



Walk Down Report: Terrestrial Ecology

The Final Layout and Environmental Management Programme for the Karreebosch 132kv Overhead Powerline and Substation (14/12/16/3/3/1/2608/AM3/1) within the Karoo Hoogland Local Municipality and the Laingsburg Local Municipality in the Northern Cape Province and Western Cape Province

Walk-down Reports

Karreebosch Wind Farm (RF) (Pty) Ltd

SLR Project No.: 720.026030.00001

19 May 2023



David Hoare
Consulting (Pty) Ltd

Address:
Postnet Suite #116
Private Bag X025
Lynnwood Ridge
0040

41 Soetdoring Avenue
Lynnwood Manor
Pretoria

Cell: 083 284 5111
david@davidhoareconsulting.
co.za

Terrestrial Ecology walk- through survey report for the Final Site Layout Plan and EMPr approval process

132 kV Overhead Powerline and Substation associated with the Karreebosch Wind Farm, Western and Northern Cape.

Prepared by: Dr David Hoare
Pr.Sci.Nat. (Botany, Ecology) 400221/05

For: G7 Renewable Energies (PTY) LTD

10 May 2023

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SPECIALIST DETAILS

The details of the Specialist are as follows –

Table 1: Details of Specialist

Specialist	Qualification and accreditation
Dr David Hoare	<ul style="list-style-type: none">• PhD Botany• Pr.Sci.Nat. 400221/05 (Ecological Science, Botanical Science)

Details of Author:

Dr David Hoare

PhD (Botany) – Nelson Mandela Metropolitan University, Port Elizabeth

Professional Natural Scientist, South African Council for Natural Scientific Professions, Reg. no. 400221/05 (Ecology, Botany)

Statement of independence:

I, David Hoare, as the appointed terrestrial biodiversity / plant species specialist, hereby declare/affirm the correctness of the information provided in this report, and that I:

1. meet the general requirements to be independent and
2. have no business, financial, personal or other interest in the proposed development and that no circumstances have occurred that may have compromised my objectivity; and
3. am aware that a false declaration is an offence in terms of regulation 48 of the EIA Regulations (2014).



Dr David Hoare

10 May 2023
Date

INTRODUCTION

The Karreebosch 140 MW Wind Energy Facility (WEF) site is located approx. 45km north of Matjiesfontein (Western Cape) and extends across the border of the Western and Northern Cape provinces of South Africa. The development is proposed to connect to Bon Espirange 132 kV Substation. The proposed 132 kV line from Bon Espirange to the proposed Karreebosch substation will be approximately 9 km long and will cross the boundary between the Western Cape and the Northern Cape.

Karreebosch Wind Farm (RF) (Pty) Ltd (Karreebosch) received Environmental Authorisation (EA) for its grid infrastructure corridor in December 2022 (EA Ref: 14/12/16/3/3/1/2608) and a split of the EA in April 2023 (EA Ref: 14/12/16/3/3/1/2608/AM3/1). Conditions 12 and 13 of the Grid EA specifically stated that the final layout and Environmental Management Programmes (EMPrs) are not yet approved. The layout and specific tower positions will need to be micro sited and will require a 30-day public participation process before the final layout and EMPrs can be submitted to the Department of Forestry, Fisheries and Environment (DFFE) for approval. Karreebosch now intends to proceed with obtaining approval of the final layout and EMPrs for the grid connection infrastructure.



Figure 1: Locality of the Karreebosch WEF and Grid Development.

For the Karreebosch Wind Energy Facility (WEF) (EA Ref: 14/12/16/3/3/2/807/AM6) to evacuate power to the national grid, Karreebosch propose to develop a 132kV double circuit twin tern OHPL and 33/132kV onsite substation. The Karreebosch OHPL will evacuate power from the Karreebosch on site substation to the existing Bon Espirange Substation.

The line walkdown is required to confirm the final layout is suitable for approval by the DFFE, based on the confirmation of placement of specific infrastructure i.e. tower positions avoiding environmental no-go areas and sensitivities on site. The Environmental specialist has conducted a detailed assessment of the receiving environment during the site assessment which formed part of the Basic Assessment process (2022) whereafter a 400m corridor was approved by the DFFE in the EA, with the inclusion of a condition in the EA that a final walkdown of the line and tower positions be undertaken by the environmental specialist.



Figure 2: Landscape in the study area looking south-eastwards from approximately the central point along the powerline (see Figure 3 for layout).

The entire extent of the proposed 132kV Karreebosch OHPL, 33/132kV Substation and associated infrastructure is located within one (1) of the Strategic Transmission Corridors, namely the Central

Corridor, as defined in and in terms of the procedures laid out in Government Notice (GN) No. 113. As mentioned above, the Karreebosch Grid EA has been authorised (EA Ref: 14/12/16/3/3/1/2608/AM3/1). As per Condition 12 of the EA, the final site layout plan must be informed by a specialist micro-siting exercise to inform the final placement of the substation, pylon structures and associated road infrastructure. As per Condition 13 of the EA, the EMPRs must be amended to include the final layout for approval and any additional mitigation measures required to be included in the EMPRs.

The infrastructure is located within an area of ridges within a low mountain range. The topography is moderate to steep (Diagram 1). The powerline crosses two ridges, one with a maximum elevation of 1320 m, and the other 1280 m. The lowest elevation is at the northern-most point in the powerline, at around 980 m.

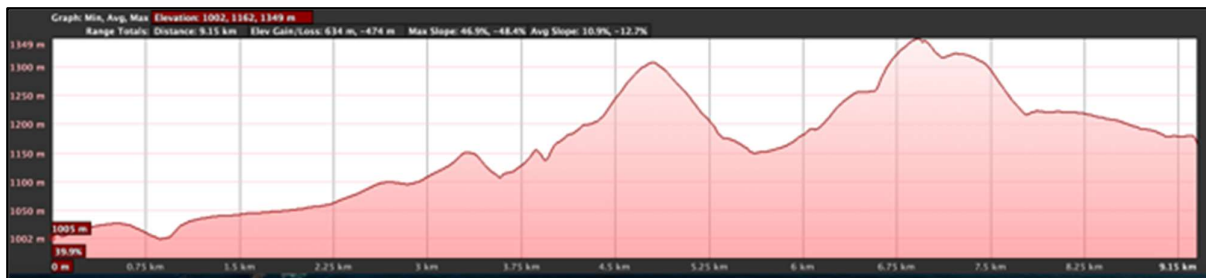


Diagram 1: Topographical profile of the study area

A part of the proposed powerline passes through an existing wind energy facility (already constructed and operational). However, most of the site consists of natural vegetation (see Figure 2 for typical vegetation on site) with some localised disturbance associated with historical farming activities, as well as the more recently constructed wind energy infrastructure.

The infrastructure crosses through two regional vegetation types, namely Central Mountain Shale Renosterveld in the southern half and Koedoesberg Moordenaars Karoo in the northern half, which corresponds largely with conditions observed on site. There are numerous small drainage lines within the project area.

Description of proposed project

The Karreebosch Grid Alignment (EA Ref: 14/12/16/3/3/1/2608/AM3/1) is currently authorised on the properties detailed in Table 1 below.

Table 1: Authorised properties

Farm Name and Portion	SG Code
Remainder of Farm Bon Espirange No. 73	C04300000000007300000
Remainder of Farm Ek Kraal No.199	C07200000000019900000
Remainder of Farm Klipbanks Fontein No. 198	C07200000000019800000
Farm Rietfontein No. 197	C07200000000019700000

The infrastructure assessed here includes the following (Figure 3):

- 132kV twin tern double circuit OHPL (approximately 9km in length);
- OHPL servitude width up to 45m, including a servitude road (right of way servitude up to 14m wide, 7m on either side of the centreline) which will follow beneath the OHPL as far as possible; with additional 4x4 access tracks deviating dependant on terrain;
- One 33/132kV onsite substation (up to 30 000m²);
- One O&M building (up to 10 000m²) located within the substation footprint;
- Monopole or lattice structures to be constructed;
- It is anticipated that towers will be located on average 200m to 250m apart; however, longer spans may be needed due to terrain, and avoidance of site sensitivities and watercourse crossings.

