4. PROJECT ALTERNATIVES

In terms of the EIA Regulations, feasible alternatives are required to be considered within the Environmental Scoping Study. All identified, feasible alternatives are required to be evaluated in terms of social, biophysical, economic and technical factors.

Essentially there are two types of alternatives:

- incrementally different (modifications) alternatives to the project; and
- fundamentally (totally) different alternatives to the project.

Fundamentally different alternatives are usually assessed at a strategic level, and EIA practitioners recognise the limitations of project-specific EIAs to address fundamentally different alternatives. Any discussions around this topic fall outside the scope of this study, and have been addressed as part of the Integrated Strategic Electricity Plan (ISEP) undertaken by Eskom. Environmental issues are integrated into the ISEP using the strategic environmental assessment approach, focussing on environmental life-cycle assessments, site-specific studies, water-related issues and climate change considerations. The following fundamentally different alternatives were considered for the proposed development:

- Demand and Scheduling Alternatives
- Process and Technical Alternatives

Both Demand and Scheduling alternatives and Process and Technical alternatives were considered as part of Eskom's broader network strengthening project.

4.1 Demand and Scheduling Alternatives

Demand and Scheduling Alternatives		Reason for rejection from further consideration
1.	Delay new power lines until new generation facilities are constructed	Will not address the short to medium term demand in the Western and Eastern Cape Provinces
2.	Construct all proposed 765 kV Transmission power lines simultaneously.	Predicted demand may not match actual demand because step load increases in demand may not materialise as quickly as planned. Staggered construction allows for changes to be made based on demand management strategies
3.	Improve energy efficiency of existing transmission power lines by installing capacitor stations between long sections of line.	This is part of routine maintenance of existing lines and the energy-savings obtained will not be sufficient to meet the predicted demand.
4.	Improve use of energy by consumers	An on-going public awareness campaign by Eskom seeks to promote energy efficiency. This is a long term demand management strategy which will not address the short to medium terms problems.

4.2 Process and Technical Alternatives

Process and Technical Alternatives		Reason for rejection from further consideration
1.	Use of proposed new generation facilities/imported power outside of Mpumalanga	Generation facilities are not guaranteed and/or timeframes not suitable to meet short-medium term power demands in the Western and Eastern Cape. It is forecasted that the demand, especially within Port Elizabeth, will exceed the supply by 2008. The construction of 765 kV Transmission power lines has been identified as the most feasible option to address this demand within the stipulated time-frames.
2.	Construct 400 kV lines instead of 765 kV Transmission power lines	400 kV lines would not satisfy the predicted power demand. In addition, one 765 kV Transmission power line is equivalent to approximately three 400 kV Transmission power lines and therefore constructing 400 kV lines would result in the construction of more lines and require a larger servitude.
3.	Use underground cables as opposed to aboveground cables	The environmental impacts associated with placing a high voltage power line underground are significantly higher than the conventional aboveground structures. In addition, the space required is that equivalent to a 4 lane highway as the conductors cannot be cooled by the air and need to be spaced apart. It is not economically viable to place a transmission line of this voltage underground – the estimated cost per kilometre is up to 10 times that of an overhead line. Maintenance activities would also require the servitude to be opened on every occasion.
4.	Upgrade existing 400 kV lines to 765 kV Transmission power lines	The additional capacity provided by upgrading of existing lines would not be sufficient to meet the short – medium term demand in the broader Cape region, particularly with the growth in Port Elizabeth. Also the infrastructure needed for 765 kV and 400 kV power lines differ and the cost involved in upgrading a 400 kV line is similar to that involved in constructing a new 765 kV line.

The importance of the project for addressing the capacity problem in the short to medium term can be summarised as follows:

- Increased generation capacity in the region is planned through the use of small "peaking" power station (Open Gas Turbine technologies and hydro-power pumped storage schemes in the Western Cape and Kwa Zulu Natal and Mpumalanga respectively). These technologies will however not be able to address the generation supply needed without an increase in base load supply.
- Current Options for increasing the base load supply include the Pebble-Bed Modular Reactor (PBMR), imported power from the Congo, new gas fired power stations along the west coast of South Africa and Namibia and a new coal fired power station in the Limpopo Province (Matimba). The most feasible of these options is the Matimba coal fired power station.

- Decommissioned power stations in Mpumalanga (Camden and Grootvlei) are being brought back to service in order to meet the growing demand and will assist in supplying additional capacity to the network whilst the new power stations are constructed.
- Generation capacity in Mpumalanga is sufficient to meet the expected demand in the short to medium term (5 to 7 years). The strengthening of the Alpha-Gamma-Hydra part of the network is however critical for ensuring adequate supply to the Western and Eastern Cape.
- Improving the efficiency of energy transfer on particularly long sections of existing lines is an ongoing maintenance activity by Eskom and will not address the supply problem without strengthening trough additional lines.
- The availability of a reliable electricity supply of good quality is fundamental to investment and economic growth in South Africa. The medium to long term socio economic benefits of this project are accordingly significant, and
- The proposed power lines will reduce the inherent risk profile of the national grid by augmenting the existing supply, resulting in less frequent outages and an improved quality of the electricity supply.

