MIS -TERMS OF REFERENCE

DEVELOPING AND IMPLEMENTING A COMPREHENSIVE MANAGEMENT INFORMATION SYSTEM (MIS)

Tender PWA-GSD/ADA/2025/49 EOI for Developing and Implementation of a Comprehensive Management Information System (MIS) - 49/2025
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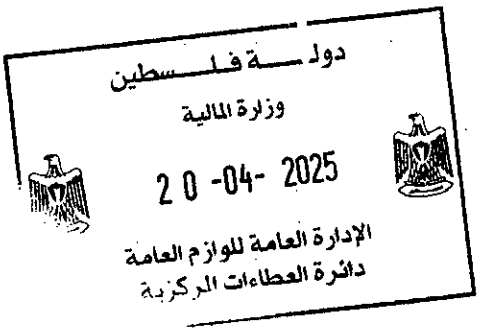

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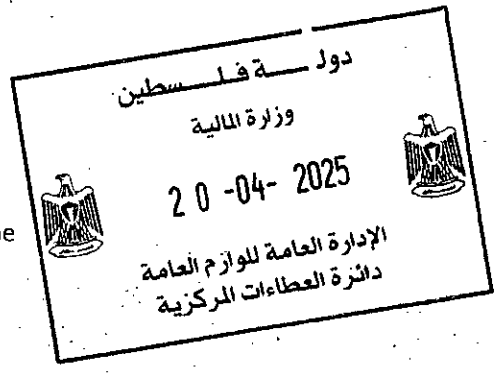
LIST OF ABBREVIATIONS

AIMS	Aid Information Management System
API	Application Programming Interface
BOQ	Bill of Quantities
EDMAS	Electronic Document Management & Archiving System
GIS	Geographic Information System
IWA	International Water Association
JTC	Joint Technical Committee
KPI	Key Performance Indicator
LIMS	Laboratory Information Management System
Mekorot	Israel National Water Company
MIS	Management Information System
NWC	National Water Company
NWIS	National Water Information System
PCBS	Palestinian Central Bureau of Statistics
PMO	Prime Minister's Office
PMU	Project Management Unit
PWA	Palestinian Water Authority
SOP	Standard Operating Procedure
UNDP	United Nations Development Programme
WASH	Water, Sanitation and Hygiene
WBWD	West Bank Water Department
WEAP	Water Evaluation and Planning System
WIS	Water Information System
WRIS	Water Regulatory Information System
WSDIS	Water Supply Distribution Information System
WSRC	Water Sector Regulatory Council



1. INTRODUCTION

The Palestinian Water Authority (PWA) intends to develop and implement a comprehensive management information system (MIS) aiming to enhance internal information management and collaboration between departments; make reliable data for planning and decision making readily available; support project management, approval and monitoring procedures; and improve information exchange with external institutions and development partners.

The present draft terms of reference (ToR) are to be read in conjunction with a second document titled "Conceptual Design and Software Requirements", which describes the functional requirements of the proposed system.

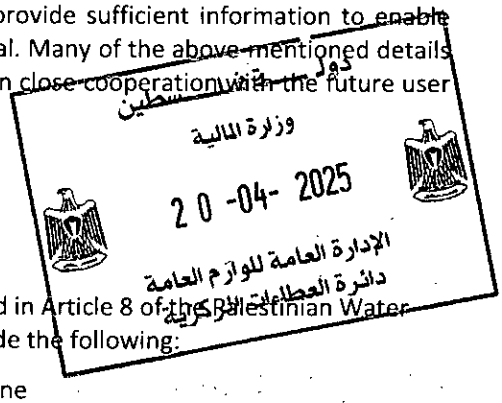
Both the ToR and the conceptual design/software requirements were developed with support from the Austrian-funded Institutional Support Programme (ISP). The ISP aims to support institutional strengthening of the PWS in the context of the water sector reform process mandated by the Water Law of 2014. Among the capacities to be strengthened through the ISP are strategic planning, policy formulation, coordination, monitoring, reporting and resource mobilization.

The MIS has the role of a tool in this broader capacity development process. In a complex and challenging sector environment, the PWA has currently insufficient human and other resources to drive the reform process and fully fulfil its multiple mandates. The MIS is seen as a contribution to making PWA's planning, decision making, coordination and reporting procedures more efficient, thus helping PWA to cope with the multitude of tasks and ensuring that planning and decisions are based on reliable data.

The MIS specified in the present ToR represents a first phase of development, based on the priorities expressed by the PWA directorates and departments. The system shall be open for further development, new modules and additional functionalities.

Despite the efforts made to compile the information needed for the ToR and specifications, it was not possible in the time available to work out the details of every functionality, data structures, indicators, workflows/processes and reporting formats to be generated by the system.

The level of detail provided at this stage is therefore meant to provide sufficient information to enable bidders to estimate the input needed and prepare a sound proposal. Many of the above-mentioned details will have to be elaborated during the first phase of development, in close cooperation with the future user departments.



2. BACKGROUND AND INSTITUTIONAL CONTEXT

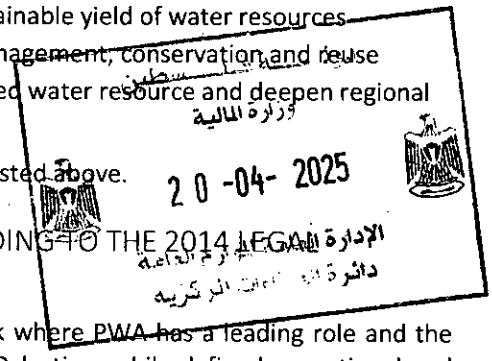
2.1. THE MANDATE OF PWA

The mandates of the Palestinian Water Authority (PWA) are defined in Article 8 of the Palestinian Water Law of 2014. According to this law, the PWA's responsibilities include the following:

- Full responsibility for managing water resources in Palestine
- Preparing water policies, strategies and plans and ensuring their implementation
- Submitting periodic status reports on water to the Cabinet of Ministers
- Surveying the available water resources
- Proposing water allocations for various sectors, ensuring effective water demand management
- Protection of water resources
- Licensing and development of water resources utilization
- Setting a general policy for the planning and evaluation of water and wastewater projects
- Setting design and quality control standards, technical specifications, and monitoring their implementation
- Taking measures and developing plans the establishment and development of the National Water Company and the Regional Water Utilities

- Endeavoring to achieve an equitable distribution and optimal use of water to ensure the sustainability of ground and surface water resources
- Coordinate and supervise scientific research and studies related to water and wastewater
- Partake in the development of approved standards of water quality for various uses
- Development and coordination of effective participation in technical cooperation programs
- Monitor precipitation, surface flows, groundwater levels, utilization quantities and water quality, as well as analysis of data to determine the safe and sustainable yield of water resources
- Develop principles and frameworks of water demand management, conservation and reuse
- Build institutional capacities for the management of shared water resource and deepen regional and international cooperation.

