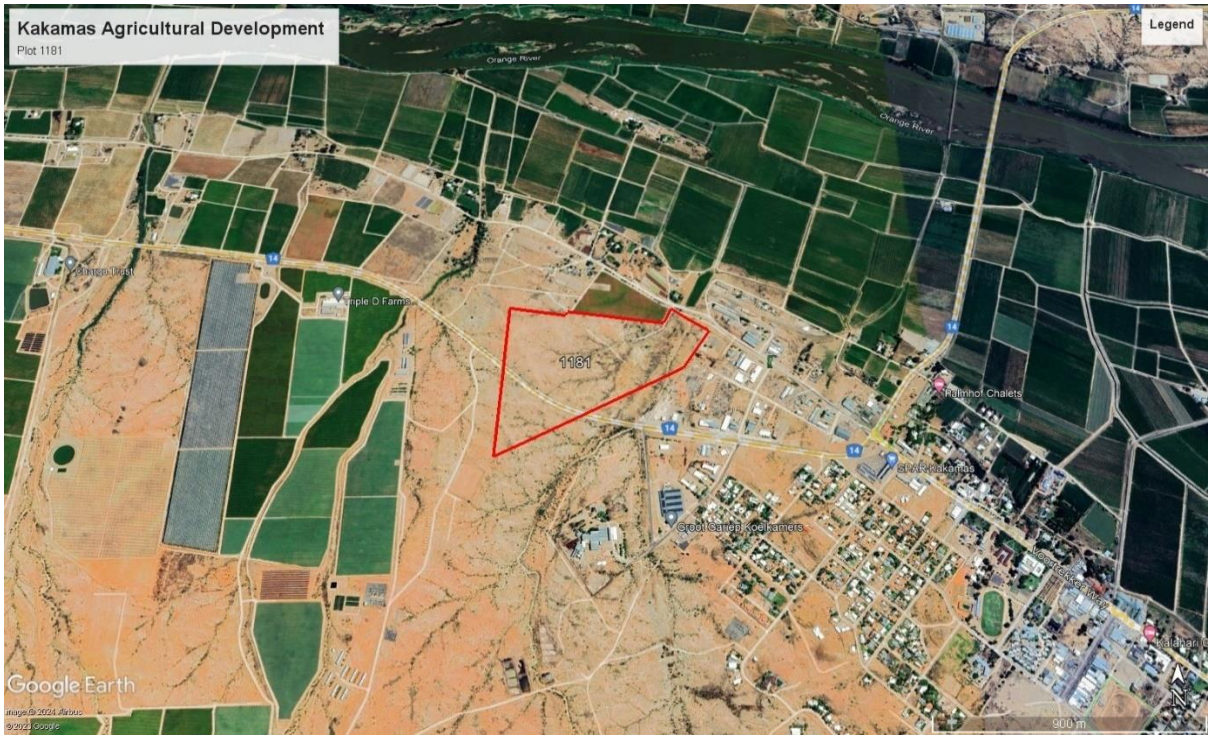
BOTANICAL SCAN & TERRESTRIAL BIODIVERSITY COMPLIANCE STATEMENT

KAKAMAS AGRICULTURAL DEVELOPMENT

THE PROPOSED DEVELOPMENT OF NEW AGRICULTURAL LAND ON ERF 1181, KAKAMAS. KAI !GARIB LOCAL MUNICIPALITY, NORTHERN CAPE PROVINCE.



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28 August 2024

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EXECUTIVE SUMMARY

Raisins South Africa is a Non-Profit Company with the vision of growing a sustainable and competitive South African raisin industry. SA is the world's 5th largest exporter of raisins, with more than 88% of its total crop earmarked for premium international markets and is one of the only production origins that can produce all major (7) raisin product categories. Kakamas is part of the Orange River agricultural region known for its raisin production. Raisins SA is now considering the development of portions of Erf 1181, next to Kakamas into vineyards and drying facilities for raisin production. Erf 1181 is about 30 ha in size, bordering on the northwestern urban edge of Kakamas. It still supports natural veld (although portions of the site are and have been disturbed in the past) and overlap a critical biodiversity area (CBA2).

VEGETATION TYPE & STATUS

According to the South African vegetation map (2018) (Mucina & Rutherford, 2006), the study area would have supported Bushmanland Arid Grassland vegetation (Figure 6), a vegetation type that is classified as "**Least Threatened**" in terms of the "*Revised List of ecosystems that are threatened and in need of protection*" (GN 47526 of 18 November 2022).

HABITAT CONDITIONS AND DIVERSITY

Erf 1181 borders on the Kakamas urban edge and is for all practical purposes surrounded by agricultural to the north and west. It still shows good connectivity to the south but is interrupted by the N14. The site itself is subject to constant human activity (used by the local community as a shortcut between the town and surrounding farming areas) and shows various signs of previous and existing disturbances (e.g., excavations, illegal dumping, old building foundations, ploughing).

LAND-USE

The property is not currently used for any specific land use other than the excavation (mining) of sand and rock and illegal waste dumping. Historically it supported several buildings and portions of the site seems to have been ploughed in the past (Refer to Figure 8).

VEGETATION ENCOUNTERED

The vegetation conforms to the Bushmanland Arid Grassland vegetation type, but still shows the effect of the recent long-term drought period that impacted the Northern Cape and Karoo over the past 7 – 8 years. Plant species diversity was low and the site itself is subject to almost constant human activity. The vegetation cover, over most of the terrain, can be described as a low open to sparse vegetation with the occasional larger shrub scattered in between, usually along drainage lines (Photo 7 to Photo 11). After good rains, it is expected that this veld will be dominated by white grasses (e.g. *Stipagrostis* species), but because of the recent long-term drought, the grassy layer were mostly absent.

PLANT SPECIES SENSITIVITY THEME

Four (4) *Vachellia erioloba* trees (NFA protected species) were observed of which 2 might be impacted, but the impacts on these plants should be easy to mitigate. Six (6) NCNCA protected species were observed (Refer to Table 9), but none of them are red-listed species and all of them are relatively common and widespread species. The proposed project is not likely to result in significant species or habitat loss.

According to the **DFFE Environmental Screening Tool** report for this site (Appendix 1), the **plant species theme sensitivity is considered MEDIUM SENSITIVE**, because of the potential for or encountering the following species:

- ***Sensitive species 144:*** One of the best know plants of the family Aspodelaceae in the Northern Cape. It has a red-list status of "Vulnerable" because of a projected overall population decline of at least 26% by 2102, while climate change species

distribution models predict losses of suitable habitat of between 33% and 68% by 2070. This species was **not observed** within the study area.

- However, four (4) ***Vachellia erioloba*** trees (NFA protected species) were observed of which 2 might be impacted, but the impacts on these plants should be easy to mitigate.
- Six (6) NCNCA protected species were observed (Refer to Table 9), but none of them are red-listed species and all of them are relatively common and widespread species. The proposed project is not likely to result in significant species or habitat loss.

As a result, the **plant species theme sensitivity** is considered **LOW SENSITIVE** with mitigation.

FAUNA & AVI-FAUNA

According to the **DFFE Screening tool report** for the site (Appendix 1), the Animal Species Theme Sensitivity is considered **HIGH SENSITIVE** because the site might potentially support two sensitive bird species, namely the **Lanner Falcon** and the **Ludwig's Bustard**.

Of these two species, only the Lanner Falcon has been observed in this area (SABAP2), but two other species of conservation concern, namely the Martial Eagle and the Black Stork were also observed in this pentad (Refer to Table 10). However, it must be noted that the pentad associated with the study area, also overlaps a portion of the Orange River (the reason for the inclusion of the Black Stork) and a large area of natural veld to the south of the site (probably the reason for the inclusion of the Martial Eagle).

Apart from insects, rodents and a few smaller reptile species, the site itself is not expected to support any significant fauna or avi-fauna. Three sensitive bird species had been observed in the larger pentad (Heading 6.2), but it is considered unlikely to highly unlikely that the development will result in any significant additional impact on the breeding or feeding habitats for any of these species.

As a result, the **animal species theme sensitivity** for this project is considered **LOW SENSITIVE**

TERRESTRIAL BIODIVERSITY SENSITIVITY THEME

According to the **DFFE Environmental Screening Tool** report for this site (Appendix 1), the **Terrestrial Biodiversity theme sensitivity is considered VERY HIGH SENSITIVE**, because it will impact on a critical biodiversity area (CBA 2) as identified by the Northern Cape critical biodiversity areas maps (Figure 7)**.** The reasons for assigning this CBA, are not clearly defined in the GIS layers, but according to information given in Critical Biodiversity Areas of the Northern Cape: Technical Report (Holness & Oosthuysen, 2016) all areas in close proximity of larger rivers were prioritized and all NFEPA (National Freshwater Ecosystem Priority Areas) rivers were given a minimum category of CBA.

In this case, it is assumed that the property was **automatically assigned CBA2 status** because of its proximity to the **Orange River**.

According, to the assessment in Table 12, the **cumulative impact is considered to be MEDIUM LOW** (Not very high as suggested by the DFFE Screening report), mainly because of the location of the site, the disturbed nature of large portions of the site, the least threatened status of the vegetation and the low potential impact on SoCC). With mitigation the cumulative impact can easily be reduced to **LOW NEGATIVE**.

As a result, the **terrestrial biodiversity theme** sensitivity is considered **LOW SENSITIVE**.

WATER COURSES AND WETLANDS

A number of intermittent or episodic drainage lines and watercourses are present. A separate specialist study was commissioned to assess the impact on watercourses and wetland.

MAIN CONCLUSION

The Terrestrial biodiversity impact assessment (Table 12) aims to take all the findings of this study into account, including the scale of the project, the conservation status of the site, the vegetation status and condition and the potential impact on SoCC.

According, to the assessment in Table 12, the main impacts associated with the proposed development are:

- A potential **Low** impact on special habitats (larger indigenous trees associated with drainage lines and watercourses);
- A potential **Low** impact on conservation priority areas (CBA 2);
- A potential **Low** impact on plant species of conservation concern (e.g., 2 x NFA protected Camelthorn trees and 5 NCNCA protected species);

It is considered highly unlikely that the development will contribute significantly to any of the following:

- Significant loss of vegetation type and associated habitat.
- Loss of ecological processes (e.g., migration patterns, pollinators, river function etc.) due to construction and operational activities.
- Loss of local biodiversity and threatened plant species.
- Loss of ecosystem connectivity.

WITH THE AVAILABLE INFORMATION IT IS RECOMMENDED THAT THE PROJECT BE APPROVED.

DETAILS OF THE AUTHOR

This is a specialist report compiled by Peet Botes from PB Consult.

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INDEPENDENCE & CONDITIONS

PB Consult is an independent entity with no interest in the activity other than fair remuneration for services rendered. Remunerations for services are not linked to approval by decision making authorities and the company have no interest in secondary or downstream development because of the authorization of this project. There are no circumstances that compromise the objectivity of this report. The findings, results, observations and recommendations given in this report are based on the author's best scientific and professional knowledge and available information. The author reserves the right to modify aspects of this report, including the recommendations if new information become available which may have a significant impact on the findings of this report.

RELEVANT QUALIFICATIONS & EXPERIENCE OF THE AUTHOR

Mr. Peet Botes holds a BSc. (Hons.) degree in Plant Ecology from the University of Stellenbosch (Nature Conservation III & IV as extra subjects). Since qualifying with his degree, he had worked for more than 20 years in the environmental management field, first at the Overberg Test Range (a Division of Denel) managing the environmental department of OTR and being responsible for developing and implementing an ISO14001 environmental management system, ensuring environmental compliance, performing environmental risk assessments with regards to missile tests and planning the management of the 26 000 ha of natural veld, working closely with CapeNature (De Hoop Nature Reserve).

In 2005 he joined Enviroscientific, an independent environmental consultancy specializing in wastewater management, botanical and biodiversity assessments, developing environmental management plans and strategies, environmental control work as well as doing environmental compliance audits and was also responsible for helping develop the biodiversity part of the Farming for the Future audit system implemented by Woolworths. During his time with Enviroscientific he performed more than 400 biodiversity and environmental legal compliance audits.

During 2010 he joined EnviroAfrica in order to move back to the biodiversity aspects of environmental management. Experience with EnviroAfrica includes NEMA EIA applications, environmental management plans for various industries, environmental compliance audits, environmental control work as well as more than 70 biodiversity & botanical specialist studies.

Towards the end of 2017, Mr Botes started his own small environmental consulting business focusing on biodiversity & botanical assessments, biodiversity management plans and environmental compliance audits.

Mr. Botes is a registered Professional Botanical, Environmental and Ecological Scientists at SACNASP (South African Council for Natural Scientific Professions) as required in terms of Section 18(1)(a) of the Natural Scientific Professions Act, 2003, since 2005.

