP by indicating the following:

- a) Profile – describing the nature of business, field of expertise, licenses, certifications, accreditations.*
- b) Business Licenses – Registration Papers, Tax Payment Certification, etc.*
- c) Latest Audited Financial Statement – income statement and balance sheet to indicate its financial stability, liquidity, credit standing, and market reputation, etc.*
- d) Track Record – list of clients for similar services as those required by UNDP, indicating description of contract scope, contract duration, contract value, contact references.*
- e) Certificates and Accreditation – including Quality Certificates, Patent Registrations, Environmental Sustainability Certificates, etc.*
- f) Written Self-Declaration that the company is not in the UN Security Council 1267/1989 List, UN Procurement Division List or Other UN Ineligibility List.*

B. Proposed Methodology for the Completion of Services

The Service Provider must describe how it will address/deliver the demands of the RFP; providing a detailed description of the essential performance characteristics, reporting conditions and quality assurance mechanisms that will be put in place, while demonstrating that the proposed methodology will be appropriate to the local conditions and context of the work.

C. Qualifications of Key Personnel

If required by the RFP, the Service Provider must provide:

- a) Names and qualifications of the key personnel that will perform the services indicating who is Team Leader, who are supporting, etc.
- b) CVs demonstrating qualifications must be submitted if required by the RFP; and
- c) Written confirmation from each personnel that they are available for the entire duration of the contract.

D. Cost Breakdown per Deliverable* (This is a summary of the financial proposal)

Deliverable	No. of months	Lumpsum cost
Brief inception report	2	
Analysis and Design report	2	
GW database management System developed and accessible		
User Acceptance Report costs	2	
Integrate with the Integrated Knowledge Portal		
Stakeholders and training workshop	2	
Overall total		

**This shall be the basis of the payment tranches described on page 5*

E. Cost Breakdown by Cost Component (The overall total in this table must equal to total in table D above)

Description of Activity	UOM	Quantity	Unit Price (UGX)	Total Amount (UGX)
I. Personnel Services				
Professional fees	Persons			
Team leader	Lumpsum	1		
Senior software engineers and Developers	Lumpsum	3		
II. Technical costs				
1. Supply, install, configure, customize the System	Lumpsum	1		
2. User Training and system Administration Training	Lumpsum	1		
3. Data Migration	Lumpsum	1		
4. Support and Maintenance.	Lumpsum	1		
5. Management costs not to exceed 8% of the total cost	Lumpsum	1		
III. Other Related Costs (if applicable)				
Overall total				

[Name and Signature of the Service Provider’s Authorized Person]

[Designation]

[Date]

Technical Evaluation Criteria

Summary of Technical Proposal Evaluation Forms		Points Obtainable
1.	Bidder's qualification, capacity, and experience	300
2.	Proposed Methodology, Approach, and Implementation Plan	400
3.	Management Structure and Key Personnel	300
	Total	1000

Section 1. Bidder's qualification, capacity, and experience		Points obtainable
1.1	Reputation of Organization and Staff Credibility / Reliability / Industry Standing	50
1.2	General Organizational Capability which is likely to affect implementation: management structure, financial stability and project financing capacity, project management controls, extent to which any work would be subcontracted	90
1.3	Relevance of specialized knowledge and experience on similar engagements done in the region/country	80
1.4	Quality assurance procedures and risk mitigation measures	60
1.5	Organizational Commitment to Sustainability (mandatory weight) -Organization is compliant with ISO 14001 or ISO 14064 or equivalent – 10 points -Organization is a member of the UN Global Compact - 5 points -Organization demonstrates significant commitment to sustainability through some other means- 5 points , for example internal company policy documents on women empowerment, renewable energies or membership of trade institutions promoting such issues	20
Total Section 1		300

Section 2. Proposed Methodology, Approach, and Implementation Plan		Points obtainable
2.1	Understanding of the requirement: Have the important aspects of the task been addressed in sufficient detail? Are the different components of the project adequately weighted relative to one another?	80
2.2	Description of the Offeror's approach and methodology for meeting or exceeding the requirements of the Terms of Reference	100
2.3	Details on how the different service elements shall be organized, controlled, and delivered	50
2.4	Description of available performance monitoring and evaluation mechanisms and tools; how they shall be adopted and used for a specific requirement	50
2.5	Assessment of the implementation plan proposed including whether the activities are properly sequenced and if these are logical and realistic	70
2.6	Demonstration of ability to plan, integrate and effectively implement sustainability measures in the execution of the contract	50
Total Section 2		400

