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SPECIALIST IMPACT ASSESSMENT FOR PROPOSED ESKOM ANKERLIG POWER STATION CONVERSION AND INTEGRATION PROJECT: TERRESTRIAL VEGETATION COMPONENT.

Prepared for: Savannah Environmental (Pty) Ltd, Johannesburg

Client: Eskom

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EXECUTIVE SUMMARY

This botanical impact assessment was requested in order to help inform decisions regarding the proposed Ankerlig power station conversion and integration project. The study area is located within a rapidly developing part of the south-western Cape, where much of the remaining natural vegetation is under intense development pressure. Three alternative new 400kV transmission line routes were investigated in the Scoping phase (Helme 2007), but only Alternative A has been taken through to the Impact Assessment phase, with a short additional alternative in the Koeberg area known as the sub-alternative. The total length of the proposed power line would be about 15km, and would run from Ankerlig to the already authorised Omega substation. An additional new diesel fuel storage area of about 17.5ha is also assessed, adjacent to the expanded power station.

Confidence levels in the botanical scoping findings are regarded as sufficient, although parts of the route had been recently burnt. At least half the route was surveyed, and the rest was assessed remotely. The proposed power line route crosses four distinct vegetation types, corresponding to different soil types. The Ankerlig plant is located within Cape Flats Dune Strandveld, an Endangered vegetation type, and this and Cape Flats Sand Fynbos (Critically Endangered) make up the bulk of the power line route. About 30% of the route is regarded as being of High botanical sensitivity, and about 40% as being of Medium sensitivity.

The key issues identified are:

- Loss of natural vegetation during the construction stage. About 70% of this will potentially be permanent (diesel storage area [approx. 17.5ha]; bushcutting of up to 12km of sensitive servitude [approx. 66ha]; pylon footprints [approx 1ha]; some tracks [1ha]), and about 20% will be temporary, as trampled and partly disturbed areas (*e.g.* around pylons) and should eventually partly recover.
- Bushcutting is identified as a major source of disturbance and vegetation loss, and should be regulated and restricted to once every ten years in the Medium and High sensitivity areas.
- Alien invasive vegetation is the major problem along large parts of the proposed power line route and how this is managed in the servitude is a key factor in the assessment. If effectively controlled it could be a positive outcome of the development.
- Cumulative effects on the relevant vegetation types are important, as all vegetation types are either Endangered or Critically Endangered, and ideally no further loss of existing habitat should take place.

Overall the **proposed diesel storage area** is likely to have a Medium to High negative impact on the vegetation at a local scale, prior to mitigation. Regional impact would be **Medium negative**, prior to mitigation. The primary negative

impact is a direct, permanent loss of natural vegetation (about 17.5ha). This impact cannot be avoided, and can only be mitigated by a biodiversity offset, which is regarded as essential. In the event of an adequate offset being put in place (recommended), the overall impact could be reduced to Neutral (Negligible impact). If this is not done botanical impacts here must be viewed as being of Medium negative.

Overall the **proposed new power line** is likely to have a **Medium to High negative** impact on the vegetation at a regional scale, prior to mitigation, primarily due to the high chance of typical Eskom bushcutting practices in the High and Medium sensitivity areas. The primary negative impact is the highly significant impact that would result from Eskom bushcutting (typical practice in Eskom servitudes) in High and Medium sensitivity areas (up to 66ha of servitude), as this would cause major community change and species loss. Additional direct, permanent loss of natural vegetation would occur in tower footprints (about 1ha), and a long-term impact in the track areas (up to 7ha). The bushcutting impact can only be mitigated by careful and ongoing removal of all invasive alien vegetation in the 55m wide servitude, and by not engaging in bushcutting in the High and Medium sensitivity areas. Bushcutting should really not be necessary as this vegetation does not grow much taller than 1.2m, and the fire risk is no more than in bushcut, grassy vegetation. Impacts could be reduced to **Very Low negative after mitigation**.

The botanical impacts of establishing the power line in the sub alternative area are likely to be very similar to those in the nearby section of Alternative A, being Low to Medium negative before mitigation, and Neutral to Low negative after mitigation.

The potentially positive impacts of this development will only come about if recommendations noted under Mitigation (Sect. 11) are implemented and enforced. If mitigation is not effectively carried out, there will be no positive impacts. Alien clearing within the 55m wide servitude in High and Medium sensitivity areas would be a Low positive impact, as alien invasive vegetation is currently a major problem in much of the study area. It would be most important and valuable to clear aliens on an annual basis within the High and Medium sensitivity areas (estimated at up to 12km of servitude), and this is thus recommended as essential mitigation. Additional botanical inputs at the walk through stage would add relatively little value, and are not consequently recommended. No towers or tracks should be placed in the wetland areas indicated in both the scoping study and this report (High sensitivity patches in southern half of Figure 2). Annual monitoring should be undertaken by an independent consultant to ensure that alien vegetation is being appropriately cleared and controlled in the High and Medium sensitivity areas, and to ensure

that these areas are not being bushcut more often than the prescribed maximum of once every ten years.

Substantial positive impacts could be realised if a biodiversity offset was part of this development. The development of the fuel storage facility presents an ideal opportunity to use a biodiversity offset as mitigation, as there is a Medium negative residual impact that cannot be otherwise mitigated. However, given that there is apparently a reluctance on behalf of the DEA&DP to implement their own provincial guidelines on biodiversity offsets (DEA&DP 2007) it seems unlikely that an offset would be approved, and thus that the positive impacts would be realised. On the other hand, given that DEAT is the decision-making authority for this application there is no reason why an offset should not be required. It is suggested that an appropriate offset would be to formally conserve an area of similar habitat and conservation value to that which is being lost. The total development footprint may amount to as much as 25ha, and as a suitable offset ratio is 15:1, the applicant should be required to secure for permanent conservation an area of Cape Flats Dune Strandveld of at least 375ha. The main positive effect of an offset would be an increase in the conservation area of an Endangered vegetation type (Cape Flats Dune Strandveld, being the vegetation type which will be most impacted by this development).

