



MINISTRY OF WATER,
SANITATION AND IRRIGATION



THE REPUBLIC OF KENYA

MINISTRY OF WATER, SANITATION, AND IRRIGATION

HORN OF AFRICA - GROUND WATER FOR RESILIENCE PROJECT (HoAGW4RP)

PROJECT ID No.: P174867

CREDIT No. IDA-7082-KE

REQUEST FOR EXPRESSIONS OF INTEREST (REOI) FOR CONSULTING SERVICES – FIRMS SELECTION

**ASSIGNMENT TITLE: CONSULTANCY SERVICES TO UNDERTAKE
COMPREHENSIVE AQUIFER ASSESSMENTS AND THE PREPARATION OF
DEVELOPMENT AND MANAGEMENT PLANS FOR MERTI AQUIFER SYSTEMS.**

REFERENCE No.:KE-WRA-327493-CS-QCBS

The Government of the Republic of Kenya has received financing from the World Bank toward the cost of the Horn of Africa Ground Water for Resilience Project (HoAGW4RP), and intends to apply part of the proceeds for consulting services.

The consulting services (“the Services”) include: to identify and assess with high percentage of certainty (high precision/ resolution) the existence of both shallow (up to 250 m) and deep (deeper than 500 m), characterize and determine the recharge mechanism and areas for groundwater resources underlying the Merti aquifer systems and determine the recharge areas. The assignment also consists of putting in place development and management plans for the aquifer through extensive stakeholder consultation. The consultancy will provide proposals and supervision for exploratory wells as well as proposals for monitoring wells and managed aquifer recharge infrastructure.

The detailed Terms of Reference (TOR) for the assignment found at the following website: <http://www.info@wra.go.ke>; <http://www.tenders.go.ke> or can be obtained at the address provided below.

The Water Resources Authority now invites eligible consulting firms (“Consultants”) to indicate their interest in providing the Services. Interested Consultants should provide information demonstrating that they have the required qualifications and relevant experience to perform the Services. The shortlisting criteria are:

- a. Core business as a consulting firm in the water sector within the last five (5) years. Have delivered consultancies in water resources planning, development, and management in

- Kenya or within the sub-Saharan region and experience in undertaking feasibility studies, detailed designs, and supervision of water-related facilities/infrastructure).
- b. Demonstration by consulting firm of having been involved in successful execution, completed and/or ongoing, of at least two (2) assignment of similar nature both in scope and complexity in similar operating environment in the last five (5) years with preferably one (1) assignment, completed or ongoing, in an informal settlement or similar environment in the last five (5) years. Details of the assignment - Name and address of the client, scope, value, and period shall be provided; and
 - c. Technical and managerial capability of the consulting firm to undertake the assignment which should be supported by detailed company profiles providing details about staff skills, necessary tools, equipment, and software to undertake the assignment.

Please Note: Key Experts will not be evaluated at the shortlisting stage.

The Consultant(s) will be selected in accordance with the World Bank's Procurement Regulations for IPF Borrowers, dated July 2016, revised November 2017, August 2018, and revised November 2020 which can be found at the following website: www.worldbank.org/procurement.

The duration of the consultancy services is twelve (12) months, comprising six (6) months for the design phase and six (6) months for the supervision phase.

The attention of interested Consultants is drawn to Section III, paragraphs, 3.14, 3.16, and 3.17 of the World Bank's "Procurement Regulations for IPF Borrowers" Fourth Edition November 2020 ("Procurement Regulations"), setting forth the World Bank's policy on conflict of interest.

Consultants may associate with other firms to enhance their qualifications, but should indicate clearly whether the association is in the form of a joint venture and/or a sub-consultancy. In the case of a joint venture, all the partners in the joint venture shall be jointly and severally liable for the entire contract, if selected. However, the experience of a sub-consultant will not be considered while short-listing.

A Consultant will be selected in accordance with the quality cost-based selection (QCBS) method set out in the Procurement Regulations.

Further information can be obtained at the address below during office hours [**weekdays Monday to Friday 0800hrs to 1700hrs local time excluding public holidays**]. Interested Consultants are required to continually check the Water Resources Authority website <http://www.info@wra.go.ke> for any additional information or clarification that may arise before the submission date.

Expressions of interest must be delivered in a written form to the address below (in person, or by mail, or by e-mail) so as to be received on or before **Tuesday 30TH May, 2023 at 1100Hours, Kenya Local time. (GMT+3 hours)**.

Request for Expressions of Interest (REOI) should be addressed to:

Chief Executive Officer
Water Resources Authority,
Ragati Road off Ngong Road,
NHIF Building,
9th Floor Wing B
NAIROBI, KENYA.

Telephone: +254 2732291, +254 2729048/9

Email addresses: procurement@wra.go.ke / info@wra.go.ke



MINISTRY OF WATER,
SANITATION AND IRRIGATION

REPUBLIC OF KENYA

Republic of Kenya



Water Resources Authority

Ministry of Water, Sanitation, and Irrigation

**HORN OF AFRICA – KENYA GROUNDWATER FOR RESILIENCE
PROJECT**

(Credit No. IDA 7082-KE; Project No. P174867)

TERMS OF REFERENCE

**Consultancy Services to Undertake Comprehensive Aquifer Assessments and
the Preparation of Development and Management plans for Merti Aquifer
System**

KE-WRA-327493-CS-QCBS

April 2023

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INTRODUCTION

1 Problem Context – The groundwater management and governance challenge

Although groundwater accounts for more than 97% of the world's freshwater supply, the general understanding of its availability, occurrence, and sustainable use remains limited and is still evolving. Its invisibility (being buried beneath the earth's surface) compounds the technical and political difficulty of its sustainable quantification, abstraction, and utilization for human development. While there have been significant investments in the abstraction of groundwater, the acquisition of knowledge on the status of groundwater resource base in most countries or the threats posed by poor land use, pollution, over abstraction, seawater intrusion, and even poor drilling techniques have frequently received inadequate investments. In Kenya, the unsustainable management and governance of groundwater presents numerous challenges. Most water policy pronouncements favor surface water. Over the past two decades, the global development community has engaged in a variety of efforts to elevate and improve knowledge about groundwater at both the technical and policy levels, including the vast opportunities groundwater offers for enhancing adaptive capacity and resilience. Numerous global forums, such as the 9th World Water Forum, which was held in Dakar, Senegal, where the *2022 UN World Water Development Report: Making the Invisible Visible* was released, demonstrate the growing awareness of the importance of groundwater in water supply.

