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BOTANICAL ASSESSMENT OF PROPOSED NEW 400kV POWER LINE: ANKERLIG - OMEGA.

Prepared for: Savannah Environmental, Johannesburg

Client: Eskom

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1. INTRODUCTION AND STUDY AREA

This botanical assessment was commissioned in order to help inform decisions regarding an application to construct a new 400kV transmission power line connecting Ankerlig power station with the yet to be built Omega substation. Ankerlig lies just west of Atlantis Industria, and Omega substation is due to be built west of the N7 highway and Koeberg hill. The total length of the new power line would be between 12 and 18km, depending on which alternative is chosen. Three alternatives were assessed at the scoping stage. Alternative C (client's preferred alternative) is the shortest and runs along the railway line, Alternative B is also fairly direct, and Alternative A is longer and follows an existing power line between Ankerlig and Koeberg, and between Koeberg and Stikland.

The study area is part of the Cape Floristic Region, which is a renowned botanical hotspot, which a very high percentage of endemic plant species (species restricted to that area) and threatened plant species. Almost 85% of the threatened plants found in South Africa are restricted to the Cape Floristic Region (Raimondo *et al* – in prep)!

Most of the study area has been heavily disturbed by agriculture and industry, but particularly along the Koeberg alternative there are still susbtantial patches of natural vegetation. The routes cross a number of seasonal and permanent wetlands, which constitute the bulk of the remaining sensitive areas along the preferred route. Large parts of the routes are heavily impacted by alien invasive vegetation, as a result of previous soil disturbance. Ongoing industrial development in the Atlantis area continues to disturb natural vegetation in close proximity to the potential servitudes. Alternative B crosses the SANDF shooting range and the Western Province shooting club (private), which is heavily disturbed in places but also supports isolated patches of high quality vegetation, although these are often invaded by aliens.

2. TERMS OF REFERENCE

- Provide a brief overview of the vegetation along the proposed alternatives, assuming a 200m wide corridor. Comment on the conservation significance and sensitivity of these areas, and indicate whether areas are likely to support species of particular conservation concern.

- Provide recommendations on the preferred alternatives from a botanical point of view, and note any issues of major concern that could or should influence routing of the power line.
- Identify practical mitigation measures to reduce negative and enhance positive impacts to vegetation and indicate how these could be implemented in the proposed project.

3. 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 was used as a surrogate for determining conservation value. Much of this interpretation is thus based on my previous experience in the area, and there is a high degree of confidence 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. Most of Area 5 was recently burned and thus the vegetation patterns 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 assessment here has thus not been as comprehensively ground-truthed and is a combination of partial fieldwork and a desktop assessment.

4. METHODOLOGY

The railway route was driven and surveyed for areas of sensitive vegetation. Alternatives A and B were more problematic, as there are a number of locked gates along the servitude, and I was not able to drive this route in its entirety, but I was able to intersect the route on a number of tracks.

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.

5. VEGETATION SENSITIVITY ALONG THE ROUTES

The proposed routes traverse an area that has been fairly extensively transformed by agriculture, originally by ploughing, and subsequently by heavy grazing and trampling by cattle, as well as too frequent fires. Alien invasive vegetation is thus not surprisingly a prominent feature of the area. Soils are typically acid to neutral sands overlying shale – derived clays, and the latter are exposed in river valleys and along the railway cuttings.

5.1 Alternative C

Over 90% of this route is of Low or Very Low regional botanical sensitivity (see Figure 1). No rare or threatened plant species are likely to persist in viable or regionally significant numbers in these areas, and the vegetation has been so disturbed that it now supports less than 10% of its original plant diversity (see Plate 1). Alien grasses and herbs dominate, along with woody invasives such as *Acacia saligna*. Typical alien grasses include *Avena* (wild oats), *Lolium* (ryegrass), *Bromus pectinatus* (ripgut brome) and common alien herbs are *Trifolium* (clover), *Erodium moschatum* (cranesbill), *Echium plantagineum* (Patterson's curse) and *Raphanus rapistrum* (wildemostert).