When fully developed, the MIS will support most of the functions listed above.



2.2. OTHER WATER SECTOR INSTITUTIONS ACCORDING TO THE 2014 LEGAL FRAMEWORK

The Water Law of 2014 introduced a new institutional framework where PWA has a leading role and the overall responsibility for the management of water resources in Palestine, while defined operational and regulatory tasks are vested in other institutions that have been created, or are in the process of being created and operationalized.

These other sector organizations defined in the Water Law are:

- The **Water Sector Regulatory Council (WSRC)**, in charge of regulating, licensing and monitoring the performance of water and wastewater service providers, including the approval of water tariffs.
- The **Regional Water Utilities**, which have the operational responsibility for providing water and wastewater services to customers within their respective region. They will gradually replace the more than 300 existing local **water service providers**.
- The **National Water Company (NWC)**, a state-owned company under development that will replace the **West Bank Water Department (WBWD)**, which is in charge of the production, distribution and sale of bulk water to service providers, including water extraction, desalination and bulk water transmission as well as the procurement of water from Israeli water systems (Mekorot).
- **Water User Associations**, in charge of managing the supply and usage of irrigation water

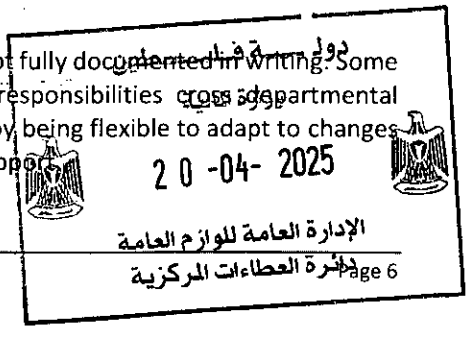
The MIS to be developed will be tailored to the mandate and responsibilities of the PWA, while the other sector reform institutions will develop their own information systems or have done this already (WSRC). However, the necessary interfaces and information exchange requirements need to be considered when developing the MIS.

2.3. ORGANIZATIONAL STRUCTURE, CAPACITIES AND CONSTRAINTS OF PWA

The internal organizational structure of PWA is currently undergoing a transformation process. Many of the internal structures and procedures are not yet consolidated, or have been decided but are not yet (fully) implemented. An overview of the current situation is given in the conceptual design & software requirements report.

Most of PWA's departments and units are significantly understaffed, as many of the positions are not filled. As a result, several departments have one single staff (the Head of Department). PWA is making efforts to recruit junior staff for critical positions, partly with support from the above-mentioned Institutional Support Programme (ISP).

In a similar way, the internal procedures of PWA are changing and are not fully documented in writing. Some of the processes are not (yet) clearly defined, in particular when responsibilities cross departmental boundaries. The PWA-MIS will have to take this situation into account by being flexible to adapt to changes of the organizational responsibilities, processes and workflows it will support.



At the time of the consultation visits, a team of PWA was working in Gaza under an organizational structure that mirrors the overall PWA structure. However, the cooperation between the PWA headquarter in Ramallah and the Gaza office was not sufficiently developed and the team was depending on office space and logistical support from cooperation projects. Given the uncertainty regarding the future situation in Gaza, the MIS will be designed taking the specific functional requirements for Gaza into account. As a web-based system supported by interactive GIS map, it will be hosted and maintained in Ramallah but will be accessible from any location.

2.4. PWA'S DATA MANAGEMENT AND PAST EFFORTS TO DEVELOP INFORMATION SYSTEMS

The PWA is undertaking efforts to enhance data availability and internal information management since many years. In this context, several databases and information systems have been developed, set up and introduced to some extent. However, they only covered certain aspects, were never fully operationalized, had functional deficiencies or were only used by certain departments, for various reasons.

Despite the above-mentioned efforts, data management at PWA is currently unsatisfactory. The operational usage of information systems varies from non-existent (where only Excel sheets are used) to limited usage of the existing information systems. An overview of these systems is provided in the conceptual design & software requirements report. However, except the Water Supply and Distribution Information System (WSDIS), building the MIS around the existing systems is not recommended due to the age of the existing systems/code; different database types and languages used; performance issues (slow loading); limited functionalities of the existing systems; and limited levels of current usage. The disadvantages of integrating diverse historically grown systems therefore exceed any possible advantages of using existing code.

The communication between departments, and between data producers and data users, is currently not well developed and basically limited to the compilation of information needed for reports. As a result, information is scattered across departments, mostly stored on the staff's desktop computers. In a similar way, there is no systematic data exchange with external institutions other than ad-hoc collection of data that are needed for planning or reporting purposes.

2.5. EXISTING IT DEPARTMENTS AND CAPACITIES

The PWA's existing databases/information systems are hosted at a local data center operated by the PWA's IT Department. It is expected that the future MIS will also be either hosted at this data center or by a combined Cloud account with the local data center, with details to be worked out and agreed by the bidder in cooperation with the IT Department.

The data center has 3 physical servers with 25 logical servers, using VMware software. HP Data Protector software is used for the backup management.

About 4 TB are currently available for the planned MIS. Additional hardware will be procured separately, if needed, and shall not be part of the bidder's proposal.

The IT Department has currently 2 staff members.

While the IT Departments is in charge of the entire PWA, there are also two relevant departments, the Databank Department and the GIS Department, under the General Directorate of Strategic Planning. These two departments are expected to be merged in the near future.

The development and maintenance of the planned MIS – including testing, system administration, user training/support, data management, report generation, etc. – will require considerable strengthening by establishing a new Hydroinformatics and Modeling Directorate (HMD).

2.6. FUTURE OUTLOOK

The Palestinian Water Authority (PWA) is in the process of establishing the Hydroinformatics and Modeling Directorate (HMD) to strengthen the operation of its planned Management Information System (MIS). The HMD will comprise three specialized departments, each with distinct roles that collectively enhance the PWA's operational and strategic capabilities:

1. Integrated Geographic Information and Databases Department

   This department focuses on collecting, organizing, and analyzing geographic data to provide accurate, up-to-date information for planning and decision-making. Acting as a central platform, it integrates geographic data, produces maps, and generates analytical reports that support sustainable development. It also collaborates closely with other PWA directorates to provide essential geographic insights for projects and policies.