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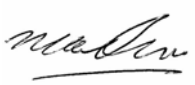
DECLARATION OF INDEPENDENCE

In terms of Chapter 5 of the National Environmental Management Act of 1998 specialists involved in Impact Assessment processes must declare their independence and include an abbreviated Curriculum Vita.

I, N.A. Helme, do hereby declare that I am financially and otherwise independent of the client and their consultants, and that all opinions expressed in this document are substantially my own.



NA Helme

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Since 1997 I have been based in Cape Town, and have been working as a specialist botanical consultant, specialising in the diverse flora of the south-western Cape. Since the end of 2001 I have been the Sole Proprietor of Nick Helme Botanical Surveys.

A selection of previous botanical work on larger projects on the west coast is as follows:

- Scoping study for Eskom Ankerlig – Omega transmission line (Savannah 2007)
- Scoping and Impact Assessment for proposed Eskom Wind Energy Facility on the Cape West Coast (Savannah 2007)
- Fine Scale vegetation mapping and conservation planning project in NW Sandveld and Saldanha Peninsula (CapeNature 2007)
- Scoping and Impact Assessment for proposed new Eskom powerline from Alexander Bay to Vredendal (SEFSA 2006)
- Assessment of proposed Bound for Gold mineral sands exploration program on the west coast south of Brand se Baai (Amathemba Environmental 2006)
- Impact Assessment of proposed Namakwa Sands expansion project, Brand se Baai (Golder 2005)
- Scoping and Impact Assessment for proposed new Eskom Omega substation (Eyethu Engineers 2004)
- Vegetation survey of proposed Namakwa Sands heavy mineral sands expansion project at Brand se Baai and Koekenaap MSP (CCA 2003)
- Scoping and IA on upgrading of Lamberts Bay - Elands Bay road (Marion Thomas 2002; revised in 2004, for EPRMS).

1. INTRODUCTION

This botanical impact assessment was requested in order to help inform decisions regarding the proposed Ankerlig power station conversion and integration project. Three alternative 400kV transmission line routes were investigated in the Scoping phase (Helme 2007), but only Alternative A has been taken through to the Impact Assessment phase, with a short additional alternative in the Koeberg area known as the sub-alternative (see Figure 2). The total length of the proposed power line would be about 15km, and would run from Ankerlig to the yet to be constructed Omega substation, and would run fairly close to the N7 highway and Koeberg at one point. An additional new diesel fuel storage area of about 17.5ha is also assessed, adjacent to the expanded Ankerlig power station.

The study area falls outside the domain of any of the Fine Scale Vegetation Mapping Projects (FSP) recently conducted for CapeNature (Helme 2007), and outside of the Cape Lowlands Renosterveld Project of the Botanical Society (Von Hase *et al* 2003).

The study area is located within a rapidly developing part of the south-western Cape, where much of the remaining natural vegetation is under intense development pressure.

2. LIMITATIONS AND ASSUMPTIONS

The fieldwork was undertaken on 19 October 2007, at the start of the summer dry season. It is thus very likely that a number of bulb, annual, and perennial species were not specifically noted, and a number of these may be of conservation concern. In order to compensate for this shortcoming the habitat approach was used, whereby habitat integrity, rarity and vulnerability were used as a surrogate for determining conservation value. Much of this interpretation is thus based on previous experience in the area, and there is a high degree of confidence (>80%) attached to the broad scale sensitivity findings.

Parts of Alternative A and B were not accessible, due to locked gates along the servitude tracks and particularly within land owed by the SANDF, but with the help of Google Earth imagery and walking along parts of this route I was able to form what is probably an accurate impression of the sensitivity of these areas. Some areas (<20% of route) were recently burned and the vegetation patterns and status in these areas were difficult to identify. Alternative B was only added as an alternative to be assessed after I had already completed my fieldwork and initial assessment and the description of that route in Helme (2007) was thus not as comprehensively ground-truthed and was a combination of fieldwork and a desktop assessment.

Servitude width is 55m, and the fuel storage area has been calculated to be about 17.5ha.

3. TERMS OF REFERENCE

Terms of reference (TOR) for the Scoping and IA phases were the standard TOR as proposed by CapeNature, and DEA&DP's guidelines for biodiversity assessment (Brownlie 2005) were also adhered to. The CapeNature TOR are as follows:

- Describe the broad ecological characteristics of the site and its surrounds in terms of any mapped spatial components of ecological processes and/or patchiness, patch size, relative isolation of patches, connectivity, corridors, disturbance regimes, ecotones, buffering, viability, etc.
- In terms of biodiversity pattern, identify or describe:

Community and ecosystem level

a. The main vegetation type, its aerial extent and interaction with neighbouring types, soils or topography;
b. The types of plant communities that occur in the vicinity of the site.
c. Threatened or vulnerable ecosystems (*cf. SA vegetation map/National Spatial Biodiversity Assessment).*

Species level

a. Red Data Book (RDB) species (indicate position on map if possible).
b. The viability of and estimated population size of the RDB species that are present (include the degree of confidence in prediction based on availability of information and specialist knowledge, i.e. High=70-100% confident, Medium 40-70% confident, low 0-40% confident)
c. The likelihood of other RDB species, or species of conservation concern, occurring in the vicinity (include degree of confidence).