Plate 1: View of typical part of Alternative C, showing fallow agricultural lands and dense alien vegetation (Port Jackson – *Acacia saligna*) adjacent to the fields. These areas are of Very Low botanical sensitivity.

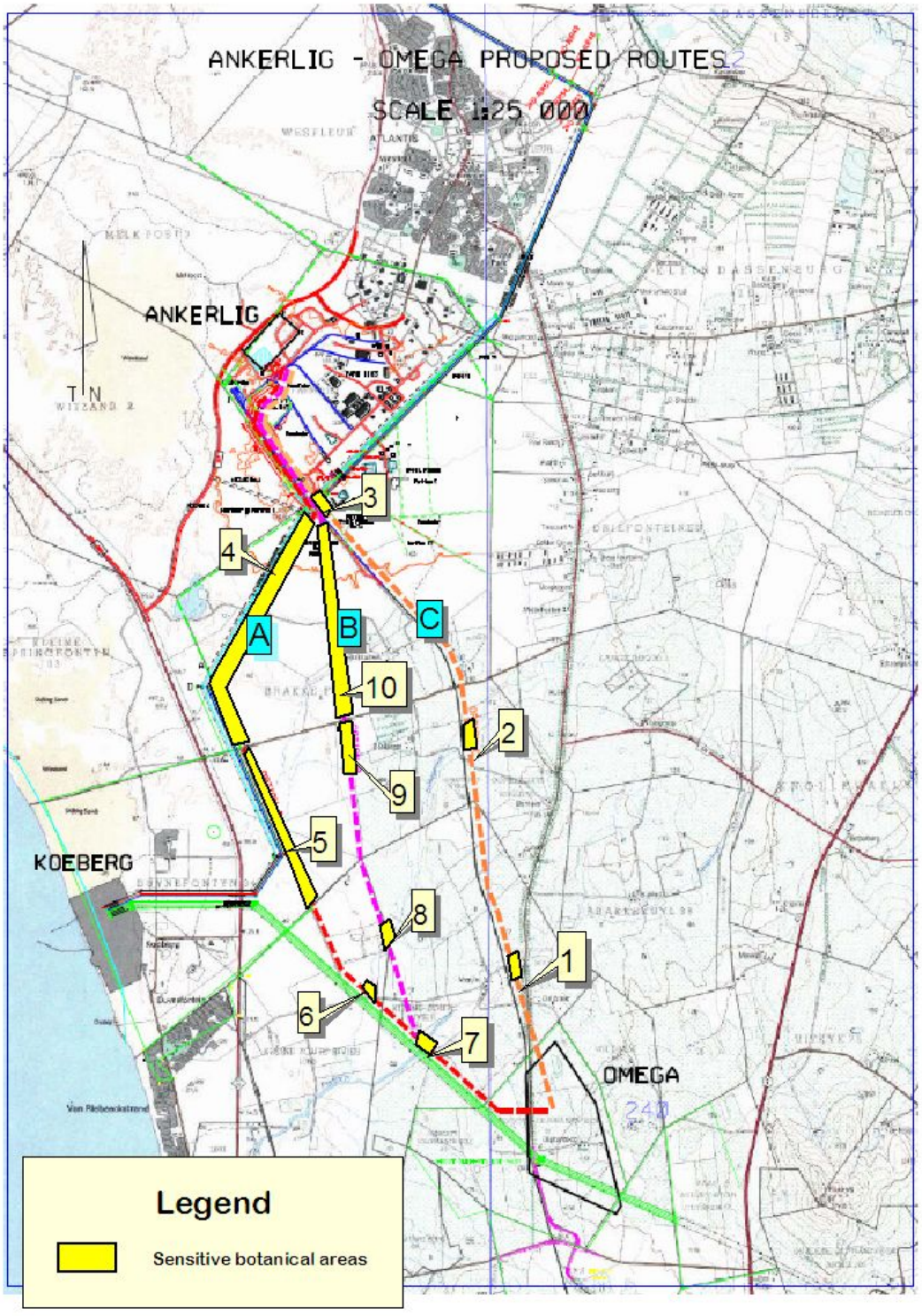

Figure 1: Map of the 3 alternative power line routes showing sensitive botanical areas (numbered, in yellow). Unhatched areas are of Low or Very Low botanical sensitivity.

