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Pri.Sci.Nat # 400045/08

REVISED BOTANICAL ASSESSMENT OF PROPOSED 132kV POWERLINE ROUTES FROM RHEBOKSFONTEIN WIND ENERGY FACILITY TO AURORA SUBSTATION, WESTERN CAPE.

Compiled for: Savannah Environmental (Pty) Ltd., Sunninghill

Client: Moyeng Energy (Pty) Ltd.

29 July 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

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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).

EXECUTIVE SUMMARY

This revised botanical assessment was commissioned in order to help inform the planning and application process for a proposed new 132kV powerline from the approved Rheboksfontein Wind Energy Facility (WEF) to the Aurora (near Hopefield) Eskom substation, a straight line distance of 39km. Three alternative routes were provided for assessment:

- **Alternative 1A** – following the existing servitude most of the way, except for a 6.7km deviation along the current eastern edge of the West Coast National Park (WCNP), and bordering on the likely eastern edge of a major, approved phosphate mine.
- **Alternative 1B** – also follows existing servitude for most of length, but with a 1km longer deviation, which would run between a new eastern extension of the WCNP and the western parts of the Park, and well east of a major, approved phosphate mine.
- **Alternative 1C** - also follows existing servitude for most of length, but carries along on this servitude for 2km after Alternatives 1A and 1B branch off, before turning northeast along southeastern edge of WCNP for 2.5km, before joining the Alternative 1A route again.

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. 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.

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. The Saldanha Municipality Fine Scale Conservation Plan (Pence 2008) shows that about 75% of all three route alternatives cross designated Critical Biodiversity Areas (CBAs). Virtually all CBAs support one or more plant Species of Conservation Concern (SCC) at any particular point (100m radius), and in many parts as many as 12 SCC may be present within a 100m radius. The northern parts of all three alternatives are designated CBAs mainly for representivity (in order to achieve conservation targets for the underlying habitat type).

The initial 14km of the route crosses mostly agricultural land of Low botanical sensitivity, with almost no natural vegetation remaining in this area. Various watercourses are crossed, but these are all fairly heavily degraded, and support weedy species of no particular conservation value.

The remainder of the route (from Km 14 to Aurora substation) crosses largely pristine Hopefield Sand Fynbos, which is deemed to be of High sensitivity. This vegetation type is currently listed as Vulnerable on a national basis (DEA 2011, Pence 2014), although it will be uplisted to Endangered in the next few years, due to the number of threatened plant species that it supports (SANBI – pers. comm.).

At least 16 plant Species of Conservation Concern were noted within the potential corridor through the Hopefield Sand Fynbos.

In terms of the construction of a new 132kV powerline on this route the following potentially negative ecological issues have been identified:

- Direct loss of areas of Vulnerable Hopefield Sand Fynbos at the construction phase, and possible associated loss of small portions of the local site populations of as many as 16 different plant Species of Conservation Concern. This loss would be mostly due to pylon placement in areas of natural vegetation, and the development of any associated access tracks in areas where these do not already exist.
- Negative operational phase impacts would primarily be the result of servitude brushcutting, and would include further possible loss of small

portions of the local site populations of certain plant Species of Conservation Concern within the brushcut servitudes.

Two small positive ecological impacts may be associated with this project. The removal of woody invasive alien vegetation from within the servitude would be a positive. Also, some of the plant Species of Conservation Concern are resprouters and would thus benefit from occasional brushcutting (provided it is not done more often than once every 4 years).

The following conclusions and recommendations for mitigation are noted:

- Construction phase botanical impacts are likely to be of minor significance for all three alternatives, with the long term loss or degradation of habitat associated with new access tracks (up to about 27ha) significantly outweighing the negative impacts of the permanent loss of habitat within the pylon footprints (<1ha). The loss of Vulnerable Hopefield Sand Fynbos habitat is less important than the loss of portions of the site populations of as many as 16 Species of Conservation Concern (SCC).
- The diversity and density of the SCC is much higher in the eastern (Alternative 1B route), and it is consequently the **least preferred** alternative. The overall Medium negative construction phase impact significance for Alternative 1B is driven by the presence of these SCC.
- Operational phase botanical impacts for all the powerline alternatives are likely to be broadly similar, although Alternative 1B is likely to have a Low – Medium negative impact, which is slightly greater than for Alternatives 1A or 1C, which would have a Low negative impact.
- The recommended alternative from a botanical perspective is thus either alternative 1A or 1C, with a **slight preference for Alternative 1C,** as it is already slightly more degraded than 1A.
- An ECO should be on site at least weekly during the construction phase and must be responsible for ensuring compliance with all environmental conditions imposed.
- Construction should ideally take place during the dry season (November to May) to minimise impacts on bulbs and annuals.
- All minor wetlands along the routes should be spanned, and no pylons should be placed in these smaller wetlands and drainage lines.
- The servitude should not be bushcut more than once every four years.
- Creation of new access tracks should be minimised in all areas of natural vegetation.

