1 Description and Evaluation of Project Alternatives

The identification of alternatives is a key aspect of the success of the EIA process and was initiated at the start of this project in the Scoping phase. All alternatives must be fully addressed and their advantages and disadvantages compared in order to determine the best alternative. There are however some significant constraints that have to be taken into account when identifying alternatives for a project of this scope. Such constraints include financial, social and environmentally related issues that will be discussed in the evaluation of the alternatives. Alternatives can be identified according to:

1. Status quo alternative;
2. Location alternative;
3. Land use alternative; and
4. Design Alternative
5. Demand side management

1.1 Status Quo Alternative

Eskom Transmission has deemed the construction of a 400kV transmission power line between the Aries-Garona substation the most feasible option for increasing the power supply to the Cape region based on the existing transmission infrastructure in the region. Presently, the Cape region is suffering from numerous energy supply problems and therefore this problem requires urgent attention to circumvent an energy crisis in the region. An additional 400kV power line is proposed between Aries-Garona-Ferrum substations (separate EIA application for the Garona to Ferrum transmission power line) in order to complete this route. Thus the status quo alternative is not a feasible option to consider as the inability to supply reliable electricity to the Cape region would have significant negative impacts on the economy and living environment of the region.

The status quo alternative (i.e. existing situation without the proposed transmission power line) will be considered as the baseline against which the impacts are rated for significance as a change to current conditions.

1.2 Alternative Location

Alternative locations could mean an alternative route between the Aries and Garona substations or alternatively, a completely different location within the greater region to provide the necessary power supply to the Cape region. Eskom Transmission has, through intensive

studies, deemed the proposed route (i.e. Aries-Garona 400kV Transmission power line) to be the optimal choice based on the existing transmission infrastructure in the Cape region. The study area was defined during the Scoping Phase of the investigation and was presented to the relevant authorities in the Plan of Study for Scoping and subsequently approved. It is understood that this study area provides a representative and feasible envelope within which to identify alternative route alignments. The primary environmental sensitivities within the study area are the Orange River and the Hartbeesrivier as well as the Neus se Berg, Aasvoëlkop and Driekop se Poort range of mountains. Regardless of whether the study area was expanded further north or south, these features would still need to be traversed.

Five alternative routes have been identified during the scoping investigations and will be considered in this EIA (refer to map in Appendix 2).

In the north-eastern section of the study area, two alternative routes (regarded as “Alternative Route 1A and 1B”) have been identified. The topography in the north-eastern section of the study area consists of relatively inaccessible hills (the Neus se Berg) thus the only locations for the power line would be through valleys or saddles. Due to the presence of the Thuru Game Lodge as well as the proposed extensions of this lodge, it is felt that the northern approach (Alternative Route 1A) is more appropriate as the visual disturbance to this area could detract from the tourism potential of this scenic area. Additionally, through correspondence with the owners of the Thuru Game Lodge the management of the game farm requires the use of helicopters in order to track and dart animals for conservation purposes. The presence of a 400kV transmission power line would create a safety hazard to the flight path of the helicopters particularly in lieu of the fact that the Thuru Lodge owners propose expanding the lodge to the north-west, which would result in Alternative Route 1B traversing the game farm (refer to Figure 1). From a visual point of view, the negative aspect of Alternative Route 1A is that it would compromise natural areas, which have scenic value. On the other hand the positive aspect of Alternative Route 1B is that it occurs along an infrastructure ‘corridor’ within which exist the railway line and its infrastructure and the local farm road connector – structural contrast would therefore be weaker than in the northern alternative. Due to the presence of the Thuru Lodge and the proposed extension of the game farm to the north, it is felt that Alternative Route 1A is the preferred route in this regard.

