

ASSESSMENT OF ISSUES ASSOCIATED WITH THE PROPOSED TRANSMISSION POWER LINE

CHAPTER 7

Three technically feasible alternative transmission power line alignment corridors (each approximately 500 m in width) were initially identified for the proposed 400kV transmission power line between the Gourikwa Power Station and Proteus Power Station (refer to Figure 7.1). Through the Scoping Study, it was concluded that Alternative 1 should be discarded based on environmental and technical considerations and therefore should not be considered further for the EIA phase. For that reason, the EIA investigates only Alternative 2 and 3.

This chapter serves to comparatively assess the identified potential direct, indirect and cumulative environmental (socio-economic and biophysical) impacts, associated with the proposed power line alternatives in order to nominate a preferred alternative power line corridor for consideration by DEAT. Recommendations are made regarding the management of the impacts for inclusion in the draft Environmental Management Plan (refer to Appendix P).

7.1. Assessment of Potential Impacts on Vegetation

The study area is located within a bioregion known as the Riversdale Plain, which lies within the Fynbos biome and the Cape Floristic Region (CFR). The South African vegetation map describes the PetroSA area as Albertinia Sand Fynbos. The vegetation in the Proteus area is indicated as being Swellendam Silcrete Fynbos, and much of the intervening area is Mossel Bay Shale Renosterveld.

The soil type is considered to be the primary driver of vegetation type in this area, which means that as the soil type changes from neutral sand to shale, and to shale and silcrete so the vegetation type shifts from Sand Fynbos to Shale Renosterveld to Silcrete Fynbos. Fire is an important element of Fynbos functioning and is an important driver of Fynbos dynamics in this region. Changes to the natural fire regimes are having significant impacts on the natural vegetation throughout the Fynbos biome.

Approximately 60% of the land crossed by Alternatives 2 and 3 is agricultural land, with the remaining 40% being natural vegetation. No natural vegetation of any consequence remains within the cultivated areas.

Figure 7.1: Locality map showing the feasible alternative transmission power line corridor alternatives (2 & 3) between Gourikwa and Proteus Substation identified for investigation within the EIA process

Very little *Albertinia* Sand Fynbos remains along any of the routes, and the bulk of the remaining natural vegetation is Swellendam Silcrete Fynbos and Mossel Bay Shale Renosterveld. There is significant overlap of species between these two vegetation types and they are also structurally very similar, with Thicket elements occurring in fire protected and well watered areas. Remaining vegetation is generally in good condition with relatively few invasive alien species, although there are scattered *Acacia mearnsii* (black wattle) and *Acacia saligna* (Port Jackson). The protected species *Sideroxylon inerme* (milkwood) was recorded as being present in the thicket elements of the vegetation.

Mossel Bay Shale Renosterveld is characterised by a high bulb diversity. The bulb *Bobartia robusta* (blombiesie) is very common in many natural areas along the proposed power line routes and was previously Red Data Book listed as Rare (Hilton-Taylor 1996), but has been downgraded to Least Threatened as the species no longer meets IUCN requirements for Red listing. The species is however a regional endemic, and is found only in the area from *Albertinia* to Mossel Bay. *Protea lanceolata* (lance leaf sugarbush) has recently been Red Data listed as 'Near Threatened', and is uncommon in the vicinity of Proteus, on the silcrete hills.

There is a low to moderate likelihood of certain very rare cryptic dwarf succulents such as *Euphorbia bayeri* (local endemic), various *Haworthia* species, and various bulbs occurring in the study area. There is also a small likelihood that the very rare *Satyrium muticum* (Endangered) could occur (the species is known from about 400 m east of Proteus substation). Most of these would be likely to occur in rocky areas.

7.1.1. Direct and Indirect Impacts on Vegetation

Impacts may be both direct and indirect, with the former occurring mostly at the construction stage and the latter mostly at the operational stage. The impacts are typically at the site scale, although the vegetation types concerned are all relatively localised (restricted to the South Western Cape), and all are regarded as threatened on a national basis, and therefore there is also a regional and national element (which ties into the cumulative impacts).

Direct impacts occur primarily at the construction stage, and the nature of the impact is direct loss of vegetation within the development footprint. Indirect impacts occur mostly during the operational phase (post-construction), and in this case the nature would vary from the introduction of alien vegetation and alien animal species (such as Argentine ants), to partial disruption of ecological processes due to the effects of the alien species, to partial disruption of ecological processes due to fragmentation of habitat.

Direct impacts during the construction phase of the transmission line are essentially only in the tower footprints (usually less than 20 m²), where vegetation loss would be permanent. Natural vegetation exists in ~ 40% of the linear extent of the alternative transmission line routes. The total extent of permanent vegetation loss on such tower footprints for any one of the three lines is likely to be less than 1 ha. Temporary vegetation loss may occur in the areas surrounding the towers, in the laydown areas, and in the access roads needed for stringing, laydown, and tower erection.

Potential indirect impacts which may be associated with the proposed project include introduction of alien species, to partial disruption of ecological processes due to the effects of the alien species, to partial disruption of ecological processes due to fragmentation of habitats. Impacts are expected to be of low to negligible significance with the implementation of appropriate mitigation measures.

Extensive Eskom infrastructure development is taking place in the region, and on-going development inevitably has a cumulative negative impact on remaining natural vegetation. In this particular instance the cumulative impacts are likely to be of low negative significance, as most of the development is taking place in previously cultivated areas, and footprints and permanent vegetation losses are very small within the vegetated areas (<1 ha in total).

The existing natural vegetation will be disturbed in various areas, mostly as a result of heavy machinery and heavy vehicles required to erect the power line and towers (with a strip of about 5 km long in the vicinity of Proteus Substation), and at the operational phase as a result of possible bushcutting within the 55 m wide servitude to reduce fire risk. Some temporary (but long-term) loss of vegetation will also occur in the tracks required to service the power lines, even if they use existing tracks, as the track is not always in the area where it is needed. These areas should eventually recover to a significant degree after the tracks are no longer in use (if natural vegetation is retained in the adjacent areas), but certain species may not return for many years, due to changes in soil structure (such as compaction). The impacts in this case are therefore rated as being long-term.