Plate 2: View of Donkergat river crossing (Area 2) from the railway bridge, showing narrow seasonal channel, invasive *Acacia saligna* (trees), and old fallow lands of Very Low sensitivity beyond.

Three sensitive areas have been identified along the route – the southern two being wetlands. Area 1 is the crossing of the Klein Zouterivier, and Area 2 is the Donkergat River crossing. Both are less than 200m wide, with the actual channels and floodplain being less than 80m wide.

The wetland vegetation typically consists of *Cyperus textilis*, *Typha capensis* (bulrush), *Phragmites australis* (reeds), *Juncus krausii* (steekriet), with grasses and low herbs such as *Cynodon dactylon* (kweek grass), *Triglochin striata* and *Cotula coronopifolia*. The invasive *Acacia saligna* is often common. No rare species were recorded in the wetland areas, but they are ecologically important areas.

The final sensitive area (Area 3) along this route is at the point where the new line would cross over the existing Atlantis Industrial transmission line, and just to the south, down as far as the Sewage Works. The vegetation in this area is classified as Atlantis Sand Fynbos, which is restricted to deep acid sands in the Atlantis region. It is regarded as an Endangered vegetation type in terms of the NSBA ratings (Rouget et al 2005; 60% remaining, 2% protected, 30% conservation target), and supports a significant number of rare and threatened

plant species. The conservation worthy portions in this area tend to be small and patchy and cannot be accurately mapped at the scale of the map provided.

At least two Red Data Book listed plants were recorded in this area, and there are likely to be others. *Serruria decipiens* (sandveld spiderhead) is Red Data listed as Vulnerable (Rebelo et al – in prep.), and *Lampranthus auranticus* (golden sand vygie) as Endangered (Raimondo et al – in prep.). Both were found in low numbers within the proposed corridor, just east of the railway.

5.2 Alternative A

About half of this route is considered to be botanically sensitive, in that it passes through vegetation that is still in good or moderate condition, or across wetlands. The bulk of the sensitive vegetation occurs in areas 4 and 5 (Figure 1). Area 4 can be regarded as being of High sensitivity (rare species likely), and Area 5 as being of Medium sensitivity. In some places the servitude has been heavily bushcut. This has reduced the species diversity and eliminated many of the rarer species so that these areas are now of Medium sensitivity (see Plate 3), with higher sensitivity vegetation sometimes still present in the immediately adjacent unbuschcut areas, although, as in Plate 3, the adjacent areas may be heavily invaded by alien *Acacia saligna.*

Plate 3: View of bushcut servitude on Koeberg – Stikland line (Alternative A; looking towards Omega site), with alien grasses dominant and Medium sensitivity vegetation remaining, with dense invasive *Acacia saligna* outside the servitude.

Plate 4: View of High sensitivity vegetation (ecotonal Cape Flats Dune Strandveld and Atlantis Sand Fynbos) near Koeberg. Note the difference between this and the bushcut servitude area in Plate 3.

Most of area 5 was recently burnt and has not yet fully recovered, and it is thus difficult to interpret the vegetation but it would appear that species diversity is relatively low and sensitivity is probably Medium on a regional scale. There is a moderate chance of rare species being present. Alien invasive vegetation is a prominent feature of the area.

Areas 6 and 7 are river crossings – the former being the lower Donkergat river and the latter the Sout River. The latter is significantly larger, with extensive *Typha* (bulrush) and *Phragmites* (reed) beds. No rare species are likely to persist in these areas but they are ecologically important.

5.3 Alternative B

Alternative B is a fairly direct route and crosses the SANDF and a private shooting range, in addition to farmlands and fallow areas. Three distinct areas of botanical sensitivity have been highlighted along this route, one of which (Area 7) is the crossing of the Sout River, and is shared with Alternative A.

Area 9 is an area of Medium sensitivity, as most of it has been previously disturbed, but there is still a moderate plant diversity in the area, with a small chance of some rare species. Alien grasses and woody Acacias are common.

