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**TECHNICAL SPECIFICATION UPGRADES TO THE  
MODDERFONTEIN WIND ENERGY FACILITY,  
LOCATED IN THE BEAUFORT WEST REDZ - PART 2  
AMENDMENT APPLICATION.**

Compiled for: Terramanzi Environmental Consulting, Noordhoek

Client: South Africa Renewable Green Energy (Pty) Ltd.

17 June 2021

## 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

**The author believes that the information presented in this report complies with the PROTOCOL FOR THE SPECIALIST ASSESSMENT AND MINIMUM REPORT CONTENT REQUIREMENTS FOR ENVIRONMENTAL IMPACTS ON TERRESTRIAL PLANT AND FAUNAL SPECIES (Government Gazette No. 43855 of 30 October 2020).**

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University of Cape Town, South Africa. BSc (Honours) – Botany (Ecology & Systematics). 1990.

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 Succulent Karoo and Fynbos Biomes. Since the end of 2001 I have been the Sole Proprietor of Nick Helme Botanical Surveys.

A selection of previous work:

- Botanical assessment of proposed cultivation areas near Clanwilliam (Aurecon & DWS 2019)

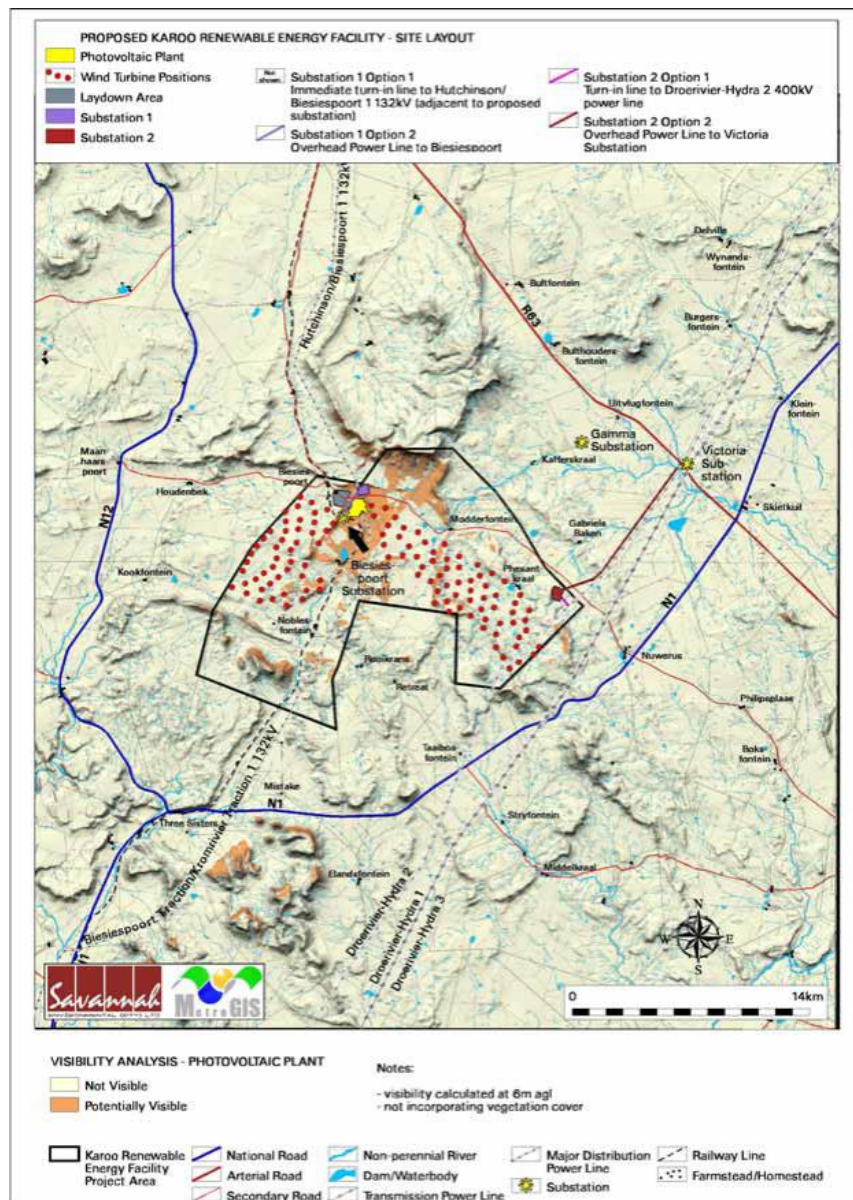
- Botanical assessment of infrastructure on Klipopmekaar farm, northern Cederberg (NaturaLibra 2019)
- Botanical assessment of Portion 15 of Bottelfontein 11, Redelinghuys (Cederberg Environmental 2018)
- Botanical assessment of Rietvlei, Koue Bokkeveld (Footprint Environmental 2018)
- Botanical assessment of Sebulon farm, Redelinghuys (Footprint Environmental 2018)
- Botanical assessment of Draaihoek farm, Leipoldtville (Footprint Environmental 2018)
- Botanical baseline assessment of Droogerivier farm, Leipoldtville (Footprint Environmental 2018)
- Botanical assessment of proposed new cultivation on farm Wittewater 93, Piketberg (Cederberg Environmental Assessment Practise 2017)
- 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 Remainder of Farm Rietfontein 244, Piketberg (Cederberg Environmental Assessment Practise 2014)
- Botanical Assessment of farm Draaihoek 293, Vredendal (Cederberg Environmental Assessment Practise 2013)
- Botanical Assessment of farm Gideonsoord 303, Klawer (Cederberg Environmental Assessment Practise 2013)
- Botanical assessment of proposed agricultural expansion on Remainder of Farm Chilton 160, Piketberg (Cederberg Environmental Assessment Practise 2013)
- Botanical assessment of proposed new N7 alignment near Clanwilliam (CCA Environmental 2013)
- Scoping study of proposed Paleisheuwel Solar PV facility, near Leipoldtville (Sharples Environmental 2012)
- Botanical assessment of a portion of Sandrug farm, Leipoldtville (Footprint Environmental 2010)

