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**BOTANICAL IMPACT ASSESSMENT OF  
PROPOSED BIODIVERSITY OFFSET OPTIONS  
FOR ESKOM KUDU (ORANJEMUND – GROMIS)  
400KV LINE.**

Compiled for: Nsovo Environmental Consulting,  
Johannesburg

Client: Eskom Holdings

19 Sep 2017

## **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, and have undertaken at least 900 site assessments during this period.

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

- Botanical assessment of proposed prospecting areas on Raskraal 255, Vanrhynsdorp (Venatouch 2016)
- Botanical assessment of proposed new cultivation and new dam and pipeline on farm Kransvlei 205, Clanwilliam (Cederberg Environmental Assessment Practise 2016)
- Botanical assessment of proposed cultivation on Rem. Andriesgrond 204, Clanwilliam (Cederberg Environmental Assessment Practise 2015)
- Botanical assessment of proposed dam on Modderfontein farm, Citrusdal (Cederberg Environmental Assessment Practise 2015)

- Botanical assessment of proposed cultivation on farms Laastedrif & Kleinvlakte, Bo Swaarmoed, Ceres (Cederberg Environmental Assessment Practise 2014)
- Botanical assessment of proposed new cultivation on Plots 960 & 961, Lutzville (Cederberg Environmental Assessment Practise 2014)
- Botanical assessment of Remainder of Farm Rietfontein 244, Piketberg (Cederberg Environmental Assessment Practise 2014)
- Botanical assessment of Remainder of Farm Draaihoek 293, Vredendal (Cederberg Environmental Assessment Practise 2013)
- Botanical assessment of Farm Gideonsooord 303, Klawer (Cederberg Environmental Assessment Practise 2013)
- Botanical assessment of Farm Patryberg 344/1, Citrusdal (Cederberg Environmental Assessment Practise 2013)
- Botanical assessment of proposed Zirco Kamiesberg mineral sand mine, Groen River, Garies (CES 2013)
- Botanical assessment of Farm Gideonsooord 303, Klawer (Cederberg Environmental Assessment Practise 2013)
- Botanical assessment of Farm Patryberg 344/1, Citrusdal (Cederberg Environmental Assessment Practise 2013)
- Botanical and Faunal assessment of proposed new Eskom powerline from Uiekraal to Bluewater Bay, Saldanha (Landscape Dynamics; 2013)
- Ecological assessment of proposed new Houhoek MTS and associated powerlines (AECOM; 2013)
- Botanical assessment of proposed agricultural expansion on Remainder of Farm Chilton 160, Piketberg (Cederberg Environmental Assessment Practise 2013)
- Scoping study of proposed Paleisheuwel Solar PV facility, near Leipoldtville (Sharples Environmental 2012)
- Basic Assessment of proposed new Eskom 66kV powerline on the Piketberg (ERM; 2010)
- Scoping and Impact Assessment of proposed Wind Energy Facility near Gouda (Savannah Environmental 2010)
- Scoping and Impact Assessment study of proposed Wind Energy Facility at Rhebokfontein, Darling (Savannah Environmental; 2010)

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## **1. INTRODUCTION**

This botanical assessment was commissioned to help inform the environmental authorisation process for the new Eskom 400kV Kudu Alexander Bay – Gromis powerline. Two specific botanical impacts were identified in the original botanical assessment for this project (Helme 2006) as primary triggers for the offset – the traversing of the Namaqua National Park and the sensitive biodiversity in the Grootderm area. The original wording relating to the proposed offset in the botanical Impact Assessment (Helme 2006) was as follows: “It is suggested that a possible option would be to increase the servitude width in the 12.5km south of Oranjemund substation, to perhaps 500m. This area should then be rezoned Open Space 3 if possible, and registered as a Private Nature Reserve, in order to try and secure some conservation status for this very vulnerable area. Alternatively, a portion of the farm Grootderm 10, not less than 50ha in extent (calculated by multiplying the length of the 12.5km sensitive area by the minimum 40m wide powerline footprint), should be purchased immediately south of the Oranjemund substation. This area should then be rezoned Open Space 3 and registered as a Private Nature Reserve.”

It is important to note that the original study (Helme 2006) preceded the release of the Western Cape biodiversity offset guidelines (DEA&DP 2011) by 5 years, and preceded the national offset guidelines by nine years (DEA 2015).

The DEA recently requested a botanical assessment of the suitability of the two alternative biodiversity offsets that have been proposed for this project.

