

## **TECHNICAL SPECIFICATIONS**

### **Water Supply Project – Al-Habeel Well**

**Project Location:** Al-Habeel Area, Tuban District, Lahj Governorate  
(13°06'33.2"N 44°48'12.7"E)

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## **1. GENERAL REQUIREMENTS**

### **1.1 Scope of Work**

The contractor shall supply, install, test, and commission an Integrative component for the existing system in the area, all existing and new components must work as a single system to operate the water well. The system should be fully operational, autonomous, and designed for high-temperature environments ( $\geq 50^{\circ}\text{C}$ ), including all civil, mechanical, and electrical works as described in the Bill of Quantities (BOQ) and these Technical Specifications.

Current situation:

- The project's existing well needs to be deepened, as the current depth is about 13 meters and needs to reach between 20-25 meters to reach the stable water level (there is a commitment from the parents to deepen).
  - The existing submersible pump (TDH 100 m, capacity of 2 L/S) works with small solar system, (8 panels 590 w), the contractor should check all the existing components.
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### **1.2 Standards and Codes**

All works shall comply with the latest versions of:

- WHO and UNICEF WASH standards
  - BS (British Standards) / IEC standards
  - Local regulations and environmental requirements
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### **1.3 Submittals**

The Contractor shall submit for approval:

- Technical datasheets (pump, inverter, panels, cables)
  - Method statements
  - Work schedule
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#### **1.4 Quality of Materials**

All materials shall be:

- New and unused
  - High quality and corrosion-resistant
  - Suitable for high temperatures (up to 50°C)
  - Approved by the Engineer prior to installation
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## **2. SOLAR PUMPING SYSTEM**

### **2.1 General Description**

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#### **2.2 Solar PV System**

- Total PV capacity should be  $\geq 1.7 \times$  motor power
  - High-efficiency solar panels compatible with the existing panels
  - Mounted on galvanized steel structure
  - Installed on reinforced concrete bases (1:2:4 mix)
  - Steel mounting structure, in accordance with the existing steel mounting and make everything to rehabilitate and strengthening, reinstall or manufacturing new steel frame for all (if needed) the existing one and the new one
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#### **2.3 Inverter / Controller**

- Capacity  $\geq 1.5 \times$  motor power
- Hybrid operation (solar + generator/grid if applicable)
- Weatherproof enclosure
- Integrated protections (overload, dry-run, voltage)

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## 2.4 Protection Systems

- Dry-run protection sensor
- Overcurrent and surge protection
- Lightning protection system

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## 2.5 Rising Main

- HDPE pipe (PN16), diameter: **2 inches**
- Installed to required depth (~33 m)
- Proper jointing and support

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## 2.6 Valves

- Non-return valve (50 mm, ductile iron)
- Compliant with BS standards

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## 3. ELECTRICAL WORKS

### 3.1 Cabling

- DC cables  $\geq 10 \text{ mm}^2$
- Pump cables  $\geq 3 \times 6 \text{ mm}^2$
- Installed in protective conduits ( $\geq 1.5$  inch)

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### 3.2 Installation

- Cables routed safely inside and outside well
- External cables buried at  $\geq 50$  cm depth

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### 3.3 Earthing System

- Copper conductor  $\geq 10 \text{ mm}^2$
- Copper earth rod

- Soil treatment (salt & charcoal)
  - Complete grounding system
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### **3.4 Control Panels**

- Weatherproof
  - Equipped with circuit breakers and protections
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## **4. CIVIL WORKS**

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### **4.1 Site Preparation**

- Clearing, excavation, and leveling
  - Removal of debris and unsuitable materials
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### **4.2 Well Protection Chamber**

- Circular chamber:
  - Diameter: **2.5 m**
  - Height: **2.5 m**

#### **Construction Details:**

- Excavation and backfilling (compacted layers)
- 20 cm stone soling
- 10 cm plain concrete (1:2:4)
- SRC cement for all concrete works

#### **Walls:**

- Solid concrete blocks with mortar (1:3)
- Internal & external plaster (2 cm thick)

#### **Finishing:**

- Weather-resistant external coating
- Cement splatter for durability

**Access:**

- Steel cover ( $\geq 3$  mm thick)
  - Steel door (2.0 × 0.9 m)
  - Anti-rust paint (2 primer + 2 finish coats)
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**4.3 Inspection Chambers**

- Size: **1 m × 1 m × 1 m**

**Includes:**

- Excavation and backfilling
  - 20 cm sub-base
  - Concrete base (1:2:4)
  - Blockwork with SRC cement
  - Plastering (internal/external)
  - Steel cover with locking system
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**4.4 Concrete Curb and Interlocking**

- Concrete strength  $\geq 300 \text{ kg/cm}^2$
- Stone base layer with concrete bedding
- Interlocking paving blocks (high strength)

**Execution:**

- Proper leveling and compaction
  - Alignment and finishing
  - Water curing for  $\geq 7$  days
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**5. PROTECTION FENCING (SOLAR AREA)****5.1 Fence Specifications**

- Chain-link mesh (plastic-coated galvanized)
- Maximum opening: **70 mm**

- Height: **2.0 m**
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### **5.2 Posts**

- Galvanized steel pipes (2-inch diameter)
  - Length: **2.5 m** (0.5 m embedded)
  - Spacing:  $\leq 2$  m
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### **5.3 Concrete Works**

- Foundations (1:2:4 mix)
  - Continuous curb: **20 × 20 cm**
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### **5.4 Reinforcement**

- Steel bars ( $\varnothing 8$  mm) top and bottom
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### **5.5 Access Gate**

- Size: **1.0 × 2.0 m**
  - Lockable
  - Heavy-duty hinges
  - Galvanized steel frame
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### **5.6 Finishing**

- Anti-rust coating (3 primer + 2 finish)
  - Gravel layer inside fence  $\geq 6$  cm
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## **6. QUALITY ASSURANCE AND CONTROL (QA/QC)**

- All works subject to Engineer approval
- Contractor shall follow approved method statements
- Materials tested before use

- Defective work shall be replaced at Contractor's cost
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## **7. TESTING AND COMMISSIONING**

- Continuous operation test: **≥ 48 hours**
  - Verify:
    - Flow rate
    - Head
    - System stability
  - Final acceptance subject to Engineer approval
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## **8. TRAINING AND HANDOVER**

- Provide on-site training for operators
  - Deliver:
    - O&M manuals
    - As-built drawings
    - Warranty documents
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## **9. HEALTH, SAFETY, AND ENVIRONMENT (HSE)**

- Provide PPE for all workers
  - Ensure safe excavation and electrical works
  - Proper waste disposal
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## **10. MEASUREMENT AND PAYMENT**

- Payment shall be based on BOQ items
- Lump sum items include all materials, labor, and equipment
- No separate payment for incidental works.

## **11. Warranty:**

- The assign contractor will provide retention guarantee for a period of no less than six months from completion of the project, the guarantee will equal to 10% of the project amount.