DECLARATION OF INDEPENDENCE

THE INDEPENDENT PERSON WHO COMPILED A SPECIALIST REPORT OR UNDERTOOK A SPECIALIST PROCESS

I Petrus, Jacobus, Johannes Botes, as the appointed independent specialist hereby declare that I:

- act/ed as the independent specialist in this application;
- regard the information contained in this report as it relates to my specialist input/study to be true and correct, and
- do not have and will not have any financial interest in the undertaking of the activity, other than remuneration for work performed in terms of the NEMA, the Environmental Impact Assessment Regulations, 2014, as amended, and any specific environmental management Act;
- have and will not have no vested interest in the proposed activity proceeding;
- have disclosed, to the applicant, EAP and competent authority, any material information that have or may have the potential to influence the decision of the competent authority or the objectivity of any report, plan or document required in terms of the NEMA, the Environmental Impact Assessment Regulations, 2014 and any specific environmental management Act;
- am fully aware of and meet the responsibilities in terms of NEMA, the Environmental Impact Assessment Regulations, 2014 (specifically in terms of regulation 13 of GN No. R. 326) and any specific environmental management Act, and that failure to comply with these requirements may constitute and result in disqualification;
- have ensured that information containing all relevant facts in respect of the specialist input/study was distributed or made available to interested and affected parties and the public and that participation by interested and affected parties was facilitated in such a manner that all interested and affected parties were provided with a reasonable opportunity to participate and to provide comments on the specialist input/study;
- have ensured that the comments of all interested and affected parties on the specialist input/study were considered, recorded and submitted to the competent authority in respect of the application;
- have ensured that the names of all interested and affected parties that participated in terms of the specialist input/study were recorded in the register of interested and affected parties who participated in the public participation process;
- have provided the competent authority with access to all information at my disposal regarding the application, whether such information is favourable to the applicant or not; and
- am aware that a false declaration is an offence in terms of regulation 13 of GN No. R. 326.

Note: The terms of reference must be attached.

Signature of the specialist:

PB Consult (Sole Proprietor)

Name of company:

28 August 2024

Date:

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ABBREVIATIONS

BAR	Basic Assessment Report
CBA	Critical biodiversity area (in terms of the 2017 City of Cape Town Biodiversity Network)
DENC	Department of Environment and Nature Conservation
EA	Environmental Authorization (Record of Decision)
EAP	Environmental assessment practitioner
ECO	Environmental Control Officer
EIA	Environmental impact assessment
EMP	Environmental Management Plan or Program
EMS	Environmental management system
EN	Endangered
ESA	Ecological support area (in terms of the 2017 City of Cape Town Biodiversity Network)
LT	Least Threatened
NEMA	National Environmental Management Act, 1998 (Act no. 107 of 1998)
SoCC	Species of Conservation Concern
VU	Vulnerable

1. INTRODUCTION

Raisins South Africa is a Non-Profit Company with the vision of growing a sustainable and competitive South African raisin industry. SA is the world's 5th largest exporter of raisins, with more than 88% of its total crop earmarked for premium international markets and is one of the only production origins that can produce all major (7) raisin product categories. Kakamas is part of the Orange River agricultural region known for its raisin production.

Raisins SA is now considering the development of portions of Erf 1181, next to Kakamas into vineyards and drying facilities for raisin production. Erf 1181 is about 30 ha in size, bordering on the northwestern urban edge of Kakamas. It still supports natural veld (although portions of the site are and have been disturbed in the past) and overlap a critical biodiversity area (CBA2) as identified in the 2016 Northern Cape critical biodiversity areas maps (Holness & Oosthuysen, 2016).

According to the vegetation map of South Africa (2012), the development footprint may impact on Bushmanland Arid Grassland, a vegetation type that is considered "Least Threatened" in terms of the revised national list of ecosystems that are threatened and in need of protection (2022).

The DFFE Screening tool report, identified various areas of potential environmental sensitivity, of which the following will be discussed in this report:

- The relative Animal species theme sensitivity is considered of **High sensitivity**;
- The relative Plant species theme sensitivity is considered of **Medium sensitivity**;
- The relative Terrestrial Biodiversity theme sensitivity is considered of **Very High sensitivity**.

The site visit confirmed that large portions of the property had been disturbed or degraded as a result of past and present land-use. Several old building foundations were encountered in the southeastern part of the site (north of the N14). In the northern part of the site areas showed evidence of been ploughed in the past, while excavations (sand/rock mining) and waste dumping are ongoing. The excavated areas are seemingly used as a (probably illegal) waste disposal site.

1.1. LEGISLATION GOVERNING THIS REPORT

EnviroAfrica was appointed the Raisins South Africa (Raisin SA) to facilitate the NEMA EIA application for the proposed project. PB Consult was appointed by EnviroAfrica to conduct a terrestrial biodiversity scan of the proposed footprint area.

This is a 'specialist report', compiled in terms of:

- The National Environmental Management Act, Act. 107 of 1998 (NEMA);
- The "Protocol for the Specialist Assessment and Minimum report content requirements for environmental impacts on terrestrial biodiversity" in terms of Sections 24(5)(a) and (h) and 44 of the NEMA (Government Notice No. 320 of 20 March 2020).

1.2. TERMS OF REFERENCE

The terms of reference for this appointment were to:

- Evaluate the proposed site(s) to determine whether any significant botanical or other terrestrial biodiversity features will be impacted because of the proposed development.
- Determine and record the position of any plant species of special significance (e.g., protected tree species, or rare or endangered plant species) that should be avoided or that may require "search & rescue" intervention.
- Locate and record sensitive areas from a terrestrial biodiversity perspective within the proposed development footprint that may be interpreted as obstacles to the proposed development.
- Make recommendations on impact minimization should it be required
- Consider short- to long-term implications of impacts on biodiversity and highlight irreversible impacts or irreplaceable loss of species.

2. STUDY AREA

2.1. LOCATION & LAYOUT

Kakamas is located on the N14, between Pofadder and Keimoes in the Kai !Garib Local Municipality of the Northern Cape Province. Erf 1181 is located on the urban edge (next to the industrial area) to the northwest of the Kakamas CBD (Figure 1). The property falls within the Orange River agricultural belt.

Figure 1: The location of the proposed development (red) in relation to the town of Kakamas.

The property is just under 30 ha in size and showed various signs of previous and existing disturbances (e.g., excavations, illegal dumping, old building foundations, ploughing) (Figure 2).

GPS Co-ordinates for the midpoint of the site: **S28° 45' 58.4" E20° 36' 14.6"**.

Figure 2: Google image showing the study area (red) within which the agricultural development will be located.

2.2. ACTIVITY DESCRIPTION

Figure 3 gives an overview of the early planning for the proposed agricultural development (note that the layout might change). Access to the site will be gained from existing roads. The proposed development will include drying facilities (brown) and new vineyards (green).

Figure 3: The proposed development envisioned by Raisins South Africa

2.3. GEOLOGY & SOILS

The Bushmanland is part of the Nama-Karoo, which is underlaid by a thick succession of sedimentary rocks. This includes the Cape Supergroup (marine origin), followed by Dwyka tillites and then as southern Africa drifted away from the south pole, by other fossil-rich sediments of the Karoo Supergroup (including Ecca and Beaufort Groups) deposited in a great inland sea (300 – 180 million years ago). Igneous activity after this period, resulted in voluminous outpourings of basaltic lava intrusions of dolerite sills and dykes into Karoo sediments. (Mucina *et al*., 2006).

According to the Council for Geoscience's, interactive web based map (https://maps.geoscience.org.za) the surface geology associated with Erf 1181 is characterized by volcanic rock of the Vyfbeker Metamorphic Suite, of which the general physical characteristics of the rocks are migmatitic, commonly porphyroblastic quartzo-feldspathic and biotite gneiss, amphibolite, leucogneiss, quartzite, subordinate marble, calc-silicate rocks and pelitic gneiss (Figure 4).

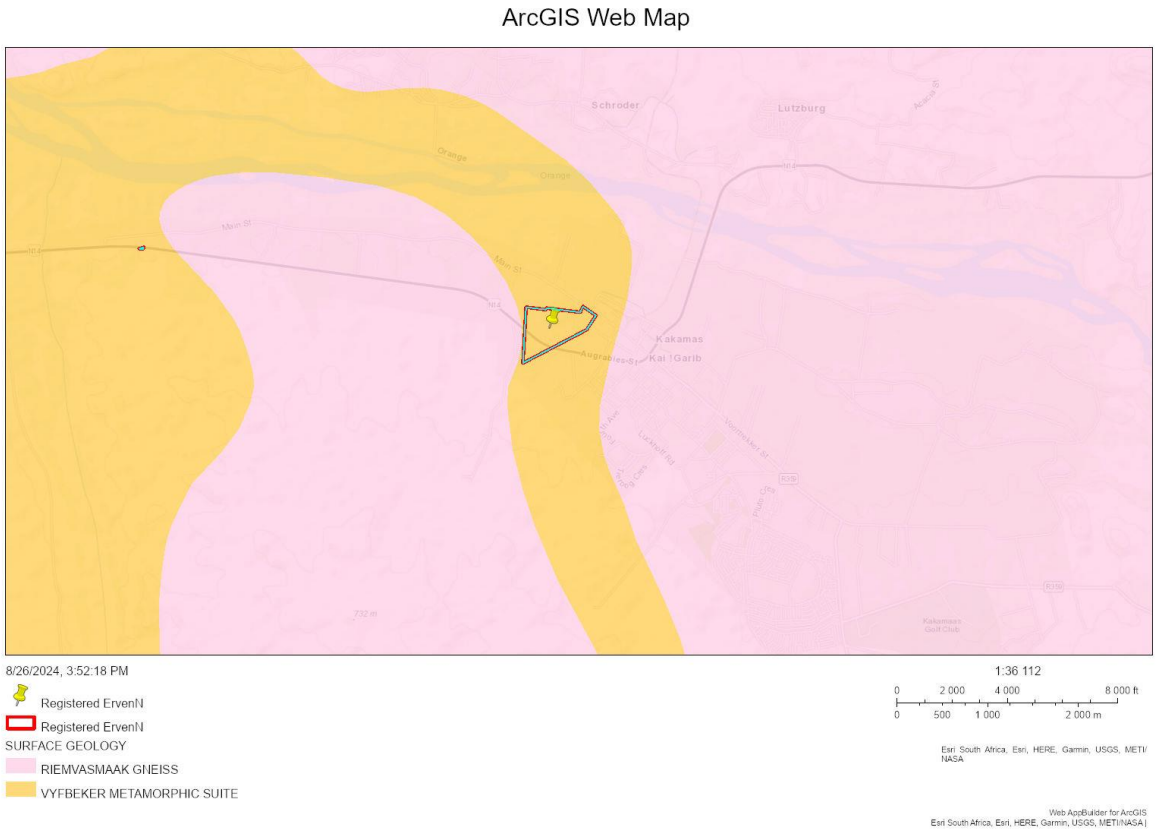


Figure 4: The Geology map of South Africa, showing the geology associated with the study area (Council for Geoscience).

Soils in most of the area associated with Bushmanland Arid Grassland are red-yellow apedal soils, freely drained, with a high base-status and less than 300 mm deep. Bushmanland Basin Shrubland is dominated by mudstones and shales of the Ecca Group and Dwyka tillites, both of early Karoo age with about 20% of rock outcrops formed by Jurassic intrusive dolerite sheets and dykes. Soils are shallow Glenrosa and Mispah forms, with lime generally present in the entire landscape, and to a lesser degree red-yellow apedal, freely drained soils with a high base status (usually less than 15% clay). The salt content in these soils is very high (Mucina *et al*., 2006).

2.4. TOPOGRAPHY

The site is slightly undulating but relatively flat to the east but also includes about 3 small koppies to the west (10 – 15 m higher in elevation) (Photo 1). In general, the site shows a drop in elevation from the west to the east (towards the small intermittent stream). The maximum slope is about 12%, but the average slope is less steep, at about 3.5%.

Photo 1: Looking over the site from northeast to southwest. Note the relatively flat areas in the foreground with small koppies towards the back.

2.5. CLIMATE

The climate of Nama-Karoo is essentially continental and is little affected by the ameliorating influences of the oceans. It is an arid biome where most of rivers are nonperennial (apart from the Orange River in this area). Shallow lakes (Bushmanland Vloere) may store water after heavy rainfall events, but this is unpredictable and will dry up during the dry season (Mucina *et. al.,* 2006).

Rainfall is unreliable and droughts are unpredictable and sometimes prolonged. In the southwest of the Nama-Karoo, rain comes in the form of unpredictable summer thunderstorms and occasional inland intrusions of winter high-pressure systems from the west. Summers are hot (mean January maximum >30°C) and winters are cold (with the mean July minimum close to zero). Temperature extremes ranges from -5°C in winter to 43°C in summer and winter frost occurs in all areas except in the extreme southeast of the biome (Albany Broken Veld). Dust devils and small whirlwinds are common in summer, but dust storms are uncommon (Mucina *et. al.,* 2006).

In all the vegetation types of the Nama-Karoo, rainfall peaks in March, while the onset of winter frost is soon afterwards, which means a very short growth season for frost sensitive species. This is further exacerbated in some years when the rains are later than usual or frost earlier than usual, or more seriously, when both occur in the same year (Mucina *et. al.,* 2006).

Kakamas normally receives about 134 mm of rain per year, with rainfall largely in late summer/early autumn (major peak) and very variable from year to year. It receives the lowest rainfall (3 mm) in June and the highest (27 mm) in March. The monthly distribution of average daily maximum temperatures shows that the average midday temperatures for Kakamas range from 20°C in July to 35°C in January. The region is the coldest during July with temperatures as low as 3.7°C on average during the night (www.saexplorer.co.za). Table 1 gives a summary of temperatures and rainfall recorded at Kakamas (https://en.climate-data.org/location/911655/).