- 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.
- All the above points should be included as Conditions of Approval in any RoD.

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1. INTRODUCTION

This revised botanical assessment was commissioned in order to help inform the planning and application process for a proposed new 132kV powerline from the approved Rheboksfontein Wind Energy Facility (WEF) to the Aurora (near Hopefield) Eskom substation, a straight line distance of 39km. Three alternative routes were provided for assessment (Figure 1):

- **Alternative 1A** – following the existing servitude most of the way, except for a 6.7km deviation along the current eastern edge of the West Coast National Park (WCNP), and bordering on the likely eastern edge of a major, approved phosphate mine.
- **Alternative 1B** – also follows existing servitude for most of length, but with a 1km longer deviation, which would run between a new eastern extension of the WCNP and the western parts of the Park, and well east of a major, approved phosphate mine.
- **Alternative 1C** - also follows existing servitude for most of length, but carries along on this servitude for 2km after Alternatives 1A and 1B branch off, before turning northeast along southeastern edge of WCNP for 2.5km, before joining the Alternative 1A route again.

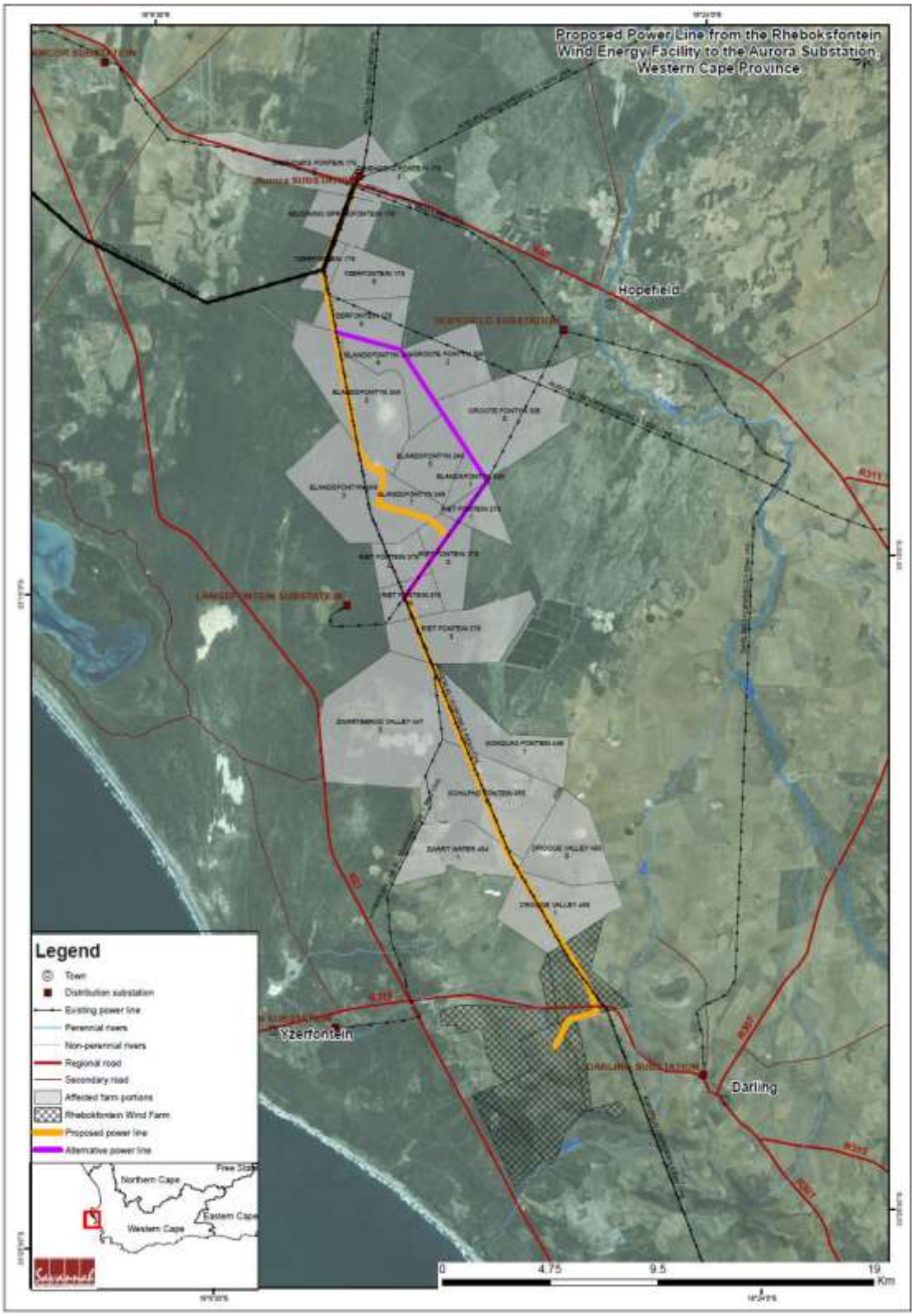

Figure 1: Map (provided) showing the three alternative powerline routes assessed. Updated map to be inserted by Savannah Environmental when ready.

2. TERMS OF REFERENCE

The terms of reference for this study were as follows:

- Provide a specialist assessment of the botanical characteristics of the alternative routes.
- Identify and map key issues and areas of botanical sensitivity.
- Identify likely botanical impacts, and assess the significance of these impacts, with and without mitigation.
- Refer to the standard Cape Nature ToR for such assessments.
- Recommend specific mitigation for the impacts identified.

3. LIMITATIONS, ASSUMPTIONS AND METHODOLOGY

The author has surveyed most of all three routes for various projects over the last five years, including extensive work for another powerline along the same corridor and for the recently approved phosphate mine just to the west of the proposed powerline (Helme 2014). Botanically sensitive areas were mapped directly onto hardcopy aerial images of the route. The site visits were undertaken early and late in the optimum winter to spring flowering season, and seasonality was thus not a major constraint on the comprehensiveness of the botanical findings, as many of the rare ephemerals were identifiable on at least one of the fieldtrips. 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). The Critical Biodiversity Area (CBA) map for the Saldanha Municipality (Pence 2008) was referred to. The information displayed in the CBA maps was used to help inform the sensitivity map in the current report.

