



**REPUBLIC OF MOZAMBIQUE
MINISTRY OF PUBLIC WORKS, HOUSING AND WATER RESOURCES**



WATER SERVICES AND INSTITUTIONAL SUPPORT PROJECT II (WASIS II)

IDA Grant. IDA D110

GROUNDWATER MANAGEMENT SERVICES FOR PEMBA, TETE AND MOATIZE

Contract Nr. FIPAG/WASISII/CON-35/20

TERMS OF REFERENCE

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1 BACKGROUND

The Republic of Mozambique has received a grant from the International Development Association (IDA) for implementation of the **Water Services and Institutional Support Project II (WASIS II)**, and it intends to apply part of the proceeds of this grant for payments under a Consultancy Services Contract for the **Groundwater Management Services for Pemba, Tete and Moatize**.

The Government of Mozambique (GoM) is implementing reforms in the urban water supply sector aimed at improving coverage, quality and efficiency of services. The reform program has involved the reorganization of sector Governance mechanisms, which has facilitated a transition towards decentralized water supply operations and management, including service regulation, investment planning, and private sector participation in operations.

More specifically, the GoM has taken steps to provide for:

- Reduced operating costs and increased efficiency, particularly through involving private sector in operations for water supply services in 21 major cities; Maputo, Matola, Boane, Beira, Dondo, Nampula, Angoche, Nacala, Pemba, Chokwe, Xai-Xai, Inhambane, Maxixe, Tete, Moatize, Chimoio, Manica, Gondola, Lichinga and Cuamba.
- Tariff adjustments that support financial sustainability; and
- Establishment of a Regulatory Board for the sector, which considers both service quality and financial performance.

The program for urban water supply also includes investments in rehabilitation and extension of systems. The GoM's implementation agency for the new urban water program is **Fundo de Investimento e Património do Abastecimento de Água – FIPAG** (Investment Fund and Water Supply Asset Holder).

FIPAG is responsible for the fixed assets of the city water supplies and for the future investment in the systems, including Pemba, Tete and Moatize. It has the mandate to ensure that the public receives an adequate and safe water supply that meets Mozambique standards for health and hygiene (the public service obligation), and is empowered to ensure these systems achieve autonomous, efficient and financially sustainable water supply operations.

The WASIS II project is to support FIPAG in implementing investments in the water supply systems in five towns, namely, Pemba, Nacala, Beira, Dondo and Tete. The investments aim to: (1) Rehabilitation and expansion of water supply production and distribution through works in the 5 cities and 60,000 household connections, (2) Institutional support component which includes support decentralization of FIPAG Operations by establishing 3 Regional Utilities and support project management, supervision of contracts, audits, training and technical studies; (3) Output-based payments for low-income-household connections, (4) Contingent emergency response through support disaster-recovery needs in FIPAG water systems by providing immediate response to an Eligible Crisis or Emergency, and (5) Capacity building and operational support to AURA.

The Water Supply Systems of the Cities of **Pemba, Tete and Moatize rely on groundwater**, namely, the Chuiba and Metuge wellfields for Pemba, Nhartanda for Tete and Revubue for Moatize. Out of the four wellfields, only for Metuge wellfield there is a preliminary assessment of the potential yield and recommendation of the feasible exploration rates, therefore, there is a need to undertake a deep and robust assessment for the four wellfields, as well as design, install

and operationalize a monitoring system for a sustainable management of the investments planned for the three towns.

In this context, FIPAG intends to hire a Groundwater Management Specialist for technical assistance for the implementation of an efficient management system of the Nhartanda, Revubue, Metuge and Chuiba wellfields, through an assessment of the yield and recommendation of the suitable abstraction rates to supply the three towns, design of piezometers system and respective monitoring system, preparation of terms of reference and procurement documents for hiring the service providers for installation of piezometer system, supervision of the installation process and training to FIPAG, ARA-Centro and ARA-Norte staff, being the last two entities responsible for the water resources management within the basins, where the four wellfields are located.