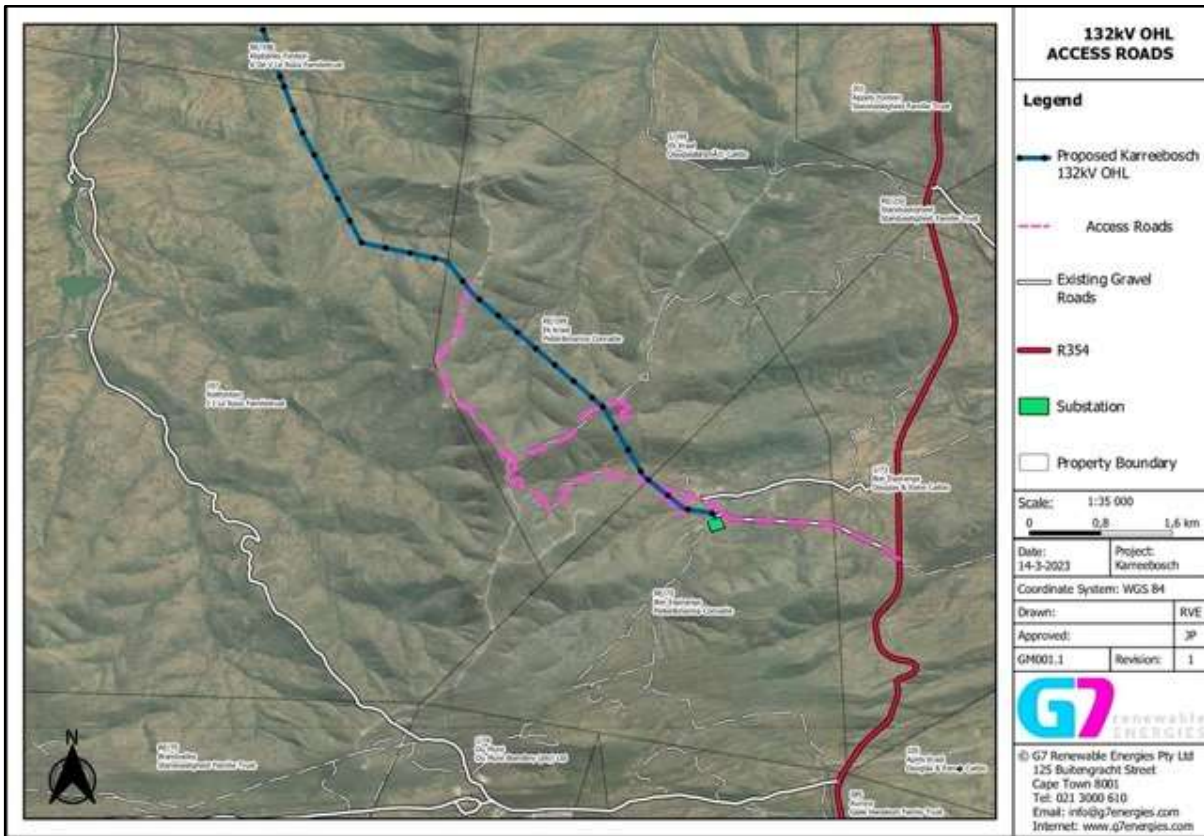


Figure 3: Layout of the proposed infrastructure.









METHODOLOGY

The detailed methodology followed as well as the sources of data and information used as part of this assessment is described below.

Survey timing

The fieldwork was conducted from 2 - 3 May 2023. The site is within the Succulent Karoo Biome. The study area is within an arid environment with an annual rainfall of just over 200 mm per annum (Mucina & Rutherford 2006). Rainfall can potentially occur at any time of the year, but is more likely in mid to late winter, most often from May to August (Mucina & Rutherford 2006).

There had been relatively good recent rainfalls prior to the field survey, both in the previous summer season and in the weeks prior to the field survey. The timing of the survey was therefore suitable for detecting most perennial plant species on site. Most species were identifiable at the time of the field survey. A possible limitation is that various flowering geophytes that tend to flower in early spring were probably not detected if they occur there. However, field surveys in nearby areas undertaken at a more suitable time of the year provide information on species that may potentially have been overlooked. The field survey was therefore acceptable in terms of assessing the flora and vegetation of the site.

Field survey approach

During the field survey, the entire footprint of the indicated infrastructure was assessed on foot. The corridor, centreline, and proposed tower positions were uploaded onto a hand-held Garmin GPSMap 64s device, which was also used to record a track within which observations were made. Digital photographs were taken of features and habitats on site, as well as of all plant species that were seen. All plant species recorded were uploaded to the iNaturalist website and are accessible by viewing the observations for this site.

Digital photographs were taken of any other features of interest that were seen on site, as well as of habitat in different parts of the site.

RESULTS

Vegetation on site

Karroid shrubland

The vegetation on site is uniform to some extent, with some variation due to topography, drainage, and surface rockiness. In general, the landscape is moderately undulating with moderate to high levels of surface rockiness, and shallow soils. These general areas are mostly dominated by dwarf karroid shrubs, with some low shrubs and herbaceous species in between.

Common and dominant plant species include the species *Eriocephalus ericoides*, *Dicerotheramnium rhinocerotus*, *Pteronia glauca*, *Oedera genistifolia*, *Ruschia intricata*, *Pentzia incana*, *Chrysocoma ciliata*, *Felicia filifolia*, *Asparagus capensis*, *Tylecodon wallichii*, *Tylecodon reticulatus*, *Tenaxia stricta*, *Pteronia empetrifolia*, *Euryops lateriflorus*, and *Felicia muricata*.

Drainage areas

Many of the drainage areas on site are dry watercourses with little vegetation, but these coalesce into more defined areas with sandy beds and rocky banks, where species such as *Mentha aquatica*, *Gomphocarpus fruticosus*, *Tenaxia stricta*, *Searsia lancea*, *Cyperus longus*, *Cyperus marginatus*, and *Wiborgia monoptera* occur. None of these, except possibly the two *Cyperus* species, are indicators of wetlands, rather the different soil conditions, with occasional areas of deep soils, or else bare rock sheets, as well as localised small areas where water may collect temporarily. The other possible difference between drainage lines and the general landscape is that they sometimes cut back into the hillslope, resulting in small overhangs and rock lips where the water flows, which creates localised shaded overhangs,

Animals on site

Two species of lizard were seen on site (Karoo Girdled Lizard and Spotted Sand Lizard), and a single klipspringer, otherwise no other animals were seen.

Other animals that have been recently observed in nearby areas in similar habitats, and are therefore likely to occur on site, include the following (excluding birds and bats):

Scientific name	Common name	Status
REPTILES		
<i>Chersina angulata</i>	Angulate Tortoise	LC
<i>Psammobates tentorius</i>	Tent tortoise	LC
<i>Agama hispida</i>	Common Spiny Agama	LC
<i>Chondrodactylus angulifer</i>	Namib Giant Ground Gecko	LC
<i>Chondrodactylus bibronii</i>	Bibron's Thick-toed Gecko	LC
<i>Karusasaurus polyzonus</i>	Karoo Girdled Lizard	
<i>Pachydactylus mariquensis</i>	Marico Thick-toed Gecko	LC
<i>Pedioplanis laticeps</i>	Cape Sand Lizard	LC
<i>Pedioplanis lineoocellata</i>	Spotted Sand Lizard	LC
<i>Trachylepis sulcata</i>	Western Rock Skink	LC
<i>Aspidelaps lubricus</i>	Cape Coral Snake	LC
<i>Bitis arietans</i>	Puffadder	LC
<i>Bitis rubida</i>	Red Adder	LC
<i>Naja nivea</i>	Cape Cobra	LC

Scientific name	Common name	Status
FROGS		
<i>Vandijkophrynus gariiepensis</i>	Karoo Toad	LC
<i>Amietia poyntoni</i>	Poynton's River Frog	LC
<i>Xenopus laevis</i>	Common Platanna	LC
MAMMALS		
<i>Alcelaphus buselaphus</i>	Hartebeest	
<i>Antidorcas marsupialis</i>	Springbok	LC
<i>Connochaetes gnou</i>	Black Wildebeest	LC
<i>Dama dama</i>	European Fallow Deer	Exotic
<i>Damaliscus pygargus</i>	Bontebok	LC
<i>Giraffa camelopardalis</i>	Giraffe	VU
<i>Oreotragus oreotragus</i>	Klipspringer	LC
<i>Oryx gazella</i>	Gemsbok	LC
<i>Pelea capreolus</i>	Grey Rhebok	NT
<i>Raphicerus campestris</i>	Steenbok	LC
<i>Sylvicapra grimmia</i>	Duiker	LC
<i>Tragelaphus oryx</i>	Eland	LC
<i>Tragelaphus strepsiceros</i>	Kudu	LC
<i>Equus quagga</i>	Plains Zebra	NT
<i>Equus zebra</i>	Mountain Zebra	VU
<i>Caracal caracal</i>	Caracal	LC
<i>Otocyon megalotis</i>	Bat-eared Fox	LC
<i>Lupulella mesomelas</i>	Black-backed Jackal	LC
<i>Herpestes pulverulentus</i>	Cape Grey Mongoose	LC
<i>Cynictis penicillata</i>	Yellow Mongoose	LC
<i>Ictonyx striatus</i>	Striped Polecat	LC
<i>Hystrix africaeaustralis</i>	Porcupine	LC
<i>Procavia capensis</i>	Dassie	LC
<i>Orycteropus afer</i>	Aardvark	LC
<i>Papio ursinus</i>	Chacma Baboon	LC
<i>Lepus capensis</i>	Cape Hare	LC
<i>Lepus saxatilis</i>	Scrub Hare	LC
<i>Pronolagus saundersiae</i>	Hewitt's Red Rock Hare	LC
<i>Cryptomys hottentotus</i>	Common Mole-rat	LC
<i>Elephantulus edwardii</i>	Cape Elephant Shrew	LC
<i>Elephantulus pilicaudus</i>	Karoo Rock Elephant Shrew	DD
<i>Gerbilliscus afer</i>	Gerbil	LC
<i>Graphiurus ocellatus</i>	Spectacled Dormouse	LC
<i>Macroscelides proboscideus</i>	Round-eared Elephant Shrew	LC
<i>Micaelamys namaquensis</i>	Namaqua Rock Rat	LC
<i>Parotomys brantsii</i>	Brant's Whistling Rat	LC
<i>Rhabdomys pumilio</i>	Four-striped Grass Mouse	LC

Pylon locations

1KAR - BON 1

Habitat conditions

Relatively flat area with some rocks and shallow soils.