This Environmental Scoping Report considers incrementally different alternative, and in particular the 'No-Go' alternative and location alternatives.

4.3 The Do Nothing Option

The Department of Environmental Affairs and Tourism (DEAT) states that the 'do nothing' or 'no-go' option should be considered in cases where the proposed development could have significant negative impacts. The "do-nothing" alternative is the option of not undertaking the proposed activity.

In the case of the proposed 765 kV Hydra Gamma 2 Transmission power line between Hydra and Gamma Substations, both the both positive and negative impacts associated with the 'no-go' alternative are therefore addressed below for consideration.

5.1.1 Potential neutral impacts of the no-go alternative

The potential positive impacts associated with the proposed 765kV Hydra Gamma 2 Transmission power line are mostly associated with biophysical aspects. Should the proposed Transmission power line not be constructed, the anticipated impacts as investigated during the Environmental Scoping Study and described within the draft ESR, would not come to pass. Therefore all potentially negative impacts associated with the construction of the proposed Transmission power line would be avoided, hence should the proposed 400kV Transmission Power line not be constructed the impacts on the study area would be neutral (neither positive nor

negative), as the biophysical aspects of the study area would remain as they currently are, not better or worse.

5.1.2 Potential negative impacts of the no-go alternative

As the national electricity supply authority in South Africa, Eskom Holdings Limited is responsible for the generation and supply of electricity to consumers throughout the country, and is therefore required to maintain a national network (the National Grid) with a reliable supply to the country. The nature of high voltage electricity transmission (of which the proposed 765kV Transmission power line is proposed to form part) is therefore for regional and national benefit and thus it is planned and developed at a more strategic level. As discussed in Chapter 1, the proposed extension of the Hydra Substation and the proposed additional Hydra-Gamma 765 kV Transmission line form part of an upgrade and strengthening programme for the Cape regions. The existing network is incapable of meeting the increased demand for energy especially in the Coega IDZ. Future demand for energy in the Port Elizabeth is projected to increase from (See Figure 4.1). Furthermore, the proposed 765 kV Hydra Gamma 2 Transmission power line forms part of a larger upgrade and strengthening programme for the Western and Eastern Cape Provinces. Without the completion of this project, the regional network will not be able to function at full capacity, and the power supply to those areas will be compromised in the near future. Should the proposed Transmission power line not be constructed, this is anticipated to have potentially significant negative impacts on economic growth and economic sustainability in the area, therefore having a knock-on effect on the social aspects associated to with the lack of economic growth.