Other pattern issues

a. Any significant landscape features or rare or important vegetation associations such as seasonal wetlands, alluvium, seeps, quartz patches or salt marshes in the vicinity.
b. The extent of alien plant cover of the site, and whether the infestation is the result of prior soil disturbance such as ploughing or quarrying (alien cover resulting from disturbance is generally more difficult to restore than infestation of undisturbed sites).
b. The condition of the site in terms of current or previous land uses.

In terms of **biodiversity process**, identify or describe:

a. The key ecological "drivers" of ecosystems on the site and in the vicinity, such as fire.
b. Any mapped spatial component of an ecological process that may occur at the site or in its vicinity (i.e. *corridors* such as watercourses, upland-lowland gradients, migration routes, coastal linkages or inland-trending dunes, and *vegetation boundaries* such

as edaphic interfaces, upland-lowland interfaces or biome boundaries)

c. Any possible changes in key processes, e.g. increased fire frequency or drainage/artificial recharge of aquatic systems.

- What is the significance of the potential impact of the proposed project – with and without mitigation – on biodiversity pattern and process at the site, at local and regional scales?
- Recommend actions that should be taken to prevent or mitigate impacts. Indicate how these should be scheduled to ensure long-term protection, management and restoration of affected ecosystems and biodiversity.
- Discuss the need for biodiversity offsets, as this has been brought up by various I&APs.
- Indicate limitations and assumptions, particularly in relation to seasonality.

4. METHODOLOGY

The approximate routes were followed as closely as possible during a field visited in October 2007. About half the route was driven or walked, and habitat types and any special species were recorded. Vegetation types used are as defined in the new SA vegetation map (Mucina & Rutherford 2006). The study approach was partly informed by the guidelines prepared by Brownlie (2005), and also by the TOR. Reference was made to extensive work done by myself in similar habitat in the area over the last ten years. Google Earth imagery was used to verify vegetation patterns, and the SA vegetation map of Mucina and Rutherford (2006) was used to confirm vegetation types.

For records of rare plants in the area I was able to access the GIS based information on the Cape Rares database (Spatial layer of rare and threatened plant localities managed by the Threatened Species Programme of SANBI (January 2007)), but there are very few records from the approximate study area.

5. DESCRIPTION OF THE AFFECTED ENVIRONMENT

5.1 Regional context

The study area falls within the southwest coastal region of the Cape Floristic Region (CFR), and is firmly part of the Fynbos biome. The CFR is one of only six floristic regions in the world, and is the only one confined to a single country. It is also by far the smallest floristic region, occupying only 0.01% of the world's land surface, and supporting about 9000 plants species, almost half of all the plant species in South Africa. At least 70% of all the species in the Cape region do not occur elsewhere, and many have very small home ranges (these are known as narrow endemics). Many of the lowland habitats are under pressure from

agriculture, urbanisation and alien plants, and thus many of the range restricted species are also under severe threat of extinction, as habitat is reduced to extremely small fragments. The latest data from the Red Data Book listing process currently being undertaken for South Africa is that fully 85% of the threatened plant species in the country occur only in the south-western Cape, and these total over 1500 species (D. Raimondo – pers. comm.). It should thus be abundantly clear that the south-western Cape is a major national and global conservation priority, and is quite unlike anywhere else in the country in terms of the number of threatened plant species.

The soil type is probably the primary driver of vegetation type in this area, which means that as the soil type changes from acid to alkaline sand so the vegetation type shifts from Strandveld to Sand Fynbos. Fire is an important element of Fynbos functioning (De Villiers *et al* 2005), but would naturally be more common in Fynbos and Renosterveld areas than in Strandveld areas (De Villiers *et al* 2005). Changes to the natural fire regimes are having significant impacts on the natural vegetation throughout the Fynbos biome (pers. obs.)

5.2 Description of the vegetation

As can be seen from Figure 2 the power line route crosses no less than four distinct vegetation types, corresponding to different soil types. The actual vegetation transitions are difficult to see on the ground, mainly due to high levels of disturbance, including recent fire and alien plant invasion.

The Ankerlig Power Station and the first 1km of the route are located within Cape Flats Dune Strandveld (Mucina & Rutherford 2006; see Figure 1). This vegetation type is restricted to the area from Atlantis south to the Cape Flats and the Cape Peninsula, and is regarded as an Endangered vegetation type on a national basis (Rouget *et al* 2004). When the analysis for the threat status of ecosystems was done in 1996 less than 60% of its original extent was still intact, with only 5% conserved, and a national conservation target of 24% (Rouget *et al* 2004), which means that the remaining patches are vulnerable to degradation and loss. Most of the High sensitivity vegetation is located in this section of the proposed route (see Figure 2).

