

ANNEX 5

Terms of Reference

For the Reuse of the Effluent of Wadi Shuayb Wastewater Treatment Plant for Solar Powered Irrigation of Three Farms, Al-Salt, Jordan

In the framework of MENA Water Matchmaker 2 Project

Funded by UfM / Sida

1. Background and context

1.1. The Matchmaker 2 Project

Middle East and North Africa (MENA) is shaped by its unique geographical, ecological, geopolitical and cultural features. It is challenged by natural conditions including water scarcity, demographic change, unemployment including among the youth, poverty, changing consumption patterns including rising water and food demands, urbanization, growing energy needs, environmental degradation, climate change, gender disparities and more. In parts, MENA faces an enduring economic crisis, war, socio-political instability, conflicts and is impacted by large-scale migratory movements. Most of such natural and man-made challenges are directly linked with water.

The project 'Making Water Cooperation Happen in MENA: Piloting Tangibles', aka MENA Water Matchmaker 2 project, aims to equip UfM MENA countries with tangible and scalable local technical solutions, combined with employability capacitation as well as with selected applicable and shareable policy tools, for improved water management and climate resilience, through multi-stakeholder, multi-sectorial and gender mainstreaming approaches. The project's main objective is to prove, through piloting, the integrated concept of applying Water-Energy-Food-Ecosystems (WEFE) Nexus technical solutions at local level while capacitating priority beneficiary groups on employment options, offering measurable and scalable contributions for further application in UfM MENA countries, and assisting the UfM Water Agenda to enter and mark progress on tangible benefits at local level, while contributing to Sweden's Strategy for MENA 2021-2025.

Water-food-energy connections lie at the heart of sustainable, economic and environmental development and protection. The demand for all three resources continues to grow for various reasons: a growing population, ongoing population movements from farms to cities, rising incomes, increased desire to spend those incomes on energy and water intensive goods/varying diets, international trade, urbanization and climate change. The WEFE Nexus approach uses context-specific solutions based on different levels of interventions to achieve long-term economic, environmental and social goals.

In the core of the MENA Water Matchmaker 2 project is the implementation of two demonstrable and scalable technical WEFE Nexus interventions combined with employability/entrepreneurship

capacitation activities, that will be implemented in Jordan and in Palestine, through a cross-country approach and towards regional benefits for MENA countries. For Jordan, Wadi Shuayb was chosen to be the area to implement the project activities.

1.2. The Wadi Shuayb Wastewater Treatment Plant

The Wastewater Treatment Plant (WWTP) in Wadi Shuayad, Al-Salt, aka Al-Salt WWTP or Plant, was established in 1973 with the aim of treating sewage and reusing the treated water for irrigating crops. The site of the plant is surrounded by two chains of mountains, from the east and west, which makes the cost of pumping water to the farms in the mountain very high.

The Plant's wastewater treating capacity is 7,600 m³/day (currently overloaded 10,000 – 11,000 m³/day). The Ministry of Water and Irrigation, that is the authority in charge of the WWTP, recently signed agreement with a contractor to raise its efficiency. This includes increasing the Plant's treating capacity from 7,600 m³/day to 25,000 m³/day and expanding services to new areas in Al-Salt and the surroundings. The expansion will be implemented in two phases, with a capacity of 12,500 m³/day for each stage, funded with 29 million Euros by the German Reconstruction Bank (KFW).

The reclaimed water coming out from Al-Salt WWTP flows by a gravity in Wadi Shuayb and is being used directly and indirectly by farmers distributed along the Wadi. Some farmers pump the treated wastewater off the plant directly to irrigate their trees while others use a gravity-based pipe to get the irrigation water.

There is a 100 m³ tank collecting the treated wastewater from Al-Salt WWTP effluent and transfer such type of water to farms through a 4" transfer pipeline elongated downstream the Plant.

The total lands irrigated directly with the reclaimed water are estimated to be 150 dunums, distributed over 25 farms.

Currently, the direct reuse of treated wastewater (TWW) for irrigation is 10% of the Al-Salt WWTP effluent.

The following tables display the average quality of the TWW in Al-Salt WWTP for year 2020 and 2021 as appeared in the Water Authority of Jordan (WAJ) lab monthly reports.

Seasonal variation in the Al-Salt WWTP effluent for year 2020

Parameter	Winter			Spring			Summer			Autumn		
	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV
INF.AVG.FLOW (m ³ /day)	10418	8298	9480	9751	11070	9703	11733	10179	10272	10193	10032	10094
pH (SU)	7.73	7.75	7.72	COVID 19 Quarantine period in 2020			7.82	7.5	8.03	8.31	7.87	7.88
TDS (mg/l)	790	801	747				836	803	834	831	830	864

TSS (mg/l)	14	16	45		43	35	37	53	34	37
BOD ₅ (mg/l)	10	6	7		10	34	28	23	13	11
COD (mg/l)	84	91	117		89	79	82	90	81	90
PO ₄ (mg/l)	8	19.6	9.4		-	16.1	14.1	13.9	10.5	-
NO ₃ (mg/l)	2	1.8	70.5			3.4	2.5	1.5	2	-
NH ₄ (mg/l)	13.7	5.2	4.6			33	29.9	31.4	13.5	-

- : Not Measured

AI-Salt WWTP effluent characteristics for year 2021*

Parameter	A-Salt WWTP Effluent 2021**			
	Unit	Minimum yearly Results	Maximum yearly Results	Average yearly Results
pH	SU	7.08	7.51	7.40
BOD ₅	mg/l	9	39	22
COD	mg/l	74	128	90
TSS	mg/l	11	82	39
TDS	mg/l	768	927	849
NH ₄	mg/l	6.7	41.1	26.7
NO ₃	mg/l	0.5	13	2.4
TN***	mg/l	31.3	52.9	42.1
PO ₄	mg/l	5.1	12.4	9.2
E.coli ***	MPN/100ml	1.7E+05	3.5E+05	2.4E+05

*: All the data was extracted from WAJ monthly reports except where noted

**: The monitoring period was from January to October /2021

***: From RSS laboratory data as these tests are not measured by WAJ labs

Assessing the average results shown in the tables above against the Jordanian Standard No. 893/2021 (JS 893/2021), the following can be summarized:

- For discharging to streams, wadis or water bodies: The effluent water quality does not comply with the requirements of the JS 893/2021 as *E.coli* exceeded the maximum allowable limit stated in the standard for such use in year 2021.
- For reuse in agriculture:
 - Irrigation of vegetable crops which are eaten raw or cooked is prohibited as per the JS 893/2021 requirements.
 - Category A/ irrigation of parks, green areas and roadsides inside the cities: The effluent water quality does not comply with the requirements of the JS 893/2021 as *E.coli* exceeded the maximum allowable limit stated in the mentioned standard in year 2021.

- Category B/ irrigation of fruitful trees, green areas and roadsides outside the cities: The effluent water quality does not comply with the requirements of the JS 893/2021 as E.coli exceeded the maximum allowable limit stated in the mentioned standard in year 2021.
- Category C/ irrigation of industrial crops, field crops and forestry: The effluent water quality complies with the requirements of the JS 893/2021 for all tested parameters in the standards group (group of properties and tests that the effluent quality should comply with the limits stated in the standard according to the usages for this category) in year 2021.
- Additional category/ irrigation of cut flowers: The effluent water quality does not comply with the requirements of the JS 893/2021 as BOD5, COD, TSS and E.coli exceeded the maximum allowable limits stated in the mentioned standard in year 2021.

2. Description of the Assignment

2.1. Objective

This Assignment consists of construction of **three (3) wetlands** (tertiary treatment) to treat the water coming out from Al-Salt Wastewater Treatment Plant and **three (3) solar systems** to provide energy for the irrigation pumping systems in **three (3) farms**.

The three farms are located in Wadi Shuaib. Figure 1 shows the three farms and the Al-Salt WWTP locations. The following table displays the coordinates of the sites.

