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REIGERPARK EXT 8 AND DELMORE PARK EXT 7 DEVELOPMENTS

THABILE ENGINEERING REFERENCE NO : ER 07/08

FINAL DESIGN REPORT FOR ELECTRICAL MV SUPPLY AND LV NETWORK DISTRIBUTION

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1. ELECTRICITY SUPPLY TO THE AREAS

1.1 Source Substation to Proposed Developments by Southnet

Ekurhuleni Metro Municipality indicated that the developments in the area will be supplied at 11 kV from the nearby Central Vertical substation. The developer has requested the mining authorities permission to erect an 11 kV switchroom adjacent to the existing Central Vertical 11 kV switchroom and to traverse the mine's land along an existing border fence with the 11 kV supply cables in the direction of Elsburg road. Once permission is granted from the mine, the developer will register servitudes for the 11 kV switchroom and the cable route in favour of Ekurhuleni Metro Municipality.

2. MV RETICULATION (11 kV)

The main 185 mm 11 kV Copper PILC supply cables (Table 19) to the development will terminate at a proposed 11kV switching station located near the intersection of Commissioner and Elsburg roads. The 11 kV cables to the Commissioner street switching station is rated at 150% of the final estimated demand and will be able to cater for a single supply cable contingency. The proposed 11 kV cable supply network layout is shown in drawing TE 0208/01 and incorporates the future developments of land to the north of Commissioner street. The detail of the Central Vertical 11 kV switchroom and the Commissioner street switching station are shown in drawings TE 0210/01 and. A new 11 kV switchroom will also be required at Central Vertical substation. This will be provided by the developer as per drawing TE 0211/1.

An application has been lodged via Ekurhuleni Metro Munic to Eskom for the expansion of the transformer capacity at Central Vertical substation. In the interim 5 MVA is available from the existing infrastructure from Ekurhuleni Metro Municipality. A 630 Amp, 11 kV SBV-4 Alstom circuit breaker will be procured and installed to the existing indoor switchboard in order to provide the initial loads.

The MV reticulation to the developments will be done via underground 185 mm and 95 mm 11 kV Copper PILC cables. The MV cable network is designed to cater for an after diversity maximum demand (ADMD) of 3.5 kVA per residential unit/dwelling. 315 kV Minisubstations are located at predetermined street front positions to feed the LV cable networks in the residential areas. The high density residential development units are expected to realize an ADMD of \leq than 3 kVA per unit. Capacity provision for these stands has been allowed on the MV cable networks. The physical electrical supply to these high density residential and commercial stands will be determined by the end developer and will be treated according to the rules and principles of Ekurhuleni Metro Munic. This will implicate that either a minisubstation or MV bulk metering unit must be supplied by the end developer for connection to the 11 kV cable ring network.

The provision made for the future commercial loads on the 11 kV cables are according to the Eskom National Masterplanning guidelines and are as follows:

- Business or Office Equivalent 0.08 kVA/m²
- Light Industrial or Equivalent 0.04 kVA/m²
- Industrial 0.1 kVA/m²

3. LV RETICULATION

Underground LV cable networks, designed to Ekurhuleni standard cable sizes (95 mm² and 35 mm²) distribute the electrical power to street front kiosks. These kiosks are to the Ekurhuleni protective structure specification and will be sized to cater for either 12, 16 or 20 meters/clients. Earth conductors (70 mm² and 25 mm²) will be run in parallel to the LV supply cables. All LV supply cables will be fed via appropriate rated feeder circuit breakers from the minisubstations.

4. METERING AND HOUSE CONNECTION CABLE

It is proposed that single phase prepaid meters be installed for each residential unit/dwelling. Each service cable will be fed via an 80 A double pole circuit breaker. The service cable will be a 16 mm copper split concentric Airdac cable equipped with 2 x communication wires. It is proposed that the developer installs these cables up to the distribution board in the dwelling, in contrast to the requirement of Ekurhuleni that these cables only be installed to 1 meter within the stand boundary. In this way the requirement of an additional cable connection will be eliminated. It is also proposed that a certified contractor be employed by the developer to install and commission the connections/meters to the households/dwellings.

5. VOLTAGE PROFILES AND FAULT LEVELS

The voltage drop profiles and fault levels calculated for each transformer zone is shown in drawing TE 0208/05 and TE 0209/04. These were calculated with ReticMaster software utilizing the Empirical AMEU Diversity Curve model to execute the studies. Important to note is that the fault level at the minisubstations exceeds 10 kA. The fault level at the protective structure exceeds 5 kA in a number of cases. It is thus proposed that the minimum fault rating of the circuit breakers be as follows:

LV Feeder Circuit Breakers:	15 kA minimum
Protective Structure Circuit Breakers:	10 kA minimum
Main Circuit Breaker in House:	5 kA minimum

6. OPERATION AND MAINTENANCE

On completion, the electrical network will be taken over by Ekurhuleni Municipality. Ekurhuleni Municipality will operate and maintain the electrical network for their account. Electricity will be sold to customers at the approved (NERSA) rates as published in the local press from time to time.

6. PUBLIC LIGHTING

The design of the public lighting is according to the guidelines laid down by the Ekurhuleni Municipality.

70 Watt high pressure sodium luminaires will be installed on 8.7 m galvanized steel

poles spaced at distances of up to 32 m apart and 1 m behind the street kerbing stone. The streetlight cables will be fed from various minisubstations via approved streetlight control gear and a 10 mm² 3 phase cable. A separate 6 mm² earth conductor will be run in parallel to the streetlight cable to ensure proper electrical earthing of all steel poles.

7. SAFETY

The network safety and protective design is based on the statutory requirements of the Occupational Health and Safety Act (Act 85 of 1993), more specifically the “Electrical Machinery Regulations”, SANS 10142, “Code of Practice for Electricity installations”, and NRS 016, “Code of Practice for the earthing of low voltage systems”.

The network shall be tested for compliance to the above and results recorded for record purposes.

Compiled by JA Deacon (Pr. Eng, Pr. CPM)
for Thabile Engineering

24 January 2008

ANNEXURE A

LIST OF DRAWINGS

REIGERPARK EXTENSION 8 - DRAWINGS	
DESCRIPTION	DRAWING NUMBER
11KV MASTER PLAN LAYOUT	TE 0208/01 (1 x sheet)
PHASE 1 DESIGN - MV & LV LAYOUT SHEET 1/3	TE 0208/02 (3 x sheets)
STREET LIGHT LAYOUT SHEET 1/3	TE 0208/03 (3 x sheets)
DUCTING/SLEEVES LAYOUT SHEET 1/3	TE 0208/04 (3 x sheets)
LV VOLTAGE DROP PROFILES AND FAULT LEVEL STUDIES	TE 0208/05 (10 x sheets)
DELMORE PARK EXTENSION 7 - DRAWINGS	
PHASE 1 DESIGN - MV & LV LAYOUT SHEET 1	TE 0209/01 (1 x sheet)
STREET LIGHT LAYOUT SHEET 1	TE 0209/02 (1 x sheet)
DUCTING/SLEEVES LAYOUT SHEET 1	TE 0209/03 (1 x sheet)
LV VOLTAGE DROP PROFILES AND FAULT LEVEL STUDIES	TE 0209/04 (1 x sheet)
SWITCHING STATION - DRAWINGS	
MAIN SWITCHING STATION - COMMISSIONER STREET	TE 0210/1 (2 X sheets)
CENTRAL VERTICAL SWITCHING STATION	TE 0211/1 (2 x sheets)