

qTOR for preparation of

**Detailed Design for the North East Ramallah Wastewater Networks
and Nablus West Treated Wastewater Conveyance System**

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List of Abbreviations

AHLC.....	Ad Hoc Liaison Committee
BOD	Biochemical Oxygen Demand
CHP	Combined Heat and Power
COD	Chemical Oxygen Demand
DBO	Design Build Operate
CHP	Combined Heat and Power Plant
COD	Chemical Oxygen Demand
DB	Distribution Board
DS	Dry Solids
EN	European Norms
EU	European Union
FIDIC.....	International Federation of Consulting Engineers
HDPE	High Density Poly-ethylene
ICA	Instrumentation, Control and Automation
IEC	International Electrotechnical Commission
IP	Ingress Protection
ISO	International Organization for Standardization
JWU	Jerusalem Water Undertaking
LV	Low Voltage
MCC	Motor Control Circuit
MDB	Main Distribution Board
MG	Million Gallons
MGD	Million Gallons per Day
MV	Medium Voltage
NEQS	National Environment Quality Standards
O&M	Operation and Maintenance
PWA.....	Palestinian Water Authority
PLC	Programmable Logic Controller
PSPS	Primary Sludge Pump Station
RTU	Remote Terminal Unit
SCADA	Supervisory Control and Data Acquisition
SDG	Sustainable Development Goals
SS	Suspended Solids
SSPS	Secondary Sludge pumping station
NH ₄ -N	Ammonium Nitrogen
NO ₃ -N	Nitrate Nitrogen
N _{tot}	Total Nitrogen
TKN.....	Kjeldahl Nitrogen
PO ₄ -P	Phosphate Phosphorus
P _{tot}	Total Phosphorus
AOX	Adsorbable organic halides
TOR	Terms of Reference
TSS	Total Suspended Solids
UNDP.....	United Nations Development Programme
UPS	Uninterrupted Power Supply
USD	US Dollars
UV	Ultra-violet
VFD	Variable Frequency Drive
WTP	(Drinking) Water Treatment Plant
WW	Wastewater
WWTP	Wastewater Treatment Plant

1. BACKGROUND

The Palestinian Liberation Organization (PLO) for the benefit of the Palestinian Authority has received financing from the World Bank for the implementation of the Water Security Development - Gaza Central Desalination Program: Associated Works Project Phase I (AWP-Phase 1) (P168739). The AWP- Phase I is part of a coordinated international effort to address chronic poor water quality in Gaza and the significant increase in domestic demand expected in the medium term. In addition, the project will contribute to enhancing the water sector institutional set up, including the development of priority investment plans for water and wastewater infrastructure in the West Bank.

The project includes three main parts: (i) Part (1) consists of several infrastructure works to implement an integrated system of water carriers and reservoirs to convey and blend water from three different sources to achieve compliance with WHO's drinking water standards; (i) Part(2) aims at building the capacity and improving the performance of the water sector institutions; and

(iii) Part (3) supports the project management and implementation.

Among the activities envisaged under Part 2, it included the support to the preparation of priority water and wastewater investments in the West Bank. The Palestinian Water Authority has requested the World Bank to utilize funds under this part prepare the detailed engineering designs for the Water Supply and Sanitation infrastructure priority projects.

2. PROJECT Area DESCRIPTION

The consultancy services will focus on wastewater infrastructure and reuse projects as presented in the table below:

	<p>The aim of this project is to develop wastewater system for North East Ramallah, and Conveyance System for reuse for Nablus West Treated Water, with the overall objective to secure improved public health and environmental conditions, and provide additional quantities for agricultural reuse .The specific local problems, to be addressed by the Consultant, are principally those associated with the current lack of wastewater infrastructure and treatment facilities and absence of treated wastewater for agricultural use in the Project areas. In particular, the specific objectives are:</p> <ul style="list-style-type: none"> • To provide the capacity for wastewater collection, treatment and re-use. • To enhance financial sustainability and self-financing capacity for future capacity expansion. 																																				
1	<p style="text-align: center;">Ramallah Wastewater Networks</p>																																				
	<p>Communities served by the project: 14 localities (municipalities, villages, camps) : (Jilijliya, Al Mazra'a ash Sharqiya, A'tara, Silwad, Yabrud, Birzeit, Ein Siniya, Silwad Camp, Jifna, Dura Al Qar', Al Jalazun Camp, Abu Qash, Ein Yabrud, Surda).The total number of inhabitants of the project villages is estimated at 45841 inhabitants by 2022 and is expected to grow to 83491 by the year 2050.</p> <p>The design services will cover the followings:</p> <p>1. Wastewater collection networks North East Ramallah (135 km).The total length of the local networks to be designed has been assessed in the feasibility study. Error! Reference source not found. lists the localities that are included in the roject, the estimated corresponding total length of sewerage networks and the estimated corresponding length of sewerage network to be designed with this project.</p> <p style="text-align: center;">Table 1: List of Communities with length of Needed Sewerage Network</p> <table border="1"> <thead> <tr> <th>No.</th> <th>Locality</th> <th>Lengths of Estimated Total Internal Sewerage System [m]</th> <th>Lengths of Estimated Needed Design Sewerage System [km]</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Ein Siniya</td> <td>4.000</td> <td>6</td> </tr> <tr> <td>2</td> <td>Jifna</td> <td>11.000</td> <td>6</td> </tr> <tr> <td>3</td> <td>Surda</td> <td>6.000</td> <td>8</td> </tr> <tr> <td>4</td> <td>Birzeit</td> <td>26.000</td> <td>10</td> </tr> <tr> <td>5</td> <td>Abu Qash</td> <td>10.000</td> <td>10</td> </tr> <tr> <td>6</td> <td>Atara</td> <td>10.000</td> <td>12</td> </tr> <tr> <td>7</td> <td>Yabrud</td> <td>3.000</td> <td>5</td> </tr> <tr> <td>8</td> <td>Ein Yabrud</td> <td>10.000</td> <td>13</td> </tr> </tbody> </table>	No.	Locality	Lengths of Estimated Total Internal Sewerage System [m]	Lengths of Estimated Needed Design Sewerage System [km]	1	Ein Siniya	4.000	6	2	Jifna	11.000	6	3	Surda	6.000	8	4	Birzeit	26.000	10	5	Abu Qash	10.000	10	6	Atara	10.000	12	7	Yabrud	3.000	5	8	Ein Yabrud	10.000	13
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8	Ein Yabrud	10.000	13																																		

9	AlJalazun Camp	30.000	0
10	Dura AlQari'	12.000	10
11	Silwad	23.000	26
12	Silwad Ref Camp	2.000	3
13	AlMazra'a Ash Sharqiya	16.000	20
15	Jilijliya	4.000	6
TOTAL	[km]	167,00	135,00

2. Trunk lines that convey the wastewater to WWTP (52 km). **Error! Reference source not found.** illustrates the communities and the projected main trunk lines as part of the recommended sanitation system. The estimated total length of the trunk lines is approximately L = 52 km;

3 pumping stations: based on the recommended locations in the Feasibility Study. However, it is the Consultant responsibility to define the exact number of pumping station based on the detailed design.