Alternative 1 (in the 2007 EA/RoD) is a broadly defined biodiversity offset in the Grootderm and Oranjemund area, expanding the existing RAMSAR site along the Orange River (see Figure 1), and Alternative 2 is more focussed, in the eastern portion of Vyftienmyl se Berg, east of Port Nolloth (Figure 2), where a property of about 930ha will be bought by Eskom and donated to the adjacent Richtersveld National Park, to be managed by SANParks.

## **2. TERMS OF REFERENCE**

The terms of reference for this study were as follows:

- Compile a report which provides an assessment of all botanical impacts related to the proposed change in offset
- Assess the advantages and disadvantages of the proposed change in offset
- Provide mitigation measures for the proposed change in offset

- Provide a list of required changes to the EMPR.



**Figure 1:** Locality map, showing various key features referred to in this report.



**Figure 2:** The area outlined in blue is the proposed Vyftienmyl se Berg offset area, being adjacent to the area already within the Richtersveld National Park (Klein Duin section; green shading).

### **3. LIMITATIONS, ASSUMPTIONS AND METHODOLOGY**

No site visit was undertaken for this report. Google Earth imagery (dated February 2016 and earlier) was used to verify landuse patterns and for mapping. Polygons were measured using Google Earth Pro.

It was not possible to provide a list of required changes to the EMPR, as per the ToR, as no copy of the EMPR was provided. Perhaps the primary constraint in terms

of this study is that no fixed area has been identified for the Grootderm/RAMSAR offset area, neither spatially nor in terms of total size, and it is thus essentially impossible to compare something of no fixed area with a well defined area elsewhere. The botanical impact assessment (Helme 2006) spoke of a minimum offset of at least 100ha in the Grootderm area, but using the latest offset guidelines this would have had to be increases to between 500 and 1000ha in order to be acceptable.

Conservation value and sensitivity (terms which are often used interchangeably in ecological assessments) 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 (which in this case generally refers to the rehabilitation potential of the habitat; high sensitivity habitats having low rehabilitation potential).

Reference was made to the GIS based database of rare plant localities maintained by CREW (Custodians of Rare and Endangered Wildflowers, based at Kirstenbosch), to the Red List of South African plants (Raimondo *et al* 2009, and its annual online updates at [redlist.sanbi.org](http://redlist.sanbi.org)) and to various other references noted in the text.

### **4. DISCUSSION**

The study area lies within the Extra Cape Subregion (CCR) of the Greater Cape Floristic Region (GCFR; Manning & Goldblatt 2012). The study area is part of the Succulent Karoo biome and is located within the Namaqualand Sandveld and Southern Namib Desert bioregions (a finer scale classification; Mucina & Rutherford 2006). The GCFR is one of only six Floristic Regions in the world, and it is also by far the smallest floristic region. The Extra Cape Subregion occupies

only 0.1% of the world's land surface, and supports about 4000 plant species, almost one quarter of all the plant species in southern Africa, and some 10% of the plant species in sub-Saharan Africa. About 78% of all the species in the region do not occur elsewhere, and many have very small home ranges (these are known as narrow endemics). It should thus be clear that the region 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 total final powerline route will cross about 10km of the Richtersveld National Park (Klein Duin section) and about 11km of the Namaqua National Park east of Hondeklipbaai, making a total of about 21km. Assuming that the total disturbance footprint will comprise the access tracks (0.4ha footprint/km), and the pylon footings (0.1ha footprint/km), it is calculated that about 0.5ha will be disturbed per km, which means that about 10.5ha will be disturbed within the SANParks area. If one uses the total servitude area through SANParks land the total is about 55ha. The RoD required an offset ratio of 1: 10-20 for impacts within the SANParks area, which implies an offset area of at least 105 – 210ha, or 550 – 1100ha if one uses the total servitude area as the base factor. The Botanical Impact Assessment for this project, which presumably informed the RoD (Helme 2006) recommended a biodiversity offset of at least 100ha for the Oranjemund – Gromis section of the route.

The proposed offset on the eastern side of the Vyftienmyl se Berg is about 930ha in extent, and is thus within the recommended offset size range, using the servitude area, and is significantly bigger than the recommended offset area if one uses the total likely development footprint with SANParks land as the base factor. The size of the proposed offset area is thus strongly supported from a botanical perspective.

