BOTANICAL CONSTRAINTS ANALYSIS FOR PROPOSED AGRICULTURAL DEVELOPMENT AT THE FARMS AAN DE VALSCH RIVIER (RE/3/186), AND HOREB (FARM 149) NEAR RIVERSDALE, HESSEQUA MUNICIPALITY, WESTERN CAPE

CAPENSIS

GREG NICOLSON

NOVEMBER 2024

REPORT PREPARED FOR

PHS CONSULTING

THE SPECIALIST

I, Gregory Nicolson, as the appointed specialist hereby declare/affirm the correctness of the information provided or to be provided as part of the application, and that I:

- in terms of the general requirement to be independent:
    - other than fair remuneration for work performed/to be performed in terms of this application, have no business, financial, personal or other interest in the activity or application and that there are no circumstances that may compromise my objectivity; or
- in terms of the remainder of the general requirements for a specialist, am fully aware of and meet all of the requirements and that failure to comply with any the requirements may result in disqualification;
- have disclosed/will disclose, to the applicant all material information that have or may have the potential to influence the decision of the Department or the objectivity of any report, plan or document prepared or to be prepared as part of the application;
- have ensured/will ensure that information containing all relevant facts in respect of the application was/will be distributed or was/will be made available to interested and affected parties and the public and that participation by interested and affected parties was/will be facilitated in such a manner that all interested and affected parties were/will be provided with a reasonable opportunity to participate and to provide comments;
- have ensured/will ensure that the comments of all interested and affected parties were/will be considered, recorded and submitted to the Department in respect of the application;
- have ensured/will ensure the inclusion of inputs and recommendations from the specialist reports in respect of the application, where relevant;
- have kept/will keep a register of all interested and affected parties that participate/d in the public participation process; and
- am aware that a false declaration is an offence in terms of regulation 48 of the 2014 NEMA EIA Regulations.

Note: The terms of reference of the review specialist must be attached.

Signature of the specialist: 

Date: 03 November 2023

NATIONAL LEGISLATION AND REGULATIONS GOVERNING THIS REPORT

This is a 'specialist report' and is compiled in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended, and the Environmental Impact Assessment Regulations, 2014, as amended.

APPOINTMENT OF SPECIALIST

Capensis Ecological Consulting (Pty) Ltd (Capensis) was appointed by Guillaume Nel Environmental Consulting to provide specialist botanical consulting in the form of a Botanical Constraints Analysis for proposed agricultural expansion farms RE/3/186, RE/144 and 149, near Riversdale in the Hessequa Municipality.

CONDITIONS RELATING TO THIS REPORT

The content of this report is based on the authors best scientific and professional knowledge as well as available information. Capensis Ecological Consulting (Pty) Ltd reserves the right to modify the report in any way deemed fit should new, relevant or previously unavailable or undisclosed information become known to the author from on-going research or further work in this field, or pertaining to this investigation.

This report must not be altered or added to without the prior written consent of the authors. This also refers to electronic copies of the report which are supplied for the purposes of inclusion as part of other reports, including main reports. Similarly, any recommendations, statements or conclusions drawn from or based on this report must make reference to this report. If these form part of a main report relating to this investigation or report, this report must be included in its entirety as an appendix or separate section to the main report.

DETAILS OF THE SPECIALIST

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Expertise

- Qualifications: BSc. Hons. (Environmental Science), MSc (Botany)
- Botanist with 8 years' experience in the field of Botanical Surveys
- Has experience in Botanical exploration in South Africa and Namibia
- Has conducted over 250 botanical assessments for the EIA process.

CONTENTS

1. INTRODUCTION

The owner of two farms near Riversdale would like to expand their current agricultural developments. The farms have historically been used for livestock grazing, and one small avocado orchard has been established. Further expansion of orchards and cash crops are proposed. The two farms total around 263 ha. A previous botanical assessment of parts of this Study area were undertaken earlier by Mark Berry (Berry, 2023). This report has been referred to, however, it has a more limited geographic scope than the constraints report. Capensis Ecological Consulting (Pty) Ltd (t/a Capensis) was commissioned to provide a Botanical Constraints Analysis (Nicolson, 2023). The purpose of the constraints analysis was to identify potentially developable versus No-Go areas. This study provided baseline information in order to determine the sites botanical sensitivity, which has informed the current development proposal. Capensis has been appointed by PHS Consulting to update the Botanical Constraints Report into a Baseline Site Sensitivity Verification report.

2. TERMS OF REFERENCE

2.1. GENERAL

Terms of reference (ToR) relevant to the study and derived from the EIA process include:

- Department of Environmental Affairs and Development Planning (DEA&DP) Guidelines for Involving Biodiversity Specialists in the EIA Process (Brownlie, 2005).
- Ecosystem Guidelines for Environmental Assessment in the Western Cape (Cadman et al., 2016).
- The requirements of CapeNature for providing comments on agricultural, environmental, mine planning and water-use related applications (Turner, 2013).
- Procedures for the assessment and minimum criteria for reporting on Identified Environmental Themes in terms of Sections 24(5)(a) and 44 of the National Environmental Management Act (Government Gazette, 2020).

2.2. SPECIFIC

The specific terms of reference followed are as follows:

The specific terms of reference followed for this assessment are as follows:

- The national web based environmental screening tool must be confirmed by undertaking an Initial Site Sensitivity Verification.
- The Initial Site Sensitivity Verification must be undertaken through the use of:
  - A desk top analysis, using satellite imagery; and
  - A preliminary on-site inspection to identify if there are any discrepancies with the current use of land and environmental status quo versus the environmental sensitivity as identified on the national web based environmental screening tool, such as new developments, infrastructure, indigenous/pristine vegetation, etc.

- The outcome of the Initial Site Sensitivity Verification must be recorded in the form of a report that:
  - Confirms or disputes the current use of the land and environmental sensitivity as identified by the national web based environmental screening tool;
  - Contains a motivation and evidence (e.g. photographs) of either the verified or different use of the land and environmental sensitivity.

- A baseline analysis must include the following:

  - A description of the ecological drivers/processes of the system and how the proposed development will impact these
  - Ecological functioning and ecological processes (e.g. fire, migration, pollination, etc.) that operate within the proposed development site
  - The ecological corridors that the development would impede including migration and movement of flora and fauna.
  - The description of any significant landscape features including rare or important flora/faunal associations.
  - A description of terrestrial biodiversity and ecosystems on the proposed Alternatives: Identify any alternative development footprints within the preferred development site which would be of a “low” sensitivity as identified by the national web based environmental screening tool and verified through the Initial Site Sensitivity Verification.

3. PROTOCOL FOR DETERMINING LEVEL OF REPORTING

The sensitivity of the site was predetermined using the Department of Environmental Affairs (DEA) Screening Tool (https://screening.environment.gov.za/screeningtool/). The study area is rated as (a) Very High for terrestrial biodiversity sensitivity (Figure 1). This rating and the validity thereof is addressed in the Sensitivity section.

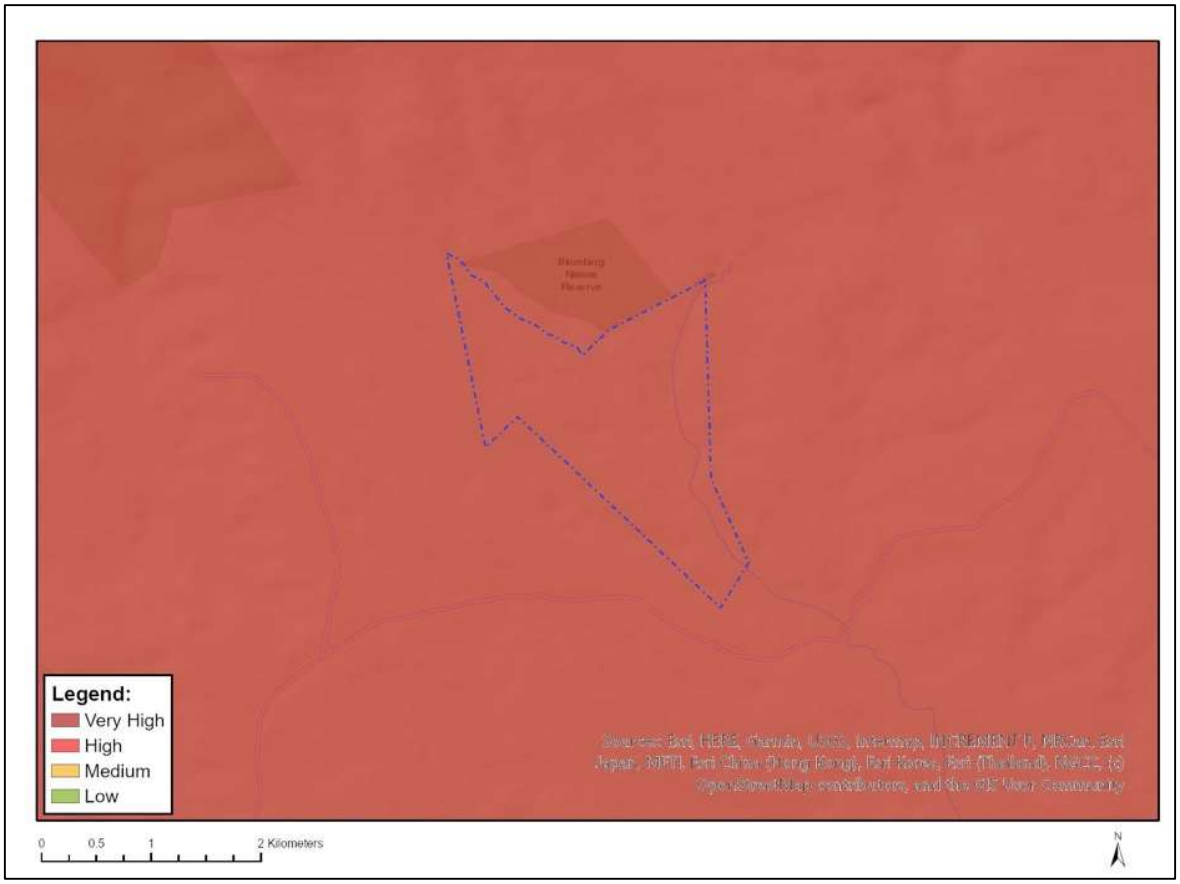

Figure 1. Map of relative terrestrial biodiversity theme sensitivity (Very High) generated from the DEA Screening Tool (https://screening.environment.gov.za).

The relative plant species theme sensitivity for the site is rated as 'Medium'. "An applicant intending to undertake an activity identified in the scope of this protocol, on a site identified by the screening tool as being of "medium sensitivity" for terrestrial plant species, must submit either a **Terrestrial Plant Species Specialist Assessment Report** or a **Terrestrial Plant Species Compliance Statement**, depending on the outcome of a site inspection undertaken in

accordance with paragraph 4" (Government Gazette 2020b). Plants listed as Species of Conservation Concern (SCC) have been identified at this site. However, due to the fact that this is a Site Sensitivity Verification and not an impact assessment, no species specialist assessment report will be included until the impact assessment phase. Threatened species found on the site are discussed in the report.