2 Background to Horn of Africa Groundwater for Resilience Programme (GW4R)

2.1 Regional Context of the Project

The Government of the Republic of Kenya (GoK), through the Ministry of Water, Sanitation, and Irrigation (MoWSI), has received a credit by the International Development Association (IDA) of the World Bank Group to implement the HORN OF AFRICA GROUNDWATER FOR RESILIENCE PROJECT (GW4R). The preparation of the GW4R is built on the foundations of the **Horn of Africa (HoA) Initiative**. During the World Bank Group/IMF Annual Meetings held in October 2019 in Washington, D.C., the Ministers of Finance, and other representatives of the Horn of Africa (HoA) countries highlighted the importance of developing a coordinated approach and came together in the Horn of Africa Initiative, bringing the nations together to address shared regional challenges. The Intergovernmental Authority for Development (IGAD) convened the Finance Ministers of the Horn of Africa (HoA) countries on October 28, 2020, under the auspices of the Horn of Africa Initiative. As part of the HoA Initiative's Resilience Pillar,

this meeting emphasized and ranked the importance of groundwater in the HoA region. Following the meeting, the finance ministers of Djibouti, Ethiopia, Kenya, and Somalia issued a communiqué in which they committed to continuing investment and policy action and urged development partners to accelerate the preparation and approval of projects they intend to support.

2.2 Project Scope and Components

The Development Objective of the GW4R project is to increase the sustainable access and management of groundwater in the Horn of Africa borderlands. The primary project beneficiaries will be an estimated 1,500,000 people in the rural communities of the five counties of Turkana, Wajir, Garissa, Marsabit and Mandera through the rehabilitation, construction, and sustainable management of boreholes as well as from aquifer restoration, recharge, and conservation activities. The project is also envisioned to benefit the institutions of Kenya that work on groundwater at the National, County, and transboundary levels. These include the Ministry of Water Sanitation and Irrigation, the Water Resources Authority, the Regional Center on Groundwater, the National Drought Management Authority, the Water Services Regulatory Board, and County Water Departments of participating counties. By giving more visibility to groundwater through policies, strategies, regulations and guidelines, the institutions and groundwater management will be strengthened. These institutions will also benefit from training, staff capacity building programs and the acquisition of equipment required to undertake their mandate. The Project is structured to be implemented through the four components as shown in Figure 1.

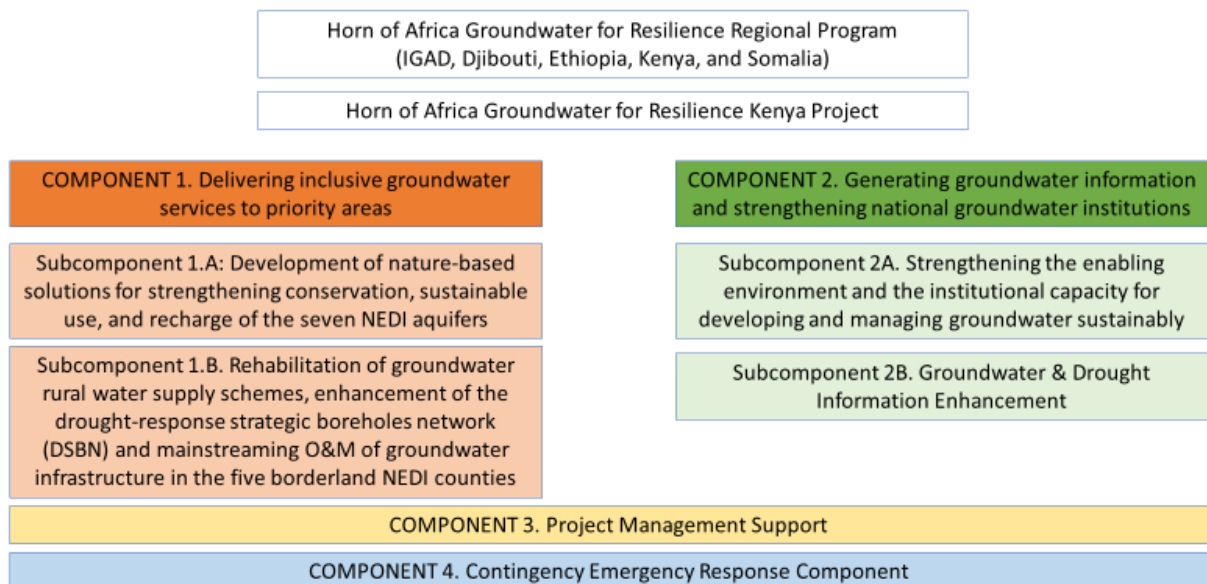


Figure 1 - Kenya GW4R Project Components

Component 1: Delivering inclusive groundwater services to priority areas

Sub-component 1.A: Under this sub-component, the Government will carry out a program of activities designed to strengthen groundwater conservation, sustainable use, and recharge of selected aquifers in Turkana, Marsabit, Mandera, Wajir and Garissa Counties. The specific activities will include: (a) facilitating the mobilization and establishment of water resources users association (WRUA) and design and implementation of a capacity building program for such WRUAs (as well any existing WRUAs) to enhance their governance and groundwater management capabilities; (b) supporting WRUAs to develop and implement Sub-Catchment Management Plans (SCMPs) comprising such activities as planting of appropriate tree species in protected groundwater recharge zones and around boreholes, re-greening overgrazed areas, and construction of small-scale aquifer recharge structures such as infiltration galleries, sand dams or diversion channels; (c) supporting the protection of aquifers through gazettement and related investments.

Sub-component 1.B: The Government will be carrying out a program of activities, designed to mainstream the sustainability of rural water supply schemes in Turkana, Marsabit, Mandera, Wajir and Garissa Counties and enhance the resilience of those communities against droughts - using as appropriate, the performance-based mechanism. The specific activities will include compiling an inventory of groundwater-based rural water supply schemes and the designated drought-response strategic boreholes network (DSBN) in Turkana, Marsabit, Mandera, Wajir and Garissa Counties; rehabilitation and upgrading of groundwater-based rural water supply schemes in those counties; mainstreaming of operations and maintenance of existing, rehabilitated, and new groundwater infrastructure through the O&M Support Facility among other governance and institutions building activities to strengthen the institutions for sustainable operations and maintenance of groundwater infrastructure in the longer-term.

