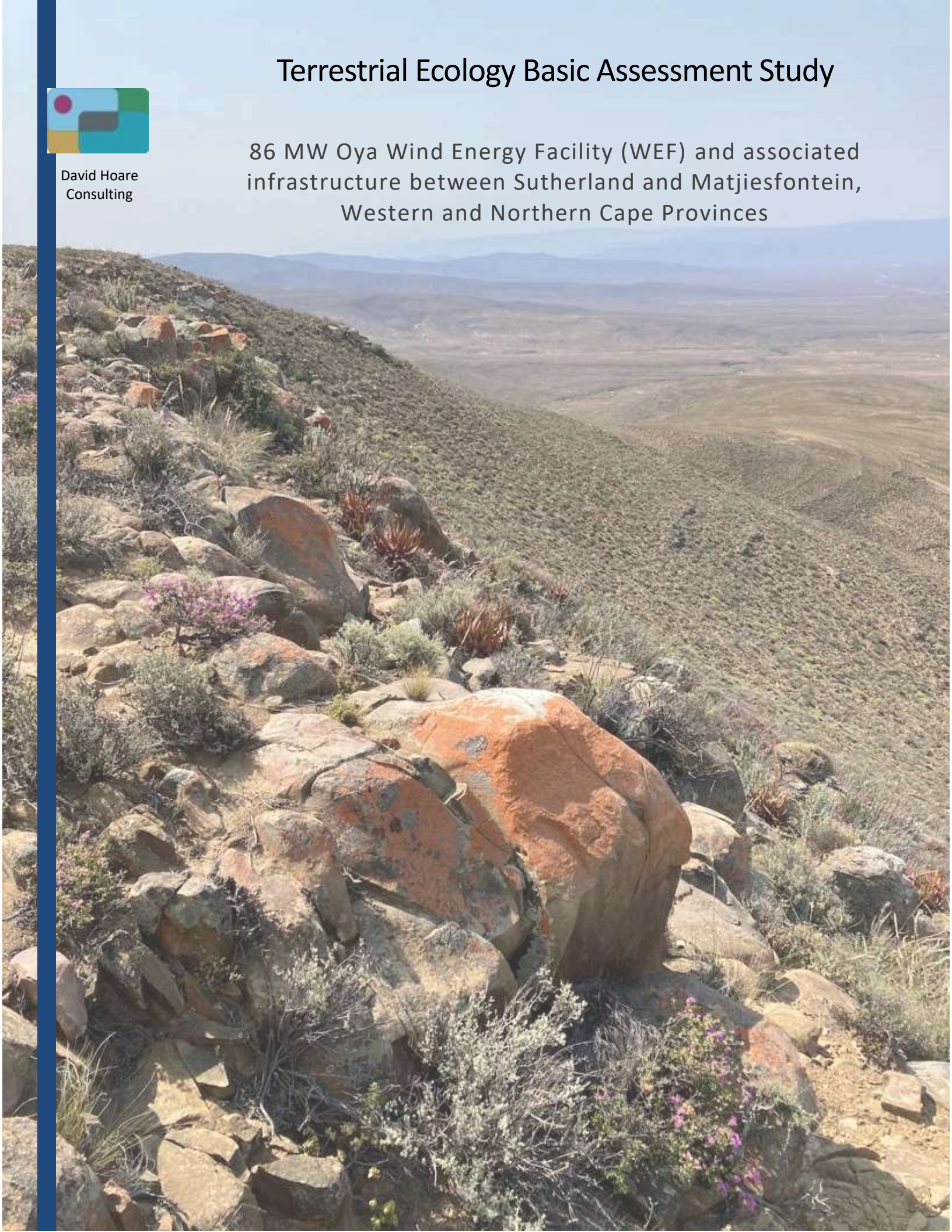
Terrestrial Ecology Basic Assessment Study

David Hoare Consulting

86 MW Oya Wind Energy Facility (WEF) and associated infrastructure between Sutherland and Matjiesfontein, Western and Northern Cape Provinces



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Terrestrial Ecology Walk Down Verification for the proposed 86 MW Oya Wind Energy Facility between Sutherland and Matjiesfontein in the Western and Northern Cape Provinces.

Location:
Witzenberg Local Municipality within the Cape Winelands District Municipality

Prepared for

Oya Energy (Pty) Ltd
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TERMS OF REFERENCE

This verification report includes the following:

- A detailed walk down survey of the proposed infrastructure associated with the Oya WEF in relation to ecological sensitivities previously identified by Ekotrust (October 2018). Turbine positions, internal road and cable crossings, substation inverters and/or transformer sites and connection routes to the distribution / transmission network (as provided by the proponent and depicted as per Figure 1 and 2) were investigated on foot to confirm the occurrence of sensitive species and/or habitats.
- The findings of the detailed walk-through, identifying any potential areas of concern / fatal flaws and/or sensitive / "no-go" areas.
- Recommend whether any buffer zones will be required, along with the extent of these buffer zones.
- Recommend whether any approvals and/or permits are required from the relevant authorities.
- Recommend whether any changes to the proposed layout are required, due to the presence of sensitive / "no-go" areas.
- The identification of changes or additions to mitigation measures required to avoid, manage or mitigate the impacts associated with the proposed project and an indication of any additional mitigation measures / recommendations for inclusion in the EMPr or specific conditions to be included in the Amended EA (should this be granted by the DEFF).
- A reasoned opinion as to whether the proposed layout for the authorised Oya WEF should be approved by the DEFF as part of the Amended EA.

LIMITATIONS, ASSUMPTIONS & UNCERTAINTIES

The following assumptions, limitations, uncertainties are listed regarding the wal down survey of the Oya Wind Energy Facility:

- The season of field survey was in spring, following a winter of good rains. The site is within a winter rainfall area with maximum vegetation growth taking place in late winter to early spring. The season of survey was therefore good for undertaking the walk down survey.
- Rare and threatened plant and animal species are, by their nature, usually very difficult to locate and can be easily missed.
- The study excludes Bats, Avifauna, Aquatic Ecology and Invertebrates as covered under other specialist assessments bar invertebrates.

1. INTRODUCTION

1.1 Background

David Hoare Consulting (Pty) Ltd was appointed to conduct a specialist terrestrial ecology 'site walkdown' micro-sighting to comply with Condition 29 of the Environmental Authorization[1], as well as part of the Environmental Authorisation Part 2 Amendment process in order to split the authorised Kudusberg Wind Energy Facility (WEF) into two separate WEF projects, namely the Kudusberg WEF and the Oya WEF. The focus of this report is specifically on the outcome of the Oya WEF site walkdown (infrastructure shown in Figure 1).