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 routes as provided in Figure 1 are reasonably accurate, at least to within about 50m. It is also assumed that existing access tracks will be used where possible, and that the average difference between pylons will be 150 to 250m. It is assumed that the disturbance footprint for each new pole will be about 25m^2, which is based on the average observed disturbance footprint for new poles (pers. obs.).

The No Go alternative is not assessed in this instance, as a powerline and grid connection is required for the approved WEF.

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 Saldanha Municipality Fine Scale Conservation Plan (Pence 2008). Virtually all CBAs support one or more plant Species of Conservation Concern.

The northern parts of all three alternatives are designated CBAs (see Figure 2) mainly for representivity (in order to achieve conservation targets for the underlying habitat type).

The alternatives initially span rolling hills, but these soon level out onto a flat, sandy plain for the majority of the route north.

Figure 2: Extract of the Saldanha region Critical Biodiversity Area (CBA) map, with route alternatives superimposed. Bright green shaded areas are the mapped CBAs.

5. OVERVIEW OF THE VEGETATION

5.1 The 80% of the route that is shared

The initial 14km of the route crosses mostly agricultural land of Low botanical sensitivity (Figure 3), with almost no natural vegetation remaining in this area (Plate 1). Various watercourses are crossed, but these are all fairly heavily degraded, and support weedy species of no particular conservation value.

The remainder of the route (from Km 14 to Aurora substation) crosses largely pristine Hopefield Sand Fynbos, which is deemed to be of High sensitivity. This vegetation type is currently listed as Vulnerable on a national basis (DEA 2011, Pence 2014), although it will be uplisted to Endangered in the next few years, due to the number of threatened plant species that it supports (SANBI – pers. comm.).

Plate 1: View along the initial part of the route (looking south), showing the complete lack of indigenous vegetation in this heavily cultivated area of Low conservation value.