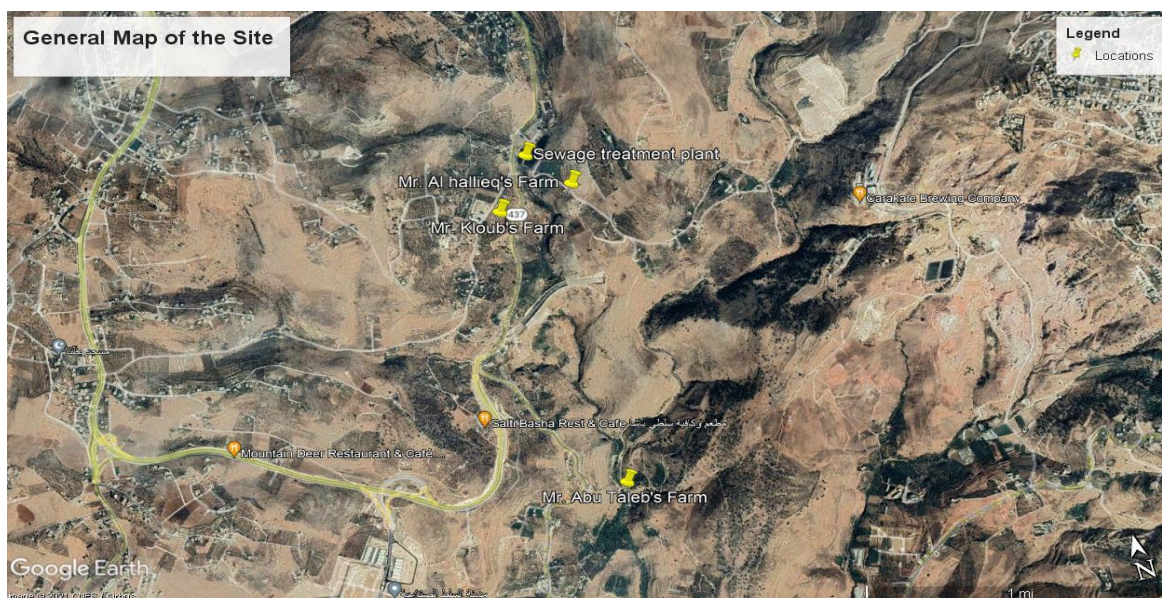


Figure 1: General Map for targeted farms located in Wadi Shuayb.

Farm	Latitude	Longitude
Farm 1	31°59'16.45"N	35°43'55.74"E
Farm 2	32° 0'19.64"N	35°44'2.61"E

Farm 3	32° 0'17.04"N	35°43'46.03"E
Al-Salt WWTP	32° 0'27.53"N	35°43'54.81"E

Notes:

- The technical intervention will be used for the irrigation of three (3) donums in each selected farm.
- The design of natural-based tertiary wastewater treatment to get water quality compliance with JS 893/2021 for category B/ irrigation of fruitful trees, green areas and roadsides outside the cities. i.e. E.coli must be reduced to 1000 MPN/ 100ml.
- The design of the solar system in each farm is calculated to cover the pumping cost.

The design basis & parameters are as follows:

Influent Parameters:

Type of Influent: treated wastewater coming from Al-Salt WWTP

Daily flow rate	: 7 m ³
BOD ₅	: 45 mg/lit.
TSS	: 90 mg/lit.
COD	: 180 mg/lit
T-N	: 55 mg/lit.
<i>E.coli</i>	: 3.5E+05

Anticipated Effluent Parameters:

BOD ₅	< 5 mg/lit.
TSS	< 10 mg/lit.
COD	< 20 mg/lit.
T-N	< 15 mg/lit.
<i>E.coli</i>	<1000 MPN/ 100ml

The Successful Applicants should also provide three (3) Portable Moisture Meters.

The Successful Applicants must provide Related Catalogues & Data Sheets of the offered equipment.

2.2. Technical Specifications

2.2.1. Wetland Construction Specifications

Process Concept

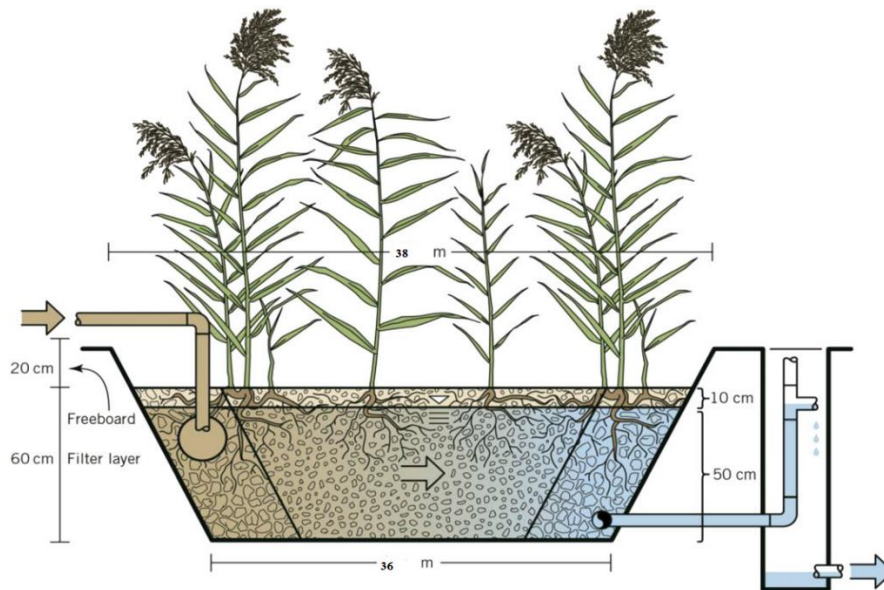
A subsurface flow constructed wetland (SSFCW) will be constructed in each farm, consisting of a bed of graded stone media with an influent distribution device to introduce wastewater at one end of the bed of stone and an effluent collection device at the opposite end of the bed to collect and discharge the treated effluent from the bed. Vegetation in the form of plants strategically placed on the surface of the bed of stone may also be used.

Location of wetlands

The three wetlands will be constructed in empty space in the three farms. The area chosen is not very flat and contains some trees and plants which represent a problem that needs to be solved. To solve this problem, a sequence of earthworks excavation and preparations of the site need to be done before starting the installation.

Surface area

The surface area will be 160 m² (36 m x 4,50 m). The Figure below shows the longitudinal section of SSFCW unit (not to scale), that is suggested to be designed for this Assignment depending on the above design concept.



The Media

The choice of the right media is an important step during the wetland construction. Different factors interfere during the selection of the right medium. The selection should be based on the availability of the medium and its price. Hydraulic conductivity describes the ease of a fluid to go through a certain medium and that can be affected by the shape, size and distribution of the particle. Choosing the right medium can have a direct impact on the wetland.

Gradation of Media

With the relatively flat hydraulic gradient available in the SSFCW, a media with large void spaces enhances the movement of the wastewater through the SSFCW. To achieve adequate void space, it is recommended that media size be [50.8-127 mm] in diameter with a gradation as follows:

Recommended Gradation for surface Media

0% Retained	[37.5 mm] sieve
40- 75% Retained	[25.0 mm] sieve
85-100% Retained	[19.0 mm] sieve
100% Retained	[12.5] mm sieve

Placement of Media

The placement of the media is critical because of the need to maintain the void spaces within the SSFCW. Media should be placed on a dry subgrade, preferably on top of a synthetic liner. The liner prevents the upward migration of soil particles from the subgrade. Heavy equipment should never be allowed on the filter media. This is to protect the void spaces from being reduced by compaction. Placement of the media should be accomplished by hand or by clamshell bucket.

Side slope/Substrate Protection

Prevention of side slope erosion and subgrade migration are critical to protecting the integrity of the SSFCW. Installation of a synthetic liner is recommended. The liner should be installed to prevent seepage beneath the liner and on the side slopes. To obtain good results, the slope within the wetland should be equal or less than 1%. For this Assignment, it is recommended to take the slope to 1%.

Lining

The choice of the right liner is a major step during the design of the constructed wetland. The main purpose of lining is to prevent the mixture of wastewater with groundwater and pollute it. The liner recommended for such constructed wetland is mainly plastic ones because they have to be frost resistance and that are LLDPE (Linear Low-density Polyethylene), HDPE (High density Polyethylene) and PVC (Polyvinylchloride). The liners thickness should be between 0.5 and 2mm. In addition to the plastic liner, a geotextile liner shall be used to protect the plastic from frost.

Influent/Effluent Structures

The influent structure should be designed to distribute the flow evenly across the width of the SSFCW and should be placed near the surface of the stone media. The effluent structure should be placed near the bottom of the SSFCW and the effluent discharge pipe should be designed to be adjustable to allow for control of the water level within the SSFCW.

Dosing and Feeding Regime

Feeding the constructed wetlands during separate periods of the day can help increase the performance of the system. The feeding/resting operations help increasing the oxygenation, biomass and reduce clogging within the wetland.

