

1. INTRODUCTION

As the national electricity supply authority in South Africa, Eskom is responsible for the generation and supply of electricity to consumers throughout the country. As electricity cannot be stored, power is generated and delivered over long distances at the very instance that it is needed. In South Africa, thousands of kilometres of high voltage Transmission lines transmit this power, which is mainly generated at the power stations located within the Mpumalanga Province coal fields, to Eskom's major substations. At these major substations, the voltage is reduced, and transmitted to smaller substations all over the country through Transmission lines (i.e. 765 kV, 400 kV or 220 kV Transmission lines). At these substations, the voltage is further reduced, and distributed via numerous distribution lines to the local users. This, therefore, illustrates the vital role that Transmission lines play in the efficient transfer of power to the consumer. In order to ensure that supply meets demand, the transmission of sufficient and reliable power to local substations must be assured.

1.1. The Need for Additional Transmission Capacity in the Greater Port Elizabeth Area

For distribution to the Greater Port Elizabeth area, power supply is required to feed the Grassridge Substation, located near the town of Coega, on the outskirts of Port Elizabeth.

The existing 220 kV and 400 kV Transmission lines that feed electricity from the Poseidon Substation (located near Cookhouse) to the Grassridge Substation are presently heavily loaded, and are close to reaching their full capacity of 550 megawatts. Greater Port Elizabeth's growing electricity demand, together with the proposed development of the Coega Harbour and associated Industrial Development Zone (IDZ), is placing an increasing demand on the current energy supply infrastructure to the Greater Port Elizabeth area. Investigations have shown a steady 2% per annum average load growth for the Port Elizabeth area, which is predicted to continue, and even elevate. The proposed Coega Harbour and IDZ alone is estimated to require an additional load of 250 megawatts during its initial onset phase. The existing Transmission lines do not have sufficient capacity to supply the anticipated additional load without jeopardising the supply to the current customers (including the Port Elizabeth City Council, which supplies other sensitive industrial customers such as the automotive industry).

In addition, the amount of power that can currently be delivered to Grassridge Substation at any one time is solely dependent on the reliability of the existing Poseidon-Grassridge 400 kV

Transmission line. The temporary loss of power transmission through this line due to failure, or the line being temporarily being taken out of service for maintenance, will result in power-outages, as the existing 220 kV Transmission line cannot supply the required load alone. Therefore, in order to reinforce the local Transmission Network's reliability (by ensuring a back-up supply to the area), maintain quality of supply to customers supplied from Grassridge Substation, as well as meet the escalating electricity demands in the area, Eskom Transmission Group propose the establishment of a second 400 kV Transmission line between the Poseidon the Grassridge Substations.

The re-enforcement of the Eskom Transmission System must, therefore, meet the following criteria:

- maintain reliability and quality of supply;
- improve overall voltage supply for at least the next 10 years;
- satisfy the firm supply requirements of existing users (e.g. residential areas, and the automotive industry), as well as new potential users associated with the Coega Industrial Development Project;
- create spare capacity to support unexpected sudden load growth;
- minimise any adverse environmental impact; and
- minimise costs to the supplier and the end-user/consumer.