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Pri.Sci.Nat # 400045/08

BOTANICAL IMPACT ASSESSMENT OF PROPOSED DEVELOPMENT OF PORTION 3 OF FARM 781 BOTRIVER (ERIN DE VIGNE), WESTERN CAPE.

Compiled for: PHS Consulting, Hermanus

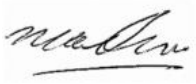
Client: Erin de Vigne (Pty) Ltd., Hermanus

20 July 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.



NA Helme

ABRIDGED CV:

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First names : NICHOLAS ALEXANDER
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University of Cape Town, South Africa. BSc (Honours) – Botany (Ecology & Systematics), 1990.

Since 1997 I have been based in Cape Town, and have been working as a specialist botanical consultant, specialising in the diverse flora of the south-western Cape. Since the end of 2001 I have been the Sole Proprietor of Nick Helme Botanical Surveys, and have undertaken over 1700 site assessments in this period.

A selection of relevant previous botanical work is as follows:

- 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 cultivation on Welbedacht farm, Tra Tra Mountains (Footprint Environmental 2020)

- Biodiversity Compliance Statement - Philippi erf 1/1460 (Infinity Environmental 2020)
- Botanical assessment of Kleinmond WWTW expansion (Aurecon 2020)
- Botanical assessment of Mooreesburg WWTW expansion (Aurecon 2020)
- Botanical assessment of Struisbaai cemetery sites (Infinity Environmental 2020)
- Botanical assessment of MoPama development site, Swellendam (Landscape Dynamics 2020)
- Botanical assessment of Ptn of Rem of Erf 1 Caledon (Theewaterskloof Municipality 2019)
- 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 new cultivation on Ptn 2 of farm Groenevalley 155, Piketberg (Cederberg Environmental Assessment Practise 2017)
- Botanical assessment of proposed new cultivation on Groot Patrysvlei, Clanwilliam (Cederberg Environmental Assessment Practise 2017)
- Botanical assessment of proposed new cultivation on farm Rosendal, Koue Bokkeveld (Cederberg Environmental Assessment Practise 2016)
- Botanical assessment of proposed cultivation on farm Kransvlei, Clanwilliam (Cederberg Environmental Assessment Practise 2016)
- Botanical assessment of proposed cultivation on farm Erfdeel, Bo-Swaarmoed, Ceres (Cederberg Environmental Assessment Practise 2016)
- Botanical assessment of proposed cultivation on farm Kransvlei and Kriedouberg, Clanwilliam (Cederberg Environmental Assessment Practise 2016)
- Botanical assessment of proposed prospecting areas on Raskraal 255, Vanrhynsdorp (Venatouch 2016)
- Botanical assessment of proposed dam expansion on farm De Vlei, De Doorns (Cederberg Environmental Assessment Practise 2015)
- Botanical assessment of proposed cultivation on Rem. Andriesgrond 204, Clanwilliam (Cederberg Environmental Assessment Practise 2015)
- Botanical assessment of proposed dam on Modderfontein farm, Citrusdal (Cederberg Environmental Assessment Practise 2015)

CONDITIONS RELATING TO THIS REPORT:

The methodology, findings, results, conclusions and recommendations in this report are based on the author's best scientific and professional knowledge, and on referenced material and available knowledge. Nick Helme Botanical Surveys and its staff reserve the right to modify aspects of the report, including the recommendations and conclusions, if and when additional relevant information becomes available.

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1. INTRODUCTION

This botanical impact assessment was requested to inform the environmental planning and authorisation process being followed for the proposed expansion of two existing dams and proposed expansion of agricultural development on Portion 3 of Farm 781 (known as Erin de Vigne), near Botriver, in the Western Cape. The study area is about 69ha in extent, and is about 4km south of Botriver. Two proposed development alternatives were considered, with most recent being the applicant's preferred alternative (Figure 2).

