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Pri.Sci.Nat # 400045/08

BOTANICAL AND TERRESTRIAL BIODIVERSITY ASSESSMENT OF PROPOSED NEW CULTIVATION ON REMAINDER OF PTN 6 OF RIETVALLEI 115, ROBERTSON.

Submitted to: Green 360 Environmental, Melkbosstrand

23 Nov 2023

DECLARATION OF INDEPENDENCE

In terms of Chapter 5 of the National Environmental Management Act of 1998 specialists involved in Impact Assessment processes must declare their independence and include an abbreviated Curriculum Vitae.

I, N.A. Helme, do hereby declare that I am financially and otherwise independent of the client and their consultants, and that all opinions expressed in this document are substantially my own, notwithstanding the fact that I have received fair remuneration from the client for preparation of this report.

NA Helme

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

Abridged CV:

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Since 1997 I have been based in Cape Town, and have been working as a specialist botanical consultant, specialising in the diverse flora of the great Cape Floristic Region. Since the end of 2001 I have been working on my own and trade as Nick Helme Botanical Surveys.

A selection of previous work undertaken in the region is indicated below:

- Botanical 24g assessment for farm Erfdeel 424, Ceres (PHS Consulting 2023)

- Botanical assessment of proposed dams and cultivation on Laastedrif farm, Ceres (Eco Balance Planning Co. 2023)
- Botanical assessment of proposed development on Ptn 29 of Farm 410 Caledon (PHS Consulting 2022)
- Botanical assessment of proposed development on Ptn 10 of Broken Hill 88, Heidelberg (Isikhova 2021)
- Botanical assessment of Ptns 3 & 6 of Farm 563 Kleinmond (Lornay Environmental 2021)
- Botanical assessment of Ptn 9 of Farm 429 Gabrielskloof, Caledon (Infinity Environmental 2021)
- Baseline ecological assessment of Karwyderskraal 584, Caledon (Terramanzi 2021)
- Botanical impact assessment of proposed development of Ptn 29 of Farm 410, Caledon (PHS Consulting 2021)
- Botanical assessment of proposed new limestone mine on Vaderlandsche Rietkuil 308, Vanrhynsdorp (Cape Lime 2021)
- Terrestrial Ecology impact assessment of proposed Zandheuvel phosphate mine, Saldanha (Exigo3 2020)
- Botanical assessment of proposed new cultivation on Welbedacht farm, Tra Tra Mountains (Footprint Environmental 2020)
- Botanical assessment of Mooreesburg WWTW expansion (Aurecon 2020)
- Botanical assessment of proposed new cultivation on Portion of Wittewater 148, Piketberg (Cornerstone Environmental 2019)
- Botanical assessment of Droogerivier farm Leipoldtville (Footprint Environmental 2018)
- Botanical assessment of Sebulon farm, Redelinghuys (Natura Libra Environmental Services 2018)
- Botanical assessment of proposed gypsum prospecting on Ptn 4 of Farm 256, Vanrhynsdorp (Venatouch 2016)
- Botanical assessment of proposed cultivation on Farm Andriesgrond, Clanwilliam (Cederberg Environmental Assessment Practise 2015)
- Assessment of proposed Elandsfontein phosphate mine, east of Langebaan (Braaf Environmental 2014)
- Botanical impact assessment of proposed Zirco mineral sand mine west of Garies, Northern Cape (CES 2014)
- Botanical assessment of Remainder of Farm Draaihoek 293, Vredendal (Cederberg Environmental Assessment Practise 2013)

- Botanical assessment of Farm Gideonsooord 303, Klawer (Cederberg Environmental Assessment Practise 2013)
- Botanical baseline study for proposed Namakwa Sands expansion, Brand se Baai (SRK Consulting 2012)
- Scoping study of proposed Karookop Wind Energy Facility near Vredendal (CSIR 2012)
- Botanical assessments for various proposed limestone & gypsum prospecting areas in the Knersvlakte (Vapopart & Tulsanite (Pty) Ltd 2012)
- Scoping study of proposed Photovoltaic Solar Energy Facility near Graafwater (Savannah Environmental 2012)
- Scoping study of proposed Olifants River Wind Energy Facility near Lutzville (Savannah Environmental 2011)

TABLE OF CONTENTS

1. INTRODUCTION

This botanical and terrestrial biodiversity assessment was commissioned as part of the environmental authorisation process being followed for the proposed new cultivation on Remainder of Ptn 6 of Farm Rietvallei 115, in the Robertson area, (see Figure 1). The 73ha study area is about 6km east of Robertson, in the Western Cape.

