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BOTANICAL WALKDOWN STUDY OF ESKOM 400kV POWERLINE FROM ANKERLIG POWERSTATION TO STERREKUS (OMEGA) SUBSTATION, WESTERN CAPE.

Compiled for: Environmental Impact Management Services (Pty) Ltd.

Client: Eskom

21 Aug 2015

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 Vitae.

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

Abridged CV:

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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 working on my own and trade as Nick Helme Botanical Surveys.

A selection of relevant work undertaken over the last few years is as follows:

- Assessment of proposed Elandsfontein phosphate mine, east of Langebaan (Braaf Environmental 2014)
- Assessment of proposed Uiekraal substation and powerline, Saldanha (Landscape Dynamics 2013)
- Assessment of proposed Bredasdorp - Arniston powerline (Landscape Dynamics 2013)
- Basic Assessment of proposed new Eskom 66kV powerline on the Piketberg (ERM 2012)
- Scoping Assessment of proposed Langefontein WEF, near Darling (CSIR 2011)

- Scoping and Impact Assessment of proposed WEF near Gouda (Savannah Environmental 2010)
- Scoping and Impact Assessment of Proposed Excelsior Wind Energy Facility near Swellendam (CSIR 2010)
- Scoping study of proposed Wind Energy Facility near Britannia Bay (Savannah Environmental 2010)
- Scoping study of proposed Wind Energy Facility at Rheboksfontein, Darling (Savannah Environmental 2010)
- Scoping study of proposed Wind Energy Facility near Vredenburg (Savannah Environmental 2010)
- Scoping study of Proposed Wind Energy Facility near Bredasdorp (CSIR 2010)
- Scoping and Impact Assessment of proposed WEF near Hopefield (Savannah Environmental 2009)
- Scoping study of Proposed Wind Energy Facility near Caledon (Arcus Gibb 2009)
- Basic Assessment of proposed new Eskom Gouda substation (Eskom 2009)
- Scoping study of proposed Wind Energy Facility near Kwaggaskloof dam, Worcester (DJ Environmental 2009)
- Scoping and Impact Assessment of proposed Wind Energy Facility near Hopefield (Savannah Environmental 2008 & 2009)
- Scoping study of Proposed Wind Energy Facility near Vredendal (DJ Environmental 2009)
- Scoping study of Proposed Wind Energy Facility west of Bitterfontein (DJ Environmental 2009).

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1. INTRODUCTION

This botanical walkdown report was commissioned in order to help inform the placement and alignment of the approved 400kV Eskom transmission line from Ankerlig powerstation to the Sterrekus (Omega) substation (see Figure 1). The original botanical assessment was undertaken in 2008 (Helme 2008).