Table 1: Average rainfall and temperatures at Kakamas (https://en.climate-data.org/location/911655/)

	January	February	March	April	May	June	July	August	September	October	November	December
Avg. Temperature (°C)	27.3	26.4	24.4	21.1	16	13.1	12.2	14.5	17.3	20.9	23.5	26.3
Min. Temperature (°C)	18.9	18.3	16.7	12.8	7.8	4.6	3.7	5.4	8.1	11.6	14.3	17.2
Max. Temperature (°C)	35.7	34.5	32.2	29.5	24.3	21.7	20.8	23.6	26.5	30.3	32.8	35.4
Avg. Temperature (°F)	81.1	79.5	75.9	70.0	60.8	55.6	54.0	58.1	63.1	69.6	74.3	79.3
Min. Temperature (°F)	66.0	64.9	62.1	55.0	46.0	40.3	38.7	41.7	46.6	52.9	57.7	63.0
Max. Temperature (°F)	96.3	94.1	90.0	85.1	75.7	71.1	69.4	74.5	79.7	86.5	91.0	95.7
Precipitation / Rainfall (mm)	17	21	27	17	9	3	4	3	3	7	13	10

3. APPROACH & METHODOLOGY

The protocol for specialist assessment and minimum report content and requirements for environmental impacts on terrestrial biodiversity was published in GN. No. 320 of 20 March 2020. It includes the requirements for a desktop analysis and site verification.

3.1. DESKTOP ANALYSIS

The first step of the study was to conduct a desktop study of the study area and its immediate surroundings. Spatial information from online databases such as SANBI BGIS and Google Earth were used to evaluate the site in terms of vegetation, obvious differences in landscape (e.g., variations in soil type, rocky outcrops etc.) or vegetation densities, which might indicate differences in plant community or species composition, critical biodiversity areas and other terrestrial biodiversity features as identified in the DEA screening tool.

This information was used to prepare a study area map, which is used as a reference during the physical site visit. Species lists were prepared, and species of special significance were flagged.

3.2. SITE SENSITIVITY VERIFICATION

The fieldwork for project was carried out on the 10th of June 2024. The site survey was conducted by walking the site and sampling the vegetation, using a modified approach, based on the Braun-Blanquet vegetation survey method (Werger, 1974).

Protected or other species of conservation concern (SoCC) and any terrestrial feature of significance was, marked by waypoints and/or on the study map (Figure 5). A hand-held Garmin GPSMAP 67 was used to track the sampling route and for recording waypoints. During the survey notes, and photographic records were collected. All efforts were made to ensure that any variation in vegetation, soil condition (e.g., rocky outcrops, watercourses or heuweltjies), or habitat were visited. Efforts were made to ensure that the plant species list was as complete as possible.

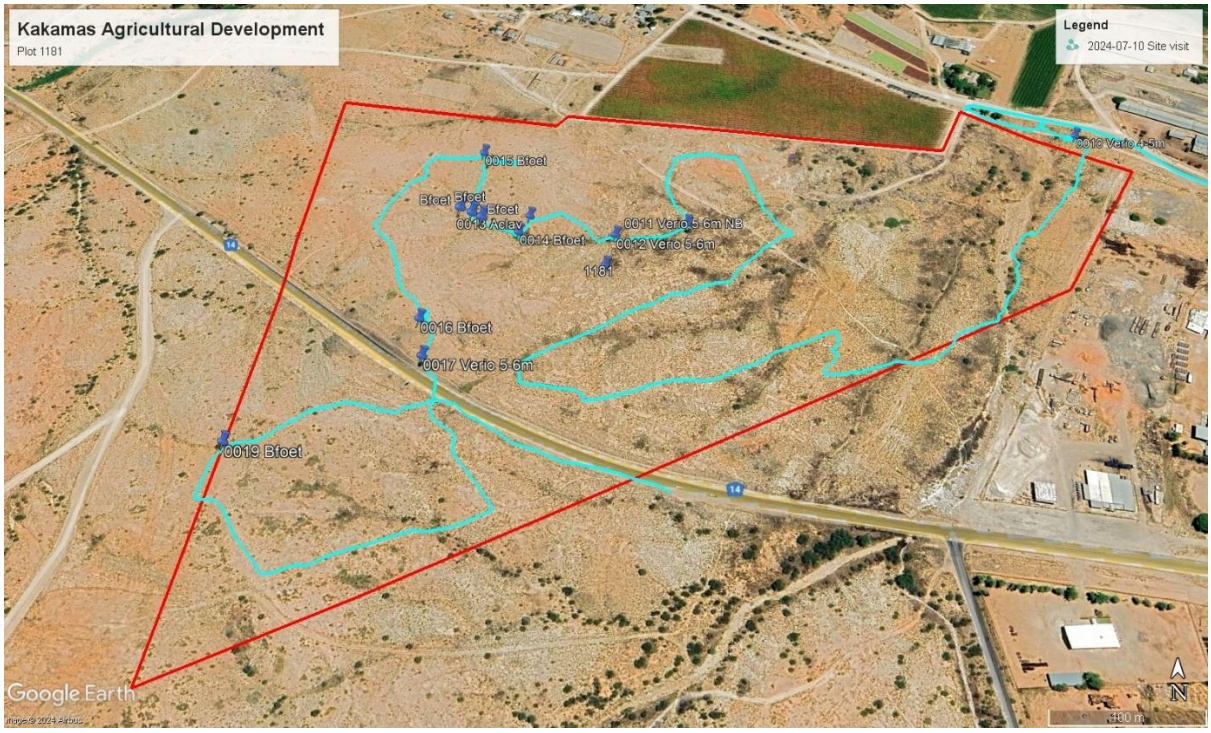


Figure 5: Google overview, showing the study area, the routes walked and potential SoCC.

3.2.1. LIMITATIONS, ASSUMPTIONS AND UNCERTAINTIES

The findings are based on a one-day site visit (not long-term repetitive sampling), which means that it is likely that some plant species might have been missed (not visible or in flower). The timing of the site visit was reasonable as essentially all perennial plants were identifiable even though the vegetation itself still showed the effects of the recent long-term (>7 years) drought period that impacted the Northern Cape and Karoo. A good understanding of the status of the vegetation and plant species in the study areas were obtained and confidence in the findings are high. There should be no limiting factors which could significantly alter the outcome of this study. It is unlikely that a full botanical assessment will result in any additional findings that would have a significant impact on the outcome.

3.3. IMPACT ASSESSMENT METHOD

The concept of environmental impact assessment based on the National Environmental Management Act, Act 107 of 1998 (NEMA) and the Environmental Impact Assessment (EIA) Regulations aims to determine whether a proposed activity/development is likely to cause significant environmental impact. The concept of significance is at the core of impact identification, evaluation and decision making, but despite this the concept of significance and the method used for determining significance remains largely undefined and open to interpretation (DEAT, 2002).

The objective of this study was to evaluate the status of the veld and to identify species of conservation concern or special habitats that might be impacted by the proposed development. The principles of the Ecosystem Guidelines for Environmental Assessment (De Villiers *et. al*., 2005), were used as guideline to evaluate the environmental significance of the property with emphasis on:

- Significant ecosystems
    - Threatened or protected ecosystems
    - Special habitats
    - Corridors and or conservancy networks
- Significant species
    - Threatened or endangered species
    - Protected species.

3.3.1. DETERMINING SIGNIFICANCE

Determining impact significance from predictions of the nature of the impact has been a source of debate and will remain a source of debate. The author used a combination of scaling and weighting methods to determine significance based on a simple formula. The formula used is based on the method proposed by Edwards (2011). However, the criteria used were adjusted to suite its use for botanical assessment. In this document significance rating was evaluated using the following criteria.

Significance = Conservation Value x (Likelihood + Duration + Extent + Severity) (Edwards 2011)

3.3.1.1. CRITERIA USED

***Conservation value*:** Conservation value refers to the intrinsic value of an attribute (e.g., an ecosystem, a vegetation type, a natural feature or a species) or its relative importance towards the conservation of an ecosystem or species or even natural aesthetics. Conservation status is based on habitat function, its vulnerability to loss and fragmentation or its value in terms of the protection of habitat or species (Refer to Table 2 for categories used).

Likelihood refers to the probability of the specific impact occurring because of the proposed activity (Refer to Table 3, for categories used).

Duration refers to the length in time during which the activity is expected to impact on the environment (Refer to Table 4).

Extent refers to the spatial area that is likely to be impacted or over which the impact will have influence, should it occur (Refer to Table 5).

Severity refers to the direct physical or biophysical impact of the activity on the surrounding environment should it occur (Refer to Table 6).

Table 2: Categories used for evaluating conservation status.

CONSERVATION VALUE	
Low (1)	The attribute is transformed, degraded not sensitive (e.g., Least threatened), with unlikely possibility of species loss.
Medium/low (2)	The attribute is in good condition but not sensitive (e.g., Least threatened), with unlikely possibility of species loss.
Medium (3)	The attribute is in good condition, considered vulnerable (threatened), or falls within an ecological support area or a critical biodiversity area, but with unlikely possibility of species loss.
Medium/high (4)	The attribute is considered endangered or, falls within an ecological support area or a critical biodiversity area, or provides core habitat for endemic or rare & endangered species.
High (5)	The attribute is considered critically endangered or is part of a proclaimed provincial or national protected area.

Table 3: Categories used for evaluating likelihood.

LIKELIHOOD	
Highly Unlikely (1)	Under normal circumstances it is almost certain that the impact will not occur.
Unlikely (2)	The possibility of the impact occurring is very low, but there is a small likelihood under normal circumstances.
Possible (3)	The likelihood of the impact occurring, under normal circumstances is 50/50, it may, or it may not occur.
Probable (4)	It is very likely that the impact will occur under normal circumstances.
Certain (5)	The proposed activity is of such a nature that it is certain that the impact will occur under normal circumstances.

Table 4: Categories used for evaluating duration.

DURATION	
Short (1)	Impact is temporary and easily reversible through natural process or with mitigation. Rehabilitation time is expected to be short (1-2 years).
Medium/short (2)	Impact is temporary and reversible through natural process or with mitigation. Rehabilitation time is expected to be relative short (2-5 years).
Medium (3)	Impact is medium-term and reversible with mitigation but will last for some time after construction and may require ongoing mitigation. Rehabilitation time is expected to be longer (5-15 years).
Long (4)	Impact is long-term and reversible but only with long term mitigation. It will last for a long time after construction and is likely to require ongoing mitigation. Rehabilitation time is expected to be longer (15-50 years).
Permanent (5)	The impact is expected to be permanent.

Table 5: Categories used for evaluating extent.

EXTENT	
Site (1)	Under normal circumstances the impact will be contained within the construction footprint.
Property (2)	Under normal circumstances the impact might extent outside of the construction site (e.g., within a 2 km radius), but will not affect surrounding properties.
Surrounding properties (3)	Under normal circumstances the impact might extent outside of the property boundaries and will affect surrounding landowners or –users, but still within the local area (e.g., within a 50 km radius).
Regional (4)	Under normal circumstances the impact might extent to the surrounding region (e.g., within a 200 km radius), and will impact on landowners in the larger region (not only surrounding the site).
Provincial (5)	Under normal circumstances the effects of the impact might extent to a large geographical area (>200 km radius).

Table 6: Categories used for evaluating severity.

SEVERITY	
Low (1)	It is expected that the impact will have little or no affect (barely perceptible) on the integrity of the surrounding environment. Rehabilitation not needed or easily achieved.
Medium/low (2)	It is expected that the impact will have a perceptible impact on the surrounding environment, but it will maintain its function, even if slightly modified (overall integrity not compromised). Rehabilitation easily achieved.
Medium (3)	It is expected that the impact will have an impact on the surrounding environment, but it will maintain its function, even if moderately modified (overall integrity not compromised). Rehabilitation easily achieved.
Medium/high (4)	It is expected that the impact will have a severe impact on the surrounding environment. Functioning may be severely impaired and may temporarily cease. Rehabilitation will be needed to restore system integrity.
High (5)	It is expected that the impact will have a very severe to permanent impact on the surrounding environment. Functioning irreversibly impaired. Rehabilitation often impossible or unfeasible due to cost.

3.3.2. SIGNIFICANCE CATEGORIES

The formal NEMA EIA application process was developed to assess the significance of impacts on the surrounding environment (including socio-economic factors), associated with any specific development proposal to allow the competent authority to make informed decisions. Specialist studies must advise the environmental assessment practitioner (EAP) on the significance of impacts in his field of specialty. To do this, the specialist must identify all potentially significant environmental impacts, predict the nature of the impact, and evaluate the significance of that impact should it occur.

Potential significant impacts are evaluated, using the method described above, to determine its potential significance. The potential significance is then described in terms of the categories given in Table 7. Mitigation options are evaluated, and comparison is then made (using the same method) of potential significance before mitigation and potential significance after mitigation (to advise the EAP).