Section 3. Management Structure and Key Personnel		Points obtainable
3.1	Composition and structure of the team proposed. Are the proposed roles of the management and the team of key personnel suitable for the provision of the necessary services?	100
3.2	Qualifications of key personnel proposed	
3.2 a	Technical Team	
	Team Leader: - The team leader must have extensive management experience working in a transboundary basin water resources analysis, planning, management, development spatial data management system. - Demonstrated skills in project planning, institutional and capacity development, and stakeholder facilitation, coupled with technical understanding gained through a career working in the water resources analysis, knowledge management, are essential. - Minimum qualifications: MSc degree in Hydrogeology, water resources engineering, hydrology, hydro-informatics environmental sciences, or similar; with a minimum of 10 years of professional experience including management in a transboundary basin of large water resources projects, international experience including developing countries.	80
	3 Senior software engineers and Developers (SWE&D): - Responsible for design, development, integration and deployment of the NB Groundwater database management system and integration into the IKP. - Minimum qualifications and experience: MSc in engineering in computer science, software engineering or closely related fields. 10 years of experience in systems analysis, design and development of complex software development projects, Extensive knowledge and experience of JavaScript, JQuery, HTML5, CSS3, Web Programming Skills, Teamwork, Verbal Communication, cross-browser compatibility, Web User Interface Design (UI), Security Principles, Object-Oriented Design, Web Services (REST/SOAP), Multimedia Content Development, API's; Extensive designing and development of GIS feature based web based applications including interactive map development, data visualization, geodata conversion, geodata transformation and geospatial analysis. MS SQL Server, MySQL, PostgreSQL and PostGIS, ArcGIS Online or Node.js; Demonstrated experience in building Geo-database using ESRI products is essential.	120
Total Section 3		300



Terms of Reference: For Geo-Database Consultancy Firm

Project Title: Enhancing conjunctive management of surface and groundwater resources in selected trans-boundary aquifers: case study for selected shared groundwater bodies in the Nile Basin.

Consultancy Title: Development of an online Groundwater database management system for Transboundary Aquifers in the Nile Basin

1. Duration of the Contract: Oct to Dec. 2021
2. Level of effort 2 man-months

Introduction:

The Nile Basin Initiative (NBI) is a cooperative arrangement initiated and led by the Nile riparian countries to promote joint development, protection, and management of the common Nile Basin water resources. One of the key result areas NBI Secretariat implemented Basin Wide Program focuses on trans-boundary groundwater aquifers. With the financial support of the Global Environment Facility (GEF) and in collaboration with the United Nations Development Program (UNDP), the Nile-SEC will implement its first groundwater study project with the objective of enhancing knowledge and capacity for sustainable use and management of trans-boundary aquifers and aquifers of regional significance in the Nile Basin. This project has five components aiming at strengthening the overall water resources management nationally and basin wide.

Along the Nile Basin countries, reliance on groundwater is rapidly increasing due to the increased demand over water supply. There is ample evidence that groundwater recharge in the Nile Basin is under threat. This is partly attributed to climate change, high rainfall variability, and land use/land cover changes leading to declining amount of surface/ground water interaction in different areas.

The interaction between groundwater and surface water systems (rivers, wetlands, lakes) has not been adequately considered in most trans-boundary river basin management initiatives, including the Nile Basin. The threats on trans-boundary aquifers are more severe because of lack of common groundwater governance and management mechanisms. Therefore, it is of vital importance to build and expand on the understanding of groundwater resources characteristics through detailed investigation, mapping, and assessment of the Nile Basin aquifer systems. The Nile Basin Initiative has received funding from Global Environment Facility (GEF) through UNDP to implement a project entitled "Enhancing conjunctive management of surface and groundwater resources in selected transboundary aquifers: Case study for selected shared groundwater bodies in the Nile Basin". The project aim is to foster the more effective utilization and protection of selected shared aquifers in the selected sub-basin in the Eastern Nile and the Nile Equatorial Lakes region through further improving the understanding of available groundwater resources and demonstrating 'conjunctive management that optimizes the joint use of surface and groundwater.

Goals; and will be supportive to environmental protection whilst enhancing socio-economic development of the basin's population.

NBI intends to employ the services of a **Consultancy Firm** to participate in, and support, the design and development of an online Groundwater knowledge and database management system for Transboundary Aquifers in the Nile Basin hereinafter referred to as 'the Assignment'.

