TECHNICAL SPECIFICATIONS

Supply, Delivery and Installation of a Stand-alone Three (3) Phase 12 kWp Solar PV System with 60kWh Lithium-ion batteries at Elonctuary Farms -North West

SECTION A: TECHNICAL SPECIFICATIONS

Table 1 Solar System Components Specifications

Specifications Item	Specifications Details

Solar modules	• Supply and install Monocrystalline Solar Modules with a capacity of 12-kilowatt Peak(kW_p)-(it can be any size of solar module(W) multiplied by the number of solar modules=12kWp.)
	• Solar modules: Jinko Solar, Canadian Solar, JA solar, RenewSys, Trinasolar , SunPro, Risen ,Haitai Solar, Astroenergy or **Equivalent**
	• Solar PV modules must comply with the SANS/ IEC standards. Compliance of solar modules to the following standards is also mandatory:
	  ○ ISO9001:2015: Quality Management System
	  ○ ISO14001:2015: Environment Management System
	  ○ ISO45001:2018: Occupational health and safety management systems

North facing solar modules	• Monocrystalline solar modules

	aligned to face True North • Employ the services of a Geomatics Professional (GPr) or Geomatics Technologist (GTg) • **Optimum tilt angle must be from 20 to 35 degrees**
Solar modules **Ground Mounting Structure**	Solar modules will be mounted on poles (use steel structure, painted, minimum of 4 poles), 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. **Solar modules ground mount structure height=3.5m** **The structure must be structurally strong to withstand winds**
Three Phase Inverter	• Supply and install a Stand-alone Three(3) Phase, Sunsynk (Or equivalent) 12kW inverter to match a 12kWp Array. • The inverter must be listed on the approved Photovoltaic (PV) Inverter List to ensure compliance in terms of NRS 097-2-1. For reference on this inverter list, please google **Approved Photovoltaic (PV) Inverter List** • Supply Install all necessary Surge Protection Devices, including the one for the Lightning Protection • Supply and install all necessary Distribution Boards for all the lighting loads. • Supply and install all necessary wiring for the solar PV System

Batteries	• Supply and install a lithium-ion battery of 60 kWh. Individual Batteries can be connected to make a total of 60kWh, for example, 15kW x 4 = 60kWh, **Brand: Sunsynk or Equivalent** • The type of batteries selected must allow **parallel connection** for scalability of energy storage. • Dischargeable at 80% Depth of Discharge (DoD). • Performance cycle life ≥6000 cycles. • Safe and secure with thermal management features. • Battery management system. • Installation Type: **Floor Stand** • Supply battery rack/cabinet for support of batteries, where applicable. • Ensure the battery model is compatible with the inverter
Electrical Connection	• Connect the solar PV system to the existing 2.5kW X 2 Three phase pumps for boreholes. The solar DB must also connect circuits for powering other electrical loads (Which are using single/three phase electrical appliances/equipment.

Lightning Protection and Earthing for Solar PV

Apply measures to prevent catastrophic damages and failures of the installed PV system due to lightning. 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 modules, therefore **install 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 modules, inverters, 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**.

Application for management

The solar PV system must include a user-friendly mobile and desktop application for monitoring and managing system performance. This app should provide real-time data on energy generation, battery status, and grid interaction, allowing users to track energy usage, savings, and system health. It should feature intuitive dashboards, alert notifications for system faults, and customizable settings to optimize energy consumption. The app must be compatible with Android, iOS, and web platforms, and allow remote access to ensure easy monitoring and control of the system, enhancing user engagement and system management efficiency.

The service provider must offer comprehensive training on how to effectively use mobile and desktop applications for monitoring and managing the solar PV system. This training should cover all key functionalities, including tracking energy generation, battery performance, and system health, as well as setting alerts and optimizing energy usage. Additionally, the provider should offer ongoing support for at least 12 months post-installation, ensuring users have access to assistance in case of any technical issues or questions regarding the app or system operation. This support will help ensure smooth adoption and optimal use of the system.

Commissioning

- Installation must have been performed under the supervision of a qualified electrician according to the approved design.
- The qualified installer/electrician/company must be a registered electrical contractor.
- The electrician must sign a certificate of compliance (COC) for the installation.
- As part of a hand over, system design, as-built drawings, line diagram, Operation and Maintenance manual, and warranty certificates must be submitted to ARC.

Warranty

All equipment (Three Phase Inverter/s, solar modules, batteries, etc) installed must have a manufacturer's warranty. The service provider shall provide a 12-month guarantee on the workmanship of the work undertaken at no cost to the ARC. If during this period the equipment is not in good working order, or not working satisfactorily owing to faulty material, design, or

workmanship, the service provider will be notified and immediate steps must be taken by the service provider to rectify the defects and/or replace the affected parts on-site, at no cost to ARC.

Inverters and batteries must be installed by a qualified electrical wireman (Proof of qualification to be provided with proposal) with a valid registration with the Department of Labour. A valid electrical certificate of compliance must be issued once installed, specific to the installation of the solar system. The installation must be compliant with SANS 10142 and all its parts. The installation must comply with all warranty claim processes specific to each brand of equipment. The service provider must hand over all documents related to warranties.

Warranties Periods:

- Inverters 5-Year warranty
- Solar modules: 12 Year product warranty and 25 Years linear power performance Warranty
- Batteries 10-year warranty

Table 2 Fencing-Supply and Installation of Security Fencing around Solar System, Fencing Perimeter=24m

Fencing Materials	• 3000mm x 1800mm steel palisade panels • Palisade Fencing Pale 30mm x 30mm x 2mm/40mm x 40mm x 3mm • Steel posts (square tubing):76mm x 76mm x 2 mm with 2.4m height (Includes concrete mix), Dig 600X300X300mm deep for erecting steel posts • 1800mm x 1000m mm Steel pedestrian gate, hinges and locks • Two layers of paints
Installation	Installation of posts, fencing and paint work

SECTION B: Compulsory Requirements

Table 3 Compulsory Requirements

1. Compulsory **Site Briefing**
2. Licensed Wiremen/Electrical Contractor Certificate as either **Installation Electrician (IE)** or a Master Installation Electrician (MIE)
3. **CIDB** Grading 2EP or above.
4. **Data sheets** for solar modules/panels must be submitted together with all the bidding documents. Solar modules must comply with SANS/IEC standards as stipulated in the specifications, please see details of specific standards required under “Product Compliance” section of the technical specifications document. Note: Data sheets must be official documents (In PDF format) from the product manufacturer Data sheets that are copied from the internet and paste into word, then back to PDF will not be allowed.

Bidders must **submit official manufacturer data sheets (PDF format)** for the following major system components:

a. **Solar Modules**
b. **Inverter**
c. **Batteries**

5. **Three (3) reference letters**

   Qualified service providers are required to demonstrate experience by submitting **three (3) reference letters** for completed projects of similar size and scope, consisting of either grid-tied solar PV systems or Stand-alone solar PV systems with a minimum capacity of 8kW. Each reference letter must include the project description, capacity, client organization, traceable contact details, and completion date. Failure to provide all three reference letters will result in disqualification.

Contingency Provision

A **contingency amount equal to 10%** of the quoted price must be included. This reserve will be held by the Agricultural Research Council (ARC) to address any unforeseen circumstances. The use of this amount will be subject to prior written agreement between ARC and the appointed Contractor/Service Provider.