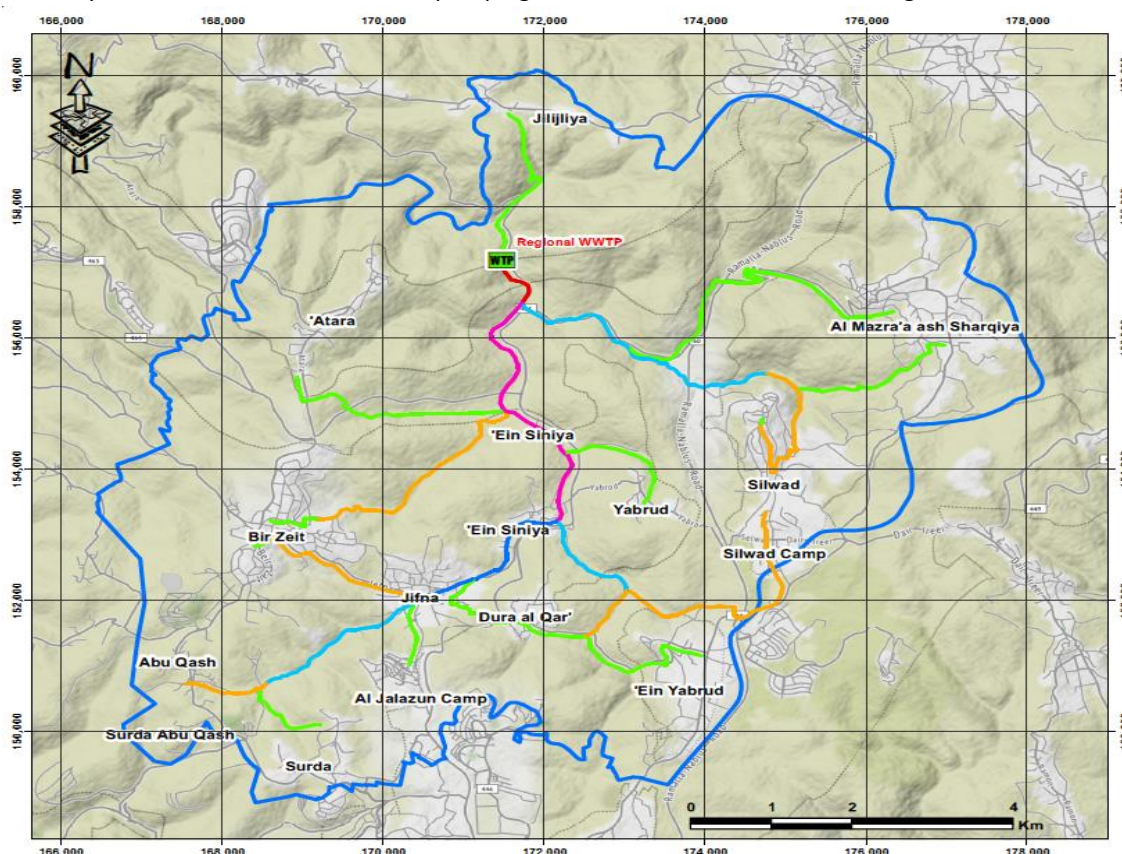


Fig. 3: Communities and projected main trunk lines

2

Nablus-West Treated Wastewater Conveyance System

Communities served by the project

East, Northeast Nablus in addition to the Jordan Valley, it shall include (but not limited) An Nassariya (2060), Beit Dajan (4865), Ein Shibly (341), Beit Hasan (1744), Al Jiftlik (3366). The reuse study shows that the agricultural demand in Al Jiftlik regions alone is at an average of 6.1 MCM/Year.

The design services will include the followings:

1. Trunk lines : (i) From Ramin reservoir to Yasid reservoir (11 km), this will be pressurized trunk line, (ii) unpressurized trunk line from Yasid reservoir to reuse areas in East Nablus and the Jordan Valley (30km). The existing components of the system (trunk line from Nablus West WWTP to Ramin Reservoir and the existing Ramin Reservoir should be considered in the design of the system.
2. Storage Reservoir (approx. 4000 m3),
3. Pumping stations: Design of Pump Station at Ramin reservoir to Yasid reservoir (Head diff. 220 m, flow ~1500 m3/hr).
4. Renewable Energy System including: (i) PV (Photovoltaic System), (ii) Hydropower System (s) at the end of the trunk line in the downstream area. The consultant shall investigate how the produced energy will be utilized or connected to the Palestinian electrical grid and conduct the necessary design.

- In addition to the new dam in Al Malaki area (downstream) which is currently under design, the consultant shall consider and make the necessary designs for further dams or/and storage ponds in order to manage all potential water quantities (from Nablus East WWTP, Al Badthan Springs, Al Fariah Springs, storm water in addition the treated water from Nablus West WWTP and may be from Tulkarem WWTP). Accordingly, the consultant shall develop a management plan to take into consideration the seasonal variation between supply and demand in order to use each drop of water for agricultural expansion.

Fig. 4 illustrates the Treated Water Conveyance System proposed alignment, and the nearby communities.