Plant species

Ruschia intricata
Aizoon africanum
Asparagus capensis
Pteronia empetrifolia
Oedera genistifolia
Oxalis pockockiae
Antimima sp.
Eriospermum capense

Babiana sambucina
Eriocephalus ericoides
Leipoldtia schultziae
Crassula deltoidea
Euphorbia rhombifolia
Cheiridopsis namaquensis
Tylecodon wallichii
Tylecodon reticulatus



Figure 4: Habitat at 1KAR - BON 1.

1KAR - BON 2

Habitat conditions

Relatively flat area with scattered small rocks and shallow soils.

Plant species

Ruschia intricata

Aizoon africanum

Asparagus capensis

Oxalis pockockiae

Drimia capensis

Eriocephalus ericoides

Tylecodon wallichii

Tylecodon reticulatus



Figure 5: Habitat at 1KAR - BON 2.

1KAR - BON 3

Habitat conditions

Relatively flat area with some rocks and shallow soils.

Plant species

Ruschia intricata

Aizoon africanum

Asparagus capensis

Oxalis pockockiae

Drimia capensis

Eriocephalus ericoides

Tylecodon wallichii

Tylecodon reticulatus



Figure 6: Habitat at 1KAR - BON 3.

1KAR - BON 4

Habitat conditions

Relatively flat area with some rocks and shallow soils.

Plant species

Ruschia intricata

Aizoon africanum

Asparagus capensis

Oxalis pockockiae

Drimia capensis

Eriocephalus ericoides

Tylecodon wallichii

Tylecodon reticulatus



Figure 7: Habitat at 1KAR - BON 4.

1KAR - BON 5

Habitat conditions

Relatively flat area with some rocks and shallow soils.

Plant species

Ruschia intricata

Aizoon africanum

Asparagus capensis

Oxalis pockockiae

Drimia capensis

Eriocephalus ericoides

Tylecodon wallichii

Tylecodon reticulatus



Figure 8: Habitat at 1KAR - BON 5.

1KAR - BON 6

Habitat conditions

Relatively flat area with some rocks and shallow soils.

Plant species

Ruschia intricata

Pteronia empetrifolia

Eriocephalus ericoides

Tylecodon reticulatus

Antimima sp.

Pelargonium carnosum

***Monsonia crassicaulis* NT**



Figure 9: Habitat at 1KAR - BON 6.

1KAR - BON 7

Habitat conditions

Relatively flat area with some rocks and shallow soils.

Plant species

Ruschia intricata
Aizoon africanum
Asparagus capensis
Oxalis pockockiae
Drimia capensis

Eriocephalus ericoides
Tylecodon wallichii
Tylecodon reticulatus



Figure 10: Habitat at 1KAR - BON 7.

1KAR - BON 8

Habitat conditions

Relatively flat area with some rocks and shallow soils.

Plant species

Ruschia intricata
Aizoon africanum
Asparagus capensis
Oxalis pockockiae

Drimia capensis
Eriosephalus ericoides
Tylecodon wallichii



Figure 11: Habitat at 1KAR - BON 8.

1KAR - BON 9

Habitat conditions

Relatively flat area with some rocks and shallow soils.

Plant species

Ruschia intricata

Aizoon africanum

Asparagus capensis

Pteronia empetrifolia

Drimia capensis

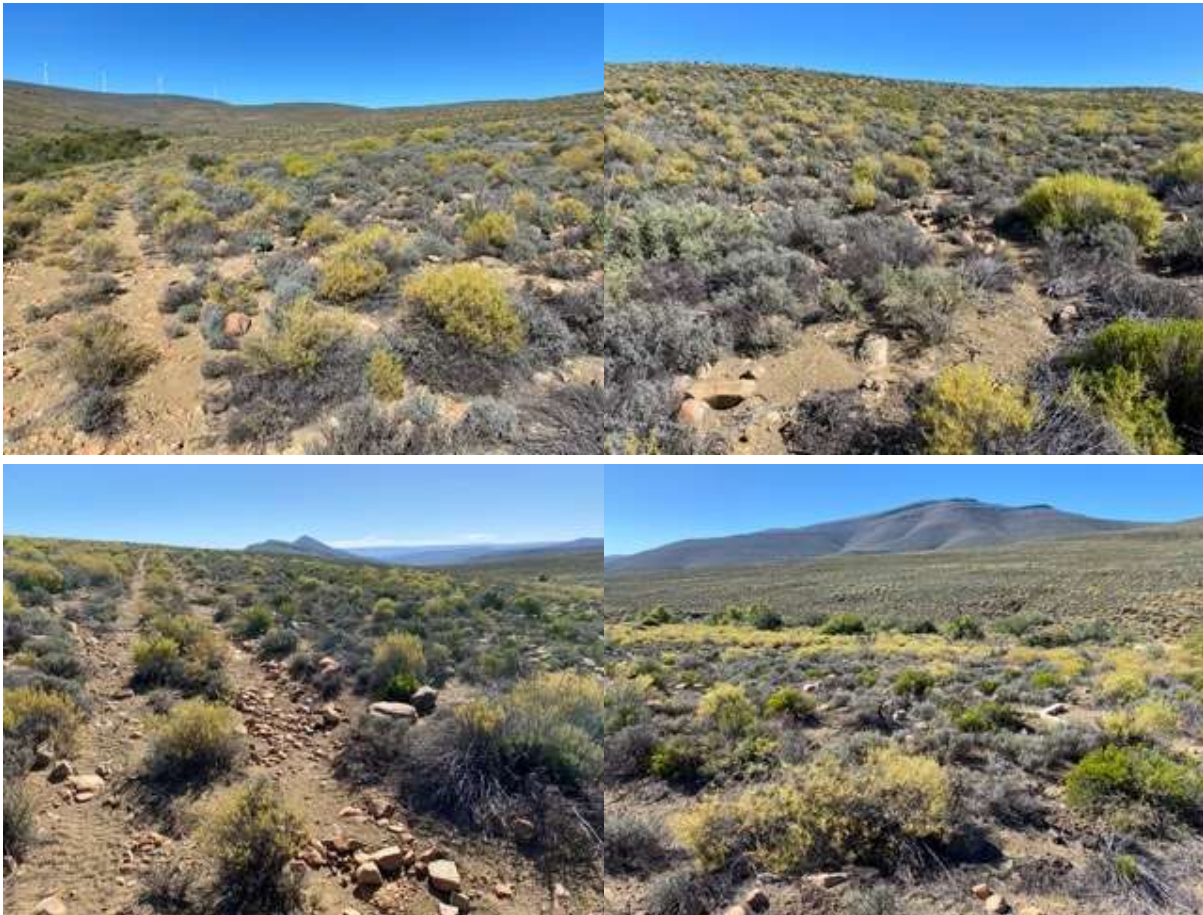


Figure 12: Habitat at 1KAR - BON 9.

1KAR - BON 10

Habitat conditions

Relatively flat area with some rocks and shallow soils.