A terrestrial ecological assessment for the authorised Kudusberg WEF was undertaken in 2018 by Ekotrust cc , at which time sensitive ecological receptors were identified and a sensitivity map was produced. Areas designated as having HIGH sensitivity included "*Rivers and streams*" and "*Midslopes*". Areas designated as "No-go" zones were "*Cliff and rocky sheets*". The report also indicated that a key botanical issue was the lack of background information to compile a checklist of SCC.

The data contained in the abovementioned report was utilised to supplement the observations made during the site walkdown undertaken in October 2020, to identify any areas of potential concern, increased sensitivity including potential 'no-go' areas, ascertain the necessity for approvals and/or permits required and to determine whether the layout for the northern section of the authorised WEF (also referred to as the Oya WEF) which is being proposed as part

Figure 1: Layout of project

[1] The final placement of turbines must follow a micro siting procedure involving a walk-through and identification of any sensitive areas by ecological, avifaunal, bat, surface water and heritage specialists.

of the amendment can be approved by the Department of Environment, Forestry and Fisheries (DEFF) or whether any changes are required to the proposed layout (due to presence of sensitive / "no-go" areas and/ or any other special features). It is a further aim of this study to ascertain whether the amended layout will result in additional potential impacts and whether there is a requirement for additional mitigation measures to be implemented by the proponent.

1.2 Project description

Kudusberg Wind Farm (Pty) Ltd (hereafter referred to as "Kudusberg Wind Farm") was issued with an Environmental Authorisation (EA) for the proposed construction of the 325 MW Kudusberg Wind Energy Facility (WEF) and associated infrastructure, between Matjiesfontein and Sutherland in the Western and Northern Cape Provinces. The EA was granted on 25 March 2019 (DEFF Reference No.: 14/12/16/3/3/1/1976 and subsequently amended on 04 April 2019 to correct a minor naming error (14/12/16/3/3/1/1976/AM1). Kudusberg Wind Farm is now proposing to submit a Part 2 EA Amendment Application to split the authorised Kudusberg WEF (14/12/16/3/3/1/1976/AM1) into two (2) separate smaller WEF projects, namely the Kudusberg WEF and Oya WEF, which will result in a number of technical and administrative changes. The split is being proposed to allow the projects to be suitable for numerous opportunities such as either the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP), Risk Mitigation Independent Power Producer Procurement Programme (RMIPPPP), other government run procurement programmes that may arise or for sale to private entities, if enabled and/or required in the drive for energy security in South Africa. Following the split, the northern section of the authorised WEF will become the Oya WEF, while the southern section of the authorised WEF will remain known as the Kudusberg WEF (authorised under 14/12/16/3/3/1/1976/AM1). In addition to the split, the final layout for the Oya WEF is being submitted which has been informed by detailed specialist walk-throughs and on-site micro-siting as per condition 29 of the Kudusberg EA. Furthermore, the approved EMPr authorised as part of the Kudusberg EA is being amended to each WEF and to incorporate the final layout for the Oya WEF, management plans and the walk-throughs.

Figure 2: Location of infrastructure relative to areas of Very high and High sensitivity (Ekotrust 2018).

The proposed Oya WEF is located largely on the higher-lying Oliviersberg and Koedoesberg Mountains between Matjiesfontein and Sutherland. The proposed wind turbines are to be placed on mountain ridges that are mostly east-west orientated. The regional vegetation on the summit of these ridges is Central Mountain Shale Renosterveld, whereas the midslopes and lower-lying areas are within Koedoesberge-Moordenaars Karoo.

2. APPROACH & METHODOLOGY

The site walk down was undertaken in October 2020 (12 October to 24 October). The entire footprint of all infrastructure was walked on foot. Photographs were taken at regular intervals, and included, as a minimum, the location of all proposed turbine positions. Plant species checklists were compiled at the proposed location of each turbine position, and any plant species of interest anywhere else within infrastructure was also recorded. Particular attention was paid to recording the locations of any protected species seen on site. The protected species list includes a large number of common and widespread species, so only an indication of the overall distribution of these was recorded as it was not possible to record the location of every plant. Attention was paid to the location of any habitat identified during the EIA as being of high or very high sensitivity.

3. RESULTS OF SITE WALK DOWN

In the section below, general habitat photographs and plant species checklists are provided for each turbine site. Similar descriptions are provided for other key sections of infrastructure (roads, construction site and collector system).

The primary sensitivity is related to plant species (protected and SCC). Much effort was therefore put into locating any possible plant species of concern, as well as documenting floristic composition at key locations.

3.1 Turbine 1 location

Figure 3: Panoramic view and Google Earth image of landscape at Turbine 1.

Plant species*	*Aizoon cymosum, Aizoon africanum, Caroxylon aphyllum, Chrysocoma ciliata, Cotyledon papillaris, Crassula deltoidea, Crassula nudicaulis, Crassula subaphylla, Dimorphotheca species, Eriocephalus ericoides (D), Euphorbia mauritanica, Euphorbia rhombifolia, Euryops lateriflorus (D), Felicia filifolia, Indigofera meyeriana, Lycium cinereum, Manochlamys albicans,* ***Mesembryanthemum guerichianum****,* ***Mesembryanthemum nitidum****,* ***Mesembryanthemum noctiflorum****,* ***Ruschia intricata (D)****,* ***Moraea flaccida****,* ***Octopoma species****, Pentzia incana, Pteronia empetrifolia (D), Pteronia incana (D), Roepera species, Tylecodon wallichii*

*Plant species listed in bold are protected according to the Cape Nature and Environmental Conservation Ordinance 19 of 1974. Species in red are of conservation concern.

Synopsis:

One species found within the laydown area has been tentatively identified as *Octopoma*, a genus for which all three currently recognised species are listed as Vulnerable. A more detailed assessment of this species is given on the next page. No additional habitat sensitivites identified within turbine or laydown area footprint.

A plant photographed within the laydown area has been tentatively identified as *Octopoma* species. The SANBI Plants of South Africa online database (http://newposa.sanbi.org/) gives a current list of three recognised species of *Octopoma*, which matches a recent taxonomic review of the genus (Powell et al. 2016) in which these three species are described. All three are listed as Vulnerable (http://redlist.sanbi.org/genus.php?genus=104). The taxonomic consensus is therefore that if the plant observed on site is within this genus then it is listed as Vulnerable, and most probably *Octopoma quadrisepalum*.

Figure 4: Octopoma quadrisepalum (preliminary identity), listed as Vulnerable, seen close to Turbine 1.