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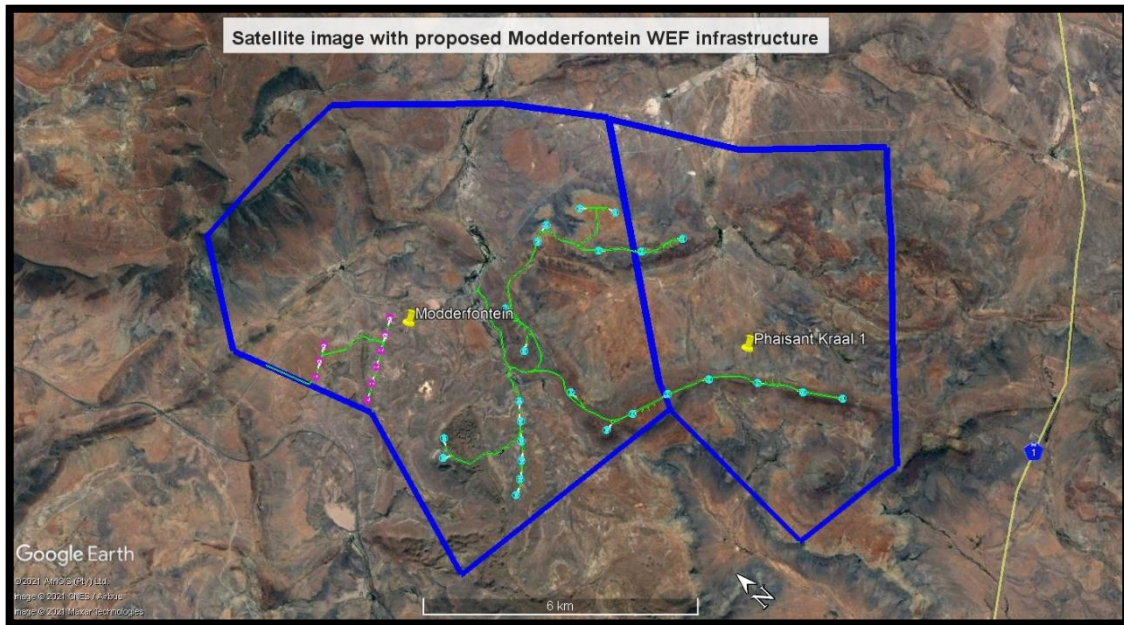
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## 1. INTRODUCTION