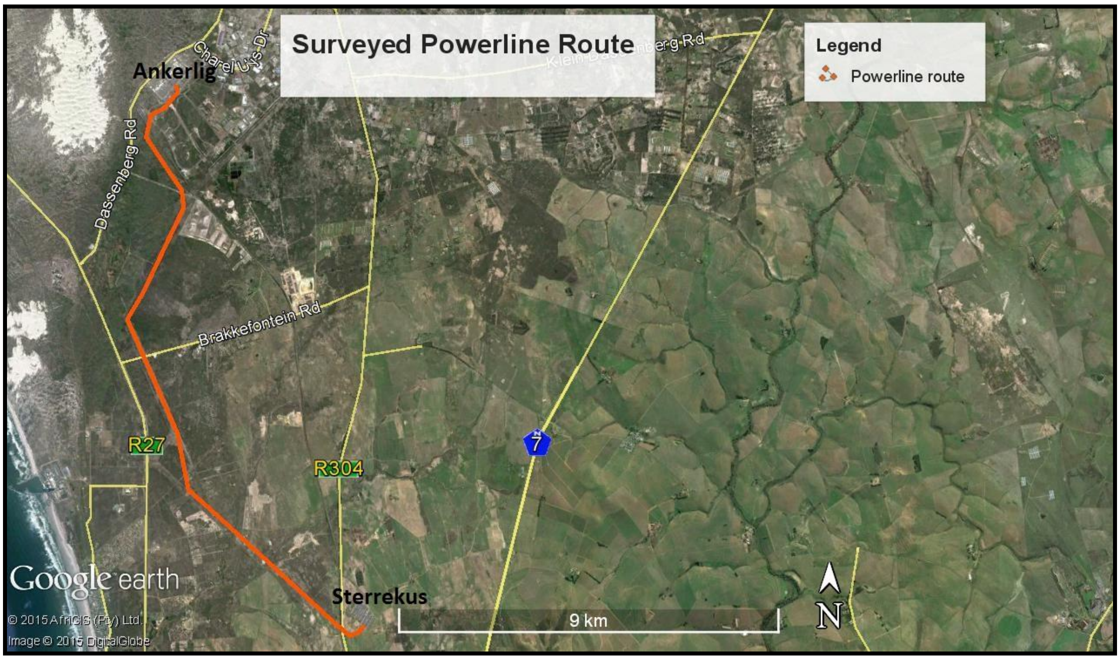

Figure 1: Map showing the powerline route surveyed (orange line).

2. TERMS OF REFERENCE

The terms of reference for this study were as follows:

- Undertake a walkdown of entire route from Ankerlig to Sterrekus (Omega), including tower positions
- Identification and mapping of sensitive areas along route
- Recommendations for mitigation
- Drafting of ecological aspects of construction and operational phase EMPr (incorporating info and findings from previous bullets)

3. LIMITATIONS, ASSUMPTIONS AND METHODOLOGY

A walkdown of the entire powerline route was undertaken on 12 August 2015. All tower (pylon) positions were surveyed, and all except three positions were photographed. These photographs are available on request, but are not included in this report as the author believes they add little or no value. The entire servitude from tower 6 to Sterrekus substation was walked, during which observations of the vegetation were made.

The site visit was undertaken early in the optimum spring flowering season, and seasonality was thus not a major constraint on the comprehensiveness of the botanical findings, as virtually all plant Species of Conservation Concern likely to be present along the route were evident and identifiable. Sufficient detail was evident to be able to assess the overall conservation value and botanical sensitivity of the areas (using a combined species and habitat based approach), and confidence in the accuracy of the botanical findings is high.

Reference was made to the GIS based database of rare plant localities maintained by CREW (Custodians of Rare and Endangered Wildflowers, based at Kirstenbosch), and to the Red List of South African plants (Raimondo *et al* 2009) and its annual online updates (redlist.sanbi.org).

Conservation value and sensitivity of habitats are a product of species diversity, plant community composition, rarity of habitat, degree of habitat degradation, rarity of species, ecological viability and connectivity, vulnerability to impacts, and reversibility of threats.

It is assumed that the route as provided in Figure 1 is accurate, at least to within about 5m. It is also assumed that existing access tracks will be used where possible, and that all towers will be lattice type towers. A significant constraint on a study of this nature is that it is impossible to know exactly where new access tracks will be created, and where construction related vehicles will drive and park, and this if of relevance as the High sensitivity habitats may have numerous, often highly cryptic (especially to the untrained eye) specimens of plant species of Conservation Concern in any one area, making it impossible to provide recommendations for avoidance. It is assumed that the disturbance footprint for each new lattice tower (pylon) will be about 25m^2, which is based on the average observed disturbance footprint for such towers (pers. obs.).

4. STUDY AREA AND REGIONAL CONTEXT

The study area is located within the southwest coastal region of the Core Cape Subregion (CCR) of the Greater Cape Floristic Region (GCFR; Manning & Goldblatt 2012). The study area is part of the Fynbos biome. The GCFR is one of only six Floristic Regions in the world, and it is also by far the smallest floristic region. The Core Cape Subregion occupies only 0.1% of the world's land surface, and supports about 9400 plant species, almost half of all the plant species in southern

Africa, and some 20% of the plant species in sub-Saharan Africa. About 68% 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). Most 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. Data from the Red Data Book listing process undertaken for South Africa indicate that 67% of the rare or threatened plant species in the country occur only in the southwestern Cape, and these total over 1800 species (Raimondo *et al* – 2009). It should thus be clear that the southwestern 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. Developments in this area thus need to take this into account.