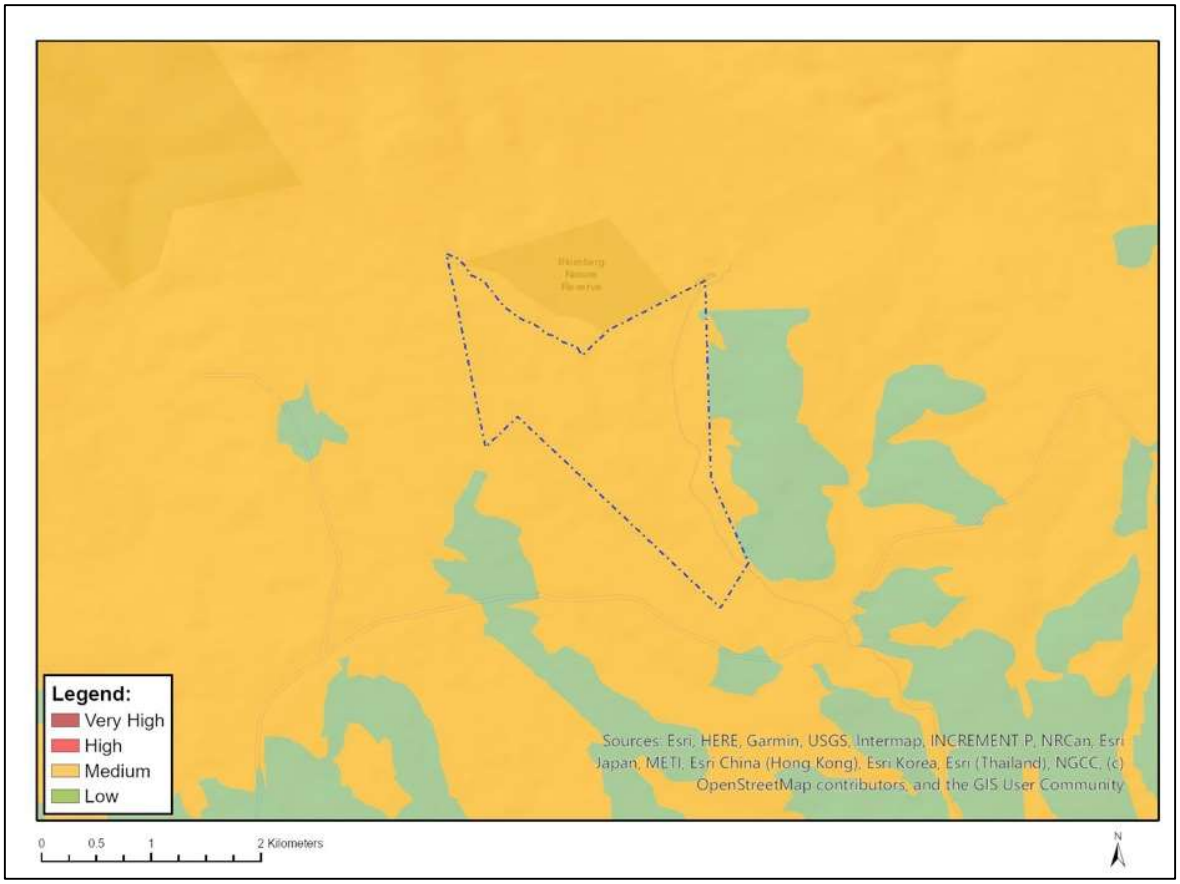

Figure 2. Map of relative plant species theme sensitivity (Medium) generated from the DEA Screening Tool (https://screening.environment.gov.za).

4. METHODOLOGY, LIMITATIONS AND ASSUMPTIONS

The study area was visited on the 28th and 29th of September 2023. The site was surveyed on foot and via vehicle. Sample waypoint positions were obtained using a Garmin GPS map 62. Photographs were taken and georeferenced using an Olympus TG-5 Camera with built-in GPS.

The following sources have been used to inform this study:

- *Site boundaries:* The property boundaries have been downloaded from the Cape Farm Mapper Website (https://gis.elsenburg.com/apps/cfm/).
- *Vegetation Types*: Based on *The Vegetation of South Africa, Lesotho and Swaziland* (VEGMAP)(Mucina & Rutherford, 2006). The South African National Biodiversity Institute (SANBI) has updated the mapping for the VEGMAP (2024) and these latest shapefiles have been used. The Vegetation of the Riversdale domain (Vlok et al., 2008) provides a Fine Scale map of the area and has also been referenced.
- *Ecosystem threat status:* Informed by (1) Revised National List of Ecosystems that are Threatened and in Need of Protection (Government Gazette, 2022), (2) species information provide in the National List of Ecosystems that are Threatened and in Need of Protection (Government Gazette, 2018), and (3) The National Biodiversity Assessment (2018)(SANBI, 2019).
- *Biodiversity planning*: The Western Cape Biodiversity Spatial Plan (WCBSP) for the Hessequa Municipality (CapeNature, 2017) is essential to determine the conservation importance of the affected habitats. Ground-truthing is an essential component in terms of determining the habitat condition.
- *Important species*: The presence or absence of threatened (i.e. species of conservation concern) and ecologically important species informs the ecological condition and sensitivity of the site. The latest conservation status of species is checked on the Red List of South African Plants (Raimondo *et al.* 2009) via the website (www.redlist.sanbi.org). A list of sensitive species generated by the National Web-based Screening Tool (screening.enviornment.gov.za) was used. Certain species cannot be disclosed to the public as per the requirements of the screening tool. Observations from iNaturalist (inaturalist.org) at and in the vicinity of the study area were also noted.
- *Previous studies*: Previous botanical studies in the region of the study area provide additional information that can support the findings of the once-off nature of a typical impact assessment report. In this case, the previous studies by Mark Berry (2023) and the constraints analysis by the author (2023) have been referenced.

The site visit was carried out during spring, which coincides with the peak flowering time in this region. The timing of the survey is regarded as optimal and no seasonal constraints apply.

Challenges faced on the site include the large area that needed to be surveyed and the inaccessibility. Crossing the Vals Rivier and the other rivers was a challenge after a winter of heavy rain. Some of the far north-east parts could not be reached, and mapping of the area has been done via knowledge of the surrounding areas and satellite imagery. Another significant challenge was determining the vegetation condition of areas recently bush cut. This practice is common on the subject properties and has been carried out over many years. The condition of recently cut areas typically appears very poor, as the shrub cover is removed and only grasses and stumps of plants are visible. Adjacent uncut areas and satellite imagery have been used to best determine the condition of the vegetation. However, in some areas there is still some uncertainty.

5. STUDY AREA

5.1. LOCALITY

The Study area lies along the base of the Langeberg Mountains to the east of the town of Riversdale in the Hessequa Municipality. Horeb Farm 149 and Farm RE/3/186 for the Study area of 263 ha. The Vals Rivier flows through the Study area. No major roads occur in the area and a dirt road between Riversdale and Herbertsdale are the main access for the farms in this area. The current landuse of the farms are mostly undeveloped, with a few nodes of farm buildings. A number of small farm roads occur on the properties (Figures 3 to 5).

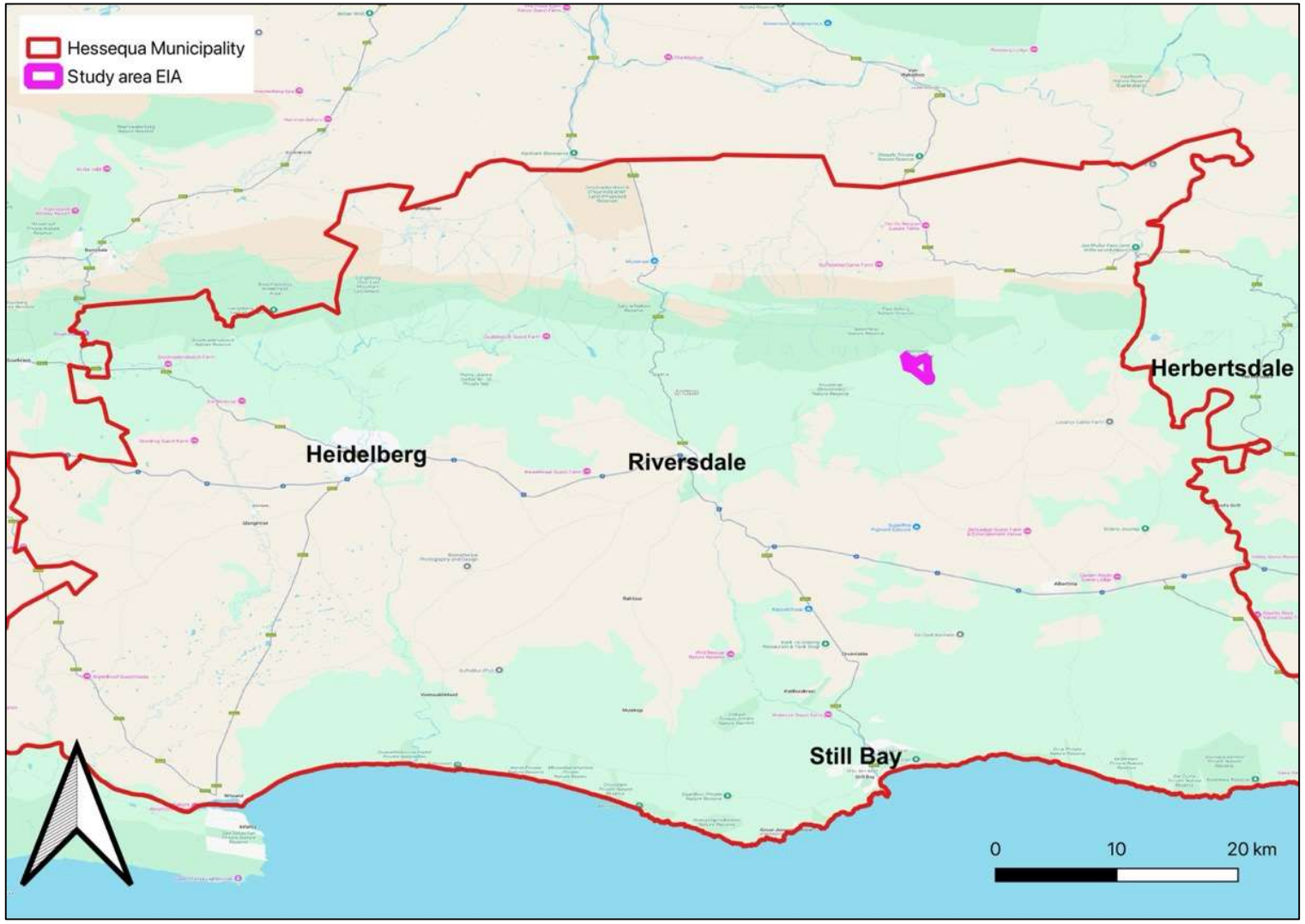

Figure 3. The location of the study area within the context of Hessequa municipality and closest suburbs, overlaid on a Google Maps ™ image.

