

**Scope of Work for Upgrading of borehole to Water Yard in Malla village-UMD locality.**

Catholic Relief Services (CRS) – United States Conference of Catholic Bishops, an international relief and development agency, committed to the alleviation of human suffering, development of people and fostering of charity and justice in the world irrespective of race, creed, or nationality.

CRS seeks qualified entity specialized and experienced in water industry and construction of water systems (including water wells, water pumping components, solar energy set, elevated water storage and distribution pipework etc.) to work in **Malla village** in **Um Dukhun** locality - Central Darfur State; the activities include upgrading borehole to water yard consists installation of submersible pump, solar energy unit, water distribution point with carts filling, installation of elevated water tank and water pipework, and fencing of each component of the system, during the period from 01st Jan 025 to 15th Feb 2025.

**Primary Functions**:

Under the overall guidance and direct supervision of CRS WASH Senior project officer (SPO), the **contractor** upgrade one borehole to water supply, storage, and distribution system in line with technical guidelines of Water and Environmental Sanitation Project (WES)-Sudan and CRS field staff.

**The contractor responsibilities:**

The specific tasks of the contractor under this scope of work should be implemented under direct supervision and instruction of CRS field staff, and each completed stage of the work should be accepted and approved by CRS field staff, and the contractor should implement and complete any required repair or amendment before starting the next stage. The work includes, but not limited to the following:

1. **Construct fence around borehole:** *(At: coordinate: Long E: 22.97924Lat N: 11.46839 altitude: 0000 m)*
   1. Provide and install materials for construct fencing around borehole size (5m\*5m\*2m high).
   2. using heavy duty steal or galvanized poles (Angles or pipes) 3 meters high with spacing 2 meters or less.
   3. stall gate door 2m\*1.5m supported with control lock.
   4. The fence should be constructed with good, barbed wire, mesh and support on top, middle, and bottom by tight wire for prevent twists.
2. **Supply and Installation of Submersible pump and pipework:**

* Supply and install of SP 14-8, Grundfos submersible pumping device with sensor or any equivalent pump of an approved brand with the following technical characteristics: average flow rate of 15.m3 of water per-hour with a Head of 45 m higher than the water well elevation through 2 inches high density polythene pipe, from the setting depth (22 meter below ground surface) to the elevated tank at 350 meters away from the borehole source.
* Supply and install RSI 3x380-420V IP66 2.2kW 5.6A, inverter, Nominal power - P2 2.2 kW, Power supply frequency: 50 / 60 Hz, Nominal voltage:3 x 380 - 440 V, Protection index (IEC 34-5): IP66, Nominal AC output voltage:380 V, DC Input Voltage: 800 V, Nominal AC output current: 6 A, Udc:400 V.
* Supply and install Sine-Wave filter: Supply frequency:60 Hz, rated voltage x 200-500 V, rated current 7.5 A, rated current at 120 Hz 5.5 A, degree of protection (IEC 34-5) IP20, cable size 4 mm2, Field loss 80 W.
* Supply and install OVR PV 40-1000 P, overvoltage protection DC, AC.
* Supply and lay all electrical cables 370m (4x6mm2 flat drop cable) plus accessories from borehole head works to control panel –preferably Grundfos model.
* The rising main from the pump to the ground surface should be of galvanized pipe or stainless-steel pipe.
* The outlet of the rising main at borehole source should be equipped with nonreturn and gate valves.
  1. Provide and install high density polythene pipe of 2 inches diameter total length 350m to connect the discharge point, at the well level, with the galvanized (GL) pipe connecting the inlet of the elevated water tank.
  2. Excavate trench of one 1 meter depth and 350 meters long extended from the water well to the elevated water tank for installing of the water pipe, the rough portion of trench should be backfilled with 15 cm-thick soft soil layer under the pipe and 25 cm-thick layer above the pipe then complete back filling of the remaining portion with the cutting excavated from the trench or alternative suitable soil materials.