The study area falls largely within a single bioregion – the Southwest Fynbos Bioregion (on sandy soils), with minor, remnant elements of the West Coast Renosterveld Bioregion on richer soils in the southern parts of the route (Mucina & Rutherford 2006), the latter being a major grain producing area. Due to the high agricultural potential of the shale and granite-derived soils in the latter the loss of natural vegetation to agriculture has been severe (>85% lost), and the bioregion has a very large number of threatened plant species (probably more than 300; Raimondo *et al* 2009). This large scale habitat loss is the primary reason why most remaining areas of natural vegetation in this bioregion are designated Critical Biodiversity Areas (CBAs) in the various Fine Scale regional Conservation Plans. Virtually all CBAs support one or more plant Species of Conservation Concern.

5. OVERVIEW 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 soil disturbance 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 2 and Plate 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 (DEA 2011). 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.

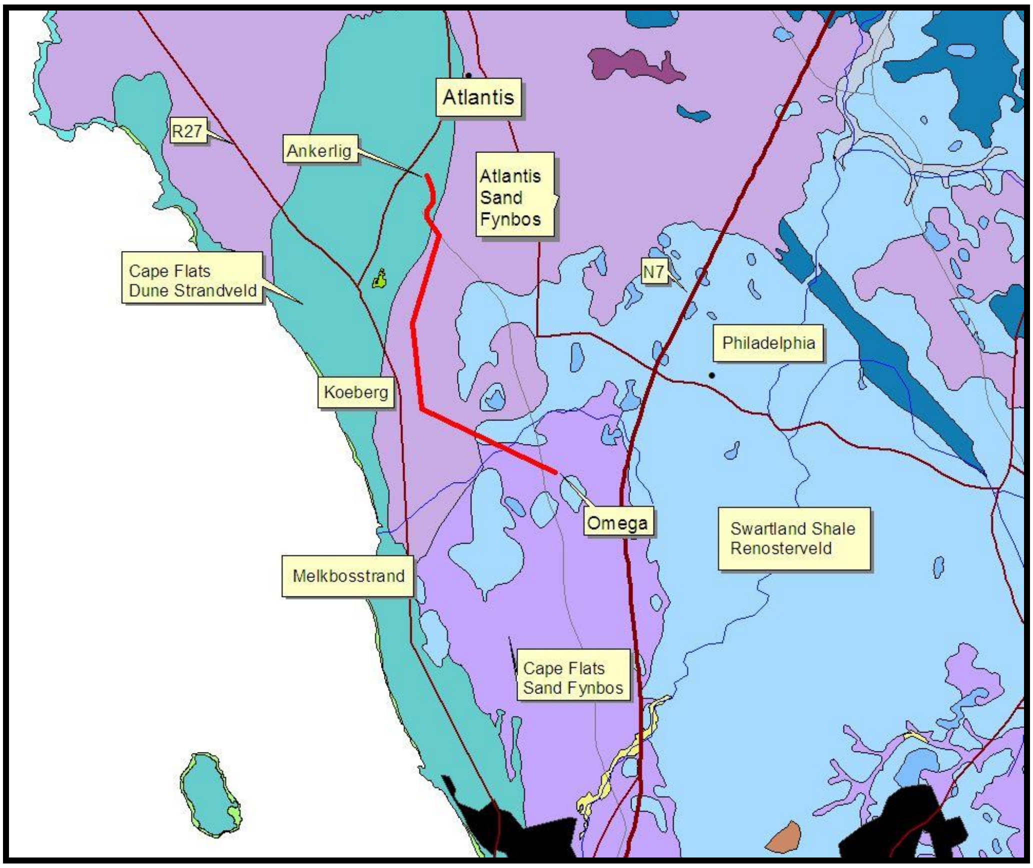

Figure 2: Extract from SA Vegetation map (Mucina & Rutherford 2006), showing approved powerline route as a red line, superimposed on the different vegetation types. Map from Helme (2008).