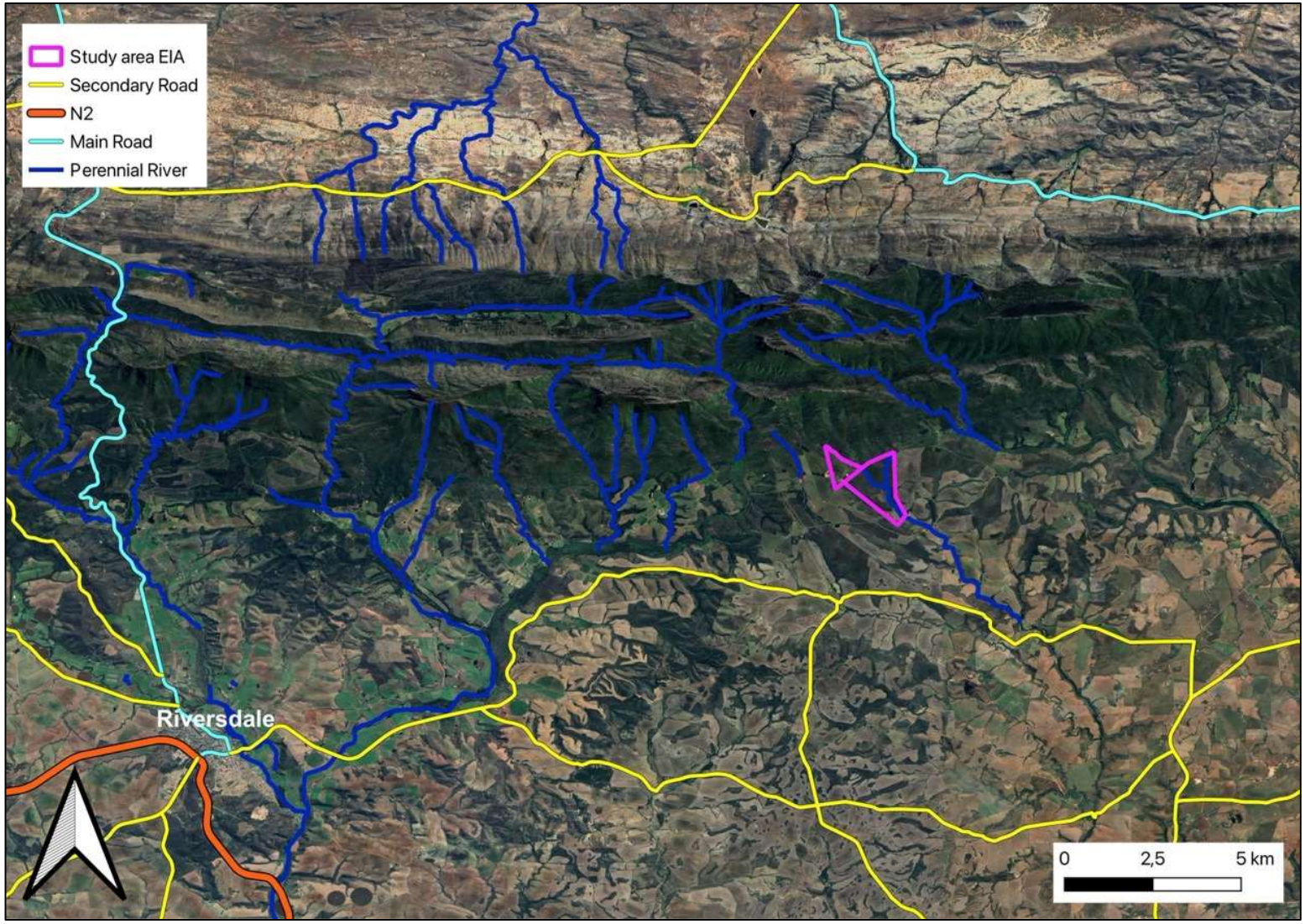

Figure 4. The location of the study area in relation to the closest roads and rivers, overlaid on a Google Maps ™ aerial image.

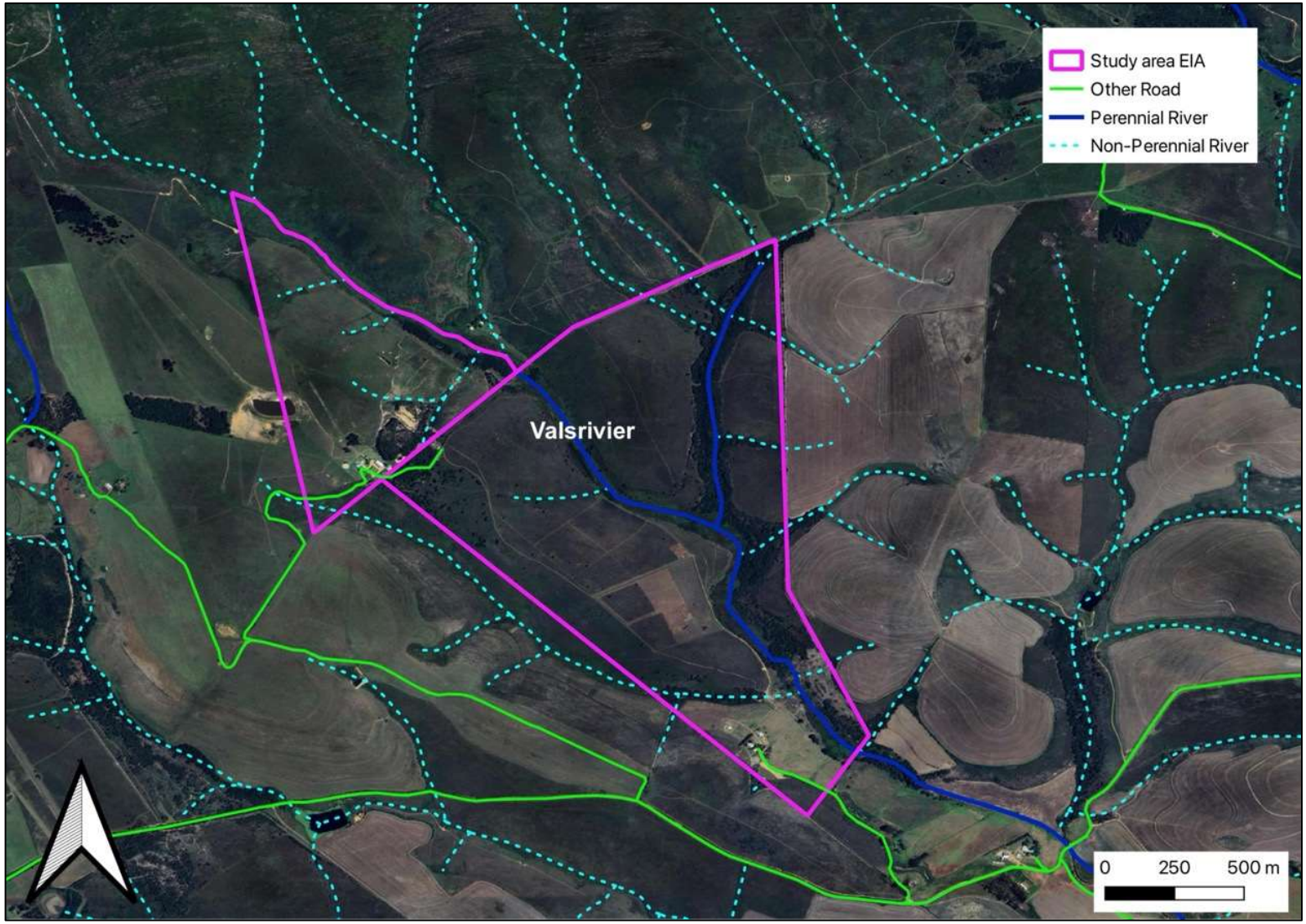

Figure 5. A Google Earth ™ image of the Study area and surrounding features.

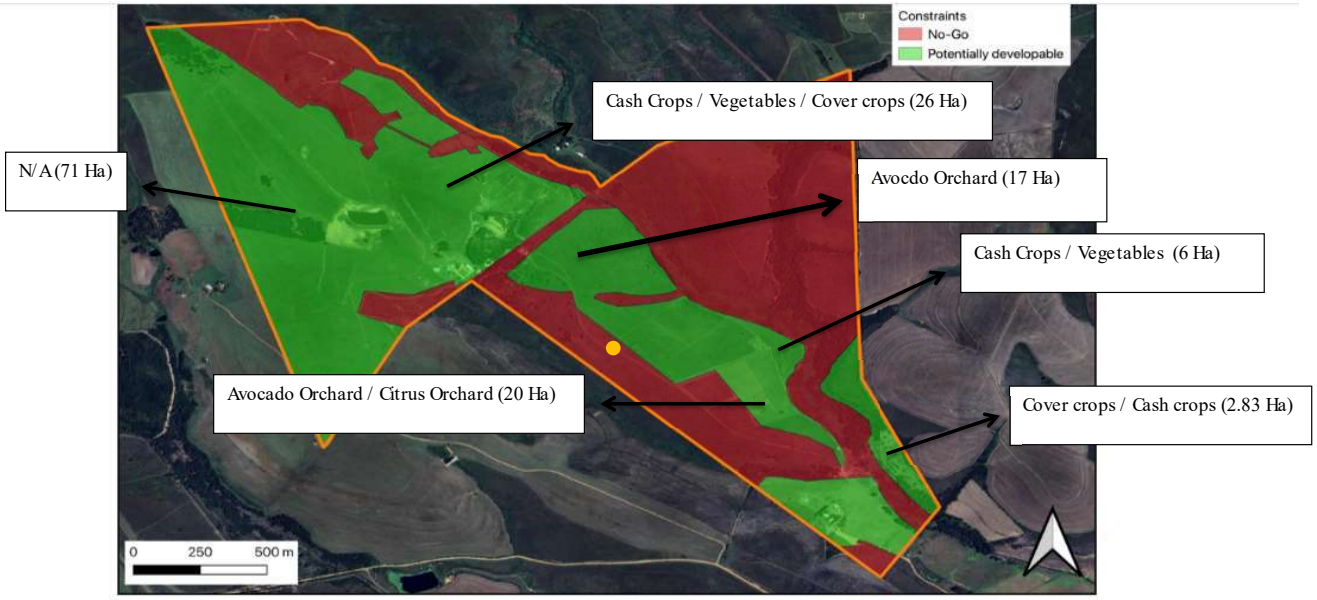

Figure 32. CONSTRAINTS AND OPPORTUNITIES MAP: The study area with potentially developable versus based on ground-truthing, represented on a Google Earth™ aerial image.

Figure 6. The proposed development areas based on the Constraints map produced by the author in 2023.

5.2. LANDSCAPE AND GEOLOGY

The site is characterized by low hills that form the foothills of the Langeberg Mountain. A number of ridges occur between the drainage lines that flow down from the mountains. The ridge is aligned in a predominantly north-south direction, and slopes down to the Vals Rivier. A number of non-perennial drainage lines occur in the study area (Figure 5). The soils in some of the site align with the vegetation type described for the area (Swellendam Silcrete Fynbos), as well a vegetation types not mapped to occur here (Garden Route Shale Fynbos or Mossel Bay Shale Renosterveld). The geology and soils for these ecosystems are described by Rebelo *et al*. (in Mucina and Rutherford, 2006) as follows:

Swellendam Silcrete Fynbos: "*Silcrete and conglomerate with dry, shallow, loamy sand of Houwhoek form. Land types mainly Db and Gb*".

Garden Route Shale Fynbos: "*Acidic, moist clay-loam, prismacutanic and pedocutanic soils derived from Caimans Group and Ecca (in the east) shales. Land types mainly Db and Fa*".

6. VEGETATION DESCRIPTION

6.1. NATIONAL VEGETATION TYPE

According to the Vegetation Map of South Africa, Lesotho and Swaziland (SANBI, 2024) (VEGMAP), the main vegetation type occurring in the study area is Swellendam Silcrete Fynbos. South Langeberg Sandstone Fynbos is mapped in the far north part of the site (Figure 7). However, elements, specifically the substrates, associated with the adjacent Garden Route Shale Fynbos were found on the site, and this vegetation type is also described below as per Mucina and Rutherford, 2006:

Swellendam Silcrete Fynbos

> *"Mainly undulating hills on the coastal forelands, the remains of the old African surface. Structurally it is a medium tall evergreen shrubland or grass- land. Predominantly asteraceous fynbos, but graminoid fynbos on summits and northern slopes where disturbed. Proteoid fynbos occurs on southern slopes and ericaceous fynbos is found in wetter habitats. Afrotemperate forest occurs in fire- safe alluvial areas, such as along*

perennial rivers. It is uncertain whether proteoid fynbos, renosterveld or thicket was the dominant type in some of the eastern plateaus—it has all been converted to pasture".