If typical Eskom bushcutting is undertaken within the full servitude width and length then there would be a direct negative impact on up to 27 ha (55 m wide by about 5000 m) of natural vegetation. It is not known whether regular bushcutting is likely as the terrain is mostly too steep and rocky for a bushcutter on a tractor, and too big to be done by hand. Regular (annual, or even up to once every three years) bushcutting would eliminate numerous plant species and change the vegetation structure, effectively turning it into a species-poor and fire-prone grassland. Bushcutting should really not be necessary as this vegetation does not grow much taller than 1.5 m in height, and the fire risk is

little more than in the grassy vegetation that comes to dominate in bushcut areas.

Impacts associated with the hard footprints are deemed to be Low negative on a regional scale **before mitigation**, and Very Low negative **after mitigation**. Impacts are expected to be similar for both alternatives under investigation.

Impact tables summarising the significance of impacts on vegetation associated with the transmission power line (with and without mitigation)

Nature: Permanent loss of vegetation in tower footprints (1ha) and associated track (~1ha)

The primary direct impacts are loss of natural vegetation at tower footprints, as well as potential impacts associated with the management of the servitudes, such as bush cutting. Some temporary (long-term) loss of vegetation will also occur in the tracks required to service the power lines. Hard infrastructure (power line footings) will result in the permanent loss of existing vegetation, and adjacent disturbance associated with this will be medium-to long-term in nature, although the vegetation should eventually recover.

If typical Eskom bush cutting is undertaken during operation and maintenance within the full servitude width and length, then this will be a direct negative impact on up to 27 ha (55 m wide by about 5000 m of Medium or High sensitivity vegetation). Regular (annual, or even up to once every four years) bush cutting eliminates numerous species and totally alters the vegetation structure, effectively turning it into a species-poor and fire-prone grassland. Impacts are therefore associated with direct impacts associated with development footprints (tower footprints) and direct impacts associated with the too frequent bush cutting of the 27 ha power line servitude.

	Without mitigation	With mitigation
Extent	Local (1)	Local (1)
Duration	Permanent (4)	Permanent (4)
Magnitude	Low (2)	Low (2)
Probability	Definite (5)	High (4)
Significance	Low (35)	Low (28)
Status (positive or negative)	Negative	Negative
Reversibility	No	No
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Only very slightly; mostly for indirect and long term impacts	
Mitigation: Post-authorisation walk down botanical study would help avoid sensitive areas. A standard mitigation required includes on-going, annual alien clearing in entire servitude.		
Cumulative impacts: None		
Residual Impacts: None		

Nature: Long-term but temporary loss of vegetation in servitude (tracks & bush cutting)		
The existing natural vegetation will be disturbed in various areas, mostly as a result of heavy machinery and heavy vehicles required to erect the power line and towers. These areas should eventually recover to a significant degree (if natural vegetation is retained in the adjacent areas), but certain species may not return for many years, due to changes in soil structure (such as compaction). Vegetation may suffer long-term but temporary disturbance (excluding bush cutting, which is addressed above), mostly in the track areas.		
	Without mitigation	With mitigation
Extent	Local (1)	Local (1)
Duration	Long term (4)	Short term (2)
Magnitude	Medium (5)	Low (2)
Probability	Highly probable (4)	Highly probable (4)
Significance	Medium (40)	Low (20)
Status (positive or negative)	Negative	Negative
Reversibility	No	No
Irreplaceable loss of resources?	Partly (possible)	No
Can impacts be mitigated?	Yes, to a significant extent	
Mitigation: Avoid bushcutting in servitude, or restrict it to once every five years; minimise number of access tracks		
Cumulative impacts: Yes; but fairly low impact		
Residual Impacts: Very low		

Nature: Alien invasion associated with disturbance along power line		
Indirect ecological impacts are often difficult to identify, and even more difficult to quantify. There are few indirect impacts of the power line, as it does not disrupt ecological connectivity or ecological processes, at least from a botanical point of view. As soil disturbance encourages alien plant invasion a possible indirect impact would be increased invasion of disturbed areas by alien plants, and a possible positive impact (after mitigation) in the form of removal of invasive alien vegetation in the 55 m wide servitude, (this would be regarded as essential mitigation). Overall indirect impacts of the power line after mitigation could therefore be Low positive.		
	Without mitigation	With mitigation
Extent	Local (1)	Local (1)
Duration	Long-term (4)	Short-term (1)
Magnitude	Low (3)	Low (2)
Probability	Probable (3)	Probable (2)
Significance	Low (35)	Low (15)
Status (positive or negative)	Negative	Positive

Reversibility	No	No
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Mitigation: Mitigation should centre on ongoing annual alien clearing within servitude, along with a policy of no bushcutting in servitude, or bushcutting at most once every 10 years.		
Cumulative impacts: Yes; but low impact		
Residual Impacts: No		

7.1.2. Cumulative impacts

To some extent a cumulative impact is a regional impact, rather than the local site scale impact, *i.e.* if something has a regional impact it also has a cumulative impact. The larger the overall site impact, the larger the cumulative impact. As direct footprint impacts are likely to be very small (especially after mitigation; <4ha of natural vegetation in total) the overall cumulative impacts of the proposed development are likely to be low. If one factors in regular bushcutting of the servitude (which would appear to be unlikely given the rough terrain) then cumulative impacts would rise substantially. Eskom is undertaking significant infrastructural development in the region and their cumulative environmental impacts, although relatively small on an individual basis, are adding up.

7.1.3. Positive impacts

The potential positive impacts will only come about if recommendations noted under Mitigation (as detailed in Section 7.1.1) are implemented and enforced. If mitigation is not effectively carried out there will be no positive impacts. Alien clearing within the 55 m wide servitude in areas of natural vegetation would be a Low positive impact, as alien invasive vegetation is currently a minor but potentially growing problem in the study area.

7.1.4. Comparison of Transmission Power Line Alternatives

The power line footprint itself will have a Low negative impact on the vegetation, and there is no significant difference between the various Alternatives in terms of botanical impacts. Therefore, there is **no preferred alternative** in this regard.

7.1.5. Conclusions and Recommendations

The power line footprint itself will have only a Low negative impact on the vegetation, and there is **no significant difference between the Alternatives** in terms of botanical impacts.

Typical Eskom bushcutting in the servitude areas with natural vegetation (a section about 5 km long closest to the Proteus substation) will have a High negative impact, and should not be undertaken. On-going alien clearing should instead be undertaken in this area as mitigation, and any bushcutting should be limited to once every five years.