Plate 1: View of Cape Flats Dune Strandveld near proposed pylon position KO9.

The bulk of the proposed route passes through what is mapped as **Atlantis Sand Fynbos** (Mucina & Rutherford 2006; Plate 2). 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 **Critically Endangered** on a national basis (DEA 2011). Within the study area much of this habitat is severely invaded by alien *Acacia saligna* (Port Jackson) and *Acacia cyclops* (rooikrans). Large parts of this section of the route are rated as being of Medium or High sensitivity.

Plate 2: View of pristine Atlantis Sand Fynbos in vicinity of proposed pylon STE 17.

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).

According to Helme (2008) more than 60% of the total route crosses areas that are either of High or Medium botanical sensitivity (see Figure 3).

At least 13 different plant Species of Conservation Concern were noted within the study area, namely *Leucospermum tomentosum* (Vulnerable), *L. hypophyllocarpodendron* ssp. *canaliculatum* (Vulnerable), *Aspalathus ternata*

(Near Threatened), *Thamnochortus punctatus* (Declining), *Macrostylis villosa* ssp *villosa* (Endangered), *Ruschia tecta* (Endangered), *Ruschia indecora* (Endangered), *Phylica harveyi* (Vulnerable), *Lampranthus explanatus* (Near Threatened), *Limonium purpuratum* (Critically Endangered), *Lachnaea grandiflora* (Vulnerable), *Capnophyllum africanum* (Near Threatened), and *Agathosma thymifolia* (Vulnerable). A few other plant SCC could be expected to occur in the area.