South Langeberg Sandstone Fynbos

"Complex of gentle to very steep, south-facing slopes, not much dissected over most of the range, but deeply dissected in parts. The Cedarberg Shale Band is prominent in the east, in an almost vertical orientation, as a narrow, smooth-sided valley along which the hiking trails are orientated. Ericaceous and restioid fynbos predominate at higher altitudes, with moderately tall to tall proteoid fynbos on middle and lower slopes. Scrub and restioid fynbos are found in habitats with much groundwater."

Garden Route Shale Fynbos

"Undulating hills and moderately undulating plains on the coastal forelands. Structurally this is tall, dense proteoid and ericaceous fynbos in wetter areas, and graminoid fynbos (or shrubby grassland) in drier areas. Fynbos appears confined to flatter more extensive landscapes that are exposed to frequent fires—most of the shales are covered with afrotemperate forest. Fairly wide belts of Virgilia oroboides occur on the interface between fynbos and forest. Fire-safe habitats nearer the coast have small clumps of thicket, and valley floors have scrub forest (Vlok & Euston- Brown 2002)."

Ecological drivers

According to Cadman et al. (2016) the key ecological drivers in **midland fynbos** ecosystems include (1) the natural fire regimes and the interplay of fire and grazing, (2) edaphic conditions and underlying lithology, and (3) drainage and soil gradients.

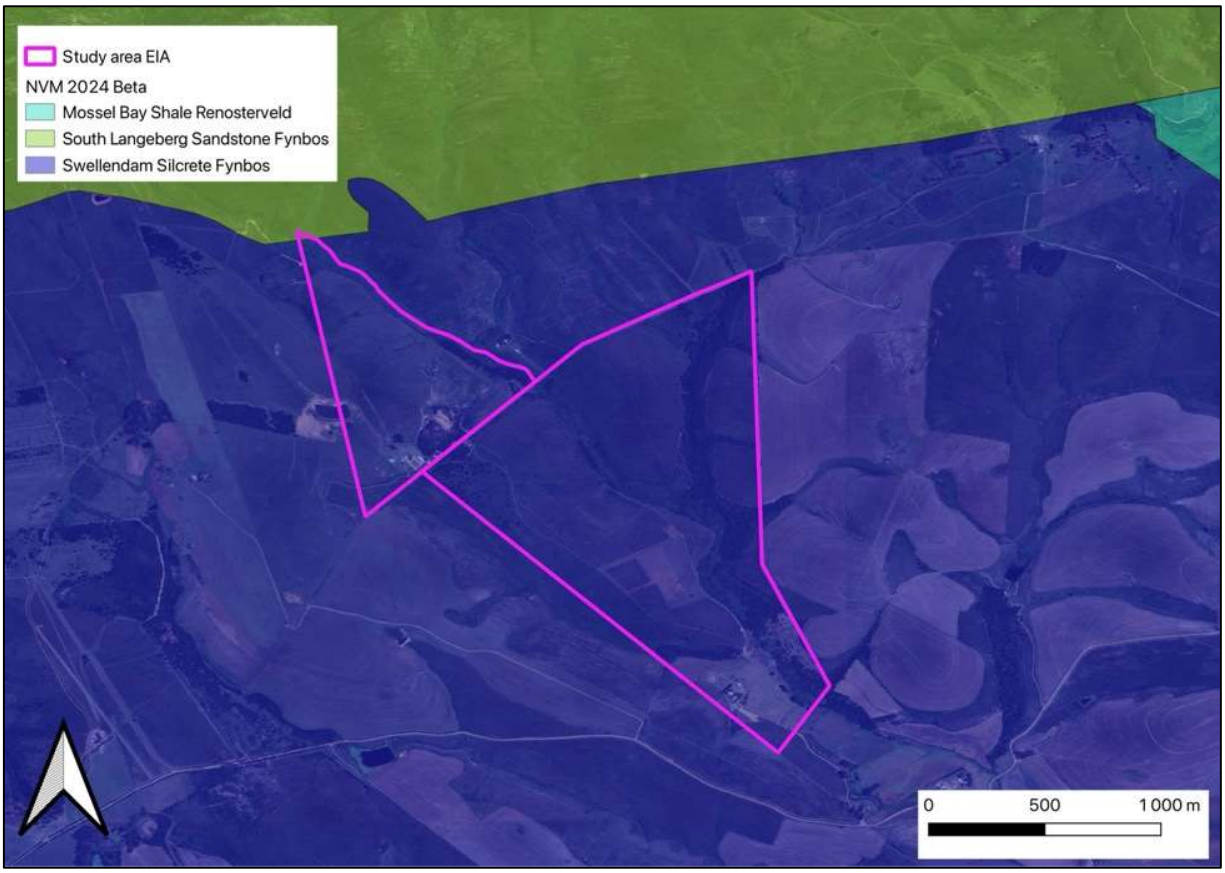

Figure 7. VEGETATION MAP: The study area superimposed on a portion of *The Vegetation Map of South Africa, Lesotho and Swaziland* (SANBI, 2018), overlaid on a Google Earth ™ aerial image.

6.2 A VEGETATION MAP FOR THE RIVERSDALE DOMAIN (2007)

The vegetation within the study area was mapped at a fine scale by Vlok and de Villiers (2007) for the Succulent Karoo Ecosystem Project (SKEP). According to this map four vegetation units are found within the Study area: (1) Langeberg Mesic Proteoid Fynbos (2) Valsrivier Thicket-Renosterveld, (3) Cloetesberg Perennial Stream and (4) Gondwana River and floodplain (Figure 8).

The descriptions of the vegetation types (Vlok and de Villiers, 2007) are as follows:

“The **Langeberg Mesic Proteoid Fynbos** is a large and heterogeneous unit that occurs along the mid southern slopes of the Langeberg. It is most similar to the Ruitersbos Mesic Proteoid

Fynbos in being dominated by often very dense stands of *Leucadendron eucalyptifolium, Leucadendron salignum, Leucadendron spissifolium, Leucospermum cuneiforme, Mimetes cucculatus, Protea eximia, Protea coronata* and *Protea neriifolia*, but differs in having localized endemic proteoid species such as *Leucospermum winteri* present. Ericoid shrubs are often prominent, with species such as *Berzelia intermedia, Erica versicolor, Erica vestita*, *Metalasia trivialis, Penaea cneorum, Phylica axillaris* and *Syncarpha paniculata* abundant. Distinctive localized endemic species include *Berzelia burchellii*, *Berzelia galpinii*, *Disa schlechteriana*, *Erica amicorum, Erica atropurpurea, Erica blenna, Erica garciae, Erica grata, Erica macilenta, Erica nematophylla, Erica rhodantha, Erica tetrahecoides* and *Erica winteri*.

The **Valsrivier Thicket-Renosterveld** is easily identified by the greater presence of Fynbos elements, such as *Leucadendron teretifolium*, in the Renosterveld. *Dicerothamnus rhinocerotis* is present, but not dominant on south facing slopes, where it seems to be displaced by *Metalasia* and *Passerina* species. The uncommon, but characteristic *Erica cruenta* is also present on south facing slopes. The rare *Erica burchelliana* is a near endemic, shared only with adjacent units in which Fynbos is more abundant. Grasses are also prominent after fire and the unit is consequently not rich in geophyte species. In wet areas the Thicket patches become almost forest like, with species such as *Canthium inerme* and *Pittosporum viridiflorum* often abundant. This unit can be confused with the Plattekloof unit, but this unit is somewhat drier and the Thicket patches are better developed than in the Plattekloof unit.

The **Cloetesberg Perennial Stream** units drain into the Gourits River drainage system, but it contains species that are typical of both the eastern Moordkuils and western Goukou Perennial Stream units, *e.g. Leucadendron conicum* and *Leucadendron salicifolium*. Even in terms of its dynamics the Cloeteberg units seem to be intermediate between these two units, but despite lacking unique characteristics the Cloetesberg units cannot be united with confidence with either the Moordkuils or Goukou units. It differs from the Goukou Perennial Stream in rarely having *Prionium* dominated streambeds well-developed and from the Moordkuils Perennial Stream unit in having some differentiating species (such as *Leucadendron salicifolium*) present. It seems to represent an important changeover zone as certain widespread species such as *Psoralea aphylla* reach its easternmost distribution within this unit, while others such as *Agapanthus africanus, Corycium exisum* and *Protea speciosa* do so within its catchment area. No endemics are known,

even from the upper seepage areas, but this may be an artifact of rather poor botanical collecting in the area.

Another rather distinctive unit within this habitat type is the **Gondwana River and floodplain** unit. It differs from all the other Gourits River related drainage areas in having the mainstream zone with rather deep sandy, quartzitic pebble beds originate from the upland Enon conglomerates. Surface water flows only seasonally. *Vachelia karoo* is prominent in this unit, but is never dominant. Shrubs such as *Dodonaea angustifolia* and *Passerina obtusifolia* are often locally abundant, but in sites where these shrubs are not abundant grasses and sedges (*e.g. Cynodon dactylon, Cyperis marginatus, Cyperis textilis, Digitaria eriantha*, *Eragrostis capensis, Eragrostis curvula, Hyparrhenia hirta, Pennisetum macrourum, Pentashistis colorata, Sporobolus africanus, Themeda triandra, etc.*) are abundant. The pebble-bed area is rich in geophytes (*e.g. Brunsvigia, Gethyllis, Gladiolus, Moraea, Tritonia, etc.* species). No endemic species are known to occur here, but a particularly odd aspect about this unit is the occurrence of hybrid swarms of species *e.g. Tritonia securigera* X *T. crocata"*.