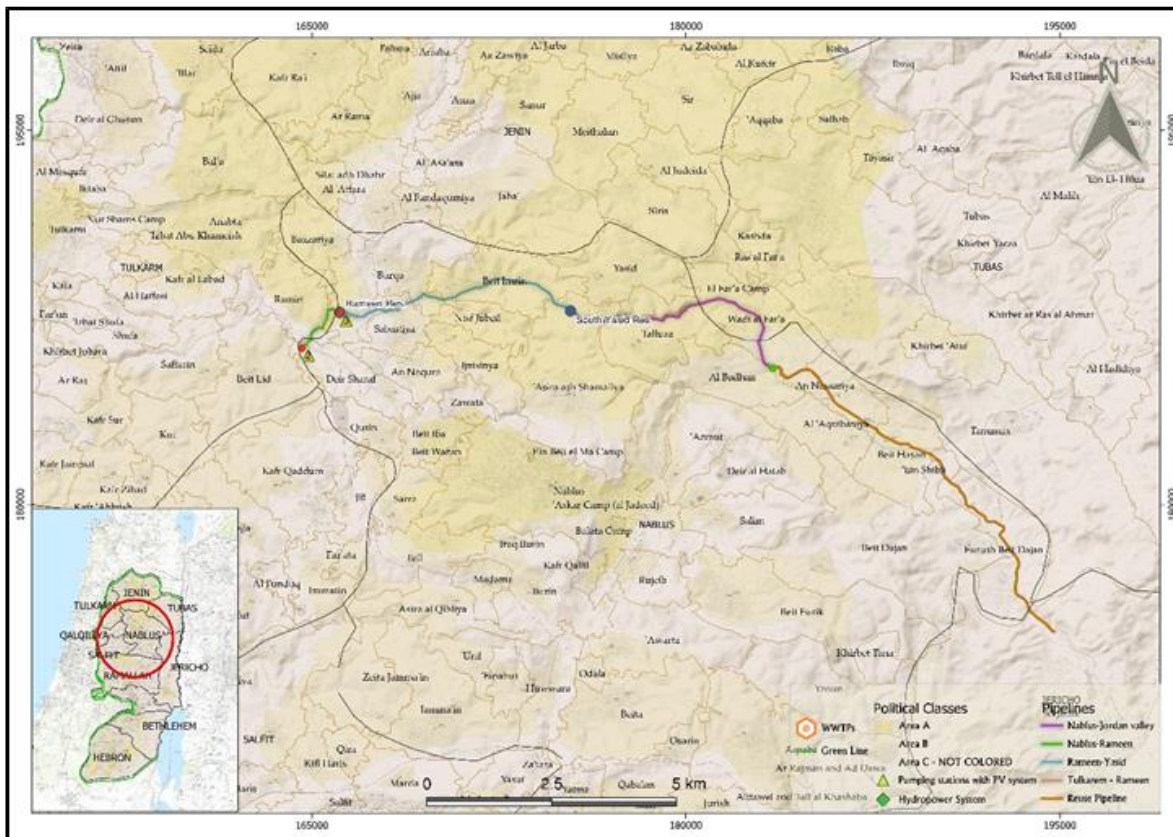


Fig. 4: Nablus West Treated Water Conveyance System

2.1. Project Area Existing Conditions

The Project is located in West Bank

A) North East Ramallah Sewage Project

The project area is located in the Northeast of Ramallah. It comprises part of the North Ramallah catchment area. It is part of the service area of Jerusalem Water Undertaking. The whole area suffers from the lack of proper sanitation systems. Only about 18.2 % of the total population of the project area (inhabitants of Al Jalazun Refugee camp and about 20 % of the inhabitants of Jifna and Ein Siniya) is connected to a sewerage collection system. Even though the sewage collected there is not treated, and the sewage flows to the Wadi at Ein Siniya causing several environmental adverse impacts.

The sewage collection network of Al Jalazun Refugee Camp has been established by the UN organization UNRWA and is under its management. The wastewater that is collected in the Camp is conveyed to a trunk line, which is laid in the wadi crossing Jifna Village. The partial internal sewerage collection system of Jifna is also connected to this trunk pipeline. The main sewer continues in the wadi and crosses Ein Siniya Village then to the north of Ein Siniya. Short local wastewater networks at Ein Siniya and Dura al Qari and some house connections located in the area also discharge the collected sewage to this line. The trunk discharges to a free outlet near Al Omari Aluminum Factory near the intersection of Nablus-Atarah road without complying with any environmental standards. Therefore, upgrading the existing sanitation infrastructure is necessary to protect not only the environment but also the available resources and the health of the population. Currently, the population residing in the area suffers from

persistent bad odors from the wastewater flowing in the open channel, which from time to time overflow of the tanks. The overflow of the sewage in the streets, and private properties represents a serious health hazard and restricts the possibility of use of the open spaces.

Table 2 shows the current status of sanitation infrastructure in the targeted localities. Existing and projected networks have to be considered for the proposal and project implementation.

Table 2: Communities and Status of Sanitation (PCBS 2022)

Village	Status of Sanitation	Year 2022 - Number
Jilijliya	No Network	697
Al Mazra'a ash Sharqiya	No Network	4480
A'tara	No Network	2748
Silwad	No Network	6993
Yabrud	No Network	634
Birzeit	20% constructed 100% Designed	6481
Ein Siniya	20% constructed	1020
Silwad Camp	No Network	503
Jifna	Network Design	3218
Dura Al Qar'	40% constructed	3343
Al Jalazun Camp	100% constructed	9042
Abu Qash	Network Design	2467
Ein Yabrud	No Network	2773
Surda	Network Design	1442
Total		45841

Error! Reference source not found. shows the build-up areas in the targeted 14 communities. The build-up areas re located in zones that are classified zone B according to the classification of the Oslo Agreement, but are surrounded by areas that are classified as zone C.