Table 7: Categories used to describe significance rating (adjusted from DEAT, 2002)

SIGNIFICANCE	DESCRIPTION
Insignificant or Positive (4-22)	There is no impact, or the impact is insignificant in scale or magnitude because of low sensitivity to change or low intrinsic value of the site, or the impact may be positive.
Low (23-36)	An impact barely noticeable in scale or magnitude because of low sensitivity to change or low intrinsic value of the site or will be of very short-term or is unlikely to occur. Impact is unlikely to have any real effect and no or little mitigation is required.
Medium Low (37-45)	Impact is of a low order and therefore likely to have little real effect. Mitigation is easily achieved. Social, cultural, and economic activities can continue unchanged, or impacts may have medium to short term effects on the social and/or natural environment within site boundaries.
Medium (46-55)	Impact is real, but not substantial. Mitigation is both feasible and easily possible but may require modification of the project design or layout. Social, cultural, and economic activities of communities may be impacted, but can continue (albeit in a different form). These impacts will usually result in medium to long term effect on the social and/or natural environment, within site boundary.
Medium high (56-63)	Impact is real, substantial, and undesirable, but mitigation is feasible. Modification of the project design or layout may be required. Social, cultural, and economic activities may be impacted, but can continue (albeit in a different form). These impacts will usually result in medium to long-term effect on the social and/or natural environment, beyond site boundary within local area.
High (64-79)	An impact of high order. Mitigation is difficult, expensive, time-consuming or some combination of these. Social, cultural, and economic activities of communities are disrupted and may come to a halt. These impacts will usually result in long-term change to the social and/or natural environment, beyond site boundaries, regional or widespread.
Unacceptable (80-100)	An impact of the highest order possible. There is no possible mitigation that could offset the impact. Social, cultural, and economic activities of communities are disrupted to such an extent that these come to a halt. The impact will result in permanent change. Very often these impacts are un-mitigatable and usually result in very severe effects, beyond site boundaries, national or international.

4. DESKTOP ASSESSMENT

4.1. BROAD-SCALE VEGETATION EXPECTED

According to the South African vegetation map (2018) (Mucina & Rutherford, 2006, as updated), the proposed development will only impact on one vegetation type, namely Bushmanland Arid Grassland (Figure 6). Acocks (1953) described this vegetation as Arid Karoo and Desert False Grassland or Orange River Broken Veld while Low & Rebelo (1996) described this vegetation as Orange River Nama Karoo. This vegetation type has been classified as "**Least Threatened**" in terms of the "*Revised List of ecosystems that are threatened and in need of protection*" (GN 47526 of 18 November 2022), promulgated in terms of the National Environmental Management Biodiversity Act, Act 10 of 2004.

Bushmanland Arid Grassland is found in the Northern Cape Province from around Aggeneys in the west to Prieska in the east. The southern border of the unit is formed by edges of the Bushmanland Basin while in the north-west this vegetation unit borders on desert vegetation (north-west of Aggeneys and Pofadder). The northern border (in the vicinity of Upington) and the eastern border (between Upington and Prieska) are formed with often intermingling units of Lower Gariep Broken Veld, Kalahari Karroid Shrubland and Gordonia Duneveld. Most of the western border is formed by the edge of the Namaqualand hills. Altitude varies from 600 – 1 200 m. The vegetation is described as occurring on extensive to irregular plains on a slightly sloping plateau sparsely vegetated by grassland, which is dominated by white grasses (*Stipagrostis* species) giving this vegetation type the character of semi-desert "steppe". In years of abundant rainfall rich displays of annual herbs can be expected (Mucina *et. al.,* 2006).

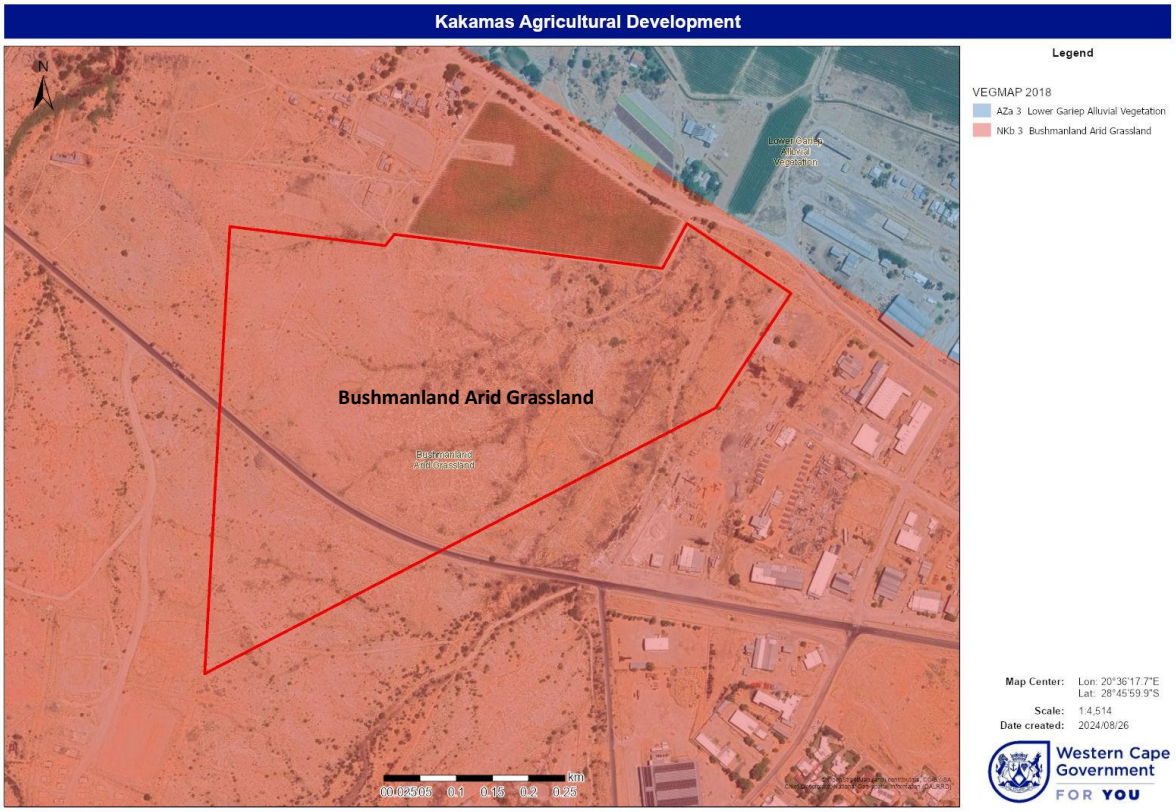


Figure 6: Vegetation map of South Africa (2018), showing the expected vegetation type (SANBI BGIS)

4.2. ECOLOGICAL DRIVERS & FUNCTIONING

Bushmanland Arid Grassland is part of the Nama-Karoo Biome, which is a large arid landlocked region on the central plateau of the western half of South Africa, extending into Namibia. It is flanked by the Succulent Karoo to the west and south, desert to the northwest, arid Kalahari Savanna to the north, Grassland to the northeast, Albany Thicket to the southeast and small parts of Fynbos to the south. In South Africa, only the Desert Biome has a higher variability in annual rainfall and only the Kalahari Savanna greater extremes in temperature. The Nama-Karoo receives most of its rainfall in summer, especially in late summer (Mucina *et. al*., 2006).

Climate is essentially continental and with almost no effect of the ameliorating influences of the oceans. Rainfall is low and unreliable, peaking in March. Droughts are unpredictable and often prolonged. Summers are hot and winters cold with temperature extremes ranging from -5°C in winter to 43°C in summer. However, rainfall intensity can be high (e.g., episodic thunderstorm and hailstorm events). This coupled with the generally low vegetation cover associated with aridity and grazing pressure by domestic stock over the last two centuries, raises the potential for soil erosion. In semi-arid environments such as the Nama-Karoo, nutrients are generally located near the soil surface, making it vulnerable to sheet erosion (Mucina *et. al*., 2006).

In contrast with the Succulent Karoo, the Nama-Karoo is not particularly rich in plant species and does not contain any centre of endemism. Local endemism is very low, which might indicate a relative youthful biome linked to the remarkable geological and environmental homogeneity of the Nama-Karoo. Rainfall seasonality and frequency are too unpredictable and winter temperatures too low to enable leaf succulent dominance (as in the Succulent Karoo). It is also too dry in summer for dominance by perennial grasses alone and the soils generally to shallow and rainfall too low for dominance by trees. But soil type, soil depth and local differences in moisture availability can cause abrupt changes in vegetation structure and composition (e.g., small drainage lines support more plant species than surrounding plains) (Mucina *et. al*., 2006).

In terms of status, very little of the Nama-Karoo has been transformed and the dominant land use is farming with small stock, cattle, and game. Farms are fenced, but generally large (because of the low carrying capacity). The biggest threat to this vegetation remains domestic livestock grazing pressure. Grazing by livestock, particularly during the summer growing season, reduces the perennial grass component, while prolonged droughts kill a high proportion of perennial plants, rapidly changing vegetation composition in favour of short-lived species with soil stored seed banks. Overgrazing after drought periods can delay vegetation recovery, which will worsen the effect of subsequent droughts.

4.3. CRITICAL BIODIVERSITY AREAS & ECOLOGICAL CORRIDORS

The Northern Cape CBA Map (2016) identifies biodiversity priority areas, called Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs), which, together with protected areas, are important for the persistence of a viable representative sample of all ecosystem types and species as well as the long-term ecological functioning of the landscape (Holness & Oosthuysen, 2016). The 2016 Northern Cape Critical Biodiversity Area (CBA) Map updates, revises and replaces all older systematic biodiversity plans and associated products for the province (including the Namakwa District Biodiversity Sector Plan, 2008). Priorities from existing plans such as the Namakwa District Biodiversity Plan, the Succulent Karoo Ecosystem Plan, National Estuary Priorities, and the National Freshwater

Ecosystem Priority Areas were incorporated. Targets for terrestrial ecosystems were based on established national targets, while targets used for other features were aligned with those used in other provincial planning processes.

Critical biodiversity areas (CBA's) are terrestrial and aquatic features in the landscape that are critical for retaining biodiversity and supporting continued ecosystem functioning and services (SANBI 2007). The primary purpose of CBA's is to inform land-use planning to promote sustainable development and protection of important natural habitat and landscapes. CBA's can also be used to inform protected area expansion and development plans.

- **Critical biodiversity areas (CBA's)** are areas of the landscape that need to be maintained in a natural or near-natural state to ensure the continued existence and functioning of species and ecosystems and the delivery of ecosystem services. In other words, if these areas are not maintained in a natural or near-natural state then biodiversity conservation targets cannot be met. Maintaining an area in a natural state can include a variety of biodiversity-compatible land uses and resource uses.
- **Ecological support areas (ESA's)** are areas that are not essential for meeting biodiversity representation targets/thresholds, but which nevertheless play an important role in supporting the ecological functioning of critical biodiversity areas and/or in delivering ecosystem services that support socio-economic development, such as water provision, flood mitigation or carbon sequestration. The degree of restriction on land use and resource use in these areas may be lower than that recommended for critical biodiversity areas.

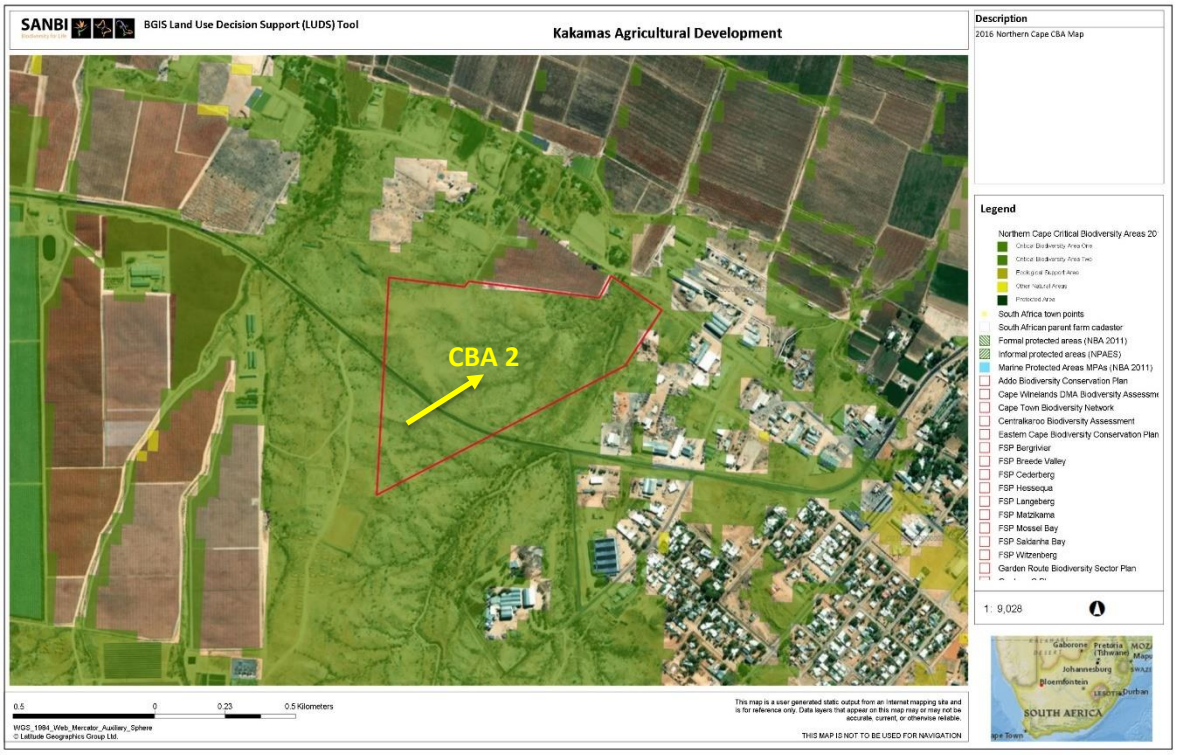


Figure 7: Northern Cape CBA map (2016) showing the study area and associated critical biodiversity areas.