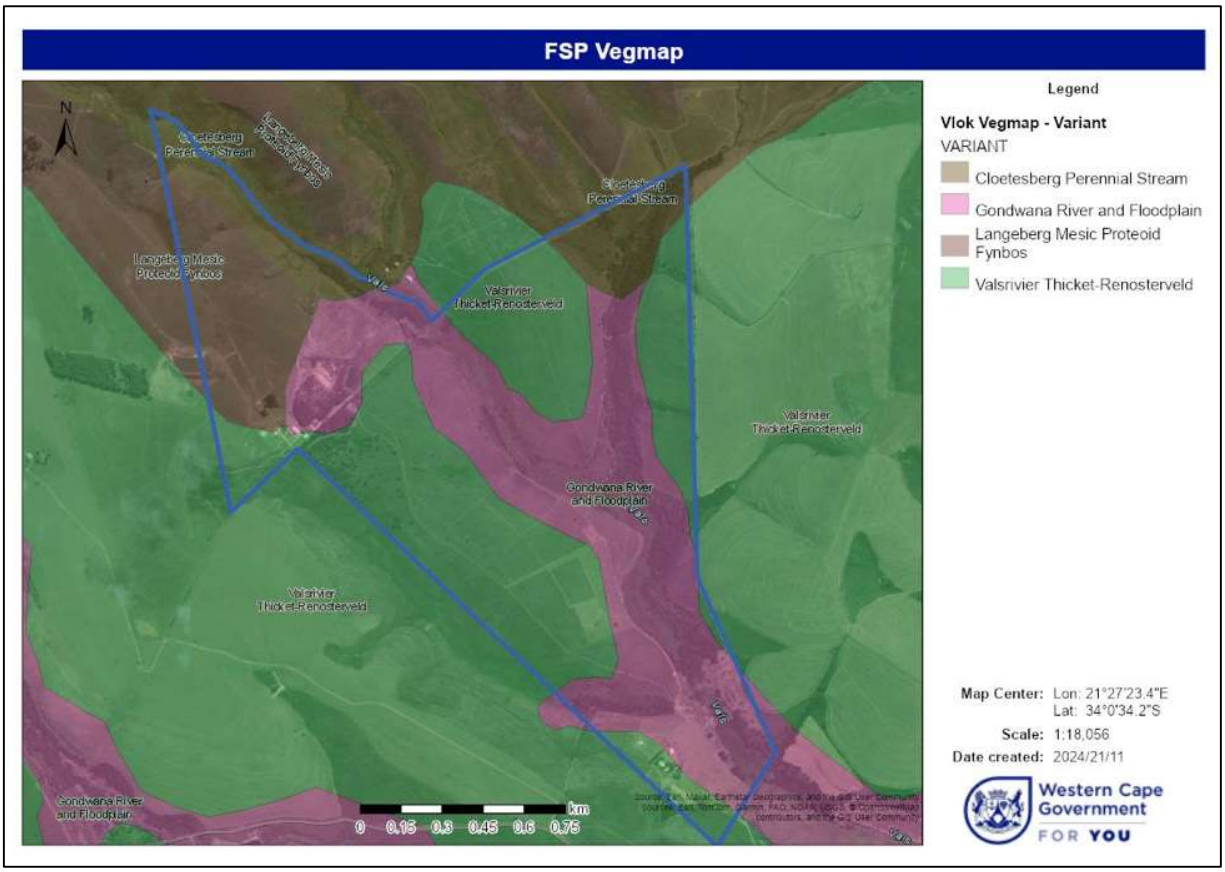

Figure 8. FINE-SCALE VEGETATION MAP: The vegetation types within the site according to the Vegetation Map of the Riversdale Domain (Vlok et al. 2007) overlaid on an ESRI aerial image from CapeFarmMapper (www.gis.elesenberg.org).

6.3. ECOSYSTEM THREAT STATUS

Ecosystem threat status is informed by *The Revised National List of Ecosystems that are Threatened and Need of Protection* (RNLETNP)(Government Gazette, 2022). Species information is not provided in the RNLETNP and is thus taken from The National List of Ecosystems that are Threatened and in Need of Protection (Government Gazette, 2011). The National Biodiversity Assessment 2018 (NBA) (SANBI 2019) has also been consulted.

Table 1 provides a summary of (a) the ecosystem status and reasons, (b) the remaining percentage of the ecosystem and the original (national) extent, (c) the proportion of ecosystem target protected, (d) the known number of species of conservation concern (Government Gazette 2011) and (e) the national conservation target from the two most relevant information sources.

Table 1. Ecosystem threat status derived from available information sources

	The Revised National List of Ecosystems that are Threatened and in Need of Protection	**The National Biodiversity Assessment**
SWELLENDAM SILCRETE FYNBOS		
Ecosystem threat status	ENDANGERED	ENDANGERED
Reason	B (Rate of loss of natural habitat)	B1– limited extend ecosystem
Remaining % of ecosystem	45 % of 86855 (ha)	41.3%
Conservation target	30%	30%
Protected area	4.9 %	N/A
Species of special concern	23 Threatened species and 14 endemic plant species	56
NOTES	Trigger Sub-Criteria: B1(i) - Swellendam Silcrete Fynbos is narrowly distributed with high rates of habitat loss in the past 28 years (1990-2018), placing the ecosystem type at risk of collapse. Scope: Global & national status (global extent assessed)	
GARDEN ROUTE SHALE FYNBOS		
Ecosystem threat status	ENDANGERED	VULNERABLE
Reason	B (Rate of loss of natural habitat)	A3,A3WC
Remaining % of ecosystem	44% of 56474 (ha)	47.9%
Conservation target	23%	23%
Protected area	5.7%	N/A
Species of special concern	8 Threatened species and 3 endemic plant species	N/A
NOTES	Trigger Sub-Criteria: B1(i) - Garden Route Shale Fynbos is narrowly distributed with high rates of habitat loss in the past 28 years (1990-2018), placing the ecosystem type at risk of collapse. Scope: Global & national status (global extent assessed)	

The threat status of Swellendam Silcrete Fynbos is described in the NBA as follows:

"*The decline in natural area to 48 % (41 966 ha)(2014) of its original extent, has been driven primarily by agriculture, especially pastures, with 36 889 ha (42 %)(2014) of the ecosystem type*

consisting of croplands and a further 5968 ha (7 %)(2014) of old fields (Rebelo et al. 2006; HBMOD 2018). Swellendam Silcrete Fynbos is also degraded due to invasions by Acacia cyclops and erosion (Rebelo et al. 2006). Additionally, there are 56 plant species that are threatened mainly as a result of alien species (42 species), overgrazing (31 species) and altered fire regimes (20 species)(Red List of Species 2018)".

6.4 CONSERVATION PLANS AND PROTECTED AREAS

The 2017 WCBSP Handbook (Pool-Stanvliet et al., 2017) distinguishes between the various conservation planning categories. Critical Biodiversity Areas are habitats with high biodiversity and ecological value. Such areas include those that are likely to be in a natural condition (CBA 1) and those that are potentially degraded or represent secondary vegetation (CBA 2). Ecological Support Areas are not essential for meeting biodiversity targets but play an important role in supporting the functioning of Protected Areas or CBAs and are often vital for delivering ecosystem services. A distinction is made between ESAs that are still likely to be functional (i.e. in a natural, near-natural or moderately degraded condition; (ESA 1) and Ecological Support Areas that are severely degraded, or have no natural cover remaining, and therefore require restoration (ESA 2). Other Natural Area (ONA) sites are not currently identified as a priority, but retain most of their natural character and perform a range of biodiversity and ecological infrastructure functions. Although not prioritised, they are still an important part of the natural ecosystem. Ground-truthing of the assigned CBA and ESA sites are described in the vegetation and sensitivity sections below.

The distribution of these sites is shown in Figure 9. The greater part of the study area is classified as a CBA 1 site with the drainage lines CBA 1 Aquatic and the other areas as CBA 1 Terrestrial. Small parts of the site are classified as CBA 2, and ESA 2 is assigned to areas with high density invasive species and smaller areas adjacent to CBA sites. ESA 1 occurs in the site but in very small and disjunct areas. A small area classified as a Protected area is mapped on the north part of the site, but this area is not accessible and is not considered as part of the site that is under application.

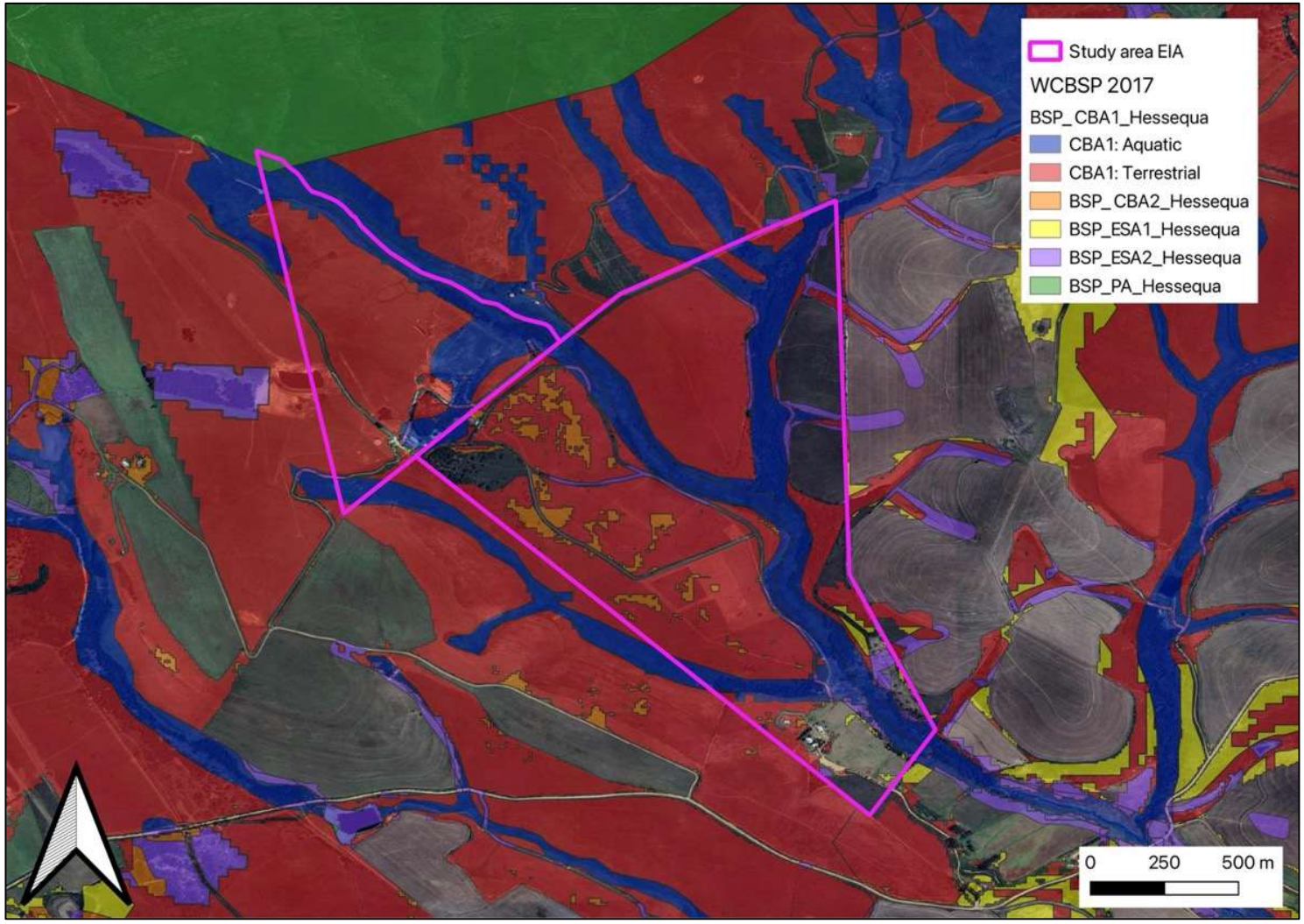

Figure 9. CONSERVATION PLANNING MAP: The study area in relation to the 2017 WCBSP overlaid on a Google Earth™ aerial image. PA stands for Protected Area (Langeberg-East Mountain Catchment Area).