3.2 Turbine 2 location

Figure 5: Panoramic view and Google Earth image of landscape at Turbine 2.

Plant species*	*Aizoon africanum, Albuca species, Asparagus capensis, Bulbine triebneri, Chrysocoma ciliata, Crassula muscosa, Ehrharta calycina, Eriocephalus ericoides (D), Eriocephalus punctulatus, Euphorbia mauritanica, Felicia muricata, Gorteria alienata (D), Hermannia species,* ***Lampranthus species, Leipoldtia schultzei****, Monsonia crassicaulis,* ***Ruschia intricata (D)****, Pentzia incana, Pharnaceum aurantium, Pteronia glauca (D), Roepera species, Searsia glauca, Selago species, Tylecodon paniculatus, Tylecodon reticulatus*

*Plant species listed in bold are protected according to the Cape Nature and Environmental Conservation Ordinance 19 of 1974.

Synopsis:
No habitat or plant species sensitivites identified within turbine or laydown area footprint.

3.3 Turbine 3 location

Figure 6: Panoramic view and Google Earth image of landscape at Turbine 3.

Plant species*	*Aizoon africanum, Albuca species,* ***Antimima hallii****, Bulbine species, Crassula deltoidea, Crassula rupestris, Crassula subaphylla, Dimorphotheca species, Ehrharta calycina, Eriocephalus africanus (D), Euphorbia loricata, Euphorbia mauritanica, Euphorbia rhombifolia, Felicia species, Gorteria alienata (D),* ***Leipoldtia schultzei****, Lycium cinereum,* ***Ruschia intricata (D)****,* ***Pelargonium abrotanifolium****, Pteronia incana (D), Roepera species, Tylecodon reticulatus*

*Plant species listed in bold are protected according to the Cape Nature and Environmental Conservation Ordinance 19 of 1974.

Synopsis:

No habitat or plant species sensitivites identified within turbine or laydown area footprint.

3.4 Turbine 4 location

Figure 7: Panoramic view and Google Earth image of landscape at Turbine 4.

Plant species*	*Aizoon africanum,* ***Antimima hallii,*** *Chrysocoma ciliata,* ***Delosperma species****,* ***Drosanthemum species****, Ehrharta calycina, Elytropappus rhinocerotis (D), Euryops lateriflorus (D), Felicia filifolia,* ***Leipoldtia schultzei****, Lycium cinereum, Manochlamys albicans,* ***Moraea tripetala****, Oedera genistifolia,* ***Pelargonium abrotanifolium****, Pentzia incana, Roepera species,* ***Ruschia intricata (D)****,* ***Ruschia spinosa****, Selago species, Tenaxia stricta, Tylecodon wallichii*

*Plant species listed in bold are protected according to the Cape Nature and Environmental Conservation Ordinance 19 of 1974.

Synopsis:

No habitat or plant species sensitivites identified within turbine or laydown area footprint.

3.5 Turbine 5 location

Figure 8: Panoramic view and Google Earth image of landscape at Turbine 5.

Plant species*	***Aloe microstigma***, *Amphiglossa tomentosa,* ***Antimima hallii***, ***Cheiridopsis namaquensis***, *Chrysocoma ciliata, Crassula deltoidea, Dimorphotheca cuneata, Ehrharta calycina, Elytropappus rhinocerotis (D), Eriocephalus ericoides (D), Euphorbia multiceps, Euryops lateriflorus (D), Fabaceae species1, Gorteria alienata (D),* ***Pelargonium abrotanifolium***, ***Pelargonium crithmifolium***, ***Pelargonium luteopetalum***, *Pteronia empetrifolia (D), Pteronia incana (D),* ***Ruschia intricata (D)***, *Selago species, Tenaxia stricta, Tylecodon paniculatus*

*Plant species listed in bold are protected according to the Cape Nature and Environmental Conservation Ordinance 19 of 1974.

Synopsis:

No habitat or plant species sensitivites identified within turbine or laydown area footprint.

3.6 Turbine 6 location

Figure 9: Panoramic view and Google Earth image of landscape at Turbine 6.

Plant species*	***Antimima hallii**, Asparagus capensis, Ehrharta calycina, Eriocephalus africanus (D), Euphorbia mauritanica, Euryops lateriflorus (D), Felicia muricata, Gorteria alienata (D), **Pelargonium abrotanifolium**, Pentzia incana, Pteronia glauca (D), Pteronia glomerata (D), **Ruschia intricata (D)**, Tylecodon paniculatus, Tylecodon wallichii*

*Plant species listed in bold are protected according to the Cape Nature and Environmental Conservation Ordinance 19 of 1974.

Synopsis:
No habitat or plant species sensitivites identified within turbine or laydown area footprint.

3.7 Turbine 7 location

Figure 10: Panoramic view and Google Earth image of landscape at Turbine 7.

Plant species*	*Aizoon africanum, Asparagus capensis, Chrysocoma ciliata, Crassula barbata, Crassula deltoidea, Dianthus namaensis, Drimia physodes, Ehrharta calycina, Elytropappus rhinocerotis (D), Eriocephalus punctulatus, Euphorbia mauritanica, Fabaceae species2, Felicia filifolia, Heliophila cornuta, Manochlamys albicans,* ***Pelargonium species****, Pteronia empetrifolia (D), Pteronia glomerata (D),* ***Ruschia intricata (D)****, Selago species, Stachys rugosa, Tribolium purpureum, Tylecodon reticulatus* *Access road:* ***Antimima hallii, Aloe microstigma***

*Plant species listed in bold are protected according to the Cape Nature and Environmental Conservation Ordinance 19 of 1974.

Synopsis:
No habitat or plant species sensitivites identified within turbine or laydown area footprint.

3.8 Turbine 8 location

Figure 11: Panoramic view and Google Earth image of landscape at Turbine 8.

Plant species*	*Amphiglossa tomentosa,* ***Antimima hallii****, Chrysocoma ciliata, Crassula subaphylla, Ehrharta calycina, Eriocephalus africanus (D), Eriocephalus ericoides (D), Euryops lateriflorus (D), Fabaceae species2, Gorteria alienata (D),* ***Moraea tripetala****, Pteronia glomerata (D),* ***Ruschia intricata (D)***

*Plant species listed in bold are protected according to the Cape Nature and Environmental Conservation Ordinance 19 of 1974.

Synopsis:

No habitat or plant species sensitivites identified within turbine or laydown area footprint.

3.9 Turbine 9 location

Figure 12: Panoramic view and Google Earth image of landscape at Turbine 9.