This terrestrial ecology (plant and terrestrial fauna) assessment report was commissioned to inform the Part 2 Amendment Application for the establishment of the Modderfontein Wind Energy Facility (WEF) northeast of Beaufort West. A layout with up to 67 turbines, each of up to 3MW, was approved in 2012 (Figure 1), and the current amendment application seeks to reduce the number of turbines to 34, by means of using bigger machines each of up to 5.6MW. The new turbines would be sited in two clusters, one of 50.4MW (Cluster 2), and one of 140MW (Cluster 1; see Figure 2). The original terrestrial ecology assessment for the site was undertaken in 2011 (Hoare 2011).



**Figure 1:** Map showing the authorised layout, with 67 turbines (from 2011 report). Note that the current study area is only the area east of the Biesiespoort Substation, and does not include the Noblesfontein component (part of which is already built).



**Figure 2:** Satellite image showing the new proposed 34 turbine (pink and blue circles) and road (green lines) positions as assessed for this Part 2 Amendment Application.

## 2. TERMS OF REFERENCE

The terms of reference for this study were as follows:

- peruse the 2011 specialist ecological report for the approved development
- provide a brief updated desktop overview of the terrestrial ecology of the project area
- provide a map of the terrestrial ecological conservation significance (sensitivity) of the project area
- identify the likely terrestrial ecology impacts of the proposed project
- assess the significance of the terrestrial ecological impacts of the proposed 34 turbine project and compare it with those of the approved 67 turbine layout
- provide a professional statement on whether the proposed Amendment will have a greater, lesser or similar impact to the approved layout in terms of terrestrial ecology
- provide feasible and reasonable mitigation recommendations to avoid or minimise the terrestrial ecological impacts of the proposed development.

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

No site visit was undertaken for this desktop report, and information on the site is drawn purely from Hoare (2011) and from available Google Earth imagery.

The presence and distribution of plant Species of Conservation Concern is a fairly good indicator of the relative conservation value of habitats at a national scale, and a habitat that supports any such species should be treated as sensitive, applying the precautionary principle.

The confidence levels in the ecological findings are considered to be only moderate (and thus suboptimal), as they are not based on direct personal experience of the site and its flora and fauna. This assessment does not include bats or birds, as these are covered by separate specialist assessments.

The author was able to reference the Cape Rares GIS layers of the CREW (Custodians of Rare and Endangered Wildflowers) project of SANBI (SA National Biodiversity Institute), online biodiversity data on inaturalist.org, and various specialist reports for the region.

Google Earth imagery dated April 2019 (and earlier) was used as a base image for the conservation value mapping.

The only copy of the authorised development layout that I was provided with is shown in Figure 1, and Figure 2 shows the proposed new turbine and road layout. The roads are assumed to be up to 21m wide, with occasional 120m long turning bays, and the cabling is assumed to run underground, either within or next to the roads.

Standard Impact Assessment criteria and ratings were used.