Component 2: Generating groundwater information and strengthening regional and national groundwater institutions

Sub-component 2.A: The Government will carry out a program of activities designed to strengthen the enabling environment and the institutional capacity for sustainable management of groundwater. The specific activities will include: (a) development of a groundwater strategy and guidelines and regulations related to groundwater management and development; (b) development of instruments for the management of transboundary aquifers including through the completion of the Kenyan transboundary policy and supporting dialogue platforms and development of memoranda of understanding between riparian countries for selected aquifers in NEDI Counties; (c) acquisition of groundwater management equipment and construction of offices; (d) conduct and implement a specialized environmental and social capacity gap assessment to improve the social and environmental management risks within the Project's participating institutions; and (e) capacity building activities to address groundwater capacity gaps across national and county groundwater institutions.

Sub-component 2.B: Carry out a program of activities designed to enhance the knowledge base of the aquifers systems and the application of this knowledge for groundwater management and development purposes such a program to include: (a) development of aquifer assessments development and management plans (AAD&MP) for the selected aquifers in NEDI Counties, Nairobi and Nakuru; (b) exploratory and monitoring wells for selected aquifers in the NEDI Counties; (c) enhancement of monitoring network in the selected aquifers in NEDI Counties, upgrading of groundwater information database and development of a mobile application to improve users' interface with the database and information access and acquisition of groundwater management equipment.

Component 3: Project management support

Carry out a program of technical assistance and project implementation support, including: (a) provision of technical assistance, training and capacity building to support implementation of all Project activities and strengthen government capacity at national and County level including through recruitment of expert consultants and contractual staff and financing the operations of the Project Coordination Unit and Project Implementation Units; (b) carrying out preparatory studies, environmental and social assessments, resettlement planning, development of standard operating procedures, technical guidelines and operational manuals; (c) procurement management and financial management, including financial and technical audits; (d) environmental and social risks management and oversight, including citizen engagement; and (e) monitoring, reviewing and evaluation of the Project.

Component 4: Contingency Emergency Response Component

Providing preparedness and rapid response measures to address disaster, emergency and/or catastrophic events in Kenya, in accordance with the applicable Contingent Emergency Response Implementation Plan.

The above program of activities will be implemented by various agencies under the overall coordination of the Ministry of Water, Sanitation, and Irrigation (MoWSI). The Water Resources Authority (WRA), will undertake implementation of all activities under Subcomponent 1.A and Component 2.B. The Water Sector Trust Fund (WSTF), will be responsible for the implementation of activities under Subcomponent 1.B. The WSTF shall sign a tripartite Performance-Based Grant Agreements (PBGAs) with each of the 5 County Governments and their selected water service providers towards implementation of sub-component 1.B activities. Both WRA and WSTF shall maintain a Project Implementation Unit (PIU) with the necessary autonomy and technical capacity to manage, coordinate, supervise, monitor, and evaluate Project activities during its implementation. The 5 County Governments along with their WSPs will be sub-PIUs under the WSTF PIU.

The MoWSI shall facilitate the implementation of Transboundary Water Management and Ground Water Policy, Strategy and Guidelines development activities under the project. MoWSI will also facilitate the implementation of groundwater research, trainings, and capacity building activities under the project. To achieve this, the MoWSI shall sign a

Memorandum of Understanding (MoU) with the Regional Centre for Groundwater (RCGW) for facilitation of the trainings and capacity building activities under the project.

3 Objectives of this assignment

As part of the implementation of sub-component 2.B of the GW4R project, the Water Resources Authority intends to engage services of a qualified consulting firm/ consortium to carry out the aquifer assessments and preparation of attendant development and aquifer management plans (AADMPs) for the Merti aquifer system.

The objective of the consultancy that this Terms of Reference refers is to identify with high percentage of certainty (high precision/ resolution) the existence of both shallow (up to 250 m) and deep (deeper than 500 m) groundwater resources underlying the Merti aquifer system. It also consists of putting in place sound groundwater management plan for sustainable use and protection and conservation of the aquifer. The services to be provided by the contracted firm(s) to the WRA under this assignment will generally consist of: -

- i. Identify all the water bearing geological formations (aquifers) in the study area and give cross sections in sufficient detail with a spread across the aquifer. A geodatabase with sufficient logging of at least 30 boreholes will be expected as part of the exercise using an appropriate logging tools and software.
- ii. Determine hydraulic characteristics of the aquifers
- iii. Determine the extent and the geometry of the individual aquifers and the thickness of the aquifer
- iv. Estimate the quantity of groundwater water in the aquifers and its extractable portion
- v. Determine the quality of groundwater in the aquifers
- vi. Determine the climate change scenario forecasting of the aquifer based on the climate change models of the country
- vii. Estimate the amount, rate of groundwater recharge, flow direction and storage
- viii. Determine the recharge areas and attendant recharge mechanism
- ix. Assess the potential of groundwater development with focus on shallow and deep aquifers
- x. Identify and recommend sites for exploratory wells and monitoring wells
- xi. Supervise the construction of and data collection from the exploratory wells and integrate the data collected into the assessment reports
- xii. Outline groundwater conservation areas and develop management guidelines incorporating aquifer conservation and protection in identified major aquifers in consultation with the aquifer stakeholders
- xiii. Develop costed aquifer management plan for individual aquifers
- xiv. Estimate the current demand (2022) and future water demands (2030, 2050, and 2070) using modelled scenarios to ascertain if the projected demands will be sustained by the aquifer and establish target plan population

- xv. Develop aquifer allocation plans and demand management plans for overexploited parts of the aquifer and also for entire aquifer
- xvi. Identify potential sites for managed aquifer recharge and suggest suitable technique recharge method for each site with justification.
- xvii. Develop an infrastructure budgeted master plan for aquifer development for which counties and communities will peg their development plans
- xviii. Provide guidelines on integration of AADMP in sub-catchment management plans and ensure interventions are aligned with relevant SCMPs
- xix. Train technical staff from MoWSI, WRA, RCGW and County Governments on use of groundwater management tools created by the consultant

4 Detailed scope of services to be provided

The consultant firm shall apply the best mix of expertise, tools, and instruments to undertake the following 7 Key Tasks;

4.1 Task 1: Carrying out detailed aquifer assessments

Under this Task, the consultant shall;

