1. INTRODUCTION

1.1. Motivation for the Proposed Project

As electricity cannot be stored, power is generated and delivered over long distances at the very instant that it is required. In South Africa, thousands of kilometres of high voltage Transmission lines (i.e. 765 kV, 400 kV and 275 kV Transmission lines) transmit this power, which is predominantly generated at the powerstations located within the Mpumalanga Province, to Eskom's major substations. At these major substations, the voltage is down-rated and distributed to smaller substations all over the country via Distribution lines (e.g. 132 kV, 88 kV and 66 kV lines). Here the voltage is down-rated further for distribution to industry, businesses, farms and homes. In order to maintain a reliable power supply within the entire network, the voltages at all substations are required to be within certain desired limits. If the network is operated at voltages which are below these limits, voltage collapse problems and power outages may be experienced.

Reliable delivery of electricity concerns consumers and industries which require a high quality of power supply for sensitive electronic equipment, and which incur high expenses as a result of even a short electricity supply interruption. To be reliable, the transmission network must have the capacity to supply the electricity required by the customers at all times, that is, the network must be designed with reserve transmission capacity in order to ensure an uninterrupted supply to customers if and when faults occur. As a transmission network reaches capacity and the demand for power increases, the operation and capacity of the Transmission lines and local substations becomes more critical.

1.2. The Purpose and Need for the Proposed Project

The transmission network in the Cape is supplied with power from the Tutuka power station. The total load requirement is fed via two 400 kV Transmission lines from the Tutuka power station to Alpha Substation. From Alpha Substation, the load is transferred via two 765 kV Transmission lines to Beta Substation. Power is then transferred to the Hydra and Delphi Substations for further transmission (Eskom, 2002).

The Eastern Cape electricity demand is approximately 1 150 MVA (at 2001 peak). This total load is fed via two 400 kV Transmission lines from Hydra Substation to Poseidon Substation. At Poseidon Substation, the load is split between the East London area (Neptune Substation) and the Port Elizabeth area (Grassridge Substation) (Eskom, 2002).

The Grassridge Substation (located near the town of Coega, on the outskirts of Port Elizabeth) is the main substation supplying electricity to the greater Port Elizabeth area. This substation is currently supplied with electricity via the Poseidon-Grassridge No 1 400 kV Transmission line, as well as via the Poseidon-Grassridge 220 kV Transmission line. These existing Transmission lines are presently heavily loaded, and are close to reaching their full capacity of 550 megawatts. A second 400 kV Transmission line between these two substations is to be constructed in the near future within the vacant registered servitude which lies directly adjacent (to the west) to the existing 220 kV Poseidon-Grassridge Transmission line in order to supplement this supply.

Greater Port Elizabeth's growing electricity demand, together with the proposed development of the Coega Harbour and associated Industrial Development Zone (IDZ) (including the proposed Aluminium Pechiney smelter) is placing an increasing demand on the current energy supply infrastructure to the Greater Port Elizabeth area. The existing Poseidon-Grassridge No 1 400 kV and 220 kV Transmission lines, as well as the proposed Poseidon-Grassridge No 2 400 kV Transmission line 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). Therefore, in order to meet this increasing demand, more power is required to be transmitted to this area for use. Eskom Transmission, therefore, propose to upgrade the capacity of an existing Transmission line (i.e. the 220 kV) to a higher voltage, and replace the older infrastructure with new infrastructure. In order to accommodate this new Transmission line infrastructure, the Grassridge Substation north of the Coega IDZ is proposed to be extended to accommodate a new 400 kV infrastructure. This extension work will require additional land adjacent to the existing substation site, and a 'mirror-image' of the existing Substation will be established (refer to Figure 1.1 overleaf).

1.3. Eskom's Planning Process and the Role of the Environmental Impact Assessment Process

The proposed Coega IDZ is situated within the greater Port Elizabeth area, approximately 20 km from Port Elizabeth. The Coega IDZ will include commercial and industrial activities as well as the Port of Ngurha. A key requirement for the operation of these proposed developments is the supply of power.

Eskom Transmission's planning process is required to be based on anticipated load requirements, rather than immediate load requirements in order to timeously supply the anticipated increased demand in the greater Port Elizabeth area.

Figure 1.1: Map showing the existing and proposed Transmission lines between the Poseidon and Grassridge Substations, as well as the existing Grassridge Substation and proposed extension

This is due to the time-consuming process of acquiring permission to construct such infrastructure, servitude negotiations with landowners, and Transmission line and substation design and construction. The Environmental Impact Assessment (EIA) process forms part of the initial planning process of a new Transmission line and/or substation.

While there should be reasonable confidence in the environmental feasibility of the proposed Transmission line corridor and substation site, other criteria may require minor alteration to the corridor which receives environmental authorisation. These may include:

- Identification of a technical problem during the detailed design phase which will require excessive cost to resolve (e.g. unstable subsurface conditions identified by detailed geotechnical investigations).
- Request by a landowner during the course of the negotiation process that the alignment be shifted to avoid disruption of a particular activity on his property, but provide a feasible new alignment.

Provided such potential deviations to the corridor are not unreasonable, or outside the original study area, it is fair for Eskom Transmission to investigate and negotiate local adjustments to the authorised alignment. As it is preferable to align the proposed Poseidon-Grassridge No 3 400 kV Transmission line alongside the new Poseidon-Grassridge No 2 400 kV Transmission line, any alternations made to the alignment of the second line during the negotiation process (which is currently underway) would result in a realignment of the proposed third line. This would facilitate the consolidation of Transmission line infrastructure, and would assist in minimising the potential impacts on properties and the environment.

1.3.1. Servitude Negotiation and the EIA Process

The process of negotiating a servitude is independent of the EIA process, and it is important that the aims of the two processes are seen as separate. They share a common cause (the construction and operation of a Transmission line) and may share common landowner databases, but they have different aims. Appendix A provides further information on the negotiation phase.