The botanical EIA and the RoD both recommended adding the offset in the Oranjemund area, with the latter referring to an addition to the newly declared Oranjemund RAMSAR site. However, there are various problems associated with acquiring a suitable property here for biodiversity conservation. Most importantly much of the southern border of the Ramsar site is adjacent to Alexander Bay settlement, which comprises of dwellings, roads, a large (now apparently defunct) farm, a golfcourse and extensive mining areas with associated disturbance, and thus there is little intact habitat allowing for ecological



connectivity to the south. A portion of the large Grootderm farm (about 4000ha) would be a suitable consideration for an offset in terms of biodiversity value (being a recognised priority for conservation), but it is not adjacent to the RAMSAR site and lies to the east of the site, separated by State Land about 4km wide. Secondly, the Grootderm property is apparently subject to a land claim (Eskom -pers. comm.), which makes negotiation for an offset or purchase at this stage very difficult (but presumably not impossible given that a servitude over the land has been obtained), but it should be noted that it does not necessarily rule out the future option of conservation orientated land use on the property, should the owners be willing.

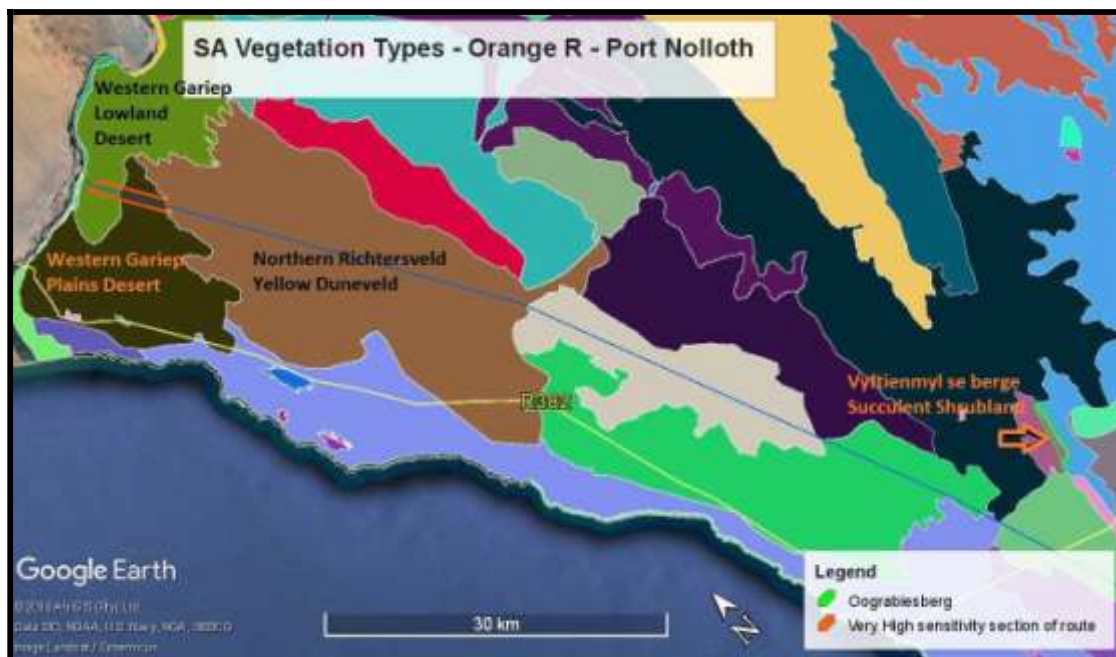
Given that it has proven impractical to purchase and conserve additional land in the Orange River mouth area, an alternative was investigated by Eskom. With the relatively recent establishment of the Richtersveld and Namaqua National Parks in the area it was believed that the most practical solution was to add conservation worthy land to SANParks, in fulfilment of the biodiversity offset requirement. After various negotiations it was decided that the most suitable offset was to acquire some 930ha of land on the eastern edge of Vyftienmyl se Berg (see Figure 1), some 22km inland of Port Nolloth, and add this to the Richtersveld National Park, which already borders on the western side of this land portion.

Dr Philip Desmet wrote a letter in May 2001 outlining the botanical importance of the Vyftienmyl se Berg, and concluded that he believed it likely that it would prove to be within the top 1% of conservation priorities with the whole Namaqualand region, and various subsequent analyses have indeed shown this to be the case. I have personally had the privilege of exploring the Vyftienmyl se Berg area with Dr Desmet and am thus familiar with the exceptional botanical diversity and endemism of this area, and I therefore strongly support the acquisition and formal conservation of the remaining eastern portion of this truly unique botanical hotspot. Although it was not highlighted in the EIA or the RoD as a target area for the biodiversity offset I believe the conservation of this area would help conserve an irreplaceable national conservation priority area, and thus falls within the general ambit of what the required biodiversity offset is supposed to achieve. The fact that it is adjacent to an area already managed by SANParks (see Figures 1 & 2) makes it doubly suitable, and it is an obvious fit that ticks all the boxes for biodiversity conservation.