Plant species

Pteronia empetrifolia

Ruschia intricata

Aizoon africanum

Eriocephalus ericoides

Tylecodon reticulatus

Pteronia incana

Euryops lateriflorus

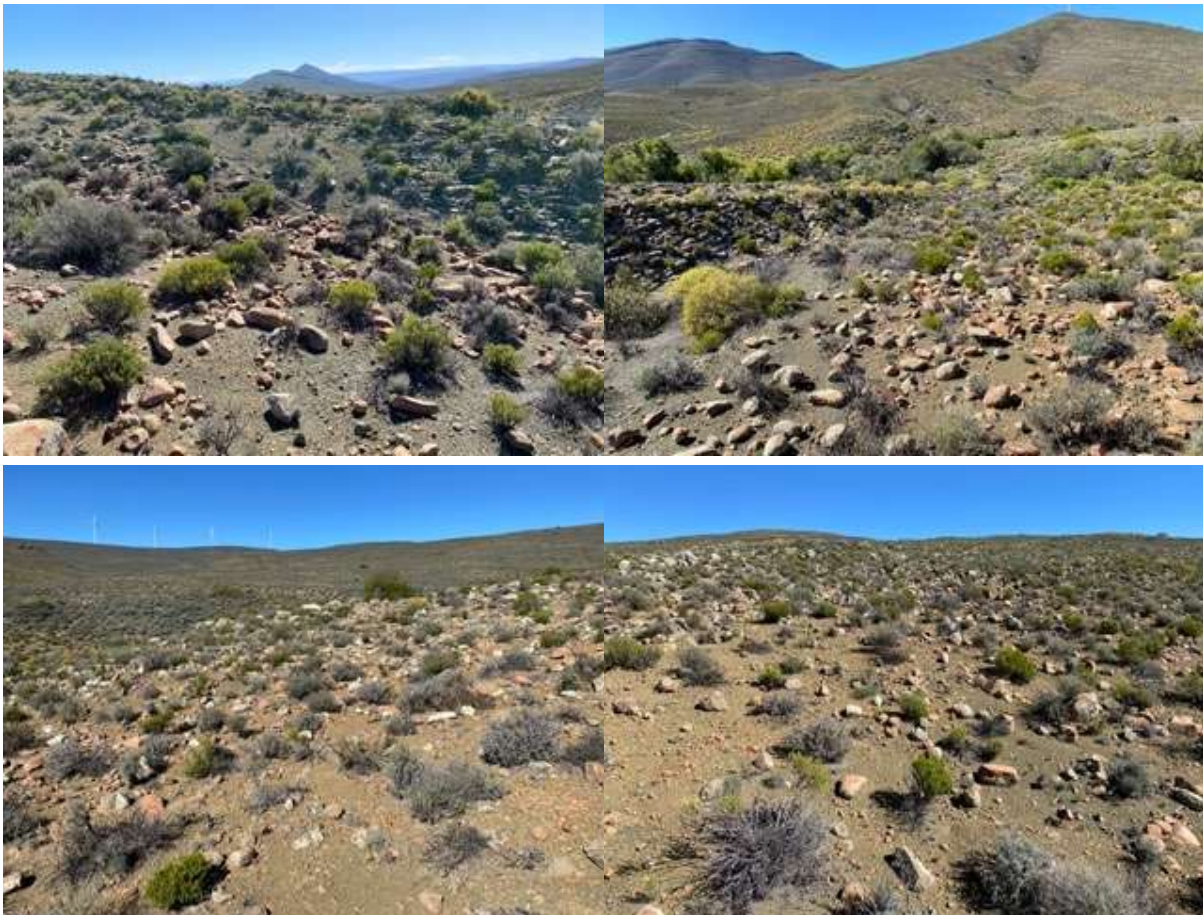


Figure 13: Habitat at 1KAR - BON 10.

1KAR - BON 11

Habitat conditions

Relatively flat area with some rocks and shallow soils.

Plant species

Pteronia empetrifolia

Ruschia intricata

Aizoon africanum

Eriocephalus ericoides

Tylecodon reticulatus

Pteronia incana

Euryops lateriflorus

Asparagus capensis

Oxalis pockockiae

Tylecodon wallichii

Tylecodon reticulatus



Figure 14: Habitat at 1KAR - BON 11.

1KAR - BON 12

Habitat conditions

Relatively flat area with some rocks and shallow soils.

Plant species

Ruschia intricata

Leipoldtia schultziae

Pteronia empetrifolia

Helichrysum asperum

Oedera genistifolia

Dicerothermus rhinocerotis

Aizoon africanum

Pelargonium carnosum

Tylecodon reticulatus

Chrysocoma ciliata

Antimima sp.

Crassula muscosa

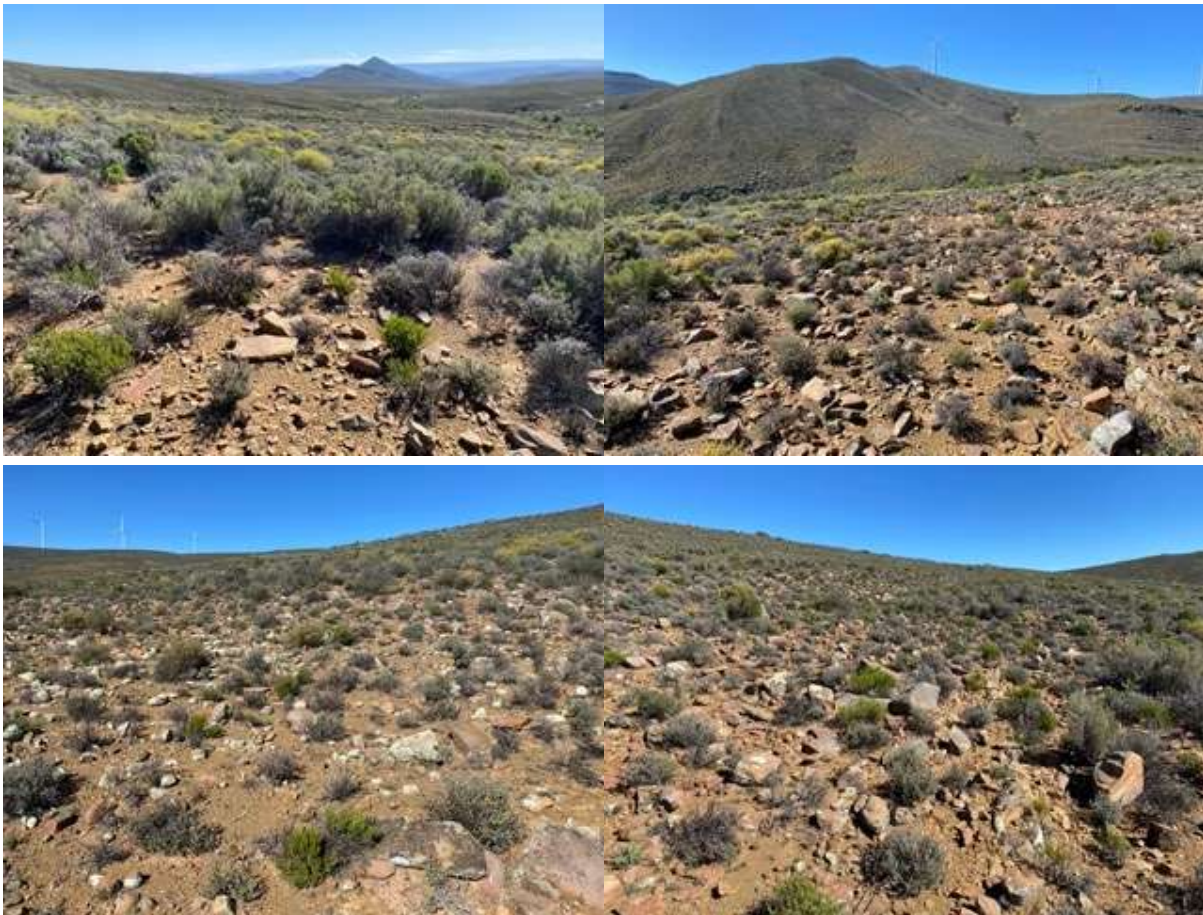


Figure 15: Habitat at 1KAR - BON 12.

1KAR - BON 13

Habitat conditions

Relatively flat area with some rocks and shallow soils.

Plant species

Ruschia intricata

Pteronia incana

Pteronia empetrifolia

Eriocephalus ericoides

Asparagus capensis

Dicerotheramnus rhinocerotis

Aizoon africanum

Tylecodon reticulatus

Chrysocoma ciliata

Oedera genistifolia

Oxalis pockockiae

Eriospermum capense

Antimima sp.

Crassula deltoidea



Figure 16: Habitat at 1KAR - BON 13.

1KAR - BON 14

Habitat conditions

Relatively flat area with some rocks and shallow soils.

Plant species

Ruschia intricata

Pteronia incana

Pteronia empetrifolia

Eriocephalus ericoides

Asparagus capensis

Dicerothermus rhinocerotis

Tylecodon reticulatus

Chrysocoma ciliata

Aizoon africanum

Oedera genistifolia

Oxalis pockockiae

Crassula deltoidea



Figure 17: Habitat at 1KAR - BON 14.

1KAR - BON 15

Habitat conditions

Relatively flat area with some rocks and shallow soils.

Plant species

Ruschia intricata

Pteronia incana

Pteronia empetrifolia

Eriocephalus ericoides

Asparagus capensis

Tylecodon reticulatus

Chrysocoma ciliata

Dicrothamnus rhinocerotis

Aizoon africanum

Oedera genistifolia



Figure 18: Habitat at 1KAR - BON 15.

1KAR - BON 16

Habitat conditions

Relatively flat area with some rocks and shallow soils.

Plant species

Ruschia intricata

Pteronia incana

Pteronia empetrifolia

Eriocephalus ericoides

Asparagus capensis

Dicerotheramnus rhinocerotis



Figure 19: Habitat at 1KAR - BON 16.

1KAR - BON 17

Habitat conditions

Relatively flat area with some rocks and shallow soils.

Plant species

Pteronia incana
Tylecodon wallichii
Aizoon africanum
Chrysocoma ciliata
Pelargonium carnosum
Asparagus capensis
Diospyros austroafricana

Asparagus laricinus
Asparagus fasciculatus
Eriospermum capense
Lacomucinaea lineata



Figure 20: Habitat at 1KAR - BON 17.

1KAR - BON 18

Habitat conditions

Relatively flat area with some rocks and shallow soils.

Plant species

Ruschia intricata

Tylecodon reticulatus

Pteronia empetrifolia

Dicerothermus rhinocerotis

Eriocephalus ericoides

Oxalis pockockiae

Eriospermum capense

Euryops lateriflorus

Pteronia incana

Tylecodon wallichii

Antimima sp.

Aizoon africanum



Figure 21: Habitat at 1KAR - BON 18.

1KAR - BON 19

Habitat conditions

Relatively flat area with some rocks and shallow soils.