Additional botanical inputs at the walk-through stage would be valuable in terms of avoiding tower placement in sensitive micro-habitats such as rocky outcrops and seasonal wetlands, as this is where many of the more localised plant (and animal) species are likely to occur. A focused power line walk down botanical study is therefore recommended during the post-authorisation phase.

Site specific mitigation measures which must be included in the EMP include:

- » Creation of new access tracks must be minimised within the servitudes
- » Bush-cutting should not be allowed within the power line servitude more often than once every five years
- » On-going, alien plant management must be undertaken every second year in the sections of the servitudes that support natural vegetation. Methodology used must comply with DWAF methodology for control of *Acacia saligna* and *Acacia cyclops*.
- » Additional botanical inputs at the walk-through stage would be valuable in terms of avoiding tower placement in sensitive micro-habitats such as rocky outcrops and seasonal wetlands, as this is where many of the more localised plant (and animal) species occur. No towers or tracks should be placed in wetland areas or on rocky outcrops indicated during the recommended power line walk down study at the post authorisation stage. During this walk down stage the botanist should also identify and locate (with GPS) any species in need of Search and Rescue before power line construction.

7.2. Assessment of Potential Impacts on Avifauna

The Southern African Bird Atlas Project recorded a total of 157 bird species in the quarter degree square within which the study area falls, i.e. 3421BB. This included seven Red Data species, four 'vulnerable' and three 'near-threatened' (Barnes, 2000). In addition, the White Stork (Protected internationally under the Bonn Convention on Migratory Species) is considered as a threatened species for the purpose of this study. This is a relatively low diversity of bird species, and

consequently Red Data species, meaning that in terms of avifauna, this study area is not particularly unique.

Two main bird micro-habitats were identified along the proposed alignments:

» *Dams:*

There are several small man-made impoundments in the study area, particularly along the eastern alignment. Depending on the water levels and the extent of exposed shoreline, these could also attract a number of bird species. Of particular concern might be Blue Cranes roosting in the shallows of dams, although the dams observed during the site visit did not appear to have the shallows required for this. Roosting Blue Cranes are particularly vulnerable to collision with power lines as they enter and leave the roost in low light conditions when visibility of the power line is low.

Figure 7.2: Photograph of a typical dam found along the proposed power line corridor

» *Arable land:*

Arable or cultivated land represents a significant feeding area for many bird species in any landscape for the following reasons: through opening up the soil surface, land preparation makes many insects, seeds, bulbs and other food sources suddenly accessible to birds and other predators; the crop or pasture plants cultivated are often themselves eaten by birds, or attract insects which are in turn eaten by birds; during the dry season arable lands often represent the only green or attractive food sources in an otherwise dry landscape. In this study area, most of the southern parts are arable lands. The most important species likely to make use of these areas is the Blue Crane. The Blue Crane uses arable lands extensively for foraging. A group of this species (20-30) was observed in the study area during the site visit on 27

and 28 March 2008 and a family group of four was also observed on 10 April 2008. The high bird atlas report rate for this species also bears testimony to its abundance in the area. Other species likely to use the arable lands are the White Stork (summer migrant), Secretarybird and Denham's Bustard (none of which are strictly speaking birds associated with arable lands, but in this study area they are).

Figure 7.3: Photograph illustrating arable land in the study area

7.2.1. Direct and Indirect Impacts on Avifauna

Due to their size and prominence, electrical infrastructure constitutes an important interface between wildlife and man. Typically, a development of this type could be expected to impact on the birds of the area through: collision of birds with earth wires and conductors; electrocution of birds on towers; destruction of bird habitat; disturbance of birds; and birds causing electrical faulting on the power line. Impacts are expected to be similar for both alternatives investigated.

Electrocution of birds on overhead lines refers to the scenario where a bird is perched or attempts to perch on the electrical structure and causes an electrical short circuit by physically bridging the air gap between live components and/or live and earthed components (van Rooyen, 2004). Due to the large size of the clearances on most overhead lines of above 132kV, electrocutions are generally ruled out as even the largest birds cannot physically bridge the gap between dangerous components. In fact, transmission lines have proven to be beneficial to many birds, including species such as Bald Ibis, Martial Eagles, Tawny Eagles, African White-backed Vultures, and even occasionally Verreauxs' Eagles by

providing safe nesting and roosting sites in areas where suitable natural alternatives are scarce (van Rooyen 2004).

Electrocutions are not envisaged as an impact on the proposed 400kV transmission line as the relevant clearances are large enough, therefore are not considered in the assessment.

Collision of large terrestrial Red Data bird species will be by far the most significant impact of the proposed power line. Provided that the correct alternative is chosen, and then an avifaunal walk down identifies the relevant sections of the power line for comprehensive marking with a suitable anti-collision marking device, the EWT are confident that this impact can be reduced to acceptable levels. The groups of birds most severely impacted by collision with overhead lines are bustards, storks and cranes. These species are generally large, heavy-bodied birds with limited manoeuvrability, which makes it difficult for them to take the necessary evasive action to avoid colliding with power lines. An unknown number of smaller, fast-flying species – especially pursuit hunting raptors such as falcons-are also prone to colliding with power lines. Unfortunately, many collision-sensitive species are considered threatened in southern Africa, and many are long-lived, slow reproducing species poorly adapted to coping with high rates of adult mortality, inflated by power line casualties.

Figure 7.4: The study area with proposed alignments showing the area of highest collision risk in the green polygon.

Several of the Red Data species recorded in the study area are known to be extremely vulnerable to impacts of power lines, through collision. The Blue Crane, Secretarybird, Denham's Bustard and White Stork are all extremely vulnerable to collision, and several birds of these species have been reported colliding with the existing power lines in the study area previously. This impact is anticipated to be of high significance. The existing lines in the area have killed numerous birds, particularly Blue Cranes and White Storks.

Disturbance from construction and maintenance activities impact on birds, particularly during breeding activities. This could lead to breeding failure if the disturbance happens during a critical part of the breeding season. Disturbance is not anticipated to be a significant impact on avifauna in most of this study area, since existing disturbance levels are high from existing infrastructure, including the Petro SA refinery.