1. **Supply and Installation of Solar energy unit and fencing including elevate tank, distribution point:** *(at long: E: 24”20.825 Lat: N 13”07.862 altitude 1695m).* 
   1. Provide and install complete solar energy unit with all accessories to properly operate the pump.

* The solar unit should be installed at the specified area 350 meters away from the water well.
* Solar panels should be installed on heavy duty steel or galvanized skeleton on top of elevated tank or elevated at least 3 meters above the ground surface to mitigate the risk of easy stealing of the panels.
  1. Provide materials and construct tight fencing (15m\*15m) around the solar panels, distribution point and elevate tank together using heavy duty steal or galvanized poles (Angles or pipes) 3 meters high with spacing 2 meters or less, and barbed wire equipped with door (2m\*2m) and locks *(solar panel should be split by partition has door 2m\*1m from elevated tank, distribution point)*.

1. **Supply and Installation of steal water tank** **and tower and fence (***same fencing around solar, distribution point with carts filling*: *(at Long: E 24”20.806 Lat: N 13”07.792 Altitude 1730m)*
   1. Provide and install cylindrical steal water tank made of mild steel plates, of capacity 15000 liters, *placed on steal tower 4-meters height*, with the main requirement including, *but not limited to*, the following:

* The bottom plate should be 6 mm thick, the side plate 5 mm and the top cover 4 mm thick.
* Paints: The tank shall be painted with antirust prime coat. Two other coats shall be applied as follows. a) Internal coating shall be of bituminous non-toxic paint. B) External shall be painted with silver coating of approved oil paint.
* The inlet connected to the supply pipeline with galvanized pipe 2 inches diameter.
* The outlet connected to the distribution pipeline with galvanized pipe 3 inches diameter.
* The water tank should be equipped with water level indicator with ladder to support chlorination process.
* Water level indicator shall be coated with white background and red graduations.
* Water tank should be disinfected before starting the supply of water to the consumers.
  1. Fabricate and erect steal tower of 4 meters height according to standard specification and guideline of Public Water Corporation (PWC).
* Casting of reinforced concrete foundation for the supporting tower.
* Foot plate and top plate thicknesses shall not be less than 16mm.
* Holding down bolts, nuts and washers shall be supplied complete with adequate sizes but not less than 16mm and 4 anchor bolts are decided to be used per footing.
* The supporting tower should be fixed on the foundation using the anchor bolts after the concrete attains its full strength after 10 days of concrete placement.
* Tower shall be painted with antirust prime coat, and bituminous black paint.

1. **Supply and Install distribution pipeline:**
   1. Supply and install high density polythene pipeline of 3” diameters and 10 meters length and connect with descending GL pipe from the elevated tank to distribution point.
   2. Connect 2” diameter pipeline with 3” diameter pipeline descending from elevated tank using reducer 3” \*2” to connect with distribution point has 12 taps including brunch line to cart filling.
   3. Digging 1 meter-depth and 350 meters-long trench to accommodate the pipeline from the borehole to elevated tank.
   4. Back fill the rough section of the trench bottom (i.e. the portion with stone, if there) back fill with fine soil from the bottom up to 150 mm thick.
   5. Lay the pipeline in the trench and backfill with soft materials up to 250 mm above the pipe then backfill the remaining portion of the trench up to the top i.e. ground surface with the cutting excavated from the trench or other available suitable source.
2. **Construction of tap stand:** (at *Lon****:*** *E 24”20.825 Lat: N 13”07.862 Altitude 1695 m)* 
   1. Construct tap stand of 12 taps connected to 2” GL pipe equipped with gate valve, installed on platform built of red bricks, and cement-sand mortar.
   2. The platform construction: The foundation of the platform should be of minimum 1.5 m width, 3 m long, and (0.3 m to 0.5 m) depth. The height of the platform 0.6 m, with 1.25 m height of the tap stand.
   3. Provide and cover the top and sides of the platform with white tiles.
   4. Provide plumping materials and connect the tap stand with the water main line with 2” size high-density polythene pipe.
   5. Construct the floor of concrete slap 10 cm thick.
   6. Construct animal trough sized 0.6\*0.6\* 10 meters long outside the fencing area and drainage ditch from the tap stand to animal trough.

