

# TRANSMISSION PROJECT – ESSELEN-JUPITER 88kV FEEDER BYPASS

## ESSELEN 88KV YARD:ASSET SPECIFICATION

STATION ELECTRIC DIAGRAM : 0.18/6462 Rev 44(current)  
KEY PLAN : 0.18/17324 Sh 1 Rev 2(current)

### 1. PROJECT DESCRIPTION

To construct an 88kV emergency bypass supply through to Jupiter Substation in the event of the loss of 275kV supply. 88kV to be supplied(on a down-rated basis) by utilizing 275kV Apollo infeed line; 275kV Busbar 2 Section 2; the current 275kV Jupiter Feeder and 275kV line.

### 2. SUBSTATION LAYOUT DESIGN AND APPLICATIONS

#### 2.1 Philosophy of Design

In the event of an emergency when 275kV cannot be supplied from Esselen to Jupiter, a contingency supply of 88kV needs to be sourced. The supply will be taken from the 88kV Feeder 11(SAR Modder 2 Tee supply – which will be interrupted during this emergency), which will connect on to the incoming 275kV line from Apollo(this line to be isolated at Apollo-end for duration of emergency). Section 2 of 275kV Busbar 2 will be dedicated for the 88kV supply; which is then fed through the 275kV Feeder 3(Jupiter 1), and out to Jupiter.

##### 2.1.1 The 275kV Yard

The 275kV busbar system comprises two normal busbars (No 1 and No 2) with two Bus Couplers (A and B), as well as a Bus Section on No 2 Busbar. The 275kV Busbars are constructed as an overhead strung Busbar system, consisting of 3 x 800mm<sup>2</sup> flexible conductor bundle per phase. The bypass supply from the 88kV yard will be brought in on the 275kV Apollo line (Feeder 4), and onto section 2 of 275kV Busbar 2; this will then be fed out through Feeder 3 to Jupiter.

##### 2.1.2 The 88kV Yard

The 88kV busbar system comprises two normal busbars (No 1 and No 2) with a single Bus Coupler (A). The 88kV Busbars are constructed as an overhead strung Busbar system, consisting of 2 x 800mm<sup>2</sup> flexible conductor bundle per phase. The 88kV supply from Feeder 11 would be diverted from SAR Modder 2 Tee, to connect to the incoming Apollo line.



No work is to be carried out within either the 88kV or 275kV Yards; rather, the following work is to be performed in the open terrace section just outside the 88kV Yard:

- 88kV Isolator for interruption to SAR Modder 2 Tee.
- Tee-off stringing from 88kV Feeder 11 line to a 275kV Isolator, to connect on to the 275kV Apollo line overhead.

## **2.2 Civil Works**

Provide foundations for the two Isolators and related PI supports steelwork. This area is to be fenced off as a live chamber, with yard stone. Special attention to be given to soil type in immediate area, since a "soil raft" is to be created due to the dolomitic conditions. Earth-Tails to be connected back to the main Earth Mat just outside the 88kV Yard.

### **2.2.1 Geo-technical survey**

This survey may be necessary as per the dolomitic conditions mentioned in item 2.2. ✓

### **2.2.2 Earthworks**

As evidenced in items 2.2 & 2.2.1

### **2.2.3 Buildings**

None.

### **2.2.4 Foundations, Plinths, and Trenches**

To provide foundations as per ByPass Layout drg and related Std Foundation drg's.

### **2.2.5 Earth-mat**

ByPass equipment as per 2.1.2 to be connected through to 88kV Yard.

### **2.2.6 Fencing**

As per 2.2 a security fence to be provided. To be shown on ByPass Layout.

### **2.2.7 Roads**

None.

### **2.2.8 Drainage**

None.



## 2.3 Structural Steel

Supply and erect the following steelwork:

- 17 x Medium Equipment supports and Top Caps for 275kV Post Insulators
- 12 x Medium Equipment supports and Top Caps for 88kV Post Insulators

## 2.4 Primary Plant

All primary plant creepage is to be based on 25mm/kV.