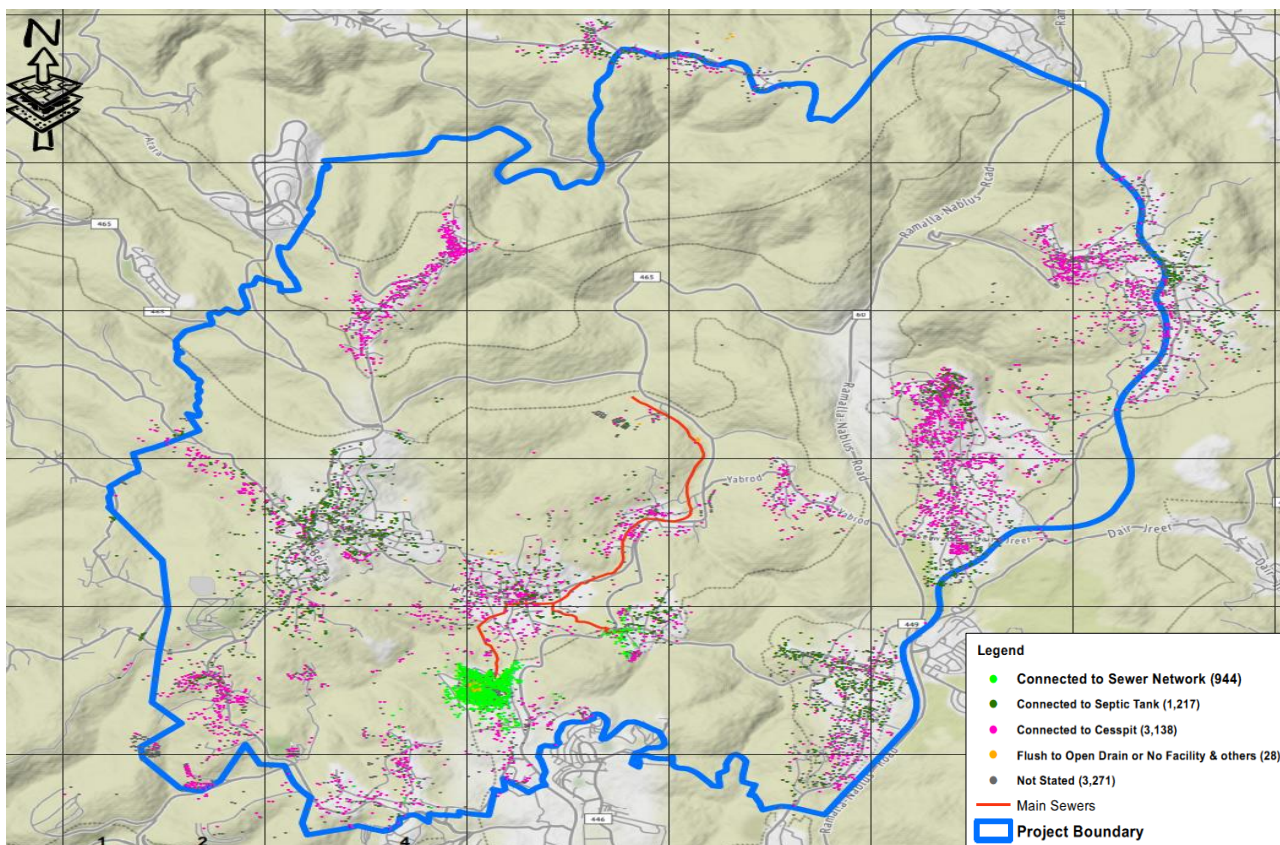


Fig. 1: Build-up areas in the targeted 14 communities at North East Ramallah
Reference: NE Ramallah Feasibility Study

B) Nablus West Treated Water Conveyance System Project

The target area of the Nablus-West Treated Wastewater Conveyance System project is starting from the eastern part of Nablus governorate to the downstream area of the Jordan Valley (east of Al Jiftlik) in Jericho Governorate. The benefited localities depend on agriculture as a primary source of living, as The Jordan Valley contains vast areas of palm plantations that need large quantities of water for irrigation. Workers of the Jordan Valley spend around 54% of their daily time in their farms, where, based on a recent survey, they seem to use the available land potential without any difficulties or restriction.

The proposed conveyance system aims to provide this region with the means to reuse the treated wastewater generated in the Nablus West Wastewater Treatment Plant, and any other potential flows generated in the future by the Tulkarm WWTP, reaching up to 13.0 MCM/year

Figure 2 below shows the target and potential reuse areas.

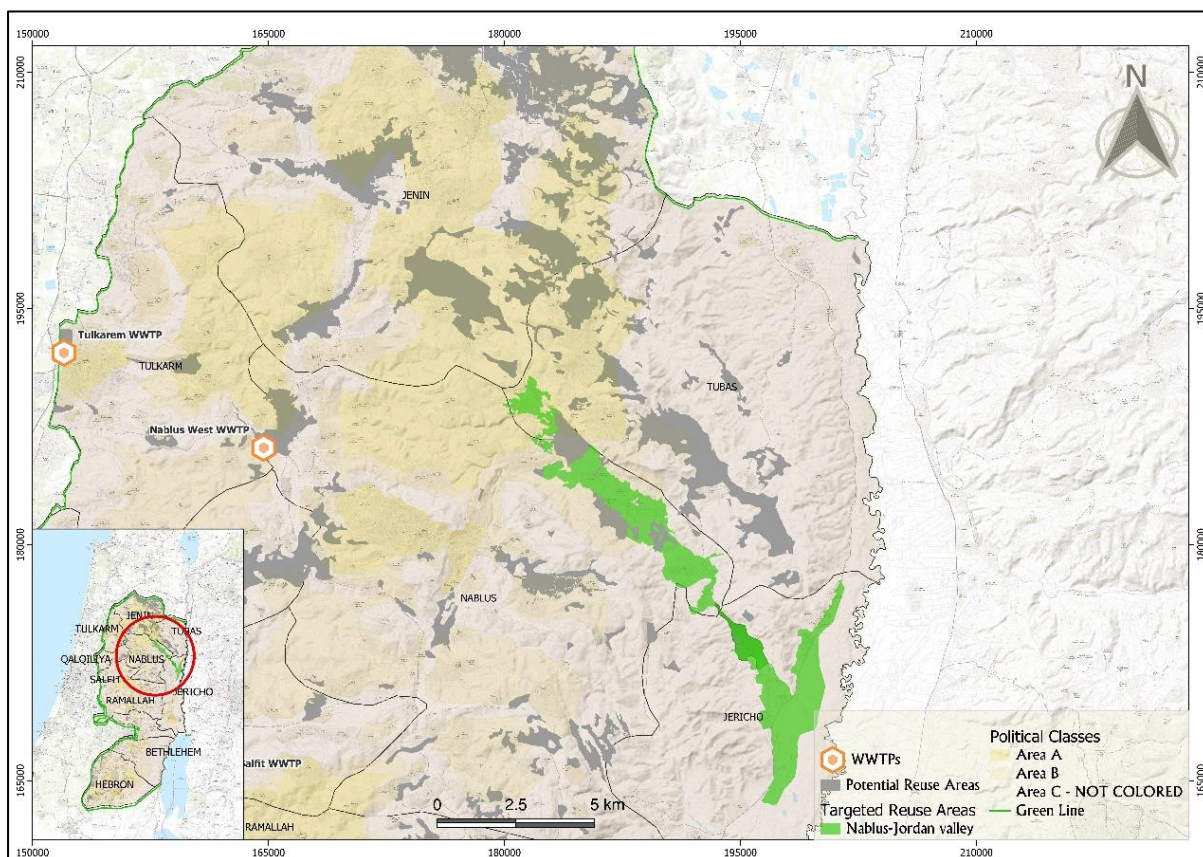


Fig. 2: Target and Potential Reuse Area

3. OBJECTIVES OF THE CONSULTANCY

The objectives of this consultancy service are:

- a) To prepare the detailed engineering design, tender documents for the following projects:
 1. North East Ramallah Wastewater Networks
 2. Nablus West Treated wastewater Conveyance System
- b) To determine the optimal procurement method to achieve the objectives listed above, taking into account potential options for private sector participation in the construction, operation, and maintenance of the wastewater system.