It does however need to be pointed out that the area adjacent to the Orange River RAMSAR site and the proposed Vyftienmyl offset area are very different in terms of their structure, vegetation and floristics. Whilst both are within the Succulent Karoo biome and the Gariep Centre of Endemism, they fall within different bioregions as per Mucina & Rutherford (2006). The immediate vicinity of the RAMSAR area is regarded as part of the Southern Namib Desert Bioregion, whilst the Vyftienmylberg area is within the Richtersveld Bioregion. The Grootderm area is largely flat and windswept, and characterised by gravel and sand, overlying various shallowly buried rocks, including schists and limestone, whilst Vyftienmyl se Berg is a large quartzite outcrop with very little deep sand or gravel. The latter supports a vegetation type that is endemic to this single mountain, and is renowned as a "fog oasis", whereas the key area along the route south of the substation supports Western Gariep Lowland Desert and Western Gariep Plains Desert (see Figure 3) with lower fog incidence than Vyftienmyl, and the two areas have very little in common from a vegetation perspective.

It is way beyond the scope of this report to do a full floristic comparison of the two areas, as extensive fieldwork would be required over various seasons in order to do that, but the following is a brief synopsis.

The Vyftienmyl se Berg has a much higher (possibly more than ten times) biomass than the Grootderm area, due to the rocky, quartzite terrain, the far greater topographic diversity and the fog trapping effects that radically supplement the available moisture. Not surprisingly the area also has a higher overall plant diversity, possibly as much as twice the overall diversity of the Grootderm area. All the known rarities on the massif are succulents, and include *Conophytum jucundum ssp marlothii* (near endemic), *C. bolusiae ssp. bolusiae* (VU; endemic), *C. fraternum* (Rare), *C. francoiseae* (VU; endemic), *C. obscurum ssp barbatum* (VU), *C. stephanii ssp. stephanii* (VU; endemic), *Mitrophyllum abbreviatum* (VU; endemic), *M. grande* (near endemic), *Namaquanthus vanheerdei* (VU), *Schlechteranthus maximiliani* (VU), *Tylecodon bodleyae* (CR), *Bulbine lavrani* (VU; incl. by some in *B. dissimilis*), *B. torsiva* (DDT: near endemic), *B. vitrea* (VU; incl. in *B. quartzicola* by some), *Anacampteros scopata* (Rare; endemic), *Gasteria pillansii var hallii* (EN). Numerous other rarities are shared with some of the adjacent Richtersveld rocky hills.



**Figure 3:** Extract of the SA vegetation map of the area, showing the powerline route (blue line) between the Orange River and the road east of Port Nolloth (yellow line at bottom right), as well as the Very High sensitivity area south of the Orange River that was the primary trigger for the need for the biodiversity offset.

Although topographically less diverse the Grootderm area supports what would appear to be an even longer list of plant rarities, including: *Portulacaria pygmaea* (EN; near endemic); *Crassula brevifolia var psammophila* (VU; near endemic), *Crassula plegmatoides* (VU); *C. sladenii* (EN), *Tylecodon schaeferianus* (VU); *Euphorbia melanohydrata* (EN; near endemic); *Monsonia multifida* (EN; near endemic); *Bulbine ophiophylla* (EN; near endemic); *Phyllopodium namaense* (VU); *P. hispidulum* (EN); *Strumaria bidentata* (CR; endemic); *Calobota acanthoclada* (EN), *Anacampseros gariensis* (EN; endemic), *Cheiridopsis brownii* (EN; near endemic), *Rhyssolobium dumosum* (EN), *Astridia citrina* (EN), *Cynanchum meyeri* (VU), *Euphorbia herrei* (CR; endemic), *Aridaria vespertina* (EN), *Babiana namaquensis* (VU) and *Othonna furcata* (near endemic). It should also be noted that the famous Alexander Bay lichen fields (just east of the main road) are still completely unprotected, and very vulnerable to damage or loss, and formal conservation of these areas should be pursued by the relevant conservation agencies in the area (DTEC and SANParks).

From a biogeographic and conservation perspective the Grootderm area is the

higher priority, as the habitats there are currently completely unconserved in South Africa (with the exception of the RAMSAR area, which is mainly riverine), although a large portion of the key gravel plains habitat is now protected north of the Orange River in the new Sperrgebiet National Park. The portions in South Africa are thus under threat of further habitat loss (mining, agriculture, offroad vehicles), and support the only South African representations of these habitat units.

The Vyftienmyl se Berge supports a different but unique assemblage of species, and is of extremely high conservation priority as a result, but at least 75% of it is already conserved within the Klein Duin section of the Richtersveld National Park. The remaining unconserved habitat is also steeper and rockier than the Grootderm area, and is thus less likely to become severely degraded (although it could be degraded by heavy grazing).