Plate 2: View of the southern part of the Sandveld section of both routes, looking south (on Schilpadfontein 455). This section of the route crosses good quality Hopefield Sand Fynbos, and is of High botanical sensitivity, with numerous Species of Conservation Concern present.

There are two existing transmission powerlines and a distribution line for much of this route (Plate 2), but the last few kilometres into Aurora substation already have at least eight parallel powerlines, making this a very busy servitude. Most of the servitude has been brushcut, although this fortunately does not seem to be undertaken annually in this area.

Dominant species in most of this Sandveld area are *Willdenowia incurvata* (zonkwasriet), *Cannomois arenicola, Passerina corymbosa* (gonna), *Leucadendron salignum* (geelbos) and *Phylica cephalantha*.

Alien invasive vegetation is rare within most of the actual proposed route, covering less than 1% of the total area. However, there are small patches here and there of invasive alien rooikrans (*Acacia cyclops*) and Port Jackson (*Acacia saligna*).

At least 16 plant Species of Conservation Concern were noted within this potential corridor, including *Leucospermum tomentosum* (Vulnerable), *L. hypophyllocarpodendron* ssp. *canaliculatum* (Vulnerable), *Serruria decipiens* (Vulnerable), *Aspalathus ternata* (Near Threatened), *Metalasia adunca* (Near Threatened), *Protea scolymocephala* (Vulnerable), *Thamnochortus punctatus* (Declining) *Cannomois arenicola* (Endangered), *Caesia sabulosa* (Vulnerable), *Macrostylis crassifolia* (Vulnerable), *Diosma aspalathoides* (Near Threatened), *Lachnaea grandiflora* (Vulnerable), *Capnophyllum africanum* (Near Threatened), *Echiostachys spicatus* (Endangered), *Helichrysum cochleariforme* (Near Threatened) and *Agathosma thymifolia* (Vulnerable). Various other plant SCC can be expected to occur. Both routes actually miss the section of the servitude (within the WCNP) that is known to support the Critically Endangered *Senecio foeniculoides*.

5.2 Botanical differences between the routes

Alternative 1B crosses an area of almost pristine and very homogenous Hopefield Sand Fynbos, with all 16 typical SCC found within this unit, which are likely to include most of those listed above. Many of the SCC occur in high densities in this particular area, making it likely that a large, brushcut servitude would have a significant negative impact on numerous actual plants.

Alternative 1A more closely follows the existing brushcut servitude and power line, and first crosses a fairly diverse patch of Sand Fynbos before traversing the heavily disturbed (and alien invaded) southern edge of the famous Elandsfonteyn dune fields. The route then crosses the only part of the total route that features exposed limestone outcrops, which are known to support two plant SCC: *Phylica glabrata* (Data Deficient) and *Muraltia harveyana* (Vulnerable), plus *Phylica strigosa*, which is currently listed as Least Concern, but should be uplisted to Vulnerable as it is a fairly rare regional endemic. On balance the proposed route is likely to impact on perhaps only 50% of the Species of Conservation Concern that the alternative route would, and most of these also occur at lower densities than those in the alternative route.

Alternative 1C is very similar to Alternative 1A, but traverses a section of Hopefield Sand Fynbos is generally more degraded and disturbed than 1A, with significantly more alien invasive vegetation (*Acacia cyclops*). It is thus also less likely to support viable populations of plant Species of Conservation Concern, and is thus preferred over Alternative 1.

6. ISSUES IDENTIFIED

In terms of the construction of a new 132kV powerline along this corridor the following potentially negative ecological issues have been identified:

- Direct loss of areas of Vulnerable Hopefield Sand Fynbos at the construction phase, and possible associated loss of small portions of the local site populations of as many as 16 different plant Species of Conservation Concern. This loss would be mostly due to pylon placement in areas of natural vegetation, and the development of any associated access tracks in areas where these do not already exist.
- Negative operational phase impacts would primarily be the result of servitude brushcutting, and would include further possible loss of small portions of the local site populations of certain plant Species of Conservation Concern within the brushcut servitudes.

Two small positive ecological impacts may be associated with this project. The removal of woody invasive alien vegetation from within the servitude in certain rehabilitable areas that still support natural vegetation would be a positive. Also, some of the plant Species of Conservation Concern are resprouters and would thus benefit from occasional brushcutting (provided it is not done more often than once every 4 years).

7. IMPACT ASSESSMENT

Construction Phase impacts would involve permanent loss of small areas of a Vulnerable natural vegetation type, and potentially the loss of portions of local populations of up to 16 different plant Species of Conservation Concern. These impacts are all negative in nature.