Area 10 consists of Atlantis Sand Fynbos in fairly good condition, although it has been bulldozed in places for the creation of the shooting ranges, and extensive areas have been invaded by alien *Acacia saligna*, and the landowners appear to have made no effort to control these invasives in a responsible manner. A previous survey of parts of the shooting range area (Helme 2004) found various patches of High quality vegetation, supporting a number of Red Data Book listed plant species, such as *Afrolimon purpuratum* (Critically Endangered), *Leucospermum tomentosum* (Vulnerable), and *Leucospermum hypophyllocarpendron* (Vulnerable). These may or may not fall within the proposed power line corridor, and it is very likely that at least parts of the corridor support High sensitivity vegetation of this nature, which is currently severely threatened by alien vegetation.

6. IMPACTS

Impacts on natural vegetation during construction and operation will include direct loss of vegetation in the footprints of the towers (approximately 50m^2 for each one; construction phase), temporary damage to vegetation in the areas around the towers and along the cable stringing route (construction phase), and damage to natural vegetation within the servitude as a result of repeated bushcutting (operational phase).

Fynbos vegetation is very sensitive to any form of soil disturbance, and plant community structure generally becomes degraded after any disturbance. The greater the disturbance the greater the levels of community degradation and species loss. Fynbos is also renowned for its high levels of plant diversity, high numbers of very localised species, and large numbers of threatened plant species. Most of these threatened species occur in lowland habitats (below 300 m), such as the current study area. It is thus likely that large scale disturbances, such as power line construction and operation, will have at least some impact on rare and/or threatened plant species, assuming that the lines pass through areas of extant natural vegetation in reasonable condition. As many of these plant species of concern can occur as very small, isolated populations, or may only be evident is spring and winter (*e.g*. bulbs), it is very difficult to predict exactly what the magnitude of the impacts are going to be. Many indigenous species will be killed

by annual bushcutting, and gradually the bushcut areas will become dominated by alien invasive annual grasses (see Plate 3), which are in themselves a major fire hazard.

In the case of the study area very little natural vegetation remains, except in the sensitive areas indicated in Figure 1. Most of the remaining natural vegetation occurs along alternative routes A and B. Negative impacts on rare and/or threatened plant species are thus likely to be greatest for Alternatives A and B, especially if servitudes in these areas are bushcut on a regular basis.

The operation of a power line in the area could have a limited positive effect on the natural vegetation if invasive alien vegetation is properly controlled within the servitudes. Alien invasive plants (notably *Acacia saligna* and *A. cyclops*) are a major threat to the remaining natural vegetation in this general area, and are degrading the remaining natural habitat, with little being done to curb their spread. Thus if alien vegetation is properly controlled and eliminated within at least the servitudes this will have a small positive effect on the natural vegetation in the immediate area. However, this positive effect will only be realised if alien removal and control is undertaken in the correct manner, where stems are hand cut and cut stumps are immediately painted with herbicide to prevent resprouting. Simply brushcutting the servitude with a tractor once a year may appear to control the invasive vegetation, but in reality will worsen the problem by encouraging resprouting (coppicing) of aliens, and causing loss of indigenous plant diversity which is not adapted to being bushcut annually.

7. GENERAL CONCLUSIONS AND RECOMMENDATIONS

- The railway route (Alternative C) presents fewer botanical constraints in that it is both shorter and of lower sensitivity, due to there being larger areas of minimal natural vegetation. From a botanical perspective it is thus the preferred alternative, and overall impacts are likely to be Low negative prior to mitigation.
- However, there are no botanical reasons why Alternatives A or B could not be used, provided that the recommended mitigation is implemented. Development impacts prior to mitigation would be Low to Medium negative. If comprehensive alien clearing of the servitudes is undertaken, and the more sensitive areas are not bushcut, benefits could actually outweigh the negatives, from a botanical perspective.
- No vehicles should be driven through seasonal or permanent wetlands.