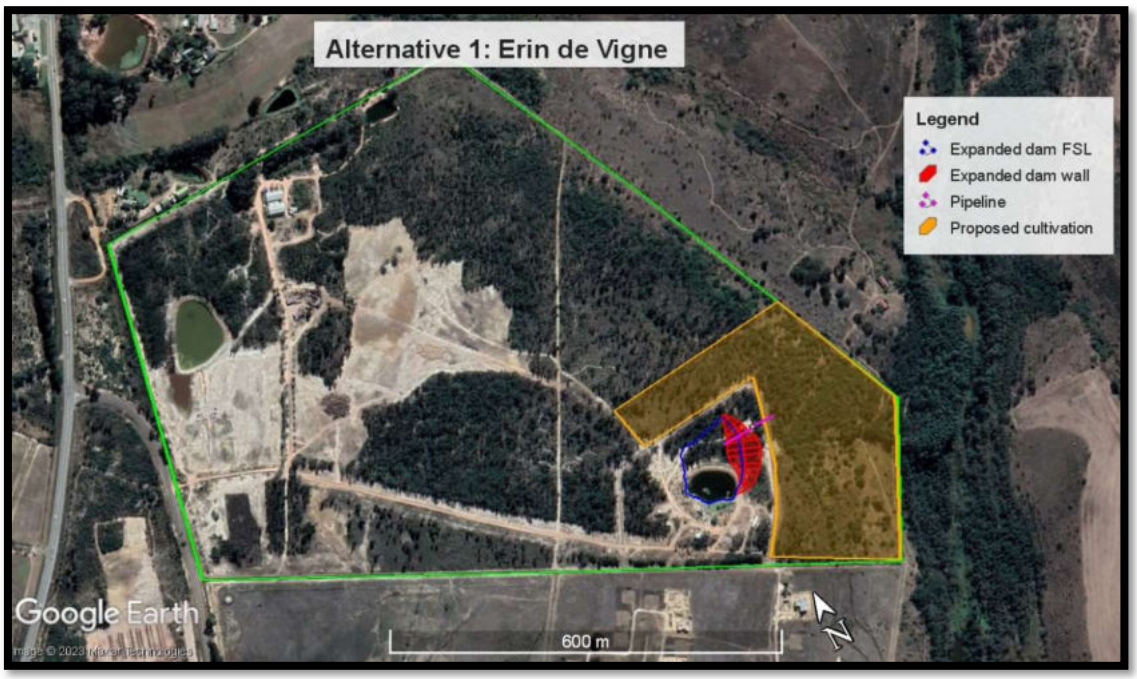

Figure 1: Map showing the proposed Alternative 1 footprints. Satellite image dated April 2021.

Figure 2: Map showing the proposed Alternative 2 footprints. Satellite image dated April 2021.

2. TERMS OF REFERENCE

The terms of reference for this study were as follows:

- Undertake a site visit to assess the vegetation on site
- compile a baseline report that describes the vegetation in the study area and places it in a regional context, including its status in terms of the relevant CapeNature Spatial Biodiversity Plan
- identify and locate (as Google Earth kmz polygons) any plant Species of Conservation Concern (SoCC) in the study area, and note any likely SoCC
- provide an overview of the botanical conservation significance (sensitivity) of the study area,
- make recommendations (prior to IA phase) for proposed layout changes in order to minimise botanical impacts
- identify and assess the likely botanical impacts of the proposed project alternatives, using standard IA methodology
- provide recommendations for feasible mitigation, and for ecological management of the site post development
- provide a professional opinion on whether any of the project alternatives could be authorised within acceptable levels of environmental impact.

3. LIMITATIONS, ASSUMPTIONS AND METHODOLOGY

The site was visited on 8 November 2022. This was outside the optimal winter – spring flowering season in this mainly winter rainfall area, and most of the likely geophytes were thus not evident, whilst all perennial plants were identifiable. There were thus some seasonal constraints on the accuracy of the botanical findings, but given the presence of many perennials these could be used as indicators of habitat sensitivity, and thus confidence in the accuracy of the botanical findings is high. The author has undertaken extensive work within the region, which facilitates the making of local and regional comparisons and inferences of habitat quality and conservation value.

Most of the study area was walked or driven, and all plants on site were noted. Photographs of many plant species were made (using a Fuji mirrorless slr camera), and uploaded to the inaturalist.org website. Satellite imagery dated April 2021 (and earlier) was used to inform this assessment, and for mapping, but is was noted that some landuse change (additional partial site clearing) has taken place since the most recent satellite imagery of April 2021. According to the EAP the recent vegetation clearance on site referred to in this report was conducted lawfully, which has evidently also been accepted by CapeNature. It is assumed that development of any particular area would result in the permanent loss of all natural or partly natural vegetation in that area.

The botanical sensitivity of a site is a product of plant species diversity, plant community composition, rarity of habitat, degree of habitat degradation, rarity of species, ecological viability and connectivity, restorability of habitat, vulnerability to impacts, and reversibility of threats.

The assessed development layouts are as shown in Figures 1 and 2. The total new cultivation for Alternative 1 is about 7.0ha, and for Alternative 2 it is about 10.0ha.

4. REGIONAL CONTEXT OF THE VEGETATION

The study area is part of the Southwest Fynbos and East Coast Renosterveld bioregions (Mucina & Rutherford 2006), and is part of the Fynbos biome, located within what is now known as the Core 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 project indicate 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 Southwest Fynbos bioregion is characterised by relatively high winter rainfall, strong rainfall gradients, poor, sandy soils, high topographic diversity, and large urban areas and high levels of alien invasive vegetation. Due to this combination of factors the loss of natural vegetation in this bioregion has been severe (>60% of original extent lost within the region), and the bioregion has a very high number of threatened plant species (Raimondo *et al* 2009).

The East Coast Renosterveld bioregion is characterised by relatively high winter rainfall, rich soils, moderate topographic diversity, and high levels of agricultural activity. Due to this combination of factors the loss of natural vegetation in this bioregion has been severe (>85% of original extent lost within the region), and the bioregion consequently has a very high number of threatened plant species (Raimondo *et al* 2009).