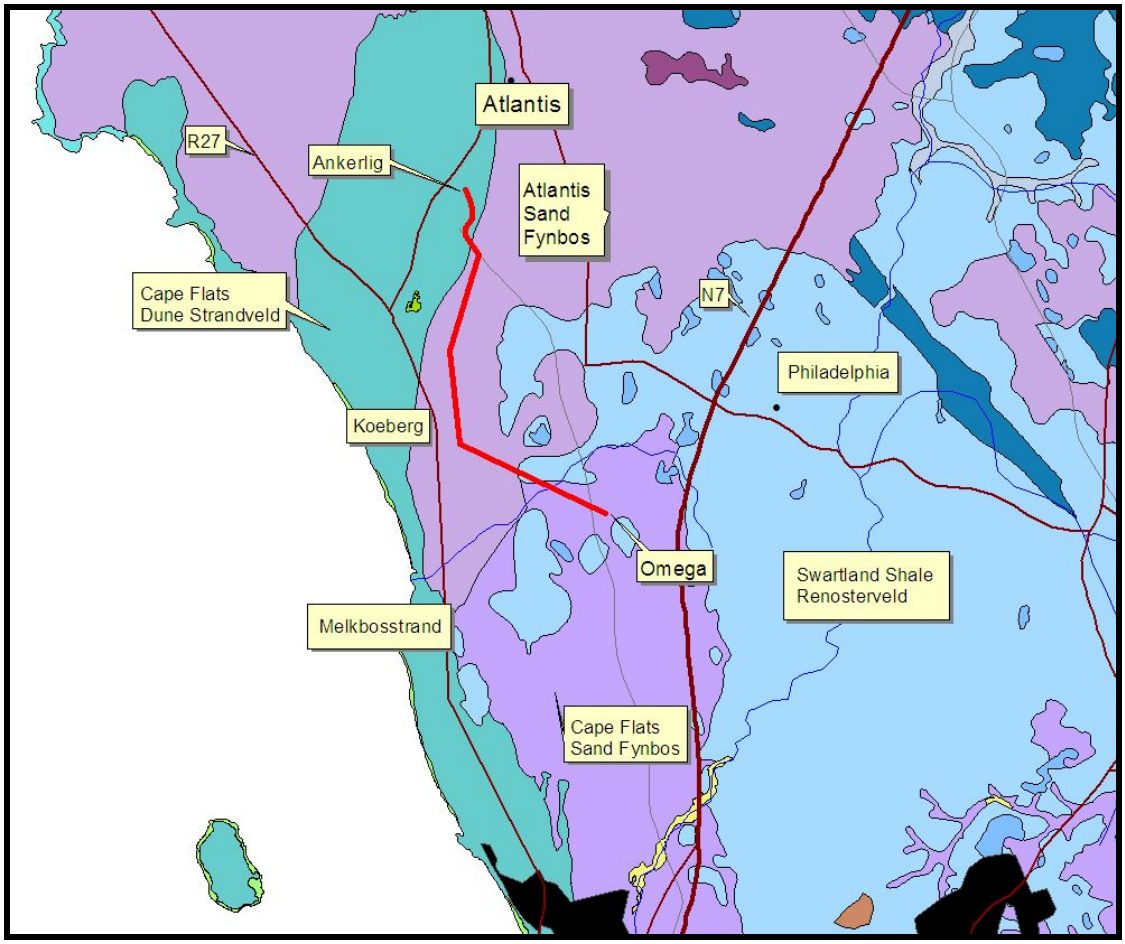

Figure 1: Extract from SA Vegetation map (Mucina & Rutherford 2006), showing route of Alternative A as a red line, superimposed on the different vegetation types.

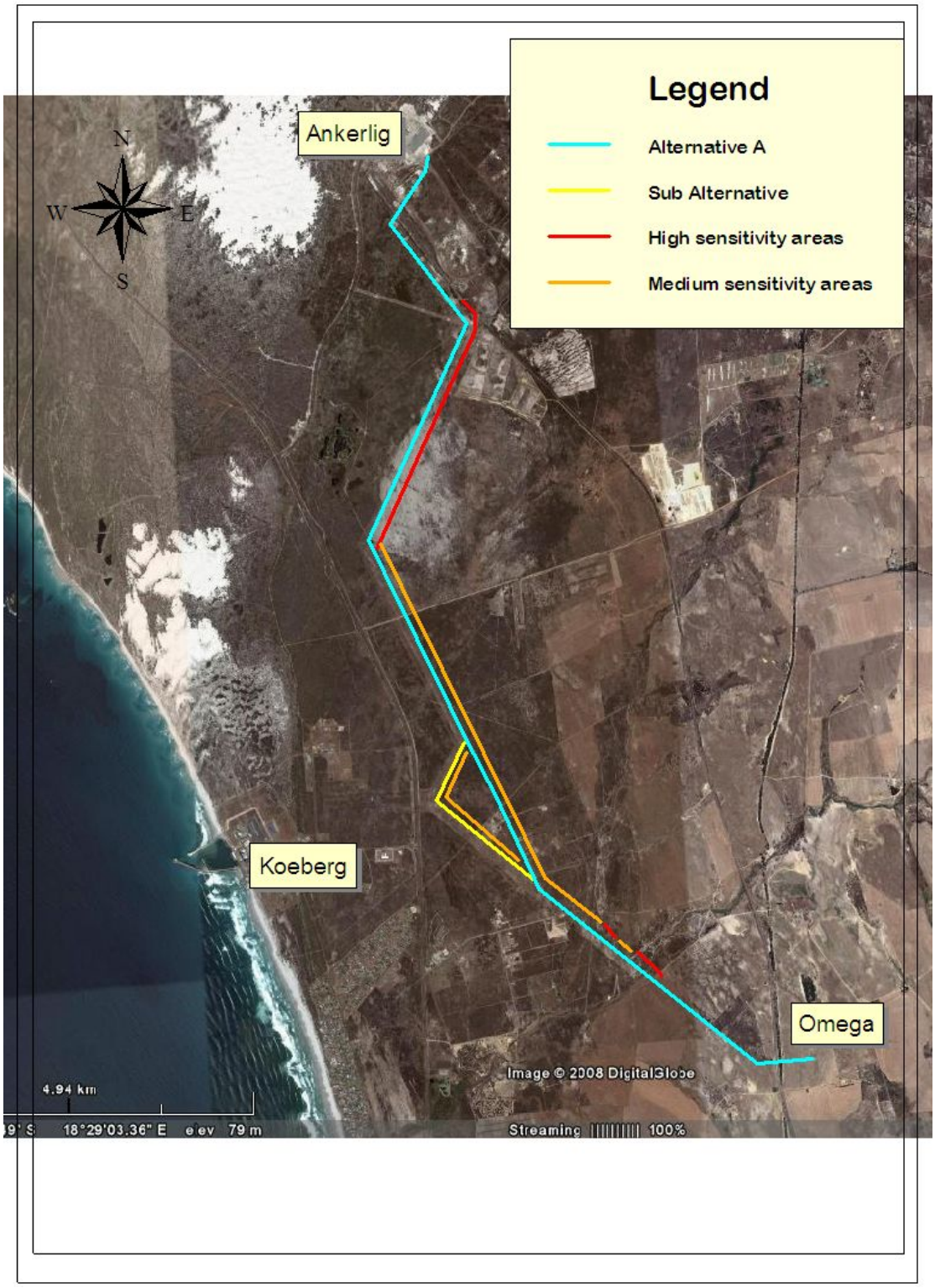

Figure 2: Satellite image of Alternative A route, showing areas of botanical sensitivity along route. Unmarked areas are of low sensitivity.

