



The bidder shall provide the ARC-VIMP (MP&IC) (accompanying the bid on the closing date/date) with the signed Declaration of Acceptance of special Conditions for the RFQ.

Description: Renewable Green energy for equipping of a borehole 150m deep, 40approx distance to the shade net tanks & 30m to the garage.

1. Water test-Chemical and microbial analysis

All the tests must be done according to the SANS 241-1-1:2015 standards and must be concluded at a SANAS Accredited Laboratory. The test report must be provided with conclusions.

2. Survey work

This work will guide the alignment /mounting of solar modules to North Facing Position and must be done before mounting of solar modules and submitted to the ARC.

3. In all solar electrical installation,

The qualified electrician who will be signing off the electrical CoC must be in control on site and must be submitted as part of solar powered borehole commissioning.

Note: Single-Phase Tester can-not work with DC and will therefore not sign off on DC installation, which would include solar PV installation.

4. All warranty and workmanship

Certificate must be submitted to ARC. The service provider must offer Warranties, both for the installation as a whole and for its components (solar modules, MPPT pump controller, pump structure system for module support and so on), this will include operation and maintenance manual. These certificates should be handed during the commissioning of the system.

5. Project management & coordination The service provider must organize an activity schedule for the project execution in consultation with ARC project manager/personnel. This schedule must be planned to allow the project manager (from ARC) time to coordinate the project effectively	
6. During handover and commissioning, The service provider must comprehensively train the farmer on how to use the solar powered borehole (inclusive of operation and maintenance), provide a standard operating procedure (SOP) in English and a soft copy send to ARC-VIMP:MP&IC division for comments.	
7. Cap: The contractor must put a borehole cap to prevent any foreign material from entering the borehole.	
8. Warranties on components of the solar panels and workmanship	
Component	Warranty period
Solar module	12 Years product warranty 25 Years Linear power performance warranty
Pump/motor	Minimum of 1 year
MPPT solar pump controller	Minimum of 1 year
Remaining components	Minimum of 1 year
Workmanship warranty/guaranty for all installation	1 Year
Structural: Solar module structural support	5 years
Note: The products warranties will be checked against any product delivered onsite:	

Compulsory requirements (Note: Failure to provide the below listed documents will lead to disqualification):

Description	Comply	Do not comply
1. Compulsory site briefing		
2. Data sheets for solar module/panels must be submitted together with all the bidding documents. Solar modules must comply with SANS/IEC standards and SABS approved as stipulated in the specification Note: Data sheets must be official documents (in PDF format) from the product manufacturer. Data sheets that are copied from the internet and pasted into word, then back to PDF will not be allowed.		
3. Solar modules/panels data sheets must have the following information printed on them: • A 12-year product warranty • 25year linear power performance warranty • Solar module must comply with Applicable IEC/Accepted international standards or SANS standard and SABS approved		

Technical specification

Specification items	Specification details
Concrete collar around a borehole	The appointed contractor will construct a shallow circular concrete collar around the borehole. This collar shall have the dimensions set out in, yielding a volume of 0.08m ³ . The concrete mix shall consist of water, Portland cement, stone aggregate (10mm), and river sand. Quantities of these materials sufficient to make 0.1m ³ of concrete with the required strength of 30MPa after 28 days are (1) 20 litre of water, (2) 42kg (0.8bags) of Portland cement, (3) 0.07 m ³ of stone aggregate and (4) 0.07 m ³ of river sand.
Cap	The contractor must put a borehole cap to prevent any foreign material from entering the borehole
Borehole Yield Test certificate	The certificate must include the following key parameters, such as the: -Yield rate (Litres/Sec & Litres per hr). -Static water level. -Dynamic water level. -Installation depths at which the sustainable rate must be maintained and so on.
Water test-Chemical and Microbial analysis	Test must be according to the SANS 241-1-2015 standards. Test report must be supplied with the conclusion: 1. Drinking Water Test SANS241 Chemistry + Microbiology Testing (Tests to be conducted at SANAS Accredited Laboratory). EC, pH, SAR, Langelier, Ryznar, Turbidity, Colour, Odour, TDS, TSS, Free Cl, F, SO ₄ , NH ₄ -N, NO ₃ -N, NO ₂ -N, Ca, Mg, Na, K, Mn, Fe, Al, HPC, Heterotrophic plate count, Total coliforms, Faecal coliforms. 2. Irrigation Water Test Chemistry & microbiology testing (SANS241 Accredited Laboratory) EC, pH, COD, SAR, Langelier, Ryznar, TSS, F, CL. SO ₄ , NH ₄ -N, NO ₃ -N, NO ₂ -N, Alkalinity, CO ₃ , HCO ₃ , Ca, Mg, Na, K, B, Mn, Fe, Faecal coliform, TDS.
Water distribution system (from borehole to the shade net tanks 4 X 5000l tanks)	Once the borehole yield has been determined, the work should include trenching (500mm below the ground) of a 40mm high pressure pipe from the borehole to the shade net tanks including the irrigation connectors and all accessories associated.