4. SCOPE OF SERVICES

The scope of services of this contract is to prepare the Detailed Engineering Design, Construction Drawings, Bill of quantities, and Technical Specification for Northeast Ramallah Wastewater Networks and Nablus West Treated

wastewater Conveyance System in the West Bank and determine the optimal procurement approach for the construction, operation, and maintenance of the systems.

4.1. Detailed Engineering Design and Tender Documents

The scope of work is to prepare a detailed design that meets standards of performance, durability and functionality, which are required for long-term operation. The detailed engineering design shall be based on basic data from the previous studies and /or information provided by PWA, plus additional data to be developed for this purpose. The design shall be carried out and incorporate, but not necessarily limited to the following:

- a. Review and finalize all the information contained in all available studies including the design and planning criteria/ parameters.
- b. Based on the review of previous studies and analysis, prepare and present different technical options to determine "least cost" solutions for the different sub-projects, including "alternative technologies", sites of structures, construction and pipe materials, dimensions, etc.
- c. Carrying out any necessary topographic surveys, mapping and geotechnical foundation, soil investigations at the sites of the major structures and pipelines, and water analyses. The detailed engineering designs shall include hydraulic and surge analysis and sanitary engineering, functional and hydraulic design, including sizing and dimensions, of subprojects using computer special software.
- d. Calculation of electrical power requirements of the whole project facilities, including reserve, of the various units outside and inside the different buildings. Design of the electrical substation and stand-by generator plant as well. Detailed design, sizing and specification of all System Control and Data Acquisition SCADA system.
- e. Design renewable energy stations (solar panels and hydro-power stations) and the needed electrical network to connect renewable energy system with the regional grid.
- f. Preparation of typical designs for special appurtenance such as valve chambers manholes, junction pits, house connections, pipe installations.
- g. Compilation of current unit rates and prices and preparation of up-to-date cost estimates of the program of investments.

In general, the Consultant shall:

1. Prepare the detailed engineering design of the approved preferred options, including.
 - ✓ Detailed design of the whole approved wastewater collection system, and reuse conveyance for the targeted areas.
 - ✓ Detailed design of all processes in the wastewater and conveyance systems
2. Prepare a longitudinal topographic (profile) survey for all piping routes scale 1/1000 horizontally and 1/100 vertically, together with a suitable scale plan for those routes.
3. Prepare an area topographic survey, scale 1/100 for every site of storage reservoir(s), pumping station, building and other facilities.
4. Prepare detailed hydraulic calculations and gradient lines for pipes, pumping stations, reservoirs, etc. showing all flows, velocities, heads, and static and friction losses.
5. Prepare an architectural and structural detailed design for all pumping stations houses, reservoirs, buildings, etc., as well as for other disciplines: (mechanical, electrical, instrument, fencing, roads, heating/ cooling, etc.).
6. Drawings should be prepared according to a generally accepted standard.
7. Carrying out topographical surveys and soil investigations as required for the detailed design.
8. Preparation of a detailed design report for all sub-projects the report should include but not be limited to the followings:
 - ✓ background data and calculation.
 - ✓ hydraulic calculations for the water pipes.
 - ✓ design calculations for pumping stations and reservoirs; and
 - ✓ structural design.as well as the design of Mechanical equipment, and as well for other related disciplines (electrical, instrument, laboratory, heating/cooling, roads, gardening, fencing, etc. Special attention shall be given to the pipeline materials.
9. Preparation of documentation and drawings needed for land expropriation in accordance with local regulations.
10. Preparation of cost estimates.
11. Preparation of market analysis to determine the number of water customers/users, and their willingness to pay, in order to understand the potential revenue base for the water system; and

12. Preparation of financial analysis to assess the viability of private sector participation options for the construction, operation, and maintenance of the wastewater and reuse system, including packaging of the proposed infrastructure into smaller sub-projects to allow for participation of local contractors, either independently or via a joint venture with international contractors/operators.

4.2. Design Services to be considered:

A) North East Ramallah Wastewater Network Project.

The network aims at improving the living conditions of the population of the Ramallah Governorate, mainly of the of Northeast Ramallah part through the construction of sewage collection systems in the affected localities, trunk lines conveying the collected sewage to the dedicated site of the regional WWTP to be constructed in Wadi Al Balat North of Atarah.

The Consultant shall prepare the detailed design and the tender documents for the construction of the sewer networks in the 14 villages of Northeast Ramallah and the trunk lines to divert the collected sewage to the dedicated site for the construction of the new regional WWTP.

B) Nablus West Treated Water Conveyance System.

The system aims at reusing the treated and redundant water from the Nablus West Wastewater Treatment Plant, in addition to the treated water from the Tulkarm WWTP (to be established in the future). Special consideration for this assignment includes, but is not limited to:

- ✓ Tentatively 2-3 pumping stations are required but the number may vary depending on the detailed design.
- ✓ Renewable Energy System: Photovoltaic (PV) system shall be designed to be installed near to each pumping station (or other areas could be provided by PWA) and sized to satisfy the peak demand of that single station. The PV modules are made up of many individuals, interconnected photovoltaic cells each assumed to be able to produce an average of more than 300W (the consultant to consider the most recent, advanced and reliable system). To ensure the modules are tilted correctly and facing the sun, they are housed in support structures. The collected generated electrical power shall be transferred to the management systems at a solar power station and connecting it to the grid system.
- ✓ Hydroelectric power technologies are on an exponential rise as they are playing a crucial role in minimizing the carbon footprint of the world. The water turbine is one of the key technologies used in producing green energy which is beneficial to both, the environment, and the society. The Consultant should advise on the most reliable, and sustainable hydropower plant system. A set of alternatives with brief comparison should be submitted to the contracting authority for approval before proceeding in the detailed design of the system. This proposal should include the pros and cons of each system, technical point view and financial comparison to make the best selection of the system.
- ✓ Detailed design of the required Pumping Stations and the Renewable Energy System, for all alternatives there is an opportunity to add a photovoltaic (PV) and / or a small hydropower system that can help lower the cost of electricity and the dependency on the national power grid. This renewable energy system should be designed considering the most recent specifications, standards and to be connected to the Grid (Grid-connected Renewable Energy System) for power exchange based on actual consumption.
- ✓ Based on the selected hydro-power technology, the consultant shall review the feasibility and possibility of design 1-2 hydro-power stations close to the storage dams or/and demand area to generated electrical power which contribute in reducing the operational cost for running the system or even more to be supplied to the national grid. The electrical transmission lines and all other infrastructure shall be included in the design.