Other Design Criteria

- Irrigation Tank: A tank with 2m³ volume is needed to collect the treated water and should be installed down the SSFCW effluent.
- Pump: The farms already have their own pumps at the effluent of the Al-Salt WWTP. It is recommended to change the type of pump to timed water pump because it will depend on hydraulic retention time and can help regulate the water flow within the wetland, thus obtain better results.
- Inlet pipe: The inlets are used to spread wastewater over the wetland where it is pumped in cycles between 5 and 10 min that is about 2 to 4 times/day. The pipes contain small openings of diameter from 6 to 10mm and usually enveloped with coarse gravel. The pipes diameters of the inlets are recommended to be between 10mm and 25mm

- Outlet pipe: Outlet pipe should be enveloped with rock or coarse gravel and the water exiting is stored at the bottom of the system. The outlets help controlling the hydraulics and effluent level to avoid water outflow. For horizontal wetland, it is recommended to use water level control pipe.

Operational Consideration

Although the SSFCW system is simple in design and operation, it cannot be left to operate by itself. While it is not a maintenance-free system, the maintenance required is primarily manual labour. With the exception of a recirculation pump that might be used only part time, there are few mechanical parts that must be maintained. At the same time, attention must also be given to the operation of the facility.

The operational considerations or management practices will have an effect on the ability of the facility to maintain long term performance capabilities. The following management practices are necessary for the system to operate properly:

- Recirculation: the system should have the capability of recirculating the effluent for the SSFCW back to either the preceding treatment or to the influent end of the SSFCW. During times when the effluent from the system does not meet discharge permit effluent requirements or when additional flow is needed within the SSFCW, the effluent flow should be recirculated. through a recirculation line installed before the irrigation tank; it is necessary to install a pump in such line with a pumping capacity up to 7m³/day.
- Bed Maintenance: Where multiple SSFCW cells are used in parallel, provisions should be designed into the system to allow for the removal of one or more of the cells from operation to perform maintenance (cleaning, media replacement, etc.). To extend the life of the SSFCW, periodic back flooding of the stone media is necessary. This can be done with a high-pressure hose inserted in the effluent collection line. Such a procedure will help in removing some of the detritus from the surface of the stone media and some of the solids deposition from the void spaces within the media.
- Control of liquid in the SSFCW: If the SSFCW is constructed with an adjustable effluent line as recommended, periodic adjustments may be necessary to maintain the proper liquid level in the stone media. For example, during periods of low flow the effluent line should be adjusted to raise the level of the liquid in the SSFCW. At other times, the SSFCW may need to be drained for maintenance. Experience has shown that if freezing temperatures occur, the SSFCW should be flooded in order to prevent freezing within the media. The following table (7) gives the maintenance operations to be performed and their frequency

General Technical Specifications and Requirements

- All works shall be according to the Jordanian Codes and Standards.
- All concrete works shall be Fare Face. Cement shall be sulfate resisting cement.
- Reinforcing steel shall be high tensile.
- All submerged metal works shall be in epoxy painted. All submerged bolts and nuts shall be in galvanized steel.
- Other metal works (Carbon Steel) shall be sand blasted and painted using epoxy paint.
- Civil & Structural works shall include all necessary Cast Iron & Galv. Steel Covers.

- Mechanical works shall include all interconnecting pipe works, fittings, valves, all according to the Jordanian Codes & Standards. Valves, none-return valves, Flanges / Unions shall be provided to enable easy operation & isolation of any part of the plant without the need to interrupt the process. Unless specified elsewhere, all Gravity Pipes shall be UPVC PN10, all Pressurized Pipes shall be UPVC PN16, all Air Lines shall be UPVC PN16.
- Electrical works shall include, Electric Panel, all needed cables & wires. All cables shall be laid inside Conduits and as per the Jordanian Codes & Standards.
- The plant shall be unmanned.
- Bidders shall submit with their tenders, related Catalogue and Reference on similar projects.

Drawings

- Successful Contractors shall submit **detailed preliminary drawings** prior to starting the site construction activities.
- Additionally, the Successful contractor will provide **As Built drawings** at the completion of the Assignment.

Pipes & Fittings

- All Drainage / Gravity pipes shall be UPVC (10 Bars).
- All pressure pipes and fittings shall be made of Galvanized Steel Class B or heavy duty UPVC (16 Bars operating pressure).

Valves

All valves shall be Ball Type, PVC or chrome plated. Pressure rating of 16 bars.

Electrical Cables, Conduits & Earthing

- All Cables shall run inside conduits or trunks.
- All conduits shall be PVC.
- All connections made to the motors shall be made via reinforced PVC Flexible Conduits.
- All Cables shall be NYY and laid in trenches inside PVC Conduits.
- Electric Power Cables shall be inside one Conduits, Control (Signal) cables shall be installed inside a separate conduit.
- Equipment and electric panel shall be earthed, an earthing rod and manhole shall be provided.

Goods Origin:

USA, Europe or Japan.

Warranty & Maintenance

All works and equipment shall be guaranteed against manufacturing defects for one year. Additionally, and during the warranty period, the Contractor shall periodically depute to the plant site his trained maintenance and operation staff will periodically visit the plant to guarantee the correct plant operation.

2.2.2. Solar System Specifications

Estimated Electricity Demand of Targeted Farms

Mr. KLOUB FARM

Mr. Kloub has two pumps connected directly to the plant's pool. One is on duty and one is back-up. The electric capacity of each pump is 4 kW.

The average daily operating hours of these pumps is 7 hours approximately, where their annual estimated energy consumption is 10,220 kWh/yr.

Mr. ALHALLIEQ FARM

Mr. Alhallieq has one pump connected directly to the plant's polishing pond. The electric capacity of the pump is 3 kW.

The average daily operating hours of the pump is 7 hours approximately, where its annual estimated energy consumption is 7,665 kWh/yr.

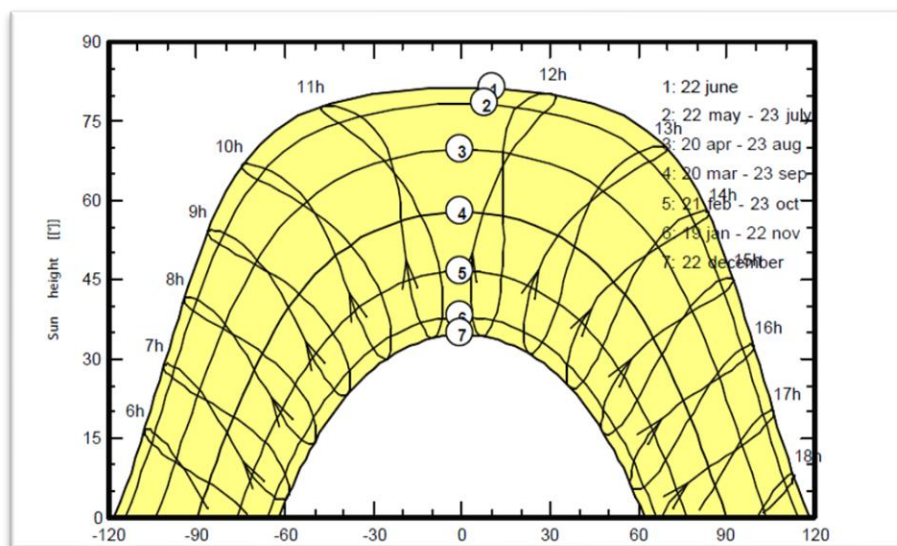
Mr. ABU TALEB FARM

Mr. Abu Taleb has one pump installed at the water stream. The electric capacity of the pump is 18.5 kW.

The average daily operating hours of the pump is 6 hours approximately, where its annual estimated energy consumption is 40,515 kWh/yr.

Site Analysis and Preliminary Designs

This section is concerned with the physical conditions of the site locations that would affect the installation of a solar PV system. The nature of a solar panel and array require that the site analysis take into account the physical structure and layout of the spaces, as well as the weather (solar irradiation, ambient temperature and wind speed). The weather plays an important role with such system, determining the amount of sunlight that can be gathered by the modules and converted into energy. The sun path for the mentioned locations is shown below.



Solar paths at Wadi Shuayb, (Lat. 31.9879° N, long. 35.7322° E, Azimuth 0)

The solar radiation data for the location is shown in the following table. The source is Meteonorm 7.2 (1990-2004), Sat=100%

Solar radiation data

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep	Oct.	Nov.	Dec
Hor. Global (kWh.m²)	94.7	108.4	164.4	190.4	234.3	246.8	251.0	230.1	187.4	149.8	110.1	89.3
Amb. Temper. (°C)	13.1	13.8	16.6	19.4	22.7	25.3	27.8	28.1	26.2	23.7	19.0	15.1
Wind velocity (m/s)	3.1	3.2	3.0	3.1	3.0	3.1	3.2	3.0	3.0	2.6	2.5	2.7

Mr. KLOUB Farm

This farm cannot be equipped with net-metering solar PV system because its electricity utility meter and its associated parts are located at the treatment plant and there is no free area to install the PV system at the treatment plant yard. The one and only approach to equip this farm with a PV system is to consider the wheeling option. This option allows the farmer to install a separate PV system at the farm, connect it to the grid through a new electric meter and export the generated energy to the utility in order to cover up the pumps electrical demand. The map in the following figure shows the farm's location and the distance to the treatment plant.