According to the Northern Cape critical biodiversity areas maps, Erf 1181 falls within a critical biodiversity area (CBA 2) as identified in the 2016 Northern Cape CBA maps (Figure 7) (Holness &

Oosthuysen, 2016).

4.4. POTENTIAL IMPACT ON CENTERS OF ENDEMISM

Kakamas is located near to, but to the east of the Gariep Centre of Endemism (GC) and the study area will **not impact** on any centre of endemism (Van Wyk & Smith, 2001)

"Gariep" is the Khoekhoe name for the Orange River, which means the "Great River". The lower Orange River cuts right through the core of the Gariep Centre of endemism (GC) and also forms the international border between South Africa and Namibia. The GC, with the Richtersveld as its core is part of the Succulent Karoo Region and is considered a region of high floristic endemism. It is located in the north-western corner of the Northern and more or less L-shaped bounded by Port Nolloth (and north to include the Richtersveld), Steinkopf, Pofadder and on the Augrabies Falls to the south and east and by the Orange River in the north (note that it also extends into Namibia) (Van Wyk & Smith, 2001).

5. VEGETATION & FLORA

Erf 1181 is about 30 ha in size, bordering on the northwestern urban edge of Kakamas. The site is hemmed in by agriculture (mostly vineyards) to the north and west, but relatively good natural veld connectivity remains to the south (intersected by the N14).

The site visit confirmed that large portions of the property had been disturbed or degraded as a result of past and present land-use (Figure 8).

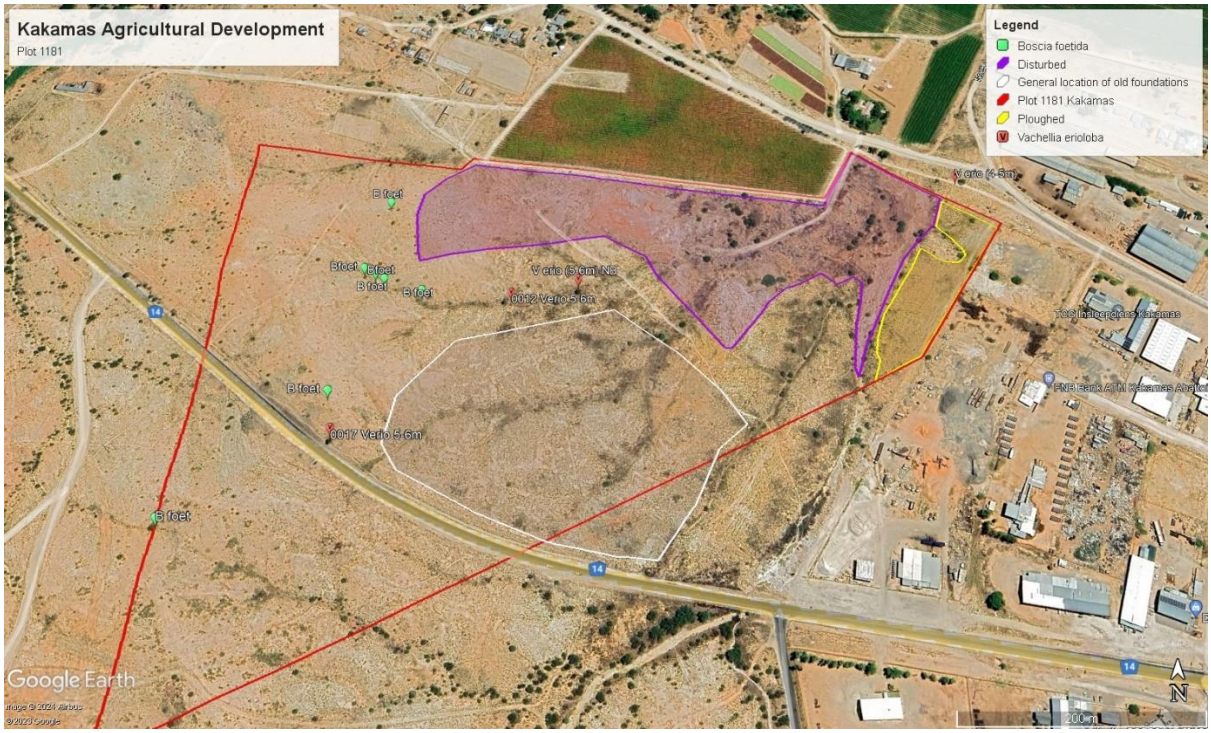


Figure 8: Google image showing the general footprint of disturbed areas as encountered on Erf 1181

East of the intermittent watercourse in the northeastern corner of the site portions of land seems to have been ploughed in the past (Photo 2). Several old building foundations (Photo 3) were observed in the southeastern part of the site (north of the N14), while excavations (sand/rock mining) and waste dumping are ongoing in the lower northwestern corner of the site (Photo 4), including sand mining in the intermittent streams (Photo 5).

Photo 2: Parallel ridges showing evidence of previous disturbance (ploughed veld) in the lower northeastern corner of the site, east of the intermittent watercourse (yellow area in Figure 8).

Photo 3: Old building foundations showing in the foreground and background of picture. Several old foundations were observed in the flatter area, just north of the N14 (white area in Figure 8).

Photo 4: Some of the larger excavated areas in the northern corner of the site (general waste burning in the background) (purple area in Figure 8).

Photo 5: Evidence of sand mining in the lower (northern) parts of the larger intermittent watercourse (purple area in Figure 8).

Photo 6: Looking from west to east over the site. Excavations can be seen in the foreground and the Eskom overhead cables in the background.

The excavated areas are seemingly used as a (probably illegal) waste disposal site. An Eskom overhead cable also runs from southeast to northwest through the site (Photo 6). The lower northern third of the site was by far the most disturbed part of the site (apart from the building foundations to the middle of the site.

5.1. VEGETATION ENCOUNTERED

The vegetation conforms to the Bushmanland Arid Grassland vegetation type, but still shows the effect of the recent long-term drought period that impacted the Northern Cape and Karoo over the past 7 – 8 years. Plant species diversity was low and the site itself is subject to almost constant human activity (used as short-cut between Kakamas and the surrounding farming areas).

The vegetation cover and species composition varied slightly over different areas within the site. The bottom of the site (northern boundary) is marked by a row of alien beefwood trees (*Casuarina cunninghamiana*) and one *Vachellia erioloba* (located outside of the proposed footprint area). The vegetation cover over most of the terrain can be described as a low open to sparse vegetation with the occasional larger shrub scattered in between, but usually along drainage lines (Photo 7 to Photo 11). After good rains, it is expected that this veld will be dominated by white grasses (e.g. *Stipagrostis* species), but because of the recent long-term drought, the grassy layer were mostly absent.

The vegetation encountered was now usually dominated by *Justicia australis, Tetraena decumbens* and *Senegalia mellifera* (swarthaak). Scattered throughout the site (although usually in close proximity to the intermittent watercourses and drainage lines) larger shrubs such as shrubby *Boscia foetida* individuals (Photo 8), *Cadaba aphylla* (rarely), *Cynanchum viminale* (occasionally), *Lycium cinereum* and *Rhigozum trichotomum*. Within the sandy river bottom of the intermittent drainage lines a few shrublike *Parkinsonia africana* trees and a further three *Vachellia erioloba* (kameeldoring) trees were observed (Photo 12) of which two (2) falls within the site (the remaining tree is near the road verge of the N14 and should be easy to protect - refer to the red markers in Figure 8).

Photo 7: Looking from east to west over the middle of the site. Note the generally low sparse vegetation cover (dominated by *Justicia* and *Tetraena* species) and larger shrubs in the background (usually associated with drainage lines).

Photo 8: One of the upper drainage lines between the low koppies or hillocks with a row of *Boscia foetida* shrubs and the occasional *Cynanchum viminale* growing within (marked by the arrows).

Other species observed in the lower stratum included species such as the occasional patch of *Aloe*

claviflora, Aptosimum spinescens, *Blepharis furcate*, *Codon royenii* (occasional), *Euphorbia spinea* (occasionally), *Kissenia capensis*, *Mesembryanthemum noctiflorum* (occasionally), *Rogeria longiflora* (common lower down) and *Salsola tuberculata.*

Photo 9: Looking from north to south over the eastern part of the site. Note the low vegetation cover with the dried out remains of *Rogeria longiflora* scattered within the site.

Photo 10: Looking from north to south over the hilly koppies in the western part of the site.

Photo 11: Looking from west to east over the southern part of the site (south of the N14).

Photo 12: The larger of the two *Vachellia erioloba* trees observed within the site.

Along the lower parts of the intermittent or episodic watercourses the shrub layer was sometimes slightly higher and denser but still dominated by *Senegalia mellifera* often in combination with *Mesembryanthemum* cf. *subnodosum* and patches of *Salsola* cf. *zeyheri* (witkoolganna) (Photo 13). Along the watercourses and the lower parts of the property invasive *Prosopis* trees were also common (Photo 14). In the sandy lower parts of the riverbeds *Tetraena decumbens* and *Mesembryanthemum noctiflorum* (vleisbos) was common. Other species that was usually only observed in close proximity to these dry watercourses were: *Berkheya* cf. *spinosissima*, *Chascanum garipense* and the naturalised weed, *Atriplex semibaccata*. The hemiparasite, *Tapinanthus oleifolius* (mistletoe) were occasionally observed growing within swarthaak bushes.

Photo 13: Salsola patch on the bank of the larger intermittent stream to the north (lower portion) of the site.

Photo 14: The larger of the two *Vachellia erioloba* trees observed within the site.

5.2. FLORA ENCOUNTERED

Table 8 gives a list of the plant species encountered on the property. It is important to note that the species list is only based on a one-day site visit and that the veld is still recovering from the recent long-term drought. It is likely that some species might have been missed. However, the author knows this vegetation type relatively good and is confident that a good understanding of the vegetation was achieved and confidence in the findings is high.

No red-listed plant species were observed, but one (1) NFA protected species and six (6) species protected in terms of the NCNCA was observed (all of them hardy widespread species) (Refer to Heading 5.3 and Table 9 for more detail).

Table 8: List of plant species observed within the proposed development footprint.

NO.	SPECIES NAME	FAMILY	STATUS	LOCATION
1.	*Aloe claviflora*	ASPHODELACEAE	LC NCNCA, Schedule 2 Protected	Only observed in the Lennertsville WTW (southern portion).
2.	*Aptosimum spinescens*	SCROPHULARIACEAE	LC	Low shrub. Occasionally observed
3.	*Atriplex semibaccata*	AMARANTHACEAE	LC	Occasional near watercourses lower down in the site.
4.	*Berkheya cf. spinosissima*	ASTERACEAE	LC	Disseldoring – rarely observed (near drainage lines).
5.	*Blepharis furcata*	ACANTHACEAE	LC	Occasionally throughout.
6.	*Boscia foetida*	BRASSICACEAE (CAPPARACEAE)	LC NCNCA, Schedule 2 Protected	Small shrubby individuals occasionally observed.
7.	*Cadaba aphylla*	CAPPARACEAE	LC	Bloustorm – occasionally to the west of the site
8.	*Casuarina cunninghamiana*	FABACEAE	**Alien invasive plant species: Must be removed.**	Windbreak to the north of the site : **SHOULD BE REMOVED**
9.	*Chascanum garipense*	VERBENACEAE	LC	Occasional near watercourses lower down in the site.
10.	*Codon royenii*	BORAGINACEAE	LC	Soetdoringbos – Occasionally observed.
11.	*Cynanchum viminale*	APOCYNACEAE	LC NCNCA, Schedule 2 Protected	Melktou – Occasionally to the west of the site
12.	*Euphorbia spinea*	EUPHORBIACEAE	LC NCNCA, Schedule 2 Protected	A small succulent rarely observed.
13.	*Justicia austalis*	ACANTHACEAE	LC	Perdebos – common throughout the site.
14.	*Kissenia capensis*	LOASACEAE	LC	Rarely observed in the higher lying areas to the west.
15.	*Lycium cinereum*	SOLANACEAE	LC	Kriedoring – Medium large shrub occasionally observed.
16.	*Mesembryanthemum* cf. *subnodosum (=Psilocaulon)*	AIZOACEAE	LC NCNCA, Schedule 2 Protected	Succulent plant, often associated with disturbed veld.
17.	*Mesembryanthemum noctiflorum*	AICOACEAE	LC NCNCA, Schedule 2 Protected	Vleisbos: Occasional throughout the site.
18.	*Parkinsonia africana*	FABACEAE	LC	Small tree, rarely observed next to drainage lines.
19.	*Prosopis* species	FABACEAE	**Alien invasive plant species: Must be removed.**	Scattered throughout the lower parts of the site: **MUST BE REMOVE**.
20.	*Rhigozum trichotomum*	BIGNONIACEAE	LC	Driedoring occasionally observed.
21.	*Rogeria longiflora*	PEDALIACEAE	LC	Desert foxglove – common throughout the site
22.	*Salsola cf. tuberculata*	AMARANTHACEAE	LC	Occasionally in dryer parts of the site.
23.	*Salsola* cf. *zeyheri*	AMARANTHACEAE	LC	Witkoolganna: medium shrub associated with drainage lines.
24.	*Senegalia mellifera*	FABACEAE	LC	Swarthaak: Medium large very thorny shrub. Common
25.	*Tapinanthus oleifolius*	LORANTHACEAE	LC	Mistletoe – a hemiparasite occasionally growing on *Senegalia mellifera*.
26.	*Tetraena decumbens*	ZYGOPHYLACEAE	LC	Medium shrub. Common

NO.	SPECIES NAME	FAMILY	STATUS	LOCATION
				throughout.
27.	*Vachellia erioloba*	FABACEAE	LC NFA protected species	Camelthorn: Near watercourses and deeper sandy areas.