The bulk of the proposed route passes through what is mapped as Atlantis Sand Fynbos (Mucina & Rutherford 2006). This vegetation type is restricted to acid sands in the Atlantis area, and has been severely impacted by agriculture,

urbanisation and alien invasive plants, so that only 60% remains, with 2% conserved, and a national conservation target of 30%. The vegetation type is thus regarded as Endangered on a national basis (Rouget *et al* 2004). Within the study area much of this habitat is severely invaded by alien *Acacia saligna* (Port Jackson) and *Acacia cyclops* (rooikrans), and was recently burnt, making it impossible to assess the vegetation accurately. Large parts of this section of the route are rated as being of Medium or High sensitivity (see Figure 2), as this section of the route supports Endangered and largely undisturbed, natural vegetation with potentially viable populations of rare species.

The southern third of the route passes through an area that is a mosaic of habitats, and which is really a broad transitional area (ecotone) between two main vegetation types – i.e. Swartland Shale Renosterveld and Cape Flats Sand Fynbos. There is very little natural vegetation remaining in this section of the route, except along the drainage lines, and consequently much of the route in this area is of Low sensitivity, although there are areas of Medium and High sensitivity. Both these vegetation types are regarded as Critically Endangered, and are amongst the most threatened in the Cape region (Rouget *et al* 2004).

5. DESCRIPTION OF ISSUES IDENTIFIED

The key issues are:

- Loss of natural vegetation during the construction stage. About 70% of this will potentially be permanent (diesel storage area [approx. 17.5ha]; bushcutting of up to 12km of sensitive servitude [approx. 66ha]; tower footprints [approx 1ha]; some tracks [1ha]), and about 20% will be temporary, as trampled and partly disturbed areas (*e.g.* around towers) should eventually partly recover.
- Bushcutting is identified as a major source of disturbance and vegetation loss, and should be regulated and restricted in the Medium and High sensitivity areas.
- Alien invasive vegetation is the major problem along large parts of the power line route and how this is managed in the servitude is a key factor in the assessment. If effectively controlled it could be a positive outcome of the development.
- Cumulative effects on the relevant vegetation types are important, as all vegetation types are either Endangered or Critically Endangered, and ideally no further loss of existing habitat should take place. However, the construction and maintenance (incl. bushcutting) of power lines, and the construction of the diesel storage tank area, have direct negative impacts (and the footprints can only be mitigated by offsets), although the long term impacts can be mitigated to some degree by alien vegetation control.

6. METHODOLOGY FOR DETERMINING SIGNIFICANCE OF IMPACTS

Direct, indirect and cumulative impacts of the above issues, as well as all other issues identified, are assessed in terms of the following criteria:

» The **nature**, which shall include a description of what causes the effect, what will be affected and how it will be affected.
» The **extent**, where it will be indicated whether the impact will be local (limited to the immediate area or site of development), regional, national or international. A score between 1 and 5 will be assigned as appropriate (with a score of 1 being low and a score of 5 being high).
» The **duration**, where it will be indicated whether:
  * the lifetime of the impact will be of a very short duration (0–1 years) – assigned a score of 1;
  * the lifetime of the impact will be of a short duration (2-5 years) - assigned a score of 2;
  * medium-term (5–15 years) – assigned a score of 3;
  * long term (> 15 years) - assigned a score of 4; or
  * permanent - assigned a score of 5.
» The **magnitude**, quantified on a scale from 0-10, where a score is assigned:
  * 0 is small and will have no effect on the environment;
  * 2 is minor and will not result in an impact on processes;
  * 4 is low and will cause a slight impact on processes;
  * 6 is moderate and will result in processes continuing but in a modified way;
  * 8 is high (processes are altered to the extent that they temporarily cease); and
  * 10 is very high and results in complete destruction of patterns and permanent cessation of processes.
» The **probability** *of occurrence*, which shall describe the likelihood of the impact actually occurring. Probability will be estimated on a scale, and a score assigned:
  * Assigned a score of 1–5, where 1 is very improbable (probably will not happen);
  * Assigned a score of 2 is improbable (some possibility, but low likelihood);
  * Assigned a score of 3 is probable (distinct possibility);
  * Assigned a score of 4 is highly probable (most likely); and
  * Assigned a score of 5 is definite (impact will occur regardless of any prevention measures).
» the **significance**, which shall be determined through a synthesis of the characteristics described above (refer formula below) and can be assessed as low, medium or high.
» the **status**, which will be described as either positive, negative or neutral.
» the *degree* to which the impact can be *reversed*.
» the *degree* to which the impact may cause *irreplaceable loss of res*ources.
» the *degree* to which the impact can be *mitigated.*

The **significance** is determined by combining the criteria in the following formula:

S=(E+D+M)P; where

S = Significance weighting
E = Extent
D = Duration
M = Magnitude
P = Probability

The **significance weightings** for each potential impact are as follows:

» < 30 points: Low (i.e. where this impact would not have a direct influence on the decision to develop in the area),
» 30-60 points: Medium (i.e. where the impact could influence the decision to develop in the area unless it is effectively mitigated),
» > 60 points: High (i.e. where the impact must have an influence on the decision process to develop in the area).