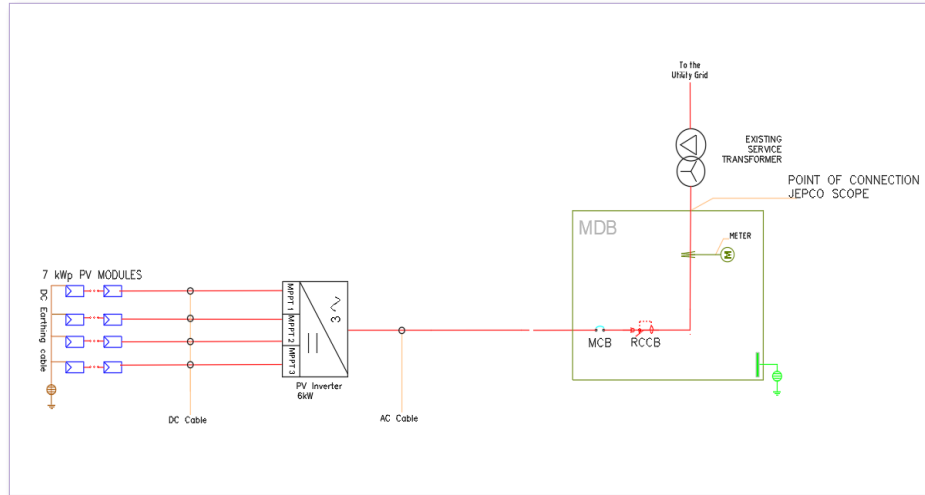
Mr. Kloub's Farm Location

In case of considering the wheeling option, the contractor shall consider some levelling works - due to land inclination - before proceeding with construction. The proposed area for installation is shown in the following figure.



The proposed area for installing the PV system at Mr. Kloub's Farm.

Mr. Kloub's farm requires 7 kWp PV system to cover its annual electricity consumption where each kWp of PV modules occupies an area of around 8-12 m² according to the height of the structure installation, system inclination and orientation. The Single Line Diagram (SLD) for this system is shown in the figure below.



SLD for Mr. Kloub's PV system

Mr. ALHALLIEQ Farm

Same as Mr. Kloub's farm, this farm cannot be equipped with net-metering solar PV system because its electricity utility meter and its associated parts are located at the treatment plant and there is no free area to install the PV system at the treatment plant yard. The one and only approach to equip this farm with a PV system is to consider the wheeling option. This option allows the farmer to install a separate PV system at the farm, connect it to the grid through a new electric meter and export the generated energy to the utility in order to cover up the pump electrical demand. The farm's location and the distance to the treatment plant is shown in the figure below.



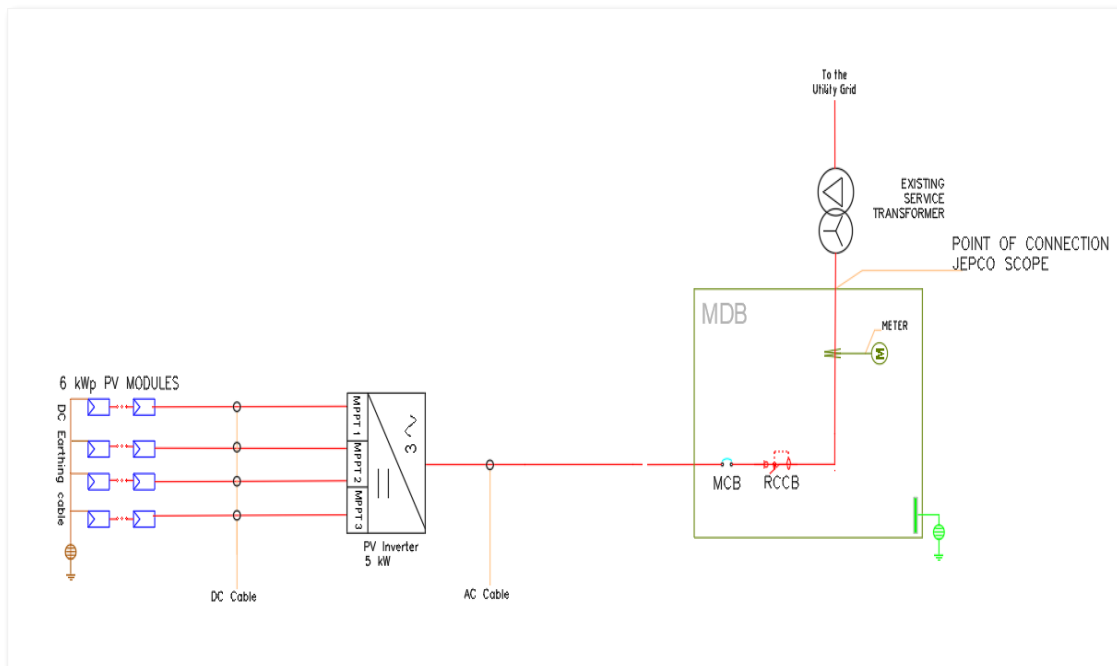
Mr. ALHALLIEQ's farm location

In case of considering the wheeling option, the contractor shall consider some levelling works - due to land inclination - before proceeding with construction. The proposed area for installation is shown below.



The proposed area for installing the PV system at Mr. ALHALLIEQ's Farm.

Mr. AlHallieq farm requires 6 kWp PV system to cover its annual electricity consumption where each kWp of PV modules occupies an area of around 8-12 m² according to the height of the structure installation, system inclination and orientation. The Single Line Diagram (SLD) for this system is shown below.



SLD for Mr. ALHALLIEQ's PV system

Mr. ABU TALEB Farm

A net-metering PV system can be installed at this farm to cover the electrical consumption as the utility electric meter is located at the farm itself. The following map shows the farm location.



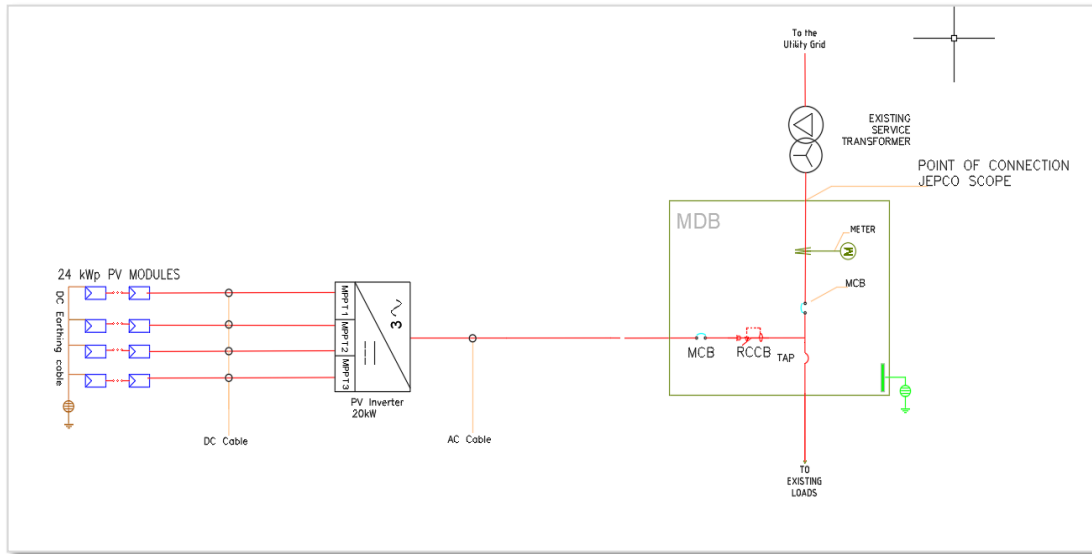
Mr. ABU TALEB's farm location

The proposed area for installation is shown below.



The proposed area for installing the PV system at Mr. ABU TALEB's farm.

Mr. Abu Taleb farm requires 24 kWp PV system to cover its annual electricity consumption where each kWp of PV modules occupies an area of about 8-12 m² according to the height of the structure installation, system inclination and orientation. The Single Line Diagram (SLD) for this system is shown as follows.