5.3. THREATENED AND PROTECTED PLANT SPECIES

South Africa has become the first country to fully assess the status of its entire flora. Major threats to the South African flora are identified in terms of the number of plant taxa Red-Listed as threatened with extinction as a result of threats like, habitat loss (e.g. infrastructure development, urban expansion, crop cultivation and mines), invasive alien plant infestation (e.g. outcompeting indigenous plant species), habitat degradation (e.g. overgrazing, inappropriate fire management etc.), unsustainable harvesting, demographic factors, pollution, loss of pollinators or dispersers, climate change and natural disasters (e.g. such as droughts and floods). South Africa uses the internationally endorsed IUCN Red List Categories and Criteria in the Red List of South African plants. However, due to its strong focus on determining risk of extinction, the IUCN system does not highlight species that are at low risk of extinction but may nonetheless be of high conservation importance. As a result, SANBI uses an amended system of categories to highlight species that may be of low risk of extinction but are still of conservation concern (SANBI, 2015).

Red list of South African plant species: The Red List of South African Plants online provides up to date information on the national conservation status of South Africa's indigenous plants (SANBI, 2020).

- No red-listed species was observed during the study.

NEM:BA protected plant species: The National Environmental Management: Biodiversity Act, Act 10 of 2004, provides for the protection of species through the "Lists of critically endangered, endangered, vulnerable and protected species" (GN. R. 152 of 23 February 2007).

- No species protected in terms of NEM: BA was observed.

NFA Protected plant species: The National Forests Act (NFA) of 1998 (Act 84 of 1998) provides for the protection of forests as well as specific tree species (as updated).

- One species protected in terms of the NFA was observed, namely Vachellia erioloba (Refer to Table 9 for impact minimisation recommendations).

NCNCA Protected plant species: The Northern Cape Nature Conservation Act 9 of 2009 (NCNCA) came into effect on the 12th of December 2011, and provides for the sustainable utilization of wild animals, aquatic biota, and plants. Schedule 1 and 2 of the act give extensive lists of specially protected and protected fauna and flora species in accordance with this act. NB. Please note that all indigenous plant species are protected in terms of Schedule 3 of this act (e.g., any work within a road reserve).

- Six (6) species protected in terms of the NCNCA was observed within the footprint (Refer to Table 9 for impact minimisation recommendations).

Table 9: Plant species protected in terms of the NCNCA encountered within the study area.

NO.	SPECIES NAME	COMMENTS	Search & rescue recommendations
1.	*Aloe claviflora* **Schedule 2 protected.** **(All plants in this Family)**	A few individuals and one patch were observed in the drier parts of the site. This is a relatively common and widespread species with a red-list status of Least Concern.	**Search & rescue** Even though a widespread species it is recommended that as many of these plants as possible are transplanted to areas that will not be disturbed (within the same property or adjacent properties). **A NCNCA Permit application must be submitted for the impacts on these plants.**
2.	*Boscia foetida* **Schedule 2 protected** **(All plants in this Genus)**	A few individuals were observed along the upper drainage lines to the west of the site. They were all small multi-stemmed shrubby individuals. This is a relatively common and widespread species with a red-list status of Least Concern	No search & rescue is proposed. *Boscia* species seldom transplant successfully, because of their extensive and deep root system and the impact on its overall population will be neglectable. **A NCNCA Permit application must be submitted for the removal of these plant**.
3.	*Cynanchum viminale* **Schedule 2 protected (All plants in this Family)**	A few individual were observed on the upper slopes of the koppies to the southwest and west of the site It is a relatively common and widespread species with a red-list status of Least Concern.	No Search & rescue proposed. Topsoil from undisturbed areas should be re-used for the rehabilitation of disturbed areas (seed store protection) that will not be used within the same property. **A NCNCA Permit application must be submitted for the removal of these plants.**
4.	*Euphorbia spinea* **Schedule 1 protected** **(All plants in this Genus)**	A few individuals were observed in the dryer upper parts of the site. Although never common, it is a widespread species with a red-list status of Least Concern.	**Search & rescue**. Any plants that might be impacted by the proposed development should be transplanted to areas that will not be disturbed (within the same property or adjacent properties). **A NCNCA Permit application must be submitted for the removal of these plants.**
5.	*Mesembryanthemum cf. subnodosum (=Psilocaulon)* **Schedule 2 protected (All plants in this Family)**	A widespread, common plant often associated with disturbed areas. It has a red-list status of Least Concern.	No Search & rescue proposed. Topsoil from undisturbed areas should be re-used for the rehabilitation of disturbed areas (seed store protection) that will not be used within the same property. **A NCNCA Permit application must be submitted for the removal of these plants.**
6.	*Mesembryanthemum noctiflorum* **Schedule 2 protected (All**	Occasionally observed throughout the site. A widespread hardy plant with a	No Search & rescue proposed. Topsoil from undisturbed areas should be re-used for the rehabilitation of disturbed areas

NO.	SPECIES NAME	COMMENTS	Search & rescue recommendations
	plants in this Family)	red-list status of Least Concern.	(seed store protection) that will not be used within the same property. **A NCNCA Permit application must be submitted for the removal of these plants.**
7.	*Vachellia erioloba* **NFA protected species**	Four trees were observed, of which two were on the outer edges of the site (or next to the N14) and should not be impacted. The two individuals within the property are both between 5 – 6m in heigh and efforts should be made to protect them. GPS co-ordinates for these two trees are: • S28° 45' 56.6" E20° 36' 17.4" • S28° 45' 57.1" E20° 36' 14.9"	**Protect *in-situ*** Two of the trees might be impacted, but all efforts should be made to protect and incorporate these trees within the development footprint. **A NFA Permit application must be submitted (if any tree were to be impacted).**

5.4. PLANT SPECIES SENSITIVITY THEME

According to the **DFFE Environmental Screening Tool** report for this site (Appendix 1), the **plant species theme sensitivity is considered MEDIUM SENSITIVE**, because of the potential for or encountering the following species:

- ***Sensitive species 144:*** One of the best know plants of the family Aspodelaceae in the Northern Cape. It has a red-list status of "Vulnerable" because of a projected overall population decline of at least 26% by 2102, while climate change species distribution models predict losses of suitable habitat of between 33% and 68% by 2070. This species was **not observed** within the study area.
- However, four (4) ***Vachellia erioloba*** trees (NFA protected species) were observed of which 2 might be impacted, but the impacts on these plants should be easy to mitigate.
- Six (6) NCNCA protected species were observed (Refer to Table 9), but none of them are red-listed species and all of them are relatively common and widespread species. The proposed project is not likely to result in significant species or habitat loss.

AS A RESULT, THE **PLANT SPECIES THEME SENSITIVITY** FOR THIS PROJECT IS CONSIDERED **LOW SENSITIVE** with mitigation.

6. FAUNA AND AVI-FAUNA

The Northern Cape is home to an exceptionally high level of insect and reptile endemism, with new species still being discovered. However, this remarkable diversity is not distributed evenly throughout the region but is concentrated in many local centres of endemism. The Bushmanland is an arid area inland of the Namaqualand and is often described as one of the most inhospitable areas in South Africa. Apart from being very arid, the soils are infertile, and the groundwater is mostly saline. Wildlife is sparse but often interesting.

Erf 1181 borders on the Kakamas urban edge and is for all practical purposes surrounded by agricultural to the north and west. It still shows good connectivity to the south but is interrupted by the N14. The site itself is subject to constant human activity (used by the local community as a shortcut between the town and surrounding farming areas) and shows various signs of previous and existing disturbances (e.g., excavations, illegal dumping, old building foundations, ploughing).

Because of the continual anthropogenic impacts, the study area is unlikely to be favoured by larger game or avi-fauna. As a result, a formal fauna or avi-fauna screening was not considered necessary, but observations were made during the site visit.

6.1. FAUNA

Historically, because of its aridity and unpredictable rainfall patterns, the Nama-Karoo region would have favoured free moving herbivores such as ostrich and springbok, nomadic birds and invertebrates with variable dormancy cued by rain. Plant defence against herbivores and seed adaption for dispersal by mammals are relatively uncommon, except along rivers and seasonal pans, where they would have lingered longer, suggesting the transient nature of herbivores. However, since the 19th century the vast herds of migratory ungulates indigenous to this biome have been replaced by domestic stock. Once farmers started fencing their properties into camps (following the Fencing Act of 1912), stock numbers were dramatically increased with dire consequences to plant and animal diversity. Grazing during and immediately after droughts periods, for instance, is regarded as one of the major causes of detrimental change in vegetation composition and the ultimately decline in palatable plants species (Mucina *et. al*., 2006).

In terms of status, very little of the Nama-Karoo has been transformed and the dominant land use is livestock farming (sheep, goat and cattle) and game farming. Farms are fenced, but large because of the low grazing capacity. The biggest threat to this vegetation remains domestic livestock grazing pressure. Grazing by livestock particularly during the summer growing season, reduces the perennial grass component, while prolonged droughts kill a high proportion of perennial plants, rapidly changing vegetation composition in favour of short-lived species with soil stored seed banks. Overgrazing after drought periods can delay vegetation recovery, which will worsen the effect of subsequent droughts.

Some of the smaller mammal species such as *Orycteropus afer* (Aardvark), *Raphicerus campestris* (Steenbok), *Sylvicapra grimmia* (Common duiker), *Suricata suricatta* (Suricate), *Otocyon megalotis* (Bat-eared fox), *Vulpes chama* (Cape fox) and *Canis mesomelas* (Black-backed jackal) might still occur on the farmlands to the south. One listed terrestrial mammals may occur in the region namely the

Honey Badger, *Mellivora capensis* (Endangered). The Honey Badger may still occur in the surrounding areas, but it has a wide national distribution, and the temporary nature of the development is unlikely to result in significant impact on habitat for these species. However, it is highly unlikely that any of these species will frequent or even visit the site because of its location (close proximity to Kakamas and agriculture) and the constant human activity.

Apart from insects, reptiles and a few smaller mammal species (e.g. rodents) that might still occur on site, the **project is not expected to have any significant long term impact on any fauna species**.

6.2. AVI-FAUNA

According to the Southern Africa Bird Atlas Project (SABAP 2) (https://sabap2.birdmap.africa/) data about 95 bird species are known from the pentad (Refer to Appendix 2 for the full list of species). This includes 5 species of conservation concern (IUCN listed species) (refer to Table 10).

Table 10: Species of conservation concern listed in the SABAP2 data set for the Kakamas Pentad 2845_2030

No.	Common group	Common species	Genus	Species	Regional	Global
30	Eagle	Martial	*Polemaetus*	*bellicosus*	**EN**	**VU**
34	Falcon	Lanner	*Falco*	*biarmicus*	**VU**	**LC**
76	Stork	Black	*Ciconia*	*nigra*	**VU**	**LC**

Refer to Table 11 for a discussion and evaluation of these species together with other sensitive animal species as identified by the DFFE Screening tool for this study area.

6.3. ANIMAL SPECIES SENSITIVITY THEME

According to the **DFFE Screening tool report** for the site (Appendix 1), the Animal Species Theme Sensitivity is considered **HIGH SENSITIVE** because the site might potentially support two sensitive bird species, namely the **Lanner Falcon** and the **Ludwig's Bustard**.

Of these two species, only the Lanner Falcon has been observed in this area (SABAP2), but two other species of conservation concern, namely the Martial Eagle and the Black Stork were also observed in this pentad (Refer to Table 10). However, it must be noted that the pentad associated with the study area, also overlaps a portion of the Orange River (the reason for the inclusion of the Black Stork) and a large area of natural veld to the south of the site (probably the reason for the inclusion of the Martial Eagle).