Operational Phase impacts are often difficult to measure and observe, and usually require pre-development measurements and observation in order to make a comparison. The primary negative indirect impacts at this phase would be the result of servitude brushcutting, and would include further possible loss of small portions of the local site populations of certain plant Species of Conservation Concern within the brushcut servitudes

Positive operational phase impacts could include ongoing removal of woody alien invasive vegetation from within the servitudes, and stimulation of flowering for certain resprouting species (as a result of occasional brushcutting), some of which are Species of Conservation Concern.

7.1. Construction Phase Impacts

The primary direct impact at this phase will be permanent loss of small areas of a Vulnerable vegetation type – Hopefield Sand Fynbos. This loss will occur as a result of the installation of pylons within areas of existing natural vegetation.

Additional loss will occur where new access tracks are required through such areas of natural vegetation, although this loss is arguably reversible, as the tracks would rehabilitate naturally if not used for many years.

For all alternatives (about 30km through natural vegetation) the estimated area to be impacted by the pylon placement would be small, about 0.5ha for the proposed route and 0.6ha for the alternative route. A further 25ha (perhaps 27ha for Alternative 1B) may be temporarily (but probably long term) impacted (habitat degradation) by new access tracks (some existing tracks could be used).

A likely second construction phase impact would be the loss of portions of local populations of plant Species of Conservation Concern (SCC) that may occur within the areas of natural habitat en route. This is likely to be of greater significance for Alternative 1B (eastern) route, as up to 16 SCC occur on this particular part of the route (and at higher densities), as opposed to probably fewer than 6 SCC for

the relevant section of the route Alternatives 1A and 1C. It is however likely that no SCC along the entire route will lose more than 5% of its local subpopulation to the proposed development.

Alternative 1C crosses a more degraded section of habitat than Alternative 1A and consequently is likely to have a slightly lower negative botanical impact than 1A, but the magnitude of this difference is not possible to portray in the relatively coarse assessment methodology typically used in EIAs.

The nature of the impact is loss of natural vegetation and associated Species of Conservation Concern in the development footprint (access track and pylons). The potential magnitude of the loss is about 0.5ha of permanent habitat loss for the proposed route and 0.6ha for the alternative route. A further 25ha (perhaps 27ha for alternative 1B) may be temporarily (but probably long term) impacted by new access tracks (some existing tracks could be used). As the area to be permanently lost is so much smaller than the area to be temporarily lost the former presumably has a much smaller overall significance.

Alternative	**Extent of impact**	**Duration of impact**	**Inten-sity**	**Probability of occurrence**	**Status of the impact**	**Degree of confidence**	**Level of significance**	**Significance after mitigation**
Alternative Route 1A	Local	Long term and Permanent	Medium	Very likely	Negative	High	**Low - Medium negative**	**Low negative**
Alternative Route 1B	Local	Long term and permanent	Medium	Very likely	Negative	High	**Medium negative**	**Medium negative**
Alternative Route 1C	Local	Long term and permanent	Medium	Very likely	Negative	High	**Low - Medium negative**	**Low negative**

Table 1: Summary table for Construction Phase botanical impacts associated with the new powerline.

The overall construction phase botanical impacts of the proposed development route are likely to be **Low to Medium negative prior to mitigation** (at a regional scale), and **Low negative after mitigation (Alternatives 1A & 1C),** and **Medium negative for Alternative 1B**.

7.2 Operational Phase Impacts

Operational phase impacts are often more difficult to measure, observe and quantify, partly because they may take place over a period of many years, and many involve the loss of small, but key insects or other creatures that the average person would never normally notice. Just because the untrained person does not notice the change does not mean that the ecological impacts are insignificant.

A powerline of this type causes relatively little disruption to ecological connectivity, provided that a major access road is not constructed, and that the access track is a simple "tweespoor" through the veld. The new poles and any new access track or portions thereof could result in very minor fragmentation of existing habitats (reducing the size of habitat remnants results in loss of species and disruption or failure of certain ecological interactions). The proposed powerline route is likely to either share or be adjacent to an existing powerline and servitude for about 80% of its length, which would already have had minor indirect impacts. However, this fragmentation impact is so insignificant in this case that it is not further assessed.