SLD for Mr. ABU TALEB's PV system

PV Modules

The photovoltaic modules have to fulfil the following technical specifications and standards, which have to be certified by an official institute if applicable:

- The photovoltaic modules shall be half cut monocrystalline PV technology, thin-film and polycrystalline modules are excluded.
- Only one supplier and one module type (one power class) are acceptable.
- PV module selected should have 72 Mono cells at least.
- The Photovoltaic modules should be manufactured before 6 months from the date of delivery on site.
- The output power of the crystalline module should not be less than 450 Wp at standard test condition (STC).
- PV manufacturer must be from Tier 1 Solar Panels producers or Jordanian factory with production capacity more than 100 MW/year.
- Operating PV temperature ranges between -10 °C & + 85 °C.
- Modules temperature sensitivity at peak power should not exceed -0.36%/°C.
- The PV modules frame should be made from Anodized Aluminum.
- The PV modules maximum system voltage should not be less than 1,000 V.
- The PV module string connectors shall be same manufacturer as used by the module manufacturer.
- The PV modules should be PID resistant.
- The PV modules should have a positive power tolerance and measurement uncertainty of +/-3% (manufacturer flasher class AAA according to IEC 60904-9).

- The PV modules shall have individual serial numbers behind each front glass and on the back side of the module.
- The PV modules' aluminum frame must not directly contact any dissimilar metal.
- Electrical connection shall be on a robust terminal block in an IP67 junction box or higher.
- The warranty for module defects after installation should be at least 10 years.
- The Successful Contractor shall provide a manufacture power guarantee for all PV modules that will be installed with their serial numbers that guarantees that the loss of the output is not more than 10% during the first 10 years and up to 20% in total after 25 years. The warranty must state that the malfunctioning solar photovoltaic module must be exchanged by the manufacturer. The replacement solar module must be identical to, or an improvement upon, the original design of the malfunctioning solar module.
- Mechanical stability – IEC 61215: Design qualification and type approval for crystalline silicon terrestrial photovoltaic (PV) modules.
- PV module safety qualification standard: IEC/EN 61730 for safety class II test.
- PV module shall be approved according to IEC 60068-2-68 (Blowing Sand Test) latest edition.
- Along with TUV, CE compliant and UL certification, salt mist/ammonia resistance should be provided.
- Mechanical load tests up to 5400 Pa, Damp Heat, Thermo Cycle and Humidity and Freeze tests.
- Flash reports of PV modules (SN, V_{oc} , I_{pmax} ,...) shall be provided.
- With the PV plant in operation and in the absence of shades, the PV modules must not exhibit hot spots or hot cells.
- Third party bankruptcy insurance shall be provided.

PV Mounting Structures

The modules have to be mounted on metallic sub constructions of suitable height from the ground and with the necessary declination in relation to the horizontal plane, so as to gain the maximum of solar radiation and energy production.

In detail, the minimum specifications of the mounting structure are:

- Made of **Hot-Dip galvanized steel**.
- The minimum effective wind speed of **130 km/h** shall be considered for the mounting structure design.
- The steel structure shall be anti-corrosion, anti-rust and can withstand high humidity. Steel shall be galvanized according to ASTM A-123 with a galvanization thickness of at least 85 μm .
- The mounting structure shall be all fitted **(no welding)**.
- All bolts, nuts, and washers for the PV modules' mounting structure must be made of stainless steel. Stainless steel must not contact the PV modules' aluminum frames.
- All clamps in contact with the PV modules' aluminum frames must be made of aluminum.
- The PV modules' aluminum frame must not directly contact any dissimilar metal.
- A detailed structural analysis shall be submitted taking into account the Jordanian Loads Code and each area specific conditions (additional safety factor).
- Anti-corrosion guarantee from the weather conditions.
- All exposed sharp edges in the mounting structure must be covered with an appropriate material.

- Manufacturer's warranty should be at least 10 years.

On- Grid Inverters

The on-grid inverters should meet the following specifications:

- The AC power of the inverter must synchronize automatically with the AC voltage and frequency of the grid (3-phase) within the tolerance range specified according to the British Energy Networks Association (ENA) engineering recommendations (G99/G98).
- The inverter(s) shall comply with the EMRC and the JEPCO regulations and standards.
- The Inverter should be designed to operate the PV array near its Maximum Power Point (MPP).
- The Inverter should be transformer-less with efficiency at max power of no less than 97% (EURO-ETA / Euro-efficiency).
- The Inverter shall be provided with integrated DC switch.
- The Inverter shall be provided with an LCD display to provide instantaneous information about the subsystems and system output data and performance.
- The Inverter shall have the following protections: reverse current, input over voltage & over current via fuses.
- Temperature operating range: -20 °C to 60 °C
- Harmonic distortion is less than 3%.
- Protection degree is IP65 or higher (outdoor).
- TUV and CE compliant.
- Warranty after installation should be for 5 years at least for the inverters. The warranty must state that the malfunctioning inverter must be exchanged by the manufacturer. The replacement inverter must be identical to, or an improvement upon, the original design of the malfunctioning inverter.
- The inverter must be cooled using natural ventilation or forced air-cooling if installed outdoors.
- The inverter must be installed on a separate hot-dip galvanized steel mounting structure i.e. separate from the PV mounting structure and must be protected from direct sun light and rain (weather conditions).
- The inverter shall have surge protection SPD on the DC and AC side. If the inverter does not support integrated SPD protection, a separate external SPD must be installed.

DC Cables, Connectors and Accessories

The DC cables (main and string) shall be selected and mounted in a way to withstand the external influences on site, such as temperature, UV irradiation, wind, sand and mechanical loads.

The minimum specifications are:

- DC cables shall comply with TUV standards.
- Operation temperature for DC cables should be up to +90 °C.
- All DC cables shall be **copper**, single-core cables and double insulated, **Aluminum** conductor is not allowed.

- DC main cables shall be underground buried in suitable electrical conduits where needed.
- DC wires from the connection box to the inverter input must be undergrounded inside PVC conduits where needed.
- Circuit shall be installed as close as possible in parallel to avoid induction loops.
- DC cables shall be UV resistant, flame retardant, and with low smoke characteristics.
- DC cables shall comply with local and international standards and JEPCO requirement.
- The cables shall not be installed in direct sunlight. Between individual mounting structures, for example, a tube shall be used for protection.
- All external cables must be installed inside a cable basket PVC Flexible pipes with glands shall be used between the modules and the cable basket or hot dipped galvanized cable tray with minimum thickness of 1.5 mm and minimum galvanization thickness of 30 µm.
- The cable ties shall be UV resistance.
- The cable clips shall be used for managing cable under PV modules.
- All cables shall be marked properly by means of permanently labels at the both ends so that cable can be easily identified.
- All cables must be fixed. The cables shall not bear any mechanical load on their terminations (strain relief) under any circumstance. Cable straps are not sufficient for the purpose of strain relief.
- The Successful Contractor shall use **red DC** cable for positive side and **black cable** for the negative side.
- The label shall provide information about the corresponding inverter, combiner box and string number.
- All cables shall be marked in compliance with IEC 60446-3 category C Basic and safety principles for man-machine interface, marking and identification.
- PV DC connectors for string interconnection shall be of the same brand and type as used by the PV module manufacturer. Connectors of different brands must never be used in the same connection (male-female). It is not allowed to cut the original connectors of the PV module.

AC Cables

- AC cables and control cables shall be Copper, XLPE insulated and armored sheathed cables with rated voltage of 0.6/1kV. These cables shall be UV resistant and flame retardant in case they are not buried.
- All cables shall be marked in compliance with IEC 60446-3 category C Basic and safety principles for man-machine interface, marking and identification.
- AC cables shall comply with local and international standards and JEPCO requirements.
- All external cables must be installed inside an external use or hot dipped galvanized cable tray with minimum thickness of 1.5 mm and minimum galvanization thickness of 30 µm.
- All cables laying in trenches must be separated by **cable spacers**.
- Reference codes and standards for all cables:
 - IEC 60189-2 Low-frequency cables and wires with PVC insulation and PVC sheath – Part 2: Cables in pairs, triples, quads and quintuples for inside installations.
 - IEC 60228 Conductors of insulated cables.