2. Modeling Department

   Dedicated to developing, updating, and applying numerical models related to water resources, this department covers both groundwater and surface water systems. It ensures that advanced modeling techniques are based on accurate and current data, fostering integration with other departments. The outputs of this department support sustainable planning and strategic decision-making, contributing to a comprehensive understanding of water resource management.

3. Applications and Technical Support Department

   This department ensures the seamless operation of software, databases, and applications. It addresses technical issues related to databases, applications, and system integration, particularly between geographic and hydrological systems. Its key responsibilities include:

   a. Maintaining and managing specialized software systems.
   b. Quickly resolving technical faults to prevent workflow disruptions.
   c. Ensuring full system integration to enhance efficiency and minimize downtime.
   d. Collaborating with the IT department to provide technical support, monitor system performance, and ensure the security and continuity of systems.
   e. Conducting periodic system maintenance to optimize functionality and reliability.

Through these three departments, the HMD will play a vital role in enhancing the PWA's operational efficiency, fostering informed decision-making, and supporting sustainable water resource management.

3. OBJECTIVES AND SCOPE OF THE MIS TO BE DEVELOPED

3.1. OVERALL OBJECTIVES

The overall objective of MIS development is to enable PWA to fulfil its assigned mandates and responsibilities, as defined in the Water Law of 2014, effectively and efficiently. This will be achieved by providing a tool for improved data management, planning, monitoring, decision making, reporting, coordination, and data exchange with external partners and institutions.

Specifically, the MIS is expected to support and enhance the following processes:

- Data entry, validation and exchange
- Coordination and data exchange between PWA departments, projects, and external partners
- Integrated planning of water resources and water use, supported by graphic visualization, GIS mapping and analysis functionalities
- Project implementation tracking and monitoring
- Water resources and water quality monitoring
- Water supply and distribution management and monitoring
- Compliance monitoring with licenses and regulations

- High-level progress monitoring and reporting against strategic plans, including the automatic calculation of performance indicators
- Communication to partners regarding activities and interventions implemented by PWA
- Archiving documents based on PWA's directorates and units
- Preparation of both regular and ad-hoc reports

It is also expected that the MIS will help to make the achievements of the water sector more visible and make it attractive for development partners' support.

In the medium to long term, the MIS is expected to support all key functions and processes within PWA. The present first phase of development will focus on the functionalities listed in section 5 below.

3.2. MIS USERS

The primary users of the MIS are the staff members of PWA.

External users – development partners, staff of other water sector institutions, researchers/consultants – will get limited access to specific content of the system.

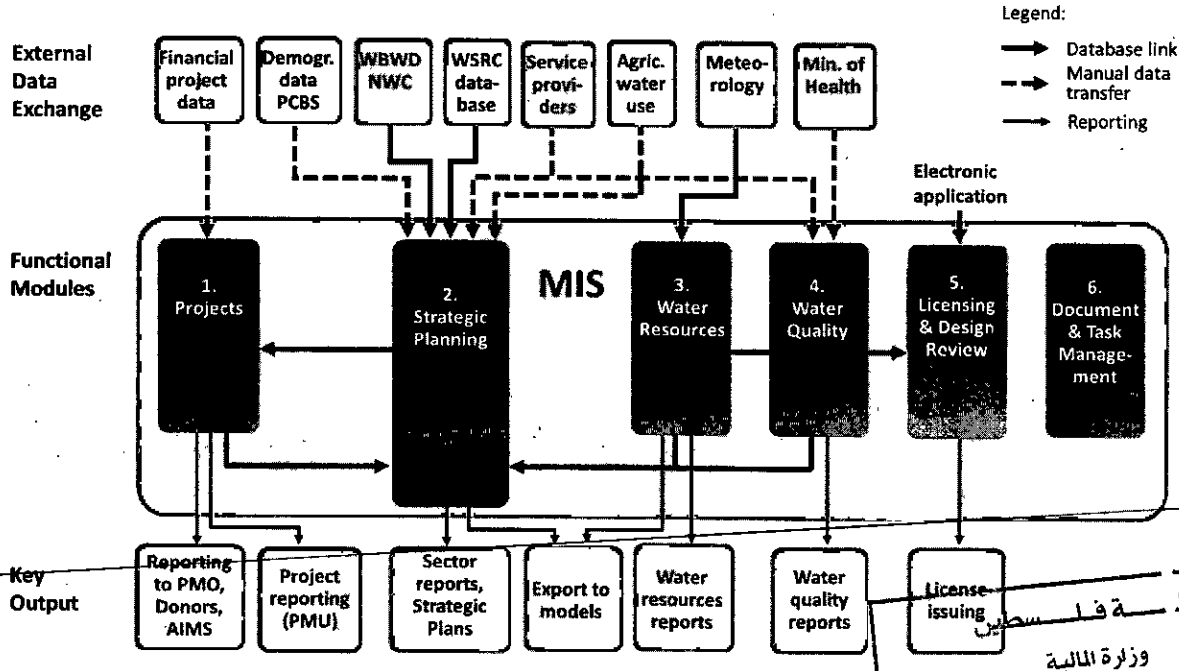
A preliminary list of the proposed user groups is provided in the conceptual design & software requirements report. The MIS shall provide flexibility regarding the definition of user groups and user rights.

3.3. SCOPE OF PHASE 1 OF MIS DEVELOPMENT

The present ToR refer to Phase 1 of MIS development, which includes setting up the overall system architecture as well as six functional modules.

Each module will have a separate dashboard with associated functionalities that are tailored to the respective tasks.

The graphic below provides an overview of the MIS's structure by functional modules.



4. SCOPE OF WORK

This scope of work includes the detailed design, development, installation, testing and initial maintenance of a Management Information System (MIS) for PWA, as described in the following sections.

4.1. GENERAL DEVELOPMENT STRATEGY

The MIS will consist of a range of functional modules with separate dashboards but sharing access to a common database and using certain common functionalities (e.g. GIS visualization, report generation). The system architecture shall be open for future additions such as new functionalities, changes of internal procedures, or additional interfaces with external databases.

It is therefore essential to develop a clearly structured and well documented system architecture with APIs that are available for future improvements of the system as well as data exchange. This will have to be implemented within a limited time (contract period) and with limited development and testing capacities at the user side.

For these reasons, it is recommended to adopt a classical "waterfall" methodology for the initial development, followed by a phase of user support, finetuning and refining of the system. The Consultant shall be responsible for the overall system functionality and integration, ensuring that each component of the overall system works efficiently with no interface problems.