Plant species*	*Chrysocoma ciliata, Euphorbia loricata, Felicia filifolia, Gorteria alienata (D),* ***Leipoldtia schultzei, Pelargonium species,*** *Pteronia empetrifolia (D),* ***Ruschia intricata (D)****, Selago species, Tylecodon reticulatus*

*Plant species listed in bold are protected according to the Cape Nature and Environmental Conservation Ordinance 19 of 1974.

Synopsis:
No habitat or plant species sensitivites identified within turbine or laydown area footprint.

3.10 Turbine 10 location

Figure 13: Panoramic view and Google Earth image of landscape at Turbine 10.

Plant species*	***Antimima hallii***, ***Antimima pumila***, *Chaenostoma species, Chrysocoma ciliata, Crassula subaphylla, Dimorphotheca cuneata, Ehrharta calycina, Elytropappus rhinocerotis (D), Eriocephalus ericoides (D), Euphorbia mauritanica, Euryops lateriflorus (D), Gorteria alienata (D),* ***Leipoldtia schultzei***, ***Mesembryanthemum tortuosum***, ***Moraea cuspidata***, ***Pelargonium abrotanifolium***, *Pharnaceum aurantium, Pteronia empetrifolia (D),* ***Ruschia intricata (D)***, *Selago species*

*Plant species listed in bold are protected according to the Cape Nature and Environmental Conservation Ordinance 19 of 1974.

Synopsis:

No habitat or plant species sensitivites identified within turbine or laydown area footprint.

3.11 Turbine 11 location

Figure 14: Panoramic view and Google Earth image of landscape at Turbine 11.

Plant species*	***Antimima hallii**, Asparagus capensis, Crassula deltoidea, Dianthus namaensis, Ehrharta calycina, Eriocephalus ericoides (D), Eriocephalus punctulatus, Euphorbia rhombifolia, Euryops species, Felicia muricata, Gorteria alienata (D), Lepidium africanum, **Leipoldtia schultzei**, Lycium cinereum, **Mesembryanthemum tortuosum**, **Pelargonium moniliferum**, Pentzia incana, Pteronia empetrifolia (D), Pteronia glauca (D), **Ruschia intricata (D)**, **Ruschia spinosa**, Tylecodon reticulatus*

*Plant species listed in bold are protected according to the Cape Nature and Environmental Conservation Ordinance 19 of 1974.

Synopsis:

Existing test tower at site. No habitat or plant species sensitivites identified within turbine or laydown area footprint.

3.12 Turbine 12 location

Figure 15: Panoramic view and Google Earth image of landscape at Turbine 12.

Plant species*	*Adromischus liebenbergii,* ***Antimima hallii****,* ***Cheiridopsis namaquensis****, Chrysocoma ciliata, Crassula deltoidea, Crassula subaphylla, Dianthus namaensis, Eriocephalus ericoides (D), Euryops lateriflorus (D), Fabaceae species2, Felicia filifolia, Gorteria alienata (D), Oedera genistifolia,* ***Pelargonium moniliforme****, Pteronia glauca (D),* ***Ruschia intricata (D)****,* ***Ruschia spinosa****, Tylecodon reticulatus*

*Plant species listed in bold are protected according to the Cape Nature and Environmental Conservation Ordinance 19 of 1974.

Synopsis:
No habitat or plant species sensitivites identified within turbine or laydown area footprint.

3.13 Turbine 13 location

Figure 16: Panoramic view and Google Earth image of landscape at Turbine 13.

Plant species*	***Antimima hallii**, Asparagus species, Crassula barbata, Crassula deltoidea, Dimorphotheca cuneata, Eriocephalus ericoides (D), Eriocephalus punctulatus, Euryops lateriflorus (D), Gorteria alienata (D), **Pectinaria articulata**, Pteronia glauca (D), Pteronia glomerata (D), **Ruschia intricata (D)**, **Ruschia spinosa***

*Plant species listed in bold are protected according to the Cape Nature and Environmental Conservation Ordinance 19 of 1974.

Synopsis:

No habitat or plant species sensitivites identified within turbine or laydown area footprint.

3.14 Turbine 14 location

Figure 17: Panoramic view and Google Earth image of landscape at Turbine 14.

Plant species*	*Aizoon africanum, Asparagus capensis,* ***Babiana cuneata****, Ehrharta calycina, Eriocephalus ericoides (D), Euphorbia mauritanica, Euphorbia rhombifolia, Euryops lateriflorus (D), Felicia filifolia, Felicia muricata,* ***Moraea tripetala****, Pteronia glauca (D),* ***Ruschia intricata (D)****,* ***Ruschia spinosa****, Selago species*

*Plant species listed in bold are protected according to the Cape Nature and Environmental Conservation Ordinance 19 of 1974.

Synopsis:
No habitat or plant species sensitivites identified within turbine or laydown area footprint.

3.15 Turbine 15 location

Figure 18: Panoramic view and Google Earth image of landscape at Turbine 15.

Plant species*	*Aizoon africanum, Albuca longipes,* ***Aloe microstigma****, Asparagus capensis,* ***Astroloba bullulata****,* ***Babiana cuneata****, Colchicum coloratum, Ehrharta calycina, Eriocephalus ericoides (D), Eriocephalus punctulatus, Euphorbia mauritanica, Euphorbia rhombifolia, Euryops lateriflorus (D), Fabaceae species2, Felicia filifolia, Felicia muricata, Gorteria alienata (D), Lachenalia comptonii,* ***Moraea tripetala****,* ***Oxalis pocockiae****, Pteronia glauca (D),* ***Ruschia intricata (D)****,* ***Ruschia spinosa****, Selago species, Stachys rugosa, Ursinia anthemoides*

*Plant species listed in bold are protected according to the Cape Nature and Environmental Conservation Ordinance 19 of 1974.

Synopsis:
No habitat or plant species sensitivites identified within turbine or laydown area footprint.

3.16 Turbine 16 location

Figure 19: Panoramic view and Google Earth image of landscape at Turbine 16.

Plant species*	*Aizoon africanum, Albuca longipes,* ***Aloe microstigma****, Asparagus capensis,* ***Astroloba bullulata****,* ***Babiana cuneata****, Colchicum coloratum, Ehrharta calycina, Eriocephalus ericoides (D), Eriocephalus punctulatus, Euphorbia mauritanica, Euphorbia rhombifolia, Euryops lateriflorus (D), Fabaceae species2, Felicia filifolia, Felicia muricata, Gorteria alienata (D), Lachenalia comptonii,* ***Moraea tripetala****,* ***Oxalis pocockiae****, Pteronia glauca (D),* ***Ruschia intricata (D)****,* ***Ruschia spinosa****, Selago species, Stachys rugosa, Ursinia anthemoides*

*Plant species listed in bold are protected according to the Cape Nature and Environmental Conservation Ordinance 19 of 1974.