7. IMPACT ASSESSMENT

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 extreme SW Cape), and all are regarded as threatened on a national basis, and thus there is also a regional and national element.

7.1 Direct Impact: Permanent loss of natural vegetation

In the case of this project the primary direct impacts are loss of natural vegetation within the diesel fuel storage area, at tower footprints, as well as potential impacts associated with the management of the servitudes, such as bushcuttting. Some temporary (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 needed. All hard infrastructure (fuel storage area and 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, but the vegetation should eventually recover.

The development footprint will result in loss of at least 17.5ha of Cape Flats Dune Strandveld in the fuel storage area at Ankerlig, and a further 1ha of mixed

vegetation in an estimated 72 tower footprints (15km of line, with average spans of 250m, estimated footprint of 10m by 10m). If typical Eskom bushcutting is undertaken within the full servitude width and length then this will be a direct negative impact on up to 66ha (55m wide by about 12 000m of Medium or High sensitivity vegetation). Regular (annual, or even up to once every four years) bushcutting eliminates numerous species and totally changes the vegetation structure, effectively turning it into a species-poor and fire-prone grassland (see Plate 3 in Helme 2007). Bushcutting should really not be necessary (although this is unlikely to be recognised by Eskom management) as this vegetation does not grow much taller than 1.2m, and the fire risk is no more than in the grassy vegetation that comes to dominate in bushcut areas.

Impacts are split up into direct impacts associated with development footprints (17.5ha of fuel storage area and 1ha of tower footprints) and a second direct impact, namely the too frequent bushcutting of the 66ha power line servitude.

Impacts associated with the hard footprints are deemed to be **Medium negative** on a regional scale **before mitigation**, and **Negligible after mitigation**.

Impacts associated with the bushcutting are deemed to be **Medium to High negative before mitigation, and Negligible after mitigation**.

Table 1: Impact Table for Direct Impacts of Fuel Storage area

Nature: Permanent loss of vegetation in development footprint (17.5ha)		
	Without mitigation	**With mitigation**
Extent	Local and regional	Local and regional
Duration	Permanent	Permanent
Magnitude	Medium	Low
Probability	Definite	Medium
Significance	**Medium**	Negligible
Status (positive or negative)	Negative	Neutral
Reversibility	No	No
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	Yes	
Mitigation: A significant biodiversity offset is the only appropriate mitigation; for this site at least 262ha of Cape Flats Dune Strandveld needs to be conserved in return for the loss of 17.5ha of this vegetation on this site (15: 1 ratio).		
Cumulative impacts: Yes; the previous developments by Eskom on the adjacent areas have not been effectively mitigated and impacts are ongoing		
Residual Impacts: Yes; hence the need for biodiversity offsets - which are the only way to deal effectively with residual impacts (notably ongoing loss of an Endangered and localised vegetation type)		

Table 2: Impact Table for Direct Impacts of Power Line

Nature: Permanent loss of vegetation in tower footprints (1ha) and bushcut servitude (66ha)		
	Without mitigation	**With mitigation**
Extent	Local and regional	Local and regional
Duration	Permanent	Permanent
Magnitude	High	Low
Probability	Definite	High
Significance	**Medium - High**	Negligible
Status (positive or negative)	Negative	Neutral
Reversibility	No	No
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	
Mitigation: Modification of normal Eskom buschclearing methodology is required in Medium and High sensitivity areas – these areas must not be bushcut more than once every ten years. Additional standard mitigation required includes ongoing, annual alien clearing in entire servitude. A significant biodiversity offset is the only appropriate mitigation for total loss of vegetation in tower footprints -probably totalling only 1ha, thus need to conserve minimum 15ha (15: 1 ratio).		
Cumulative impacts: Yes; but very small if adequately mitigated		
Residual Impacts: Yes; hence the need for biodiversity offsets - which are the only way to deal effectively with residual impacts (notably ongoing loss of Endangered and Critically Endangered vegetation types)		

7.2 Direct Impact: Long term but temporary loss of natural vegetation

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, and in areas adjacent to the fuel storage site. 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). The impacts in this case thus rate as being long-term. A very rough estimate is that along 15km of new power line about 7ha of currently mostly natural (some alien invaded or partly disturbed) vegetation may suffer long-term but temporary disturbance (excluding bushcutting, which is addressed under permanent impacts), mostly in the tweespoor track areas.

Table 3: Impact Table for Direct Impacts of Power Line

Nature: Long term but temporary loss of vegetation in servitude tracks		
	Without mitigation	**With mitigation**
Extent	Local and regional	Local and regional
Duration	Long term	Long term
Magnitude	Low - Medium	Low - Medium
Probability	Highly probable	Highly probable
Significance	**Low - Medium**	Low - Medium w
Status (positive or negative)	Negative	Negative
Reversibility	No	No
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Not really	
Mitigation: Mitigation cannot really reduce the magnitude of this specific impact, but annual alien clearing in the servitude can help to alleviate the primary environmental problem in the area.		
Cumulative impacts: Yes; but very small		
Residual Impacts: Very small		

7.4 Indirect impacts

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 (notably *Acacia*), and a possible positive impact (after mitigation) in the form of removal of invasive alien vegetation in the 55m wide servitude, and thus totalling some 66ha (this would be regarded as essential mitigation). Overall indirect impacts of the power line after mitigation could thus be Low positive.