Plant species

Ruschia intricata

Oedera genistifolia

Pteronia incana

Pteronia empetrifolia

Dicerothermus rhinocerotis

Selago densiflora

Felicia muricata

Felicia filifolia

Oxalis pockockiae

Asparagus capensis

Euryops lateriflorus

Berkheya rigida

Tenaxia stricta

Tylecodon wallichii



Figure 22: Habitat at 1KAR - BON 19.

1KAR - BON 20

Habitat conditions

Relatively flat area with some rocks and shallow soils.

Plant species

Ruschia intricata

Oedera genistifolia

Pteronia incana

Pteronia empetrifolia

Dicerotheramnus rhinocerotis

Selago densiflora

Felicia muricata

Felicia filifolia

Oxalis pockockiae

Asparagus capensis

Euryops lateriflorus

Berkheya rigida

Tenaxia stricta

Tylecodon wallichii



Figure 23: Habitat at 1KAR - BON 20.

1KAR - BON 21

Habitat conditions

Relatively flat area with some rocks and shallow soils.

Plant species

Ruschia intricata
Crassula muscosa
Pteronia incana
Selago densiflora
Selago subspinoso
Asparagus capensis
Pteronia empetrifolia
Erioccephalus ericoides
Oxalis melanosticta
Tylecodon wallichii

Dicerotheramnus rhinocerotis
Euryops lateriflorus
Felicia muricata
Felicia filifolia
Crassula umbella
Eriospermum capense
Aizoon africanum
Oxalis burkei



Figure 24: Habitat at 1KAR - BON 21.

1KAR - BON 22

Habitat conditions

Relatively flat area with some rocks and shallow soils.

Plant species

Eriocephalus ericoides
Tylecodon wallichii
Selago subspinoso
Felicia filifolia
Asparagus capensis
Ruschia intricata
Empodium plicatum
Eriospermum capense
Dicerthamnus rhinocerotis
Drosanthemum sp.

Pteronia incana
Pteronia empetrifolia
Crassula tomentosa
Oxalis melanosticta
Tenaxia stricta
Chrysocoma ciliata
Pelargonium articulatum
Crassula tetragona
Stachys rugosa



Figure 25: Habitat at 1KAR - BON 22.

1KAR - BON 23

Habitat conditions

Relatively flat area with some rocks and shallow soils.

Plant species

Pteronia incana

Aizoon africanum

Dicrothamnus rhinocerotis

Euryops lateriflorus

Tylecodon wallichii

Oedera genistifolia

Tenaxia stricta

Eriospermum capense

Asparagus capensis

Felicia filifolia

Chrysocoma ciliata

Felicia muricata

Oxalis burkei



Figure 26: Habitat at 1KAR - BON 23.

1KAR - BON 24

Habitat conditions

Relatively flat area with some rocks and shallow soils.

Plant species

Pteronia incana

Felicia filifolia

Tylecodon wallichii

Aizoon africanum

Oxalis burkei

Felicia muricata

Dicrothamnus rhinocerotis

Oedera genistifolia

Pteronia empetrifolia

Tenaxia stricta

Eriospermum capense

Eriocephalus ericoides



Figure 27: Habitat at 1KAR - BON 24.

1KAR - BON 25

Habitat conditions

Relatively flat area with some rocks and shallow soils.

Plant species

Dicrothamnus rhinocerotis

Aizoon africanum

Eriocephalus ericoides

Oedera genistifolia

Pteronia empetrifolia



Figure 28: Habitat at 1KAR - BON 25.

1KAR - BON 26

Habitat conditions

Relatively flat area with some rocks and shallow soils.

Plant species

Pteronia incana

Tylecodon wallichii

Aizoon africanum

Pteronia empetrifolia

Oxalis pockockiae

Felicia filifolia

Oxalis burkei

Chrysocoma ciliata



Figure 29: Habitat at 1KAR - BON 26.

1KAR - BON 27

Habitat conditions

Relatively flat area with some rocks and shallow soils.

Plant species

Aizoon africanum

Tenaxia stricta

Pteronia empetrifolia

Pentzia incana

Tylecodon wallichii

Oxalis pockockiae

Pteronia incana

Stachys rugosa



Figure 30: Habitat at 1KAR - BON 27.

1KAR - BON 28

Habitat conditions

Relatively flat area with some rocks and shallow soils.

Plant species

Pentzia incana

Pteronia empetrifolia

Dicrothamnus rhinocerotis

Tylecodon wallichii

Eriocephalus ericoides

Aizoon africanum



Figure 31: Habitat at 1KAR - BON 28.

1KAR - BON 29

Habitat conditions

Relatively flat area with some rocks and shallow soils.

Plant species

Felicia muricata

Ruschia intricata

Eriosephalus ericoides

Pteronia empetrifolia



Figure 32: Habitat at 1KAR - BON 29.

1KAR - BON 30

Habitat conditions

Relatively flat area with some rocks and shallow soils.

Plant species

Ruschia intricata

Crassula muscosa

Pteronia incana

Selago densiflora

Selago subspinoso

Asparagus capensis

Pteronia empetrifolia

Eriocephalus ericoides

Oxalis melanosticta

Tylecodon wallichii

Dicerotheramnus rhinocerotis

Euryops lateriflorus

Felicia muricata

Felicia filifolia

Crassula umbella

Eriospermum capense

Aizoon africanum

Oxalis burkei



Figure 33: Habitat at 1KAR - BON 30.

1KAR - BON 31

Habitat conditions

Relatively flat area with some rocks and shallow soils.

Plant species

Ruschia intricata

Crassula muscosa

Pteronia incana

Selago densiflora

Selago subspinoso

Asparagus capensis

Pteronia empetrifolia

Eriocephalus ericoides

Oxalis melanosticta

Tylecodon wallichii

Dicrothamnus rhinocerotis

Euryops lateriflorus

Felicia muricata

Felicia filifolia

Crassula umbella

Eriospermum capense

Aizoon africanum

Oxalis burkei



Figure 34: Habitat at 1KAR - BON 31.

1KAR - BON 32

Habitat conditions

Relatively flat area with some rocks and shallow soils.

Plant species

Ruschia intricata

Crassula muscosa

Pteronia incana

Selago densiflora

Selago subspinoso

Asparagus capensis

Pteronia empetrifolia

Eriocephalus ericoides

Oxalis melanosticta

Tylecodon wallichii

Dicerotheramnus rhinocerotis

Euryops lateriflorus

Felicia muricata

Felicia filifolia

Crassula umbella

Eriospermum capense

Aizoon africanum

Oxalis burkei



Figure 35: Habitat at 1KAR - BON 32.

1KAR - BON 33

Habitat conditions

Relatively flat area with some rocks and shallow soils.

Plant species

Ruschia intricata

Crassula muscosa

Pteronia incana

Selago densiflora

Selago subspinoso

Asparagus capensis

Pteronia empetrifolia

Eriocephalus ericoides

Oxalis melanosticta

Tylecodon wallichii

Dicrothamnus rhinocerotis

Euryops lateriflorus

Felicia muricata

Felicia filifolia

Crassula umbella

Eriospermum capense

Aizoon africanum

Oxalis burkei



Figure 36: Habitat at 1KAR - BON 33.

1KAR - BON 34

Habitat conditions

Relatively flat area with some rocks and shallow soils.

Plant species

Pteronia incana

Dicrothamnus rhinocerotis

Tenaxia stricta

Pteronia empetrifolia

Ruschia intricata

Aizoon africanum

Euryops lateriflorus



Figure 37: Habitat at 1KAR - BON 34.

1KAR - BON 35

Habitat conditions

Relatively flat area with some rocks and shallow soils.

Plant species

Pteronia incana

Dicrothamnus rhinocerotis

Tenaxia stricta

Pteronia empetrifolia

Ruschia intricata

Aizoon africanum

Euryops lateriflorus



Figure 38: Habitat at 1KAR - BON 35.

1KAR - BON 36

Habitat conditions

Relatively flat area with some rocks and shallow soils.

Plant species

Pteronia incana

Dicrothamnus rhinocerotis

Tenaxia stricta

Pteronia empetrifolia

Ruschia intricata

Aizoon africanum



Figure 39: Habitat at 1KAR - BON 36.

1KAR - BON 37

Habitat conditions

Relatively flat area with some rocks and shallow soils.

Plant species

Pteronia incana

Pteronia empetrifolia

Aizoon africanum



Figure 40: Habitat at 1KAR - BON 37.

1KAR - BON 38

Habitat conditions

Relatively flat area with some rocks and shallow soils.

Plant species

Pteronia incana

Pteronia empetrifolia

Aizoon africanum



Figure 41: Habitat at 1KAR - BON 38.

1KAR - BON 39

Habitat conditions

Relatively flat area with some rocks and shallow soils.

Plant species

Pteronia empetrifolia

Pteronia incana

Aizoon africanum



Figure 42: Habitat at 1KAR - BON 39.

1KAR - BON 40

Habitat conditions

Cleared area directly next to existing substation.

Plant species

Ruschia intricata

Aizoon africanum

Protected trees

Tree species protected under the National Forest Act are listed in Appendix 2. There are none with a geographical distribution that includes the region in which the proposed project is located. There is one (1) species that has a geographical distribution that ends south of the study area, namely *Podocarpus latifolius*, but this species does not occur near to the site.