Synopsis:
No habitat or plant species sensitivites identified within turbine or laydown area footprint.

3.17 Turbine 17 location

Figure 20: Panoramic view and Google Earth image of landscape at Turbine 17.

Plant species*	*Aizoon africanum, Albuca longipes,* ***Aloe microstigma****, Asparagus capensis,* ***Astroloba bullulata****,* ***Babiana cuneata****, Colchicum coloratum, Ehrharta calycina, Eriocephalus ericoides (D), Eriocephalus punctulatus, Euphorbia mauritanica, Euphorbia rhombifolia, Euryops lateriflorus (D), Fabaceae species2, Felicia filifolia, Felicia muricata, Gorteria alienata (D), Lachenalia comptonii,* ***Moraea tripetala****,* ***Oxalis pocockiae****, Pteronia glauca (D),* ***Ruschia intricata (D)****,* ***Ruschia spinosa****, Selago species, Stachys rugosa, Ursinia anthemoides*

*Plant species listed in bold are protected according to the Cape Nature and Environmental Conservation Ordinance 19 of 1974.

Synopsis:
No habitat or plant species sensitivites identified within turbine or laydown area footprint.

3.18 Turbine 18 location

Figure 21: Panoramic view and Google Earth image of landscape at Turbine 18.

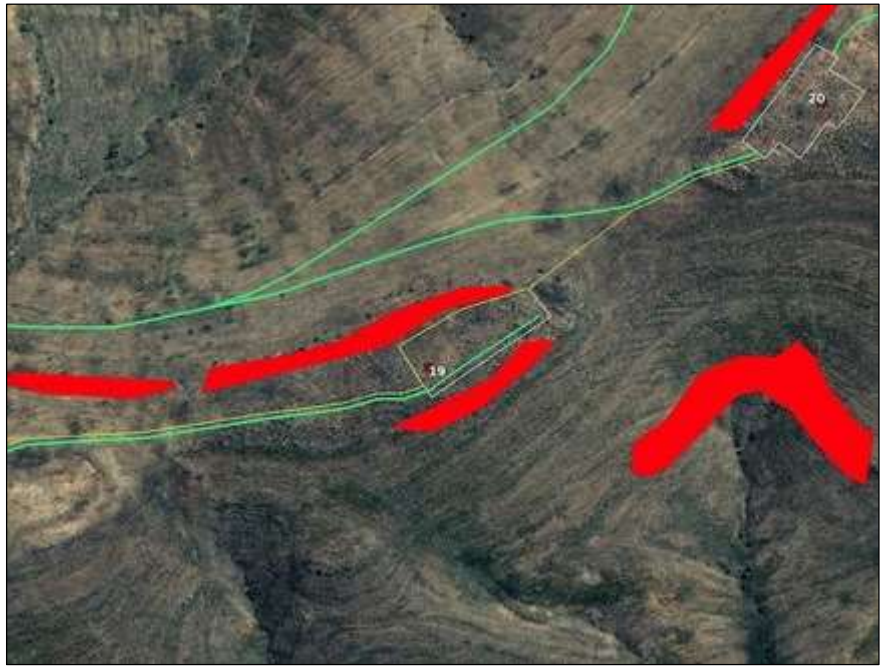
Plant species*	*Aizoon africanum, Albuca longipes,* ***Aloe microstigma****, Asparagus capensis,* ***Astroloba bullulata****,* ***Babiana cuneata****, Colchicum coloratum, Ehrharta calycina, Eriocephalus ericoides (D), Eriocephalus punctulatus, Euphorbia mauritanica, Euphorbia rhombifolia, Euryops lateriflorus (D), Fabaceae species2, Felicia filifolia, Felicia muricata, Gorteria alienata (D), Lachenalia comptonii,* ***Moraea tripetala****,* ***Oxalis pocockiae****, Pteronia glauca (D),* ***Ruschia intricata (D)****,* ***Ruschia spinosa****, Selago species, Stachys rugosa, Ursinia anthemoides*

*Plant species listed in bold are protected according to the Cape Nature and Environmental Conservation Ordinance 19 of 1974.

Synopsis:
No habitat or plant species sensitivites identified within turbine or laydown area footprint.

3.19 Turbine 19 location

Figure 22: Panoramic view and Google Earth image of landscape at Turbine 19.



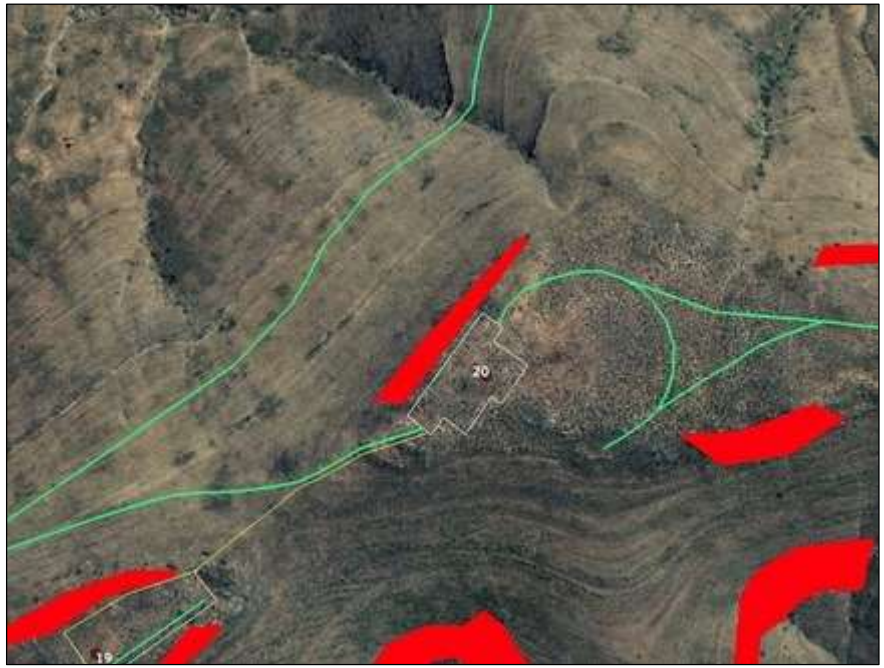
Plant species*	*Aizoon africanum, Albuca longipes,* ***Aloe microstigma****, Asparagus capensis,* ***Astroloba bullulata****,* ***Babiana cuneata****, Colchicum coloratum, Ehrharta calycina, Eriocephalus ericoides (D), Eriocephalus punctulatus, Euphorbia mauritanica, Euphorbia rhombifolia, Euryops lateriflorus (D), Fabaceae species2, Felicia filifolia, Felicia muricata, Gorteria alienata (D), Lachenalia comptonii,* ***Moraea tripetala****,* ***Oxalis pocockiae****, Pteronia glauca (D),* ***Ruschia intricata (D)****,* ***Ruschia spinosa****, Selago species, Stachys rugosa, Ursinia anthemoides*

*Plant species listed in bold are protected according to the Cape Nature and Environmental Conservation Ordinance 19 of 1974.