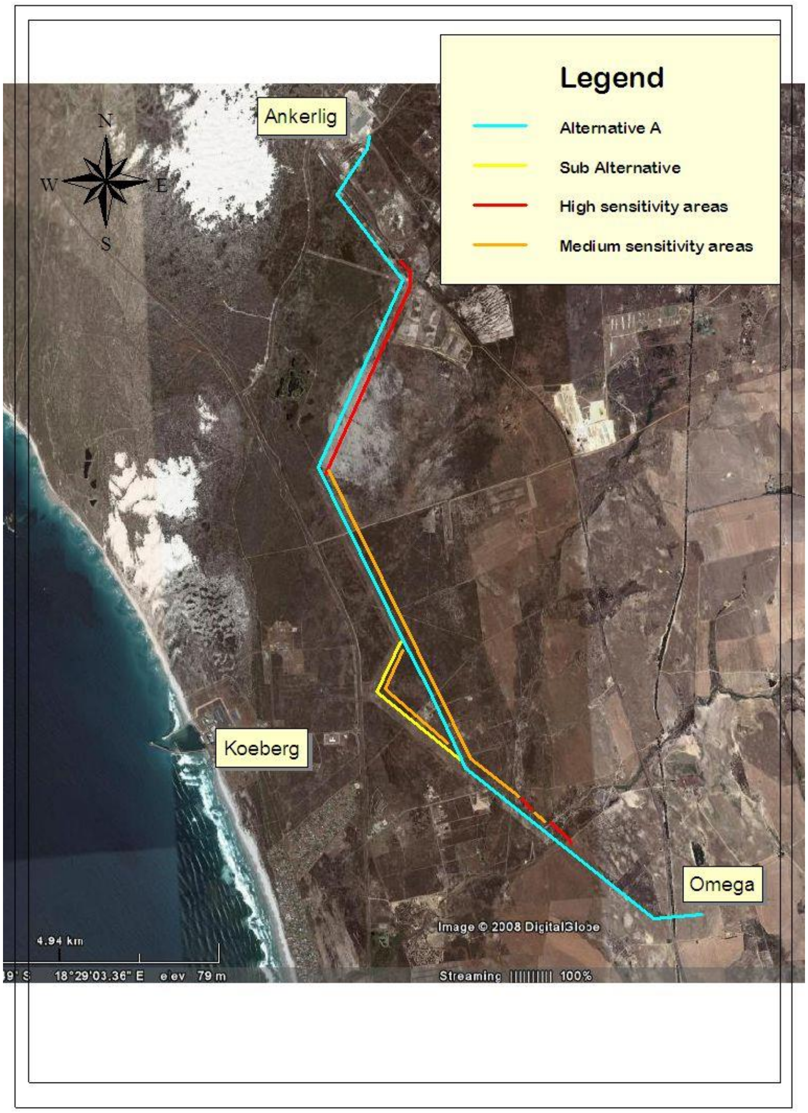

Figure 3: Copy of the botanical sensitivity map from Helme (2008), showing position of the High and Medium sensitivity areas along the route. According to the Environmental authorisation no brushcutting may take place in these sections of the servitude, or if it is undertaken it may only be done once every ten (10) years.

6. ROUTE SENSITIVITY DESCRIPTION

The following table summarises the route sensitivity for every pylon position, and makes recommendations for minimising or avoiding botanical impacts in each area.

Pylon #	**Description of habitat**	**Botanical Sensitivity**	**Plant Species of Conservation Concern**	**Woody alien invasive vegetation**	**Site specific Mitigation Requirements**
1AT/AUR1	Heavily disturbed Cape Flats Dune Strandveld	Low	None	None	None
2AT/AUR2	Heavily disturbed Cape Flats Dune Strandveld	Low	None	None	None
2AT/KO3	Heavily disturbed Cape Flats Dune Strandveld	Low	None	Many *Acacia saligna*; brushcut	None
2AT/KO4	Heavily disturbed Cape Flats Dune Strandveld	Low	None	Many tall *Acacia saligna*	None
2AT/KO5	Completely transformed & hardened	Very Low	None	None	None
2AT/KO6	High diversity Cape Flats Dune Strandveld	High	None	None in footprint; many surrounding	Move pylon 20m SE, N or NW off High sensitivity dune ridge; avoid impacting on dune ridge with new access road
2AT/KO7	Medium diversity Cape Flats Dune Strandveld	Medium	None	1 4m tall *Acacia saligna*, 3 *A. cyclops*	None

2AT/KO8	High diversity Cape Flats Dune Strandveld	Medium	None	Mostly cut by woodcutters; 5 *Acacia cyclops*, 1 *A. saligna*	None
2AT/KO9	High diversity Cape Flats Dune Strandveld	Medium	None	2 *Acacia cyclops*	None
2AT/KO10	Disturbed Cape Flats Dune Strandveld	Low	None	Many 4m tall *Acacia saligna*	None
2AT/STE12	Partly disturbed Atlantis Sand Fynbos	Low	None	Some small *Acacia saligna*; mostly previously cleared	None
STE13	Nearly pristine Atlantis Sand Fynbos	High	*Phylica harveyi* (VU)	None	None
STE14	Nearly pristine Atlantis Sand Fynbos	High	*Macrostylis villosa* (EN); *Lampranthus explanatus* (NT) nearby	None	None
STE15	Pristine Atlantis Sand Fynbos	High; no existing road access	*Macrostylis villosa* (EN); *Ruschia tecta* (EN)	None	Move 20m E/NE to minimise impact on *Ruschia tecta*
STE16	Pristine Atlantis Sand Fynbos	High; no existing road access	*Limonium purpuratum* (CR); *Ruschia tecta* (EN)	None	Move 20m W to minimise impact on *Ruschia tecta*
STE17	Pristine Atlantis Sand Fynbos	High; no existing road access	*Ruschia tecta* (EN), *Lachnaea grandiflora* (VU), *Thamnochortus punctatus* (Declining), *Leucospermum hypophyllocarpo-dendron* (VU)	None	None