Habitat Destruction and transformation resulting from activities associated with the construction phase and maintenance of power lines and substations will inevitably take place. These activities have an impact on birds breeding, foraging and roosting in or in close proximity of the servitude through modification of habitat. In general, much of the proposed study area is disturbed or degraded to some extent already. In this context, habitat destruction associated with construction of the proposed line and substation is not anticipated to be significant. The exception to this statement is the northern area close to Proteus Substation, where some fynbos remains.

Impact of birds on quality of power supply- A number of mechanisms exist through which birds are able to cause electrical faults on transmission lines. Frequent faulting affects the quality of electrical supply to the end customers. Power utilities aim to maximise the quality of supply to customers at all times.

In the case of a bird streamer induced fault, the fault is caused by the bird releasing a "streamer" of faeces which can constitute an air gap intrusion between the conductor and the earthed structure. Larger bird species such as vultures and eagles capable of producing large or long streamers are more likely to cause streamer faults.

Bird pollution is a form of pre-deposit pollution. A flashover occurs when an insulator string gets coated with pollutant, which compromises the insulation properties of the string. When the pollutant is wetted, the coating becomes conductive, insulation breakdown occurs and a flashover results. Since this involves a build up of bird faeces or bird pollution and not a once off event such as a streamer, the more an insulator string becomes coated with faeces, the more likely a fault.

Bird nests may also cause faults through nest material protruding and constituting an air gap intrusion. When nests cause flashovers, the nesting material may catch fire. This in turn can lead to equipment damage or a general veld fire. Apart from the cost of replacing damaged equipment, the resultant veld fire can lead to claims for damages from landowners. Certain species such as crows and large eagles are likely to nest on power line towers such as the proposed power line.

This impact is only possible on the self support towers along the proposed power line, as the cross rope suspension tower does not provide suitable space in the relevant positions.

Impact tables summarising the significance of impacts on avifauna associated with the transmission power line (with and without mitigation)

Nature of impact: Collision of birds with overhead cables, particularly the earth wires. Species particularly relevant are the Blue Crane, White Stork and Denham's Bustard.		
	Without Mitigation	With mitigation
Extent	Local impact will be confined to site (1)	Local (1)
Duration	Permanent (5)	Permanent (5)
Magnitude	High (8)	Low (4)
Probability	Highly probable (4)	Improbable (2)
Significance	Medium (56)	Low (20)
Status	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	High	Medium
Can impacts be mitigated?	Yes – to large extent	
Mitigation: An avifaunal walk down should be conducted during the site specific EMP, to identify the high risk sections of the power line route. These sections should be fitted with suitable marking devices on the earth wires at construction, according to the Eskom Transmission guidelines.		
Cumulative impacts: The cumulative impact of numerous power lines crossing the habitat of these species is significant. In general terms this increases the chances of collisions occurring as the change of birds crossing power lines in mid flight is greater. This can be offset partly by power lines close to each other and of the same height becoming more visible.		
Residual impacts: The impact will last as long as the power line is operational.		

Nature of impact: Impact of birds on quality of supply		
	Without Mitigation	With mitigation
Extent	Site (1)	Site (1)
Duration	Permanent (5)	Permanent (5)
Magnitude	Low (4)	Minor (2)
Probability	Probable (3)	Very improbable (1)
Significance	Medium (30)	Low (8)
Status	Negative for line performance and Eskom's business	
Reversibility	Low	
Irreplaceable loss of resources?	No	
Can impacts be mitigated?	Yes	
Mitigation: All self-supporting towers on the proposed power line should be installed with Bird Guards as per Eskom Transmission guidelines, to deter birds from perching in high risk areas.		
Cumulative impacts: The cumulative impact of bird related faulting on Eskom's Transmission network is significant.		
Residual impacts: This impact will last the lifetime of the power line.		

7.2.2. Comparison of Transmission Power Line Alternatives

Due to the close proximity of alternatives to each other, the standard method of comparing alternatives mathematically, based on report rates for relevant bird species, is not possible here. The comparison is therefore made on the basis of physical characteristics of the study area. In this regard, **Alternative 3** is the most preferred alternative for the following reasons:

- » Placing the new line adjacent to existing lines (two 132kV and two 400kV lines) is desirable from an avifaunal perspective as it reduces the amount of habitat destruction during construction and maintenance since there are existing roads; reduces the amount of disturbance in the landscape as the existing lines are already a disturbance; partially mitigates for the impact of collision, since the more lines are placed together the more visible they become.
- » Placing a 400kV line on the outside of this consolidated corridor, would also be advantageous from a bird collision perspective as it would 'shield' the lower inner 132kV line (the existing 132kV lines have recorded numerous collisions of Blue Cranes and other species – EWT Database)

In order to demonstrate the relative preference of the alternatives from an avifaunal perspective, a score of 1 to 10 was assigned to each alternative. A score of 10 would mean that the corridor is highly preferred, while a score of 1 would mean that the corridor is a 'no go' from an avifaunal point of view.

Table 7.1: Preference scores for the alternative corridors

Alternative	Preference Score
Alt 2	6
Alt 3	7

7.2.3. Conclusions and Recommendations

Impacts on avifauna as a result of the construction and operation of the proposed power line are expected to be of medium significance before mitigation. With the implementation of the recommended mitigation measures, this impact can be reduced to one of low significance. Although the impacts associated with the two identified corridors are considered to be similar in nature, Alternative 3 is considered to be the preferred alternative as this option would mitigate impacts associated with the existing 132kV line located along this corridor.

7.3 Assessment of Potential Impacts on Heritage Sites

In heritage terms, a survey of the study area revealed that extensive dispersed scatters of ESA and MSA material that lie on the lowlands below the escarpment have not been negatively affected by the existing power line, nor were the heritage qualities of any generally protected structures in the area. This would also apply to the proposed power line alignment.

7.3.1. Direct and Indirect Impacts on Heritage Sites

Heritage sites can be negatively affected through disturbance of the land surface, destruction of significant structures and places as well as any action that will alter the feel and appearance of an historic place or building. Impacts can therefore be direct (through disturbance or destruction of sites) or indirect (as a result of visual impacts on the area or site).