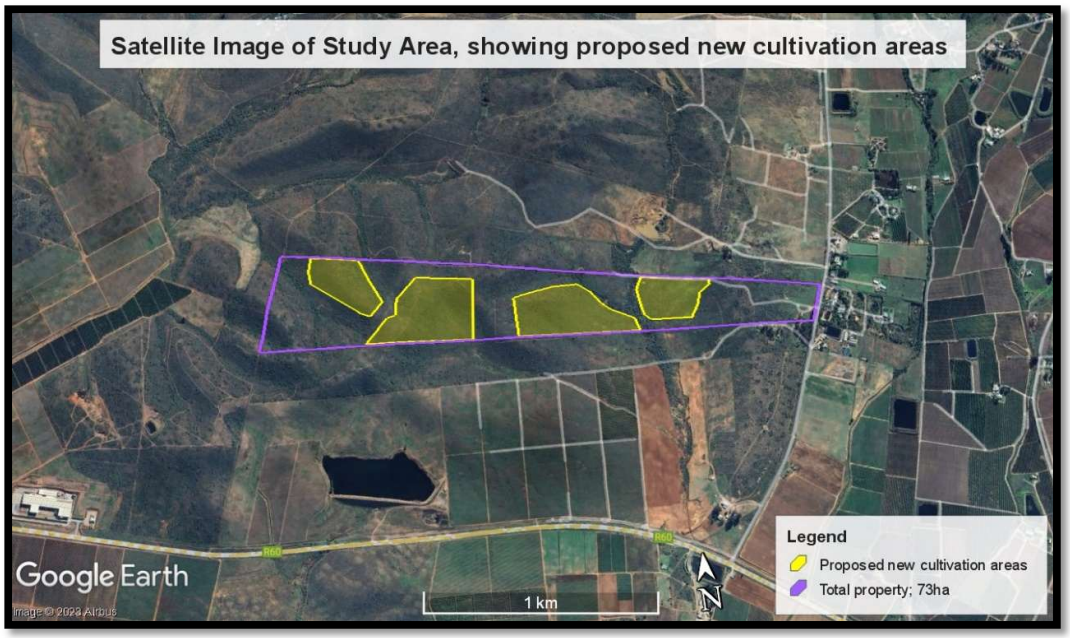

Figure 1: Satellite image showing the extent and position of the 73ha study area, plus the proposed 30ha of new cultivation.

2. TERMS OF REFERENCE

The terms of reference for this study were as follows:

- Undertake a site visit (ideally in late winter/spring) to assess the vegetation and fauna on the property
- Identify and describe the vegetation and fauna in the study area and place it in a regional context, including its status in terms of the relevant Spatial Biodiversity Plans (CBA/ ESA/ONA, etc)
- Identify and locate any (likely) plant and faunal Species of Conservation Concern in the study area, based on observation and literature and iNaturalist website review
- Provide an overview of the botanical and faunal conservation significance (sensitivity) of the study area

- Identify any sensitive faunal habitats and rare or threatened plant species that should be avoided
- Determine and describe any botanical and faunal constraints on development of the study area
- Identify and assess the likely botanical and faunal impacts of the proposed development, before and after mitigation (using standard IA methodology)
- Provide all mitigation requirements for any identified negative impacts on the faunal and flora should development take place.

3. LIMITATIONS, ASSUMPTIONS AND METHODOLOGY

The study area was first visited on 7 September 2021, and again on 16 Sep 2023. Both site visits were thus during the optimal spring flowering season in this strongly winter rainfall region. All perennial plant species were identifiable, and many (but not all) of the potential bulbs and annuals were also evident and identifiable. There is a low to medium likelihood that certain plant Species of Conservation Concern may have been overlooked due to the inevitable constraints associated with just one or two site visits to a fairly large site, notably some of the early and later flowering annuals and bulbs. The author believes that sufficient information was available to make an accurate assessment of the vegetation and its significance, and the confidence level in the accuracy of the findings is high.

The vegetation in the study areas was surveyed on foot, and all plant species were noted in the field, and various digital photographs were taken using a Fuji mirrorless slr camera. In some cases vouchers will be lodged in the Compton Herbarium (Kirstenbosch). The biodiversity website iNaturalist.org was consulted for additional records from the area, and my photographs were also uploaded to this website. Mapping was done directly onto satellite imagery, using the Fields Area Measure App on a Motorola smartphone, and these polygons were then exported to Google Earth for final mapping. Conclusions were drawn based on the available documentation and twenty five years of professional experience in the area and the region. Faunal observations during fieldwork were purely incidental, and no trapping or camera trapping was undertaken. Key faunal references are as noted in the text.

Google Earth aerial imagery dated May 2023 (and prior imagery) was used to verify vegetation patterns, and for mapping purposes. Google Earth was used to measure polygon areas.

It is assumed that all mitigation recommendations made in this report will be included as Conditions of Authorisation in any subsequent Record of Decision, and that they will be adequately and timeously implemented.

The No Go alternative would be no further cultivation or loss of vegetation in the study area. Cultivation assumes loss of all terrestrial biodiversity in that area. It is important to note that the proposed development layout in 4 nodes is the result of an iterative process undertaken over the last two years (with applicant, specialist and EAP), and whilst not ideal for the applicant (not the most cost effective layout) it was designed with ecological sustainability of the natural habitat on the greater property in mind. No alternative development layouts were prepared for assessment, thus mitigation generally refers to factors other than layout change (Search and Rescue, but also ecological corridor functionality).

4. STUDY AREA AND REGIONAL CONTEXT

Soils in the study area are generally deep to shallow loamy clays, derived from the underlying shales, with very different stony, sandstone alluvium in the eastern parts of the site. There is some exposed bedrock in small parts of the site, often on ridgetops. Seasonal drainage lines and associated wetlands are present, but are the focus of an additional specialist study. Altitudinal range is about 75m (210 – 285m), with most aspects present.

Plate 1: View (to the northwest) of undisturbed Robertson Karoo vegetation in the western part of the site. *Pentzia incana* (ankerkaroo) is dominant here.

Plate 2: View of Robertson Karoo on deeper soils in eastern part of the site, looking west. A previously disturbed area (yellowish green) is in the middle distance.