## 3 PLANT

System Voltage (kV)	Rupturing Capacity (kA,min)	BIL (kV,min)	Creepage (mm/kV,min)	
275	50	1050	25	
88	40	380	25	

### 3.1 88KV BYPASS – JUST OUTSIDE 88KV YARD

#### 3.1.1 PRIMARY PLANT

- 1 x 275kV Isolator OES 3150A 50kA 31mm/kV
- 1 x 88kV Isolator OES 2500A 40kA 25mm/kV
- 17 x 275kV Post Insulator C6-1175 25mm/kV
- 12 x 132kV Post Insulator C4-550 25mm/kV
- Labels
- 2 x Bull Conductor (at 275kV Isolator)
- 1 x Centipede Conductor ( at 88kV Isolator)

#### 3.1.2 SECONDARY PLANT

##### 3.1.2 a) Protection

Protection settings to be changed according to ByPass conditions.

##### 3.1.2 b) Control

##### 3.1.2 c) Measurements

##### 3.1.2 d) Telecommunication

**4 COMMON YARD**

**4.1 Labels**

- a) Phasing Discs
- b) Busbar Labels

**4.2 Safety (Control Room)**

- a) None

**4.2.1 Primary Plant**

- a) None in the common yard

**4.2.2 Busbar**

- a) Aluminium Tubes ( $\phi 250 \times 6WT$ ) for 275kV ByPass connection
- b) Aluminium Tubes ( $\phi 200 \times 8WT$ ) for 88kV ByPass connection

**4.2.3 AC Reticulation**

- a) None

**4.2.4 OPGW**

- a) None

**4.2.5 Control and Battery Room**

**4.2.5.1 Furniture**

- a) Existing

**4.2.5.2 Protection**

- a) Existing 275kV and 88kV Bus Zone Schemes to be reviewed and modified where necessary

**4.2.5.3 Telecommunications**

- a) None

**4.2.5.4 Control**

- a) None

**4.2.5.5 Metering**

- a) None

**4.2.5.6 DC and Standby**

- a) None

**4.2.5.6.1 Control Room**

- a) None



4.2.5.6.1 a) 110V DC Systems

None

4.2.5.6.1 b) 50V DC Systems

None

4.2.5.7 Load shedding

a) None

**5 SECURITY**

Existing

**6 EARTHING**

275kV and 88kV Earthing to be rated for 50kA and 40kA respectively

**7 TRANSPORT**

None required

**8 EMERGENCY PREPAREDNESS PLAN PROCEDURES**

These need to be assessed and revised in accordance with various possible emergencies.



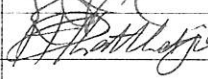

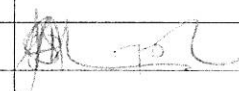
**Revision Control**

**ESSELEN BYPASS: ASSET SPECIFICATION**

Rev No	Description	Responsible	Date
0	Initial scope of work	Emlyn Buchler	26-05-2011



Esselen National ByPass Asset Specification

SIGN OFF DOCUMENT : ESSELEN BYPASS			
DISCIPLINE	NAME	DATE	SIGNATURE
Project Management	Nkibi Nkwana	13/09/2011	
Project Management - Civil			
<del>ATP</del> Expansion Planning	<i>Timothy Khosa</i>	4/10/11	
<b>Substation Design:</b>	Phineas Tlhatlhetji	13/09/2011	
• Electric (CED)			
• CED Electrical			
• Civil (CED)			
• Application			
<b>Secondary Application:</b>	Leon Kotze	13/9/2011	
• Protection			
• Control			
• Measurement			
• Telecommunication			
• DC & Standby			
<b>Substation Technology:</b>	Sibongile Maphosa	13/09/2011	
<b>National Control:</b>			
• System Operations			
<b>Region:</b>			
• Secondary Plant			
• Primary Plant			
• Performance & Planning			