## **4. THE VEGETATION**

### **4.1 Regional Context**

The study area lies within the Nama Karoo biome and the Upper Karoo bioregion (Mucina & Rutherford 2006) and is outside the Greater Cape Floristic Region (GCFR). The Nama Karoo is a large biome (19% of the country) but is relatively species poor (although the total figure is unknown), and has very few local few endemics and no centres of endemism (Mucina & Rutherford 2006). Because the entire biome is semi-arid, with

unpredictable rainfall and almost no surface water, agriculture is limited to extensive stock farming (mostly sheep), with very limited irrigated agriculture (using groundwater), and this means that habitat transformation and loss has been low – much lower than for most other biomes, but overgrazing is a problem in at least 60% of the area (Mucina & Rutherford 2006).

The latest conservation planning products for the area (not shown in Hoare 2011; Oosthuysen & Holness 2017) indicate that the study area is classified as an ESA (Ecological Support Area) and ONA (Other Natural Area), a relatively low conservation rating (Figure 4). No higher level Critical Biodiversity Areas (CBAs) are mapped within the study area. Activities that do not impinge on ecological functioning and water quality are permissible within ESAs and ONAs (Holmes *et al* 2012).



**Figure 3:** Conservation planning map for the area, showing original proposed turbine and road layout, and that no CBAs are mapped in the study area. All areas are mapped as lower level ONAs (Other Natural Areas) or ESAs (slightly higher level). The provincial boundary separates the two properties and accounts for the different colouring.

The vegetation in the study area has been mapped for the vegetation map of South Africa (Mucina & Rutherford 2006 and online updates) as **Eastern Upper Karoo, Upper Karoo Hardeveld** and **Southern Karoo Riviere**. All of these units have been gazetted as a **Least Threatened** vegetation types on a national basis (DEA 2011), and this classification was supported by Skowno *et al* (2019).



Although not threatened the units are poorly conserved, with less than 5% of their total areas formally conserved.

Essentially all the koppies, tabletops and higher lying areas are classed as **Upper Karoo Hardeveld**, whilst the valleys and lower slopes are **Eastern Upper Karoo**, with the main river valleys being **Southern Karoo Riviere**. Upper Karoo Hardeveld tends to be richer in species than the other two units, with a greater chance of more localised species, mainly due to greater habitat diversity, including rocky outcrops and cliffs. All the proposed turbines and most of the road infrastructure in the amended layout are located within **Upper Karoo Hardeveld**.

#### 4.2 Plant Species of Conservation Concern

No plant Species of Conservation Concern<sup>1</sup> (previously known as Red Data or Red Listed species; Raimondo *et al* 2009) were confirmed by Hoare from within the study area (Hoare 2011), and the likelihood of any occurring within the study area is deemed to be low.

Many legally protected species are present in the project area, and in fact as many as 30% of all plants in the area may be legally protected (Provincial Gazette for Northern Cape 2012, and CapeNature Ordinance 2000). This means that any disturbance or loss of these species requires the relevant permit from DENC or CapeNature.

### 5. BOTANICAL SENSITIVITY

Botanical sensitivity is a product of regional and local habitat rarity, presence of plant species of conservation concern, diversity of indigenous plant species, presence of wetlands, presence of soil type interfaces, degree of habitat disturbance, and if disturbed, the rehabilitation potential.