STE18	Pristine Atlantis Sand Fynbos	High; no existing road access	*Ruschia tecta* (EN), *Lachnaea grandiflora* (VU), *Thamnochortus punctatus* (Declining), *Leucospermum hypophyllocarpo-dendron* (VU)	None	None
STE19	Disturbed Atlantis Sand Fynbos	Medium; existing road access	None	Some large *Acacia saligna* and *A. cyclops*	None
STE20	Heavily disturbed Atlantis Sand Fynbos	Low	None	Some large *Acacia saligna*	None
STE20	Heavily disturbed Atlantis Sand Fynbos	Low	None	Some large *Acacia saligna*	None
STE21	Heavily disturbed Atlantis Sand Fynbos	Low	None	Some large *Acacia saligna*	None
STE22	Heavily disturbed Atlantis Sand Fynbos	Low	None	Dense *Acacia saligna*, recently brushcut	None
STE23	Heavily disturbed Atlantis Sand Fynbos	Low	None	Dense *Acacia saligna*, recently brushcut	None
STE24	Heavily disturbed Atlantis Sand Fynbos	Low	None	Dense *Acacia saligna*, recently brushcut	None
STE25	Heavily disturbed Atlantis Sand Fynbos	Low	None	Dense *Acacia saligna*, recently brushcut	None

STE26	Heavily disturbed Atlantis Sand Fynbos	Low	None	Dense *Acacia saligna*, recently brushcut	None
STE27	Heavily disturbed Atlantis Sand Fynbos	Low	None	Dense *Acacia saligna*, recently brushcut	None
STE28	Heavily disturbed Atlantis Sand Fynbos	Low	None	Dense, tall *Acacia saligna*	None
STE29	Heavily disturbed Atlantis Sand Fynbos	Low	None	Dense, tall *Acacia saligna*	None
STE30	Heavily disturbed Atlantis Sand Fynbos	Low	*Thamnochortus punctatus* (Declining)	Dense, tall *Acacia saligna*	None
STE31	Heavily disturbed Atlantis Sand Fynbos	Low	None	Fairly dense, tall *Acacia saligna*	None
STE32	Heavily disturbed Atlantis Sand Fynbos	Low	None	Fairly dense, tall *Acacia saligna*	None
STE33	Heavily disturbed Atlantis Sand Fynbos	Low	None	Fairly dense, tall *Acacia saligna*	None
STE34	Heavily disturbed Atlantis Sand Fynbos	Low	None	Fairly dense, brushcut *Acacia saligna*	None
STE35	Heavily disturbed Atlantis Sand Fynbos	Low	None	Fairly sparse, tall *Acacia saligna*	None
STE36	Heavily disturbed Atlantis Sand Fynbos	Low	None	Fairly sparse, tall *Acacia saligna*	None
STE37	Cultivated	Very Low	None	None	None

STE38	Heavily disturbed Atlantis Sand Fynbos	Low	None	Fairly sparse, tall *Acacia saligna*	None
STE39	Heavily disturbed Sand Fynbos and Strandveld mix	Low	None	Dense, tall *Acacia saligna*	None
STE40	Heavily disturbed Sand Fynbos and Strandveld mix	Low	None	Fairly sense, low *Acacia saligna*	None
STE41	Heavily disturbed Sand Fynbos and Strandveld mix	Low	None	Fairly sense, low *Acacia saligna*	None
STE42	Cultivated	Very Low	None	None	None
STE43	Cultivated	Very Low	None	None	None
STE44	Cultivated	Very Low	None	None	None
STE45	Cultivated	Very Low	None	None	None

8. SPECIFIC RECOMMENDATIONS

Four specific pylon position changes are recommended, and these are outlined below.

Pylon KO6

Figure 4 is a botanical sensitivity map for the surrounds of pylon KO6. The pylon is currently located on a High sensitivity dune ridge, and if possible should be relocated to anywhere within the surrounding Low sensitivity area shown. It is acknowledged that as this is a strain (bend) tower it may be difficult if not impossible to move this tower.