Plate 3: View of spring daisies in eastern parts of site, with *Gazania krebsiana* (orange) and *Gorteria piloselloides* (yellow) prominent.

Plate 4: View of undisturbed area dominated by *Euryops tenuissimus* (harpuis) and *Ruschia carollii*.

4.1 National and Regional Context

The site is part of the Rainshadow Valley Karoo bioregion, and is within the Succulent Karoo biome, which is itself a key part of what is now known as the Core Cape Region of the Greater Cape Floristic Region (GCFR; Manning & Goldblatt 2012). The GCFR is one of only six Floristic Regions in the world, and is the only one largely confined to a single country (the Succulent Karoo component extends into southern Namibia). It is also by far the smallest floristic region, occupying only 0.2% of the world's land surface, and supporting about 11500 plant species, over half of all the plant species in South Africa (on 12% of the land area). At least 70% of all the species in the Cape region do not occur elsewhere, and many have very small home ranges (these are known as narrow endemics). Many of the lowland habitats are under pressure from agriculture, urbanisation and alien plants, and thus many of the range restricted species are also under severe threat of extinction, as habitat is reduced to extremely small fragments. Data from the nationwide plant Red Listing process undertaken is that 67% of the threatened plant species in the country occur only in the southwestern Cape, and these total over 1800 species (Raimondo *et al* 2009)! It should thus be clear that the southwestern Cape is a major national and global conservation priority, and is quite unlike anywhere else in the country in terms of the number of threatened plant species.

The upper to middle Breede River valley (Tulbagh to Bonnievale) has a long history as a grape, fruit and vegetable growing area, and much of the low-lying land is now cultivated, and farmers are expanding into the surrounding areas, placing pressure on the remaining

areas of suitable habitat. The CapeNature Spatial Biodiversity Plan (Pence 2017) has mapped terrestrial and aquatic Critical Biodiversity Areas (CBAs) in the region, but most of the site is mapped as ONA (Other Natural Area) with some aquatic Critical Biodiversity Areas (CBA1) in the drainage lines (see Figure 2).

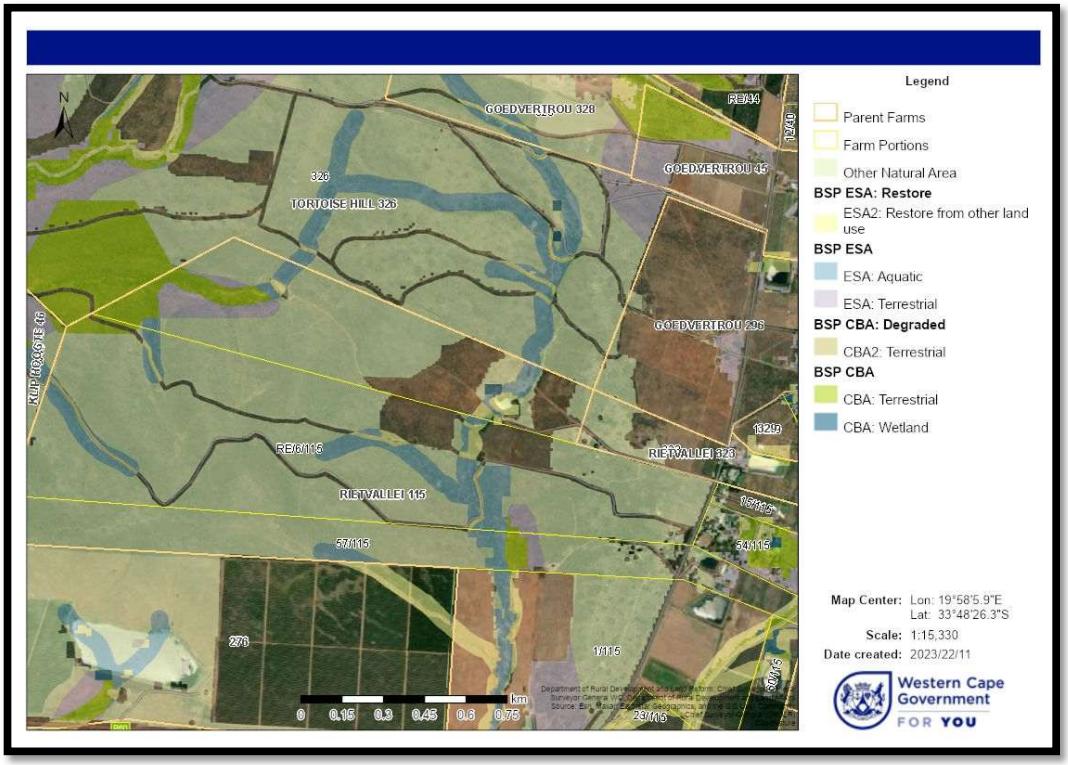

Figure 2: Extract of the CapeNature Spatial Biodiversity Plan (Pence 2017), showing that most of the site is mapped as ONA (Other Natural Area) with some aquatic Critical Biodiversity Areas (CBA1) in the drainage lines.

5. DESCRIPTION OF THE VEGETATION ON SITE

The SA Vegetation Map (Mucina & Rutherford 2006 and online updates; see Figure 3) shows that most of the original natural vegetation in the study area is **Robertson Karoo**, with a small area of **Breede Shale Renosterveld** in the eastern area, and the author generally agrees with this. No copy of this vegetation is shown as it adds little value. The valleys to the east and west supported Breede Alluvium Renosterveld, but much of this is now lost to cultivation.