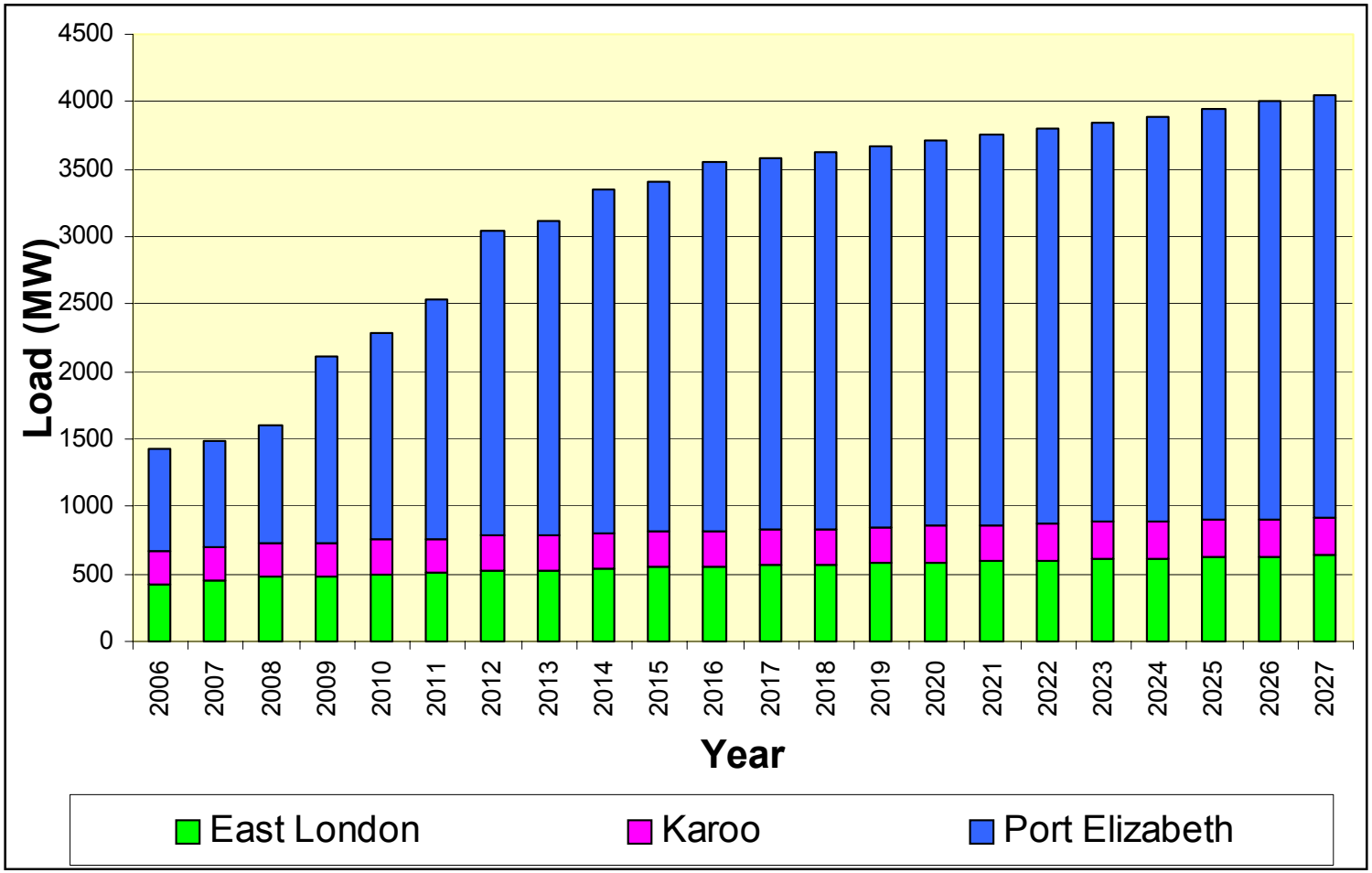

Figure 4.1: Comparative assessment of the Expected Load growths within East London, Port Elizabeth and the Karoo

4.4 Hydra Gamma 1 EIA Alternative: Eskom Open Registered Servitude

Two feasible alternative route corridors for the construction of the proposed 765 kV Transmission line between the existing Hydra Substation and the proposed Gamma Substation were identified for investigation within the previous Environmental Scoping Study undertaken during 2005, i.e.:

- *Corridor 1* - the existing vacant Eskom servitude which extends between Hydra Substation and a site earmarked for the Gamma Substation, and
- *Corridor 2* - parallel to the existing Hydra-Droërivier No 2, 400 kV Transmission line.

During the Hydra Gamma 1 EIA process the existing Eskom registered servitude was discarded by the landowners. As a result, the alternative Transmission line alignment (Corridor 2) was identified for consideration with the EIA process. It was anticipated that the majority of the impacts identified could be mitigated to some extent through the construction of the Hydra-Gamma 765 kV Transmission line parallel to the existing Hydra-Droërivier line.

Through the negotiation process undertaken for Hydra Gamma 1, the landowners were informed of the proposed Hydra Gamma 2 Transmission power line. Through this negotiation process all, but one, effected landowners preferred the Hydra Gamma 2 line be placed adjacent to Hydra Gamma 1, thereby consolidating the impacts to one farm, as opposed to spreading the impacts.

Therefore, the Eskom open registered servitude is rejected from consideration within this EIA process due to opposition from the majority of landowners.

4.4 Hydra Gamma 2: Transmission line Alternatives

The current EIA application involves the proposed extension of the 765 kV Hydra Substation and the construction of an additional 765 kV Transmission power line that will run parallel to the Hydra-Gamma 765 kV Transmission power line, which received authorisation in December 2005.

One feasible alternative has been identified for investigation within the ambit of this EIA process, with a deviation alternative under consideration for that portion of the proposed Transmission line where opposition was received from an affected landowner. (Refer Figure 4.2).

Preferred Alternative Alignment (indicated in orange on Figure 4.2)

Extending from just outside Hydra Substation near De Aar, in a southerly direction parallel to the approved Hydra Gamma 1 power line and into the Gamma Substation.

Alternative Deviation Alignment (indicated in blue on Figure 4.2)

Approximately 20 km south of De Aar, the alignment deviates approximately 1 km west, for a distance of approximately 10 km.

These alternate Transmission line corridors are considered to be technically feasible and are evaluated within this Environmental Scoping Report.

4.5 Hydra Substation extension alternatives

4.5.1 Substation infrastructure alternative

A suitable site for the proposed substation extension has been identified on Eskom owned land, adjacent to the existing Hydra Substation. No alternative technically feasible sites have been identified for the establishment of the substation extension as this is required to take place as part of the existing substation infrastructure.