In view of the above, the required services will comprise two components, namely: Component (1) Chuiba and Metuge wellfields in Pemba and Component (2) –Nhartanda, Chitatha and Revubue (I and II) wellfields in Tete and Moatize, respectively.

2 Objectives

The objective of this assignment is the provision of technical assistance for Groundwater Management Services in Pemba, Tete and Moatize aiming at comprehensive study of the five aquifers and works supervision, as following: Data collection and characterization of the five aquifers that feed the wellfields supplying the respective cities of Pemba, Tete and Moatize.

- (1).Assessment of the current use of the aquifers in reference.
- (2).Design of monitoring network, system and preparation of technical specifications
- (3).Preparation of procurement process, including procurement documents for hiring a services provider for the detailed study of the five aquifers.
- (4).Supervise the implementation of the service provider’s activities for the full study of the five aquifers.
- (5).Preparation of FIPAG groundwater supply source management measures and operation rules and training of Staff.
- (6).Supervise the installation of system monitoring database to be undertaken by the service provider and staff training.

3 SCOPE OF SERVICES

The activities to be performed under this assignment will consist essentially of two phases, namely, the preliminary study and preparation of procurement documents for selection of service provider to conduct a detailed study of the five wellfield and respective aquifers, phase 1 and supervision of works to be executed as part of the full study of the wellfields and training for FIPAG, ARA-Norte, ARA-Centro staff.

The main activities to be performed by the Groundwater Specialist will include but not limited to the following:

PHASE I – Preliminary study and preparation

The phase 1 of this assignment aims at ensuring the preliminary aquifer assessment based on available exploration data, design of the outline of monitoring system and preparation process for the execution of the detailed study to be conducted by the service provider. The activities of this phase will include but will not be limited to the following:

1. Undertake data collection and review on the hydrogeology, geomorphology, geology, hydrology, hydro-geochemistry, socioeconomic studies and land use of the four aquifers in Tete/Moatize and Pemba.
2. Identify and characterize (size, depth, production, aquifer, water quality, infrastructure for abstraction, etc) of the existing boreholes within the four aquifers in Tete/Moatize and Pemba.
3. Assess de groundwater availability and the water demand (current status of the groundwater exploration).
4. Preliminary assessment and characterization of the five aquifers in Tete/Moatize and Pemba, based on the available exploration data and studies/literature;
5. Preparation of the requirements and specification for design and implementation of aquifer performance modelling and monitoring network;
6. Preparation of the terms of reference, specifications and procurement documents for hiring of Service Provider responsible for implementation of monitoring system, including update on aquifer' piezometer network, installation of measuring equipment, monitoring system modelling and installation, and training of operation staff from ARA-Norte, ARA-Centro and FIPAG operational staff.
7. Technical assistance during the recruitment of the service provider.
8. Assessment and preparation of FIPAG groundwater supply sources operation rules.

PHASE II – Implementation – Supervision of the drilling activities and installation of monitoring system.

1. Supervision of the service provider's activities, including drilling of test boreholes to be undertaken as part of the investigation, revision of monitoring network/system installation, setup and implementation.
2. Quality control (review) of the deliverables to be produced and submitted by the service provider responsible for detailed study, modeling, installation and operationalization of the monitoring system of the five aquifers.

4 METHODOLOGY

The consultant's methodology for the implementation of the assignment shall address but not be limited to the following:

- (1). Situational analysis to confirm the scope of the assignment, desk collection and review, including the relevant legislation on the groundwater exploration activities.
- (2). Preliminary assessment of the current status of the aquifer exploration (including the exploration made by private sector), confirmation of the existing supplies, assessment of the potential for expansion of the existing supplies including preliminary identification

of the potential expansion area for the exploration of the aquifers.