- IEC 60502-1 Power cables with extruded insulation and their accessories – Part 1: Cables for rated voltages of 1 kV ($U_m = 1, 2$ kV) and 3 kV ($U_m = 3, 6$ kV).
- IEC 60502-2 specifies the construction, dimensions and test requirements of power cables with extruded solid insulation from 6 kV ($U_m = 7.2$ kV) up to 30 kV ($U_m = 36$ kV) for fixed installations such as distribution networks.
- Reference codes and standards for cable testing:
 - IEC 60885 Electrical test methods for electric cables
 - IEC 60332 Tests on electric and optical fibre cables under fire conditions

AC Distribution Boards

- The Distribution Boxes shall be made of hot coated or galvanized steel; dust and vermin proof with a protection degree **IP66** at least.
- The main distribution board shall house the PV energy meter.
- The terminals and bus bars shall be made of tin coated copper and appropriately sized; the boxes shall have suitable cable entry with suitable glands arrangement for both input and output cables.
- Suitable markings on the bus bars shall be provided to identify the bus bars.
- The distribution box shall be grounded and for this purpose a suitable ground terminal is to be arranged.
- The distribution boards shall be completely factory assembled, pre-wired, and tested.
- All distribution boards must be equipped with an appropriate SPD device.
- The distribution boards shall be designed to meet the requirements of applicable parts of the following Standard's last edition:
 - IEC 60038 IEC Standard Voltages
 - IEC 60044-1 Instrument Transformers - Part 1: Current Transformers
 - IEC 60044-2 Instrument Transformers - Part 2: Inductive Voltage Transformers
 - IEC 60051 Direct acting indicating analogue electrical measuring instruments and their accessories
 - IEC 60068 Environmental testing
 - IEC 60071 Insulation Coordination
 - IEC 60073 Basic and safety principles for man-machine interface, marking and identification - Coding principles for indication devices and actuators
 - IEC 60085 Electrical Insulation - Thermal Evaluation and Designation
 - IEC 60255 Electrical Relays
 - IEC 60269 Low Voltage Fuses
 - IEC 60445 Basic and safety principles for man-machine interface, marking and identification - Identification of equipment terminals, conductor terminations and conductors
 - IEC 60529 Degrees of protection provided by enclosures (IP Code)
 - IEC 60865 Short-circuit currents - Calculation of effects
 - IEC 60934 Circuit-breakers for equipment

- IEC 61000 Electromagnetic compatibility (EMC)
- IEC 61140 Protection against electric shock - Common aspects for installation and equipment.
- IEC 60664 Insulation Coordination with Low-voltage Systems including clearances and Creepage Distances for Equipment.
- IEC 61008-1 Residual Current operated circuit Breakers without integral overcurrent protection.

Labelling

- Each item of equipment must have a nameplate bearing the manufacturer's name, address, model number, and serial number securely affixed in a conspicuous place.
- Tags for each power cable or wire located in manholes, hand holes, and vaults shall be provided.
- Warning labels shall be provided and affixed in a conspicuous place.
- All labelling material shall be weather-resistant.
- All cables shall be listed in a cable list and shown on the schematic diagrams. All cables shall be identified at each end using a robust and weatherproof identification tag indicating the cable reference number.
- Where cables pass through draw pits, identification markers shall be fitted to the cables at both ends of the pit.

Spare Parts

- The Contractor's must submit a spare part list with a quantity of 1% or one-set of all main components of the PV system. The list shall include but not limited to:
 - PV modules.
 - AC components.
 - DC components.
- The Contractor's shall include the spare parts as a separate additional item in the financial offer.
- If the Successful Contractor used items from the spare parts during the operation and maintenance period, the Contractor shall re-stock the spare parts at his own expenses.
- GWP-Med is entitled to request additional spare parts from the Successful Contractor at the same price of the proposed materials during the O&M period.
- The spare parts should be delivered by the proposer before the final acceptance of the Assignment if requested.

Testing

Material tests

- It's the Successful Contractor's responsibility to do the following tests and any other tests for verification of any materials/costs at accredited lab:
 - **Steel:**
 - ✓ Mechanical Properties (Tensile, yield, Elongation)
 - ✓ Chemical properties

- ✓ Galvanization Thickness
- ✓ Galvanization type
- **Concrete:**
 - ✓ Compressive strength of concrete.
- All testing and samples required on civil activities and works during implementation shall be carried by the Successful Contractor and at his expense according to the Owner Representative instructions and comply in minimum with ministry of housing and public work regulation.
- The Successful Contractor will bear the full expenses of these tests and shall be included in his offer

Requirements for Works

Engineering Works

- All requirements by authorities for licensing the PV Plant including all necessary drawings and follow-ups are the responsibility of the Successful Contractor and are considered an integral part of the scope of work of the Contractor.
- The design of the method for fixing the PV mounting system to the ground shall take into consideration the geotechnical test report that shall be provided by the Successful Contractor.
- The Successful Contractor shall provide structural design of the structural steel elements as per the following requirements:
 - Include a simulation model shall be provided for showing all nodes and elements with detailed loads and reactions calculations.
 - Be in accordance with the AISC-306: Steel construction manual.
 - Consider that if secondary members' or rails' material is different from the PV module material, then a separator shall be used to prevent corrosion.
 - Include seismic and snow load design calculations for the mounting system and its attachments showing compliance to the requirements of the National Building Code (Loads and forces). The mounting structure of PV shall withstand an **effective** wind speed of **130 km/hour**, relative humidity of 100% and a temperature of 60 °C.
 - Include designs for all elements of the hardware required for mounting the PV system and assembling the PV modules and the attachments to the mounting structure.
- The Successful Contractor shall provide 3D analysis of the mounting structure using STAAD.pro or any equivalent program.
- The Successful Contractor must comply with the specifications for interconnection provided from JEPCO after conducting the Grid-Impact-Study.

Construction Works

- The Successful Contractor shall apply Jordanian "labour law" that includes the use of underage labour, non-resident or unlicensed labourers.
- All permits and approvals required to execute the work are the responsibility of the Successful Contractor, the Successful Contractor shall provide the owner with copies of all approved permits and applications for permits still in process on the effective date of the contract.

- The Successful Contractor is responsible for all fees required for obtaining all approvals and permits required for the Assignment **including the GIS fees.**
- It is the responsibility of the Successful Contractor to submit all the data required from and for the JEPCO and other related parties.
- It is the Successful Contractor's responsibility to execute the work and identify the required permits at his own expenses. All permits shall be provided as hard and soft copies to the owner.
- The Successful Contractor during the implementation of the Assignment shall provide a weekly report covering the progress achieved in the previous week and the planned activities for the up-coming week. The report shall cover Engineering, Permitting, Procurement, Safety and Implementation activities. The Contractor shall also provide a progress versus planned report, the reports shall outline areas of concern and plans for corrective action (if needed) to maintain the Assignment schedule.
- The Successful Contractor shall keep the site clean; all trash and rubbish shall be disposed of off-site by a licensed waste disposal company in accordance with the applicable laws. Any location of works shall be returned to its original state at all times.
- The Successful Contractor shall be responsible for storing all system equipment and their safety.
- All excavation works required for laying the cables shall comply with all applicable codes and approved by Owner and Owner Representative.
- All cable laying and configuration of the trenches shall follow applicable international standards and the following:
 - The depth of the least profound cable shall be minimum 40 cm.
 - A cross-support shall be installed for each layer every 5 meters to fix the cables and to maintain them parallel
 - Backfill of the trench with a warning tape at least 20 cm above cables and covering the entire width of the trench.
 - Compaction till the existing ground level. Trenches shall be accurately free of stones.
 - Before cable laying the trench bed shall be levelled either by making use of existing natural sandy soil or alternatively by filling with and compacting a layer of sand.
 - The trenches shall have a minimum width of 60 cm.
 - The trench excavated in the internal roads, in addition to the above conditions, shall be protected with reinforced concrete tiles and the cables shall be armoured. In case of public road crossing, reinforced concrete slab and conduits shall be installed instead of concrete tiles.
 - All ducts shall be sealed after cable installation with suitable expanding material to prevent ingress of water, dust and vermin. Any cable entries through walls shall be via proprietary cable transits and sealed after installation.
 - Chests or manholes must be installed every 20 m and in any change of direction.
- The Owner and the Owner Representative have the right and authority to review, inspect, and if needed, cause corrective actions to be taken if any part of the system is not constructed in a safe manner.
- All Successful Contractor -generated waste from the construction or installation process shall be removed to a disposal site at no additional expense to the owner.

- All Subcontractors, Contractors or third parties should be approved by the Owner and Owner Representative and they have the right to accept or reject them.
- The Successful Contractor shall be fully responsible for the acts and negligence of its subcontractors and all persons either directly or indirectly employed by Contractor.
- The above ground portion of the electrical systems shall be neatly routed to facilitate access, troubleshooting, maintenance ...etc.
- All testing required on civil activities shall be carried by the Successful Contractor and comply in minimum with ministry of housing and public work regulation.
- Excavation works may only start after the aforementioned design approval of civil and structural works and after approval from the Owner and Owner Representative.