The assignment described in the Terms of Reference (ToR) was funded through NBI member country contributions, and Global Environment Facility through United Nations Development Program. This document presents the Terms of Reference for the Assignment. The Consultant shall be selected competitively based on UNDP's procurement procedures.

Because of the nature of the work, the Consultant shall be internationally sourced based on approved UNDP's criteria.

Project Information:

This project is briefly described as follows:

Project title: Enhancing conjunctive management of surface and groundwater resources in selected trans-boundary aquifers: case study for selected shared groundwater bodies in the Nile Basin.

Project objective: To enhance knowledge and capacity for sustainable use and management of trans-boundary aquifers and aquifers of regional significance in the Nile Basin

Specific Objectives:

- Improve knowledge and understanding of groundwater resources in the Nile Basin.
- Strengthen overall water resources management nationally and basin wide.
- Respond to climate change impacts through effective risk-reduction adaptation measures - e.g.: conjunctive use and management of surface water and groundwater
- ensure a healthy ecosystem and strengthened livelihood

Project components:

Component 1: Furthering knowledge and understanding about availability of groundwater resources in the selected aquifers underlying watersheds in the sub-basins of the Eastern Nile and the Nile Equatorial Lakes.

Component 2: Development of action plans on groundwater resources governance, management, and protection for inclusion in national, sub-basin frameworks – also including consideration of surface water/groundwater resources conjunctive use

Component 3: Targeted pilot projects to explore conjunctive use of surface and groundwater, and links to biodiversity conservation and climate change adaptation

Component 4: Further strengthening capacity to address groundwater issues at the national and regional levels

Component 5: Communications and awareness raising

Three aquifer areas have been chosen for the current intervention, namely the Kagera aquifer shared among Burundi, Rwanda, Tanzania, and Uganda; the Mt Elgon aquifer shared between Kenya and Uganda, the Gedaref-Adigrat aquifer shared between Ethiopia and Sudan. The aquifers are located in diverse ecological zones ranging between arid, semi-arid and tropical. This study will aim at fostering current mutual understanding for the groundwater flow regime and mechanism of recharge, policies, management systems, community engagement and sustainable development plans for effective utilization and protection from over abstraction, depletion, and pollution.

Consultancy/Assignment Objectives:

1. The Consultancy firm shall design and develop an online Groundwater knowledge and database management system for Transboundary Aquifers in the Nile Basin to store raw groundwater data for interesting groundwater sources and knowledge generated from multiple national groundwater projects. The knowledge base will comprise of aquifer maps and geo-database of key aquifer attributes. The aquifer maps shall, at a minimum, include aquifer areal extents, water table elevation, key water recharge areas, key water demand centers they support (if any), and water quality status (using key parameters) with identified water quality hotspots. The geo-database will be integrated into the Nile Basin Decision Support System (NB DSS).

Consultancy/Assignment Scope:**Available Groundwater Data:**

The consultancy firm shall review the available groundwater data, explore, and develop an inventory of available data to be used in this consultancy and carry out the following: -

- Review currently available datasets at NileSEC and identify the gaps in data and advise NileSEC on data completeness. This shall focus on availability of all datasets and knowledge, including metadata that shall be listed by NileSEC in the groundwater inventory report. The result of this activity is to define the suitability of data for the database system and shall be documented and used to refine the groundwater inventory report.
- Extracting data from ongoing or completed national projects, international data repositories. The existing geological and hydrogeological information will be harmonized in a compatible format to be easily used by modern software platforms.
- Design a data model with a structure and format for each item/theme to be included in the database,
- Identify and analyze associations for the non-spatial data to spatial features as necessary.
- Identify and analyze associations for knowledge products to the non-spatial data/spatial features to as necessary.

Groundwater Database:

After reviewing the data available, the consultancy firm shall design the database that forms the backend platform for the system. The following aspects shall be considered when designing and developing the backend: -

- Design a data model synthesizing and incorporating data structures and formats and taking into consideration linkages with the spatial features
- Develop and Implement the data-model and meta-data scheme in the DBMS. The main purpose of the meta-data scheme is to document the source, history, and quality of the data in a well-structured and standardized manner, and
- Populate the database with the validated data that shall be collected under SADA and Modelling works and Knowledge products

Groundwater knowledge and database management system Frontend:

After reviewing data and establishing a first draft of the database/database model, the consultancy firm shall design and develop the frontend or user interface for the system. The following aspects of the system shall be considered when designing and developing the frontend: -