The initial "waterfall" development consists of the following stages:

- **Detailed requirement specifications** (refining and confirming the requirements from the conceptual design & software requirements report) in close interaction with the users
- **System design**, working out the technical solutions in response to the requirements
- **Implementation**: coding and integration of the system, testing by the developers, installation
- **Import of existing data**: migration of data from existing databases
- **Testing:** User acceptance testing by the PWA Databank Department and the main MIS user departments for each module.
- **Training** and **documentation**
- **Technical support and system maintenance** during a period of 2 years after the installation of the production version of the system.

The technical support & maintenance phase will also be used to implement minor modifications and finetuning based on user feedback.

4.2. DETAILED REQUIREMENT SPECIFICATIONS

This first step includes the review, confirmation and refinement of the requirements described in the conceptual design & software requirements report.

During this phase, the following items will be specified in detail:

- Data types and structure (fields), as needed for creating the data model
- For each data type:
  - data validation requirements (by the system, by users)
  - data aggregation requirements (by administrative/catchment area, by year etc.)
- User interface and dashboards for each module
- Use cases, procedures and workflows to be supported
- Indicators to be calculated by the system and formulas to be used
- Reporting formats to be generated
- Interface requirements for data exchange with external databases / data sources, definition of protocols to be used
- User groups and user rights
- Bilingual (English-Arabic) language support details
- Details on the non-functional system requirements, including
  - Performance and scalability

  - Data security and access control
  - Backup, disaster recovery and system restoration.
- Technical and user documentation deliverables
- Training plan for user and administrator training

These specifications shall be developed in close consultation with the user departments. For each module, the departments listed in the second column of Table 1 ("Department(s) where Module is anchored") will be the main counterparts for the specifications.

At the end of the Detailed Requirements Specifications phase the agreed specifications shall be submitted to the Client for approval, before proceeding to the system design.

4.3. SYSTEM DESIGN

It is the Consultant's responsibility to translate the agreed requirements into an appropriate system design and architecture, and to ensure that it is adapted to the existing hardware, software and communication environment.

The general system requirements are described in the conceptual design & software requirements report. The system shall be GIS web-based, well documented, and based on software and code that will be owned by PWA.

The proposed solutions for system hosting and data security shall comply with the relevant regulations. It is the Consultant's responsibility to retrieve and ensure compliance with these regulations.

Details and open questions shall be agreed with the PWA's Hydroinformatics and Modeling Directorate (HMD).

The proposed design shall be presented to PWA for approval before proceeding to implementation.

The design to be presented includes:

- Proposed system architecture
- Software, programming language, coding practice and frameworks to be used
- APIs and proposed integration solutions with other databases/information systems
- Hosting infrastructure specifications: Server configurations, bandwidth, storage, cloud service provider (if applicable).
- Data security and encryption solution, compliance with the relevant regulations
- Access control and user authentication methods to ensure data security and prevent unauthorized access.
- Compliance certification and adherence to the relevant regulatory standards
- Backup and recovery strategy: Regular data backups, disaster recovery and system restoration in case of data loss or system failure
- System monitoring, detection of anomalies, and incident response
- Details on any third-party services, vendors or products involved in software development, system hosting, security, or other aspects
- Proposed training programme, including user awareness on data handling and data security
- Testing methodologies and procedures
- Processes for regular system updates, tracking changes and version control

4.4. SYSTEM IMPLEMENTATION AND INSTALLATION

System implementation includes all components of the system including database setup and configuration, programming of the required mobile apps and interfaces, the agreed input formats, dashboards, GIS functionalities and reporting formats, as well as system administration and user management.

Coding and internal testing can be done at the Consultant's headquarters but should be done, to the extent possible, with involvement of the PWA's Hydroinformatics and Modeling Directorate (HMD), in the interest of ownership, deep understanding of the system, and capacity building.

Installation on the Client's servers and user testing shall begin after successful completion of the Consultant's internal testing.

Installation also includes making available the mobile apps for download and user testing.

4.5. IMPORTING OF EXISTING DATA

At this stage, the Consultant will import the data from the existing databases and information systems, in particular from:

- Mawared/WIS for wells/springs and the related time series (water levels, flows) as well as other water infrastructure
- WSDIS for water supply infrastructure; time series of water production/import, distribution and consumption; service provider data; and demographic/socioeconomic data.
- LIMS for water quality data

Additional relevant datasets and data sources may be identified by PWA during the inception phase.

To which extent, and how far back in time, historical time series data shall be imported is to be agreed with the Client.

Data that are currently not held in databases, such as project data, shall be imported from Excel spreadsheets. To this end, the developers shall provide appropriate import routines.

The PWA will support this process and will provide access to the databases and other data sources as needed.

The MIS developers shall be responsible for the data migration process and the integrity of the database, but not for the completeness or quality of the imported data.

4.6. TESTING

User acceptance testing will be led and coordinated by the PWA Hydroinformatics and Modeling Directorate (HMD). Testing will be done by the same departments that were involved in the detailed requirement specifications before (see section 4.2).

External support consultants may be involved for technical verification and quality assurance and to support the testing process.

4.7. DOCUMENTATION

The system shall be **documented** at three levels:

1. at the User level, by providing a concise user manual describing the procedures for data entry, validation, visualization, generation of reports and data exchange for each of the main user groups
2. at the Administrator level, by providing a more detailed and technical manual for system administrators
3. at the Coding level, by providing adequate technical documentation as well as the source code, in a way that allows qualified developers to expand, improve and further develop the system in the future.

The documentation is expected to include:

- Version control documentation, change log and release notes
- API Documentation: Comprehensive documentation for any APIs or interfaces used by the system, outlining endpoints, parameters, and expected responses for developers integrating with the system
- Testing and quality assurance procedures and documentation during the development process.
- Troubleshooting guide and FAQs for system users and administrators
- Support and contact information for assistance related to the system
- Documentation of compliance with relevant regulatory standards.

4.8. TRAINING

Training shall be delivered at three levels:

1. **User training**, separately for each module, covering all steps from data entry/import through validation to analyses and report generation
2. **System administrator training** for all aspect of system administration that do not require changes of the code
3. **Technical training** for Hydroinformatics and Modeling Directorate staff, mainly delivered through close involvement in the system development and installation process. This includes providing them with a thorough understanding of the system architecture and interfaces.

The Consultant shall prepare a detailed plan on how the training requirements shall be implemented.