Specific Activities:

As part of the preparation of detailed engineering design, specific activities required includes follows:

(a) Topographical Surveys:

- ✓ The Consultant shall carry out topographic surveys of all roads, streets etc. where pipes will be laid . The survey shall be carried out using total stations and associated computer software to produce 2-D and 3-D

plan metric drawings in sheets to the standards of the PWA and to scale 1: 1000 produced digitally using compatible AutoCAD computer software.

- ✓ The survey shall be made for the full width of the roads from property line to the property line and of all above ground and underground features and utilities. The features shall include but not be limited to road widths and center lines, sidewalks, walls and/or building facades, telephone cabinets, electricity substations, poles and draw pits, and any other features present within the road widths. All features must be shown on the drawing using well-established symbols.
- ✓ The survey shall include establishing survey control points referenced to fixed features and documented by reference numbers, sketches, and photographs.
- ✓ All survey points shall have X, Y, Z coordinates with the points describing the roads at an average horizontal interval of 25m.
- ✓ Surveys shall be prepared for all facilities included in the detailed design.

(b) Soil investigation

- ✓ The soil investigation shall consist of coring and drilling test boreholes (minimum 10 boreholes, 20 m deep each at every site of each reservoir, pumping station, building or any other buildings) and along the routes of the water mains (one every 1 km) distance. The depth of holes shall not be less than 6.0m from the surface or as appropriate.
- ✓ Bulk samples must be collected for laboratory testing and the stratification described. Standard Penetration Tests (SPT) or an equivalent test shall be performed. The laboratory test shall include sieve analysis of the soil samples and determination of the Atterberg limits for the material passing No.4 sieve. In addition, chemical tests for the soil and groundwater encountered and the determination of the water table level shall be carried out. Additionally, the consultant should be responsible to perform any other required soil investigations according to the requirement of the project.

(c) Drawings

- ✓ These shall involve the preparation of final design drawings for each sub-project. Detailed construction drawings of water pipes, disposal system, and reuse to suitable scales, plans 1: 1000 and profiles, 1: 1000 horizontal and 1: 100 vertical scale; for structural, architectural, mechanical and electrical plans and details, scale 1: 100 or 1:50, 1:25 to be used.
- ✓ The drawings shall also show the exact location of all structures including reservoirs. Details of chambers, manholes and other appurtenances shall be given at suitable scales.

(d) Technical Specifications:

The Consultant shall prepare technical specifications for the implementation of the Project works in accordance with International Standards. These include but are not limited to the following:

- a. Technical specifications for all materials and work included in the civil works component.
- b. Technical specifications for all plants and equipment to be incorporated in the Project works.
- c. General obligations of the contractors.
- d. The tests and measurements to be carried out prior to, during and upon completion of the Project, test and certifications of equipment and supplies at the place of manufacture or fabrication before shipment to OT. The Technical Specifications shall specify tests and procedures in detail; and
- e. Specifications of all vehicles, plant and equipment, laboratory equipment, reagents and furniture and fittings, office equipment and furniture, workshop equipment and tools needed for an adequate operation of the system and plants, additional to any existing facilities.
- f. Any other necessary and required implementation guideline

The consultant is responsible to provide the specifications of items of work or materials included in the above-mentioned designs or anticipated.

(e) Building GIS Data Sets and Comprehensive Computer Models

- a. To prepare a GIS data set for all of the proposed designed assets (main pipes, pumps, reservoirs, etc.) for all the water supply systems in the study area.
- b. To build a compressive model for the distribution system, in order to be able to use this model for future operation, maintenance, exposition and monitoring of the system.

- c. Providing capacity-building programs for the PWA targeted staff to get acquainted with such software moldings and be able to expand, calibrate and validate the models.

Note: Some software suggested to do the aforementioned tasks can be: WaterGEMS, WaterCAD, Infoworks WS, Mike Urban and WEST by DHI. With confirmation from the contracting authority.

(f) Bills of Quantities and Cost estimations

- ✓ This shall include the preparation of detailed Bills of Quantities for all works, as well as services envisaged for implementation and defining how quantities will be measured for payment. The Consultant shall prepare the bills of quantities in computer format using standard software. Additionally, the consultant is responsible for cost estimations, as well as the preparation of a financing plan for the period of works execution.
- ✓ The Consultant shall, simultaneously, prepare confidential priced Bills of Quantities, with the accurate unit and/or lump sum rates, whichever is applicable, which in total shall equal the cost estimate in the above paragraph. The cost estimate shall identify both local and foreign currency costs associated with the construction drawings kept for this purpose, in preparation of the as-built drawings.
- ✓ Maintaining a comprehensive record of all works executed, materials, plants, and equipment supplied variations to design or field changes in construction, and Project cost changes.
- ✓ The Consultant shall also prepare cost estimates for the operations of all works over their intended life cycle.

4.3. Assessment of Private Sector Participation Options

The consultant will assess private sector participation options for the construction, operation, and maintenance of the wastewater and reuse system to determine an approach that is viable and provides optimal value for money. The Consultant shall therefore undertake the following:

- a. Baseline Market Analysis: Identify historical trends in usage and revenue of existing services in the water sector to determine the size of the potential customer base.
- b. Legal, Regulatory and Institutional Analysis: Identify any relevant legal, regulatory, and institutional bottlenecks that may negatively impact the viability of the project and/or the ability of the private sector to deliver the proposed water services. Subject to this analysis, recommend necessary changes/mechanisms to the legal, regulatory and/or institutional environment that would be needed in order to enable private sector participation in the project.
- c. Financial Analysis: Using relevant technical information and cost estimates, and taking into account baseline market analysis, develop a financial model that assesses the financial viability of the various private sector participation options during operation, and maintenance.
- d. Develop Project Structure: Based on the financial analysis undertaken, develop a proposed PPP project structure(s), including an indicative project risk allocation and payment mechanism.
- e. Market Sounding: Socialize the proposed project structure with potential bidders as a way of assessing bidder appetite and further informing the proposed project structure(s).
- f. Public Sector Comparator: Assess whether the proposed PPP project structure(s) provides better value for money than public procurement and implementation of the project.

5. PROJECT MANAGEMENT

PWA is the Implementing Agency of the Project and will be responsible for proper implementation of this study. PWA - **PMU**, headed by a Project Manager- to coordinate all Project activities, including future tendering procedures and contract management issues. The PM will be inter alia responsible for:

- support the consultant's obtaining required permits, information, and approvals.
- Reviewing work plans.
- Reviewing and monitoring progress and giving directions.
- Taking appropriate measures for coordinating the activities.
- Reviewing and approving all reports studies and designs (Reports, studies, drawings and any other documents).
- Reviewing and approving tender documents.

Coordination: All studies and design and other activities of the Consultant shall be closely coordinated with PWA Project Coordinator.