The CapeNature Spatial Biodiversity Plan (Pence 2017; Figure 3) indicates that that most of the site is mapped as CBA2, which does not reflect the subsequent cultivation of large areas in 2018-2019. The map is thus outdated in some places, but it does show that the proposed cultivation would occur in unmapped areas, plus areas mapped as CBA2, CBA1 (terrestrial; a small patch), CBA2 (watercourse), and CBA1 (wetland). The CapeNature SBP is not regarded as being particularly relevant or accurate in terms of the current study, partly due to the recent landuse changes, and partly due to significant under-mapping of areas that should be CBA1 (terrestrial), the latter being due to a lack of groundtruthing in the CBA mapping process.

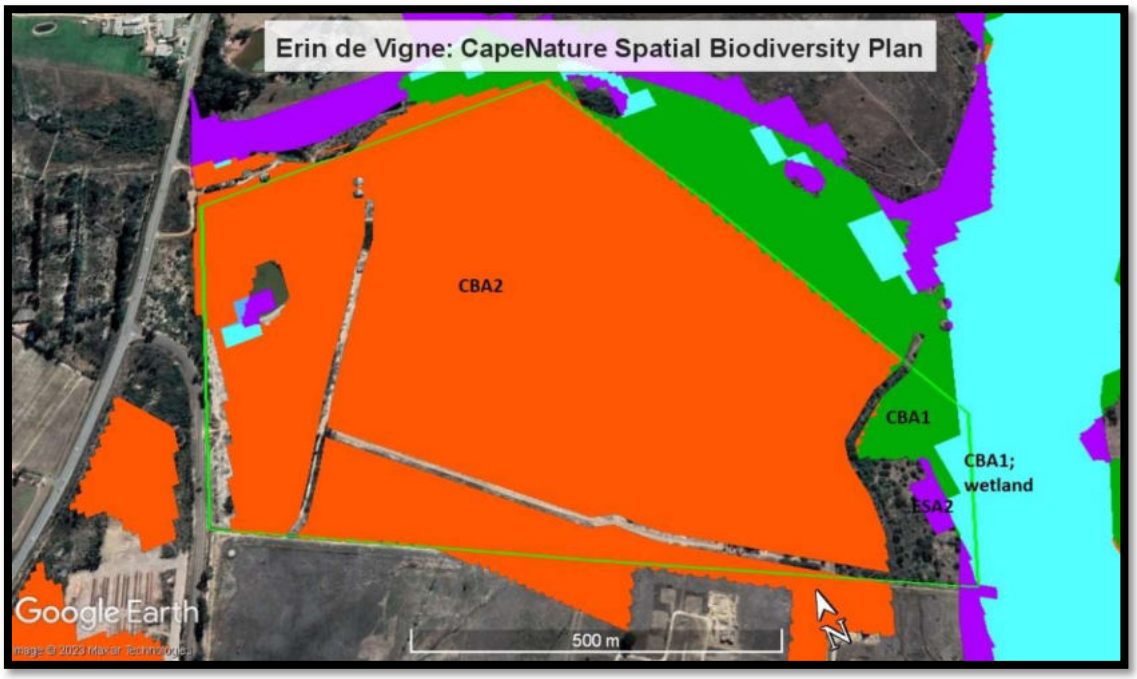

Figure 3: Extract of CapeNature Spatial Biodiversity Plan (Pence 2017) showing that most of the site is mapped as CBA2, and does not reflect the subsequent cultivation of large areas in 2018-2019.

5. THE VEGETATION IN THE STUDY AREA

According to the SA Vegetation Map the original natural vegetation in the study area is a mix of **Western Ruens Shale Renosterveld, Ruens Silcrete Renosterveld** and **Elim Ferricrete Fynbos** (prior to human disturbance; (Mucina & Rutherford 2018; Figure 4). Based on my groundtruthing most of the site would probably be better mapped as Elim Ferricrete Fynbos, but this is difficult to substantiate given the recent soil disturbance in many areas.

Western Ruens Shale Renosterveld is gazetted as **Critically Endangered** on a national basis (Government of South Africa 2022). Less than 9% of its total original extent remains intact, less than 1% is conserved, and the national conservation target is 26% (Rouget *et al* 2004). The unit is known to support a large number of plant Species of Conservation Concern (Raimondo *et al* 2009). This unit occurs on loamy, shale derived soils, and the vegetation type needs fire for optimal ecological functioning (Helme & Rebelo 2016).

Ruens Silcrete Renosterveld is gazetted as **Endangered** on a national basis (Government of South Africa 2022). Less than 22% of its total original extent remains intact, less than 1% is conserved, and the national conservation target is 27% (Rouget *et al* 2004). The unit is known to support a large number of plant

Species of Conservation Concern (Raimondo *et al* 2009). This unit occurs on sandy or loamy soils with a high proportion of ferricrete or silcrete, and the vegetation type needs fire for optimal ecological functioning (Helme & Rebelo 2016).

Elim Ferricrete Fynbos is also gazetted as **Endangered** on a national basis (Government of South Africa 2022). Less than 58% of its total original extent remains intact, less than 5% is conserved, and the national conservation target is 30% (Rouget *et al* 2004). The unit is known to support a very large number of plant Species of Conservation Concern (Raimondo *et al* 2009). This unit occurs on sandy or loamy soils, often with ferricrete evident, and the vegetation type needs fire for optimal ecological functioning (Helme & Rebelo 2016).