Table 4: Impact Table for Indirect Impacts of Power Line

Nature: Alien invasion associated with disturbance along power line		
	Without mitigation	**With mitigation**
Extent	Local	Local
Duration	Long term	Temporary
Magnitude	Low	Low
Probability	Distinct possibility	Distinct possibility
Significance	**Low**	Low
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 small		
Residual Impacts: No		

The fuel storage area (approx. 17ha) impacts negatively on existing ecological connectivity across the western Atlantis area, even though the surrounding area is already partly developed. The development of this facility will have a relatively minor (Low) indirect negative ecological impact when compared to to the main Ankerlig facility (this aspect was overlooked by the IA for the original Ankerlig power station facility), and the impact would be assessed as Low negative. This could be best mitigated by a biodiversity offset, although offsets are not usually used for Low impacts.

Table 5: Impact Table for Indirect Impacts of Fuel Storage Area

Nature: Loss of ecological connectivity in area		
	Without mitigation	**With mitigation**
Extent	Local & regional	Local & regional
Duration	Permanent	Permanent
Magnitude	Low	Minor - low
Probability	Probable	Probable
Significance	**Low**	Very Low
Status (positive or negative)	Negative	Negative
Reversibility	No	No
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Not really; at least not on site	
Mitigation: Biodiversity offset proposed for direct impact will help mitigate indirect impact as well		
Cumulative impacts: Yes; but relatively small		
Residual Impacts: Yes; small		

7.5 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 Atlantis to Cape Town region is a hotspot of threatened plant species (pers. obs.), due to large scale habitat loss, and any development impacting on remaining natural vegetation in this area will thus have a cumulative negative

impact. The larger the overall site impact, the larger the cumulative impact. The primary cumulative negative impact is thus the loss of 17.5ha of Endangered Cape Flats Dune Strandveld for the fuel storage site, which will be situated adjacent to the Ankerlig power station, whose recent construction also caused an as yet unmitigated loss of a much larger area of the same vegetation type.

7.6 Positive impacts

The potential positive impacts will only come about if recommendations noted under Mitigation (Sect. 11) are implemented and enforced. If mitigation is not effectively carried out there will be no positive impacts. Alien clearing within the 55m wide servitude would be a Low positive impact, as alien invasive vegetation is currently a major problem in much of the study area (see Sect. 7.4 for impact table). It would be most important and valuable to clear aliens with the High and Medium sensitivity areas (estimated at up to 12km of servitude).

Substantial positive impacts could be realised if a biodiversity offset was part of this development. However, given that there is apparently a reluctance on behalf of the DEA&DP to implement their own provincial guidelines on biodiversity offsets (DEA&DP 2007) it seems unlikely that an offset would be approved, and thus that the positive impacts would be realised. On the other hand, given that DEAT is the decision-making authority for this application there is no reason why an offset should not be required. It is suggested that an appropriate offset would be to formally conserve an area of similar habitat and conservation value to that which is being lost. The total development footprint may amount to as much as 25ha, and as a suitable offset ratio is undetermined, but at least 5:1, and possibly as much as 20:1, the applicant should be required to secure for permanent conservation an area of Cape Flats Dune Strandveld of at least 125ha, and possibly as much as 500ha. The main positive effect of an offset would be an increase in the conservation area of an Endangered vegetation type (Cape Flats Dune Strandveld, being the vegetation type which will be most impacted by this development). The positive effects of an offset could either be an increase in the conservation area of an Endangered vegetation type (Cape Flats Dune Strandveld, being the vegetation type which will be most impacted by this development), or otherwise improved ecological management (such as by funding alien clearing) of existing areas of conserved habitat of this type.

8. ASSESSMENT OF SUB ALTERNATIVE

The proposed sub-alternative follows the existing Koeberg line and would presumably run on the east side of the existing line, so as not to cross the existing lines. The vegetation in this area is Atlantis Sand Fynbos, but it is fairly heavily degraded, and may have been previously ploughed in places, and is consequently heavily invaded by alien *Acacia saligna*. Overall conservation value of this section of vegetation is Low to Medium, as it could probably be rehabilitated, and is likely to support a few rare species, in limited numbers (e.g.

Lampranthus spp.). However, these rare species are likely to be very scattered, and the area is currently not being adequately managed from an ecological perspective.

The botanical impacts of establishing the power line in this area are likely to be very similar to those in the nearby section of Alternative A, being Low to Medium negative before mitigation, and Neutral to Low negative after mitigation.

9. IMPACT STATEMENT AND SUMMARY TABLE

Overall the **proposed new power line** is likely to have a **Medium to High negative** impact on the vegetation at a regional scale, prior to mitigation, primarily due to the high chance of typical Eskom bushcutting practices in the High and Medium sensitivity areas. The primary negative impact is the highly significant impact that would result from the usual Eskom bushcutting in High and Medium sensitivity areas (up to 66ha of servitude), as this would cause total community change and species loss. Additional direct, permanent loss of natural vegetation would occur in pylon footprints (about 1ha), and a long term but temporary impact in the track areas (up to 7ha). The bushcutting impact can only be mitigated by careful and ongoing removal of all invasive alien vegetation in the 55m wide servitude, and by not engaging in bushcutting in the High and Medium sensitivity areas. Bushcutting should really not be necessary as this vegetation does not grow much taller than 1.2m, and the fire risk is no more than in bushcut, grassy vegetation. Impacts could be reduced to **Negligible after mitigation**.

Overall the proposed diesel storage area is likely to have a Medium to High negative impact on the vegetation at a local scale, prior to mitigation. Regional impact would be **Medium negative**, prior to mitigation. The primary negative impact is a direct, permanent loss of natural vegetation (about 17.5ha). This impact cannot be avoided, and can only be mitigated by a biodiversity offset, which is regarded as essential. In the unlikely event of an adequate offset being put in place the overall impact could be reduced to Low positive. If this is not done botanical impacts here must be viewed as Medium negative.