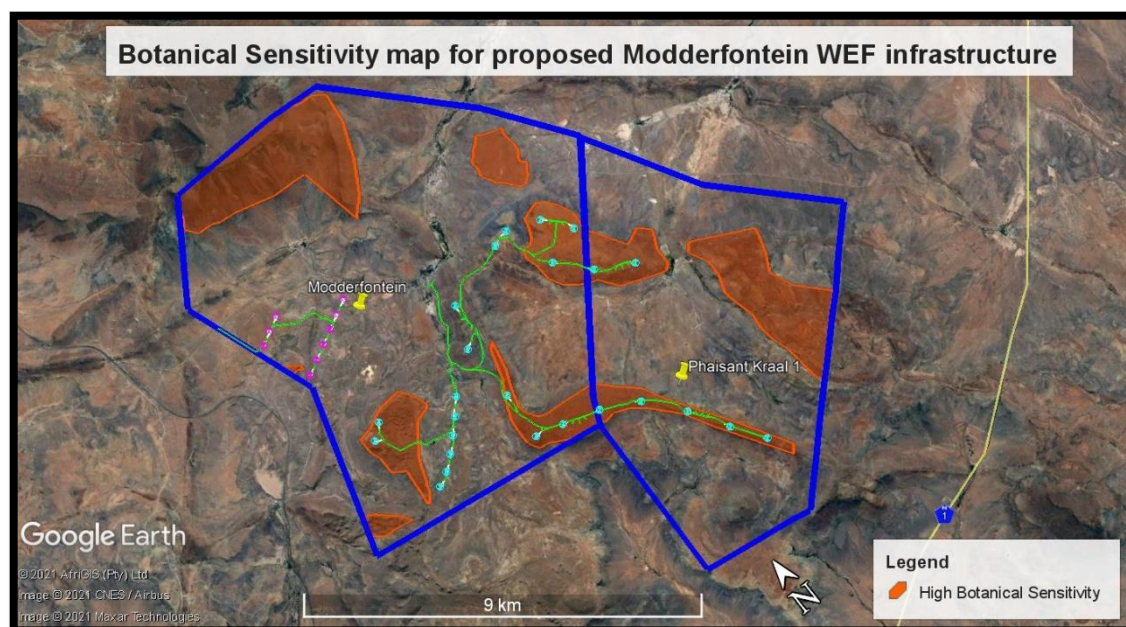
Figure 4 is a desktop based map of the botanical sensitivity in the study area. As no site survey was undertaken it should be note that the accuracy of this sensitivity mapping is relatively low, and is not informed by accurate observations of plant species on the ground, but is rather a habitat based approach. Dolerite outcrops are known to be hotspots of plant and animal diversity in this landscape

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<sup>1</sup> The Red List of South African Plants (Raimondo *et al* 2009) has assessed all plant species in South Africa, and all indigenous species are now technically Red Listed or Red Data Book species, and thus it is preferable to use the term Species of Conservation Concern to refer to species that are listed as either Threatened or Rare

(pers. obs.; Hoare 2011), and the mapping is based largely on the imagery, with dolerite outcrops standing out in terms of colour (red clays vs the grey clays derived from shales) and topography. Most of the rarer and more localised plant species in the area are likely to be succulents, and these tend to prefer rocky outcrops, as they are more stable.

About 25% of the site is assessed as being of High sensitivity, and this area includes most of the dolerite ridges and plateaus. Eight of the 25 proposed turbines in the amended layout occur within areas of High botanical sensitivity, whilst an estimated 20 of the 67 authorised turbine positions are estimated to have been located in High sensitivity areas.



**Figure 4:** Botanical Sensitivity map of the study area, with proposed infrastructure superimposed. Unshaded areas within the study areas are of Medium botanical sensitivity.

