Annex 1 (A)

TECHNICAL SPECIFICATIONS & SCOPE OF WORK FOR CONSTRUCTION OF SWDS (Solar pump)

1. WATER YARD

1.1. Typical Water Yard Technical Specification

Water Sources:

The motorization of the two boreholes one in Mayen Gumel in Warrap and the other in Lohutok in Eastern Equatoria will make use of existing boreholes (currently fitted with hand pumps)

Yield:

The selected water source for a solar or diesel pumped scheme should have a tested yield of a minimum of 3 m^3/hour.

A water meter should be installed at the well head to monitor the quantity of water pumped from the well during usage. The recorded yields in record cannot be relied on so the contractor shall be expected to conduct their own pump testing

Water quality:

Before the end of pumping test two water samples of 1litre each should be taken for full routine physico-chemical analysis. The water samples should be analyzed in a certified and approved laboratory. Bacteriological and physiochemical tests should be undertaken Major Parameters such as Fe, Mn, Fl, Cl, bicarbonates, turbidity, etc. (minimum of 10 parameters) should be conducted for all new water sources. Samples collected should be submitted to relevant laboratories within 12 hours of collection.

Size of Schemes:

All water schemes shall be constructed to meet a daily water demand of 20m3/ day for large schemes and assuming a solar duty pumping cycle of 7 hours and must be direct current PV pumping configuration without use of batteries and or inverters. The solar pumped schemes are proposed to serve population sizes of over 1,000 people assuming a water demand of 20L/Per Person per day.

Submersible Pump:

A suitable submersible pump with capacity not exceeding 4 m^3/ hour (20m^3 demand) at 80m depth or a minimum of 2.0m^3/hour at 100m shall be selected. The pump should be powered by solar panels with direct DC pumping configuration following the wire-to-water principles without any need for inverter or storage batteries.

Solar Panels:

Supply and install 12 solar photovoltaic cells of 120 watts and fitted onto suitably sized racks and mounted on top of the overhead tanks and secured from theft, vandalism and or being blown away by wind. The mounting rack shall be grounded through a suitable earthing rod to safeguard the structure against lightning strike.

Control Panel:

Select appropriate Switch Box that regulates power to the pump and that selects the best source. The Control Box should have a starter, a phase failure relays a low-level relay, an ammeter and a lockable weatherproof enclosure. The control panel shall be well grounded.

Rising Main:

The pipe from the pump to well-head should be galvanized iron (GI) 32mm OD diameter.

Storage:

A total dead storage capacity of 10 m^3 capacity prefabricated PVC tanks painted externally black should be provided and installed over the checkered mild steel support. The tank sits on a steel tank tower stand 6m above the ground.

Buried Pipes:

All ground pipes (both GI and HDPE) shall be laid at a depth of 500mm. Standard sizes used are 3” and 2” GI Pipe jointing should be either flange or threaded fittings.

Tap-stands:

The scheme should have 2 distribution points with 4 tap stands fixed on a concrete support tap stand. Control valve is set within before the meter box to regulate flow to the consumer. The detail of the tap is shown in the attached drawing.

Water meters:

At each tap-stand a consumer meter is placed. This allows consumption to be monitored, measured.

Manholes:

Brick or concrete block manhole internal dimension 60cm x 60cm and 60cm depth plastered inside with lockable metal cover fixed on an angle iron frame to house the water meter and valves. The manhole is

built on a 15cm mass concrete base. The top of the manhole is constructed 20cm above the ground level to avoid stepping of vehicles on the manhole.

Drainage channel:

Drainage channels of 7 metres length should be provided to channel the spilt water to the livestock watering troughs.

Elevated Water Tank:

- Total Tank Storage Capacity: $10m^3$
- Tower Height: 6m
- Shape Cubical or cylindrical
- Each Tank Capacity: $5m^3$

Tank Body:

- The tank will be PVC or HDPE materials and black in colour on the exterior and white in colour on the interior.