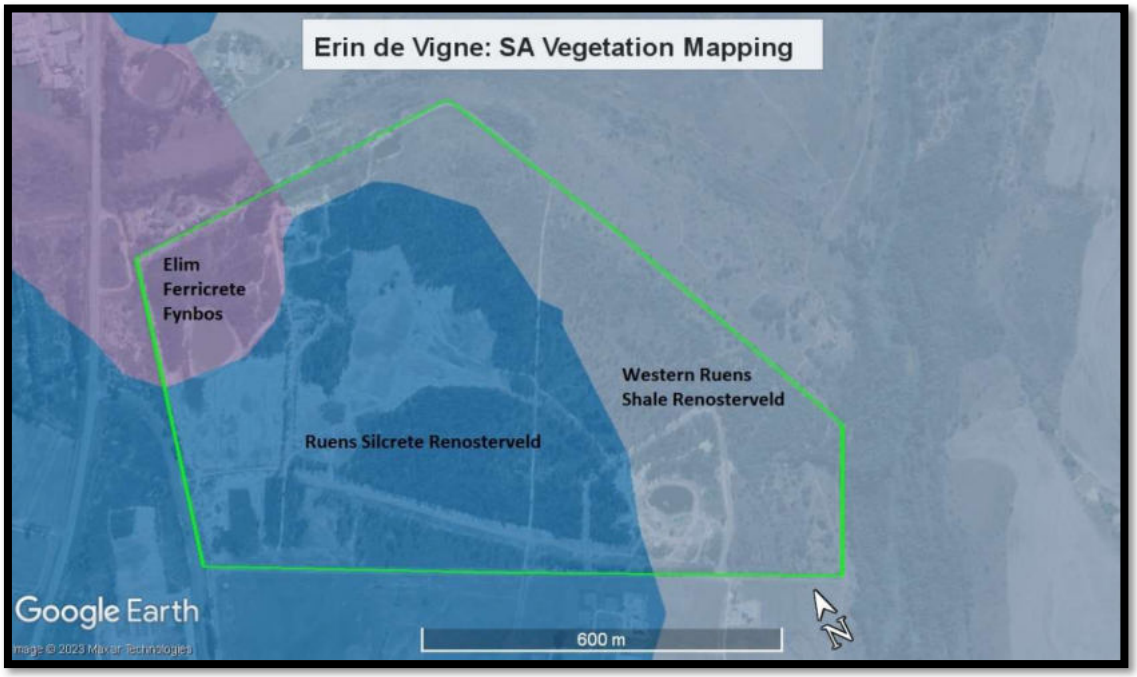

Figure 4: Extract of SA Vegetation Map for the study area, showing that Western Ruens Shale Renosterveld, Ruens Silcrete Renosterveld and Elim Ferricrete Fynbos are mapped in the study area (prior to human disturbance). In reality most of the site would actually be better mapped as Elim Ferricrete Fynbos.

Plate 1: View of previously disturbed secondary vegetation in the southern part of the site, looking southwest. This area is not proposed for cultivation under either alternative.

Plate 2: View of recently cleared area in central part of site, looking northeast from road. This area would be cultivated in Alternative 2.

Plate 3: View of Very High sensitivity area just northwest of current fencing around housing. As seen here part of this had recently been disturbed by vegetation clearing.

Plate 3: View of Very High sensitivity area just northwest of current fencing around housing.

Plate 4: View of Very High sensitivity Shale Renosterveld in the northern corner of the site.

Plate 5: View of Very High sensitivity seasonally wet vegetation near the southwestern corner of the site.

Plate 6: View of Low sensitivity, previously cultivated and now densely alien invaded area along the eastern edge of the site.

The following description of habitats is split up into the three primary areas of botanical sensitivity (see Figure 5).