Monocrystalline Solar module with a capacity of 550 W X6	Monocrystalline solar module, aligned to face true north Optimum tilt angle must be 20 to 35 degrees. Brands: Solar modules: Jinko Solar, Canadian Solar, JA solar, RenewSys, Trinasolar, SunPro, Risen, Haitai Solar, Astroenergy or Equivalent.
1.1 kW centrifugal borehole pump and a 1.1 kW solar pump controller with a build-in MPPT (Maximum Power Point Tracking Technology). Pump must have a non- return valve to ensure water does not flow back into the borehole. Pump pressure head= 150m Flow=4 m ³ /hour	Water pumping at specific depth (Depth as per borehole yield test). Use pump data sheet to select correct pump that fit the required flow and pressure drop. Note: the actual required pump and solar PV capacity will be based on the results of actual borehole yield test, therefore changes due to site specific requirements are expected.
Level sensor for the submersible pump (to be installed in the borehole)	Dry-run protection
Float level switch	Installation in the 20 00litre tank for controlling the pump and level of water in the tank.
Protection cabinet	Protect equipment from overload (fuses) switch off the installation to perform maintenance via main switch ON/OFF. Protect the installation from lightning strikes and surge (surge arresters-SPD) Centre a central point of grounding
Grounding	Equipment and System Grounding Equipment Grounding: Connect the solar module frame, solar array mounting structure (Steel support structure), enclosures, metal frames and conduits of the system to a grounding electrode (metal rod or plate buried in the soil). System Grounding: Connects the current carrying conductors/electrical components of the system, to negative/ the neutral, to the grounding electrode/Earth Spike.
Enclosures	All enclosure must have suitable protection against outdoor conditions
Mounting Structure	Solar modules will be mounted (use steel structure, painted to fit on the structures, The steel structure stand for solar modules must be covered with two layers of paint, one made with a rust-proof paint and the other made with a thick paint finish or galvanized. Mount structure height=3.5m, the structure must be structurally strong to withstand winds, which can mount 6 solar panels, concreted to around the structure as specified technical (Concrete collar around a borehole)

	
Supply all cables	PV Red and black solar cables, pump power supply cable-submersible wire (6-10mm, 2-4 core), grounding wires and other related cables, to delivered the required flow rate for filling the irrigation tanks.
Sundries	All accessories Lithium batteries 5kW and inverter 5kW must be stored and mounted in a garage approx. 30m from the borehole, Ac and DC control box must be provided. Power needs to be connected to the irrigation control box, solenoids and booster pump, approximately 40m to the shadenet

Lightning Protection and Earthing for Solar PV Apply measures to prevent catastrophic damage and failure of the installed PV system due to lightning on the mobile frame. South Africa is in a highly lightning-dense region when compared to the rest of the world. Therefore, lightning strikes can still pose a risk to any electrical system, including solar panels, so installing lightning protection specific to the installed solar PV system. Proper grounding, surge protection, and adherence to safety guidelines are crucial to minimizing the potential damage caused by lightning strikes. Grounding involves connecting solar panels and other electrical components to the Earth's surface, creating a path for electrical currents to safely dissipate into the ground.