- (i) Collect existing data and information of the defined aquifer area, including data, reports and maps on rainfall, geomorphology, geology, borehole completion records, hydrogeology, geophysics, water quality, seismic, remote sensing imagery (Landsat, SAR, radar etc.), topography, water resources information from petroleum exploration, soils, land use and infrastructure, solar radiation, temperature, humidity, evapotranspiration, vegetation type, wind speeds and any other necessary data e.g., population density and distribution, livestock/wildlife migration routes, refugee camps, health centers).
- (ii) Undertake aquifer-wide abstraction survey to determine current abstractions and develop a geodatabase for the collected datasets. The details will include but not exclusive to georeferenced positions, ownership, current use and status of boreholes.
- (iii) Collate, process, geo-reference, and integrate all data to create organized geodatabases and datasets (GIS layers) taking care to populate them with appropriate georeferenced details.
- (iv) Fill the data gaps identified in (i) and (ii) above through field excursions, sampling and chemical analyses, geophysical investigations and indigenous knowledge inquiry.
- (v) Characterize aquifer parameters, water availability and water quality; estimate aquifer recharge and safe yield; establish current (2022) and project future (2030, 2050, 2070) groundwater demands, and establish target plan population

(vi) Undertake tracer studies to determine aquifer recharge mechanism and sources

In undertaking the data collection and detailed aquifer assessments processes, the consultant shall refer to

- data and information in recent interventions focused on assessment of groundwater surveys/mapping using remote sensing methods and geophysical studies including but not exclusive to; (i) the “***Groundwater exploration and assessment in Ethiopia, Kenya, and other drought-stressed regions in Africa***” project implemented jointly by the Ministry of Water, Sanitation and Irrigation and the USAID/U.S Geological Survey (USGS); (ii) the UNICEF “***Hydrogeological mapping of underground water using remote sensing and GIS; and geophysical survey in Angola, Kenya, Somalia, and Ethiopia***”. (iii) Turkana and Marsabit Aquifer Mapping reports by Water Resources Authority (iv) Feasibility Study for Groundwater Development and Management of the Merti by IGAD (v) **Preparatory reports by Rural Focus done as a precursor to AADMP consultancies and numerous reports and studies cited in this report, including studies for –corresponding aquifers. The Rural Focus Report and data of the aquifer under assessment shall be shared with the consultant for cross-referencing.**

4.2 Task 2: Identification of potential sites for drilling exploratory wells

Using the data collected and processed during Task 1 – aquifer assessments, the consultant shall;

- Identify potential sites for drilling exploratory wells to provide information for filling the data gaps and which if successful can be handed over towards community water supply water. To this end, the firm shall conduct hydrogeological/geophysical surveys on the targeted areas and confirm sites for exploratory borehole drilling; VES and HEP to be done using existing boreholes as control and ERTs (electrical resistivity tomography), EM and seismic along defined cross-sections with probing depth of deeper than 500 m
- Prepare and submit hydrogeological survey reports for targeted sites to be indicated by the client for exploratory drilling.
- Carry out Environment and Social Impact Assessment of proposed exploratory wells drilling works based on the relevant Kenyan statutory regulations and the World Bank ESF and prepare Environmental and Social Management Plan (ESMP) to mitigate the adverse effects, including the socio-economic aspects and Resettlement & Rehabilitation Plan (RAP) for affected people (if any). The scope also includes preparation of monitoring plan for implementation of the ESMP and RAP. The scope of the ESIA and ESMP shall include the following:
 - o Assess the anticipated environmental and social impacts of the proposed works.

- Estimate costs of the impacts and mitigation measures.
 - Identify institutional and training needs to implement mitigation measures.
 - Conduct environmental and social impact assessments to include an elaborate Environmental and Social Management Plan (ESMP) including proposed work programs, cost effective budget estimates, schedules, staffing and training requirements, and other necessary support services to implement the mitigating measures.
 - Preparation of the ESIA and ESMP shall follow World Bank Group Environment and Social Framework:
<http://documents1.worldbank.org/curated/en/383011492423734099/pdf/The-World-Bank-Environmental-and-Social-Framework.pdf>
- Prepare complete tender package using World Bank Group's Standard Procurement Documents (SPD) for the drilling of the exploratory wells including; detailed design drawings and calculations, quantity take-off and preparation of bills of quantities, and/or schedules of materials as appropriate for the nature of work or the intended mode of procurement Engineer's confidential estimate of cost of works to completion. The estimate shall include taxes and levies in accordance with the Laws of Kenya Implementation schedules

4.3 Task 3: Identification of potential sites for establishing groundwater monitoring network/stations

Using the data collected and processed during Task 1 – aquifer assessments, the consultant shall;

- Identify potential sites for establishing groundwater monitoring wells to provide information for guiding groundwater allocation and aquifer protection decision making. To this end, the firm shall conduct hydrogeological/geophysical surveys on the targeted areas and confirm sites for exploratory borehole drilling; VES and HEP to be done using existing boreholes as control and ERTs (electrical resistivity tomography), EM and seismic along defined cross-sections with probing depth of deeper than 500 m
- Prepare and submit hydrogeological survey reports for targeted sites to be indicated by the client for monitoring wells drilling.
- Carry out Environment and Social Impact Assessment of proposed exploratory wells drilling works based on the relevant Kenyan statutory regulations and the World Bank ESF and prepare Environmental and Social Management Plan (ESMP) to mitigate the adverse effects, including the socio-economic aspects and Resettlement & Rehabilitation Plan (RAP) for affected people (if any). The scope also includes preparation of monitoring plan for implementation of the ESMP and RAP. The scope of the ESIA and ESMP shall include the following:

- Assess the anticipated environmental and social impacts of the proposed works.
 - Estimate costs of the impacts and mitigation measures.
 - Identify institutional and training needs to implement mitigation measures.
 - Conduct environmental and social impact assessments to include an elaborate Environmental and Social Management Plan (ESMP) including proposed work programs, cost effective budget estimates, schedules, staffing and training requirements, and other necessary support services to implement the mitigating measures.
 - Preparation of the ESIA and ESMP shall follow World Bank Group Environment and Social Framework:
<http://documents1.worldbank.org/curated/en/383011492423734099/pdf/The-World-Bank-Environmental-and-Social-Framework.pdf>
- Prepare complete tender package using World Bank Group's Standard Procurement Documents (SPD) for the drilling of the exploratory wells including; detailed design drawings and calculations, quantity take-off and preparation of bills of quantities, and/or schedules of materials as appropriate for the nature of work or the intended mode of procurement Engineer's confidential estimate of cost of works to completion. The estimate shall include taxes and levies in accordance with the Laws of Kenya Implementation schedules
 - During procurement of both the exploratory and monitoring wells works, the consultant shall provide support to the WRA on request by preparing for and attending pre-bid meetings, answering clarification requests and issuing of amendments to tender documents as shall be deemed relevant.