In summary, no species of protected trees were found or are likely to occur in the geographical area that includes the site.

Assessment of infrastructure layout

Sensitivities identified on site

The main site-specific sensitivity identified on site is the presence of drainage lines / watercourses. It is assumed that the presence and description of these is covered by the Aquatic Specialist and is not described further here.

No threatened (CR, EN or VU) plant species were recorded during the current walk-through survey.

There are numerous species on site that are protected under the Northern Cape Nature Conservation Act No. 9 of 2009, and the Cape Nature and Environmental Conservation Ordinance 19 of 1974, for which removal permits will be required. Species protected under this legislation that were recorded on site are given in Appendix 1.

There are locations on site with steep topography where care will need to be taken in constructing infrastructure, as well as in placing service roads. Where possible, roads should follow as shallow a gradient as possible. Roads should preferably have an average gradient of 1:10 or less, but should not exceed a gradient of 1:5.

Based on the walk-through survey of the site, reported here, no changes to the layout are proposed.

CONCLUSIONS

- A walk-through survey of the entire infrastructure footprint area was conducted. No areas of concern were identified, and no layout changes are proposed.
- Plant species protected according to the Northern Cape Nature Conservation Act were identified, where they occurred within footprint areas.
- The current layout is therefore deemed to be acceptable and will have limited impacts on ecological systems, processes and patterns.

RECOMMENDATIONS

The following recommendations are made:

- Apply for permits for permanent destruction/removal of the identified protected plant species (as listed in Appendix 1) prior to construction commencing.
- The mitigation measures contained in the EMP are sufficient and no additional mitigation measures are recommended for inclusion.

Appendix 1: Combined checklist of plant species found on site.

Family	Scientific name	Status
AIZOACEAE	<i>Aizoon africanum</i>	Protected NC Schedule 2
(MESEMBRYANTHEMACEAE) now AIZOACEAE	<i>Antimima hallii</i>	Protected NC Schedule 2, CNECO Schedule 2
(MESEMBRYANTHEMACEAE) now AIZOACEAE	<i>Antimima pumila</i>	Protected NC Schedule 2, CNECO Schedule 2
ASPARAGACEAE	<i>Asparagus capensis</i>	
ASPARAGACEAE	<i>Asparagus fasciculatus</i>	
ASPHODELACEAE	<i>Astroloba bullulata</i>	Protected NC Schedule 2
ASTERACEAE	<i>Athanasia trifurcata</i>	
IRIDACEAE	<i>Babiana sambucina</i>	Protected NC Schedule 2, CNECO Schedule 2
ASTERACEAE	<i>Berkheya rigida</i>	
SCROPHULARIACEAE	<i>Chaenostoma sp.</i>	
Pteridophyta	<i>Cheilanthes hastata</i>	
(MESEMBRYANTHEMACEAE) now AIZOACEAE	<i>Cheiridopsis namaquensis</i>	Protected NC Schedule 2, CNECO Schedule 2
ASTERACEAE	<i>Chrysocoma ciliata</i>	
ASTERACEAE	<i>Cineraria alchemilloides</i>	
ASTERACEAE	<i>Crassothonna protecta</i>	
CRASSULACEAE	<i>Crassula deltoidea</i>	Protected NC Schedule 2
CRASSULACEAE	<i>Crassula expansa</i>	Protected NC Schedule 2
CRASSULACEAE	<i>Crassula muscosa</i>	Protected NC Schedule 2
CRASSULACEAE	<i>Crassula saxifraga</i>	Protected NC Schedule 2
CRASSULACEAE	<i>Crassula tetragona</i>	Protected NC Schedule 2
CRASSULACEAE	<i>Crassula tomentosa</i>	Protected NC Schedule 2
CRASSULACEAE	<i>Crassula umbella</i>	Protected NC Schedule 2
CYPERACEAE	<i>Cyperus longus</i>	
CYPERACEAE	<i>Cyperus marginatus</i>	
CARYOPHYLLACEAE	<i>Dianthus namaensis</i>	Protected NC Schedule 2
ASTERACEAE	<i>Dicrothamnus rhinocerotis</i>	
EBENACEAE	<i>Diospyros austro-africana</i>	
ASPARAGACEAE	<i>Drimia capensis</i>	
(MESEMBRYANTHEMACEAE) now AIZOACEAE	<i>Drosanthemum sp.</i>	Protected NC Schedule 2, CNECO Schedule 2
	<i>Empodium plicatum</i>	
ASTERACEAE	<i>Eriocephalus ericoides</i>	
ERIOSPERMACEAE	<i>Eriospermum capense</i>	
GERANIACEAE	<i>Erodium cicutarium</i>	
EUPHORBIACEAE	<i>Euphorbia braunsii</i>	Protected NC Schedule 2
EUPHORBIACEAE	<i>Euphorbia loricata</i>	Protected NC Schedule 2
ASTERACEAE	<i>Euryops lateriflorus</i>	
ASTERACEAE	<i>Felicia filifolia</i>	
ASTERACEAE	<i>Felicia muricata</i>	
APOCYNACEAE	<i>Gomphocarpus fruticosus</i>	Protected NC Schedule 2, CNECO Schedule 2
ASTERACEAE	<i>Gorteria alienata</i>	

AMARYLLIDACEAE	<i>Haemanthus coccineus</i>	Protected NC Schedule 2, CNECO Schedule 2
ASTERACEAE	<i>Helichrysum asperum</i>	
ASTERACEAE	<i>Helichrysum luteoalbum</i>	
MALVACEAE	<i>Hermannia vestita</i>	
MALVACEAE	<i>Lacomucinaea lineata</i>	
(MESEMBRYANTHEMACEAE) now AIZOACEAE	<i>Leipoldtia schultzei</i>	Protected NC Schedule 2, CNECO Schedule 2
ASTERACEAE	<i>Leysera gnaphalodes</i>	
SOLANACEAE	<i>Lycium cinereum</i>	
LAMIACEAE	<i>Mentha aquatica</i>	
GERANIACEAE	<i>Monsonia crassicaulis</i>	
RUBIACEAE	<i>Nenax microphylla</i>	
ASTERACEAE	<i>Oedera genistifolia</i>	
ASTERACEAE	<i>Othonna auriculifolia</i>	
OXALIDACEAE	<i>Oxalis burkei</i>	Protected NC Schedule 2
OXALIDACEAE	<i>Oxalis melanosticta</i>	Protected NC Schedule 2
OXALIDACEAE	<i>Oxalis pocockiae</i>	Protected NC Schedule 2
GERANIACEAE	<i>Pelargonium abrotanifolium</i>	Protected NC Schedule 1
GERANIACEAE	<i>Pelargonium articulatum</i>	Protected NC Schedule 1
GERANIACEAE	<i>Pelargonium carnosum</i>	Protected NC Schedule 1
ASTERACEAE	<i>Pentzia incana</i>	
	<i>Psora crenata</i>	
ASTERACEAE	<i>Pteronia empetrifolia</i>	
ASTERACEAE	<i>Pteronia glauca</i>	
(MESEMBRYANTHEMACEAE) now AIZOACEAE	<i>Ruschia intricata</i>	Protected NC Schedule 2, CNECO Schedule 2
ANACARDIACEAE	<i>Searsia lancea</i>	
ANACARDIACEAE	<i>Searsia longispina</i>	
ASTERACEAE	<i>Pteronia incana</i>	
SCROPHULARIACEAE	<i>Selago densiflora</i>	
SCROPHULARIACEAE	<i>Selago subspinosa</i>	
LAMIACEAE	<i>Stachys rugosa</i>	
POACEAE	<i>Tenaxia stricta</i>	
CRASSULACEAE	<i>Tylecodon paniculatus</i>	Protected NC Schedule 2
CRASSULACEAE	<i>Tylecodon reticulatus</i>	Protected NC Schedule 2
CRASSULACEAE	<i>Tylecodon wallichii</i>	Protected NC Schedule 2
FABACEAE	<i>Wiborgia monopectera</i>	
Lichen	<i>Xanthoparmelia hottentotta</i>	

Appendix 2: List of protected tree species (National Forests Act).