The key operational phase botanical impact associated with power lines is the servitude management, and specifically the brushcutting of vegetation in the servitude. Regular brushcutting can have serious negative botanical impacts for certain species and even certain vegetation types (such as Succulent Karoo), but can in fact be positive for other species, so making generalisations is not always advisable. Although brushcutting is seldom, if ever, necessary from a fire reduction perspective in the western parts of the Western Cape, servitudes in the region are nevertheless often regularly brushcut (pers. obs.). This undoubtedly alters the species composition within the servitude, and generally results in the loss of longer lived species that cannot resprout from a rootstock. Short lived perennials and annuals are favoured by brushcutting. The seasonality of the brushcutting is also critical, as cutting during the flowering and fruiting season (generally June to November) can also eliminate species from an area. From an ecological perspective it is best not to brushcut at all, and if it has to be done it should be done only once every four or five years at most. It is never possible to determine at the Impact Assessment stage what the proposed Eskom brushcutting schedule will be for a powerline, making it difficult to predict likely impacts. It is however likely to be negative for about 10 of the 16 SCC recorded along the route, and perhaps mildly positive for the remainder.

The only other notable operational phase impact is likely to be removal of the woody alien invasive vegetation (notably *Acacia* species) from within the servitude, which would be a positive impact. These species are typically taller than the natural vegetation and thus present more of a fire hazard for the power lines, and their removal from within otherwise densely invaded areas can create something of an ecological corridor, although there is no published evidence to support this. Alien invasive vegetation is not common anywhere along the proposed route, except around the southern edge of the Elandsfonteyn dune fields (proposed alternative), and in parts of the Alternative 1C route.

The overall operational phase impacts of the **Alternatives 1A and 1C** are likely to be **Low negative both before and after mitigation,** and for **Alternative 1B** they are **likely to be Low to Medium negative both before and after mitigation**.

The nature of the impact is very minor habitat fragmentation and associated ecological impacts, loss of parts of local subpopulations of certain Species of Conservation Concern due to likely brushcutting (mostly negative, but some positive), and removal of woody alien invasive from within servitudes (positive).

Alternative	**Extent of impact**	**Duration of impact**	**Intensity**	**Probability of occurrence**	**Status of the impact**	**Degree of confidence**	**Level of significance**	**Significance after mitigation**
Alternative Route 1A	Local	Temporary to long term	Medium	Very likely	Negative and positive	Medium	**Low negative**	**Low Negative**
Alternative Route 1B	Local	Temporary to long term	Medium	Very likely	Negative and positive	Medium	**Low – Medium Negative**	**Low – Medium Negative**
Alternative Route 1C	Local	Temporary to long term	Medium	Very likely	Negative and positive	Medium	**Low negative**	**Low Negative**

Table 2: Summary table for Operational Phase botanical impacts associated with the new powerline.

8. CONCLUSIONS AND REQUIREMENTS FOR MITIGATION

- Construction phase botanical impacts are likely to be of minor significance for all three alternatives, with the long term loss or degradation of habitat associated with new access tracks (up to about 27ha) significantly outweighing the negative impacts of the permanent loss of habitat within the pylon footprints (<1ha). The loss of Vulnerable Hopefield Sand Fynbos habitat is less important than the loss of portions of the site populations of as many as 16 Species of Conservation Concern (SCC).
- The diversity and density of the SCC is much higher in the eastern (Alternative 1B route), and it is consequently the least preferred alternative. The overall Medium negative construction phase impact significance for Alternative 1B is driven by the presence of these SCC.
- Operational phase botanical impacts for all the powerline alternatives are likely to be broadly similar, although Alternative 1B is likely to have a Low – Medium negative impact, which is slightly greater than for Alternatives 1A or 1C, which would have a Low negative impact.
- The recommended alternative from a botanical perspective is thus either alternative 1A or 1C, with a **slight preference for Alternative 1C,** as it is already slightly more degraded than 1A.
- An ECO should be on site at least weekly during the construction phase and must be responsible for ensuring compliance with all environmental conditions imposed.
- Construction should ideally take place during the dry season (November to May) to minimise impacts on bulbs and annuals.
- All minor wetlands along the routes should be spanned, and no pylons should be placed in these smaller wetlands and drainage lines.
- The servitude should not be bushcut more than once every four years.
- Creation of new access tracks should be minimised in all areas of natural vegetation.
- 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.
- All the above points should be included as Conditions of Approval in any RoD.

9. REFERENCES

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