Table 11: Animal species theme sensitivity evaluation and discussions

SPECIES	STATUS & DISCUSSION
Falco biarmicus (Lanner Falcon / Edelvalk) **Vulnerable (VU)**	**Status**: The Lanner falcon appears to be decreasing at a rate that satisfies the population-trend criterion for regionally **Vulnerable**. It occurs widely but sparsely throughout South Africa, Lesotho and Swaziland, with the highest densities recorded in Western Cape and KwaZulu-Natal. Not threatened globally but *Near-threatened* in South Africa, due to local extinctions possibly caused by a

SPECIES	STATUS & DISCUSSION
	vulnerability to agrochemicals. It has however benefited from the clearing of savanna and the increasing availability of free-range poultry (Taylor, 2015). **Habitat**: It generally favours open grassland, cleared or open woodland and agricultural land (Birdlife International, 2023). **Diet**: It hunts mainly birds, especially doves, pigeons and chickens, using extreme speed to surprise its prey. It often hunts from a high perch or while soaring high up in the air, making a steep and rapid dive to intercept a bird either aerially or on the ground. It often hunts in pairs, enabling them to catch large or highly illusive prey (Hockey *et. al*., 2005). **Breeding**: The species seems to be monogamous and territorial solitary nesters (probably with a long pair bond). The nest is typically a simple scrape in sand or soil on a cliff ledge or is placed in another structure such as a building or nest box. It may also use the stick nest of another bird such as a White-necked raven, Verreaux's eagle or Bateleur, sometimes displacing them while they are breeding and possibly killing their chicks in the process. As these stick nests are often on utility pylons and poles, Lanner falcons have been able to colonise treeless areas where they have not previously occurred (Hockey *et. al*., 2005). The species is partial migrant in southern Africa, as many juveniles depart from their breeding grounds around December-January in the eastern grasslands of South Africa, heading west and south-west to the Kalahari, Karoo and the Western Cape, returning May-June (Van Zyl *et. al.,* 1994). **Conclusion**: According to the SABAP2 data the Lanner Falcon has been observed in this pentad and is likely to hunt over the larger area. The study area, itself does not support any significant numbers of prey (in fact none of its prey was observed, although dove and pigeons might visit the site). The proposed development might have a low (most probably insignificant) impact on its hunting area but will have no impact on its breeding or nesting habitats. Overall, it is considered unlikely that the proposed development (because of its location) will result in any significant additional impact on the hunting or breeding patterns of this species. With regards to this project the sensitivity rating is considered to be **Low Sensitive**.
Neotis ludwigii (Ludwig's Bustard) **Endangered (EN)**	**Status**: Ludwig's Bustard is a near endemic and classified as **endangered** because of a projected rapid population decline. It has a large range centred on the dry biomes of the Karoo and Namib in southern Africa, being found in the extreme south-west of Angola, western Namibia and in much of South Africa (Del Hoyo *et al.* 1996, Anderson 2000). Today it occurs predominantly in the dry Karoo region of South Africa (Herold, 1988), but historically its distribution is believed to have extended to the eastern and north-eastern portions of the Grassland Biome (Brooke, 1984). **Habitat**: It inhabits open lowland and upland plains with grass and light thornbush, sandy open shrub veld and semi-desert in the arid and semi-arid Namib and Karoo biomes (Shaw, 2015). **Diet**: Ludwig's bustards have a varied diet and can eat small animals on the ground such as insects and vertebrates. Their preferred insect is the locust, which are common in their habitat. They are also capable of consuming flowers and seeds. **Breeding**: The breeding season spans from August-December, with the species

SPECIES	STATUS & DISCUSSION
	nesting on bare ground with a clutch of 2-3 eggs (Del Hoyo *et al.* 1996, Jenkins & Smallie 2009) **Conclusion**: According to the SABAP2 data sets the Ludwig's Bustard had not been observed within the pentad associated with the study area. Because of its location and constant human activity it is considered highly unlikely that the proposed development will result in any significant impact on the breeding or feeding patterns of this species. With regards to this project the sensitivity rating is considered to be **Low Sensitive**.
Polemaetus bellicosus (Martial eagle) **Endangered (EN)**	**Status**: The Martial Eagle is a low density apex predator which normally holds large territories but can also be "floaters" (not holding a territory but moving around). It is southern Africa's largest eagle and is considered **endangered**, because of deliberate or accidental poisoning, habitat loss, and loss of available prey, collisions with power lines etc. The remaining population is believed to be 800 pairs in South Africa (Taylor, 2015). It has an extensive range across much of sub-Saharan Africa but is generally scarce to uncommon or rare. **Habitat**: It inhabits open woodland, wooded savanna, bushy grassland, thornbush and, in southern Africa, more open country and even subdesert, from sea level to 3,000 m but mainly below 1,500 m (Ferguson-Lees & Christie 2001). **Breeding**: Evidence suggests that breeding pairs select strongly against human-disturbed habitats. They need large trees for nests and prefer protected areas as breeding spots. **Conclusion**: According to the SABAP2 data sets, the Martial Eagle had been observed in the larger pentad, but in this case, it is believed that the bird might hunt (and breed) over the farmlands to the south but is unlikely to occur so close to the urban edge. The proposed development is not expected to have had any significant additional impact on the breeding or feeding patters of this species. With regards to this project the sensitivity rating should be **Low Sensitive**.
Ciconia nigra (Black Stork) **Vulnerable (VU)**	**Status**: The regional population estimated for the Black Stork is less than 1 000 mature individuals which satisfies the population size criterion for regionally **Vulnerable**. In addition, a population size reduction of greater than 30% is suspected to have occurred over the last 47 year period (Taylor *et. al.*, 2015). The Black Stork occur widely from Western Europe to northern China and Japan, with non-breeding birds migrating annually to East Africa and the Sahel, northern India and eastern China. What makes the southern African population unusual is the fact that they are resident breeders and are believed to undergo only regional migrations between seasons. **Habitat**: Although the Black Stork of southern Africa have a widespread distribution, ranging from Zambia to South Africa, the population is fairly sparse as these birds prefer remote areas and have particular feeding habits. It is reliant on shallow waterbodies, such as estuaries and rivers, in which it forages (Chevallier *et al.* 2008). The degradation of wetlands and the damming of small rivers have undoubtedly had a negative impact on this species. **Diet**: The Black Stork's diet consists mainly of fish, caught in clear streams, estuaries and dams.

SPECIES	STATUS & DISCUSSION
	Breeding: Unlike Black Stork in Eurasia, which breeds in trees, the southern African population breeds on cliffs in remote mountainous regions. Breeding occurs during winter (May to July) when the birds can capitalise on the abundance of prey available when the water is receding. **Conclusion**: According to the SABAP2 data sets, the Black Stork had been observed in this pentad, but in this case, it is believed that this is only because the pentad overlaps a portion of the Orange River. The proposed footprint area does not support the breeding or feeding requirements for this species, and it is considered highly unlikely that the proposed development will result in any impact on this species. With regards to this project the sensitivity rating is considered to be **Low Sensitive**.

The discussion under Heading 6.1, 6.2 & Table 11 suggests that apart from insects, rodents and a few smaller reptile species, the site itself is not expected to support any significant fauna or avi-fauna. Three sensitive bird species had been observed in the larger pentad associated with the study area, but it is considered unlikely to highly unlikely that the development will result in any significant additional impact on the breeding or feeding habitats for any of these species.

AS A RESULT, THE **ANIMAL SPECIES THEME SENSITIVITY** FOR THIS PROJECT IS CONSIDERED **LOW SENSITIVE** (NOT HIGH SENSITIVE AS GIVEN BY THE DFFE SCREENING TOOL).

7. TERRESTRIAL BIODIVERSITY

Erf 1181 borders on the Kakamas urban edge and is for all practical purposes surrounded by agricultural to the north and west. It still shows good connectivity to the south but is interrupted by the N14. The site itself is subject to constant human activity (used by the local community as a shortcut between the town and surrounding farming areas) and shows various signs of previous and existing disturbances (e.g., excavations, illegal dumping, old building foundations, ploughing).

Development Footprint: The proposed development will result in the transformation of a large portion of Erf 1181 (which is just under 30 ha in size) in order to develop new vineyards and a raisin drying facilities (Refer to Figure 3 for a potential broad layout).

Vegetation: The vegetation type is considered "Least Threatened" and is not particularly rich in plant species and local plant endemism is very low. Meaning that the vegetation type is fairly similar over extended areas, and it would be unlikely that localised impacts will have any significant impact on any specific species or the vegetation type as a whole.

Sensitive Plant Species: Four (4) *Vachellia erioloba* trees (NFA protected species) were observed of which 2 might be impacted, but the impacts on these plants should be easy to mitigate. Six (6) NCNCA protected species were observed (Refer to Table 9), but none of them are red-listed species and all of them are relatively common and widespread species. The proposed project is not likely to result in significant species or habitat loss.

Sensitive Animal Species: Apart from insects, rodents and a few smaller reptile species, the site itself is not expected to support any significant fauna or avi-fauna. Three sensitive bird species had been observed in the larger pentad associated with the study area, but it is considered unlikely to highly unlikely that the development will result in any significant additional impact on the breeding or feeding habitats for any of these species.

Conservation Priority Areas: Although Erf 1181 shows various signs of disturbance it falls within a critical biodiversity area (CBA 2) as identified in the 2016 Northern Cape CBA maps (Figure 7).

7.1. DIRECT IMPACTS

Direct impacts refers to impacts with a direct impact on the terrestrial biodiversity associated with the proposed footprint area and may include:

- Direct loss of vegetation type and associated habitat due to construction and operational activities.
- Loss of ecological processes (e.g. migration patterns, pollinators, river function etc.) due to construction and operational activities.
- Loss of local biodiversity and threatened plant species.
- Loss of ecosystem connectivity

In this case the direct impact will result in the transformation of land up to 30 ha in size.

7.2. INDIRECT IMPACTS

Indirect impacts are impacts that are not a direct result of the main activity but are impacts associated or resulting from the construction activities. The following possible indirect impacts were associated with the proposed project:

- Impacts on vegetation type, connectivity and ecological functioning;
- Establishment of a temporary construction associated infrastructure or facilities.
- Temporary lay-down or storage areas (e.g. pipe's and fittings and concrete mixing material).
- Waste management.

In this case the indirect impacts might lead to an impact on connectivity (within a CBA) and on NFA and NCNCA protected species.

7.3. CUMULATIVE IMPACTS

In order to comprehend the cumulative impact, one has to understand to what extent the proposed activity will contribute to the cumulative loss of ecological function and other biodiversity features on a regional basis.

Having discussed the various possible environmental impacts above, it is concluded that:

- The development will result in the transformation of a large portion of Erf 1181 (<30 ha).
- Erf 1181 falls within a CBA area, but various portions of the site show signs of historic and continual anthropogenic impacts.
- The vegetation type is considered "Least Threatened" and located next to the Kakamas urban edge and surrounded by agriculture to the north and west.
- The impact on plant species of conservation concern is expected to be medium-low and can easily mitigated to low by the protection of two *Vachellia erioloba* trees (5-6m in height).
- It is considered unlikely that the project will result any significant additional impacts on fauna or avi-fauna.

7.4. THE NO-GO OPTION

In this case, the No-Go alternative, will not necessarily result in no further impact. Land use will remain the same and the agricultural and associated anthropogenic impacts will continue (to expand), while alien infestation is likely to increase.

7.5. TERRESTRIAL BIODIVERSITY IMPACT ASSESSMENT

Using the methodology described under Heading **Error! Reference source not found.**: Impact Assessment Method, the terrestrial biodiversity assessment given in **Error! Reference source not found.** aims to evaluate each of the identified impacts associated with the proposed development, using the findings discussed in this report as input. The colour given under the significance column in Table 12 relates to the scores as shown in the picture to the right (Refer to Table 7).

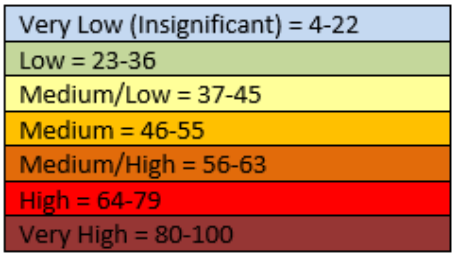


Table 12: Terrestrial biodiversity impact associated with the proposed development

Impact assessment								
Aspect	**Mitigation**	**CV**	**Lik**	**Dur**	**Ext**	**Sev**	**Significance**	Short discussion
Special habitats: Potential impact on special habitats (e.g. true quartz or "heuweltjies")	Without mitigation	2	5	5	1	1	24	The potential impact on SoCC (e.g. *Boscia* & *Vachellia erioloba* x 2) associated with drainage lines and watercourses.
	With mitigation	2	2	5	1	1	18	Protection of NFA protected species (and watercourses where possible).
Watercourses & Wetlands: Potential impact on natural water resources and it's ecological support areas.	Without mitigation						0	A freshwater specialist had been appointed to evaluate the impact on these systems.
	With mitigation						0	
Landuse and cover: Potential impact on socio-economic activities.	Without mitigation	1	2	5	1	1	9	No specific land use. Historically it supported several buildings and is now used for sand and rock mining as well as illegal dumping.
	With mitigation	1	2	5	1	1	9	The impact on landuse might be partially positive as it will stop further mining and dumping in the lower parts of the site.
Vegetation status: Loss of vulnerable or endangered vegetation and associated habitat.	Without mitigation	2	2	5	1	1	18	The vegetation is Least Threatened, and portions of the site is severely disturbed.
	With mitigation	2	2	5	1	1	18	Refer to the impact minimisation recommendations (protection of larger indigenous trees).
Conservation priority: Potential impact on protected areas, CBA's, ESA's or Centre's of Endemism.	Without mitigation	3	5	5	1	1	36	The falls within a CBA2, but portions of the site has been severely disturbed.
	With mitigation	3	4	5	1	1	33	Protection of NFA protected species (and watercourses where possible).
Connectivity: Potential loss of ecological migration corridors.	Without mitigation	2	2	5	1	1	18	Connectivity is already compromised to the west, north and east with the N14 to the south.
	With mitigation	2	2	5	1	1	18	Protection of NFA protected species (and watercourses where possible).