- There should be no construction or tower placement in any sort of wetland or floodplain area (seasonal or permanent). As most of the wetlands in the study area are less than 250m wide it should be possible to span them.
- Existing access tracks should be used where possible in order to minimise the creation of new tracks.
- Mixing of concrete should not be undertaken in areas of natural vegetation. No concrete residue should be left in any areas of natural vegetation. If concrete is to be used in natural areas the concrete should be mixed in low
  sensitivity areas and brought in where needed.
- If Alternative A or B is selected no bushcutting should be undertaken in Areas 3, 4, 9 and 10 as this will significantly reduce the indigenous species diversity and will encourage the spread of alien invasive grasses.
- As a general guideline bushcutting should take place only once every two or three years, in order to allow some of the potential rare indigenous species to flower and set seed. Bushcutting in sensitive areas should ideally not remove vegetation lower than 30cm, which probably means that bushcutting should be undertaken by hand rather than by a tractor.
- Whatever route is chosen all invasive woody aliens (mainly *Acacia saligna*) must be cleared at least every two years within the servitudes, which should help reduce the fuel load and hence the risk of fire. Alien clearing should be according to Eskom Bushclearing Standards, and specific mention should be made of the immediate painting of suitable dyed herbicide onto all cut stumps of resprouting species such as Port Jackson (*Acacia saligna*). If this is not done within ten minutes of the stems being cut the cut stems will rapidly regrow. As alien invasive vegetation is one of the primary threats to natural vegetation in this area the regular removal of woody invasive alien species could in fact have a slight positive impact overall.
- It is suggested that at the IA stage a more detailed survey of the preferred route should be undertaken in order to fine tune the recommendations and mitigation requirements. If Alternative C is chosen minimal additional study will be required.

7. REFERENCES

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14 Jan 2008

Savanna Environmental (Pty) Ltd
Johannesburg
ATT: Jo-Anne Thomas

Dear Jo-Anne

Opinion on vegetation on proposed fuel storage site : Eskom Ankerlig (Remainder of Farm 1395)

I have been asked to comment on whether the vegetation on the Remainder of Farm 1395 could be similar to that on the site for the power station expansion, as well as to provide an indication as to what work would be required to be undertaken within the EIA phase in order to assess potential impacts of this fuel storage area.

In answer to the first question I would say that the vegetation structure and species composition is likely to be very (>80%) similar to that on the adjacent portion to the west that was part of the recent application for the power station expansion. I base my opinion on analysis of aerial imagery from Google Earth, and on some knowledge of the general site, having been on site early in 2006, and again in September 2007. The vegetation type is certainly the same – being Cape Flats Dune Strandveld. This vegetation type is regarded as an Endangered vegetation type in terms of the NSBA (Rouget et al 2004), and is restricted to the Atlantis area, the Cape Flats, and the south Peninsula. It is possible that up to three threatened plant species still occur in limited numbers on the site, but it is

considered fairly unlikely that these constitute regionally significant populations, partly because the site is quite small, and partly because the site is already partly degraded (as evidenced by the patches of dense invasive *Acacia cyclops* and open sand, in total covering up to 30% of the site). The local conservation value of the site is likely to be Medium, and the regional conservation value is likely to be Low to Medium. The loss of the site is unlikely to have major regional consequences from an ecological process point of view, as on the other (east) side of the site is the main part of the Atlantis Industrial area, with no natural vegetation of significance.

It should however be noted that some sort of biodiversity offset is likely to be recommended at the Impact Assessment stage in order to compensate for the unavoidable loss of existing biodiversity and habitat (Endangered vegetation type) on the site. This would be in addition to standard basic mitigation such as Search and Rescue of various species.

It is recommended that at the Impact Assessment stage a botanist be appointed to conduct a botanical survey of the site (preferably during the period June – August). They should assess the condition and connectivity of the site from an ecological perspective, assess the likelihood of occurrence of threatened or localised plant species, assess the size and viability of populations of any such species, and make recommendations for mitigation, including recommendations in terms of a possible biodiversity offset (where, how big, etc.). In addition, they should also obviously undertake an Impact Assessment using the usual criteria.

Yours sincerely

Nick Helme