Robertson Karoo is currently gazetted as Least Concern on a national basis (Government of South Africa 2022). This unit has less than 84% of its total original extent still remaining, <1% is formally conserved, and the national

conservation target is 16% (Rouget *et al* 2004). The low level of conservation means that the unit is vulnerable to further habitat loss, notably from agriculture and mining, as most of the land is in private ownership, and is experiencing rapid, ongoing habitat loss.

Breede Shale Renosterveld is currently gazetted as Endangered on a national basis (Government of South Africa 2022). This unit has less than 69% of its total original extent still remaining, only 2% is formally conserved, and the national conservation target is 27% (Rouget *et al* 2004). The low level of conservation means that the unit is vulnerable to further habitat loss, notably from agriculture and mining, as most of the land is in private ownership, and is also experiencing rapid, ongoing habitat loss.

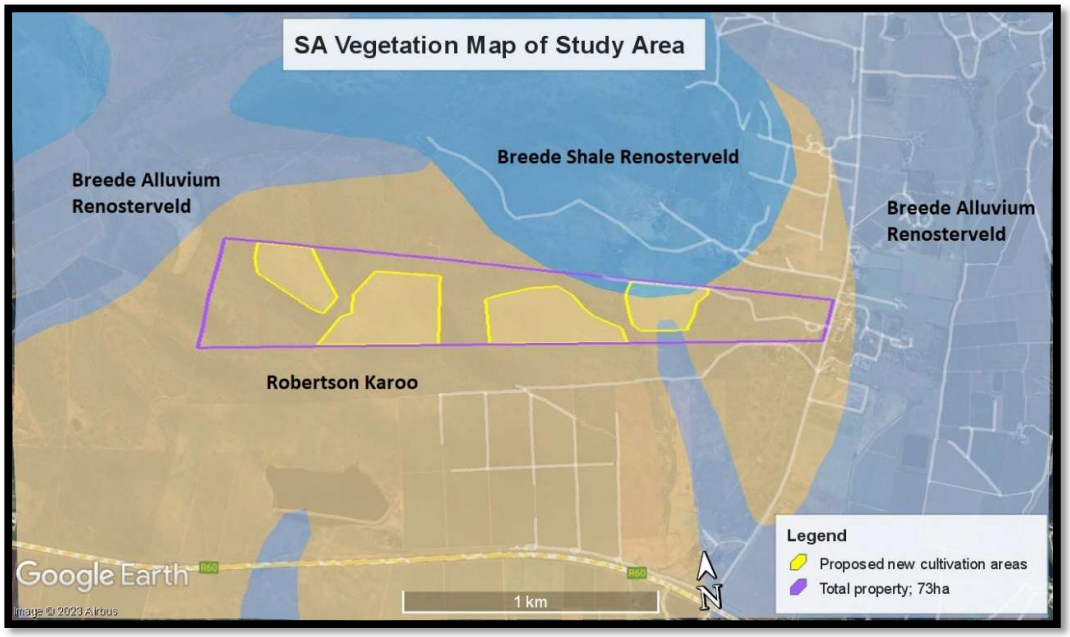

Figure 3: Copy of the SA Vegetation map of the study area.

The sandstone alluvium in the eastern quarter of the study area is species rich, and supports numerous (and high numbers of) dwarf succulents and geophytes, some of which are not present in the rest of the study area. This area is of High botanical sensitivity. The area is dominated by *Ruschia caroli, Aizoon africanum, Pteronia paniculata, P. incana, Gorteria integrifolia*, *Oxalis pes caprae, Pentzia incana, Euphorbia mauritanica, E. burmanii, Euryops tenuissimus, Hermannia cuneifolia, Oncosiphon suffruticosum* and *Chrysocoma ciliata*, with additional species *Chaenostoma revoluta, Carissa haematocarpa, Sarcostemma vimineus,*

Plantago afra, Dicerothamnus rhinocerotis, Gasteria disticha, Freesia refracta, Euclea undulata, Gloveria integrifolia, Searsia pallens, Lycium ferocissimum, Ehrharta calycina, E. delicatula, Asparagus capensis, A. rubicundus, Cotyledon orbiculata, Roepera foetida, Cleretum papulosum, Oxalis convexula, Ornithogalum hispidum, Helichrysum patulum, H. cymosum, H. rutilans, Ursinia anthemoides, Hesperantha cucullata, Massonia depressa, Senecio abbreviatus, Tetragonia sarcophylla, Albuca viscosa, A. canadensis, Eriospermum capense, Cephallophyllum purpureo-album, Diascia parviflora, Crassula atropurpurea, C. tetragona, C. subaphylla, Euphorbia nesemanii, Pelargonium luteolum, Moraea lewisiae, Ornithoglossum viride, Grielum humifusum, Wiborgia mucronata, Tylecodon paniculatus and *Ferraria crispa*.

Shale and alluvial silt soils dominate the western 75% of the site, with some 5ha of previously disturbed area east of the main drainage line, in the vicinity of the easternmost proposed development area. The vegetation is lower and sparser in this area, and more dominated by annuals (see Plate 3). Common species here include *Dicerothamnus rhinocerotis, Gorteria pilosellifolia, Oxalis pes caprae, Gazania krebsiana, Aizoon afrianum, Pteronia incana, Chrysocoma ciliata, Pentzia incana, Moraea miniata, Senecio burchellii, Crassula tetragona, Mesembryanthemum pallens, Arctotheca calendula, Ursinia anthemoides, Athanasia trifurcata, Diascia parviflora, Rhynchopsidium sessiliflorum, Oncosiphon suffruticosus* and *Lycium ferocissimum*.