4.4 Task 4 – Supervision of the drilling of exploratory and monitoring wells

The Consultant shall, along with WRA staff, undertake supervision the exploratory wells drilling works to ensure that their implementation is in conformity with approved designs, specifications, and associated drawings including collection of the data envisaged by their drilling. This includes ensuring that revisions/amendments are made in accordance with applicable terms and conditions of the contract that corresponds to the contacts of works. It is expected that there will be about **12** sites for drilling exploratory wells (These numbers will be confirmed with WRA with appropriate rationale on the sites and depths and therefore the numbers are tentative).

During the drilling supervision, the consultant shall undertake the following tasks;

- **Coordination and quality control of drilling works** including developing and implementing a quality control and assurance plan to ensure that the works are built, and equipment installed in conformity with the Contractual Specifications, approved drawings, standards, agreed program, good engineering practice and in a technologically acceptable way.
- **Cost Control:** Develop and implement a plan for drilling cost control by completing field and quantity surveys required for determination of actual

- quantities of work accomplished by the Contractor; Review each payment application and associated valuation of the Works prepared by the Contractor and, after making any necessary corrections, draw up and sign as approved an Interim Payment Certificate (IPC) for settlement by the WRA. All such IPCs will include provisions for the recovery of Advance Payments made if any, and any other provisions such as retention money, taxes, interest, claims or liquidated damages.
- **Progress Control:** Using the same basic data as those established for cost control, a progress chart for each drilling site will be maintained and updated accordingly. The Consultant will examine the works progress especially during the works meetings at the sites. A monthly progress report shall be prepared by the Consultant and submitted to the Client in a timely manner
 - **Environmental and Social Safeguards Management Plan Implementation:** The Consultant will provide technical expertise and support focal points in the WRA PIU to ensure implementation of all environmental and social safeguards instruments relevant for the drilling works. The Consultant will ensure the Contractor's Environmental, Social, Health and Safety (ESHS) performance is in accordance with WBG ESF and good international industry practice and delivers the Contractor's ESHS obligations as per contract.
 - **Data collection and Documentation:** The consultant will collect data against the codes of practice for the supervision and construction of boreholes and ensure such data is integrated into the aquifer assessment reports. The data so collected will be incorporated into the geodatabases collected under this consultancy

4.5 Task 5: Identification and delineation of potential areas for groundwater conservation and protection

The Consultant shall identify and delineate areas with medium to high groundwater utilization to propose groundwater development capping, or abstraction to be eased while promoting managed aquifer recharge for the aquifers. In this respect he will use inventory of the boreholes and their current uses data collected. The consultant will also to identify alternative sources of water to encourage conjunctive use where applicable. Consultant in this assignment will also identify delineate conservation and protection areas to be gazetted given its relevance for aquifer recharge; inform site selection for managed aquifer recharge (MAR) considering both the physical and the social dimensions; and the consultant to provide demand projection of groundwater culminating in a comprehensive report and maps. Selection of these areas and sites depend on water demand, demography and socio-economic parameters (villages, roads, cattle migration routes, refugee camps, economic development plans, power lines, schools, health centres etc.). While taking abovementioned factors for identifying the potential areas for groundwater conservation and protection, it is recommended that the consultant include map overlays showing the

suitability of the various groundwater recovery techniques (e.g., like dugwells, manually drilled wells, machine-drilled wells, sand dams and underground dams).

The consultant will provide manuals and drawings, designs for the appropriate MAR identified in the course of the study. This will be in areas and MAR interventions not identified by the consultant dealing with siting and design of MAR infrastructure in a separate consultancy but who is looking at more aquifer recharge in the shallow aquifers. These should include location details and incorporated in the relevant SCMPS.

4.6 Task 6: Preparation of groundwater development plan

The consultant will undertake groundwater development planning through analysis of data of natural aquifer condition (meteorology, hydrology, and hydrogeology) that were accumulated by reliable observation and measurement, borehole inventory and prediction of future water demand and also forecast the aquifer development against climate change scenarios. Define optimum groundwater development of the aquifer corresponding to the safe yield. The consultant to compare the current pumping status against the aquifer safe yield such that areas of high abstraction are subjected to restriction, areas with medium abstraction are carefully planned for future development based on the known established safe yield while areas with low abstraction currently can be promoted for groundwater development. Using the result of assessment exercise and analysis that were carried out during the study, the consultant required to formulate the groundwater development plan. This will incorporate current needs and projected plans from the County Governments in the relevant aquifer areas. This plan should be presented to relevant aquifer development stakeholders for comments and ratification in a workshop setting. This consultancy will also evaluate and prescribe aquifer uses for various competing needs including but not exclusive to potential small holder and large irrigation, public water supply, livestock, commercial and environmental. This plan should be presented to relevant aquifer development stakeholders for comments and ratification in a workshop setting. The other very relevant stakeholders and therefore top priority in consultation are the community gatekeepers especially on grazing land and water matters. Each aquifer should be addressed separately from the other.

This should provide sufficient details include depth of boreholes, distances between boreholes taking in account the grazing management practices that are in place in the areas and the CIDP. The consultant will develop aquifer allocation plans and demand management plans for overexploited aquifer/aquifer areas or entire aquifer as delineated or zoned under assessment. He will develop an infrastructure budgeted master plan for aquifer development for which counties will peg their groundwater development plans. This consultancy will also evaluate and prescribe aquifer uses for various competing needs including but not exclusive to potential small holder and large irrigation, public water supply, livestock and environmental.

The consultant will table the plan in a workshop setting to enable appropriate dissemination. The dissemination should consider divergent capacities of stakeholders and ensure that the information can be translated to an acceptable form of communication that can be understood at community level.

Task 7: Development of Aquifer Management Plan (Aquifer Conservation and Protection Plan)

The consultant is expected having determined the aquifer recharge mechanism develop aquifer protection and conservation plan along with stakeholders to enable aquifer sustainability in the face of various land use changes, anthropogenic activities including livelihood activities. The plan will include costed structural and non-structural activities including conservation, livelihood, gazettement of the conservation area that will secure the aquifer for the future, with time frames and responsibilities for various activities. The consultant will be expected to table the implementation aspects including the governance structure for the aquifer management to the aquifer stakeholders including WRUAs. AMPs need to be prepared in a simplified manner so that they are easily understood and implementable by the stakeholders, while ensuring wider acceptability. Sustainability necessarily considers the reliability, resilience and the vulnerability of the resource. Reliability is the ability of system to meet demands; resilience is the measure of the ability of the system to recover from failure and vulnerability is the measure of loss/damage incurred because of failure.