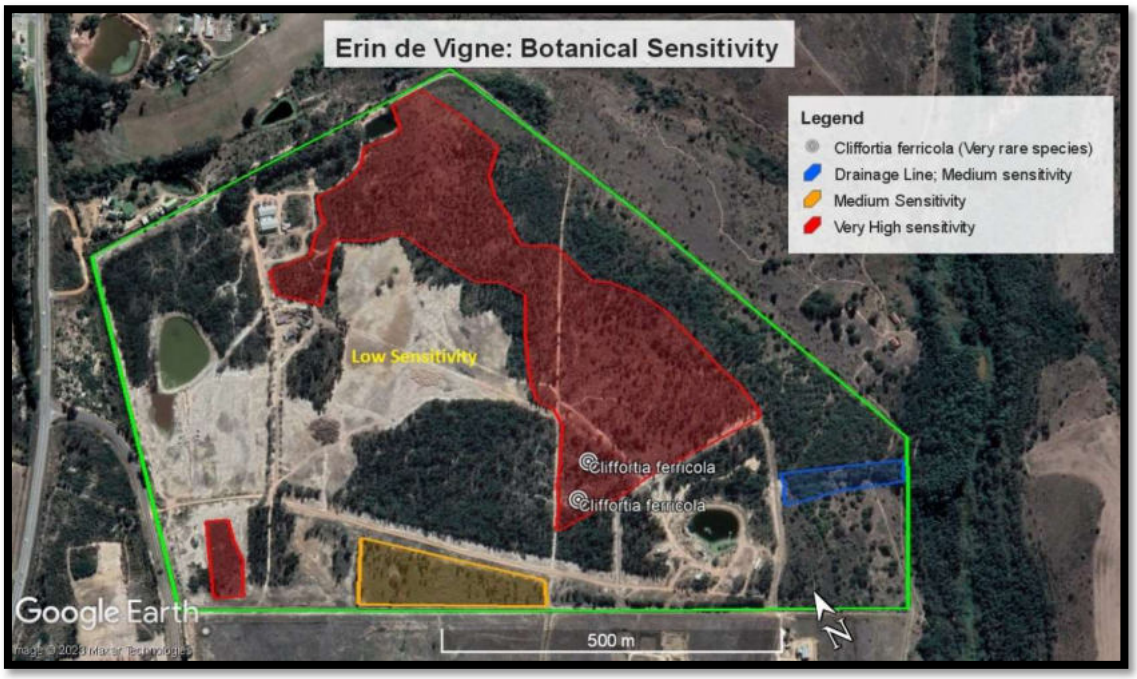

Figure 5: Botanical sensitivity map of the study area (green polygon). Note that all unshaded areas within the study area are deemed to be of Low sensitivity.

5.1 Low Sensitivity Areas

About 65% of the study area is deemed to be so disturbed as to be of Low botanical sensitivity (see Figure 5). These areas are either currently or previously cultivated, previously quarried or used for residential purposes, and support negligible natural vegetation and no plant Species of Conservation Concern. These areas present no major botanical constraints to the proposed development.

Typical indigenous plant species in these areas are weedy, widespread species that are common in secondary habitat, such as *Athanasia trifurcata, Berkheya rigida, Senecio burchellii, Tribolium uniolae, Seriphium plumosum, Passerina corymbosa, Helichrysum patulum, H. indicum, Ehrharta calycina, Cliffortia ruscifolia* and *Dicerothamnus rhinocerotis*. Areas that are not developed tend to be heavily invaded by various alien invasive species, including *Acacia saligna, A. mearnsii, A. longifolia, Pinus* species and *Hakea gibbosa*.

5.2 Medium Sensitivity Areas

About 5% of the study area is deemed to be of Medium botanical sensitivity, and these areas have good rehabilitation potential. Both patches are presumably previously disturbed, but more than twenty years ago, as there has been quite substantial natural rehabilitation since then, such that there is now a low to moderate diversity of mostly indigenous plants in the area. There is a 5-10%

cover of woody alien invasives, including *Acacia saligna*, *A. mearnsii* and *Hakea sericea*. Indigenous species noted include *Passerina corymbosa*, *Elytropappus rhinocerotis, Athanasia juncea, Aspalathus hispida, Oxalis pescaprae, Helichrysum petiolare, H. indicum, H. cymosum, Ficinia albicaulis, Ornithogalum thyrsoides, Micranthus junceus, Fuirena coerulescens, Cyanella hyacinthoides, Tenaxia stricta, Isolepis ludwigii, Struthiola laxa, Metalasia acutifolia, Wimmerella arabidea, Erica quadrangularis, Asparagus rubicundus* and *Athanasia trifurcata*.

A single plant Species of Conservation Concern was recorded in this area, in the form of the highly cryptic *Restio anomalus,* which was found only on the seasonally damp clays below the current dam (eastern edge of site). This species is Redlisted as Endangered (Linder & Turner 2011), and is found only in the southern Cape coastal area from here towards Agulhas.

5.3 High Sensitivity Areas

About 14.5ha of the study area is of Very High botanical sensitivity (see Figure 5). Although some of this area has been lightly to moderately invaded by woody alien vegetation, notably *Hakea gibbosa, Acacia saligna* (Port Jackson), *Acacia mearnsii* (black wattle) and *Pinus* (pine), the rehabilitation potential is very good, and the underlying natural vegetation has generally not yet been compromised by aliens. Another important management related issue in these areas is lack of fire, as the vegetation should be fire-driven, but the vegetation would appear not to have burnt for at least 20 years, and is thus thoroughly senescent (Helme & Rebelo 2016).

Soils in the area range from fairly deep clays in the north, to loamy sands with underlying ferricrete (koffieklip) layers in the south and southeast.

Indigenous plant diversity is high, and the following indigenous species were noted: *Phaenocoma prolifera*, *Lanaria lanata, Geochloa rufa, Wachendorfia paniculata, Ehrharta calycina, Indigofera heterophylla, Aspalathus acuminata, A. ciliaris, Dicerothamnus rhinocerotis, Nemesia barbata, Oxalis purpurea, Ornithogalum thyrsoides, Pelargonium myrrhifolium, Athanasia trifurcata, Senecio pubigerus, S. pterophorus, Osteospermum moniliferum, Protea repens, Erica quadrangularis, E. pilosiflora, Helichrysum petiolare, Anthospermum spathulatum, Searsia rosmarinifolia, Manulea cheiranthus, Euclea tomentosa, Asparagus rubicundus, Montinia caryophyllacea, Tenaxia stricta, Leucadendron salignum, Ficinia indica, F. secunda, Ehrharta rigida, Passerina corymbosa, Dimorphotheca*