Synopsis:
No habitat or plant species sensitivites identified within turbine or laydown area footprint.

3.20 Turbine 20 location

Figure 23: Panoramic view and Google Earth image of landscape at Turbine 20.



Plant species*	*Aizoon africanum, Albuca longipes,* ***Aloe microstigma****, Asparagus capensis,* ***Astroloba bullulata****,* ***Babiana cuneata****, Colchicum coloratum, Ehrharta calycina, Eriocephalus ericoides (D), Eriocephalus punctulatus, Euphorbia mauritanica, Euphorbia rhombifolia, Euryops lateriflorus (D), Fabaceae species2, Felicia filifolia, Felicia muricata, Gorteria alienata (D), Lachenalia comptonii,* ***Moraea tripetala****,* ***Oxalis pocockiae****, Pteronia glauca (D),* ***Ruschia intricata (D)****,* ***Ruschia spinosa****, Selago species, Stachys rugosa, Ursinia anthemoides*

*Plant species listed in bold are protected according to the Cape Nature and Environmental Conservation Ordinance 19 of 1974.

Synopsis:
Slightly degraded from overgrazing. No habitat or plant species sensitivites identified within turbine or laydown area footprint.

3.21 Collector system



Figure 24: View of collector alignment from A (northwards), from A (southwards), and from B (eastwards).

Synopsis:

With the exception of the areas south of the ridge, and going up the ridge in two places, the collector system follows the turbine access roads, the sensitivity of which is covered in the assessment of the turbines themselves. The remaining part of the collector system includes a straight part along the flats in the south, and two rising sections. The rise from the lower-lying areas to the ridge traverses moderately steep slope in both places, otherwise there are no particular issues associated with the collector system. There is a 4x4 trail rising up the mountain in proximity to the eastern alignment, which is positive in terms of existing impacts. The southern flat part runs close to the existing gravel road.

3.22 Construction site

Figure 25: View of the construction site.

Synopsis:
The location of the construction site is perched on the lowlands bordering on an existing road. No issues were identified for the site.

3.23 Access roads

Figure 26: View from near Turbine 19 towards the north, following the alignment of the main access road.

Synopsis:

There is a main access road from the north onto the main ridge of the WEF. This follows a path from the construction site southwards up the ridge towards Turbines 19 and 20. A view from the top of the climb looking northwards is shown in Figure 25. No sensitivity issues were identified along this route alignment.

All other roads link from one turbine position to the next and these are assessed as part of the turbine positions.

7. RECOMMENDED LAYOUT CHANGES

There is a possible occurrence of a Vulnerable plant species within 40 m of Turbine 1. This plant (tentatively identified as *Octopoma quadrisepalum*), is on the Red List, as well as protected under the Cape Nature and Environmental Conservation Ordinance 19 of 1974. If the identity of this species is confirmed then it may be required that Turbine 1 is shifted a minimum of 90 m eastwards and that the crane pad is located to the east of the new position so as to avoid any direct impacts on this species. Alternatively, an application can be submitted for a permit to relocate the plant or destroy it, but there is no guarentee that the permit application would be approved.

On the basis of the original sensitivity assessment by Ekotrust (2018) as well as the detailed walk down survey undertaken here, no additional issues of ecological significance were identified within the footprint of any of the infrastructure. Therefore, no additional layout changes are recommended, except for that described for Turbine 1.

8. CONCLUSIONS

On the basis of the walk down, no sensitivities have been identified within the footprint of proposed infrastructure, except for a possible occurrence of a Red List species near to Turbine 1, the identity of which needs to be confirmed before any final recommendations are made. If the identity is confirmed as a Red List species then a shift of the Turbine 1 location 100 m to the east is recommended. No other changes are required to the proposed layout.

Of the remaining Red List plant species that were considered to have a probability of occurring on site (see list in Appendix 1), none similar to those in the Appendix were observed on site, except for four observations of *Lotononis* that have not yet been identified to species level - there is a small risk that they could be *Lotononis venosa*, listed as Vulnerable, but it is more likely that they are observations of more common species from the genus since none closely match the published description for the listed species (Van Wyk 1990).

A permit is required for the destruction of all protected species (marked in bold in the lists for each turbine position).

From an ecological point of view, on the basis that few sensitivities occur within the proposed footprint, it is recommended that the final layout is approved.

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VAN WYK, B-E. 1990. Studies in the genus Lotononis (Crotalarieae, Fabaceae). 13. Two new species and notes on the occurrence of cleistogamy in the section Leptis. Bothalia 20,1: 17-22.

10. APPENDICES:

Appendix 1: Plant species of conservation importance that were assessed as having a high probability of being found in the study area.

Taxon	Latest (IUCN version 3.1) Conservation Status**	Habitat	Flowering Time	Probability of occurrence*
Lotononis venosa FABACEAE	Vulnerable	Few known locations. Some of the habitat has been transformed for crop cultivation in the past. Further agricultural expansion and overgrazing by livestock are potential threats. Klein Roggeveld Mountains. Central Mountain Shale Renosterveld, Koedoesberge-Moordenaars Karoo. Open karroid scrub on sandy clay alluvium.	September	**HIGH,** vegetation type and habitat suitable.
Octopoma nanum / octojuge / quadrisepalum AIZOACEAE	Vulnerable	A localized habitat specialist with fewer than 10 known locations and declining due to overgrazing by livestock and game. Tanqua Karoo, Western Little Karoo, Koedoesberge-Moordenaars Karoo, Matjiesfontein Quartzite Fynbos, Tanqua Wash Riviere, Flats and gentle slopes with loamy soils and sparse quartz gravel. Previously recorded in grid as well as a number of surrounding grids that include Roggeveld plateaux, Moordenaars karoo and Cape mountains.	November	**HIGH,** Found on flats and gentle slopes with loamy soils and sparse quartz grave
Ehrharta eburnea *POACEAE*	Near Threatened	Calvinia, Sutherland and Montagu. Rocky places in mountain renosterveld.	September-November	**HIGH,** habitat and distribution matches
Geissorhiza karooica *IRIDACEAE*	Near Threatened	Roggeveld Mountains to Matjiesfontein. Succulent karoo shrubland on course shale slopes.	August-September	**HIGH,** previously recorded on nearby site
Lachenalia whitehillensis *HYACINTHACEAE*	Near Threatened	Southern Roggeveld Escarpment near Sutherland to Matjiesfontein in the southern Great Karoo. Sandy soils in riverbeds and on alluvial plains, sometimes in damp places among rocks in river beds.	October	**HIGH,** recorded on nearby project
Senecio erysimoides ASTERACEAE	Data Deficient – Taxonomically problematic	Unknown, but recorded on three occasions in similar landscapes (Roggeberg foothills) to the north of the site.	December-April	**HIGH**, habitat matches