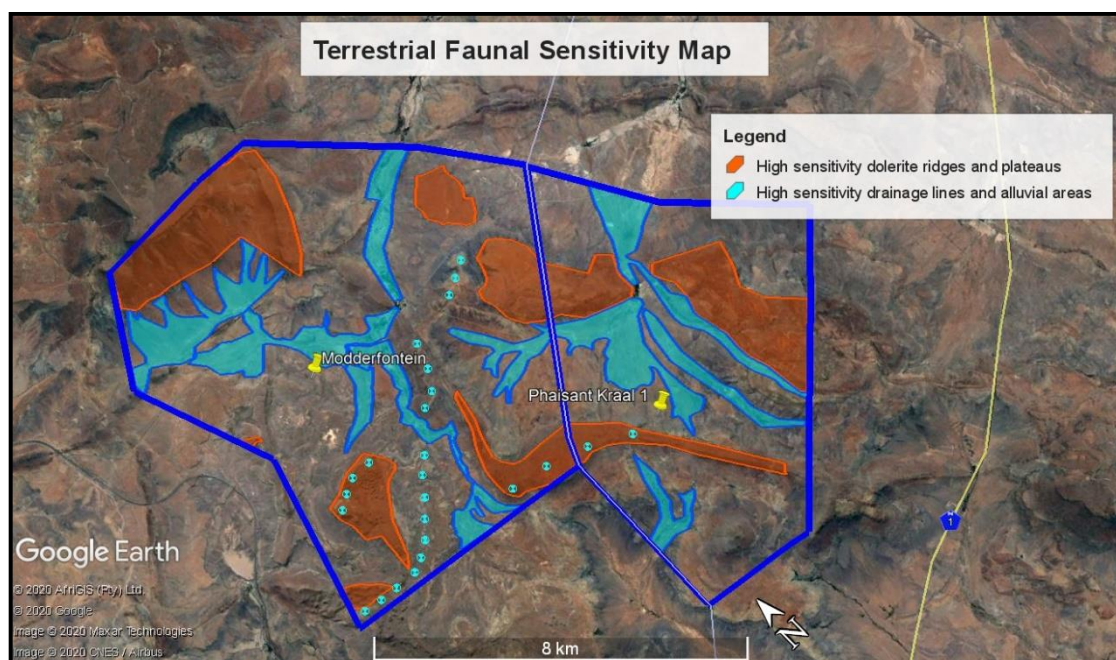
## 6. TERRESTRIAL FAUNAL SENSITIVITY

Key terrestrial faunal species potentially in the area include various reptiles and the Riverine Rabbit (*Bunolagus monticularis*; Critically Endangered), which has been confirmed from within 10km of this site, and is certainly the most threatened of any of the potential faunal species in the area. Riverine Rabbits require alluvial areas with soft soils and scattered vegetation.

Hoare (2011) noted that Namaqua Plated Lizard could occur in the area and that it was listed as Near Threatened, but the species has subsequently been listed a Least Concern (Bates *et al* 2014). Other localised reptiles potentially in the area (in rocky outcrops) are the Nuweveld Crag Lizard (*Pseudocordylus microlepidotus ssp namaquensis*) and Cloete's Crag Lizard (*Cordylus cloetei*), but both are also listed as Least Concern (Bates *et al* 2014).

Braack's Pygmy Gecko (*Goggia braacki*) is also a very local endemic in this area, inhabiting dolerite outcrops, and is Redlisted as Near Threatened (Bates *et al* 2014). This species has been recorded within the Karoo National Park, some 80km to the southwest. The Karoo Dwarf Tortoise (*Homopus boulengeri*) is also listed as Near Threatened and is likely to occur in low numbers throughout the study area.

No threatened butterflies (Mecenero *et al* 2013) or amphibians (Measey 2011) are likely to occur in significant numbers within the project footprints.



**Figure 5:** Terrestrial Faunal Sensitivity map of the study area. Unshaded areas within the study areas are generally of Medium faunal sensitivity. Blue dots are the proposed turbine positions in the amended layout.

The terrestrial faunal sensitivity map combines the preferred riverine and alluvial habitat for Riverine Rabbits with rocky outcrops and ridges (preferred habitat for many reptiles, and roosting sites for bats) and is shown in Figure 5. No turbines

are proposed within the more sensitive alluvial areas, but about 1.5km of this habitat is traversed by proposed roads.

Fifteen of the proposed turbines in the amended layout are found within the rocky hill area, which would be the preferred habitat for various lizards, geckos and snakes.