pluvialis, Microloma tenuifolium, Cyanella hyacinthoides, Pelargonium triste, Restio capensis, R. macer, Ursinia anthemoides, Albuca cooperi, Diospyros glabra, Berkheya armata, Lobostemon fruticosus, Aristea spiralis, Arctotis acaulis, A. angustifolius, Staberoha distachyos, Senecio pinifolius, Stoebe capitata, Heliophila scoparia, Bulbinella triquetra, Diosma hirsuta, Gnidia juniperifolia, Athanasia juncea, Metalasia acutifolia, Salvia chameleagna, Tritoniopsis antholyza, Cliffortia juniperina, C. ruscifolia, Cliffortia ferricola, Erica imbricata, Willdenowia sp., Corymbium africanum, Serruria flagellifolia, Tetraria ustulata, Elegia vaginulata, E. squamosa, Otholobium rotundifolium, Leucospermum truncatulum, Aulax umbellata, Restio vimineus, Brunia laevis, Merciera leptoloba, Restio rigoratus, Micranthus junceus and *Cyanella hyacinthoides.*

At least nine plant **Species of Conservation Concern** (SoCC) were recorded on site (see Table 1), all within the High sensitivity area, with a good chance that there are one or two other SoCC (not found during this survey; such as *Erica rhodopis* or *Erica ustulescens*, both known from within 500m of the site). This is a relatively high figure for a fairly small area and is indicative of the high conservation value of the better quality habitat on site. A tenth SoCC (*Restio anomalus*; Endangered) was recorded only in the Medium sensitivity area.

Species	**Redlist Status**
Arctotis angustifolia	Critically Endangered
Cliffortia ferricola	Critically Endangered
Elegia squamosa	Endangered
Erica pilosiflora ssp. pilosiflora	Vulnerable
Leucospermum truncatulum	Near Threatened
Merciera leptoloba	Near Threatened
Otholobium rotundifolium	Near Threatened
Restio rigoratus	Endangered
Serruria flagellifolia	Endangered

Table 1: The 9 plant Species of Conservation Concern recorded within the High sensitivity parts of the site. A tenth SoCC (*Restio anomalus*; Endangered) was recorded only in the Medium sensitivity area.

6. RECOMMENDATIONS AFTER THE INITIAL SITE SURVEY

- About 65% of the site has been heavily degraded and is of Low botanical sensitivity. These areas present few ecological constraints to development, and development restricted to these areas would not have more than a Low negative ecological significance.
- The less disturbed parts of the site are of Medium and Very High botanical value and sensitivity, and should not be considered for development. These areas support at least ten plant Species of Conservation Concern. Loss of these areas to development would be associated with High negative ecological impacts.
- Ongoing, ecologically appropriate management of the undeveloped areas will be required as part of any development approval for the Low sensitivity areas.

7. IMPACT ASSESSMENT

7.1 Construction Phase (Direct) Ecological Impacts

The primary construction phase ecological impact of the two alternative development layouts is very different, as Alternative 1 would entail loss of about 1.6ha of Very High sensitivity vegetation (Endangered or Critically Endangered vegetation types), and about 0.7ha of Medium sensitivity vegetation, whereas the Preferred Alternative (Alternative 2) would not entail loss of any Medium or Very High sensitivity vegetation.

The primary botanical impact of the **Preferred Alternative** would be permanent loss of Low (about 10ha) sensitivity natural vegetation in the development footprints (prior to and after mitigation). Botanical significance of this loss is Low negative before and after mitigation.

The Preferred Alternative is not likely to result in the loss of any plant Species of Conservation Concern on site.

The Preferred Alternative will result in loss of about 10ha mapped as CBA2 in terms of the CapeNature Spatial Biodiversity Plan (Pence 2017). These are deemed to be important, but degraded areas of habitat.

The primary botanical impact of **Alternative 1** would be permanent loss of about 1.6ha of Very High sensitivity vegetation, loss of about 0.7ha of Medium sensitivity vegetation, and loss of about 4.7ha of Low sensitivity natural

vegetation in the development footprints (prior to and after mitigation). Botanical significance of this loss is High negative before and after mitigation.

Alternative 1 is likely to result in the loss of at least 6 different plant Species of Conservation Concern on site. Botanical significance of this loss is High negative before and after mitigation.

Alternative 1 will result in loss of about 2.7ha mapped as CBA2, about 0.7ha mapped as CBA1, and about 0.3ha mapped as ESA2 in terms of the CapeNature Spatial Biodiversity Plan (Pence 2017). The rest of the proposed development area is unmapped in this plan.

The proposed dam changes will have no impact on any significant natural vegetation as they will occur entirely in Low sensitivity areas.

The extent of the impacts are deemed to be local and regional, but also national, in that the vegetation types and threatened species are also assessed at a national level.

