



## Scope of Work – Substation Engineering

## Technology

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## 1. INTRODUCTION

The project involves the relocation of the borehole water supply system of Marathon Substation, currently the borehole is located outside the perimeter fence and supplies the substation through a pump. The problem is the criminal activity of tempering and theft of the borehole system elements (pump and cables). The project is initiated as a response to the security threats and to prevent tempering and theft of the system by having it relocated inside the perimeter of the substation.

An external consultant (hydrogeologist) was appointed to locate and ideal position within the substation and drill the borehole for water supply; the borehole has been drilled and cased. The borehole information is as follows:

- Borehole coordinates - 25°24'40.2"S; 30°55'21.1"E
- Depth of borehole = 100 m
- Water table height = 18 m
- Estimated yield = 1.2 L/s (103 m<sup>3</sup>/day)
- Recommended pump inlet depth = 60 m
- Recommended submersible pump = 4", 0.55Kw, 220V submersible pump which can deliver 10 L/min

## 2. REFERENCES

- [1] (240-55922824) - Substation Layout Design Guideline
- [2] (240-109644476) - Standard for Implementation of Substation Layouts for Transmission Substations
- [3] South African Grid Code
- [4] Occupational Health and Safety Act (OHS Act) 85 of 1993
- [5] (32-1205) - Eskom Maintenance Management Policy
- [6] (TST41-794) - Substation and Facility Maintenance
- [7] (32-727) - Eskom Safety, Health, Environment and Quality policy
- [8] (SANS 1200) – General Civil
- [9] (240-1001183119) - Standard for Fences in Eskom Transmission Stations
- [10] Guidelines for Human Settlement Planning and Design Vol 2 – CSIR
- [11] SANS 10142 – Wiring code

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### 3. SCOPE OF WORK

Designs and construction are in accordance to [1] – [10]. All construction is to be carried out in accordance with Eskom's Safety, Health, and Environmental Specification. Construction will be done in a substation with live electrical equipment; therefore, all necessary safety procedures must be strictly adhered to.

#### 3.1 SUBMERSIBLE PUMP

##### 3.1.1 Specification

Install submersible pump according to the following specification. Although the pump is specified the contractor must ensure it is suitable for the depth and distance to the water supply tank. The depth of the borehole is 100m. The water table height at the time of drilling was 18m.

- Submersible pump 4 inch,
- Motor power at 0.55 kw,
- Voltage rated at 220V,
- Flow rate at 10 L/min.
- The pump is to be fixed on nylon rope according to the manufacturer's specification.
- Provide all necessary connectors, adaptors and consumables.

##### 3.1.2 Installation

Prepare the site for installation. Ensure all safety measures are in place.

Lower the submersible pump into the borehole to the recommended depth of 60m.

Connect the pump to the power supply as specified on drawing MAR20P10-SE-E48.

Ensure earthing is done.

Securely fasten the pump and ensure it is properly aligned.

#### 3.2 ELECTRICAL INSTALLATION

- Supply and install new supply cable from existing pump house DB to new PHDB located withing the pump house.
- Supply and install equipped Distribution Board PHDB in the pumphouse according to the drawing MAR20P10-SE-E48
- Supply and install supply cable from PHDB to borehole pump.
- Supply and install isolator switch at borehole for bore hole pump.
- Supply and install Float switches in the Head tank for control of the borehole pump.

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- Test, Commission and issue C.O.C.

### **3.3 BOREHOLE**

- The borehole will have a concrete apron around and provide for a sanitary seal for protection against aquifer pollution.
  - Size 1 x 1m
  - Concrete apron to be 15 MPa concrete, 100 mm in thickness and to be reinforced with mesh wire ref 200. Top cover to be 30mm.
- Water supply pipe from borehole to tank:
  - Dig a narrow trench at a depth of min. 600mm between the borehole and the water supply tank.
  - Install a 25 mm diameter HDPE class 6 pipe to the borehole pump and water supply tank. Lay the pipe in the trench. Backfill the trench with the excavated material in layers of 150mm. The first layer over the pipe to be compacted carefully.

### **3.4 ELEVATED WATER TANK**

- The quality of the current existing elevated water tank is to be inspected.
- The condition of the tank shall be reported and recommendations for repairs shall be undertaken.
- The quality of the all the pipes and connections to be checked and replaced if required. All exterior pipes to be galvanised steel.

### **3.5 WATER RETICULATION PIPELINE**

- The contractor must detect and inspect the current water reticulation system in Marathon.
- If there are any bad conditions, replacement or repairs must be conducted to restore the water reticulation system. The contractor should replace all the above ground water pipes which are polycop type to suitable size copper to SANS 460 class 2.
- After checking and alterations the pipes and connections, the complete system must be checked for proper water flow and pressure. In case of water pressure too low, the contractor must install and connect a suitable pressure pump at the water supply tank.

### **3.6 FILTRATION DEVICE**

- A suitable purification reverse osmosis system will be installed at the kitchens of the office and control building where drinking water is available.

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### 3.7 TESTING AND COMMISSIONING

- Conduct a thorough testing of submersible pump, water pipe connections and the reticulation system to the satisfaction of Eskom.
- Testify that the pump is delivered the specified water quantity of 1,2 litre/sec.
- Confirm that no leaks is evident and with no irregularities.
- Make the necessary adjustments or repairs to ensure optimal performance of the complete water reticulation system.
- Commission the installation and provide a certificate of compliance for the electrical installation.
- Provide operational instructions to Eskom.

### 4. DOCUMENT LIST

The following documents are applicable to this enquiry:

Drawing number	Document name
MAK20P10-SE-E48	Electrical installation
MAK20P10-SE-E51	Layout

### 5. AUTHORISATION

This document has been seen and accepted by:

Name	Designation
Dawie Naude	Engineer – Civil
Andile Maneli	Middle Manager – Civil

### 6. REVISIONS

Date	Rev.	Compiler/s	Remarks
April 2022	0	S Mabena	First Issue
September 2023	1	D Naude	Final scope defined.

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## **7. DEVELOPMENTAL TEAM**

The following people were involved in the development of this document:

- Sithembiso Mabena
- Dawie Naude

## **8. ACKNOWLEDGEMENT**

Andre Jacobs – SNR. Advisor secondary plant.

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