- (3). Identification and assessment of the main operational challenges of the existing boreholes and each aquifer, in general, in order to outline the requirements for the aquifer protective measures. The evaluation shall include the water quality component (with focus to iron bacteria, for the specific case of Nhartanda wellfield).
- (4). Supervision of the service provider's activities related to the installation of the equipment (piezometers), operationalization of the monitoring system of all the wellfield and training to FIPAG, ARA-Norte and ARA-Centro staff in operation of the management system of the wellfield.
- (5). Assessment on other FIPAG groundwater supply sources operation activities and recommendation of the most appropriate rules and procedures toward a sustainable exploration.

The Consultant shall demonstrate in his/her methodology how his/her activities under this assignment will contribute for the successful implementation of the detailed study to be done by the service provider.

The Consultant shall ensure the execution of all tasks and sub-tasks outlined in the terms of reference for the phase I and II, in strict coordination with ARA-Norte, entity responsible for the groundwater management of the Metuge in Pemba, and ARA-Centro entity responsible for the groundwater management at Nhartanda and Rovubue I aquifer in Tete and Chitatha and Revubue aquifer in Moatize.

The Consultant shall be responsible for data collection, storage and analysis of all available information, namely, reports, bulletins, operation data, aerial imagery, etc, necessary for the fulfillment of his contractual obligations. In this context, the Consultant will be the sole responsible for the analysis of the information to be provided by FIPAG, namely, that information concerning the exploration of the five wellfields (Metuge, Chuiba, Nhartanda, Chitatha and Revubue), including the characteristics of the wellfields, investment plans, water demands, abstractions, etc. The Consultant will also be responsible for the collection of all available technical data to be provided by other entities other than FIPAG, such as DPOPHRH, ARA-Centro, ARA-Norte, Municipalities, EDM, INE, etc), for which FIPAG will grant a credential letter to the Consultant, if necessary.

For the implementation of this assignment, the Consultant may have to conduct site inspections or survey aiming at acquiring or confirming information related to existing infrastructure in the four wellfields or other locations within the water supply systems supplied from the four wellfields.

The Consultant shall also be responsible for acquiring all necessary approvals and licenses for rendering the services described in the present terms of reference. This responsibility shall include all approvals to be granted by relevant authorities such as Ministry of Public Works, Housing and Water Resources, Ministry of Land and Environment, Municipalities of Pemba, Tete and Moatize, National Administration of Roads, Telecommunications and Electricity authorities, etc. The Consultant shall also ensure that all of his activities or these activities arising from the outcome of his activities, are in line with the Mozambican Environmental Legislation and the World Bank Safeguards.

At the investigation stage of the aquifers listed under this terms of reference, the Consultant's responsibilities will include the supervision of the activities of the service provider to be engaged on the detailed study of the aquifers, including supervision of the construction, equipment, personnel, facilities, installation of piezometers and design, implementation and

monitoring of the operation of the piezometers. The supervision activities shall be extended to the management of quality, time and cost. The Consultant will be required to ensure that the assignment to be conducted matches with other ongoing or future activities to be implemented by FIPAG under WASIS II Project.

The Consultant shall keep track of all information to be generated from the Contract to be signed as an outcome of this term of reference, including that related to the engineering or environment, such as personnel, minutes of meetings, photographic reports, financial management, applications for payment of the service provider to be hired for the execution of the detailed study of the wellfield, etc.

5 OUTPUTS AND DELIVERABLES

As a result of assignment, the Consultant will be required to generate and submit the outputs and deliverables to be approved by FIPAG, described as below:

(a) Inception Report

The inception report shall address, amongst others, the Consultant's understanding of the assignment, assessment of the available data, discussion and updated methodology, resources allocated and updated work plan and organizational structure to implement the assignment. This report shall show the Consultant's preparedness following his review of the existing information related to the operation of the existing five wellfields and the discussions with FIPAG.

The Inception report shall also address the challenges identified by the Consultant with regard to the implementation of the assignment and strategy that the Consultant will adopt to overcome these challenges.