PWA will ensure close coordination and co-operation with the local authorities for technical and general contractual and coordination matters. A detailed coordination mechanism between the PWA and the Consultant shall be discussed during the signing of the contract.

Technical information and access to the existing records will be provided upon request.

No office space will be made available for the consultant. Housing accommodation shall be provided by the consultant.

Any means of transportation shall be provided by the consultant and the expenses are deemed to be included in the global price.

6. Studies to be provided by the Client

The following reports / documents shall be provided to the consultant to assist in preparation of the detailed design:

Nablus West Treated Water Conveyance System

A Feasibility Report titled “Treated Wastewater Reuse Strategy for the West Bank” has been prepared in June and July 2022. The Project Components that have been developed in the Feasibility Report for the reuse of the treated wastewater from Tulkarm and Nablus West include:

- Water Conveyance System: this is the system comprising (i) the main pumps required to convey water uphill from the WWTP to the (ii) elevated storage / buffer tanks via (iii) the main large-diameters pipelines
 - The Reservoir(s) System: depending on the alternative option, one or two reservoirs might be built to store water during the months when irrigation is not required.
 - The Irrigation Project(s) System: depending on alternative option, one or two drip irrigation projects are proposed to reuse the largest amount (potential) of treated wastewater.
- The Renewable Energy System: for all alternatives there is an opportunity to add a photovoltaic (PV) and / or a small hydropower system that can help lower the cost of electricity and the dependency on the national power grid.

Northeast Ramallah Wastewater Networks

Two studies have been elaborated that relate at least in part to the project area in coordination, cooperation and partnership between PWA, EIB, JWU, UNDP and KFW. They have led to the determination of the main features and requirements of the sanitation system in North East Ramallah area. The Documents listed below shall be considered as bases for the execution of the project. These documents will be provided to the awarded consultant.

- **Feasibility Study** For North East Ramallah Villages Wastewater Collection And Treatment System”– TA 2017177 PS FTF
- **Wastewater Master Plan** for JWU Jurisdiction Areas

6. LOGISTICS AND TIMING

6.1. Project Location

The project will be implemented in West Bank / Palestine

6.2 Commencement date & Period of execution

The envisaged commencement date of the Consultancy by December 2023. The period of execution of the tasks identified in this Terms of Reference is (10) months from the Commencement Date.

7. REQUIREMENTS

7.1. Qualification of the Firm

General Experience of the firm:

A consulting firm specialized in water and wastewater having been in business at least the past 15years’.

Specific experience of the firm:

- Firm capability and relevant experience in the execution of consultancy assignment of a similar nature, including successful experience in the execution of at least two (2) consultancy services of a similar nature to design wastewater projects during the last five (5) years

- The firm has to prove its availability of appropriate skills among staff and/or the ability to mobilize a diversified team of experts with appropriate knowledge and skills and preferably employees of the firm.

7.2. Personnel

The consulting services are to be provided by an organization which brings together the full range of skills needed to meet the requirements of these TOR.

The Consultant shall be responsible for the professional and technical competence of its employees and will select reliable and competent individuals who will perform effectively in the implementation of this Contract, who will respect the local customs and who will conform to a high standard of moral and ethical conduct.

The Consultant should pay attention to the need to ensure the active participation of local professional skills where available, and a suitable mix of international and local staff in the Project teams.

7.1.2. Qualifications:

The required qualifications of the Consultant's staff are outlined below. In all positions mentioned, fluency in English is required. With expatriate personnel overseas experience is considered advantageous. All experts who have a crucial role in implementing the contract are referred to as "Key Experts". The profiles of the "Key Experts" for this contract shall be:

Key Experts

All experts who have a crucial role in implementing the contract are referred to as key experts.

The consultant's team shall include the following Key experts and be supported by other experts as considered necessary by the consultant and as substantiated in his Tender:

- Key expert 1: Team Leader
- Key experts 2: Wastewater pipeline engineer, Hydraulic
- Key experts 3: Process design
- Key expert 4: Structural Engineer
- Key expert 5: Electromechanical Engineer
- Key expert 6: Hydrogeologist

The first two listed key experts (namely the Team Leader and hydraulic engineer) shall be permanent staff of the Proposer

Key expert 1: Team Leader

Qualifications and skills:

The Team Leader shall have a University degree in Water Engineering field;

He/She shall be fluent in English language, both written and oral;

General professional experience;

The Team Leader is expected to have preferably 15 (fifteen) years of post-graduate professional experience in preparation and implementation of wastewater infrastructure projects;

Specific professional experience;

He / She shall have previous experience as Designer for the design of minimum 2 (two) similar sewerage Projects; and minimum of 8 (years) as Project Manager or Team Leader;

He / She shall have previous experience as Team Leader for design of minimum 2 (two) similar sewerage networks and trunk lines;

Previous experience in tender dossier preparation for sewerage network works contract under FIDIC Red book will be an asset.

Key experts 2: Wastewater pipeline engineer, Hydraulic

The Designer will be responsible for detailed design and tender documents preparation.

Qualifications and skills:

The Designer shall have a University degree in Water Engineering field or equivalent;

He/She shall be fluent in English language, both written and oral;

General professional experience;

The Designer is expected to have preferably 12 (twelve) years but not less than 7 (seven) years post graduate professional experience covering design of wastewater infrastructure;

Specific professional experience;

He/She shall have previous experience as Designer of at least 2(two) similar sewerage projects.

Key experts 3: Process design

Qualifications and skills:

Minimum M.Sc. degree in process or sanitary engineering or equivalent;

Good command of English, written and spoken;

General professional experience: Minimum 10 years.

Specific professional experience:

Successful completion of 2 design assignments as Process Engineer (or equivalent).

Key expert 4: Structural Engineer

Qualifications and skills:

Minimum B.Sc. in structural or civil engineering or equivalent;

Good command of English, written and spoken;

General professional experience: Minimum 10 years;

Specific professional experience:

Successful completion of 1 design assignment for 1 concrete water/wastewater reservoir, and concrete structure for wastewater projects

Key expert 5: Electromechanical Engineer

Qualifications and skills:

- Minimum B.Sc. in Electrical Engineering (or equivalent);
- Good command of English, written and spoken;
- General professional experience: Minimum 10 years of relevant experience.

Specific professional experience:

- Successful completion of 2 similar assignments in wastewater infrastructure projects including Solar and hydro-power panels.

Key expert 6: Hydrogeologist

Qualifications and skills:

- post graduate qualifications in hydrogeology
- At least 15 years relevant experience;
- Substantial experience in dams and artificial groundwater recharge projects,

Specific professional experience:

- Successful completion of 2 similar assignments in related to Dam design.