* Conservation Status Category assessment according to IUCN Ver. 3.1 (IUCN, 2001), as evaluated by the Threatened Species Programme of the South African National Biodiversity Institute in Pretoria. *IUCN (3.1) Categories: VU = Vulnerable, EN = Endangered, CR = Critically Endangered, NT = Near Threatened.

Appendix 2: Flora protected under the Cape Nature and Environmental Conservation Ordinance 19 of 1974

SCHEDULE 3: Endangered Flora
As per the Cape Nature and Environmental Conservation Ordinance 19 of 1974

Family: APOCYNACEAE	Common name / Additional notes
Pachypodium namaquanum	Halfmens (currently listed as LC)
Family: GESNERIACEAE	
Charadrophila capensis	Cape Gloxinia (currently listed as Rare)
Family: LILIACEAE	
Aloe pillansii	Now called *Aloidendron pillansii*, currently listed as Endangered
Aloe buhrii	Currently listed as Vulnerable
Aloe erinacea	Now called *Aloe melanacantha*, currently listed as Least Concern
Family: PROTEACEAE	
Mimetes capitulates	Currently listed as Endangered
Mimetes hottentoticus	Currently listed as Critically Endangered
Mimetes stokoei	Currently listed as Critically Endangered
Orothamnus zeyheri	Currently listed as Vulnerable
Protea odorata	Currently listed as Critically Endangered
Family: STANGERIACEAE	
Stangeria eriopus	Bobbejaankos (currently listed as Vulnerable)
Family: ZAMIACEAE	
Encephalartos spp.	Cycads, all species

SCHEDULE 4: PROTECTED SPECIES
As per the Cape Nature and Environmental Conservation Ordinance 19 of 1974

Family:AMARYLLIDACEAE	**All species**
Family: APOCYNACEAE	**All species except those listed in Schedule 3**
Family: AQUIFOLIACEAE	All species
Ilex mitis	
Family: ARACEAE	
Zantedeschia elliottiana	Yellow arum lily (currently DDT)
Family: ASCLEPIADACEAE (now Apocynaceae)	**All species**
Family: BORAGICNACEAE	
Echiostachys spicatus	
Family: BRUNIACEAE	All species
Family: COMPOSITAE (now Asteraceae)	
Senecio colyphyllous (*coleophyllous*?)	
Cotula duckitteae	
Family: CRASSULACEAE	
Crassula columnaris	
Crassula perfoliata	
Crassula pyramidalis	
Kalanchoe thyrsiflora	
Rochea coccinea (now Crassula cochinea)	
Family: CUNONIACEAE	
Cunonia capensis	
Platylophus trifoliatus	

Family: DIOSCOREACEAE	
Testudinaria sylvatica (now Dioscorea sylvatica)	
Testudinaria elephantipes (now Dioscorea elephantipes)	
Family: ERICACEAE	All species
Family: EUPHORBIACEAE	
Euphorbia bupleurifolia	
Euphorbia fasciculata	
Euphorbia globosa	
Euphorbia horrida	
Euphorbia meloformis	
Euphorbia obesa	
Euphorbia schoenlandii	
Euphorbia symmetrica	
Euphorbia valida	
Family: GEISSOLOM(AT)ACEAE	All species
Family: GESNERIACEAE	
Streptocarpus	All species
Family: GRAMINAE (now Poaceae)	
Arundinaria tessellata (Thamnocalamus tessellatus)	
*Secale africanum (*now *Secale strictum* subsp. *africanum)*	
Family: GRUBBIACEAE	All species
Family: IRIDACEAE	**All species**
Family: LEGUMINOSAE (now Fabaceae)	
Erythrina acanthocarpa	
Erythrina humeana	
Liparia comantha	
Liparia sphaerica	
Liparia splendens	
Podalyria calyptrata	
Priestleya vestita	
Priestleya tomentosa	
Family: LILIACEAE (now split into a number of families)	
All species of the genus ALOE except those specified in Schedule 3 and the species *Aloe ferox*	
Gasteria beckeri	
Gloriosa superba	
All species of the genus Haworthia	
All species of the genus Kniphofia	
All species of the genus Lachenalia	
Littonia modesta	
Sandersonia aurantiaca	
All species of the genus Velthemia	
Agapanthus walshii	
Daubenya aurea	
Family: MELIACEAE	
Nymania capensis	
Family: MESEMBRYANTHEMACEAE (now Aizoaceae)	**All species**
Family: MUSACEAE (now Strelitziaceae)	
Strelitzia	All species
Family: NYMPHAECEAE	
Nymphaea capensis (now N. nouchali)	
Family: ORCHIDACEAE	All species
Family: OXALIDACEAE	
Oxalis nutans (no such species)	

Family: PENAEACEAE	All species
Family: POLYGALACEAE	
Muraltia minuta	
Family: POLYPODIACEAE	
Adiantium (now Family Pteridaceae)	All species
Hemitelia capensis (now Alsophila capensis, Family Cyathaceae)	
Polystichum adiantiforme (now Rumohra adiantiformis, Family Dryopteridaceae)	
Family: PORTULACACEAE	
Anacampseros (now Family Anacampserotaceae)	All species
Family: PROTEACEAE	
All species	
Family: RANUNCULACEAE	
Anemone capensis (now A.tenuifolia)	
Family: RESTIONACEAE	
Chondropetalum	
Acockii pillans (no such species)	
Elegia fenestrata	
Restio acockii	
Restio micans	
Restio sabulosus	
Family: RETZIACEAE (now Stilbaceae)	
Retzia capensis	
Family: RHAMNACEAE	
Phylica pubescens	
Family: RORIDULACEAE	All species
Family: RUTACEAE	All species
Family: SCROPHULARIACEAE	
Diascia	All species
Harveya	All species
Nemesia strumosa	
Halleria	All species
Family: THYMELAEACEAE	
Lachnaea aurea	