(b) Wellfields Preliminary assessment Report for the five wellfields

In this report the Consultant shall address the current situation pertaining the exploration of the aquifers that feed the five wellfields, preliminary assessed potential and identification of alternatives to be considered for the expansion of the wellfields, aiming at providing a preliminary indication to inform the detailed study of the wellfields to be undertaken by the service provider, following this assignment. The report shall also include the requirements and specifications for the design and implementation of the modelling and monitoring system/network.

(c) Terms of reference for hiring a service provider for execution of the detailed study of the five wellfields

The Terms of Reference shall describe the existing situation, principles, objectives, scope of works and activities to be undertaken and the services provider's responsibilities for the detailed assessment of water yield of the five aquifers. All relevant and required information for hiring the service provider including boreholes and equipment specifications shall be addressed in detail in the Terms of Reference.

(d) Procurement Documents for hiring a service provider for execution of the detailed aquifer study, groundwater modeling and monitoring system for the five wellfields.

The procurement documents shall be structured in separate volumes and shall include the requirements and procedures for preparation of the proposals, requirements for the execution of the study of the five wellfields, technical specifications and quantification of the activities

to be undertaken. The procurement documents shall be prepared in accordance with the World Bank relevant Procurement Procedures.

(e) *Evaluation Report of the tender for hiring a service provider.*

The Individual Consultant to be hired under this term of reference will be integrated to the evaluation committee indicated by FIPAG for selection of the service provider *for execution of the detailed study of the five wellfields. At the end of the evaluation process, the Individual Consultant shall prepare the bid evaluation report, in coordination with the other evaluation committee members, under guidance of the FIPAG's Project and Investments Director.*

(f) *Monthly progress report on project implementation services and works of the five wellfields studies.*

The monthly progress reports shall address the progress of the activities planned for the reporting period, any delays occurred and mitigation strategies to be adopted to overcome them in the coming reporting period. The report shall also include the updated plan for the assignment showing how the remaining activities will be implemented.

(g) *FIPAG groundwater supply sources operating rules*

The report shall assess the operation and maintenance practices on groundwater supply sources, address recommended procedures and rules for each aquifer source.

6 FORM OF CONTRACT, SCHEDULE OF DELIVERABLES AND PAYMENT

The Contract will be a lump-sum assignment for the provision of the services described in this term of reference. Payment will be based on Consultant's invoices which will be submitted as applicable, in line with the delivery schedule of the results agreed in the contract and work schedule.

The payment of remuneration fees will be subject to local/withholding taxes of 20% on the gross remuneration amount and should be shown separately on the invoices. The withholding tax will be paid by FIPAG.

Reimbursable costs and miscellaneous expenses will be refunded for expenses actually and reasonably incurred, if provided for and accepted in the Financial Proposal. Applications for reimbursable expenses should be made on the basis of all-inclusive costs, which include accommodation, transport, subsistence, travel (including air travel to and from Maputo) and all other expenses. The Consultant will be required to submit original versions of receipts or any other evidence of payment, along with his/her invoice and application for the payment of reimbursable costs.

The total amount that will be paid to the Consultant for remuneration and reimbursable expenses shall not exceed the ceiling amount reflected in the Contract.

The deliverables shall be submitted and paid according to the Schedule summarized in the table below.

<i>Output</i>	<i>Schedule</i>	<i>Payment</i>
Inception Report (Component I and Component II)	One month after Start Date (SD).	10% of Contract amount.
Four Wellfields Preliminary Assessment Report	Two and half month after SD.	17% of Contract amount.
Terms of reference for hiring a service provider for execution of the study of the 4 wellfields.	Three and half month after SD.	5% of Contract amount.
Procurement Documents for hiring a service provider for execution of the study of the 4 wellfields.	Five months after SD.	5% of Contract amount.
Evaluation Report of the tender for hiring a service provider for execution of the study of the 4 wellfields.	Eight months after SD.	5% of Contract amount.
FIPAG groundwater supply sources operating rules	Twelve months after SD	10%
Monthly progress report of the implementation of the study of the 4 wellfields.	Monthly basis, for phase 2	12x4.0% of Contract amount.