Impact tables summarising the significance of impacts on heritage sites associated with the transmission power line (with and without mitigation)

Nature of impact: Impacts on buried Pleistocene archaeology/palaeontology

Alternatives 2 and 3 essentially follow a similar corridor, however each option is on either side of the existing Proteus-Gourikwa servitudes which have already been well studied. Hart (2006) reported "Isolated artefacts of Early and Middle Stone Age origin (one flake every linear 15 m) were noted lying on the ground surface of the ostrich camps of the lowlands. Even if these were found on any of the tower footprints, the significance of impacts in heritage terms is very low." Large open scatters of Early Stone Age material exist on the lower coastal plain areas. The study area lies in agricultural land that has

been subject to many years of transformation. While it is possible that excavations for tower bases may impact relatively a very small portion of these scatters, the significance of the severity and overall accumulative impact on this material is considered to be negligible.

	Without Mitigation	With mitigation
Extent	Local (1)	Local (1)
Duration	Permanent (5)	Permanent (5)
Magnitude	Low (1)	Low (1)
Probability	Probable (2)	Probable (2)
Significance	Low (14)	Low (14)
Status	Neutral	Neutral
Reversibility	No	
Irreplaceable loss of resources?	Yes	
Can impacts be mitigated?	No	
Mitigation: None.		
Cumulative impacts: Loss of heritage sites in the area.		
Residual impacts: None.		

Nature of impact: Transmission line operation

Operational impacts caused by the presence of the transmission line relate to the change of sense of place and impact on the cultural landscape. Given that the proposed new transmission line is situated in close proximity to an already existing 400 kV line from Gourikwa to Proteus, the additional line is not expected to result in changes to the atmosphere/quality of the area. In general terms, the study area does not have any special heritage or tourism status.

	Without Mitigation	With mitigation
Extent	Local (1)	Local (1)
Duration	Permanent (4)	Permanent (4)
Magnitude	Low (1)	Low (1)
Probability	Probable (2)	Probable (2)
Significance	Low (12)	Low (12)
Status	Neutral	Neutral
Reversibility	No	
Irreplaceable loss of resources?	Yes	
Can impacts be mitigated?	No	
Mitigation: None.		
Cumulative impacts: None.		
Residual impacts: None.		

7.3.2. Comparison of Transmission Power Line Alternatives

As a result of the relatively close proximity of the alternatives investigated, impacts on heritage sites are expected to be similar. Therefore, there is **no preference** in terms of the alternative transmission power line alternatives.

7.3.3. Conclusions and Recommendations

No further field work will be necessary in terms of assessing impacts to transmission line Alternatives 2 or 3. The route has been adequately studied in previous EIA processes (Ninham Shand, 2005; 2007), and investigations indicated that no sites/artefacts of heritage value would be impacted by the construction of an additional power line along this route. There is no preference in terms of the alternatives investigated.

» *Action required during the proposed activity*

Should any finds be unearthed during construction activity, an archaeologist and Heritage Western Cape should be informed immediately. The relevant contact person at Heritage Western Cape is Ms Celeste Booth (021 4839685). The person responsible for reporting any finds that evoke concern should be a senior person on site, or an environmental control officer who is on site during construction.

» *Human remains*

Human remains can occur anywhere on the landscape. Most archaeologists retrieve several skeletons a year from various development projects around the province, so finds of this nature are not necessarily rare. Human remains are protected by several sets of legislation which means that certain protocols must be followed in the event of a find.

- 1) leave the remains in place, nothing should be moved
- 2) Cordon off the area
- 3) Call Ms Mary Leslie at SAHRA (021 4624509)
- 4) Contact an archaeologist
- 5) Once an archaeologist has examined the find, the archaeologist/SAHRA should contact SA Police services and the state pathologist to report human remains
- 6) If the human remains are found to be a legitimate burial or a pre-colonial burial, an emergency exhumation permit will be issued by SAHRA or HWC

Figure 7.5: Visual Impact Index for transmission power line alternatives

7.4. Assessment of Potential Visual Impacts

The visual impact assessment is based on the visual exposure (visibility), the visual distance (proximity of the observer) and the viewer incidence (number of observers) of the proposed project infrastructure. It takes into account the size (width, height and length) of the structures associated with the transmission power line. The combined results of the visual exposure, viewer incidence/perception and visual distance of the proposed infrastructure are displayed on Figure 7.5. Here the weighted impact and the likely areas of impact are indicated as a visual impact index. Values were assigned for each potential visual impact per data category (as mentioned above) and merged in order to calculate the visual impact index. An area with short distance visual exposure of the project infrastructure, a high viewer incidence and a predominantly negative perception of the structures would therefore have a higher value (greater impact) on the index.

The area of potentially high visual impact is indicated within a 500 m buffer zone from the transmission power line. This area (predominantly vacant farmland) is, however, greatly devoid of random observers upon whom the transmission power line could have a visual impact.

An area with a very high visual impact value occurs along the R327, near the Proteus Substation. Alternative 2 will cross this road alongside the existing Gourikwa-Proteus 400kV transmission lines, while Alternative 3 will cross the road and run adjacent to the road for approximately 600 m before entering the substation (based on information supplied by Eskom).

The sightings of the proposed Gourikwa-Proteus transmission power line will be influenced by the existing power line infrastructure (Gourikwa-Proteus 1 & 2 400kV and Mossgas-Proteus 1 & 2 132kV, as well as the Duinzicht-Proteus 66kV and Blanco-Proteus 132kV lines). This congregation of power lines at the Proteus Substation adjacent to the R327 mitigates the potential individual visual impact of the proposed Gourikwa-Proteus transmission line to some extent. On the other hand, each new power line entering the Proteus Substation contributes to the cumulative visual impact of the substation due to its location adjacent to, and in close proximity of this road.

Most of the farm settlements (as identified from the satellite images) are not expected to experience high visual impacts. The sensitive visual receptor indicated as Patrysfontein (south of Alternative 2) on the map, may experience a very high visual impact (from approximately 330 m from the alignment) if Alternative 2 is preferred. This visual impact will be additional to the visual impact already present due to the existing transmission and distribution lines that traverse near (400 m at the closest) the homestead.

Figure 7.6: View of the Proteus substation from the R327

The potential visual impact of the construction of the Gourikwa-Proteus transmission power line is generally envisaged to be relatively low. This is due to the transmission alignment adjacent to the existing power lines within the study area. The already visible power lines (existing vertical disturbance) are expected to absorb the visual exposure of an additional power line to a large degree. This is true for both the alternatives.

The areas with the highest envisaged visual impact along the transmission line alignment are expected to occur near the Proteus Substation where the power line would cross the R327, and at the Patrysfontein settlement.