<i>Vachellia erioloba</i>	<i>Vachellia haematoxylon</i>
<i>Adansonia digitata</i>	<i>Azelia quanzensis</i>
<i>Balanites subsp. maughamii</i>	<i>Barringtonia racemosa</i>
<i>Boscia albitrunca</i>	<i>Brachystegia spiciformis</i>
<i>Breonadia salicina</i>	<i>Bruguiera gymnorhiza</i>
<i>Cassipourea swaziensis</i>	<i>Catha edulis</i>
<i>Ceriops tagal</i>	<i>Cleistanthus schlechteri</i> var. <i>schlechteri</i>
<i>Colubrina nicholsonii</i>	<i>Combretum imberbe</i>
<i>Curtisia dentata</i>	<i>Elaeodendron (Cassine) transvaalensis</i>
<i>Erythrophysa transvaalensis</i>	<i>Euclea pseudebenus</i>
<i>Ficus trichopoda</i>	<i>Leucadendron argenteum</i>
<i>Lumnitzera racemosa</i> var. <i>racemosa</i>	<i>Lydenburgia abottii</i>
<i>Lydenburgia cassinoides</i>	<i>Mimusops caffra</i>
<i>Newtonia hildebrandtii</i> var. <i>hildebrandtii</i>	<i>Ocotea bullata</i>
<i>Ozoroa namaensis</i>	<i>Philenoptera violacea (Lonchocarpus capassa)</i>
<i>Pittosporum viridiflorum</i>	<i>Podocarpus elongatus</i>
<i>Podocarpus falcatus</i>	<i>Podocarpus henkelii</i>
<i>Podocarpus latifolius</i>	<i>Protea comptonii</i>
<i>Protea curvata</i>	<i>Prunus africana</i>
<i>Pterocarpus angolensis</i>	<i>Rhizophora mucronata</i>
<i>Sclerocarya birrea</i> subsp. <i>caffra</i>	<i>Securidaca longependunculata</i>
<i>Sideroxylon inerme</i> subsp. <i>inerme</i>	<i>Tephrosia pondoensis</i>
<i>Warburgia salutaris</i>	<i>Widdringtonia cedarbergensis</i>
<i>Widdringtonia schwarzii</i>	

No species have a geographical distribution that includes the study area.

Appendix 3: Flora protected under the Northern Cape Nature Conservation Act No. 9 of 2009.

SCHEDULE 1: SPECIALLY PROTECTED SPECIES

As per the Northern Cape Nature Conservation Act, No. 9 of 2009, Schedule 1

Family: AMARYLLIDACEAE	
<i>Clivia mirabilis</i>	Oorlofskloof bush lily / Clivia
<i>Haemanthus graniticus</i>	April fool
<i>Hessea pusilla</i>	
<i>Strumaria bidentata</i>	
<i>Strumaria peryae</i>	
Family: ANACARDIACEAE	
<i>Ozoroa</i> spp.	All species
Family: APIACEAE	
<i>Centella tridentata</i>	
<i>Chamarea snijmaniae</i>	
Family: APOCYNACEAE	
<i>Hoodia gordonii</i>	
<i>Pachypodium namaquanum</i>	Elephant's trunk
Family: ASPHODOLACEAE	
<i>Aloe buhrii</i>	
<i>Aloe dichotoma</i>	
<i>Aloe dichotoma</i> var. <i>rumosissima</i>	Maiden quiver tree
<i>Aloe dabenorisana</i>	
<i>Aloe erinacea</i>	
<i>Aloe meyeri</i>	
<i>Aloe pearsonii</i>	
<i>Aloe pillansii</i>	
<i>Trachyandra prolifera</i>	
Family: ASTERACEAE	
<i>Athanasia adenantha</i>	
<i>Athanasia spathulata</i>	
<i>Cotula filifolia</i>	
<i>Euryops mirus</i>	
<i>Euryops rosulatus</i>	
<i>Euryops virgatus</i>	
<i>Felicia diffusa</i> subsp. <i>khamiesbergensis</i>	
<i>Othonna armiana</i>	
Family: CRASSULACEAE	
<i>Tylecodon torulosus</i>	
Family: DIOSCORACEAE	
<i>Dioscorea</i> spp.	Elephant's foot, all species
Family: ERIOSPERMACEAE	
<i>Eriospermum erinum</i>	
<i>Eriospermum glaciale</i>	
Family: FABACEAE	
<i>Amphithalea obtusiloba</i>	
<i>Lotononis acutiflora</i>	

<i>Lotononis polycephala</i>	
<i>Lessertia</i> spp.	
<i>Sceletium tortuosum</i> (=Aizoaceae, <i>Mesembryanthemum tortuosum</i>)	
<i>Sutherlandia</i> spp.	Cancer Bush, all species
<i>Wiborgia fusca</i> subsp. <i>macrocarpa</i>	
Family: GERANIACEAE	
<i>Pelargonium</i> spp.	Pelargonium, all species
Family: HYACINTHACEAE	
<i>Drimia nana</i>	
<i>Ornithogalum bicornutum</i>	
<i>Ornithogalum inclusum</i>	
Family: IRIDACEAE	
<i>Babiana framesii</i>	
<i>Ferraria kamiesbergensis</i>	
<i>Freesia marginata</i>	
<i>Geissorhiza subrigida</i>	
<i>Hesperantha minima</i>	
<i>Hesperantha oligantha</i>	
<i>Hesperantha rivulicola</i>	
<i>Lapeirousia verecunda</i>	
<i>Moraea kamiesensis</i>	
<i>Moraea namaquana</i>	
<i>Romulea albiflora</i>	
<i>Romulea discifera</i>	
<i>Romulea maculata</i>	
<i>Romulea rupestris</i>	
Family: MOLLUGINACEAE	
<i>Hypertelis trachysperma</i>	
<i>Psammotropha spicata</i>	
Family: ORCHIDACEAE	
<i>Corycium ingeanum</i>	
<i>Disa macrostachya</i>	Disa
Family: OXALIDACEAE	
<i>Oxalis pseudo-hirta</i>	Sorrel
Family: PEDALIACEAE	
<i>Harpagophytum</i> spp.	Devils' claw
Family: POACEAE	
<i>Prionanthium dentatum</i>	
<i>Secale strictum</i> subsp. <i>africanum</i>	Wild rye
Family: PROTEACEAE	
<i>Leucadendron meyerianum</i>	Tolbos
<i>Mimetes</i> spp.	All species
<i>Orothamnus zeyheri</i>	
Family: ROSACEAE	
<i>Cliffortia arborea</i>	Sterboom
Family: SCROPHULARIACEAE	
<i>Charadrophila capensis</i>	Cape Gloxinia
Family: STANGERIACEAE	
<i>Stangeria</i> spp.	Cycads, all species
Family: ZAMIACEAE	
<i>Encephalartos</i> spp.	Cycads, all species

SCHEDULE 2: PROTECTED SPECIES

As per the Northern Cape Nature Conservation Act, No. 9 of 2009, Schedule 2

Family: ACANTHACEAE	
<i>Barleria paillosa</i>	
<i>Monechme saxatile</i>	
<i>Peristrophe spp.</i>	All species
Family: ADIANTHACEAE	
<i>Adiantum spp.</i>	Maidenhair Fern, all species
Family: AGAPANTHACEAE	
<i>Agapanthus spp.</i>	All species
Family: (MESEMBRYANTHEMACEAE) AIZOACEAE	All species
Family: AMARYLLIDACEAE	All species except those listed in Schedule 1
Family: ANTHERICACEAE	All species
Family: APIACEAE	All species except those listed in Schedule 1
Family: APOCYNACEAE	All species except those listed in Schedule 1
Family: AQUIFOLIACEAE	All species
<i>Ilex mitis</i>	
Family: ARACEAE	
<i>Zantedeschia spp.</i>	Arum lilies, all species
Family: ARALIACEAE	
<i>Cussonia spp.</i>	Cabbage trees, all species
Family: ASPHODOLACEAE	All species except those listed in Schedule 1 and the species <i>Aloe ferox</i>
Family: ASTERACEAE	
<i>Helichrysum jubilatatum</i>	
<i>Felicia deserti</i>	
<i>Gnaphalium simii</i>	
<i>Lopholaena longipes</i>	
<i>Senecio albo-punctatus</i>	
<i>Senecio trachylaenus</i>	
<i>Trichogyne lerouxiae</i>	
<i>Tripteris pinnatilobata</i>	
<i>Troglodyton acocksianum</i>	
<i>Vellereophyton lasianthum</i>	
Family: BURMANNIACEAE	
<i>Burmannia madagascariensis</i>	Wild ginger
Family: BURSERACEAE	
<i>Commiphora spp.</i>	All species
Family: CAPPARACEAE	
<i>Boscia spp.</i>	Shepherd's trees, all species
Family: CARYOPHYLLACEAE	
<i>Dianthus spp.</i>	All species
Family: CELASTRACEAE	
<i>Gymnosporia spp.</i>	All species
Family: COLCHICACEAE	
<i>Androcymbium spp.</i>	All species
<i>Gloriosa spp.</i>	All species
Family: COMBRETACEAE	
<i>Combretum spp.</i>	All species
Family: CRASSULACEAE	All species except those listed in Schedule 1
Family: CUPPRESSACEAE	
<i>Widdringtonia spp.</i>	Wild cypress, all species