7 REPORTING REQUIREMENTS

All documents, correspondence, instructions, communications, etc related to the assignment shall be in English, and final reports also in Portuguese, except the terms of reference and procurement documents which will not require submission in Portuguese.

The Consultant will report formally to FIPAG's Director General or his designated representative and liaise with the FIPAG's Project and Investments Director and his designated representative and counterpart.

All Reports shall first be submitted in draft form for review and comments and when all of the Client's comments have been attended to, to the Client's satisfaction, five hard copies of the final reports shall be delivered to the Client together with three complete electronic versions on a flash drive, one in the PDF format for possible reproduction to interested parties and two in the MS Word for text and MS Excel for tabular and financial data, if applicable.

All reports shall be submitted in English as one A4 size volume addressing an executive summary and main report, accompanied by separate volumes of Appendices if any and deemed adequate. The final versions of all reports shall be submitted in two languages, English and Portuguese, with the exception above indicated for the terms of reference and procurement documents.

All reports and communications will be in English.

8 QUALIFICATIONS AND EXPERIENCE REQUIREMENTS

The **Groundwater Specialist** shall possess the following qualifications and experience

- Hold degree in civil engineering, Hydraulic, Geology or similar, relevant to the groundwater science.
- At least fifteen (15) years of cumulative experience related to groundwater engineering studies, designs and work supervision.
- He/she must have had, in the last ten (10) years, specific experience in groundwater investigations and/or studies of similar size and complexity (covering at minimum assessment of potential yield of wellfield, recommended abstractions for exploration of aquifers, saline intrusion studies, etc). This shall include demonstrated experience in supervision of drilling of production boreholes with minimum diameter of 12", with at least two (2) of the previous assignments in sub-Saharan Africa and Mozambique being an advantage.
- At least five (5) years experience in assignments related to monitoring groundwater quality.
- At least two (2) similar assignments
- Fluent in English; and the ability to speak Portuguese will be an advantage.
- Knowledge of the World Bank safeguard policies and the regulations and requirements of the Government of Mozambique (GoM) is an advantage.

9 LEVEL OF EFFORT AND TIME REQUIREMENTS

The professional inputs required for the assignment are estimated at **15 person months**, which is deemed to be a reasonable indication. However, should the Consultant find the indicative LOE to be insufficient, he/she shall propose adjustment on the level of effort with proper motivation, which shall be reviewed as part of the evaluation process for selection of the Consultant.

The services to be contracted under this term of reference are anticipated to last thirty-six (36) months from Start Date indicated in the Commencement Notification Letter issued by FIPAG following the contract signature and clearance by the Administrative Court. The Consultancy activities will be allocated as per the Consultant's proposed plan and approved by FIPAG, which shall take into consideration the phasing of the assignment addressed in this term of reference, namely, phase 1 (preliminary assessment and preparation of the procurement documents) and phase 2 (supervision of the works related to the study of the wellfields and training to FIPAG staff).

The Consultant will not be required to be based full time in FIPAG premises, but will be expected to spend a reasonable amount of time (estimated at 60% of his time) at FIPAG Head office in Maputo with regular visits to Pemba, Tete, Moatize and other cities supplied by FIPAG through groundwater sources to conduct the site investigations, including interaction with local FIPAG and Regional Water Resources Authorities.

The Consultant shall submit a plan for the implementation of the assignment, to be reviewed and approved by FIPAG, this plan shall be updated time-to-time, to adjust any delays that may arise.

It should be noted that this assignment may commence during the restrictions imposed by the pandemic COVID 19, therefore, the travelling schedule and structure may have to be

corrected to address such delays and allow more productivity of each site visit. This may include further procedures required by the Government of Mozambique, including quarantine as the case may be, if the Consultant is a foreigner.

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