Impact tables summarising the significance of visual impacts associated with the transmission power line (with and without mitigation)

<i>Nature of Impact: Potential visual impact on users of the R327</i>		
	Without mitigation	With mitigation
<i>Extent</i>	Local (4)	NA
<i>Duration</i>	Long term (4)	NA
<i>Magnitude</i>	Moderate (5)	NA
<i>Probability</i>	Highly probable (4)	NA
<i>Significance</i>	Medium (52)	NA
<i>Status (positive or negative)</i>	Negative	NA
<i>Reversibility</i>	None	NA
<i>Irreplaceable loss of</i>	No	NA

resources?		
Can impacts be mitigated?	No	NA
Mitigation: None		
Cumulative impacts: The construction of each new power line across this road in the vicinity of the substation contributes to the potential cumulative visual impact experienced by road users.		
Residual impacts: NA		

Nature of Impact: Potential visual impact on residents of the Patrysfontein settlement (Alternative 2)		
	Without mitigation	With mitigation
Extent	Local (4)	NA
Duration	Long term (4)	NA
Magnitude	High (6)	NA
Probability	Highly probable (4)	NA
Significance	Medium (56)	NA
Status (positive or negative)	Negative	NA
Reversibility	None	NA
Irreplaceable loss of resources?	No	NA
Can impacts be mitigated?	Yes	NA
Mitigation: Alternative 3 (as opposed to Alternative 2) is expected to not significantly visually impact on this settlement.		
Cumulative impacts: The construction of each new power line in close proximity of this settlement contributes to the potential cumulative visual impact experienced by its residents.		
Residual impacts: None		

7.4.1. Comparison of Transmission Power Line Alternatives

It is clear from the visual impact index that there is only a **slight difference** in the potential visual impact associated with Alternatives 2 and 3. This is due to the two alignments running parallel to each other. Alternative 2 is expected to impact on residents of the Patrysfontein settlement, whereas Alternative 3 is not expected to have a significant visual impact on this settlement.

7.4.2. Additional issues related to the visual impact

- » *Landscape character/land use character*
The construction of the Gourikwa-Proteus transmission power line adjacent to existing power lines (i.e. an existing vertically disturbed landscape) is not considered to be in conflict with the current landscape character of the area.
- » *Visually sensitive features (scenic features or attractions)*
The area in close proximity of the proposed transmission power line does not contain any identified visually sensitive features or scenic attractions.
- » *Potential impact of the project infrastructure on tourism and eco-tourism*
The specific area surrounding the proposed power line infrastructure is not currently viewed as a major tourist destination. Therefore, the establishment of the proposed transmission line is not expected to significantly influence the tourism potential within the region.
- » *Visual absorption capacity (VAC) of the natural vegetation*
The visual absorption capacity of the natural vegetation in this region is not considered as an element that could successfully negate or mitigate the visual impact of the power line due to the relatively low growth form and the height of the proposed transmission line towers.

7.4.3. Conclusions and Recommendations

The visual impacts associated with the proposed transmission power line will be additional to existing visual impacts. The number of transmission power lines already present within the study area mitigates the visual impacts that would be associated with "green fields" projects. The establishment of the PetroSA industrial area in the 1980s has set the trend for industrial style developments within the region. It is unlikely that this trend would be reversed in the foreseeable future and it is envisaged that the region will come under increasing development pressure, further impacting on the visual quality of the area.

There is only a **slight difference** in the potential visual impact associated with Alternatives 2 and 3 as the two alignments run parallel to each other, with **Alternative 3 being marginally preferred over Alternative 2.**

7.5 Assessment of Potential Impacts on the Social Environment

The study area is located in a predominantly rural area, with the dominant land use being agriculture. The study area is located approximately 15 km west of Mossel Bay adjacent to the PetroSA GTL plant, within the Mossel Bay Municipality of the Eden District. The KwaNonqaba, Joe Slovo and Dana Bay communities are

the closest situated to the study area. Farms surrounding the Gourikwa site to the north and west include:

Farm	Owners/ Residents	Orientation
B&H Boerdery	Bennie & Hennie Pienaar	Located close to the Gourikwa Power Station, south of Alt 2
Patryfontein	Ignatius Muller & Quintus Muller	Crossed by Alt 2 & 3
Arum Valley	Gilbert Muller	South west of Alt 2
Kleinberg	Lucas Muller	South west of Alt 2

Potential impacts associated with the proposed transmission line can be expected to be similar to impacts experienced from the existing transmission lines following similar alignments to those proposed for the additional line, as well as impacts that can commonly be anticipated from construction and operation of power lines.

7.6.1. Potential Impacts Associated with the Construction Phase

Issues relevant for the construction phase include:

- » Creation of temporary employment opportunities
- » Impact on current land-uses
- » Increase in traffic

Increase in traffic during the construction phase are be expected to be minimal and similar to those experienced during the construction of the existing power lines in the study area. Additional traffic impacts along the R327 were noted as negligible by residents along this road, who indicated the road to be little used, and did not raise any concerns regarding additional construction traffic when probed in this regard. This impact is therefore not assessed in any further detail.

Impact tables summarising the significance of social impacts associated with the construction phase of the Gourikwa-Proteus power line (with and without mitigation)

Nature: Temporary local employment opportunities

Construction of the transmission power line will create a number of temporary employment opportunities during the construction phase. This impact can be maximised through an emphasis on local employment creation. It is important to note that opportunities for local labour would be limited to semi-skilled and unskilled jobs as the erection of a power line is a highly skilled job.

As it may be expected that skilled labour may need to be brought in from other areas, an additional impact would be housing of temporary employees.

	Without Mitigation	With Mitigation
Extent	Local (2)	Local (2)
Duration	Very short (1)	Short-term (2)
Magnitude	Low (4)	High (8)
Probability	Probable (3)	Highly probable (4)
Significance	Low (21)	Medium (48)
Status	Positive	Positive
Reversibility	Impact lasts only as long as employment	Impact can be augmented through skills development and on-the-job training
Can impacts be mitigated?	Yes - effective mitigation can maximise this potential positive impact.	