Family: CYATHEACEAE	
<i>Cyathea</i> spp.	Tree ferns, all species
<i>Cyathea capensis</i>	Tree Fern
Family: CYPERACEAE	
<i>Carex acocksii</i>	
Family: DROSERACEAE	
<i>Drosera</i> spp.	Sundews, all species
Family: DRYOPTERIDACEAE	
<i>Rumohra</i> spp.	Seven Weeks Fern, all species
Family: ERICACEAE	Erica, all species
Family: EUPHORBIACEAE	
<i>Alchornea laxiflora</i>	Venda Bead-string
<i>Euphorbia</i> spp.	All species
Family: FABACEAE	
<i>Aspalathus</i> spp.	Tea Bush, all species
<i>Erythrina zeyheri</i>	Ploughbreaker
<i>Argyrolobium petiolare</i>	
<i>Caesalpinia bracteata</i>	
<i>Calliandra redacta</i>	
<i>Crotalaria pearsonii</i>	
<i>Indigofera limosa</i>	
<i>Lebeckia bowieana</i>	
<i>Polhillia involucrate</i>	
<i>Rhynchosia emarginata</i>	
<i>Wiborgia humilis</i>	
Family: HYACINTHACEAE	
<i>Daubinya</i> spp.	
<i>Lachenalia</i> spp.	Daubinya, all species
<i>Veltheimia</i> spp.	Violtjie, all species
<i>Eucomis</i> spp.	Pineapple flower, all species
<i>Neopatersonia namaquensis</i>	
<i>Ornithogalum</i> spp.	All species
Family: IRIDACEAE	All species except those listed in Schedule 1
Family: LAURACEAE	
<i>Ocotea</i> spp.	Stinkwood, all species
Family: MESEMBRYANTHEMACEAE	All species
Family: MELIACEAE	
<i>Nymania capensis</i>	Chinese Lantern
Family: OLEACEAE	
<i>Olea europea</i> subsp. <i>africana</i>	Wild olive
Family: ORCHIDACEAE	Orchids, all species except those listed in Schedule 1
Family: OROBANCHACEAE	
<i>Harveya</i> spp.	Harveya, all species
Family: OXALIDACEAE	
<i>Oxalis</i> spp.	Sorrel, all species except those listed in Schedule 1
Family: PLUMBAGINACEAE	
<i>Afrolimon namaquanum</i>	
Family: POACEAE	
<i>Brachiaria dura</i> var. <i>dura</i>	
<i>Dregeochloa calviniensis</i>	
<i>Pentaschistis lima</i>	
Family: PODOCARPACEAE	

<i>Podocarpus spp.</i>	Yellowwoods, all species
Family: PORTULACACEAE	
<i>Anacampseros spp.</i>	All species
<i>Avonia spp.</i>	All species
<i>Portulaca foliosa</i>	
Family: PROTEACEAE	All species except those listed in Schedule 1
Family: RESTIONACEAE	All species
Family: RHAMNACEAE	
<i>Phyllica spp.</i>	All species
Family: RUTACEAE	
<i>Agathosma spp.</i>	Buchu, all species
Family: SCROPHULARIACEAE	
<i>Diascia spp.</i>	All species
<i>Halleria spp.</i>	All species
<i>Jamesbrittenia spp.</i>	All species
<i>Manulea spp.</i>	All species
<i>Nemesia spp.</i>	All species
<i>Phyllopodium spp.</i>	All species
<i>Polycarena filiformis</i>	
<i>Chaenostoma longipedicellatum</i>	
Family: STRELITZIACEAE	
<i>Strelitzia spp.</i>	All species
Family: TECOPHILACEAE	
<i>Cyanella spp.</i>	All species
Family: THYMELAEACEAE	
<i>Gnidia leipoldtii</i>	
Family: ZINGIBERACEAE	
<i>Siphonochilus aethiopicus</i>	Wild ginger

Appendix 4: 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
<i>Pachypodium namaquanum</i>	Halfmens (currently listed as LC)
Family: GESNERIACEAE	
<i>Charadrophila capensis</i>	Cape Gloxinia (currently listed as Rare)
Family: LILIACEAE	
<i>Aloe pillansii</i>	Now called <i>Aloidendron pillansii</i> , currently listed as Endangered
<i>Aloe buhrii</i>	Currently listed as Vulnerable
<i>Aloe erinacea</i>	Now called <i>Aloe melanacantha</i> , currently listed as Least Concern
Family: PROTEACEAE	
<i>Mimetes capitulates</i>	Currently listed as Endangered
<i>Mimetes hottentoticus</i>	Currently listed as Critically Endangered
<i>Mimetes stokoei</i>	Currently listed as Critically Endangered
<i>Orothamnus zeyheri</i>	Currently listed as Vulnerable
<i>Protea odorata</i>	Currently listed as Critically Endangered
Family: STANGERIACEAE	
<i>Stangeria eriopus</i>	Bobbejaankos (currently listed as Vulnerable)
Family: ZAMIACEAE	
<i>Encephalartos spp.</i>	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
<i>Ilex mitis</i>	
Family: ARACEAE	
<i>Zantedeschia elliottiana</i>	Yellow arum lily (currently DDT)
Family: ASCLEPIADACEAE (now Apocynaceae)	All species
Family: BORAGINACEAE	
<i>Echiostachys spicatus</i>	
Family: BRUNIACEAE	All species
Family: COMPOSITAE (now Asteraceae)	
<i>Senecio colyphyllous (coleophyllous?)</i>	
<i>Cotula duckettae</i>	
Family: CRASSULACEAE	
<i>Crassula columnaris</i>	
<i>Crassula perfoliata</i>	
<i>Crassula pyramidalis</i>	
<i>Kalanchoe thyrsiflora</i>	
<i>Rochea coccinea (now Crassula cochinea)</i>	

Family: CUNONIACEAE	
<i>Cunonia capensis</i>	
<i>Platylophus trifoliatus</i>	
Family: DIOSCOREACEAE	
<i>Testudinaria sylvatica (now Dioscorea sylvatica)</i>	
<i>Testudinaria elephantipes (now Dioscorea elephantipes)</i>	
Family: ERICACEAE	All species
Family: EUPHORBIACEAE	
<i>Euphorbia bupleurifolia</i>	
<i>Euphorbia fasciculata</i>	
<i>Euphorbia globosa</i>	
<i>Euphorbia horrida</i>	
<i>Euphorbia meloformis</i>	
<i>Euphorbia obesa</i>	
<i>Euphorbia schoenlandii</i>	
<i>Euphorbia symmetrica</i>	
<i>Euphorbia valida</i>	
Family: GEISSOLOM(AT)ACEAE	All species
Family: GESNERIACEAE	
<i>Streptocarpus</i>	All species
Family: GRAMINAE (now Poaceae)	
<i>Arundinaria tessellata (Thamnocalamus tessellatus)</i>	
<i>Secale africanum (now Secale strictum subsp. africanum)</i>	
Family: GRUBBIACEAE	All species
Family: IRIDACEAE	All species
Family: LEGUMINOSAE (now Fabaceae)	
<i>Erythrina acanthocarpa</i>	
<i>Erythrina humeana</i>	
<i>Liparia comantha</i>	
<i>Liparia sphaerica</i>	
<i>Liparia splendens</i>	
<i>Podalyria calyptrata</i>	
<i>Priestleya vestita</i>	
<i>Priestleya tomentosa</i>	
Family: LILIACEAE (now split into a number of families)	
All species of the genus ALOE except those specified in Schedule 3 and the species <i>Aloe ferox</i>	
<i>Gasteria beckeri</i>	
<i>Gloriosa superba</i>	
All species of the genus <i>Haworthia</i>	
All species of the genus <i>Kniphofia</i>	
All species of the genus <i>Lachenalia</i>	
<i>Littonia modesta</i>	
<i>Sandersonia aurantiaca</i>	
All species of the genus <i>Veltheimia</i>	
<i>Agapanthus walshii</i>	
<i>Daubenya aurea</i>	
Family: MELIACEAE	
<i>Nymania capensis</i>	

Family: MESEMBRYANTHEMACEAE (now Aizoaceae)	All species
Family: MUSACEAE (now Strelitziaceae)	
<i>Strelitzia</i>	All species
Family: NYMPHAEACEAE	
<i>Nymphaea capensis (now N. nouchali)</i>	
Family: ORCHIDACEAE	All species
Family: OXALIDACEAE	
<i>Oxalis nutans (no such species)</i>	
Family: PENAECACEAE	All species
Family: POLYGALACEAE	
<i>Muraltia minuta</i>	
Family: POLYPODIACEAE	
<i>Adiantum (now Family Pteridaceae)</i>	All species
<i>Hemitelia capensis (now Alsophila capensis, Family Cyathaceae)</i>	
<i>Polystichum adiantiforme (now Rumohra adiantiformis, Family Dryopteridaceae)</i>	
Family: PORTULACACEAE	
<i>Anacampseros (now Family Anacampserotaceae)</i>	All species
Family: PROTEACEAE	
All species	
Family: RANUNCULACEAE	
<i>Anemone capensis (now A.tenuifolia)</i>	
Family: RESTIONACEAE	
<i>Chondropetalum</i>	
<i>Acockii pillans (no such species)</i>	
<i>Elegia fenestrata</i>	
<i>Restio acockii</i>	
<i>Restio micans</i>	
<i>Restio sabulosus</i>	
Family: RETZIACEAE (now Stilbaceae)	
<i>Retzia capensis</i>	
Family: RHAMNACEAE	
<i>Phyllica pubescens</i>	
Family: RORIDULACEAE	All species
Family: RUTACEAE	All species
Family: SCROPHULARIACEAE	
<i>Diascia</i>	All species
<i>Harveya</i>	All species
<i>Nemesia strumosa</i>	
<i>Halleria</i>	All species
Family: THYMELAEACEAE	
<i>Lachnaea aurea</i>	

Appendix 5: 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

Diaphanathe 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
Merwillia 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