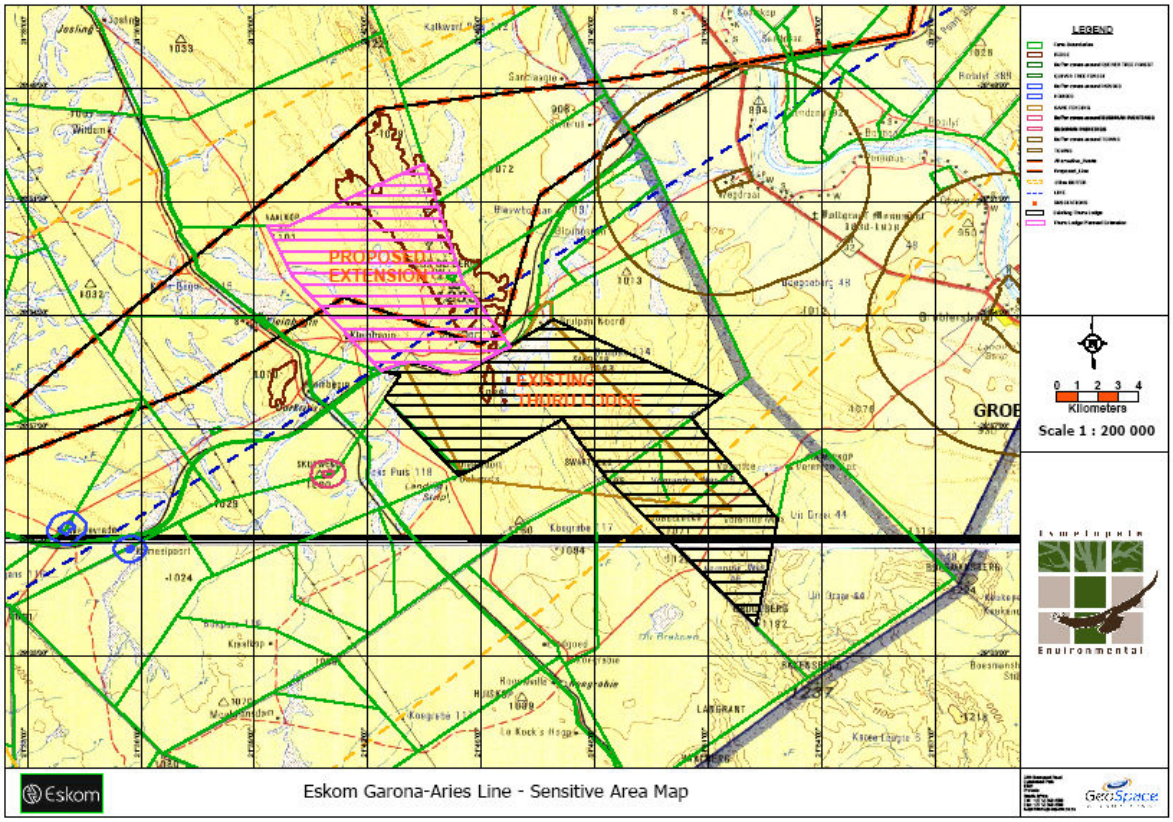

Figure 1: A view of the location of the existing Thuru Lodge showing the proposed extension of the Lodge to the north-west.

In the central section of the study area, no alternatives have been proposed, as the receiving environment contains no major obstacles to merit an alternative route. The current proposed route would ensure that the service road of the railway line could be utilized for regular servicing of the power line without the need for further road construction in the area. Secondly, the visual impact of the proposed transmission power line would be minimised as the railway line already visually impacts upon this location.

Three alternatives are proposed in the southern section of the study area. Alternative Route 2A is proposed in order to minimise the visual impact of the proposed power line on the Quiver Tree Forest (a scenic area of this endangered tree species). Alternative Route 2B is proposed in order to align the transmission power line with the existing railway line as far as possible and Alternative Route 2C is proposed as this route alignment provides the shortest route and thus a significant cost saving to Eskom Transmission.

The ecological specialist study recommended that the area surrounding the Quiver Tree Forest be regarded as a sensitive area and that Alternative Route 2B should not be the preferred route, as the transmission power line would result in a visual disturbance to this

natural feature. From a visual perspective, the positive aspect of Alternative Route 2B is that more evidence of human activity and cultural modifications (railway, its structures and service road and a quarry) occur along the route and therefore structural contrast with the landscape would be weaker than in the northern route where there is less evidence of man made intervention. The negative aspect of Alternative Route 2B is that it brings the power transmission power line closer to sensitive viewing areas (Kenhardt and the Quiver Tree Forest) and it is routed through a natural feature (rocky hills – "Aasvoëlkop") that has high scenic value as well as a higher presence of birds of prey. It is thus concluded that Alternative Route 2A is the preferred route in this instance.

1.3 Alternative Land Use

The proposed development of a 400kV Transmission power line is a linear project and does not require a change of land use for the majority of the properties along its length. Eskom will negotiate for a 55m wide servitude strip with the affected landowners; however, the land below the spans will still remain in the current land use (i.e. mainly farming). Only the footprint of the pylon structures will necessitate the land directly below them to be affected. As the pylons are approximately 400m apart it is not foreseen that this small loss of land will negatively affect any property owners. The nature of this application does not depend on land-use and as such this is not a viable alternative to be considered.

1.4 Alternative Design / New Generation Systems

Electricity can only be transmitted through power lines. Power line designs consist of two broad types, i.e. subterranean or above ground. Subterranean power transmission is a hugely costly affair and at present there are no subterranean high voltage transmission power lines in South Africa (due to the cost). Thus the only option for power transmission is above ground using the standard pylon designs with spans of cable between them.

Another alternative design investigated would be upgrading existing transmission power lines to carry more power. This option would result in the physical load on the existing towers to increase substantially and thus the towers would be inadequate and require replacement. Furthermore, it would not be possible to remove any transmission power lines from service to perform the upgrading work, as the remaining transmission power lines would not be able to supply the electrical loads in the region. This option would not optimise the existing infrastructure or permit future growth in the region. Another option would be to utilize existing power line servitudes and simply upgrade the capacity of these servitudes (i.e. a second

transmission power line running parallel to existing). Unfortunately there are at present no existing high voltage transmission power lines between the Aries and Garona sub-stations, which could be utilized.

Transmitting power through transmission power lines is currently the cheapest way to supply the end customers. The permitting process and construction of a new generating facility would require a much greater amount of time prior to supply that a transmission power line would. The need for the supply is urgent and therefore there is a requirement to provide supply fairly quickly. It is also important to note that Eskom is at present planning two new peaking power generation facilities in the Western Cape Province as well as recommissioning certain old coal fired power stations.

Alternative designs and/or new generating capacity are therefore not deemed feasible.

1.5 Demand side management

Demand Side Management (DSM) can generally be defined as the activities performed by the electricity supply utility, which are designed to produce the desired changes in the load shape through influencing customer usage of electricity and to reduce overall demand by more efficient use. These efforts are intended to produce a flat load duration curve to ensure the most efficient use of installed network capacity. By reducing peak demand and shifting load from high load to low load periods, reductions in capital expenditure (for network capacity expansion) and operating costs can be achieved. Some of the basic tools are the price signals (such as time of use tariffs) given by the utility and direct load management. This option is practiced to a certain extent, but is currently not considered feasible for expansion in this particular region. Eskom is currently looking at various means to achieve a flatter load profile in this area. However, the increase in energy demand in the region requires additional energy input and not simply adjusting the load profile.