**Bill of quantities and quotation:**

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| --- | --- | --- | --- | --- | --- |
| No | Item Description | Unit | Q’ty | Unit price | Total price |
| 1 | **1. Construct fence around borehole** | | | | |
| 1.1 | Provide and install materials for construct fencing around borehole size (5m\*5m), using heavy duty steal or galvanized poles (Angles or pipes) 3 meters high with spacing 2 meters or less. | Job | 1 |  |  |
| 1.2 | install gate door 2m\*1.5m supported with control lock. | job | 1 |  |  |
|  | **Sub-total (1)** | | | |  |
| 2 | **Supply and Installation of Submersible pump** | | | | |
| 2.1 | Supply and install of SP 14-8, Grundfos submersible pumping device with sensor or any equivalent pump of an approved brand with the following technical characteristics: average flow rate of 15.m3 of water per-hour with a Head of 45 m higher than the water well elevation through 2 inches high density polythene pipe, from the setting depth (25 meter below ground surface) to the elevated tank at 350 meters away from the borehole source. | no | 1 |  |  |
| 2.2 | Supply and install RSI 3x380-420V IP66 2.2kW 5.6A, inverter, Nominal power - P2 2.2 kW, Power supply frequency: 50 / 60 Hz, Nominal voltage:3 x 380 - 440 V, Protection index (IEC 34-5): IP66, Nominal AC output voltage:380 V, DC Input Voltage: 800 V, Nominal AC output current: 6 A, Udc:400 V. | no | 1 |  |  |
| 2.3 | Supply and install Sine-Wave filter: Supply frequency:60 Hz, rated voltage x 200-500 V, rated current 7.5 A, rated current at 120 Hz 5.5 A, degree of protection (IEC 34-5) IP20, cable size 4 mm2, Field loss 80 W. | no | 1 |  |  |
| 2.4 | Supply and install OVR PV 40-1000 P, overvoltage protection DC, AC. |  | no | 1 |  |
| 2.5 | Supply and lay all electrical cables 370m (4x6mm2 flat drop cable) plus accessories from borehole head works to control panel –preferably Grundfos model. |  |  |  |  |
| 2.6 | The rising main from the pump to the ground surface should be of galvanized pipe or stainless-steel pipe. | m | 30 |  |  |
|  | **Sub-total (2)** | | | |  |
| 3 | **Supply and Installation of Solar energy unit and fencing (***same fence of elevate tank, tower, distribution point, cart filling***)** | | | | |
| 3.1 | Provide and install complete solar energy unit with all accessories to properly operate the pump.  *(The solar unit should be installed at the specified area 305 meters away from the water well.*  *Solar panels should be supported with heavy duty steel or galvanized skeleton (5m\*4m area at 15 degree) on the top of tank or elevated at least 3 meters above the ground surface). Earth connection, TH cable 6mm2 green, yellow.* | set | 1 |  |  |
| 3.2 | "Construct, Supply and install 300w polycrystalline solar panels to supporting steel frame stanchion (4m x 3m area 1m high at 15 degree) to power submersible pump (sunshine)include electric cable and combiner box-see design, Voltage at Maximum Power (Vmax) :35 V,Current at Maximum Power (Cmax):8,61 A, open circuit voltage (Voc) : 46 V, short circuit current (lsc) :9,6 A, module efficiency :17,5 %, power tolerance (+) : + 1,5 %.  The minimum power requirement is 4Kw, i.e 75% of output in the most critical month. A one-year warranty is required, with power losses limited to 3% in the first year and 0.5% from the second year onwards." | no | 1 |  |  |
| 3.3 | Provide materials and construct tight fencing (15m\*15m) with door (2m\*2m) around the solar panels, elevate tank, and distribution point including cart filling with partition in between them using heavy duty steal or galvanized poles (Angles or pipes) 3 meters high with spacing 2 meters or less, and barbed wire equipped with door and locks (the fencing area depend on the size of the solar unit that fit the selected pump mentioned on above). the partition between panel and distribution point also has door (2m high\*1m width) for allow guard to operate system. | job | 1 |  |  |