Mitigation:

Make use of local labour where possible. Means to achieve this are suggested below:

- » Identify types and levels of employment that the development could offer.
- » Appoint a local labour broker, to be identified in consultation with local community stakeholders.
- » Refer contractors to jobseeker's databases kept by local community structures (e.g. local council, Red Door, Residents' Association) when sourcing local labour.
- » Identify targets for BEE & local employment. Criteria for 'local' to be agreed in consultation with local community stakeholders.
- » Reserve agreed percentage of higher level positions for local employment.
- » Skills training to be undertaken where viable to facilitate employment.
- » Location of appropriate transport providers who would be available to assist contractors in transporting workers from these sites.
- » Younger people tend to have higher levels of education and may stand in line for higher levels of employment. Opportunities for the employment of younger people should be maximised.
- » Investigate opportunities to maximise employment of women.

Cumulative Impacts:

The impact of on-going employment through on-going construction activities of the Gourikwa transmission power line can be considered cumulative to previous construction processes and other project components, as well as other developments in the area, with the Mossel Bay area currently being targeted for increased industrial developments.

Residual Impacts:

- » The families of those who secure work will benefit and this will impact on their health and well-being for the duration of employment.
- » Local businesses benefit indirectly as a result of increased local spending by those who are employed. This also impacts on the health and well-being of their families.

Nature: Impact on current land-users

Current land uses that may be impacted by construction (and subsequent operation of) the proposed transmission power line on Alternative 2 or 3 include sheep, cattle and ostrich farming and wheat cultivation on the farm Patryfontein owned by Ignatius Muller. Mr Muller noted that during the construction of the existing transmission and distribution lines across his land construction trucks caused significant tracts of damage to land (in addition to that covered by

the servitude) that can no longer be cultivated or used for grazing. Another potential impact on livestock farming relates to the possibility of construction workers leaving gates open and resulting stock losses. Alternative 3 would also impact on a pivot irrigation point the Mullers are planning to erect on the farm Patryfontein. The presence of a landing strip about 2 km from the power lines was noted as a potential impediment to Alternative 1, which was considered during scoping, but was not considered as a hindrance for Alternatives 2 and 3 considered in this assessment, as these are in close proximity to existing lines which do not impact on the use of the landing strip.

Alternative 2		
	Without Mitigation	With Mitigation
Extent	Site-only (1)	Site-only (1)
Duration	Short (2)	Short (2)
Magnitude	Low (4)	Minor (2)
Probability	Definite (5)	Definite (5)
Significance	Medium (35)	Low (25)
Status	Negative	Negative
Reversibility	Rehabilitation of areas impacted by construction activities would be required as part of EMP.	
Alternative 3		
	Without Mitigation	With Mitigation
Extent	Site-only (1)	Site-only (1)
Duration	Short (2)	Short (2)
Magnitude	High (8)	Minor (2)
Probability	Definite (5)	Definite (5)
Significance	Medium (55)	Low (25)
Status	Negative	Negative
Reversibility	Rehabilitation of areas impacted by construction activities would be required as part of EMP.	
Can impacts be mitigated?	Yes	
Mitigation: Mitigation and compensation to be negotiated with affected landowners and residents.		
Cumulative Impacts: NA		
Residual Impacts: NA		

7.6.2. Potential Impacts Associated with the Operation Phase

Issues relevant for the operation phase include:

- » Provision of electricity, impacting on local/regional/national linkages and macro-economy
- » Impacts on health and safety
- » Impacts on current land uses
- » Impacts on sense-of-place

The additional 400kV power line is considered essential for transmission of the additional electricity to be generated by the converted CCGT plant to the Proteus Substation, from where it would be integrated into the national grid. This impact was established to be of high positive significance affecting the South African population as a whole during the scoping study. It will therefore not be assessed any further in this report.

Impact tables summarising the significance of social impacts associated with the operation phase of the Gourikwa-Proteus power line (with and without mitigation)

Nature: Impact on Health and Safety		
The impact relates to potential risks associated with living in close proximity to a transmission line as a result of EMFs.		
	Without Mitigation	With Mitigation
Extent	Site only (1)	N/A
Duration	Permanent (5)	N/A
Magnitude	Low (4)	N/A
Probability	Possible (3)	N/A
Significance	Medium (40)	N/A
Status	Negative	N/A
Reversibility	Irreversible	N/A
Can impacts be mitigated?	Ensure minimal exposure - Minimise number of people potentially at risk of health impacts related to EMFs through appropriate alignment. This has been considered in the design of an appropriate buffer zone to minimise potential impacts.	
Mitigation: N/A		
Cumulative Impacts: Potential cumulative impacts due to presence of existing transmission lines on affected properties.		
Residual Impacts: Perception of risk. While power line servitude and design may be technically considered as sufficient mitigation to limit health impacts that are only deemed to affect the area situated directly under the power line, people's perceptions of the health risks of exposure to EMFs are firmly entrenched. Surrounding residents will therefore continue to perceive this as a significant potential social impact, despite studies by Eskom and internationally indicating the actual impact to be limited.		

Nature: Impact on current Land-users

The proposed transmission line (Alignments 2 & 3) can impact on safety of livestock on the farm Patryfontein. Mr Ignatius Muller of Patryfontein noted that he has lost a number of sheep that have been injured or trapped by the grids around the existing towers. It was noted, however, during Focus Group discussions that the new design of towers does not include such grids. Another possible impact is livestock losses from maintenance teams, which may leave gates open. During the site visit it was noted that a farmer had exchanged the stipulated Eskom lock, therefore prohibiting access to the maintenance team. This could be a result of problems

experienced in this regard. Another impact of existing transmission lines is that crops (wheat) on Patrysfontein can no longer be effectively sprayed aerially. An additional line along this route could magnify this impact by increasing the affected area that cannot be sprayed. Alternative 3 could further impact on a pivot irrigation point Mr Ignatius Muller hopes to erect north of existing transmission lines. Alternative 2 (south of existing lines) would therefore be the preferred option to minimise impacts in this regard.