Other Experts (Non Key Staff)

CVs for experts other than the key experts are not examined prior to the signature of the contract. Other experts to be included in tenders include but are not limited to:

- geotechnical specialist
- Environmental Specialist
- GIS/ACAD Engineer
- Tender Document Specialist

- Others as needed

The consultant shall propose a team he considers appropriate for the provision of the required services, and the consultant shall be fully responsible for the appropriateness of the team selected and its performance and outputs.

It is to be noted that civil servants and other staff of the public administration and or affiliated with the government cannot be recruited as experts, unless prior written approval has been obtained from the Contracting Authority.

The total estimated level of effort for completion of this assignment is 40 man-month

7.3. Facilities to be provided by the Consultant

Office accommodation: The Consultant shall provide a furnished office and accommodation for its staff and all experts working on the contract. The corresponding costs shall be included in the financial proposal.

The Consultant shall ensure that experts are adequately supported and equipped. In particular it must ensure that there is sufficient administrative, secretarial and interpretation provision to enable experts to concentrate on their primary responsibilities. It must also transfer funds as necessary to support their work under the contract and to ensure that its employees are paid regularly and in a timely fashion.

The Consultant shall provide its experts with transportation means to access the study area as required.

The equipment that is necessary to perform the services comprising of computers, software, printers, telephones, fax, internet access, copy machines, car rentals etc. shall be provided by the Consultant. The Consultant shall bear the running costs of all his equipment and materials. These costs shall be included in the financial proposal of the tenderer.

Equipment: No equipment is to be purchased on behalf of the Contracting Authority / beneficiary country as part of this service contract or shall be transferred to the Contracting Authority / beneficiary country at the end of this contract. Any equipment related to this contract which is to be acquired by the beneficiary country must be purchased by means of a separate supply tender procedure.

7.4. Workshops

After the review of the feasibility study report and any other studies provided by the client, the Consultant shall arrange and conduct two (2) workshops to be held in the project field office or some other place as necessary. At the workshop, the review of feasibility study findings (e.g., the technical alternative options, costs, environmental impact) will be presented and discussed. The workshop will be attended by concerned agencies, project stakeholders from the government central and field level, institutions, media, NGO's and local communities.

Other workshops to be held in the Project area attended by community representatives in order to discuss and produce a plan to coordinate efforts on community health and wellbeing of the people of the Project area.

7.5. Support by PWA - the Contracting Authority

- The Contracting Authority will make available and free of charge the pertinent data and information available as per. The Consultant may make photocopies at his own expense.
- Any data, drawings, maps, information and other items, which are necessary to complete the Project, and which need to be obtained from governmental or non-governmental agencies, shall be obtained by the Consultant at his own expense and at no cost to the Contracting Authority.
- The Contracting Authority will provide the Consultant with support as may be required.

8. REPORTS

8.1. Requirements

The Consultant shall prepare and deliver to PWA a number of reports, documents and files covering all the work performed by him in the execution of the Consultancy services for both locations (Ramallah wastewater collection system and Nablus West Reuse). All these submissions shall be in English and shall be submitted in both hard and soft copies, and shall include all relevant data, maps, drawings, diagrams, reports and other documents as appropriate with information sources/references (3 (three) hard copies and 4 (four) electronic copies on USB, unless otherwise directed). These shall be submitted in the requisite number of copies to PWA, according to the schedule of submission in agreed Work plan. The official date of submission shall be the date on which the reports are received by PWA. The form of printing, type of cover and binding of the reports shall be determined by mutual agreement between PWA and the Consultant.

8.2. Submission and approval of Progress and Study Reports

The type and contents of the reports to be submitted shall be subject to revisions from time to time as services progress. The Consultant shall initially prepare reports according to the prescribed time schedules for the Project as follows:

a) Inception Report

The Consultant shall submit within 1 month after the Commencement Date an Inception Report covering detailed design phases, which should include:

- Detailed findings of the FS review and description of the approach to work and of work components, organization, and technical aspects of the Project to be covered.
- Any problems unforeseen, with recommendations for their solutions.
- Detailed work plan.
- Detailed staffing schedule and sub-division of work between the field and home office.
- Detailed schedule for the delivery of reports which could be divided for coverage of specific subject areas. and
- Detailed schedule for data, services and facilities to be provided by PWA

b) Draft Detailed Design and Tender Documents for the Wastewater Systems.

- the Consultant shall submit a Draft Detailed Design Report for the works related to subprojects within four (4) months the Commencement Date of the contract
(Submission of the reports/reports should be on a task basis and each part be submitted separately (or in percentages of progress) before submitting the final package, this will help the PWA to review the reports and provide comments in parallel with the ongoing process of work.)
- The Contracting Authority will provide comments to the Consultant within (2) two weeks.
- The Consultant shall provide a Final Design Report within (2) two weeks after the receipt of the Contracting Authority's comments.
- Unless further comments will be made, the Final Design Report will be approved by the Contracting Authority within (2) two weeks after its submission.
- The Consultant will provide a Draft for all detailed specifications of Tender Documents according to Standard Procurement Documents and potential donor regulations (eg EIB North East Ramallah Wastewater Networks and AfD for the Nablus West Treated Water Conveyance System) within (2) months after submission of the draft Detailed design report. *(Submission of the reports/reports should be on a task basis and each part be submitted separately (or in percentages of progress) before submitting the final package, this will help the PWA to review the reports and provide comments in parallel with the ongoing process of work.)*
- The Contracting Authority will provide comments within 3 weeks.
- The Consultant shall provide Final Tender Documents within 3 weeks of receipt of PWA comments.
- Unless further comments are made, the Final Tender Documents will be approved by PWA within two weeks after their submission.

This implies a total time period for the detailed design and tender documents of **(10) months from commencement day.**

Consultant shall submit to PWA the documents hard and soft copies for each sub-project and other materials as follows:

- Full-size tender drawing
- Technical specifications required for tender document Estimates of construction costs (Confidential)
- Implementation program and construction schedule.

c) Other Reports

Special reports which are not scheduled in the Work Plan, but are part of the assignment shall be developed including the PPP analysis Report, Geotechnical and Topographical Survey Reports which will be developed during the implementation of the Services, and which may require immediate action by PWA, or third parties, on important technical findings or the future of the Project.

d) Final Design and Tender Documents

- The Report shall include a summary of all stages of the services provided including timetables, main issues, summary of the scope of works of the investment project including, phasing if relevant, time schedule of works/supply execution etc. The format will be proposed by the Consultant and agreed with the Contracting Authority.