|  | **Sub-total (3)** |  |  |  |  |
| **4** | **Supply and Installation of steal water tank** **and tower** | | | | |
| 4.1 | Provide and install cylindrical steal water tank made of mild steel plates, of capacity 15000 liters, thicknesses 6mm for the bottom 5mm for side wall and 4mm for the top cover placed on steal tower 4-meters height, with accessories and the main requirement including, but not limited to what specified in scope of work hereabove. | job | 1 |  |  |
| 4.2 | Provide materials, fabricate, and erect steal tower of 4 meters height supported by ladder with bearing capacity of 20 tons to curry 15 cubic meter steel tank according to standard specification and guideline of Public Water Corporation (PWC).  Including but not limited to specification in the scope of works hereabove. | job | 1 |  |  |
|  | **Sub-total (4)** | | | |  |
| **5** | **Supply and Installing distribution pipeline 2” diameter** | | | |  |
| 5.1 | Supply and install high density polythene pipeline of 2” diameters length 350 meters and connect with the GL pipe ascending from well source to the elevated tank. | m | 350 |  |  |
| 5.2 | Supply and connect a 3”-diameters, 10 meters long high-density polyethene pipe connect with descending outlet GI pipe of tank then reduced to 2” with reducer 3’\*2” to supply water to the distribution point, cart filling equipped with control valve. | m | 10 |  |  |
|  |  |  |  |  |  |
| 5.3 | Digging trench 1 meter-depth and 350 meters-long to accommodate the pipeline from well water source, to elevated tank. | m | 350 |  |  |
| 5.4 | Back fill the rough section of the trench bottom *(i.e. the portion with stone)* back fill with sand or fine soil from the bottom up to 150 mm thick. | m | 350 |  |  |
| 5.5 | Lay the pipeline in the trench and backfill with soft materials up to 250 mm above the pipe then backfill the remaining portion of the trench up to the top i.e. ground surface with the cutting excavated from the trench or other available suitable source | m | 350 |  |  |
|  | **Subtotal (5)** | | | |  |
| 6 | **Construction of tap stand has 12 taps** | | | |  |
| 6.1 | Provide complete set of plumping materials and fittings for construction of tap stand of 12 taps connected to GL pipe equipped with gate valve. | set | 1 |  |  |
| 6.2 | Construction of the platform: the foundation of the platform should be of minimum 1.5 m width, 3 m long, and (0.3 m to 0.5 m) depth. The height of the platform 0.6 m, with 1.25 m height of the tap stand. | job | 1 |  |  |
| 6.3 | Provide and cover the top and sides of the platform with white tiles. | job | 1 |  |  |
| 6.4 | Provide plumping materials and connect the tap stand with the water main line with 2” size high-density polythene pipe. | job | 1 |  |  |
| 6.5 | Construct the floor of concrete slap 10 cm thick | job | 1 |  |  |
| 6.6 | Construct animal trough sized 0.6\*0.6\* 3 meters long outside the fencing area and 10m drainage ditch from the tap stand to animal trough at North site. | job | 1 |  |  |
| 6.7 | Any other addition(s) proposed by the vendor. |  |  |  |  |
|  | Sub-total (6) | | | |  |
|  | **Grand Total\*** | | | |  |

*\*The final cost of the work will be adjusted to the actual work done and materials provided, verified, and approved by the CRS field officers.*

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| Vender Name: Signature: Date: |
| Stamp |