The consultant will undertake an analysis of appropriate aquifer protection best practice in similar settings and recommend practices that will be tenable in the aquifer recharge areas that will be determined in this contract. This will include appropriate conservation and livelihood activities in these areas. This should be taken through stakeholder engagements by the consultant for buy-in and ratification. Manuals for the various techniques for conservation including greening techniques and livelihood activities will be provided, with appropriate drawings and illustration for ease of reference. Methods for community adoption/take up of appropriate activities will be recommended by the consultant.

4.7 Task 8: Government of Kenya staffs capacity building

During the execution of the aforementioned tasks, the consultant will be expected to transfer knowledge on comprehensive aquifer assessments techniques applied that are not commonly used i.e., remote sensing approach and also the preparation of development and management plans.

WRA, County Governments and any other government agencies will provide counterpart staff to be part of the Consultant's team. The transfer of expertise of the counterparts will be on the job and through targeted workshops or training modules: The counterparts will be given specific pre-planned and agreed assignments geared towards improving their capacity to independently undertake aquifer assessments, preparation of development and management plans. The Consultant will provide a detailed on-the-job training program for the counterparts during the execution of their work. It is not expected that the Consultant will assign time-critical elements of the assignment solely to the counterparts and should any delay in any part of the assignment be anticipated because of the use of counterparts, the Client must be informed in advance.

The Consultant will provide the Client with a detailed training and capacity building program at Inception phase.

4.8 Project/Assignment phases

The assignment will be carried out in two phases. **Phase I** will involve carrying out of the following tasks; carrying out detailed aquifer assessments (Task 1), identification of potential sites for drilling exploratory wells (Task 2), identification of potential sites for establishing groundwater monitoring networks or stations (Task 3), and Identification and delineation of potential areas for groundwater conservation and protection (Task 5). Capacity building of the government of Kenya /interns staff (Continuous) (Task 8).

Phase II of the assignment will comprise of carrying out the following tasks: Supervision of the drilling of exploratory (Task 4), Preparation of groundwater development plan (Task 6), Development of Aquifer Management Plan (Aquifer conservation and protection plan) (Task 7), and Capacity building of the Government of Kenya/Interns staff (Continuous) (Task 8).

5 Consultancy deliverables, duration, and management

5.1 Duration of assignment

The total duration of the assignment is expected to be 12 months (365 days)

5.2 Deliverables

All Schedule reports will be submitted as one (1) original and five (3) copies and 2 USB sticks All soft copies *MUST* be submitted together with corresponding editable versions. The following table details the expected schedule of reports/deliverables. The deadline shown in the table below are for the final acceptable reports, drafts should be submitted 2weeks earlier to allow for Client’s comments. Payments to the consultant by the WRA shall be made strictly based on approved deliverables.

Table 1 - Schedule of Deliverables

S/No	Task	Expected Deliverables	Submission Deadline (From date of Contract Commencement)
	Task 1: Carrying out detailed Aquifer Assessments	Detailed Aquifer Assessment Report, geodatabases for all collected data (shapefiles, georeferenced maps and reports etc)	8 th month
	Task 2: Identification of potential sites for drilling exploratory wells	Hydrogeological survey reports, bidding documents and ESMP reports	5 th month
	Task 3: Identification of potential sites for establishing groundwater monitoring network/stations	Hydrogeological survey reports, bidding document and ESMP reports	9 th month
	Task 4 – Supervision of the drilling of exploratory	Drilling supervision and borehole completion reports	7 th – 8 th month

	Task 5: Identification and delineation of potential areas for groundwater conservation and protection	Groundwater conservation areas reports and maps, Proposed MAR sites maps and detailed techniques reports	5 th – 8 th month
	Task 6: Preparation of groundwater development plan	Comprehensive groundwater development plan	9 th month
	Task 7: Development of Aquifer Management plan	Water Allocation Plan, Groundwater Numerical Model, and Aquifer Management Plan	10 th -11 th month
	Task 8: GoK Staff training on new applied technologies used in aquifer Assessment, development of development plans and aquifer management plan, managed aquifer recharge infrastructure identification, exploratory wells documentation etc and such areas that may be deemed necessary within the course of the consultancy	Training materials and reports	5 th – 12 th month

5.3 Client Inputs

The WRA will provide to the Consultant with available information and data and where needs may arise will write introductory letters to enable consultants to carry out their work with ease.

5.4 Contract management arrangement and payments

The consultant shall report to the Chief Executive Officer WRA through WRA PIU team leader.

5.4.1 Consultant Obligations

Facilities

Transport – The consultant will be responsible for all air and surface transport costs for their staff. Consultant to provide security strategy at point of contract signing.

Other items: The Consultant shall be responsible for its office support costs, the cost of housing and other services for staff on the assignment and procurement and transport of all office technical equipment, machinery and purchase of vehicles needed for the assignment. The Consultant shall be responsible for arranging and meeting the cost of all supporting services, e.g., the communications and printing costs. In particular:

Equipment and Furniture: Proposals by the Consultants should include provisions for office equipment, furniture, and surveying instruments.

Investigations, Laboratory and Tests: Provisions for field testing equipment should be included in the proposals. Other required tests can be carried out by approved international accredited laboratories at the contractor's expense.

5.4.2 Security Management

Operating in GW4R project areas may at times presents security challenges. The firm contracted will be responsible for all their own security arrangements and will be required to recognize the risks involved in working in this context and to acknowledge that these risks are borne independent of the WRA. The firm will be required to provide a detailed security plan as part of their proposal.

5.4.3 Payments

The Consultant's fees shall cover the wages and salaries of the professional staff inputs utilized on the assignment, provision for supporting services necessary to carry out the assignment, purchase/hire of vehicles, procurement of equipment and direct costs for travel, freight, accommodation, report production and other expenses.

In proposing the level, timing and type of professional staff inputs, the consultants shall take due account of the requirements of the terms of reference and will consider all relevant factors that affect the cost of the assignment.

The amount and schedule of payment of fees shall be in accordance with the terms and conditions of the contract agreement finally made between the Client and the consultants.