Testing and Commissioning

- All documentation, commissioning tests and inspection procedures will be carried out according to the standard protocol “IEC 62446-1 standard” for the PV side and All transformers shall be subjected to the following Routine tests in accordance with IEC 60076.
- The two test regimes will be carried out according to the standard protocol “IEC 62446-1 standard.
- A certified third party approved by the Owner, Owner Representative and JEPCO must perform the testing and commissioning for AC and DC sides.
- The final commissioning will be performed after the following:
 - Approval of the “commissioning and testing plan” by the Owner, Owner Representative and JEPCO.
 - Approval of the proposed testing equipment and instruments by the Owner, Owner Representative and JEPCO.
 - The final commissioning will be performed by the Contractor on his own expenses and will be witnessed and approved by the Owner, Owner Representative and JEPCO.
 - If there is a need of any additional tests or testing equipment asked by the Owner or Owner Representative or JEPCO, the Contractor must accept and provide the inquiries on his own expenses.

Operation, Maintenance and Cleaning

- The operation and maintenance period must be for **two years** starting from the COD and final acceptance.
- The Successful Contractor must commit to all parts of the maintenance and cleaning plan and technical support provided in the Proposal.
- All resources related to the cleaning shall be the Successful Contractor’ responsibility and at his own cost throughout the O&M period including but not limited to (water, Water distribution network/ piping system cleaning devices, detergents, etc.).
- Preventive maintenance shall be performed as to ensure that equipment and structures are intact, safe and functioning properly.
- An inspection report of the system performance and check-up shall be provided every month during the operation period.
- The Contractors shall include clear troubleshooting methodology and contact information that the owner or the Owner Representative can use in case of emergencies.
- The Contractors shall include a detailed cleaning mechanism for the PV system.

- The Contractors shall include a cleaning schedule, an approximation of the amount of water that will be consumed in the cleaning process, and a list of the tools that will be used. The contractor shall provide water for the cleaning process.
- The Successful Contractor must show his commitment to the following times response periods that shall be pre-assigned by himself:
 - Response time for problem solving.
 - Response time for support.
 - Response time for (hardware/software) failure of the system components or any other related components.
 - Response time for failed equipment or any other component replacements.
- The cleaning frequency shall be dependent on the Successful Contractor soiling losses assumed in his simulation.

2.2.3. Portable Moisture Meters

The portable Moisture Meter should use Time Domain Reflectometer (TDR) technology to measure volumetric water content in soil. The instrument should be provided with software application and measures at a range of 0 to 100% Volumetric Soil Water Content (VWC) with +/- 2% accuracy. The device should be provided with GPS data & mapping features and equipped with waveguides.

Communication protocols should include USB, USB-Ethernet, Bluetooth or WiFi. A built-in camera is also required for site documentation purposes.

Three (3) instruments are to be supplied.

2.3. Bill of Quantities

Item	Description	Unit	Quantity
A. Drawings			
01	Preliminary drawings (constructed wetland, solar panels) – mechanical and electrical	Lump sum	1
02	As Built drawings (constructed wetland, solar panels) – mechanical and electrical	Lump sum	1
B. Works			
01	Site cleaning for the constructed wetland and the solar panels (in each farm).	Lump sum	3
02	Construction of fully operational constructed wetland of 160 m ² (as specified), including irrigation tank of 2 m ³ , recirculation pump (7m ³ /d), inlet pump, filtering media, lining, inlet / outlet piping, etc.	Lump sum	3
03	Installation of timed irrigation pumps for the irrigation of the additional trees which will be installed (including el. Board).	Pcs	6 (3 duty + 3 standby)
04	Connection of the irrigation tank with new pumps (one in each farm).	Lump sum	3
05	Construction of a fully operational solar power system of 6 kWp (as specified)	Lump sum	1

06	Construction of a fully operational solar power system of 7 kWp (as specified)	Lump sum	1
07	Construction of a fully operational solar power system of 24 kWp (as specified)	Lump sum	1
08	Connection of the solar power systems to the grid.	Lump sum	3
09	Fencing around the constructed wetlands to avoid accidents after the completion of the works (one in each farm), including gate of 4m width.	Lump sum	3
10	Fencing around the solar power systems to avoid accidents after the completion of the works (one in each farm) – including gate of 4m width.	Lump sum	3
11	Supply and plantation of trees in the farms (per farm/total) * Mango Avocado Moringa Lemon or Orange Permanganate * The selection of the trees to be planted will be made after consulting with the farm owners and the GWP-Med representative	Pcs	125/375
12	Construction of irrigation network of 3 donums for the new trees (one in each farm)	Lump sum	3
13	Rehabilitation of the area of construction (remove materials that are not needed in the area for the operation of the interventions)	Lump sum	3
C. Additional Equipment			
01	Portable Moisture Meter	Pcs	3
D. Licensees, Fees, Certificates			
01	The Successful Contractor is responsible for all fees required for obtaining all approvals and permits required for the Assignment including the GIS fees.	Lump sum	a.a.

2.4. Reporting line

The Successful Contractor will work under the direct supervision of / and communicate directly with Dr. Ghazi Abu Rumman, GWP-Med Senior Programme Officer and Head of the GWP-Med operations in Amman who is serving as Project Coordinator for Technical Solutions. Questions must be addressed in writing.

3. Obligations

3.1. Visit of the Area of Installation

- The applicants are invited to visit the Farms Site to establish and thoroughly appraise the extent and nature of the required works.

3.2. Materials, Services and Facilities

- It is understood that, except as otherwise specifically stated in the present Bid Documents,

the Successful Contractor will provide and pay for all materials, labor, tools, equipment, water, light, power and transportation, supervision, temporary construction of any nature, and all other services and facilities of any nature whatsoever necessary to execute, complete, and deliver the Assignment within the specified timeframe.

- Materials and equipment will be stored as to insure the preservation of their quality and fitness for the Assignment. Stored materials and equipment to be incorporated in the Assignment will be located to facilitate prompt inspection.
- Manufactured articles, materials, and equipment will be applied, installed, connected, erected, used, cleaned, and conditioned as directed by the manufacturer.
- Materials, supplies and equipment will be in accordance with samples submitted by the Successful Contractor and approved by the GWP-Med representative.

3.3. Protection of Work, Property and Persons

- The Successful Contractor will be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Assignment. Successful Contractor will take all necessary precautions and programs in connection with the Assignment.
- The Successful Contractor will take all necessary precautions for the safety of, and will provide the necessary protection to prevent damage, injury or loss to all employees on the Assignment and other persons who may be affected thereby, all the Assignment and all materials or equipment to be incorporated therein, whether in storage on off the site, and other property at the site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures and utilities not designated for removal, relocation or replacement in the course of construction.
- The Successful Contractor will comply with all applicable laws, ordinances, rules, regulations and orders of any public body having jurisdiction. Successful Contractor will erect and maintain, as required by the conditions and progress of the Assignment, all necessary safeguards for safety and protection.
- The Successful Contractor will notify owners of the farms when progress of the Assignment may affect them.
- The Successful Contractor will remedy all damage, injury or loss to any property caused, directly or indirectly, in whole or in part, by Successful Contractor, any Subcontractor or anyone directly or indirectly employed by any of them or anyone for whose acts any of them be liable.
- In emergencies affecting the safety of persons or the Assignment or property at the site or adjacent thereto, the Successful Contractor, without special instruction or authorization from the GWP-Med representative, will act to prevent threatened damage, injury or loss. Successful Contractor will give the GWP-Med prompt.
- Written Notice of any significant changes in the Assignment or deviations from the Bid Documents caused thereby, and a Change Order will thereupon be issued covering the changes and deviation involved.

3.4. Barricades, Danger, Warning and Detour Signs

- The Successful Contractor shall provide, erect and maintain all necessary barricades, sufficient red lights, flares, danger signals and signs, provide a sufficient number of watchmen and take all necessary precautions for the protection of the work and safety of the public.

3.5. Supervision

- The Successful Contractor shall maintain, at all times during the progress of work, a competent and experienced supervisor who shall represent the Successful Contractor, and all directions given to him shall be binding. Important decisions of any directions, if requested by the supervisor, shall be confirmed in writing.
- Supervision by the GWP-Med representative does not relieve the Successful Contractor of responsibility for defective work executed under the direct control of the Successful Contractor. Responsibility for defective work rests upon the Successful Contractor, whether discovered by the GWP-Med prior to final payment or subsequent thereto.