## **7. LIKELY TERRESTRIAL FAUNAL AND BOTANICAL IMPACTS**

In terms of the construction of the proposed infrastructure on this site the following potentially negative ecological issues have been identified:

- Direct, permanent loss of the existing natural vegetation and animal habitat during the construction phase (cable trenches, turbine footprints, roads). Temporary direct impacts will also arise at the construction phase.
- Possible construction phase impact on certain less mobile terrestrial animal species (cable trenches, turbine footprints, roads).
- Indirect, permanent ecological impacts at the operational phase. The main negative impact is likely to be a degree of habitat fragmentation and loss of the current ecological connectivity across the site, with secondary issues likely to be the introduction or facilitated spread of various invasive alien plant species.

No significant positive direct ecological impacts are expected to be associated with this project.

## **8. IMPACT ASSESSMENT**

Table 1 summarises the likely significance of the botanical and faunal impacts of the two projects – the authorised project and the amended layout. It is evident from this table that there appears to be no difference between the two, but this is a function of the coarse scales used in impact assessment, and obviously a 34 turbine layout will have an approximately 50% smaller overall footprint than a 67 turbine layout, and thus the amended layout is likely to have a lower botanical and faunal impact than the authorised layout overall. The amended layout still has a significant negative botanical impact, which cannot be mitigated to a level below Medium negative. Expected impacts on two threatened reptile species are also likely to be Medium negative for both development alternatives, but these were not discussed by Hoare (2011) as the SA reptile Redlist was only published in 2014. All impact levels noted are assumed to include all mitigation as outlined in Hoare (2011).

Impact	Turbines		Access roads and underground cabling	
	Authorised layout	Amended layout	Authorised layout	Amended layout
Vegetation	Medium	Medium	Medium	Medium
Threatened Fauna (2 reptile species; <i>Goggia braackii</i> and <i>Homopus boulengeri</i> )	Medium	Medium	Medium	Medium
Threatened Fauna (Riverine Rabbit)	Zero	Zero	Zero	Zero
Wetlands	Zero	Zero	Medium	Medium
Alien Invasive Plants	Low	Low	Low	Low

**Table 1:** Summary of the significance of the botanical and faunal impacts (after mitigation) for the authorised layout and for the amendment application. Impact significance for the authorised layout is taken from Table 4 in Hoare (2011), with the exception of the two threatened reptiles, which were not discussed in Hoare (2011).

## 9. CONCLUSIONS AND RECOMMENDATIONS

- The study area is currently mapped as an Ecological Support Area (ESA) and Other Natural Area (ONA) in terms of the Western and Northern Cape Spatial Biodiversity Plans. No Critical Biodiversity Areas (CBAs) are mapped from within the project area.
- No plant Species of Conservation Concern were recorded in the study area by Hoare (2011).
- The Critically Endangered Riverine Rabbit is not likely to be significantly impacted by the proposed project (with only about 1.5km of new roads through the preferred habitat), although it is likely to occur in the project area.
- Two Near Threatened reptiles (Braack's Pygmy Gecko and Karoo Dwarf Tortoise) are likely to occur in the study area and may be impacted by the proposed turbines, roads and cabling. The former is largely restricted to rocky outcrops while the latter is more wide ranging.
- The amended proposal will have an approximately 50% smaller overall footprint than the approved layout, and thus the amended layout is likely to have a lower botanical and faunal impact than the authorised layout

overall, but the amended layout still has a significant negative botanical impact, which cannot be mitigated to a level below Medium negative.

- All mitigation and EMP requirements outlined in Hoare (2011) should also be required for the amended layout, if authorised.
- Additional mitigation required is as follows:
  - During construction all cable trenches should be closed up as soon as possible, and the ECO must survey all open trenches three times a day and remove any animals that have fallen into these trenches.
  - Roads, turning areas and cable trenches must avoid all rocky outcrops, and where this is not possible impact on outcrops must be minimised.
  - All turbine, cable and road construction through rocky areas should be preceded and accompanied by surveys for all fauna, and especially of relatively slow moving species such as tortoise and geckos, and these should be immediately translocated to similar habitat out of harms way.

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