Development Alternative	Extent of impact	Duration of impact	Intensity	Probability of impact	Irreplaceable loss of biodiversity	Significance before mitigation	Significance after mitigation
Alternative 1	Mainly local	Permanent	High	Definite	High	High -ve	High -ve
Preferred Alternative	Mainly local	Permanent	High	Definite	Low	Low -ve	Low -ve
No Go	Local	Unknown and variable	Neutral to low negative	Likely	Low	Neutral to Low negative	Neutral to Low negative

Table A: Summary table for construction phase botanical impacts associated with the proposed development alternatives. The primary construction phase impacts would be loss of about 10ha of Low sensitivity vegetation in the development footprint for the Preferred Alternative. For Alternative 1 the impact will be loss of 1.6ha of Very High sensitivity vegetation, loss of about 0.7ha of Medium sensitivity vegetation, and loss of about 4.7ha of Low sensitivity vegetation, plus loss of footprint populations of at least 6 plant Species of Conservation Concern.

7.2 Operational Phase Ecological Impacts

Operational phase impacts will take effect as soon as the natural or partly natural vegetation on the site is lost, and will persist in perpetuity, or as long as the area is not rehabilitated. Operational phase impacts include loss of current levels ecological connectivity across the overall property, and associated habitat fragmentation. The new development is likely to result in further fire suppression of the adjacent natural areas, with associated negative ecological impacts, and may result in alien Argentine ant introduction, with associated negative ecological impacts on seed dispersal.

For both alternatives there will be some habitat fragmentation and associated loss of ecological connectivity in the study area as a result of the proposed cultivation but ecological connectivity will remain across some of the adjacent area. Much of the vegetation on the greater property has been lost to other developments over a long period and the assessed development is merely another element of the ongoing loss of vegetation on this site. The habitat fragmentation impact is likely to be **Low negative** before and after mitigation, for both alternatives.

Alien invasive Argentine ants (*Linepithema humile*) impact negatively on the adjacent natural vegetation. It is very difficult to accurately assess the impact, as this would require detailed pre and post construction surveys of the vegetation and ant fauna over some years, but it is well known that these alien ants are strongly associated with human residences, stores, dumps, cultivation, etc, and forage up to 50m away from their nests (in the aforementioned areas). The Argentine ants outcompete and displace the indigenous ants, which disperse 30% of all Fynbos plants (less important in Renosterveld), and their presence thus typically leads to seed dispersal failure in 30% of the surrounding Fynbos species, up to 50m away from nests. These ants are almost certainly already present on site given the existing disturbance, and the likely ecological impact of the proposed development in terms of these ants in the surrounding vegetation is **Low negative**, and mitigation is virtually impossible, other than limiting disturbance and built footprints.

Fire at ecologically appropriate intervals (every 8 – 15 years) is necessary in Fynbos and Renosterveld for optimal ecological functioning of these fire dependant vegetation types (Helme & Rebelo 2016). The disruption of natural fire regimes in the natural veld surrounding the developments is a very likely impact, as further deliberate fire-suppression is likely in the vicinity of the development,

and is already occurring, with no fire for at least the last 15 years. On balance the increased likelihood of longer fire return intervals (versus what would occur naturally in the area), already way beyond what is ecologically optimal, is likely to have a **Medium negative** botanical impact at a local scale, before mitigation, and Neutral after mitigation (but likelihood of that is uncertain and possibly low).

The two development alternatives are likely to have overall similar operational phase negative botanical impacts (Medium negative before mitigation, Low negative after mitigation), but in theory both could have lower impacts than the No Go alternative which would be a result of the required mitigation for any authorised development (ecological management of remaining Very High sensitivity vegetation), which should thus be mandatory if either alternative is authorised.

Development Alternative	Extent of impact	Duration of impact	Intensity	Probability of impact	Irreplaceable loss of biodiversity	Significance before mitigation	Significance after mitigation
Alternative 1	Mainly local	Permanent	Medium	Very likely	Medium	Medium -ve	Low -ve
Preferred Alternative	Mainly local	Permanent	Medium	Very likely	Medium	Medium -ve	Low -ve
No Go	Local	Unknown and variable	Low to Medium negative	Very Likely	Medium	Low to Medium negative	Low to Medium negative

Table B: Summary table for operational phase botanical impacts associated with the proposed development alternatives. The operational phase impacts would be loss of current ecological connectivity across the site and associated habitat fragmentation, as well as likely disruption of optimal fire regimes and of ant-based seed dispersal in the surrounding natural areas. The mitigation is primarily alien invasive plant management and fire management.

Significant positive ecological impacts of the proposed development are likely during the operational phase, being those arising from proper implementation of the required ecological management plan for the natural Open Space areas (the Very High sensitivity areas, for the Preferred alternative). The positive impacts would be evident largely for just the Preferred alternative, deriving from ongoing alien invasive vegetation management and appropriate fire management or at

least fire simulation of these areas. These positive impacts are unlikely to come about without the proposed development and implementation of mandatory Conditions of Approval (*i.e.* not in the No Go scenario).

7.3 The No Go Alternative

The No Go alternative (continuation of the *status quo)* on this site probably means little or no invasive alien plant management in the Very High sensitivity areas, no appropriate fire schedules in the natural vegetation, and possible future disturbance of the Very High sensitivity areas and is likely to involve moderate to high levels of ongoing habitat degradation. It is likely that the No Go alternative will have a **Low to Medium negative botanical impact** in the long term (see Table B).