In the rolling shale hills on the western 70% of the site there is a high diversity of typical Robertson Karoo plant species, with many different plant communities, depending mainly on aspect and soil depth. Typical species include *Dicerothamnus rhinocerotis*, *Ruschia carolii, Euryops tenuissimus, Pentzia incana, Euphorbia burmanii, Gazania krebsiana, Euclea undulata, Gloveria integrifolia, Lobostemon echioides, Oxalis pes-caprae, O. flava, O. stellata, O. obtusa, O. confertiifolia, O. convexula, Indigogera heterophylla, Drosanthemum asperulum, Pteronia paniculata, P. incana, Rhynchopsidium pumilum, Freesia refracta, Gladiolus permeabilis, Searsia pallens, Roepera spinosa, Hemimeris racemosa, Nemesia pageae, Freylinia undulata, Crassula atropurpurea, C. tetragona, Calobota cytisoides, Satyrium erectum, Tritonia pallida, Dodonaea angustifolia, Freesia caryophyllacea, Pelargonium abrotanifolium, P. lobatum, Gladiolus venustus, Senecio radicans, Anginon swellendamense, Curio acaulos, Bulbine praemorsum, Heliophila pendula, Geissorhiza sp., Ursinia anthemoides, Hesperantha cucullata, Cotyledon orbiculata, Oedera squarrosa, O. genistifolia,*

Chrysocoma ciliata, Felicia tenella, Helichrysum cymosum, H. rosum, Thesium spicatum, Albuca cooperi, Drimia capensis, Carissa haematocarpa, Oncosiphon suffruticosum, Ehrharta calycina, Holothrix secunda, Babiana patula, Cephalophyllum diversiphyllum, Pentzia incana, Hermannia amoena, Tylecodon paniculatus, Euphorbia nesemanii, Hyobanche sanguinea, Eriospermum proliferum, Eriocephalus africanus, Anisodontea fruticosa, Ficinia indica, F. nigrescens, Senecio sarcoides, Microloma sagittatum, Cotula laxa, Bulbine frutescens, Moraea gawleri, Freesia refracta, Sebaea exacoides, Tripteris aghillana and *Lycium ferocissimum*.

The riverine areas support thicket composed of *Vachellia karoo, Olea europaea* ssp*. cuspidata, Roepera foetida, Buddleja saligna* and *Searsia pallens*.

5.1 Plant Species of Conservation Concern (SoCC)

Four plant SOCC were recorded in the study area (see Table 1), and there is a Medium - High likelihood that other SoCC are present in the area, most of which are likely to be small bulbs. Partly due to the layout of the proposed development areas it is estimated that no more than 30% of the site populations of any one of these species will be lost to the proposed development, meaning that at least 70% of the site populations will be conserved on site, which is a good, conservative ratio.

Species	**Redlist Status**	**Estimated % of site population in development nodes**	**Notes**
Cephalophyllum diversiphyllum	Near Threatened	30%	>200 plants on site; moderate regional significance
Euphorbia nesemanii	Near Threatened	10%	<50 plts; moderate to high significance
Oxalis confertifolia	Data Deficient (taxonomy)	30%	>300 plants; low to moderate significance
Freesia caryophyllacea	Near Threatened	30%	>300 plants; moderate significance

Table 1: List of plant SoCC recorded in the area.

5.2 Botanical Conservation Value

The botanical conservation value of an area is a product of plant species diversity, plant community composition, rarity of habitat, degree of habitat degradation, rarity of species, ecological viability and connectivity, restoration potential and reversibility of threats.

The majority of the study area is mapped as High sensitivity, with the previously partly disturbed area being Medium sensitivity, and the eastern 2.3ha being Low sensitivity (see Figure 4).

Factors informing this assessment include the following: 1) the underlying vegetation type is still technically Least Threatened on a national basis, but is poorly conserved, and under constant threat of further loss (mainly to cultivation); 2) no mapped terrestrial Critical Biodiversity Areas occur within the study area, but there are some aquatic CBAs; 3) the recorded presence of at least four plant Species of Conservation Concern, most of which are quite widely scattered within the High sensitivity areas; 4) disturbance history; and 5) higher plant species and structural diversity in some areas.