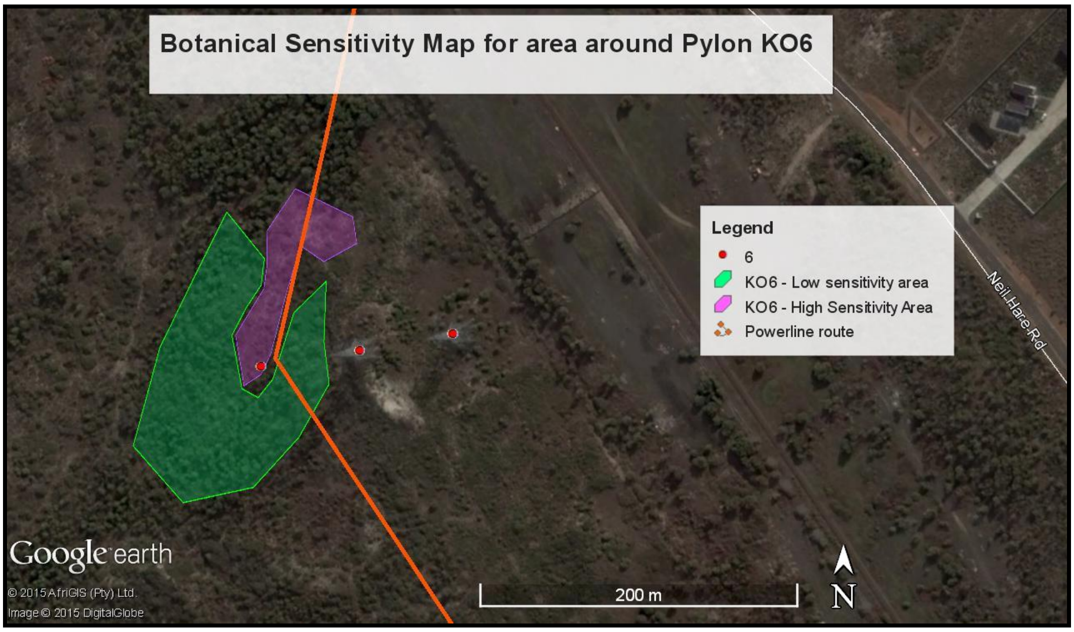

Figure 4: Botanical sensitivity map for surrounds of pylon KO6. The pylon is currently located on a High sensitivity dune ridge, and if possible should be relocated to anywhere within the surrounding Low sensitivity area shown.

STE13

Figure 5 is a botanical sensitivity map for the surrounds of pylon STE13. The pylon is currently located in a High sensitivity area, and if possible should be relocated to the Low sensitivity area shown, some 70m to the northeast, along the current longitudinal alignment.

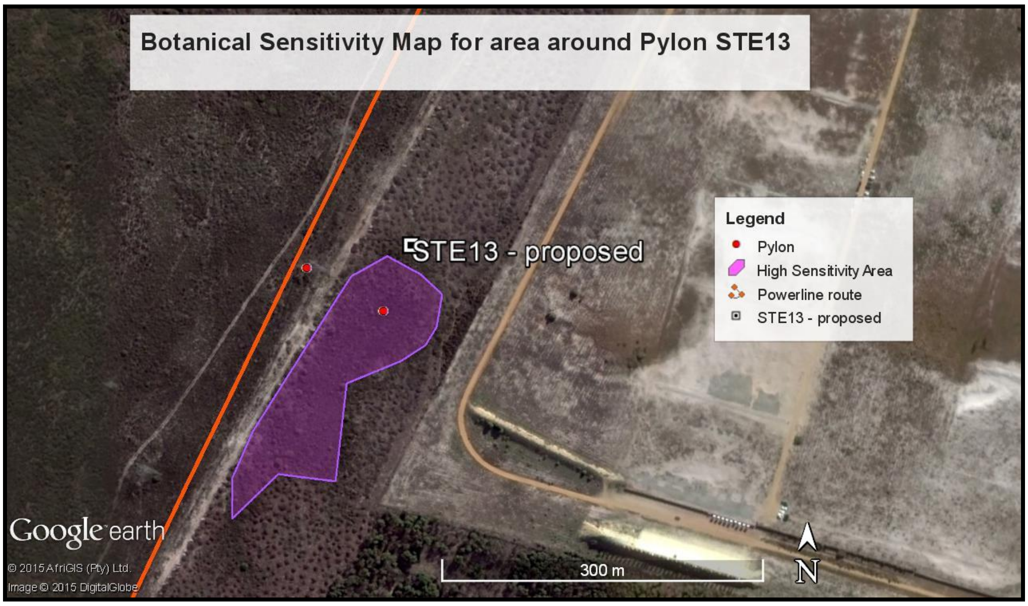

Figure 5: Botanical sensitivity map for surrounds of pylon STE13. The pylon is currently located in a High sensitivity area, and if possible should be relocated to the Low sensitivity area shown.