Alongside manuals, supplementary training materials should be developed such as video tutorials, walkthroughs, or interactive guides to facilitate user and administrator understanding of the system functionalities.

4.9. HANDOVER, FOLLOW-UP SUPPORT, SYSTEM MAINTENANCE AND FINETUNING

After the successful completion of user acceptance testing and training, the system shall be handed over formally to PWA.

During a period of three years after the date of handover, the consultant shall provide the following services:

- **System maintenance**, regular updates and security fixes
- **Technical support** to users, knowledge transfer and troubleshooting (remote support and through a local partner who is present in Ramallah)
- **Troubleshooting and fixing bugs** that may be detected during the two-year period
- **Finetuning**: Implementing minor changes and improvements of the system based on user experience and feedback, following a structured process for evaluating, approving, and implementing such changes. This shall not include wishes for entirely new functionalities, but rather finetuning of the agreed functionalities, reporting formats etc.
- **Documentation updates**: Any changes or improvements made during the maintenance period are to be documented appropriately in the system's technical documentation and manuals.

During the maintenance and support period, the consultant is expected to provide regular reports and maintain regular communication with the client regarding system performance, issue resolution, and system improvements.

4.10. HARDWARE, SOFTWARE AND COMMUNICATION COSTS

The Consultant's services shall not include procuring **hardware**. The PWA and its partners shall procure the required hardware, as needed.

To this end, the Consultant will provide specifications for servers, (if needed), user workstations, peripherals, and devices for data capturing in the field (e.g. tablets).

- At the beginning of MIS development, the Consultant and the Client shall agree on a time schedule to ensure that the required hardware is available in time for system installation and user testing.

All **software** related costs – own software development as well as payments for the usage of libraries, development frameworks etc. – shall be included in the Consultant's proposal. The Consultant is expected not to use software components that require continuous license fee payments after system installation. License costs for standard software (e.g. operating systems or office software) shall be borne by PWA.

Communication costs, such as internet access and usage of mobile networks, are not to be included in the Consultant's proposal, apart from those needed for system development before installation.

The Consultant shall provide minimum requirements for internet access and mobile communications to ensure satisfactory speed and functionality of the system.

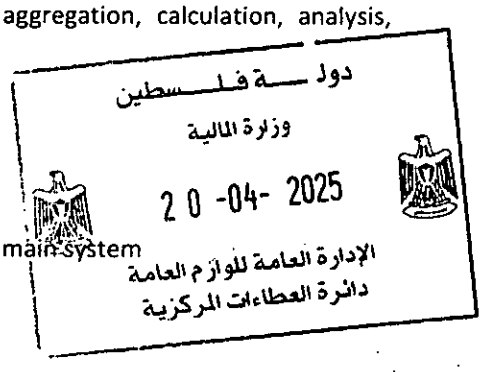
5. REQUIRED SYSTEM FEATURES AND FUNCTIONALITIES

5.1. REFERENCE TO CONCEPTUAL DESIGN & SOFTWARE REQUIREMENTS REPORT

Please refer to the "Conceptual Design & Software Requirements" report for a full description of the functional and other requirements to be fulfilled by the system. The information provided below summarizes some of the key features of the system to be developed but is to be read in conjunction with the above-mentioned report.

The Consultant is expected to develop and install a consistent, fully functional and integrated system with the following components

- Database
- User interface with a set of module-specific dashboards, ensuring compatibility across various devices and web browsers
- Six functional modules consisting of data entry, validation, aggregation, calculation, analysis, visualization and report generation routines
- GIS component (visualization and interactive query)
- System and user administration
- Interfaces (APIs) for data exchange with external databases
- Mobile apps for field use, using the same user credentials as the main system
- Data security and backup mechanisms



5.2. FUNCTIONAL MODULES

The following table provides a list of proposed modules. It is intended to provide a quick overview of the system, while details on the functionalities are provided in the conceptual design & software requirements report.

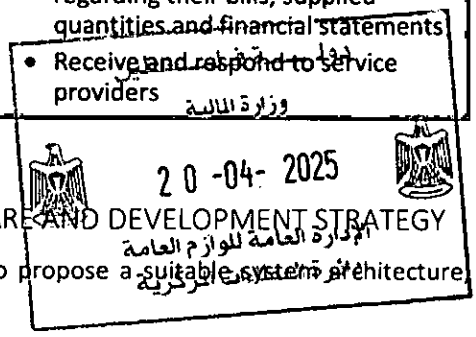
Table 1: list of the Functional modules, main data types and functionalities for MIS Phase 1

Module	Type of development	Main data types	Purpose / main tasks to be supported
Water Supply and Distribution Information	Upgrade the existing WSDIS module by additional reports, integrate it with	• Water supply time series from different resources (Locally produced and	• Interactive GIS map providing all information related to the identified item in the water sector.

Module	Type of development	Main data types	Purpose / main tasks to be supported
System (WSDIS)	other modules mainly Billing, Online-Monitoring Systems located at WBWD and all other related Modules at PWA	purchased from other sources. • Invoiced water time series at service provider's level • Service providers time series data including demographic and demands • Geodatabase for water distribution infrastructures (pipelines, reservoirs, booster stations, resources, invoice meters, bulk meters, etc. • Master Plans data	• Generate different types/levels of reports with dynamic filters and supported by charts • Calculate the None-revenue for water (NRW) at route level • Calculate the level of fare distributions at cluster/service providers levels
Water Resources Management system (WRMIS)	New development module, this module will be developed based on the WSDIS structure and sharing the same GIS map. This module will include a Mobile application to be used for collecting data from the field. Integration with other modules is needed where applicable	• Wells and springs data and time series • Watersheds data and time series (storm flow, infrastructures) • Collected field data related to water resources with data verification modules. • Meteorological data (Rainfall, Temperature, etc.) • Physical data (land use, soil, geological data as GIS files) • Master Plans data	• Interactive GIS map providing all information related to the identified item in the water resources. • Generate different types/levels of reports with dynamic filters and supported by charts • Estimated missing data based on the time series history • Provide aggregation reports (monthly, quarterly, semiannual and annual reports)
Wastewater Management system (WRMIS)	New development module, this module will be developed based on the WSDIS structure and sharing the same GIS map. This module will include a Mobile application to be used for collecting data from the field. Integration with other modules is	• Wastewater treatment plants data and time series • Water transfer infrastructures data (pipelines, reservoirs, booster stations) • Reuse data (areas, crops, irrigation techniques, water user associations, etc.) • Transboundary flow meters data and Invoicing time series data • Master Plans data	• Interactive GIS map providing all information related to the identified item in the water resources. • Generate different types/levels of reports with dynamic filters and supported by charts • Estimated missing data based on the time series history • Provide transboundary flow and deductions reports • Provide aggregation reports (monthly, quarterly, semiannual and annual reports)