- Design mock-up interfaces for the system to elaborate on the visual details before development starts. Mock-ups shall include considerations for interactive map visualizations
- Develop a prototype of the system. This shall bring together visuals and interactivity in a real-free version of the final product. In this version, Nile-SEC staff shall start to verify the validity of the consultant's work by engaging in an iterative process and providing feedback to the consultant.
- Making the three shared aquifers "visible" and recognized by countries, all stakeholders, and decision makers through new geodatabase that comprises geological and hydrogeological maps and drawn on the basis of existing data/information (including previous isotope surveys and data,
- Conduct unit testing for all modules that shall be developed in the system.
- Conduct User Acceptance Testing (UAT): The consultant, during the inception phase, shall provide guidelines for conducting user acceptance testing by way of a template that shall be used in the UAT process.
- Develop a refined version of the system. The consultant shall review and incorporate UAT feedback from the client's teams and refine the system to produce a working and acceptable version of the system

JAT process, upon approval from the client, the consultancy firm shall facilitate an online stakeholder workshop to introduce the system to a wider audience involving national and regional technical teams working on the three pilot aquifers. The workshop shall include training on administering and maintaining the system. Each focal point institution in each participating country will be capacitated with dedicated computers on which geodatabase and information system is loaded. Technicians from the focal point institutions will be trained on how to use, update, and maintain the geo-database. The data collection and population of the database shall be conducted collaboratively by contractors, consultants, relevant experts from the national focal institutions, and the local and international stakeholders.

Assignment outputs

The consultancy firm's expected outputs from the assignment shall include

- A Brief inception report
- A regional groundwater knowledgebase for all shared aquifers that draws on data and analysis carried out at the SADA report
- GW database management system developed and accessible online. The geo-database will be integrated into the Nile Basin Decision Support System (NB DSS).
- User Acceptance Report
- GW DBMS integrated and accessible through the Integrated Knowledge Portal
- Stakeholders and training workshop. Technicians from the focal point institutions will be trained on how to use, update, and maintain the geo-database. The contracted firm will make sure that each focal point institution in each participating country will be capacitated with dedicated computers/servers on which geodatabase and information system is loaded.

Level of Effort

This assignment is expected to take a total of 2 man-months distributed over the contract period from October to December 2021. This includes inputs of any sub-consultants the consultancy firm might need to engage to execute the assignment. The consultancy firm will be responsible for costs incurred as a result of engaging sub – consultants during the assignment (if applicable, these costs should be included in the financial proposal). The Client shall pay the consultancy firm professional fees against deliverables described in this document. The proposed payment schedule is depicted in the payment terms.

The consultancy firm shall be responsible for their own costs for travel (if any) to the location depicted, which cost must be included in the financial bid. All travels will have to be approved by the task manager in consultation with the country host institutions.

Reporting:

The consultancy firm shall report to the Groundwater Project Manager/ Technical Lead with oversight by Deputy Executive Director/Head of Basin-wide Program.

The consultant shall work from his/her home venue and partly from the NBI secretariat.

Monitoring & Evaluation:

For monitoring the progress of the production of the reports, the consultant will submit monthly reports that evaluate the progress of deliverables and the implementation of the different activities of the assignment.

The consultancy firm shall be able to demonstrate a sufficiently experienced software development team in hydrogeology, hydrology with several years of professional experience (international reference projects). Specifically, the consultancy firm's team should include:

1. **Team leader (TL):** The team leader must have extensive management experience working in a transboundary basin water resources analysis, planning, management, development spatial data management system. Demonstrated skills in project planning, institutional and capacity development, and stakeholder facilitation, coupled with technical understanding gained through a career working in the water resources analysis, knowledge management, are essential. Minimum qualifications: MSc degree in Hydrogeology, water resources engineering, hydrology, hydro-informatics environmental sciences, or similar; with a minimum of 10 years of professional experience including management in a transboundary basin of large water resources projects, international experience including developing countries.
2. **3 Senior software engineers and Developers (SWE&D):** responsible for design, development, integration and deployment of the NB Groundwater database management system and integration into the IKP.