STE15 and STE16

Figure 5 is a map showing proposed position shifts of pylons STE15 and STE16. The entire area along this section of the servitude is a High sensitivity area, and the shifts are merely to try and minimise impacts on various threatened plant species. STE15 should be moved some 30m to the northeast, and STE16 should be moved some 36m to the southwest, both proposed positions being along the current longitudinal alignments (no lateral shifts).

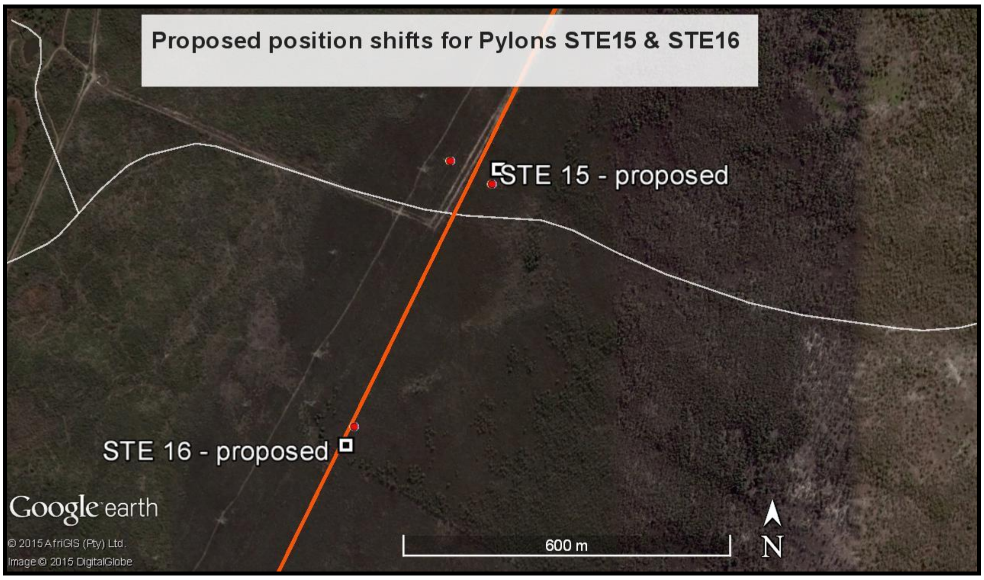

Figure 6: Map showing proposed position shifts of pylons STE15 and STE16. The entire area along this section of the servitude is a High sensitivity area, and the shifts are merely to try and minimise impacts on various threatened plant species.

9. GENERAL REQUIREMENTS FOR MITIGATION OF BOTANICAL IMPACTS

The following points should all be included within the EMPR.

- Construction in the High sensitivity areas should ideally take place during the dry season (November to May) to minimise impacts on bulbs and annuals.
- Creation of new access tracks should be minimised in all areas of natural vegetation. This is especially important in the areas between pylons STE15 and STE19.
- All woody alien invasive vegetation must be removed from the servitude within one year of powerline construction, and follow-ups conducted once every two years thereafter. Appropriate methodology should be sued to

treat the cut stumps of the felled alien shrubs, viz. immediate hand painting of herbicide onto the cut stumps to prevent resprouting. No spraying of herbicide should be undertaken, as it also kills numerous non-target indigenous species.

- As per the Environmental Authorisation no brushcutting should be undertaken in the High and Medium sensitivity parts of the servitude (see Figure 3). If brushcutting proves necessary (unlikely due to the fact that the mature, natural vegetation is less than 1.5m tall), then this may only be undertaken once every ten years.

10. REFERENCES

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