Connections for Inlets, Outlets and Washout:

- 75mm tank inlet flange Bs thread to connect water filling pipe.
- 75mm tank outlet flange Bs thread to connect the main network distribution pipe.
- 100mm tank wash outlet flange to connect washout pipe.
- 75mm tank overflow flange connect overflow pipe.
- Water filling inlet pipe shall be well supported at tank and tower.
- Washout and overflow pipes shall be on one side of the tank and to be connected with one valve and one discharge pipe down to the ground level.

Supporting Steel Tank Tower:

- Height of tower shall be 6 meters
- 12 Branch beams shall be of IPE standard 140x70 mm or equivalent.
- Main beams shall be of IPE 180x90 mm
- Stanchions shall be of 3 m height manufactured from 180x90 mm or equivalent.
- All wind bracing shall be manufactured from 65×65×6 mm and tied with Bolts, Nuts and of (1) bay 3m
- Foot plate and top plate thickness shall not be less than 16 mm.
- Gusset plates thickness shall not be less than 6 mm.
- Anchor bolts (22 mm×500cm) with nuts and washer four anchor bolts are to be used per footing.

Paint:

- The paint used shall be oil-based.
- Two coats shall be applied to finish on all steel components.

Tank (as supplied by the manufacturer):

- Exterior shall be black in colour.
- Interior shall be white in colour.
- Tank shall be black carbon plastic.
- Tank diameter shall be 1,900mm.
- Tank height shall be 2,000mm.

Water Distribution System (see drawings for details)

1. Distribution network

- The length and Size of pipes according to the layout drawing.
- All pipes and fitting of galvanized iron or HDPE
- The main valve 75mm of cast iron sluice valve (1) inlet and (1) outlet.
- The 50mm (2") Water Meters to be fixed after the main inlet valve.
- To excavate trenches to 500mm depth for the transmission pipes, connect and backfill.
- The overflow/washout pipe to be extended to the yard fence.
- 50mm valves should be of ball type for animal troughs and carts filling.
- Use petcock valves 25mm (1") for the distribution platforms.
- Standpipe for carts filling with 50mm valve.

2. Floor & Foundation (see details in drawings):

Designed mainly to keep up the environment inside water yard especially around troughs. This can be achieved if:

- Safe handling of spill water and proper drainage system
- Keeping area around livestock watering troughs dry
- Assure safety of livestock during watering

3. Concrete Foundation:

- 0.20m thickness 1:3:6 P.C.
- Apron 0.1m thickness 1:3:6 P.C. over compacted sand & dry stone.
- Drainage channel
- Drainage pipe OD 4" PVC
- Soak – away well. 2.0 diam 3.0deep

4. Public Standpoint

Consists mainly of two points each 4 taps and galvanized iron delivery

1. 8 No 1" OD diameter petcocks.
    1. Plat form casted of concrete 4.5x2.3m, compacted sand fill, 0.1m concrete 1:3:6 floor, Concrete drainage channel leading to soak away well. Detail drawing attached.

5. Fence:

Fencing of the entire water yard components consists

- 10 x 10m for G.H, E.W.T & P.S. Pipes using galvanized iron chain-link gauge-10.
- 6 x 1.5 x 0.75m for vegetable water and livestock watering trough (see lay-out details in the drawing) for rectangular option.

- 2.25 OD X 0.75M for circular option.

    - 2" OD diameter black steel - 2 m.l fence posts erected on 30x30x60 concrete foundation. The steel posts installed at 2m intervals.
    - 3" OD diameter black steel pipes - 2 m.l corner posts fixed in 0.3 x 0.3 x 0.6m 1:3:6 P.C - block reinforced with 2 side angles 2" x 2" x 1/4.
    - GI chain-link rolls 1.8 m high lightened by 6mm steel rods fixed to fence posts at three levels.

6. Gates:

- 3.0 m main gate:
- Comprising 2 leaves 1.5m each – constructed of 1.5" M.S pipes & expanded metal
- 4" O M.S pipe supporting member fixed on 0.4 x 0.4 x 0.6m P.C. 1:3:6 block accessories, bolts, straps, etc.
- 1.0m Gate access to the water kiosks. The specification like the above main gate.

_____ Applicant's Signature Date