3.6. Clean Up

- Upon completion of the items within a given location as specified and before monthly estimates will be paid, the construction area and all other areas occupied by the Successful Contractor during the construction of said Contract shall be cleaned of all surplus and discarded materials, bracing, forms, rubbish and temporary structures that were placed there by the Successful Contractor.
- Disposal of the aforementioned shall be the responsibility of the Successful Contractor.

3.7. Work Deviation

- The GWP-Med, without invalidating the Successful Contractor, may order extra work or make changes by altering, adding or deducting from the work with the contract sum being adjusted accordingly.
- All such work shall be executed under the conditions of the original contract, except that any claim for the extension of time caused thereby shall be adjusted at the time of ordering such change.
- The value of any such extra work or change shall be determined in one or more of the following ways:
 - By estimate and acceptance of lump sum.
 - By unit prices named in the contract or subsequently agreed upon.
- Work deviations from the side of the Successful Contractor will be communicated in writing and will not commence before the approval of GWP-Med.

3.8. Penalties

- If the Successful Contractor shall fail to start and complete the Assignment within the time frame state above, the Contracting authority shall assess a penalty of €100 per calendar day for each and every day the Successful Contractor fails to complete the contract.
- The designated GWP-Med manager reserves the option to extend the scheduled completion date or waive this penalty clause in its entirety if he is of the opinion that extenuate in circumstances deemed such action appropriate.

3.9. Correction of Work

- The Successful Contractor will promptly remove from the premises all Work rejected by the GWP-Med representative for failure to comply with the Bid Documents, whether incorporated in the construction or not, and the Successful Contractor will promptly replace and re-execute the Work in accordance with the Bid Documents and without expense to the GWP-Med and will bear the expense of making good all Work of other Contractors destroyed or damaged by such removal or replacement.
- All removal and replacement Work will be done at the Successful Contractor's expense. If the Successful Contractor does not take action to remove such rejected Work within ten (10) days after receipt of Written Notice, the GWP-Med may remove such Work and store the materials at the expense of the Successful Contractor.

3.10. Construction Safety and Health Standards

- The Successful Contractor and any sub-contractor shall not require any laborer or mechanic employed in performance of the contract to work in surroundings or under working conditions which are unsanitary, hazardous, or dangerous to his health or safety, as determined under construction safety and health standards.
- Failure of GWP-Med representative to inform the Successful Contractor of safety violations will not release the Successful Contractor of his responsibilities.

3.11. Confidentiality

- By submitting a tender, the Contractors are committing to an understanding of the requirements of the work and have sufficiently addressed all aspects of the tender. All information you have provided has been checked to be correct and as intended.
- All information supplied by GWP-Med in connection with this tender to date, and any further information supplied during the tender process shall be regarded as confidential and must not be shared with any other organization without written permission of GWP-Med.

4. Duration of the Works and Contract

Duration of Works: 60 Calendar Days.

Duration of contract: Duration of Works plus three months.

5. Contract Price and Schedule of Payments

The maximum fee for this assignment is 190,000 EUR*. This amount includes all other costs, income taxes and any other amount payable or cost that may be required for the completion of the work/service, including VAT.

The schedule of payments is as follows:

- 30% payment of contract value in advance upon contract signatory and the presentation of two performance guarantees:
 - First performance guarantee equal with 20% of the amount of the advance payment, with a duration equal to the duration of the works and the

- Second performance guarantee equal with 10% of the amount of the advance payment, with a duration equal to the duration of the works plus 3 months (The first Performance Guarantee shall be released within 30 days from the completion of works to the satisfaction of GWP-MED and the second performance guarantee shall be released within 3 months from the completion of works to the satisfaction of GWP-MED. Any performance guarantee issuance expenses bear's the successful participant.
- 70% payment upon satisfactory completion of the works (Written Acceptance of works Performed)

*The final payment will be issued upon measuring of the total works performed.

6. Selection Criteria

The proposers should pass through two stages of evaluation, the first stage is On/Off selection criteria, who will pass through this stage will be Qualified and eligible to the second stage of evaluation which is Award Criteria according to the following criteria, please notice that the evaluation will be based on a percentage of 20% Financial and 80% Technical.

- The participants must be licensed to perform work in Jordan.
- The participants must provide proof of their average annual turnover for the last three (3) fiscal years being at least equivalent to the maximum amount of this Call. The applicant should provide the Financial Statements (Income Statement and Balance Sheet) of the last three years duly certified by a Public Accountant, and with authentication of receiving by the Government's Internal Revenue Authority. Include any indication of credit rating, industry rating, etc.
- The participants must present a minimum duration of operation of ten (10) years in contracted technical interventions. Proof to be provided by the related chamber (date of registration).

Failure to comply with the above requirements and provide relevant proof with the application is considered ground for exclusion.

6.1. Award Criteria

The evaluation of the qualified -according to the previous criteria- offers will be made as follows and based on the requirements and information requested below:

- Company Profile: Provide a brief description of the Participant, its legal mandates/authorized business activities, the year and country of incorporation, types of activities undertaken, approximate annual budget, environmental management systems or standards etc.

- Understanding of the Assignment Context: The Participants must provide a maximum 3-page Work Method Statement describing the work to be performed and a timeframe based on the ToR.
- Compliance specifications sheet: The Participants must provide a Letter of Compliance with the technical specifications and the procedures described in the ToR.
- Previous experience: The participants must provide a list of three (3) completed assignments of similar (comparable) nature, complexity and size to those requested in the Call. The applicant should provide a list of those assignments with the following details for each one of them:

Title of Assignment	
Date & duration of the Assignment	
Geographical area of intervention	
Contents of intervention (mention briefly key elements like type of works and key metrics)	
Cost of the Assignment	
Funder and End Client (if different) contact details for reference cross-checking* Name of the client Email of the client *By doing this the participants give their consent to the Contracting Authority to contact the listed clients. In case confidentiality matters exist, please indicate accordingly.	

6.2. Awarding Criterion and Evaluation Process

The Technical Offers of all qualified participants shall be evaluated as follows:

Name of Natural or Legal person or Entity:			
(1) Criterion	(2) weighting (w)	(3) points of criterion (c), 100-150	(4) Score = (2) x (3)
Company Profile	20%		
Understanding of the Assignment context	30%		

Compliance Specification sheet	30%		
List of three (3) assignments of similar (comparable) nature, complexity and size to those requested in the Call	20%		
UTO	100%		

Scoring for each evaluation criteria starts from 100 points (when minimum requirements are met) up until maximum 150 points (100p Base +10p for extra criteria over base up to 50 additional points) .

For Criterion “Company Profile” score starts at 100 points (when minimum requirements are met) and can reach 150 points depending upon the relevance to the requested assignment, the fiscal capacity, the presence (number of years) in the market, the type of undertaken activities of the participant , environmental management systems or standards etc.

For Criterion “Understanding of the Assignment context” score starts at 100 points when minimum requirements are met) and can reach 150 points depending upon the understanding of the nature of the requested assignment (what the participant must do), on the method of work (how the participant will do it) and the estimated time of completion (based on the timeframe included).

Each evaluation criteria is evaluated autonomously. The final scoring of each evaluation criteria is the outcome of its scoring multiplied by the corresponding weighting factor. The overall score of the technical offer is the sum of the final scoring of all the evaluation criteria.

The overall score of the technical offer is calculated on the basis of the following formula:

$$UTO = w1 \times c1 + w2 \times c2 + \dots$$

where $w1 + w2 + \dots = 100$

For the overall score which will determine the ranking of offers, technical evaluation will be weighted with 80%.

Evaluation of the Financial Offer

Upon completion of the technical evaluation all qualified Participants will be notified by the Contracting Authority to send the password for unlocking Folder B containing their Financial Offer. The Financial Offer of each qualified applicant is evaluated on the basis of the following formula:

$$UFO = 100 \times \text{max amount as in the call / amount in financial offer}$$

For the overall score which will determine the ranking of offers, financial evaluation will be weighted with 20%.

Offers which have been rejected as inadmissible or as not meeting the minimum requirements shall not be evaluated.

Identification of the most economically advantageous offer on the basis of best price / quality ratio

The final listing of the most economically advantageous offers will be made on the basis of the following formula:

$$U = UTO \times 80\% + UFO \times 20\%$$

Where U is the total scoring of each offer

The most economically advantageous offers is the one with the greatest value of U.

In case of equal overall scores, the retained offer shall be the one whose corresponding technical Offer received the highest rating.

6.3. Terms and Conditions

Language

The language of this procedure, the tender documents and the offers is English. Any documentation (certificates, etc) submitted in any other language should be accompanied by a translation in English, certified by a lawyer or public authority.