7. THE VEGETATION OF THE STUDY AREA

The vegetation is described with the aid of habitat and survey maps (Figures 10 and 11) and vegetation condition categories defined in Table 2. The vegetation on the site varies in condition from Transformed to Intact condition. However, the greater part of the site has been previously farmed. It appears that the study area has undergone periodic bush cutting, and has likely been grazed extensively. The current condition of the vegetation on the site is difficult to determine in areas that have been recently bush-cut. However, in a number of places, adjacent vegetation appears to have been previously cut and provides a point of reference. There are some intact areas that have not been bush-cut and these suggest that the current farming practice has a slightly detrimental effect on the species diversity, and therefore also ecological integrity of the site. The greater part of the site supports Fynbos, and only the most southerly part of the site supports more typically renosterveld vegetation. A number of habitats have been mapped on the site, these are as follows:

1. Transformed
2. Highly degraded (Fynbos)
3. Degraded to Highly degraded Fynbos
4. Degraded Fynbos
5. Semi-intact to Degraded Fynbos
6. Semi-intact Fynbos
7. Semi-intact Renosterveld
8. Intact Fynbos
9. Wetland
10. Drainage line
11. Dam

Note that due to the highly variable condition of vegetation on the site, it was necessary to combine some habitat condition classes to represent a relatively homogenous area. For example, Degraded to Highly degraded Fynbos has been mapped for areas that are mostly highly degraded but contain some smaller patches of Degraded vegetation within this. These smaller patches can not be mapped accurately as they are so patchy.

Table 2. The habitat condition descriptions used for the vegetation on the site.

Habitat condition	Description	Representative of indigenous vegetation
Intact	A true representation of the original vegetation type in terms of structure and species makeup. Minimal soil disturbance. Unlikely to have ever been ploughed. Disturbance may be evident.	Yes
Semi-intact	Closely resembles the original vegetation type in terms of structure and species makeup but has undergone some form of current or historical disturbance. Restoration potential is high.	Yes
Degraded	Only a few species representative of the original vegetation type are present. The vegetation has undergone heavy disturbance. Restoration potential is either low or moderate.	Yes
Highly degraded	The original vegetation is usually absent and has been removed in the past. Only a few remnant or pioneer species are present. Soils usually ploughed in the past. Restoration potential is very low.	No
Transformed	No remnant species present. The landscape is altered irreversibly with no restoration potential. Examples include cultivated farmland and the built environment.	No

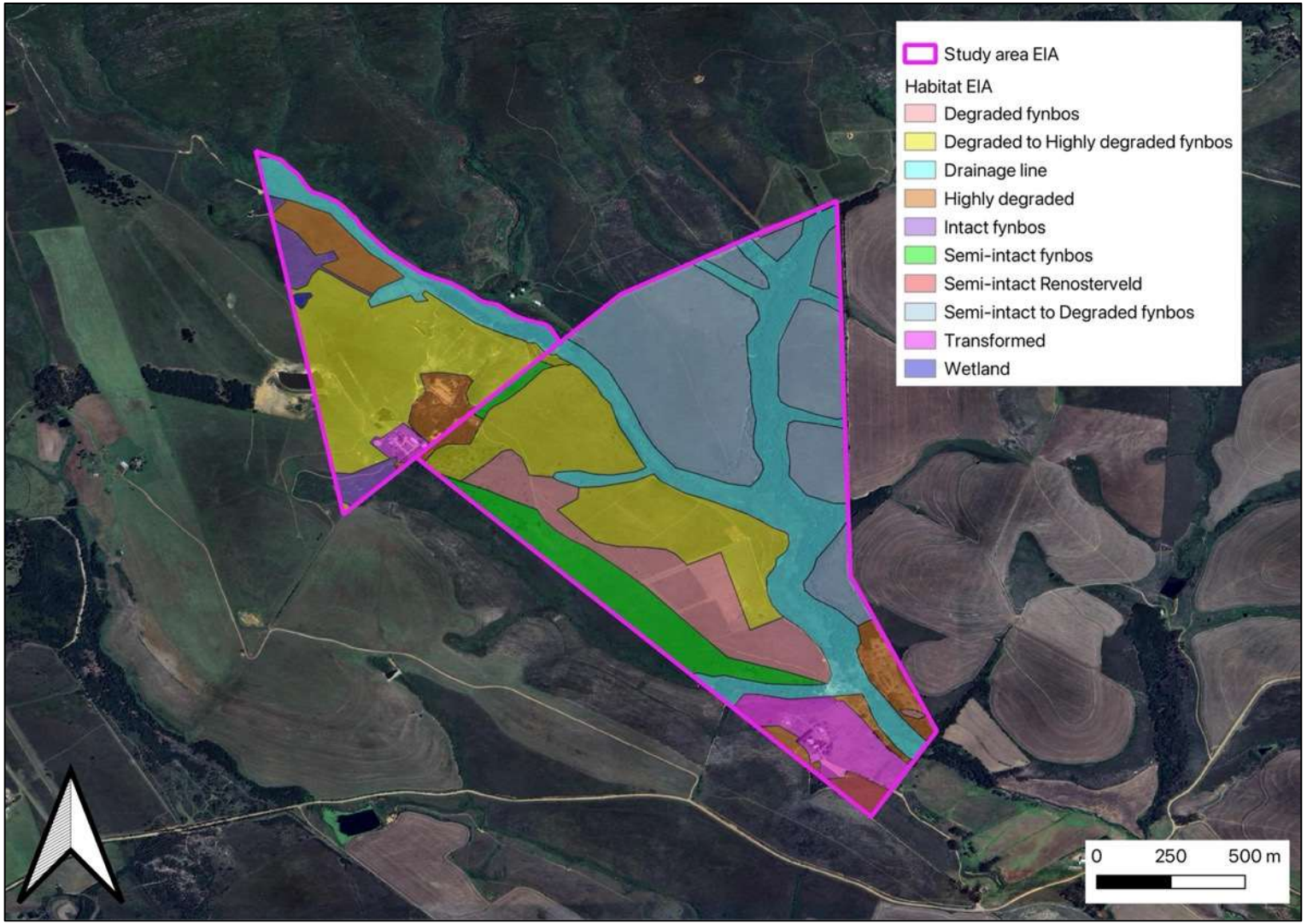

Figure 10. HABITAT MAP: The study area with ground-truthed habitat categories represented on a Google Earth™ aerial image.

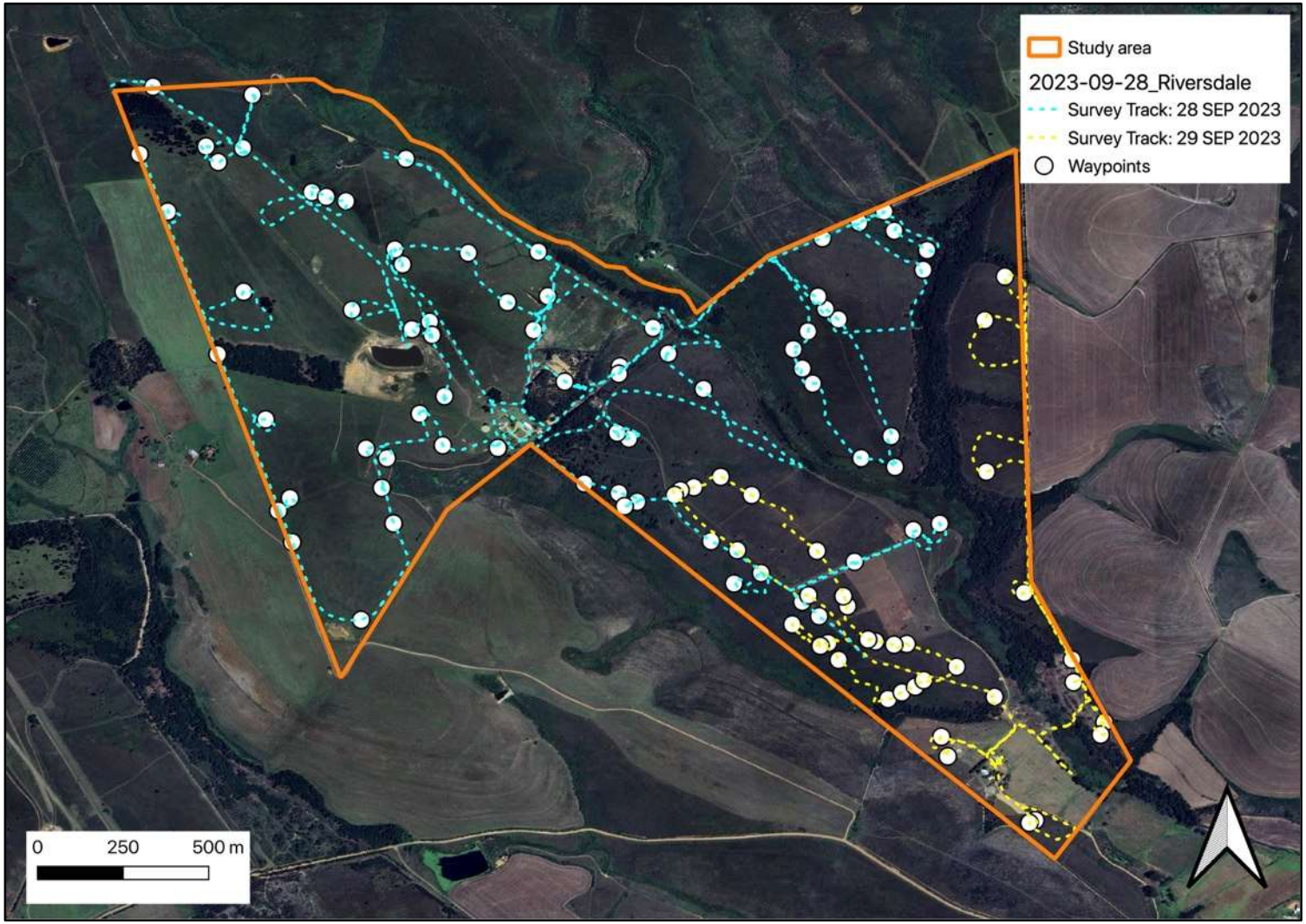

Figure 11. SURVEY MAP: The study area with sample waypoints and survey tracks represented on a Google Earth™ aerial image.

7.1 TRANSFORMED (includes DAMS) AND HIGHLY DEGRADED VEGETATION

These two habitats have been modified to such a degree that they no longer represent indigenous vegetation. Transformed areas are those that have already been developed for buildings, farm infrastructure or orchards. The Highly degraded habitat is dominated by a dense stand of gum trees *Eucalyptus* sp. where some earth moving has taken place.

Figure 12. The dense stand of gum trees and cleared area in front of them that make up the Highly degraded habitat.

Figure 13. The Highly degraded habitat from inside the stand of gums. Some earth moving can be clearly seen.

7.2 DEGRADED TO HIGHLY DEGRADED FYNBOS

This habitat occupies extensive portions of the north-west part of the site. There is a long history of agricultural activities here, mostly bush cutting and grazing of livestock. The vegetation is comprised of mostly indigenous species, however, species diversity is low, and dominated by a few hardy disturbance tolerant species. Typical species noted in this habitat include common coppice kolkol *Berzelia intermedia* which is typically an indicator of wet soils some heath *Erica quadrangularis*, cube heath *Erica cubica*, golden yellowwort *Sebaea aurea*, finestem Caperose *Cliffortia filicaulis*, *Helichrysum* sp., Slangbos *Stoebe plumosa* and katstert *Anthospermum aethiopicum*. Grasses (such kikuyu *Cenchrus clandestinus*, kweek *Cynodon dactylon,* weeping lovegrass *Eragrostis curvula*), sedges and restios such as wheat Capereed *Restio triticeus*, all occur in this habitat, with sedges more dominant in the slightly wetter areas.

Other Fynbos species recorded for this habitat include the common sunshine conebush *Leucadendron salignum*, eastern blombush *Metalasia trivialis,* eastern kalossie *Ixia orientalis*, two-tone heath *Erica versicolor* and white satin *Geissorhiza inflexa.*

A number of listed invasive alien plants species (IAPs) occurs either in concentrated areas or scattered in the site. Those identified include black wattle *Acacia mearnsii*, gum trees *Eucalyptus* sp., pines *Pinus* sp.