Payments are proposed to be made according to the following schedule:

S/No.	Reports	Content	% of contract amount payable
1	Inception	Scope and understanding of the project, methodology and approaches and timelines for submitting reports	20
2	1st Progress	Desk study and literature reviews, analyses of existing data, GIS geodatabase and maps, remote sensing and proposed sites of interests (GCA areas and potential sites for MAR infrastructure) including deliverables for task 1, 5, and 8	15
3	2nd Progress	Updated first progress report with comments from reviewers, Draft groundwater development plan and Draft Aquifer Management plan, Stakeholder engagement reports for the two reports and incorporation of the stakeholders comments; proposed sites for drilling exploratory wells together hydrogeological sites assessments; Draft Standard Procurement Documents (SPD) for the drilling of the exploratory wells and Environment and Social Impact Assessments, ESF, Environmental and Social Management Plan (ESMP) , Resettlement & Rehabilitation Plan (RAP) as wells as monitoring plan for implementation of the ESMP and RAP as	20

		described in the TOR.(including deliverables for task 2,3, 6,&7, especially aquifer management plans and Groundwater Development Plans)	
4	Draft Final AADMP	Reports with final development plans, aquifer management plan, Assessment report with updates from exploratory wells, delineated GCA areas, mapped and confirmed sites for MAR infrastructure, designs and manuals and Updated GIS geodatabase with field acquired data and data verifications, Draft Standard Procurement Documents (SPD) for the drilling of the monitoring wells and Environment and Social Impact Assessments, ESF, Environmental and Social Management Plan (ESMP) , Resettlement & Rehabilitation Plan (RAP) as wells as monitoring plan for implementation of the ESMP and RAP as described in the TOR	15
5	Final AADMP	Updated AADMP draft final reports with incorporated reviewers comments, all the generated soft and had maps, training manuals and reports, and final GIS geodatabase	30

6 Team Composition & Qualification Requirements for the Key Experts

6.1 General experience of the firm

The Consultancy firm should display that within the last five (5) years they have delivered consultancies in water resources planning, development and management in Kenya or within the sub-Saharan region. Acceptable similar projects are:

- Must have an experience or demonstrate a plan in working in areas with security challenges
- Must have at least one detailed aquifer assessment in Horn of Africa with multiple borehole siting and incorporating climate change scenarios and any other of the following;
- At least one (1) Study that includes Groundwater Resource Potential mapping using remote sensing
- At least one (1) consultancy project on design and construction supervision of drilling exploratory wells and establishing monitoring wells and installing of telemetric loggers.
- At least 1 consultancy project in identification of managed aquifer recharge
- At least 1 consultancy in water conservation and livelihoods of arid and semi-arid regions
- At least one (1) developed aquifer management plan or participated in the development of one
- At least (1) developed groundwater development plan or participated in formulation of one

- Demonstrate experience in groundwater numerical modelling of an aquifer

In the documentation of his reference projects, the Consultant shall also clearly state the length of study/consultancy, level of community/stakeholder consultation and investment cost. The consulting firm which cannot present these requested minimum references will not be considered.

The consulting firm must be registered with regulatory body in Kenya or the firm's country of origin or where they operate from, and all staff that are required to be registered with regulatory boards to practice must be registered with regulatory boards in Kenya. The registration of the consulting firm must be in the field of geosciences and been registered and in operation for at least 5 years.

Firms participating in the bidding process may form joint ventures with domestic and/or foreign firms to enhance their qualifications and capabilities. A joint venture may be for the long term (independent of any particular procurement), or for a specific procurement. All the partners in a joint venture shall be jointly and severally liable for the entire contract. (As per WB procurement regulations clause 5.38)

6.2 General Requirements and Qualifications for Personnel

The consulting firm should have a team of key experts. Lead professionals should be able to provide leadership, oversight and coordination, ensure proper integration and quality of findings and results, fill capacity gaps, and bring advanced groundwater resources analytical skills and global experience to the assignment. Key experts should be able to ensure study relevance and effectiveness in the context of prevailing local conditions, ensure sensitivity to social and cultural aspects, and assist with linguistic aspects. Inclusion of locals in the team would also contribute to important capacity building. The following should be considered by the bidding firm:

- (i) Key staff must have demonstrated international experience. For the purposes of this contract, 'internationally experienced' are those experts who have worked outside of Kenya, while local assignments are considered to be those in Kenya.
- (ii) In its bid, the Consultant shall include a detailed time schedule showing each specific task that will be used as a tracking sheet to meet the project deliverables. Personnel scheduling chart, identifying each individual by name and his discipline, and showing on a Gantt chart the estimated number of man-months of each individual, shall be used on the project.
- (iii) The Consultant shall be required to make appropriate use of available local expertise to ensure that local conditions and capacities are best considered. In the selection of local individuals, any conflicts of interest must be avoided. The Consultant shall also note that civil servants and other staff of the public administration of the beneficiary country cannot be recruited as experts.
- (iv) The firm's nominated team leader must have been a permanent employee of the firm for at least two years before the bid date. Indicative requirements and details of each key expert, including the skills, qualifications, experience, and expected inputs, are provided below.

6.3 Indicative Consultant's Personnel

In each phase, the Consultant is free to organize their resources as they wish around the key personnel subject to review and approval by the WRA. The Consultant will determine the appropriate staff and man months for the assignment. However, the Consultant may vary the estimation to suit best his proposed methodology and work program for the assignment so long as the specific objectives of the assignment are achieved with no cost implications to the Client.

The consultant is to provide an Organizational Chart indicating the names of these key individuals to be involved in the major tasks of the assignment and their lines of responsibility should be submitted.

The **minimum qualifications and experience requirements** for the Key **Experts** are as below:

a) Team Leader

General qualification: The team leader must possess a Master's Degree in Geosciences **or related fields** from a **University recognized in Kenya** with over ten (15) years progressive experience working in a similar environment or **with experience working in the region**. Five (5) of which must have been on groundwater resources assessment, exploratory groundwater databases and groundwater monitoring borehole network design, monitoring wells designing equipping and installation and telemetric transmission of , internet of things networks and . S/He will plan and coordinate the activities of the project and liaise with the Employer to deliver the scope of works;

Relevant experience: The team leader must demonstrate having been involved in leading successful execution, completed and/or ongoing of at least two (2) similar assignments in the five (5) years.

b) Hydrogeologist

General Qualification: The Hydrogeologist is expected to possess a Bachelor's Degree in geology (or equivalent) from a University recognized **in Kenya**. S/he must be a Registered Hydrogeologist with the Ministry of Water & Sanitation and Irrigation.