Minimum qualifications and experience: MSc in engineering in computer science, software engineering or closely related fields. 10 years of experience in systems analysis, design and development of complex software development projects, Extensive knowledge and experience of JavaScript, JQuery, HTML5, CSS3, Web Programming Skills, Teamwork, Verbal Communication, cross-browser compatibility, Web User Interface Design (UI), Security Principles, Object-Oriented Design, Web Services (REST/SOAP), Multimedia Content Development, API's; Extensive designing and development of GIS feature based web based applications including interactive map development, data visualization, geodata conversion, geodata transformation and geospatial analysis. MS SQL Server, MySQL, PostgreSQL and PostGIS, ArcGIS Online or Node.js; Demonstrated experience in building Geo-database using ESRI products is essential.

The project focus on data and information collected from stakeholders from the 3 aquifers. This broadly relates to;

1. Various groundwater resources assessment studies done by the Ministries in charge of water affairs for countries sharing the aquifers
2. Groundwater maps and reports produced for various districts and Water Management Zones under the Groundwater Mapping Programme
3. Borehole drilling and water level monitoring data available in the National Groundwater Databases.
4. Data and information submitted by groundwater consultants and drilling contractors to the Ministries in charge of water
5. Assessment studies undertaken by groundwater consultants, drilling contractors, national and international academic and research institutions, individuals as part of MSC and PhD research, Non-Governmental Organizations etc.
6. Relevant documents on groundwater and related resources from stakeholders/local communities for the study/aquifer areas
7. Reports from countries where heavy groundwater development from basement complex rocks and other geological formations is ongoing to assess the extent to which they have instituted measures to mitigate possible impacts of human activities and climate change on the quality and quantity of groundwater resources

Functional Requirements:

The Nile Basin Groundwater Database System shall at a minimum be based on the following user requirement. The System shall;

1. Have a single sign-in feature where backend users are authenticated/ authorized to access the system
2. Have a dashboard displaying aquifer statistics that shall be agreed upon with the client's representative. This shall at a minimum include detailed groundwater resources assessment (quantity and quality) and distribution of groundwater resources.
3. have the ability report and assess, on each aquifer, the institutional and technical capacity of key players to address the potential impacts of human development and climate change on groundwater resources
4. Have the ability to store strategies in form of report and/or text that are in place for each aquifer to address the capacity gaps.
5. The system shall provide and report on situation assessment of the groundwater resources in various aquifers environments
6. The system shall provide a visual extent, by way of maps, for the 3 pilot aquifer systems and existing and proposed well fields in the different hydrogeological environments
7. The system shall provide a detailed record of stakeholder identification, mobilization, and consultation
8. Have the ability to record and display groundwater demand assessment (current and future) in various aquifers for NBI.

10. Have the ability to store pumping tests data that determines aquifer properties. This shall make it possible to provide groundwater potential and sustainability of groundwater development in various hydrogeological units
11. Have the ability to map threats and/or pressures from human activities and climate change on groundwater resources, both spatially and in time. This may also be stored as reports.
12. Have the ability to use results of the modelling and assessment both spatially and in time to estimate groundwater safe yields for respective aquifer systems and climatic environments, and present the information and other relevant model outputs in form of maps and reports, to guide decision making related to groundwater resources
13. Produce Hydrogeological maps, figures and reports showing aquifer characteristics, distribution, and aquifer responses to pumping with recommendations for sustainable abstraction under different pumping regimes for the different hydrogeological formations
14. Ability to interactively visualize vector files
15. Visualize spatial data that is accessed from external sources in form of maps
16. Ability to download Spatial data
17. Display of spatial and non-spatial data generated from the SADA study
18. Ability to access statistics of available spatial data in the database
19. Internal users should have the ability to manage content in the geospatial database

Non-functional requirements:

20. The user interface shall be menu driven. It shall provide dialog boxes, help screens, radio buttons, check boxes, dropdown list boxes, and spin buttons for user inputs and hyperlinked
21. Internal users shall have the ability to back up the system and
22. The system shall use Inter-operable solutions for common and uniform data formats like XML for data exchange.
23. The system shall be responsiveness on all online devices. Font and image resizing should be utilized to cater for different media configurations.
24. The system shall provide a flexible architecture to ensure scalability in order to allow for future expansion and support.
25. The system shall support large number of concurrent users.
26. The system shall provide ability to manage/operate the system with minimal or no programming experience.
27. The system shall be able to present information in multilingual interface (English and French).
28. 404 and other error pages will be designed with NBI customized information.
29. Web pages must be navigable – content should not be hidden under several pages.
30. The system shall able to generate and present usage statistics for monitoring purposes.

32. The system shall have a Frequently Asked Questions page (FAQ) that will help users to find answers for previous questions.