7.4 Cumulative Impacts

The cumulative ecological impacts are in many ways equivalent to the regional ecological impacts, in that the vegetation type/s likely to be impacted by the proposed development have been, and will continue to be, impacted by numerous developments and other factors (the cumulative impacts) within the region. The primary cumulative impacts in the region are loss of natural vegetation and threatened plant species to ongoing agriculture, plus urban development and alien plant invasion (Mucina & Rutherford 2012; Helme & Rebelo 2016).

The overall cumulative ecological impacts at the regional scale are likely to be Low negative for the Preferred Alternative, as the footprint is not within the Very High sensitivity areas, and these areas of priority natural vegetation on the site (about 14ha) and should be formally conserved and appropriately managed.

7.5 Positive Impacts

No significant positive ecological impacts of the proposed development are likely during the operational phase, other than those arising from proper implementation of the required ecological management plan (EMP) for the natural Open Space areas (the approx. 14ha of High sensitivity vegetation). The positive impacts would arise from ongoing alien invasive vegetation management and appropriate fire management/simulation of these areas. These positive impacts could be of Medium positive significance, and are unlikely to come about without the proposed development (aka No Go scenario).

8. REQUIRED MITIGATION

The following mitigation assumes that the Preferred Alternative will be authorised, and is considered, essential, feasible and reasonable:

- The approved new cultivation footprints on site must be surveyed, demarcated and fenced off prior to any site development or vegetation loss.
- No dumping of material or any form of disturbance may take place within the Very High sensitivity areas.
- The two areas of Very High botanical sensitivity (as per Figure 5, totalling about 14ha) must be buffered from any new development or soil disturbance or cultivation by at least 5m. It is recommended that this surrounding 5m buffer be either a dirt road (currently the case for about 40% of the area) or brushcut firebreak, as this will facilitate fire and alien vegetation management in the conservation area.
- Any firebreaks around the conservation area should be cut using hand-held brushcutters, and this should be done in November every year. No soil disturbance may be caused in these areas.
- No vehicles should be allowed into the Very High sensitivity areas, except on existing tracks, which are clearly evident on the satellite imagery from April 2021.
- The Very High sensitivity areas must be formally managed by the landowner as a conservation area, according to requirements set out in an EMP. This EMP should incorporate inputs from the specialist ecologist.
- A key element of the EMP will be alien invasive vegetation management within the 14ha Very High sensitivity area, which must be done according to guidelines in Martens *et al* (2021). The efficacy of this work must be audited by the specialist botanist or CapeNature within two years of any project authorisation, with a target of zero invasive alien vegetation on site at that stage. The specialist must be able to make binding management recommendations for this area if this target is not met.
- The natural vegetation in the conservation area (14ha) must be burnt once every 10 - 12 years, and thus a fire management plan must be incorporated into the EMP. As the vegetation is currently well overdue for a burn the first management burn must be undertaken within two years of any authorisation. The landowner should enlist the help of the local FPA, and should get professional help to undertake the management burn, which

should be done in late summer (February or March) for optimal ecological results, and only once the area is alien vegetation free.

- No planting of any species should be undertaken in the Very High sensitivity areas.

9. CONCLUSIONS AND RECOMMENDATIONS

- About 65% of the study area is of Low botanical sensitivity, but about 14ha supports Very High sensitivity vegetation, with at least 9 recorded plant Species of Conservation Concern, and a further SoCC in one of the two Medium sensitivity areas.
- The vegetation type in the remaining Very High sensitivity areas is a mix of Elim Ferricrete Fynbos, Ruens Silcrete Renosterveld and Western Ruens Shale Renosterveld, all of which are either Endangered or Critically Endangered vegetation types.
- Alternative 1 would entail loss of about 1.6ha of Very High sensitivity vegetation (Endangered or Critically Endangered vegetation types), and about 0.7ha of Medium sensitivity vegetation, whereas the Preferred Alternative would not entail loss of any Medium or Very High sensitivity vegetation. Alternative 1 would have a High negative botanical impact at the construction phase, and is thus not supported.
- The Preferred Alternative is acceptable from a botanical perspective (Low negative impact after mitigation), provided that all required mitigation (see Section 8) is adequately implemented, with the primary focus being long term ecological management of the remaining 14ha of Very High sensitivity habitat on site. The No Go alternative is not advantageous for the ecology of this sensitive area as most of it is currently invaded by alien invasive vegetation, which will get a lot worse unless properly managed, is currently subject to various disturbances, and is being degraded by a lack of fire. In spite of it being legally required of landowners to manage alien invasive vegetation on their land there is little leverage available (in the absence of an EA) to ensure that this requirement is implemented.
- If one accepts this argument it is then essential that the 14ha Very High Sensitivity area be properly managed for conservation, on an ongoing basis. To this end it may be advisable to secure this by means of a Stewardship Agreement with CapeNature, but given their unfortunate ongoing capacity constraints it is not known whether or not this is feasible. There is

supposedly an existing Contract Nature Reserve (Craigantlet NR) immediately adjacent to this site (which I helped set up), although there is not much evidence of active management on this reserve, and the area is being invaded by alien vegetation (pers.obs.).

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