Alternative 2		
	Without Mitigation	With Mitigation
Extent	Site-only (1)	Site-only (1)
Duration	Short (2)	Short (2)
Magnitude	Low (3)	Minor (2)
Probability	Definite (5)	Definite (5)
Significance	Low (30)	Low (25)
Status	Negative	Negative
Reversibility	Rehabilitation of areas impacted by construction activities would be required as part of EMP.	
Alternative 3		
	Without Mitigation	With Mitigation
Extent	Site-only (1)	Site-only (1)
Duration	Permanent (5)	Permanent (5)
Magnitude	Medium (4)	Low (3)
Probability	Definite (5)	Definite (5)
Significance	Medium (55)	Medium (45)
Status	Negative	Negative
Reversibility	Rehabilitation of areas impacted by construction activities would be required as part of EMP.	
Can impacts be mitigated?	Yes	
Mitigation: Mitigation and compensation to be negotiated with affected landowners and residents.		
Cumulative Impacts: Impacts can be considered cumulative to existing transmission lines		
Residual Impacts: NA		

Nature: Impacts on Sense of Place

The proposed transmission power line across rural countryside may be expected to have an impact on the currently rural character of the area, and therefore potentially affect surrounding residents' 'sense of place'. The fact that there are existing power lines in the area mitigates this impact to some extent, but also result in cumulative impacts.

Impacts on sense of place would relate primarily to visual impacts. Residents on Patrysfontein currently within 1 km of the existing transmission lines along the route followed by Alignments 2 and 3 (Ignatius Muller and Quintus Muller) also noted the humming noise emitted by the existing lines to be a significant impact, particularly in misty conditions and at night. This is an effect known as corona, which is known to be worse during misty/light rain conditions, and cannot be avoided or reduced. Impact are expected to be similar for both alternatives under consideration.

	Without Mitigation	With Mitigation
Extent	Local (2)	NA
Duration	Medium (3)	NA
Magnitude	Moderate (6)	NA
Probability	Probable (3)	NA
Significance	Moderate (33)	NA
Status	Negative	NA
Reversibility	No	
Can impacts be mitigated?	No	
Mitigation: NA		
Cumulative Impacts: Impacts related to the Gourikwa site can be considered cumulative to the existing transmission lines, which already impact on the region's otherwise rural character		
Residual Impacts: NA		

7.6.3. Comparison of Alternatives

Alternative 2 is nominated as the preferred alternative from a social perspective, as this alternative minimises impacts on surrounding landowners. Although this alternative will result in cumulative impacts on the farm Patrysfontein, particularly the households of Mr Quintus Muller, it was indicated during discussions with these landowners that an additional servitude to the south of existing lines would be feasible.

Alternative 3, to the north of existing transmission lines across the farm Patrysfontein, will add cumulative impacts for residents on the farm, living within a 1 km radius of the existing lines. Noise emitted from the power lines, particularly in misty conditions and at night is an impact currently experienced, and can be expected to increase with an additional line. Land use impacts that may increase relate to safety of livestock and crops which cannot be effectively sprayed by plane. In addition, this alternative would impact on a pivot irrigation point Mr Ignatius Muller intends to erect to the north of existing lines.

7.6.4. Conclusions and Recommendations

The most significant positive social impact that may be associated with the proposed development is the provision of electricity, and its related linkages to the broader national economy. The extent to which local employment creation during construction can truly be considered positive depends on the extent to which local labour is used and capacitated during the construction process, as well as on ensuring optimal working conditions for labourers. The possibility of an influx of jobseekers is also noted, though Eskom's specific contribution to such population influx is regarded of limited significance.

From a social perspective **Alternative 2** is the preferred alternative for the transmission power line, as it would have a reduced impact on current and planned land use.

7.7. Nomination of the Preferred Power Line Alternative

Transmission power line Alternatives 2 and 3 have been comparatively assessed through the impact assessment specialist studies. The following summaries the preference in alternatives from the various specialist disciplines:

- » **Ecological assessment:** The power line footprint itself will have a negative impact of low significance on the vegetation, and there is no significant difference between the two alternatives in terms of botanical impacts. Therefore, there is **no preferred alternative**.

- » **Avifauna assessment:** Due to the close proximity of alternatives to each other, there is no significant difference between the two alternatives in terms of impacts on avifauna. Placing the new line adjacent to existing lines (two 132kV and two 400kV lines) is desirable from an avifaunal perspective as it reduces the amount of habitat destruction during construction and maintenance since there are existing roads; reduces the amount of disturbance in the landscape as the existing lines are already a disturbance; partially mitigates for the impact of collision, since the more lines are placed together the more visible they become. – both alternatives are adjacent to existing power lines.

The selection of a preference between the two alternatives based on the physical characteristics of the study area nominates **Alternative 3** as the preferred alternative. In addition, placing a 400kV line on the “outside” of the consolidated power line corridor is seen to be advantageous from a bird collision perspective as it would ‘shield’ the lower inner 132kV line (the existing 132kV lines have recorded numerous collisions of Blue Cranes and other species – EWT Database).

- » **Heritage assessment:** As a result of the relatively close proximity of the alternatives investigated, there is no significant difference between the two alternatives in terms of impacts on heritage sites. Therefore, there is **no preference** in terms of the alternative transmission power line alternatives.

- » **Visual assessment:** There is only a **slight difference** in the potential visual impact associated with Alternatives 2 and 3, as both alignments run parallel to each other. Alternative 2 is expected to impact on residents of the Patryfontein settlement, whereas Alternative 3 is not expected to have a significant visual impact on this settlement.

- » **Social assessment:** **Alternative 2** is the preferred alternative for the transmission power line, as it would have a reduced impact on current and planned land use and surrounding landowners. Although this alternative will result in cumulative impacts on the farm Patryfontein, particularly the households of Mr Quintus Muller, it was indicated during discussions with these landowners that an additional servitude to the south of existing lines would be considered to be feasible.

All studies except the social and avifauna assessments do not indicate a preference in alternative. The assessment of the impacts on the social environment indicate a **strong preference** for Alternative 2. This preference has been supported by the landowners affected by the proposed servitude. The avifauna assessment indicates that there is no significant difference between the two alternatives in terms of impacts on avifauna, and that the preference for Alternative 3 is primarily based on the ability to mitigate impacts associated with the existing 132kV Distribution power line.

The impacts on the social environment associated with Alternative 3 are not able to be mitigated to an acceptable level. The landowners have indicated that they would, however, accept the impacts associated with Alternative 2. Alternative 2 is therefore considered to be most appropriate and feasible from the social perspective.

Alternative 2 is therefore considered to be the most appropriate and feasible alternative from an overall environmental perspective, as assessed through this impact assessment process. It is considered reasonable that the identified impacts can be mitigated to acceptable levels.