4.5.2 Substation Access Road alternative

Currently the access road to the existing Hydra Substation infrastructure lies on the western side of the substation, with a northern entrance road to the various parts of the substation (refer to Figure 4.3). The proposed new substation infrastructure forming part of the extension is planned to be constructed adjacent to the existing infrastructure upon the portion of Eskom owned land on the western side of the substation. The existing access road therefore needs to be re-aligned such as not to restrict the construction of the additional substation infrastructure. It is proposed this access road be re-aligned further west to allow space for the extension and accordingly access to both the new and additional infrastructure via a northern entrance road.

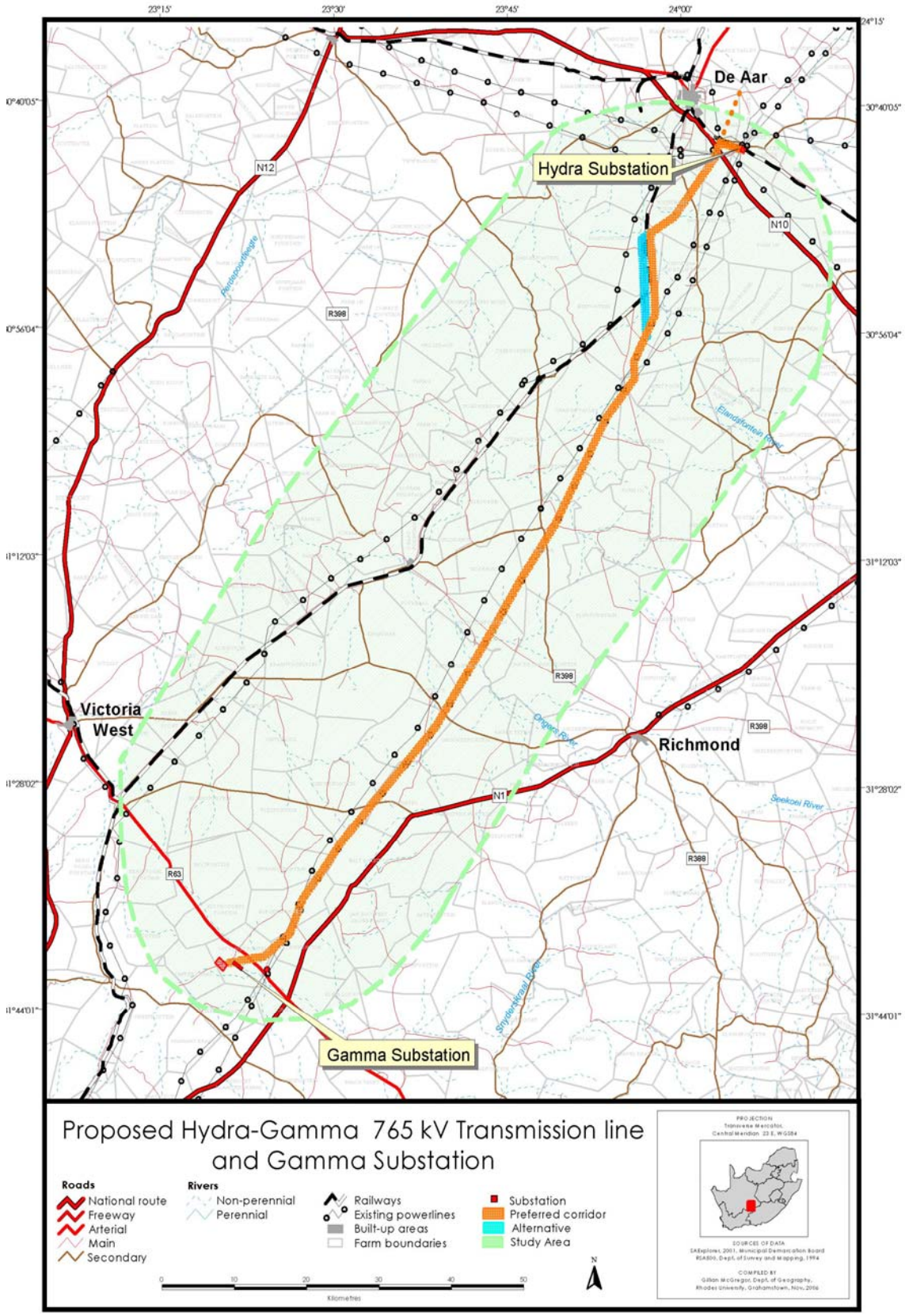

Figure 4.2: Map indicating alternative corridor alignments

Figure 4.3: Existing Hydra Substation with existing access road on western side of substation.