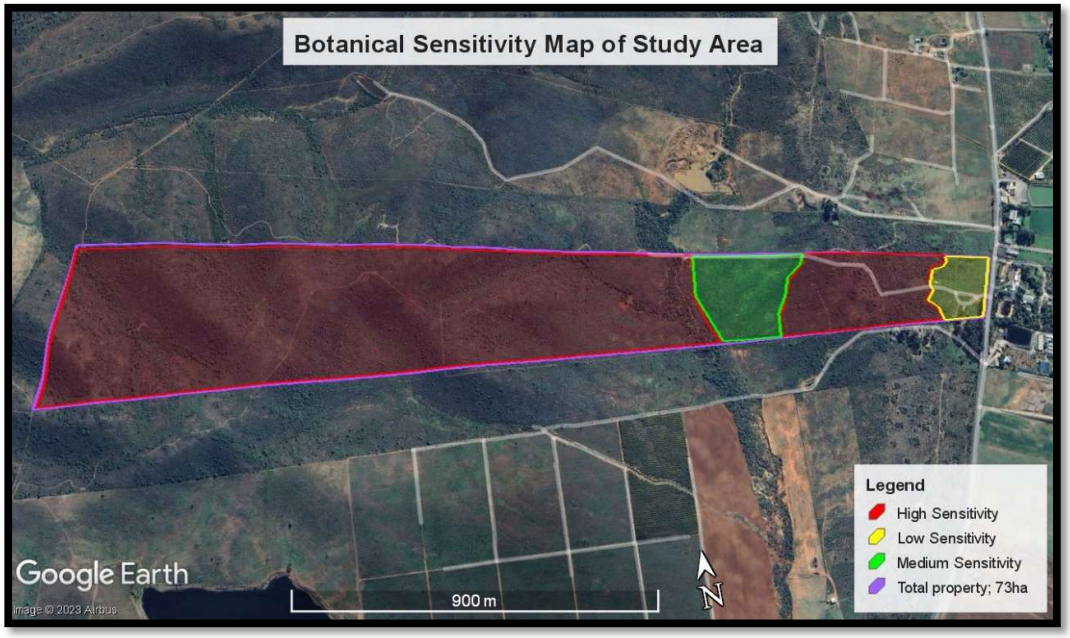

Figure 4: Botanical sensitivity map of the study area.

6. FAUNA

The site still supports a largely intact, diverse, typical Robertson Karoo fauna.

The avifauna is currently fairly typical of the region, and three Species of Conservation Concern (SoCC) have been recorded foraging in the study area. The avian SoCC recorded (pers. obs.) foraging nearby and on site are Black Harrier (*Circus maurus*; Regionally Endangered, Globally Vulnerable; Taylor *et al* 2015), Black Bustard (*Afrotis afra*; Vulnerable; previously known as Korhaan) and Blue Crane (*Anthropoides paradiseus*; regionally Near Threatened, Globally Vulnerable).

Fynbos endemics like Cape Sugarbird (*Promerops cafer*) and Orangebreasted Sunbird (*Anthobaphes violacea*) are absent as they are largely dependent on the diversity of *Protea* and *Erica* species for nectar, none of which are present on site. Malachite and Lesser Double Collared Sunbirds are however common.

There are no known confirmed records of threatened mammals, amphibians or reptiles from this particular property, although one or two may be present, but probably in very low numbers.

Three species of tortoise have been recorded in the area, and the region supports large populations of Angulate Tortoise (*Chersina angulata*; Least Threatened) and Leopard Tortoise (*Stigmochelys pardalis*; Least Threatened*),* with the Parrotbeak Padloper (*Homopus areolatus*) being less common*.*

No threatened frogs are likely to occur on site, with the most common species likely to be *Strongylopus grayii* (Clicking Stream Frog).

Steenbok (*Raphicerus campestris*), Common Duiker (*Sylvicapra grimmia),* Grysbok (*Raphicerus melanotis*), Aardvark (*Orycteropus afer*) are the most prominent mammals that still occur on site (all seen or spoor observed), and it is likely that lynx (*Felis caracal*) is still present as the largest predator.

No threatened butterfly species are likely to occur within the habitat on site (Mecenero *et al* 2013), but the site may support a high diversity of moths and butterflies, in addition to many other insects, some of which could be rare or localised, as insect diversity patterns in the Fynbos region often parallel plant

diversity patterns. Most other insect groups have not been assessed nationally for Redlist status. Honeybees (*Apis mellifera*) were very common on site in spring.

Faunal sensitivity is expected to largely mirror the botanical sensitivity (see Figure 4), as it is usually dependant on available habitat.

7. IMPACT ASSESSMENT

7.1 Identification and assessment of likely botanical impacts

The primary botanical impacts are those associated with the loss of the 30ha of natural vegetation, 90% of which is of High botanical sensitivity, and 10% of Medium sensitivity (see Figure 4). An additional impact will be the loss of part of the site subpopulations of the four recorded plant Species of Conservation Concern (see Table 1), which will range from 10-30% of the site subpopulations of these SoCC.

All botanical impacts are negative, at least until mitigation is factored in.

Primary mitigation involves the on-site conservation of the remaining approximately 30ha of mapped High sensitivity vegetation and about 0.7ha of the Medium sensitivity area, along with east – west and north – south ecological corridors.

<u>Construction Phase Impacts</u>

In the case of this project the primary construction phase impact is loss of natural vegetation and partly natural vegetation within the new 30ha agricultural development footprint.

For purposes of this assessment it is assumed that about 30ha of natural vegetation will be lost, 90% of which is of High botanical sensitivity, and 10% of Medium sensitivity. 90% of this will occur within a vegetation type classified as Least Threatened on a national basis (Robertson Karoo), but which is very poorly conserved (<1%) and subject to ongoing cumulative agricultural impacts. The remaining 10% will occur within what is mapped as Breede Shale Renosterveld, which is gazetted as Endangered (Government of South Africa 2022).

An additional impact will be the loss of an estimated 10-30% of the site subpopulations of at least four recorded plant Species of Conservation Concern (see Table 1).

The loss of about 5ha of natural vegetation of Medium conservation value (eastern node) is likely to be of Medium negative botanical significance, whereas the loss of another 35ha of High sensitivity natural vegetation (other three nodes) is likely to be of Medium to High botanical significance.

Given that there is little additional mitigation possible (other than that noted and required in Section 8) these impacts cannot be notably reduced.