Module	Type of development	Main data types	Purpose / main tasks to be supported
	needed where applicable		
Lab Management Information System (LIMS)	Upgrade and update the existing LMIS module (re-publish), integrate it with other modules mainly WRMIS Mobile application to be used for collecting data from the field is also needed.	• Water quality data and time series related, mainly generated by the PWA Lab, to water and wastewater geo-databases. • Water samples history • Water quality standards	• manage and track laboratory samples, data, and workflows. • Sample tracking • Data management and analysis • Compliance with regulatory standards • Automation of lab workflows • Interactive GIS map providing all information related to the identified item in the water resources and wastewater facilities. • Generate different types/levels of reports with dynamic filters and supported by charts
Gaza Recovery and Reconstruction Module (GRR)	New development module, this module will be developed based on the WSDIS structure and sharing the same GIS map. This module will be linked to Project Tracking system where applicable.	• Before 7th of October 2023 water and wastewater infrastructures with their data • Intervention data regarding reconstruction after the war ends. This will include water and wastewater interventions with all technical and financial data	• Interactive GIS map providing all information related to the identified water or waste water interventions. • Generate different types/levels of reports with dynamic filters and supported by charts
Projects Management and Tracking system (PMT)	New development module linked supported by workflow	• Project data • Project results • Financial agreements • Strategic plans and targets • Project cycle	• Project progress monitoring from identification to completion • Keep track of project pipeline and donor portfolios • Produce project fact sheets • Support communication with and reporting to development partners • Support project management and reporting by PMU project managers • Summary reporting to inform high-level meetings and working groups • Reporting on performance against strategic plans and targets • Link to AIMS system (hosted by PMO)
Document Management and Workflow System (DMWS)	New development module linked other modules where applicable	• Documents to be shared/archived • Document metadata • Trainees, training courses	• Document management (sharing and archiving) • Task allocations and tracking • Managing trainees and scholarships

Module	Type of development	Main data types	Purpose / main tasks to be supported
		• Scholarship data • Joint water Committee archive and follow ups • License applications with attached documents • Project design files • Workflow configuration (steps of the process) • Control visits to monitor compliance	• Partly replacing the old EDMAS system • JWC documentation and archiving • Support cross-departmental workflows processes within PWA, • Electronic submission of license applications • Documentation of the internal review and approval process and decisions • Monitoring of compliance with license conditions
Adminsitartion Archiving System	Upgrade the existing system with more reporting, advanced searching capabilities	• Communication duties and responses/feedbacks between Head of PWA office and other directorates and units	• History of duties and feedbacks within PWA and NWC offices. • Follow up warnings and notifications
Water Portal (Mobile applications)	Upgrade the existing system with more integrations with other databases	• Service providers data (financial and Invoicing data) • Complaints system • GIS interactive map	• Provide data for service provides regarding their bills, supplied quantities and financial statements • Receive and respond to service providers



5.3. CHOICE OF SYSTEM ARCHITECTURE, SOFTWARE AND DEVELOPMENT STRATEGY

Within the requirement specifications, the Consultant is free to propose a suitable system architecture, software to be used, and development strategy.

It is the Consultant's responsibility to critically assess the required functionalities and ensure that a consistent system is developed, based on his professional experience.

Before implementation, the proposed solution shall be presented to the PWA's Hydroinformatics and Modeling Directorate and user departments, including external supporting experts that may be appointed. The proposed solution shall be approved by the Client before proceeding to implementation.

5.4. PROGRAMMING LANGUAGE AND OPEN SOURCE REQUIREMENTS

To the extent possible, widely used programming languages and frameworks should be used in the interest of facilitating future system maintenance and further development.

The system shall be developed using software and development tools that are free of license costs after the completion of development, except for the licensing of standard software used for the operating system and office applications.

Any software or license costs to be incurred during the development period shall be included in the Consultant's proposal.

After handover, the source code shall be provided to the PWA as a safeguard. The PWA commits not to utilize the code for further development unless the developing company is unable to deliver technical support or upgrades in accordance with terms to be mutually agreed upon at a later stage.

5.5. INVOLVEMENT AND CAPACITY BUILDING OF PWA STAFF

In the interest of ownership and sustainability, the PWA's staff shall be involved in system specification, development and testing to the maximum extent possible. A concept for this shall be submitted as part of the proposal.

The main elements of this involvement are:

- Detailed requirement specifications in cooperation with the user departments for each module
- Involvement of Hydroinformatics and Modeling Directorate in the system development to ensure full ownership and understanding of the system architecture and code
- Strong role of the Hydroinformatics and Modeling Directorate during system installation and deployment
- User acceptance testing by the Hydroinformatics and Modeling Directorate and other user departments
- Cooperation between the Consultant and the user departments for the import of existing data
- Comprehensive training in system administration and maintenance for Hydroinformatics and Modeling Directorate staff

PWA intends to strengthen the Hydroinformatics and Modeling Directorate for these tasks.

5.6. EXISTING INFORMATION SYSTEMS

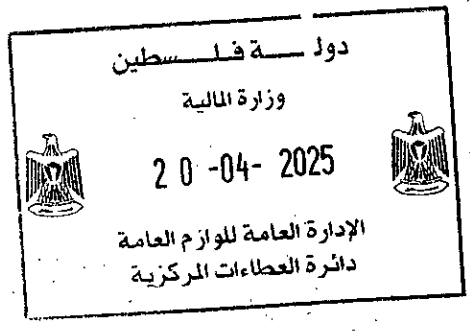
The existing information systems used by PWA – Mawared/WIS, LIMS and WSDIS – shall be fully incorporated into or replaced by the new MIS. Inconsistencies due to parts of the systems taken over are to be avoided. The entire MIS including any "inherited" components shall be the responsibility of the Consultant.

Given the age, status and functionality limitations of the existing systems, it is expected that replacing the systems will be the most viable solution. However, the Consultant is free to propose another integration solution in cases where this may be appropriate.

5.7. USER INTERFACE, DASHBOARDS AND GIS FUNCTIONALITIES

The MIS user interface shall be structured by providing separate, dedicated dashboards for each of the modules:

- Water Supply and Distribution
- Water Resources
- Wastewater Management
- Water Quality
- Gaza Recovery and Reconstruction
- Projects Management and Tracking
- Licensing & Design Review
- Document & Task Management



Each dashboard shall be designed to support the main tasks of the module effectively and intuitively. The details are to be elaborated in close cooperation with the respective user departments.