Figure 14. Extensive areas have been bush-cut over many years and grazed with livestock. The result is a Highly degraded habitat with grassy and Fynbos elements.

Figure 15. One of the Degraded areas within this habitat, contains a low diversity of indigenous species, but is dominated by typical Fynbos species such as the white flowered *Berzelia intermedia* and pink *Erica* sp.

Figure 16. An extensive area of recently bush-cut Fynbos on the western ridge of the study area. Species diversity here is low due to many years of use for agriculture, however, mostly indigenous species area present.

7.3 DEGRADED FYNBOS

The Degraded Fynbos habitat is similar to the Degraded to Highly degraded Fynbos habitat as described above, however, the species diversity is slightly higher and the impact of bush cutting is slightly less severe. Additional species noted include: wartstem pincushion *Leucospermum cuneiforme*, seeroogblom *Boophone disticha*, needle everlasting *Helichrysum teretifolium*, gwarrie *Euclea* sp.

Figure 17. The Degraded Fynbos habitat has been partially cut. The uncut areas show a moderate diversity of Fynbos elements.

Figure 18. Towards the southern part of the western ridge some of the Degraded Fynbos showing some renosterveld elements such as the renosterbos and slangbos with restios and ericas,

7.4 SEMI-INTACT TO DEGRADED FYNBOS

This habitat occurs predominantly on the central ridge and eastern side of the study area. It consists of historically brush cut areas. Species diversity is moderate and includes typical Fynbos elements of emergent tall proteas with a dominant low asteraceous shrub layer. Some bulbs are present, suggesting that the land has not been ploughed. The dominant species in this habitat are: *Metalasia trivialis*, lambstail *Lanaria lanata*, *Cliffortia filicaulis*, spiderweb purplegorse *Muraltia ciliaris*, *Erica* sp. *Helichrysum* sp. *Anthospermum aethiopicum, Restio triticeus, Berzelia intermedia*, noughts and crosses *Penaea mucronata*, and *Leucadendron salignum*.

Bulbs include large brown Afrikaner *Gladiolus liliaceus*, coastal watsonia *Watsonia laccata*, *Geissorhiza inflexa, Eriospermum capense* and Chinkerinchee *Ornithogalum thyrsoides*.

Three species of conservation concern (SCC) or importance include the Near Threatened green sugarbush *Protea coronata*, The Near Threatened fluffy hardleaf *Phylica velutina* and

the Endangered linearleaf sugarbush *Protea decurrens*. Another noteworthy find here is a range extension for the Fynbos sorrel *Oxalis truncatula.*

The lower slopes of this habitat close to the rivers contain scattered individuals of black wattle, and the higher elevations contain silky hakea *Hakea sericea*.

Figure 19. The Semi-intact to Degraded habitat has been recently bush-cut on the central ridge. The cut areas appear to be in very poor in condition, however, the uncut areas show the true habitat condition and diversity. This kind of Fynbos can recover fairly well from such bush cutting if it is not undertaken too often.

Figure 20. Some of this habitat has not been recently cut but the diversity is fairly low on the lower slopes. The drainage lines can be easily identified by the large concentration of black wattle.

Figure 21. The Semi-intact to Degraded habitat on the eastern ridges of the site have a moderate diversity of species dominated by typical Fynbos elements such as ericas, restios and *Metalasia trivialis*. The Endangered linearleaf sugarbush *Protea decurrens* occurs on this ridge.

7.5 SEMI-INTACT FYNBOS

This habitat occurs on the south-western part of the study area on a west-facing slope that contains some exposed silcrete. The area with exposed silcrete has not been brush-cut and contains some good condition vegetation. It is similar in composition to the habitat described above. There are high numbers of *Protea coronata* and *Protea decurrens* in this habitat. The Langeberg bobbejaantjie *Babiana fourcadei* also occurs here in large numbers. Part of this area has been recently bush-cut, however, the historical imagery suggests the historical extent of this habitat.

Figure 22. There is some exposed silcrete in this area under this Fynbos. It has therefore not been brush-cut and is in good condition, however, its is only a small isolated area that has not been cut. Diversity is high and the Near Threatened *Protea coronata* and the Endangered *Protea decurrens* occur here.

Figure 23. The vegetation lower on the west-facing slope has been partially cut but is in good condition.

Figure 24. The Endangered *Protea decurrens* is a resprouter and can survive the periodic cutting.

7.6 SEMI-INTACT RENOSTERVELD

This habitat occurs only in the small patch of vegetation close to the farm entrance in the far south-west part of the site. The vegetation has more renosterveld and thicket elements than … and is likely to be more representative of Mossel Bay Shale Renosterveld (SANBI Vegmap) or Valsrivier Thicket-Renosterveld (Vlok Vegmap). Typical renosterveld species include renosterbos *Elytropappus rhinocerotis, Oedera* sp., *Helichrysum* sp., common gonna *Passerina corymbosa*, and thatching grass *Hyparrhenia hirta.* One SCC was found here, the NT *Phylica velutina*.

Thicket elements include dune curranthrhus *Searsia laevigata*, glossy currantrhus *Searsia lucida*, poison starapple *Diospyros dichrophylla*, common spikethorn *Gymnosporia buxifolia*, crossberry *Grewia occidentalis* and bitter aloe *Aloe ferox*. A protected tree species, the cheesewood *Pittosporum viridiflorum* was found in the site and is associated with the thicket

elements. IAPs found here include prickly pear *Opuntia ficus indica*, black wattle and rooikrans *Acacia cyclops*.

Figure 25. This habitat has thicket elements such as large shrubs and renosterveld elements such as renosterbos.

7.7 INTACT FYNBOS

The only parts of the Study area that appear to be previously undisturbed are two areas on the western side of the site. These areas contain higher species diversity than the other parts of the site, and especially the northern patch which appears to be seasonally wet and occurring on a relatively steep slope. This is likely the reason that it has not been previously cultivated. Additional species noted here include the common pagoda *Mimetes cucullatus*, blackbeard sugarbush *Protea neriifolia*, hairy Cape sweetpea *Podalyria burchelli*, *Elegia fistulosa* (in wetter areas), braken fern *Pteridium aquilinum,* broom thatchreed, *Thamnochortus fruticosus*, foxy purplegorse *Muraltia alopecuroides* and a *Moraea* sp.

Figure 26. The Intact Fynbos near the north of the site contains a very high diversity of species. The Valsrivier can be seen in the middle of the image.

Figure 27. The edge of the Intact habitat where it meets with the Highly degraded areas.

7.8 WETLAND and DRAINAGE LINES

The major drainage line that runs through the site is the Vals Rivier. Another perennial stream joins the Vals Rivier, and both of these have a number of non-perennial tributaries that flow into them. The tributaries are mostly cleared of vegetation, but some still contain indigenous species. The major drainage lines contain a high density of invasive black wattle, especially in the lower reaches.

Wet areas occur throughout the site, and the only wetland that has been mapped is a wet area that is surrounded by cultivated lands. However, there are a number of wet indicator species such as *Berzelia intermedia* that occurs throughout the site. There are likely to be wetlands within the Intact Fynbos habitat. The mapped wetland is dominated by two restios, broom anglereed *Restio paniculatus* and pipe goldreed *Elegia fistulosa*, along with the sedge hairy hippo sedge *Fuirena hirsuta*.

Figure 28. A view of the east facing slope of the central ridge. The tributaries of the Valsrivier have not been completely transformed in this area.

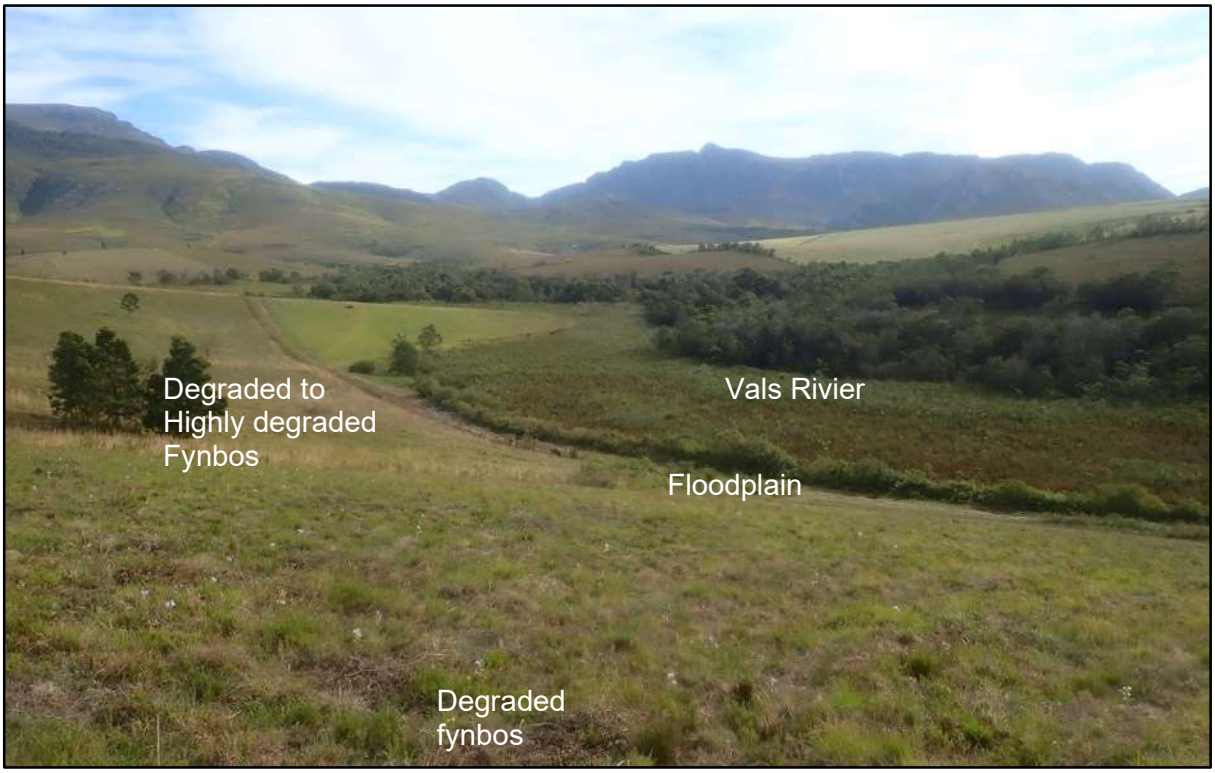

Figure 29. The Vals Rivier is dominated by the mature black wattles. The adjacent floodplain can be seen. The foreground shows the recently cut Degraded Fynbos habitat. Further away on the habitat becomes Degraded to Highly degraded.

The freshwater features on the site have not been mapped accurately and should be verified by a freshwater ecologist. Their sensitivity and appropriated buffers should be delineated before a final development plan is made.

8. SENSITIVITY AND ECOLOGICAL CONSTRAINTS

A sensitivity map was produced by taking into consideration the ecological condition and conservation value of the habitat types. The ecosystem status of the vegetation types is factored into the sensitivity along with presence (known records or absence) of SCC and spatial ecological connectivity. Restoration potential is also considered, or the condition that the vegetation would be if left uncut. The sensitivity map is derived from the habitat map, which in turn informs the constraints map (Figures 31 and 32) The location of the SCC are presented in Figure 30. However, the constraints on the site are not only determined by the sensitivity, but also the spatial distribution of features on the site. Existing roads have been used as boundaries for the constraints.