Table 1 summarises this assessment. The magnitude of the impacts will be High (by definition, in that ecological functioning previously present in the development areas will be totally eliminated), duration will be permanent, and extent will be site specific (local).

Alternative	**Extent of impact**	**Duration of impact**	**Intensity**	**Probability of occurrence**	**Degree of confidence**	**Significance before mitigation**	**Significance after mitigation**
5ha cultivation in Medium sensitivity area	Local	Permanent	High	Definite	High	Medium negative	Medium negative
35ha cultivation in High sensitivity area, but with 30ha of on-site ecological corridors and conservation areas	Local	Permanent	High	Definite	High	Medium - High negative	Medium – High negative
No Go alternative	Local	Unknown; possibly temporary	Low (but unknown)	Low	Medium	Neutral	Not Applicable

Table 2: Impact table for Construction Phase botanical impacts associated with the proposed cultivation. Impacts include loss of natural vegetation, plus loss of portion of local sub-population of at least four plant Species of Conservation Concern (SCC).

Operational Phase Impacts

The most obvious operational phase impact will be increased habitat fragmentation and loss of some of the current unhindered terrestrial ecological connectivity across the study area. The overall intensity of this change is likely to

be low in a regional context, as the proposed layout has been designed to ensure good ecological corridors that run across the site both from east – west and north to south (something not generally done in other cultivation footprints in the area, most of which have almost zero ecological sensitivity).

The cultivation will not result in the loss of any major mapped terrestrial CBAs, but will result in loss of a small area (<1.5ha) of mapped terrestrial ESA1 (Ecological Support Area), and large areas mapped as ONA (Other Natural Area). Small areas of mapped aquatic CBA1 will be lost. Significance of the loss of these categories on site is deemed to be Low – Medium negative significance.

Pesticide and fertigation drift (under windy conditions often prevalent during crop spraying) into the adjacent natural veld is known to have a significant negative effect on the natural insect life and consequently on the pollination and seed set of various plants (Knight *et al* 2005; Pretorius 2010), and is thus likely to be an issue on this site, and although its magnitude is very difficult to assess it is likely to be relatively low. Runoff of excess fertiliser typically induces a rapid growth of weeds in areas within 5m of fields, which soon outcompete the natural vegetation in any areas where this occurs. This can be seen on the existing edges of cultivation in many areas.

The conservation of the approximately 30ha of High sensitivity natural vegetation on site, plus the functionality of the ecological corridors, can be viewed as a significant positive impact that takes place over the operational phase of the project, and in this regard it helps to reduce the negative operational phase impacts.

Overall, combined, operational phase botanical impacts are likely to be of Medium negative significance before mitigation, and Low to Medium negative after mitigation (which factors in the ecological corridors and conservation of 30ha of natural vegetation on site).

Alternative	Extent of impact	Duration of impact	Intensity	Probability of occurrence	Degree of confidence	Significance before mitigation	Significance after mitigation
40ha of cultivation in 4 nodes	Local	Permanent	Medium	Definite	High	Medium negative	Low to Medium negative
No Go alternative	Local	Unknown; possibly temporary	Low (but unknown)	Low	Medium	Neutral	Not Applicable

Table 3: Impact table for Operational Phase botanical impacts associated with the proposed cultivation. Impacts include habitat fragmentation, increased pressure on remaining natural areas, loss of mapped ONA, and pesticide and fertigation drift from fields (impact on pollinators, etc).

7.2 The No Go Alternative

The No Go alternative usually implies the continuation of the status quo (no cultivation). In this case this would be a preferred option from a botanical and ecological perspective, with no significant botanical or ecological impacts.

7.3 Cumulative Impacts

The cumulative botanical impacts of the 40ha of cultivation are understood to be broadly equivalent to the regional botanical impacts, in that the main vegetation type impacted by the development has been, and will continue to be, impacted by numerous agricultural developments and other factors (the cumulative impacts) within the region. Although agriculture is by far the most important factor causing habitat loss, additional cumulative factors include urbanisation, road construction and mining.

The overall cumulative botanical impact of the proposed development is Low to Medium negative in line with the post mitigation operational phase impact. However, without mitigation the cumulative impact is likely to be Medium negative.

7.4 Faunal Impacts

Construction Phase Impacts

In the case of this project the primary construction phase faunal impact is loss of natural vegetation and habitat within the new agricultural development footprint, along with potential direct loss of individuals of faunal species not able to move away fast enough. Loss of breeding habitat (often underground) and food source

(flowering plants) for insects is a key faunal impact of cultivation. Direct loss of faunal species and habitat is likely to have a **Medium negative impact** on many species, mitigated only by the fact that 40% of the site will remain as natural habitat.

No known faunal Species of Conservation Concern (SoCC) are likely to be lost on site, but at least three bird SoCC will be impacted (mostly at the operational phase), as all three occur in the area and presumably periodically visit the site. Given that about 40% of the site will remain as natural it's unlikely that the development will mean that these species no longer visit the site, but it can be assumed that it will become notably less suitable for them, as all three prefer undisturbed natural habitat, and do not use vineyards or orchards for foraging. The development impact on these three SoCC is likely to be **Low to Medium negative**.

Table 4 summarises this assessment. The magnitude of the impacts will be High (by definition, in that ecological functioning previously present in the development areas will be totally eliminated), duration will be permanent, and extent will be site specific (local).