Table 6: Overall summary table of proposed fuel storage facility and power line impacts on vegetation

Nature: Long term to permanent loss of vegetation and habitat		
	Without mitigation	**With mitigation**
Extent	Local, regional and national	Local & regional
Duration	Long term to permanent	Permanent
Magnitude	Medium to High	Low
Probability	Definite	Highly probable
Significance	**Medium - High**	Very Low

Status (positive or negative)	Negative	Negative
Reversibility	Not in direct building footprints (17.5ha plus about 1ha), but are in other disturbance areas (at least 66ha of Medium and High sensitivity)	No
Irreplaceable loss of resources?	No (with offset) Yes (without offset)	No
Can impacts be mitigated?	Yes. Bushcutting needs to be limited to Low sensitivity areas; annual alien clearing in sensitive areas of servitude; plus offset for footprints.	
Mitigation: See Section 11		
Cumulative impacts: Medium negative		
Residual Impacts: Ongoing loss of Cape Flats Dune Strandveld (minimum of 17.5ha on site)		

10. CONCLUSIONS

- The fuel storage area requires an offset as mitigation, as the Medium negative impact cannot be effectively mitigated any other way, and Cape Flats Dune Strandveld is an Endangered vegetation type. This is exactly the sort of development where offsets are valuable, as the development causing the impact will happen, whether mitigated or not, and cumulative impacts are significant. See Section 11.1 for details.
- Typical Eskom bushcutting in the High and Medium sensitivity servitude areas will have a High negative impact, and should not be undertaken. Ongoing alien clearing should instead be undertaken in this area as mitigation. See Section 11 for details.
- The power line footprint itself will have only a Low negative impact on the vegetation, and there is no significant difference between the Sub-Alternative and Alternative A in terms of botanical impacts.

11. RECOMMENDED SITE SPECIFIC MITIGATION

- Search and Rescue (S&R) of certain translocatable, selected succulents and bulbs occurring in the fuel storage area is recommended. However, it is difficult to know where to translocate these to, as no offset area has yet been decided on. Once an offset area has been decided and confirmed then the rescued material can be translocated to the offset area.
- If no offset is approved by the authorities then the development proposal must include an upfront conservation contribution from the applicant equivalent to the value of the offset discussed in Sect 11.1.

- Creation of new tracks must be minimised within the servitudes.
- No bushcutting may occur within the High and Medium sensitivity sections of the servitudes (see Figure 2). If it is proven essential, the maximum frequency permitted should be once every ten years.
- Ongoing, annual alien plant management must be undertaken in the High and Medium sensitivity sections of the servitudes. Methodology used must comply with DWAF methodology for control of *Acacia saligna* and *Acacia cyclops*. Key elements include: alien clearing must be undertaken by well trained teams using the right equipment; all stems must be cut by hand (not heavy machinery); all cut stumps must immediately (within 5 minutes) be painted with a suitable herbicide that contains a visible dye (in order to prevent resprouting, and to ensure that all stems are painted); no spraying of herbicide; cut stems must be neatly stacked at the outside edges of the servitudes, or preferably removed from the servitudes to an approved organic waste dump site.
- Additional botanical inputs at the walk down stage would add relatively little value, and are not consequently recommended.
- No towers or tracks should be placed in the wetland areas indicated in both the scoping study and this report (High sensitivity patches in southern half of Figure 2).
- Annual monitoring should be undertaken by an independent consultant to ensure that alien vegetation is being cleared appropriately (see bullet 5) from the High and Medium sensitivity areas, and to ensure that these areas are not being bushcut more than once every ten years.

11.1 Biodiversity Offsets

Biodiversity offsets are designed to mitigate the unavoidable residual impacts of a development, such as the loss of up to 17.5ha of Cape Flats Dune Strandveld in the new fuel storage area, and further unavoidable loss of approximately 7.5ha. Search and Rescue of some of the translocatable species can mitigate impacts to a minor degree, but the bottom line is that about 25ha of an Endangered vegetation type will be permanently lost, with no benefit to conservation of this habitat as a whole. As only 5% of the national conservation target for this vegetation type has been achieved (Rouget et al 2004) it is clearly highly desirable that there be increases in the amount of Cape Flats Dune Strandveld that is formally conserved. The best way to achieve this is by means of biodiversity offsets, whereby essential developments that impact negatively on the habitat in one area actually contribute directly to the conservation of the same habitat in a nearby area. DEA&DP guidelines for biodiversity offsets were published in 2007, and state that offsets should ideally involve direct conservation of the same vegetation type or habitat, and in a nearby area, and only if this is not possible should an indirect financial offset be considered. In this case there are suitable areas of Cape Flats Strandveld that could be acquired as

offsets, and in many cases these are priority areas adjacent to existing conservation areas, such as the Blouberg Conservation Area (BCA).

The DEA&DP guideline (2007) suggests offset ratios for Endangered vegetation types of up to 20:1, where 20ha are purchased for conservation for every 1ha of vegetation that is lost on site. This ratio is regarded as negotiable down to 15:1, depending on the level of the residual impact, and this is in turn partly dependant on the quality of the habitat being lost. I would suggest that the ratio be closer to 15: 1 for this particular site (Medium negative residual impact means lower ratio), meaning that Eskom needs to acquire and conserve at least 375ha of good condition Cape Flats Dune Strandveld. This large offset could be made up of two or even three different areas, as it is likely to be difficult to secure such a large portion in one area. If the authorities approve this offset as a condition of approval then a biodiversity specialist should be contracted by Eskom to identify suitable properties for acquisition as an offset. Once purchased, these areas must be declared formal conservation areas, and the material rescued from the development site could be moved to these sites. The offset area may be contracted to suitable conservation agencies (such as CapeNature or City of Cape Town Environmental Management) for management.

12. REFERENCES

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