Use earthing, electrical configurations, and protection products based on standard compliance and protection. Note: Only electrical contractor will be allowed to work on electrical installation, thus a registered qualified electrician, The electrician who will be signing off the electrical CoC must be in control on site. He must carry out or supervises the work effectively. Further note that a licenced Single-Phase Tester (SPT) cannot work with DC and will therefore not sign off on DC installations, which would include PV and any three-phase installations. Therefore, a person with SPT qualification cannot issue a Certificate of Compliance for solar installations.

Summary of the specifications for test-pumping of boreholes

Step-drawdown Test:

4 to 6 x 1-hour steps, each at a different rate – incrementally increasing. During the last step try to draw the water level down to the pump depth.

The yields to use for the steps are:

Step1 – One third of the expected yield

Step2 – two-thirds of the expected yield

Step3 – equal to the expected yield

Step4 – one and a half times the expected yield

The planned steps can be adjusted during the test, although the yield during the individual steps must be constant. Yield must be measured at least 3 times during the test to ensure it is constant. Recovery of the water level after the step test should be monitored till the water level recovers to ~ 1 m hours of the Static water level or for ~ 12 hours.

Constant Discharge Test:

24 – 72 hours at a constant rate

If the water level is drawn down to pump inlet during the test, the pump must be stopped immediately and recovery of the water level monitored. The constancy of the yield is very important, otherwise the data cannot be analyzed. The water level measurements should be taken and recorded according to the South African National Standard for the test pumping of water boreholes (SANS 10299-4:2003).

Recovery Test:

Immediately after the pump is turned off after the pumping test, start measuring water levels. You need to measure recovery until:

- Water levels recover to less than 5 % of the total drawdown during the constant discharge test
- At least three readings taken in succession are identical
- A time equal to the total time taken for the Constant Discharge Test has elapsed
- The data that needs to be collected includes:
 - Data and time at commencement of test
- The Static Water level at the start of the test
- The depth of the borehole

- The distance from the borehole to observation boreholes (if applicable)
- Pump installation depth
- Water strike depths (if known from drilling/landowner)
- Borehole diameter
- Rainfall (if it rains during the test)
- Drawdown of the water level

Rate of discharge (for Steps and constant Tests)

Pump:

Pump must have suitable power drive and have the correct pumping capacity. This needs to be managed properly!

It is VERY IMPORTANT that the pumping rate is CONSTANT during the individual steps and the constant discharge test. The mathematical equations used for analysing the data are only valid if the flow is constant! If the variation in the pump yield exceeds 5 % the test must be stopped, water levels allowed to recover, and the test restarted using suitable equipment! Valves and flow gauges are needed to monitor and control the flow rates as during pumping the change in head results in the pump yield changing. Pump inlet must be at the main water strike. If this is not known, install the pump 3 – 5 m from the bottom of the hole.

Pump must have a non-return valve to ensure water doesn't flow back into the borehole
Flow can be measured using:

- Bucket of known volume and stop watch (most reliable, and should be used to check other methods), Flow meter (note that if using a flow meter it will only work when the discharge pipe is full and the flow is not turbulent).
- Orifice weir
- V-notch weir

Observation Boreholes:

Boreholes close by should have their water levels monitored during the Test. Boreholes in the area should be rested for at least a day before pumping.

Bill of quantities for supply delivery and installation of renewable green energy solution

Description	Quantity	Unit Price	Total
1. Supply and installation of mounting steel structure (including concrete)	1		
2. Monocrystalline solar module 550kW	6		
3. 1.1 kW borehole pump (a non- return valve). and 1.1kW build-in MPPT controller/Solar pump, dry run protection including cable ties,, base plate, control box, rope, high pressure pipe 40mm.	1		
4. Protection cabinet with central grounding point, all switches and surge arrestors.	1		
5. Submersible wire length, 4 core 10mm ²	1		
6. Solar cables, grounding wires and earth spikes	1		
7. Electrical installation and CoC	1		
8. Sundries	1		
9. Connection of irrigation control box, pump and solenoids to the green energy.	1		
10. Lithium Battery 5kW (including fuses holder)	2		
11. AC control box (2 way)	1		
12. DC control box (2 way)	1		
13. Invertor 5kW	1		
14. Borehole yield test	1		
15. PV red and black cables	1		
Total			