Appendix 3: Flora and vertebrate animal species protected under the National Environmental Management: Biodiversity Act, 2004 (Act 10 of 2004)

(as updated in R. 1187, 14 December 2007)

CRITICALLY ENDANGERED SPECIES
Flora
Adenium swazicum
Aloe pillansii
Diaphananthe millarii
Dioscorea ebutsniorum
Encephalartos aemulans
Encephalartos brevifoliolatus
Encephalartos cerinus
Encephalartos dolomiticus
Encephalartos heenanii
Encephalartos hirsutus
Encephalartos inopinus
Encephalartos latifrons
Encephalartos middelburgensis
Encephalartos nubimontanus
Encephalartos woodii

Reptilia
Loggerhead sea turtle
Leatherback sea turtle
Hawksbill sea turtle

Aves
Wattled crane
Blue swallow
Egyptian vulture
Cape parrot

Mammalia
Riverine rabbit
Rough-haired golden mole

ENDANGERED SPECIES
Flora
Angraecum africae
Encephalartos arenarius
Encephalartos cupidus
Encephalartos horridus
Encephalartos laevifolius
Encephalartos lebomboensis
Encephalartos msinganus
Jubaeopsis caffra
Siphonochilus aethiopicus
Warburgia salutaris
Newtonia hilderbrandi

Reptilia
Green turtle
Giant girdled lizard
Olive ridley turtle
Geometric tortoise

Aves
Blue crane
Grey crowned crane
Saddle-billed stork
Bearded vulture
White-backed vulture
Cape vulture
Hooded vulture
Pink-backed pelican
Pel's fishing owl
Lappet-faced vulture

Mammalia
Robust golden mole
Tsessebe
Black rhinoceros
Mountain zebra
African wild dog
Gunning's golden mole
Oribi
Red squirrel
Four-toed elephant-shrew

VULNERABLE SPECIES
Flora
Aloe albida
Encephalartos cycadifolius
Encephalartos Eugene-maraisii
Encephalartos ngovanus
Merwilla plumbea
Zantedeschia jucunda

Aves
White-headed vulture
Tawny eagle
Kori bustard
Black stork
Southern banded snake eagle
Blue korhaan
Taita falcon
Lesser kestrel
Peregrine falcon

Bald ibis
Ludwig's bustard
Martial eagle
Bataleur
Grass owl

Mammalia
Cheetah
Samango monkey
Giant golden mole
Giant rat
Bontebok
Tree hyrax
Roan antelope
Pangolin
Juliana's golden mole
Suni
Large-eared free-tailed bat
Lion
Leopard
Blue duiker

PROTECTED SPECIES
Flora
Adenia wilmsii
Aloe simii
Clivia mirabilis
Disa macrostachya
Disa nubigena
Disa physodes
Disa procera
Disa sabulosa
Encephelartos altensteinii
Encephelartos caffer
Encephelartos dyerianus
Encephelartos frederici-guilielmi
Encephelartos ghellinckii
Encephelartos humilis
Encephelartos lanatus
Encephelartos lehmannii
Encephelartos longifolius
Encephelartos natalensis
Encephelartos paucidentatus
Encephelartos princeps
Encephelartos senticosus
Encephelartos transvenosus
Encephelartos trispinosus
Encephelartos umbeluziensis
Encephelartos villosus
Euphorbia clivicola
Euphorbia meloformis
Euphorbia obesa
Harpagophytum procumbens
Harpagophytum zeyherii
Hoodia gordonii
Hoodia currorii
Protea odorata
Stangeria eriopus

Amphibia
Giant bullfrog
African bullfrog

Reptilia
Gaboon adder
Namaqua dwarf adder
Smith's dwarf chameleon
Armadillo girdled lizard
Nile crocodile
African rock python

Aves
Southern ground hornbill
African marsh harrier
Denham's bustard
Jackass penguin

Mammalia
Cape clawless otter
South African hedgehog
White rhinoceros
Black wildebeest
Spotted hyaena
Black-footed cat
Brown hyaena
Serval
African elephant
Spotted-necked otter
Honey badger
Sharpe's grysbok
Reedbuck
Cape fox

Appendix 5: Curriculum vitae: Dr David Hoare

Education
Matric - Graeme College, Grahamstown, 1984
B.Sc (majors: Botany, Zoology) - Rhodes University, 1991-1993
B.Sc (Hons) (Botany) - Rhodes University, 1994 with distinction
M.Sc (Botany) - University of Pretoria, 1995-1997 with distinction
PhD (Botany) – Nelson Mandela Metropolitan University, Port Elizabeth

Main areas of specialisation

- Vegetation ecology, primarily in grasslands, thicket, coastal systems, wetlands.
- Plant biodiversity and threatened plant species specialist.
- Alien plant identification and control / management plans.
- Remote sensing, analysis and mapping of vegetation.
- Specialist consultant for environmental management projects.

Membership
Professional Natural Scientist, South African Council for Natural Scientific Professions, 16 August 2005 – present. Reg. no. 400221/05 (Ecology, Botany)
Member, International Association of Vegetation Scientists (IAVS)
Member, Ecological Society of America (ESA)
Member, International Association for Impact Assessment (IAIA)
Member, Herpetological Association of Africa (HAA)

Employment history
1 December 2004 – present, Director, David Hoare Consulting (Pty) Ltd. Consultant, specialist consultant contracted to various companies and organisations.
1January 2009 – 30 June 2009, Lecturer, University of Pretoria, Botany Dept.
1January 2013 – 30 June 2013, Lecturer, University of Pretoria, Botany Dept.
1 February 1998 – 30 November 2004, Researcher, Agricultural Research Council, Range and Forage Institute, Private Bag X05, Lynn East, 0039. Duties: project management, general vegetation ecology, remote sensing image processing.

Experience as consultant
Ecological consultant since 1995. Author of over 380 specialist ecological consulting reports. Wide experience in ecological studies within grassland, savanna and fynbos, as well as riparian, coastal and wetland vegetation.

Publication record:

Refereed scientific articles (in chronological order):

Journal articles:

HOARE, D.B. & BREDENKAMP, G.J. 1999. Grassland communities of the Amatola / Winterberg mountain region of the Eastern Cape, South Africa. *South African Journal of Botany* 64: 44-61.

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BioMap workshop, Stellenbosch, March 2002 to develop strategies for studying vegetation dynamics of Namaqualand using remote sensing techniques

South African Association of Botanists Annual Congress, Grahamstown, January 2002.

28th International Symposium on Remote Sensing of Environment, Somerset West, 27-31 March 2000.

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