It is not really possible to provide a simple table comparing loss of habitat in the Grootderm area (associated with the powerline construction) with the conservation gain associated with an offset in the Vyftienmyl se Berg, as one is not comparing like for like. However, the ratios of habitat loss to habitat gain have been outlined earlier in this report, and the proposed 930ha Vyftienmyl se Berg offset ticks all the boxes in this regard.

In conclusion, the two areas – Grootderm and Vyftienmyl se Berg – are both national and regional conservation priorities, but are very different in terms of their topography, likely threats and floristics. The Grootderm area presents a more immediate conservation priority in that it is entirely unconserved within South Africa, but it would unfortunately appear that no land portions adjacent to the RAMSAR site are currently available for a biodiversity offset consideration. It would thus appear reasonable that the 930ha Vyftienmyl se Berg option be pursued as the required biodiversity offset for this project, as the conservation of this area would be a very welcome addition to the Richtersveld National Park and the overall SA conservation estate. Both SANParks and DTEC should in any event actively pursue expansion of the conservation areas in this semi-arid global plant hotspot.

## 5. ASSESSMENT OF THE TWO BIODIVERSITY OFFSET ALTERNATIVES

As noted in the previous section it is not really possible to directly compare the two offset alternatives from a botanical perspective, as they are biologically very different areas, and one is thus not comparing “apples with apples”, but rather “apples with oranges”. Comparisons that could be made include contribution to threatened habitat types, contribution to achievement of habitat conservation targets, and contribution to protection of total plant Species of Conservation Concern. Table 1 is an attempt to do so.

	<b>Grootderm/RAMSAR</b>	<b>Vyftienmyl se Berg</b>
<b>Total Area of Offset</b>	Unknown, possibly 500-1000ha	930ha
<b>Level of threat to habitat in offset area</b>	High	Low
<b>Presence of threatened vegetation types</b>	None	None
<b>Contribution to achievement of habitat conservation targets</b>	10-20% of Western Gariep Plains Desert target	95% of Vyftienmyl se Berg Succulent Shrubland target
<b>Total number of plant Species of Conservation Concern</b>	21	18
<b>Likelihood of implementation of offset</b>	Low	High

**Table 1:** Basic comparison of the proposed offsets

Summarising this table one thus finds that the RAMSAR/Grootderm offset area would thus potentially support slightly more plant Species of Conservation Concern, has a higher level of threat, but would contribute a lower proportion to reaching the national conservation target for the relevant vegetation type, and is less likely to be implemented.

The RAMSAR/Grootderm offset area would be more appropriate in terms of protecting threatened species and threatened habitat, particularly as the primary impact area (the trigger area) is within habitat types that occur only in the proposed RAMSAR/Grootderm offset area and do not occur in the Vyftienmyl se Berg area. Its primary downside is that no land is currently available for conservation purchase in this area, and thus an offset in this area is unlikely to be implemented. It thus comes down to a tradeoff between practicality, achievability and scientific and conservation value.

<b>Overall Botanical Impact of Powerline in Oranjemund – Gromis section</b>	<b>With 500-1000ha RAMSAR/Grootderm offset</b>	<b>With 930ha Vyftienmyl se Berg offset</b>
Before Mitigation	Medium to High -ve	Medium to High -ve
After Mitigation	Low to Medium -ve	Medium -ve

**Table 2:** Comparison of the two offset proposals in terms of the botanical impact of the new powerline (Oranjemund – Gromis section only).

## 6. CONCLUSIONS AND RECOMMENDATIONS

- The ideal offset scenario would be to conserve a minimum of 500ha of largely natural habitat within the vicinity of the Oranjemund substation (Grootderm farm), but due to outstanding land claims this would not appear to be feasible in the near future.
- Given the non-feasibility of an offset in the Grootderm area another location for the offset needs to be secured, and the proposed 930ha eastern portion of Vyftienmyl se Berg is a good alternative, in that it is a recognized local and regional plant conservation priority, with a high diversity of rare and localized plant species. The only issues are that it is a different vegetation type to that impacted by the powerline, and it has a much lower degree of threat.
- Given that both proposed offsets would lower the overall botanical impact of the powerline in the Oranjemund – Gromis section from an inadvisable Medium to High negative, to an acceptable Medium negative (Vyftienmyl se Berg option) or Low to Medium negative (Grootderm option) either of the offsets is acceptable from an impact assessment perspective.
- As an offset is a key requirement in terms of mitigation for the approved project the most feasible offset should thus be implemented as soon as possible, and in this instance this means the Vyftienmyl se Berg offset.

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