The MIS modules shall also have a GIS view for the visualization of the project locations, water infrastructure, measuring stations and sampling points. It should be straightforward to switch between dashboard, tabular and GIS views. The GIS maps should provide direct access to database content such as tables or trendline charts.

5.8. FULL ENGLISH – ARABIC LANGUAGE SUPPORT

The MIS shall be fully bilingual, English-Arabic. This includes the following features:

- Switching of language for all menus and labels of the user interface
- Providing for the storage of names and descriptions in both languages in the data model
- Allowing entry of text in search windows, filtering etc. in either language
- Supporting the generation of reports in English and Arabic
- Switchable display of names on GIS maps (or display of names in both languages)
- Generation of tabular output from right to left for tables in Arabic language
- Generation of tables with labels on both sides (leftmost column for English and righmost column for Arabic)
- Interface layout and design to accommodate bidirectional text, allowing smooth readability and alignment for Arabic content where the text flows from right to left
- Allowing users to set their preferred language for the interface

5.9. INTERFACES WITH EXTERNAL DATABASES

For each of the data exchange requirements that have been specified, the Consultant shall propose and (after approval) implement a technical solution that ensures reliable data transfer, data security and user friendliness.

Data import will be done either through

- direct, automated regular data import using appropriate APIs, or
- using a tool for manual data import.

Development of interfaces and of the tool for manual data import is part of the Consultant's scope of work.

Direct, automated regular data exchange through APIs is preferred for databases from which large quantities of data will have to be imported at regular intervals. This is expected for:

1. Regular import of data on water service providers from the database of the **WSRC's Water Regulatory Information System**
2. Regular import of data on water production, distribution and supply from **West Bank Water Department / National Water Company** *(On-line monitoring and billing system)*
3. Regular import of rainfall and other meteorological data from **Palestinian Meteorological Department**

Manual import using a data import tool is expected for:

- Financial project data (data on disbursements etc. from financial management systems)
- Demographic and socioeconomic data from the Palestinian Central Bureau of Statistics (PCBS)
- Data from water service providers (if not obtained through WSRC)
- Wastewater volume and quality data from wastewater treatment plants
- Water quality data from Ministry of Health
- Data on agricultural water use
- Export of project and performance data to the PMO's Aid Information Management System

The **data import tool** will support the user to define the database fields to which the data to be imported shall be written; set the correct time information; and handle validation at the time of uploading to the database (rejecting or confirming values flagged as unexpected or outliers, entering comments)

The data import tool will initially include an import template for each of the above-mentioned types of data, but shall be customizable for importing other types of data or to change the existing templates.

The MIS should also be able to import data from **automatic dataloggers** (installed at bulk water meters or flow measuring stations). Details on the technical options are to be clarified during the inception phase of the consultancy.

5.10. MOBILE APPS FOR FIELD DATA ENTRY

The system will include two mobile apps – or one app with both functionalities – for offline data entry by field staff. The apps shall support data entry for

- Water resources time series data (water levels and flows for wells, springs and wadis)
- Water quality samples (field sampling data)

The mobile app(s) will allow to enter data without internet connection and synchronize with the database after returning to the office, or as soon as internet connection is available. The mobile app(s) shall support uploading photographs and the storage of GPS coordinates with the data collected in the field.

Further requirements for the mobile app(s) are specified in the "Conceptual Design & Software Requirements" report.

5.11. DATA VALIDATION

Data validation shall be supported in two ways:

1. Automatic validation at the moment of data entry/import, based on customizable thresholds for acceptable values
2. Interactive validation by the users' departments, using graphics of the data where outliers are highlighted for verification.

5.12. CUSTOMIZABLE REPORTING FORMATS AND WORKFLOWS

The **reports generated by the system** shall be customizable regarding the selection of parameters, indicators and time periods to be used. Changing a report format should be possible by system administrators without programming.

In a similar way, where the system supports **workflows or internal procedures** these should also be configurable without programming. For example, if the licensing or design review processes are modified, it should be possible to add or remove steps from the process, for example by adding or removing the need for approval by a PWA department. System administrators should be able to define, modify and remove the steps of the process and to assign the users or departments that are involved in the process.

5.13. FLEXIBLE QUERIES AND DATA EXPORT

It should be straightforward for the user to formulate queries by flexibly selecting parameters to be retrieved from a dataset defined by a time window and other filtering criteria. Many of the tasks to be performed by PWA staff involve compiling specific information for reports or in response to request from donors, the Minister, or others. As it is impossible to foresee all these requirements, the user has to be flexible in compiling the information he or she needs.

User-friendly export options shall be offered for each of the tables or graphics generated by the system, using common formats such as xlsx, pdf and jpg.

5.14. USER MANAGEMENT AND ADMINISTRATION

The MIS shall include a comprehensive system to manage users (adding, deleting, changing access rights, password management) and flexibly define user rights. Each of the user groups to be defined shall have specific rights for reading, editing/uploading and validating/approving data. These rights should be configurable for certain types of data (e.g. water quality data only), certain processes (e.g. approving a design) and for certain locations (e.g. Gaza area only).

The system design should also include access options for external users such as development partners, other ministries or sector reform institutions, universities, consultants, and the general public.

Details will be worked out during the inception phase of system development.

6. PROJECT MANAGEMENT AND ORGANISATION

6.1. TIMEFRAME

The contract duration shall be three years, consisting of one year of system development (including detailed specifications, testing and training) and two years of support and system maintenance after the installation. The Consultant's input after the first year is limited to intermittent interventions and support as needed.

The following time schedule is indicative, to be confirmed and refined by the Consultant.

Table 2: Indicative Time Schedule for MIS Development

Month from start	1	2	3	4	5	6	7	8	9	10	11	12	13 – 36 (2 years)
Phase	Design			Implementation									Maintenance & support
1. Detailed requirement specifications	■	■											
2. System design			■										
3. System development (coding, internal testing))				■	■	■							
4. System installation							■						
5. Import of existing data							■	■					
6. User acceptance testing								■	■	■			
7. Training								■	■	■	■		
8. Finetuning based on feedback										■	■		
9. Handover to PWA												■	
10. Technial support, system maintenance & fixing bugs													Intermittent support as needed

6.2. DELIVERABLES

Table 3 below visualizes the tentative schedule for the deliverables using the same structure as the time schedule above.