Alternative	**Extent of impact**	**Duration of impact**	**Intensity**	**Probability of occurrence**	**Degree of confidence**	**Significance before mitigation**	**Significance after mitigation**
40ha cultivation	Local	Permanent	High	Definite	High	High negative	Medium negative
No Go alternative	Local	Unknown; possibly temporary	Low (but unknown)	Low	Medium	Neutral	Not Applicable

Table 4: Impact table for Construction Phase faunal impacts associated with the proposed cultivation. Impacts include loss of natural habitat and direct loss of species not able to move out.

Operational Phase Impacts

The most obvious operational phase impact is likely to be increased habitat fragmentation and partial loss of the currently complete terrestrial ecological connectivity across the study area.

The cultivation will not result in the loss of any mapped CBAs, but will result in loss of small areas of mapped ESA (Ecological Support Area), some aquatic CBA1, and large areas of ONA (Other Natural Area).

Pesticide and fertigation drift (under windy conditions often prevalent during spraying) into the adjacent natural veld is known to have a significant negative effect on the often diverse natural insect life and consequently on the pollination and seed set of various plants (Knight *et al* 2005; Pretorius 2010), and is thus likely to be an issue on this site and although its magnitude is very difficult to assess it is likely to be medium (local scale).

No known faunal Species of Conservation Concern (SoCC) are likely to be lost on site, but at least three bird SoCC will be impacted (mostly at the operational phase), as all three occur in the area and presumably periodically visit the site. Given that about 40% of the site will remain as natural it's unlikely that the development will mean that these species no longer visit the site, but it can be assumed that it will become notably less suitable for them, as all three prefer undisturbed natural habitat, and do not use vineyards or orchards for foraging. The development impact on these three SoCC is likely to be **Low to Medium negative**.

The conservation of the 30ha of natural habitat on site, plus the ecological corridors, can be viewed as a notable positive impact that takes place over the operational phase of the project, and in this regard it helps to reduce the negative operational phase impacts.

Overall, combined, operational phase faunal impacts are likely to be of High negative significance before mitigation, and Medium negative after mitigation.

Alternative	**Extent of impact**	**Duration of impact**	**Intensity**	**Probability of occurrence**	**Degree of confidence**	**Significance before mitigation**	**Significance after mitigation**
40ha cultivation	Local	Permanent	High	Definite	High	High negative	Medium negative
No Go alternative	Local	Unknown; possibly temporary	Low (but unknown)	Low	Medium	Neutral	Not Applicable

Table 5: Impact table for Operational Phase faunal impacts associated with the proposed cultivation. Impacts include habitat fragmentation, loss of ecological connectivity, less suitable habitat for three bird SoCC, increased pressure on remaining natural areas, and pesticide and fertigation drift from fields.

8. REQUIRED MITIGATION

The following is regarded as essential, feasible and reasonable mitigation and is factored into the assessment, and assumes that the negotiated layout as shown in Figure 1 (maximum of 30ha of cultivation, in 4 nodes) will be approved:

- No soil disturbance or loss of vegetation should take place outside the four approved development areas, and no further applications for cultivation on this property outside these four areas should be approved in the future.
- No dumping of rocks, soil or vegetation may occur within any of the natural (non-development) areas.
- Extensive botanical Search and Rescue of all translocatable bulbs and succulents (and any other translocatable species noted) should be undertaken from all approved development areas prior to land clearing. This should be undertaken by a specialist indigenous succulent and bulb grower approved by the botanist, and must take place for the bulbs at the end of the flowering season (late September - October), and for the succulents in late autumn (April – May). A very large amount of material (tons) will be available, and the applicant must ensure that there is adequate budget to support a sustained and comprehensive plant Search and Rescue program from site. The material cannot be used elsewhere on site (as it is already well vegetated) so the rescued material will have to be removed and sold off over time, perhaps for rehabilitation or landscaping projects in the region.
- The four nodes should be cleared sequentially, not at the same time, allowing even slower, burrowing animals enough time to move away.
- No animal species disturbed by the site clearing should be harmed, and should either be allowed to move away, or should be moved by hand to areas that will not be cleared.
- Many plant species (upwards of 30%) within the proposed cultivation areas are also legally Protected Species in terms of the CapeNature Ordinance. All the relevant permits will have to be obtained by the applicant before any land clearing is undertaken.

9. CONCLUSIONS AND RECOMMENDATIONS

- The development of 30ha of new cultivation in four nodes on site is likely to have a Medium – High negative botanical and faunal impact at a regional scale.
- Although most of the vegetation type on site (Robertson Karoo) is Least Threatened on a national basis it is still very poorly conserved (<1%), making it vulnerable to further loss (especially from agriculture, which is ongoing at pace in the region) unless steps are taken to address this.
- At least four plant Species of Conservation Concern (SoCC) are likely to be directly impacted by the proposed cultivation, as are three bird SoCC. However, no more than 10-30% of the site subpopulations of the plant SoCC will be lost, and the birds will still use the site, although perhaps less readily.
- The required mitigation has to a large degree already been built into the development proposal, which was deliberately broken up into four nodes to allow for ecological connectivity in all directions across the site, and the conservation of 40% of the vegetation and faunal habitat on site. Although the loss of 60% of the vegetation on site has a relatively high negative botanical impact the overall impact is significantly mitigated by the 30ha that will be conserved on site.
- All other mitigation, as outlined in Section 8, must be implemented correctly and timeously.

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