Relevant experience: The hydrogeologist must have a minimum of ten (10) years progressive working experience in the field of groundwater exploration and development, five (5) of which should have been in groundwater assessment projects.

c) GIS and Remote Sensing Specialist.

General Qualification: The remote sensing expert is expected to possess a Bachelor's Degree in Geospatial Engineering (or equivalent) from a University recognized in Kenya. S/He must have at least 5 years' experience of Remote Sensing GIS software, and will be expected to have experience in water resources assessment mapping.

Relevant experience: Remote sensing expert must have experience in map generation through data collection, input, analysis, manipulation, maps production and report

generation and must demonstrate of having generated groundwater or land-use change related maps in similar assignments or related works in the last two (2) years..

d) Water Quality expert

General Qualification: The Water Quality expert is expected to possess a Bachelor's Degree in Chemistry (or equivalent) from a University recognized in Kenya.

Relevant experience: The water quality expert must have experience in the field of water quality analysis and minimum of five (5) years progressive working experience. S/He must have participated in similar assignments in the last two (2) years, carrying out water quality analyses, interpretation and reporting.

e) Geophysicist

General Qualification: The geophysicist must possess a Bachelor degree in Geology, Geophysics or Physics from a University recognized in Kenya.

Relevant experience: S/he must possess relevant experience in the field of geophysical investigations and field data collection, analysis and interpretation with minimum of five (5) years progressive working experience and must have carried out geophysical work related to groundwater in the last two (2) years.

f) Database Specialist

General qualification: The database expert must possess a Bachelor's Degree in ICT data management (or equivalent) from a university recognized in Kenya.

Relevant experience: The database expert must demonstrate relevant experience in putting up database systems to handle scientific data in digital platform with a minimum of five (5) years in handling water resource data or any related resource database. S/He must have handled a similar assignment in the last two (2) years. Experience in the setup and handling of natural resources databases will be an added advantage.

g) Community Engagement Specialist

General qualification: The community engagement specialist must possess a Bachelor's degree in sociology, community development or related causes from a university recognized in Kenya.

General experience: S/he must possess relevant experience in the field of community engagement and livelihoods and field data collection, analysis and interpretation with minimum of five (5) years progressive working experience.

Relevant Experience: S/He must have handled community issues related to water resources and social safeguards and arid and semi-arid climate livelihoods in the last two (2) years.

h) Natural Resources Specialist

General experience: The natural resources expert must possess a Bachelor's degree in natural resources, Earth sciences or water resources (or equivalent) in a university recognized in Kenya

General experience: He/she must have been working progressively in the field for the last 5 years. .

Relevant experience: The expert must possess relevant experience in the field of natural resources management and planning especially in water conservation and field data collection, analysis and interpretation experience. S/He must have handled similar assignments in the last two (2) years.

i) Water Rights Specialist

General qualification: The water rights expert must possess a Bachelor's degree in geology/ hydrogeology/ water resources/water resources engineering/ hydrology

Relevant experience: The expert must possess relevant experience in the field of water licensing, regulations, allocations and field data collection, analysis and interpretation with minimum of five (5) years progressive working experience. S/He must have worked on similar issues; groundwater allocation plans and guidelines, water rules and regulations interpretation and legal interpretation of water law in the last two (2) years.

j) Hydrologist

General qualification: The hydrologist must possess a Bachelor's degree in water resources, earth sciences or geography (or equivalent) from a university recognized in Kenya.

Relevant experience: The hydrologist must possess relevant experience in the field of hydrological investigations and field data collection, analysis and interpretation with minimum of five (5) years progressive working experience in carrying out water resources assessment and situation analysis. Registered professional with the Ministry of Water & Sanitation and Irrigation is preferred. S/He must have worked on a similar assignment in the last two (2) years in river flow regime and hydrograph modelling.

k) Water Engineer

General qualification: The water engineer must possess a Bachelor's degree in civil engineering, water engineering or geotechnical engineering from a university recognized in Kenya.

General experience; He/she should have five (5) years progressive working experience in water engineering drawing and infrastructure. S/He must be a Registered/certified professional by the Ministry of water Irrigation and Sanitation.

Relevant experience: Water engineer must possess relevant experience in the field of sand-dams, sub-surface dam designs and drawing and field data collection, analysis and interpretation. S/He must have work in similar assignments in the last two (2) years.

l) Environmental safeguards Specialists

General qualification: The expert must have a Bachelor’s degree in either natural resource sciences/ management / environmental sciences/ climate change from a university recognized in Kenya and Certificate in Environmental Impact Assessment (EIK) or Environmental Social and Impact Assessment (ESIA).

Relevant experience: The expert must have at least 10 years’ experience in undertaking environmental assessments and implementation support in relevant field related to water supply and water infrastructure development projects. The expert must also demonstrate experience with implementation of projects following World Bank Environmental and Social Framework (ESF) within the last 5 years and must have handled similar assignment in the last two (2) years.

m) Social safeguards Specialists

General qualification: The expert must have a Bachelor’s degree in social sciences (sociology, community development, anthropology, social work, governance peace and conflict) or equivalent in a university recognized in Kenya.

Relevant experience: S/He must have at least 10 years’ experience undertaking social safeguard assessment and implementation support in relevant field related to water supply and infrastructure development projects, community-based training, engagement and capacity building in matters water resources development, management and conservation. The expert must demonstrate experience with implementation of projects following World Bank Environmental and Social Framework (ESF) within the last 5 years with the implementation of similar projects in the last two (2) years.

The following is the estimated Key Person-Months requirement:

S/No		Input (person months)	
		PHASE I	PHASE II
	Key Experts		
1	Team Leader	8	4
2	Hydrogeologists	8	6
3	GIS and Remote Sensing Specialist	7	0
4	Chemist /Geochemist	6	0
5	Geophysicist	6	2
6	Database Specialist	6	2
7	Community engagement specialist	3	2
8	Environmental safeguards Specialists	5	2
9	Social safeguards specialists	8	2
10	Natural Resources specialist/Ecologist	3	1

11	Hydrologist	6	2
12	Water Rights Specialist	3	2
13	Water/ Civil Engineer	3	0
	GRAND TOTAL INPUT	72	25

NB//: The total man-months for the entire assignment is **97**.