Table 3: Schedule of Deliverables and Milestones

Month from start	1	2	3	4	5	6	7	8	9	10	11	12	13 – 36 (2 years)
Phase	Design			Implementation									Maintenance & support
A – Inception Report	◆												
B – Detailed requirement specs		◆											
C – System design approved			◆										
D – System installed							◆						
E – User manual/training material								◆					
F – Existing data imported									◆				
G – Training program completed											◆		
H – Feedback from user testing incorporated											◆		
I – Handover to PWA, including source code & documentation												◆	
J – Brief half-yearly reports on support provided & work done													◆ ◆ ◆
K – Final system documentation													◆

The beginning of the implementation phase (system development) is conditional on the approval of the detailed requirement specifications (deliverable B) and system design (deliverable C) by the client.

The working language for all the deliverables shall be English. The User Manual and training materials (deliverable E) shall also be made available in Arabic. The MIS itself will be fully bilingual English-Arabic.

6.3. STEERING AND MANAGEMENT OF THE ASSIGNMENT

The PWA will nominate a focal person and a **MIS Technical Committee** for the assignment. The Technical Committee will

- oversee the progress of the assignment
- approve deliverables, and
- assist with tasks such as retrieving data, liaising with external stakeholders (outside of PWA) and organizing training events.

The MIS Technical Committee will usually meet after the submission of key deliverables and as needed.

The MIS Technical Committee is expected to consist of the Programme Director of the Institutional Support Programme (ISP); the heads of the main user departments/units; as well as the heads of the IT and Databank departments.

Given the limited human resources of PWA, it is desirable to contract an independent individual consultant for the following tasks:

- Support PWA in monitoring progress and project management by reviewing deliverables and preparing consolidated comments
- Support PWA departments to work out detailed requirements, dashboard content, reporting formats, workflows, etc., as needed by the Consultant for the detailed requirement specifications.
- Testing MIS functionalities (in parallel with the PWA MIS user departments).

In this case, this Consultant will also be a member of the MIS Technical Committee.

The Consultant is expected to work in close coordination and cooperation with the PWA's staff, in particular staff of the Hydroinformatics and Modeling Directorate, throughout the assignment.

6.4. REGULAR COORDINATION BETWEEN CONSULTANT AND CLIENT

The Consultant is expected to be available for the following regular meetings and coordination processes:

- Periodic interim progress review meetings during the development process, to monitor progress and discuss any challenges or proposed changes
- Collaboration with the PWA team on testing and quality assurance to conduct joint testing, gather feedback, and ensure that the system meets the required standards and functionalities

After system installation:

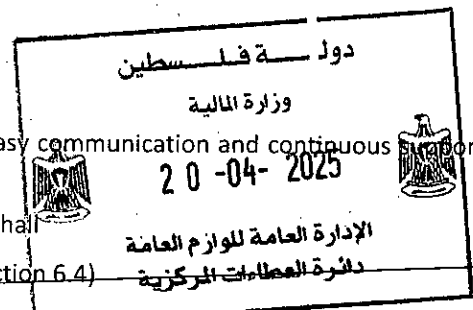
- Advisory sessions after the system goes live to address any additional queries, provide guidance on system utilization, and address emerging needs or challenges
- Workshops or sessions aimed at monitoring system performance, evaluating its impact, and identifying areas for improvement
- Knowledge transfer sessions for PWA staff to ensure they have the necessary skills and understanding to maintain and support the system independently
- Training review meetings, to assess the effectiveness of training programs and identify any additional training needs
- Discussions on potential system enhancements or improvements based on post-implementation feedback and evolving requirements

These may take place online and/or through the Consultant's local partners, unless specified in the following paragraph.

6.5. LOCATION AND TRANSPORT

The Consultant's core team is expected to be present in Ramallah at the following times:

- At inception, for a kick-off meeting and interaction with the PWA departments on modalities of cooperation and preparation of the detailed requirement specifications
- At the end of the design phase, to present and discuss the proposed system design and detailed requirement specifications (deliverables B and C)
- At the time of system installation, also to organize the import of existing data, user testing, and the training programme
- For the trainings, according to the agreed programme
- At the time of final handover to PWA (deliverable I)



The Consultant should have a representative in Ramallah for easy communication and continuous support throughout the assignment.

During the period of maintenance and support, the Consultant shall

(i) be available for online support as described above (section 6.4)

(ii) ensure quick response times in case of support needed or bugs to be fixed, to be specified in a Service Level Agreement (response to critical issues, fixing bugs, general queries, etc.)

(iii) provide personal and hands-on support, if needed, through the representative in Ramallah

An efficient issue tracking or ticketing system should be implemented to log, monitor, prioritize, and track the progress of support requests, ensuring transparent communication and accountability.

International travel, airport transfers, local travel, accommodation and daily allowances should be included in the Consultant's proposal.

7. CONSULTANT'S TEAM AND QUALIFICATION REQUIREMENTS

7.1. GENERAL QUALIFICATION

The Consultant firm (s) shall have a proven record of developing and implementing GIS-Web-based information systems, preferably international experience (at least 3 successfully implemented systems in the last 7 years). The Consultant firm shall provide evidence of successful implementation, such as written confirmations from the clients and/or online availability of the systems.

7.2. TEAM QUALIFICATION

It is the Consultant's responsibility to propose a suitable team of experts that provides the necessary expertise in project management, system design, software development, GIS and training. The availability of in-house software development capacities is a requirement.

The Team Leader should have the following specifications:

- A relevant university degree
- At least 10 years' experience in information systems including GIS components
- Proven experience in managing complex system development projects as Team Leader
- Water sector experience is an advantage *(can be covered by another team member)*
- Experience in information system/GIS related training *(can be covered by another team member)*
- Good command of English is a requirement; speaking Arabic is an advantage.

In addition to the Team leader, the consultant company must have the following key experts with at least 10 years of expertise with his/her involvement in at least three similar projects:

1. Informatics and GIS Expert
2. Developer expert, Front End sowftware specialist
3. Developer expert, Back End sowftware specialist
4. Database Expert
5. System Arcitechure Expert

If the lead Consultant firm does not have a permanent representation in Palestine, he should associate with a local partner company with relevant experience in the development of information systems. This is a requirement in order to ensure that adequate support is available in Palestine, both during system development and after handover to PWA.

The Palestinian partner's staff shall be involved in all steps of the development and implementation process, to ensure that adequate capacities for system maintenance, user support and future developments are available in Palestine.