In general, High, High-Medium are not supported for development, Medium sensitivity area are partially considered as developable, whereas Medium-Low, Low and Very low sensitivity areas are generally potentially developable, except for where connectivity is required between the more sensitive areas.

Major drainage lines and wetlands are important ecological features and these have all been mapped as No-Go areas. Appropriate buffers around these features must be suggested by a freshwater ecologist.

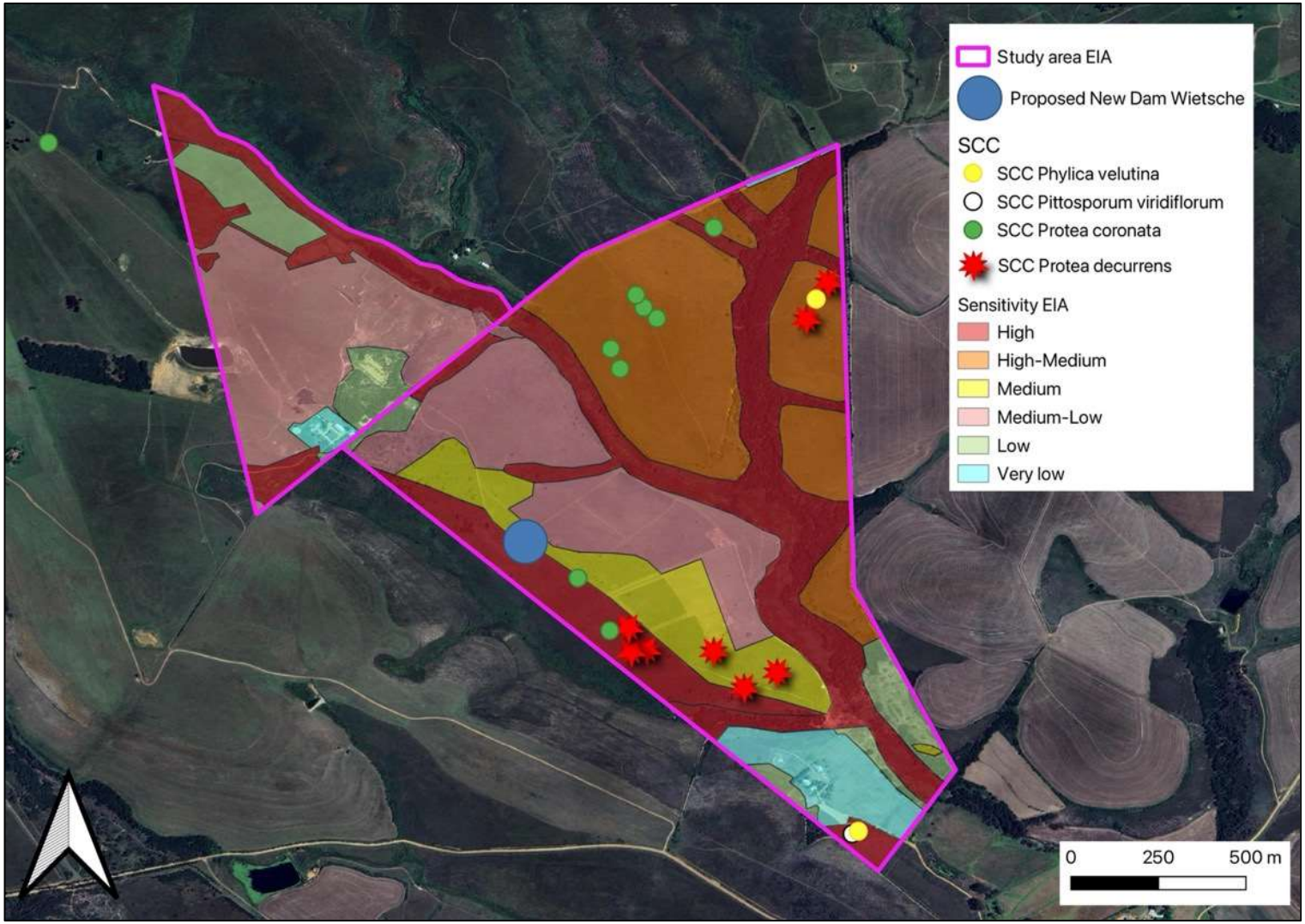

Figure 30. SENSITIVITY MAP: Google Earth ™ image showing the sensitivities and SCC mapped within the Study area.

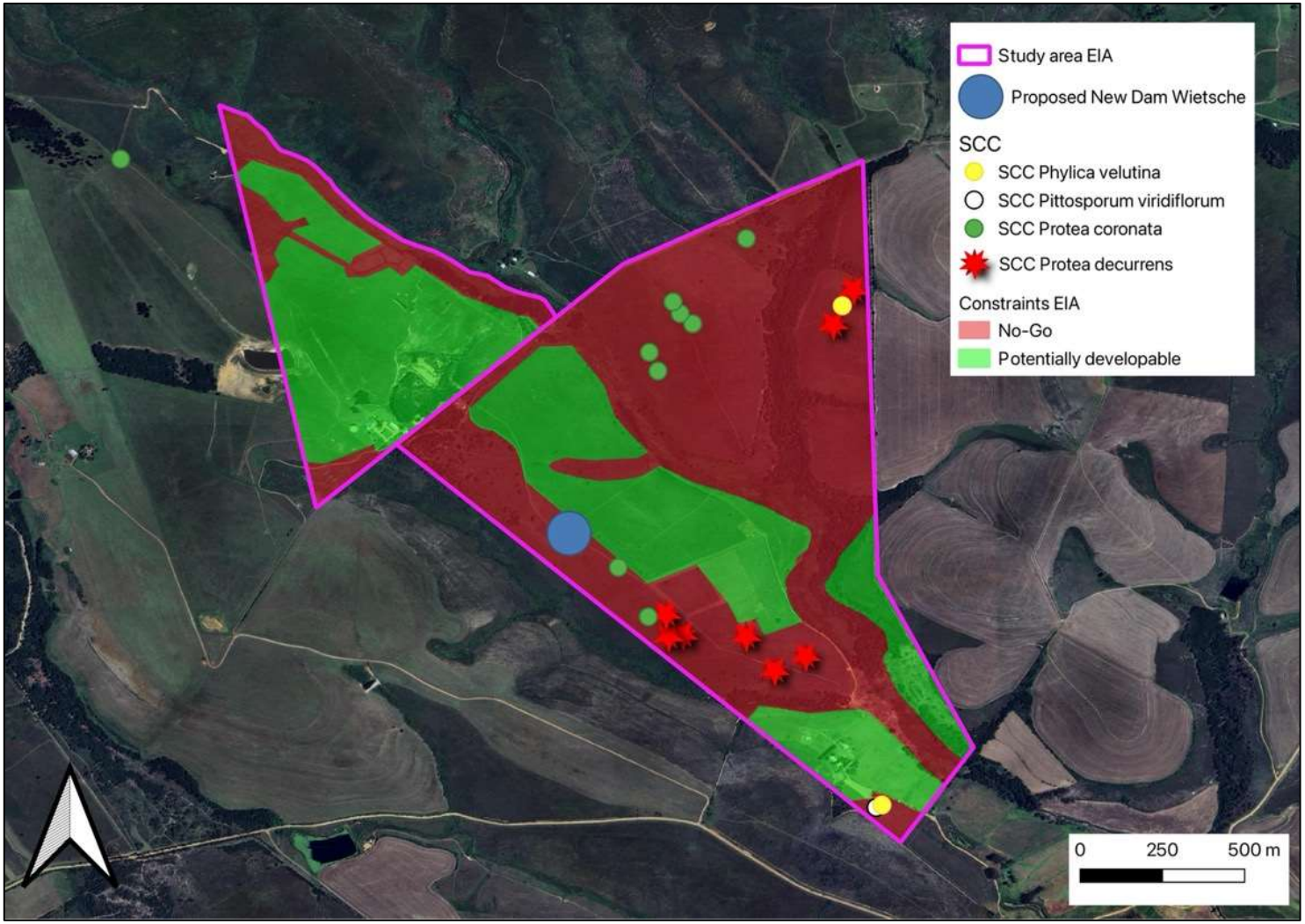

Figure 31. CONSTRAINTS AND OPPORTUNITIES MAP: The study area with potentially developable versus based on ground-truthing, represented on a Google Earth™ aerial image.

9. CONCLUSIONS AND RECOMMENDATIONS

Most of study area is characterized by vegetation that has been or is currently used for agriculture. The typical agricultural activities are bush-cutting the Fynbos and livestock grazing. This type of land management favours species that respond well to cutting, including shrubs, graminoids and bulbs. Species that would not persist under these conditions are those that regrow from seeds only (i.e. non-resprouters) and require a few years to mature enough to produce seeds (e.g. re-seeding proteas). This management regime therefore allows the indigenous vegetation to persist, but reduces the species diversity.

For the purposes of this application, the no-go scenario should be considered. This is the scenario where the current agricultural management continues. Under this scenario the condition of the vegetation may decline if the bush-cutting frequency is increased, or if the numbers of livestock are increased. However, indigenous vegetation and ecological processes are likely to persist in the medium-term, even under increased grazing pressure.

The presence of threatened vegetation types on the site indicate that allowing some areas to remain natural is very important ensure species and ecological processes persist on the subject properties. The numerous drainage lines and adjacent areas are all important and should be excluded from development, along with a suitable buffer, which must be indicated by a freshwater specialist.

Terrestrial areas with Intact, Semi-intact and Semi-intact to degraded condition, especially where SCC are present, have been classified as No-Go areas. Some small sites of poorer quality vegetation have also been included in the No-Go area as corridors that connect better quality vegetation, or where a natural boundary such as a road exists and has been used. The remainder of the site has been mapped as potentially developable, in areas where agricultural activities have already had a moderate to severe impact on the indigenous vegetation.

The subject properties are large, and if the suggest No-Go areas are observed, indigenous vegetation and ecological processes can persist on the site. It would be recommended that the bush-cutting and grazing is excluded from all drainage lines and buffers, and is not intensified in

other terrestrial areas. The provisional location of the new dam is proposed within an area mapped as a No-go site. It is recommended that the position be moved into an area mapped as potentially developable. The provisional areas proposed for cultivation are restricted to the potentially developable sites based on the terrestrial constraints report. A final layout for agricultural expansion should be developed only after a freshwater and faunal ecologists have also provided a constraints map of the site.

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APPENDIX 1: ABBREVIATED CURRICULUM VITAE: GREG NICOLSON

Experience

- Expertise in field work in the CFR – vegetation surveys, plant identification, plant collection, ecological monitoring
- Data management and analysis
- Basic skills in GIS programs
- Vegetation and species mapping
- MSc thesis entitled *" Road reserves as conservation assets: exploring the species of conservation concern and the ecological condition of the N7 road reserve".* Graduation date: December 2010
- Experience leading teams of field assistants in remote mountainous areas
- Completed over 100 botanical survey/assessment reports

Career History

- 2019 – present: Co-founder and independent botanist at Capensis Ecological Surveys
- March 2013 – Dec 2018: independent botanical specialist and associate of Bergwind Botanical Surveys & Tours CC
- March 2011 – December 2012: conducted a comprehensive post fire survey of the Paardeberg (Paardeberg Sustainability Institute)

Education and qualifications

- Pr. Nat. Sci. (116488)
- MSc (Botany) – University of Cape Town (2010).
- BSc: Hons (Env. Science) – University of Cape Town (2005)
- BSc: Environmental and Geographical Science - University of Cape Town (2002 – 2004)

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