Impact assessment								
Aspect	**Mitigation**	**CV**	**Lik**	**Dur**	**Ext**	**Sev**	**Significance**	Short discussion
Plant SoCC: Potential impact on threatened or protected plant species.	Without mitigation	3	4	5	1	2	36	The potential impact on NFA protected trees (2 x Kameeldoringbome) and several NCNCA protected species (none of which are red-listed species).
	With mitigation	3	2	5	1	1	27	Refer to the impact minimisation recommendations in Table 9.
Fauna & Avi-Fauna: Potential impact on mammals, reptiles, amphibians & birds.	Without mitigation	2	1	5	1	1	16	The unlikely but potential impact on 3 bird species of conservation concern.
	With mitigation	2	1	5	1	1	16	Refer to the impact minimisation recommendations in Table 11.
Cumulative impacts: Cumulative impact associated with proposed activity.	Without mitigation	3	5	5	1	2	39	The main impact relates to the potential impact the CBA and on protected plant species).
	With mitigation	3	4	5	1	1	33	Protection of NFA protected species (and watercourses where possible).
The "No-Go" option: Potential impact associated with the No-Go alternative.	Without mitigation	3	4	3	1	1	27	The No-Go alternative will not necessarily result in no further impact. Land use will remain the same and the agricultural and associated anthropogenic impacts will continue (to expand), while alien infestation is likely to increase
	With mitigation							

The Terrestrial biodiversity impact assessment (Table 12) aims to take all the findings of this study into account, including the scale of the project, the conservation status of the site, the vegetation status and condition and the potential impact on SoCC.

According, to the assessment in Table 12, the main impacts associated with the proposed development are:

- A potential **Low** impact on special habitats (larger indigenous trees associated with drainage lines and watercourses);
- A potential **Low** impact on conservation priority areas (CBA 2);
- A potential **Low** impact on plant species of conservation concern (e.g., 2 x NFA protected Camelthorn trees and 5 NCNCA protected species);

7.6. TERRESTRIAL BIODIVERSITY THEME SENSITIVITY

According to the **DFFE Environmental Screening Tool** report for this site (Appendix 1), the **Terrestrial Biodiversity theme sensitivity is considered VERY HIGH SENSITIVE**, because it will impact on a critical biodiversity area (CBA 2) as identified by the Northern Cape critical biodiversity areas maps (Figure 7)**.** The reasons for assigning this CBA, are not clearly defined in the GIS layers, but according to information given in Critical Biodiversity Areas of the Northern Cape: Technical Report (Holness & Oosthuysen, 2016) all areas in close proximity of larger rivers were prioritized and all NFEPA (National Freshwater Ecosystem Priority Areas) rivers were given a minimum category of CBA.

In this case, it is assumed that the property was **automatically assigned CBA2 status** because of its proximity to the **Orange River**.

According, to the assessment in Table 12, the **cumulative impact is considered to be MEDIUM LOW** (Not very high as suggested by the DFFE Screening report), mainly because of the location of the site, the disturbed nature of large portions of the site, the least threatened status of the vegetation and the low potential impact on SoCC).

With mitigation the cumulative impact can easily be reduced to **LOW Negative**.

It is considered highly unlikely that the development will contribute significantly to any of the following:

- Significant loss of vegetation type and associated habitat.
- Loss of ecological processes (e.g., migration patterns, pollinators, river function etc.) due to construction and operational activities.
- Loss of local biodiversity and threatened plant species.
- Loss of ecosystem connectivity.

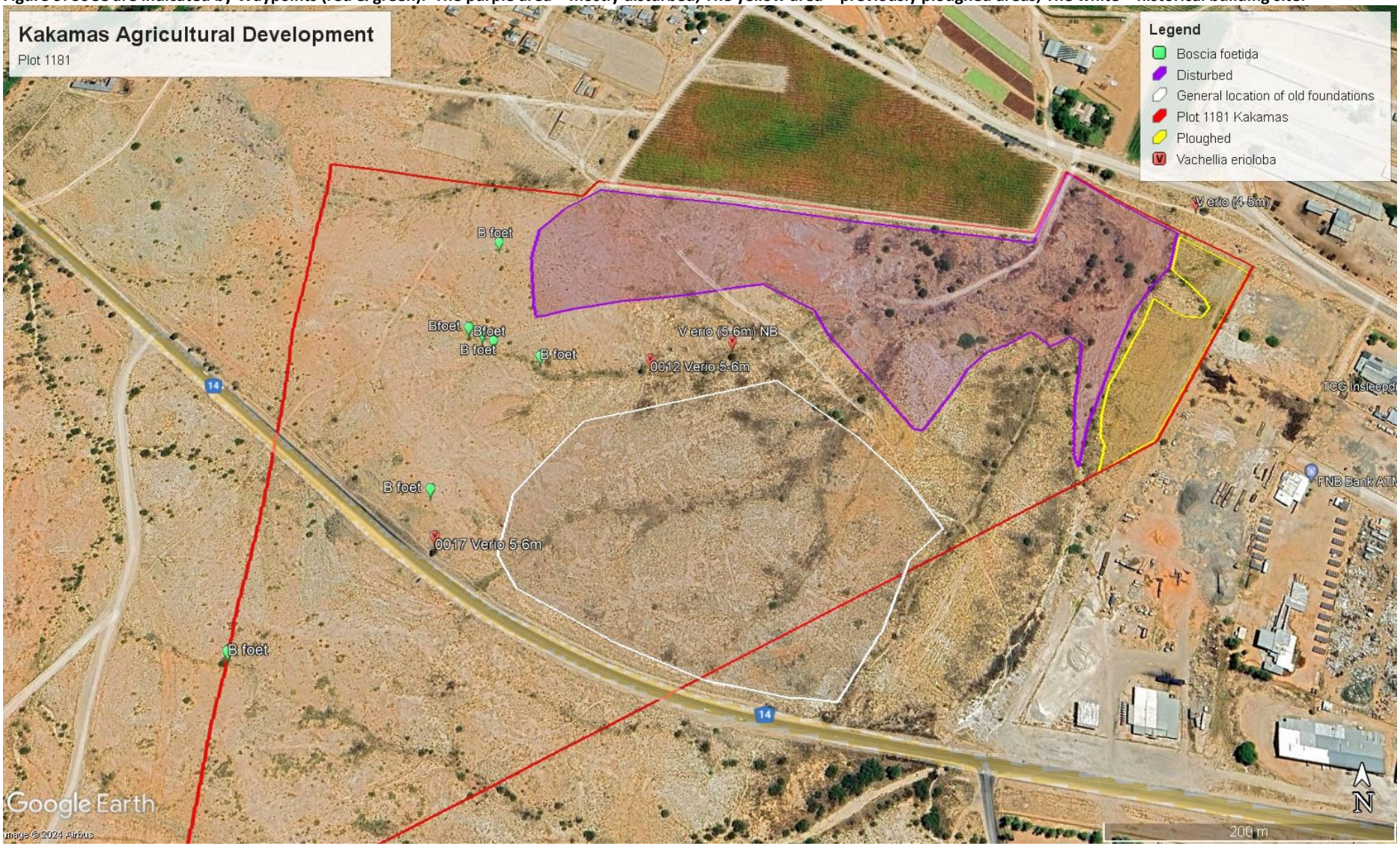
As a result, the Terrestrial biodiversity theme sensitivity for this project is considered **LOW SENSITIVE**.

7.7. TERRESTRIAL BIODIVERSITY SENSITIVITY MAP

The proposed mitigation recommendations focus on the protection of the plant species of conservation concern. Refer to the **Sensitivity map (**Figure 9**)**.

In Figure 9, the most important features are the red waypoints, which shows the location of the 4 *Vachellia erioloba* (Camelthorn) trees observed in the Erf.

Figure 9: SoCC are indicated by Waypoints (red & green). The purple area = mostly disturbed; The yellow area = previously ploughed areas; The white = historical building site.



8. RECOMMENDATIONS

The most significant terrestrial biodiversity features of the site is considered to be the 4 Camelthorn trees and a number of NCNCA protected species encountered. The following recommendations aims at minimising the potential impact on these plant species.

- All construction must be done in accordance with an approved construction and operational phase Environmental Management Plan (EMP), which must be developed by a suitably experienced Environmental Assessment Practitioner.
- A suitably qualified Environmental Control Officer must be appointed to monitor the construction phase in terms of the EMP and any other conditions pertaining to specialist studies.
- Before any work is done the footprint must be clearly demarcated. The demarcation must aim at minimisation the impact on SoCC and disturbance to watercourses – wherever possible (taking the recommendations from the freshwater specialist into account).
- The "Search & Rescue" recommendations given in Table 9 must be implemented:
  - An effort should be made to replant at least 50% of the ***Aloe*** species within the footprint area, to adjacent land, outside off the footprint area.
  - ***Euphorbia spinea*** individuals encountered within the footprint area should be replanted outside the footprint area.
  - Search & Rescue must include an aftercare period, during which the plants are watered from time to time to give them the best possible chance of survival.
  - All efforts must be made to **protect** (or incorporate) the ***Vachellia erioloba*** (Camelthorn) trees when planning the final layout of the infrastructure. A protection sone of at least 2 m should surround the canopy of these trees (in an effort to protect the root systems of these trees);
- All alien invasive species within the footprint and or within 10 m of the footprint must be removed responsibly.
  - Care must be taken with the eradication method to ensure that the removal does not impact or lead to additional impacts (e.g., spreading of the AIP due to incorrect eradication methods);
  - Care must be taken to dispose of alien plant material responsibly.
- Indiscriminate clearing of any area outside of these footprints may not be allowed.
- An integrated waste management approach must be implemented during construction.
  - Construction related general and hazardous waste may only be disposed of at approved waste disposal sites.
  - All rubble and rubbish should be collected and removed from the site to a Municipal approved waste disposal site.

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APPENDIX 1: DFFE SCREENING REPORT

APPENDIX 2: SABAP2 – BIRD SPECIES LIST

The SABAP2 species list for Pentad 2845_2030. Regional and Global red list categories are from the 2019 BirdLIfe South Africa list categorisation. Red listed species are marked in green.

No.	Common Group	Common species	Genus	Species	Regional	Global
1		Bokmakierie	*Telophorus*	*zeylonus*		
2		Hamerkop	*Scopus*	*umbretta*		
3	Barbet	Acacia Pied	*Tricholaema*	*leucomelas*		
4	Barbet	Crested	*Trachyphonus*	*vaillantii*		
5	Bee-eater	Swallow-tailed	*Merops*	*hirundineus*		
6	Bishop	Southern Red	*Euplectes*	*orix*		
7	Bulbul	African Red-eyed	*Pycnonotus*	*nigricans*		
8	Bunting	Lark-like	*Emberiza*	*impetuani*		
9	Canary	Black-throated	*Crithagra*	*atrogularis*		
10	Canary	White-throated	*Crithagra*	*albogularis*		
11	Canary	Yellow	*Crithagra*	*flaviventris*		
12	Chat	Familiar	*Oenanthe*	*familiaris*		
13	Chat	Karoo	*Emarginata*	*schlegelii*		
14	Cisticola	Levaillant's	*Cisticola*	*tinniens*		
15	Cormorant	Reed	*Microcarbo*	*africanus*		
16	Cormorant	White-breasted	*Phalacrocorax*	*lucidus*		
17	Coucal	Burchell's	*Centropus*	*burchellii*		
18	Crake	Black	*Zapornia*	*flavirostra*		
19	Crombec	Long-billed	*Sylvietta*	*rufescens*		
20	Cuckoo	Diederik	*Chrysococcyx*	*caprius*		
21	Cuckoo	Jacobin	*Clamator*	*jacobinus*		
22	Darter	African	*Anhinga*	*rufa*		
23	Dove	Cape Turtle	*Streptopelia*	*capicola*		
24	Dove	Laughing	*Spilopelia*	*senegalensis*		
25	Dove	Namaqua	*Oena*	*capensis*		
26	Dove	Red-eyed	*Streptopelia*	*semitorquata*		
27	Dove	Rock	*Columba*	*livia*		
28	Duck	Yellow-billed	*Anas*	*undulata*		
29	Eagle	Booted	*Hieraaetus*	*pennatus*		
30	Eagle	Martial	*Polemaetus*	*bellicosus*	**EN**	**VU**
31	Eagle-Owl	Spotted	*Bubo*	*africanus*		
32	Egret	Little	*Egretta*	*garzetta*		
33	Egret	Western Cattle	*Bubulcus*	*ibis*		
34	Falcon	Lanner	*Falco*	*biarmicus*	**VU**	**LC**
35	Falcon	Pygmy	*Polihierax*	*semitorquatus*		
36	Firefinch	Red-billed	*Lagonosticta*	*senegala*		
37	Fiscal	Southern	*Lanius*	*collaris*		
38	Goose	Egyptian	*Alopochen*	*aegyptiaca*		
39	Goose	Spur-winged	*Plectropterus*	*gambensis*		

No.	Common Group	Common species	Genus	Species	Regional	Global
40	Goshawk	Pale Chanting	*Melierax*	*canorus*		
41	Grebe	Little	*Tachybaptus*	*ruficollis*		
42	Greenshank	Common	*Tringa*	*nebularia*		
43	Guineafowl	Helmeted	*Numida*	*meleagris*		
44	Heron	Black-headed	*Ardea*	*melanocephala*		
45	Heron	Goliath	*Ardea*	*goliath*		
46	Heron	Grey	*Ardea*	*cinerea*		
47	Hoopoe	African	*Upupa*	*africana*		
48	Ibis	African Sacred	*Threskiornis*	*aethiopicus*		
49	Ibis	Hadada	*Bostrychia*	*hagedash*		
50	Kestrel	Rock	*Falco*	*rupicolus*		
51	Kingfisher	Pied	*Ceryle*	*rudis*		
52	Kite	Black-winged	*Elanus*	*caeruleus*		
53	Lapwing	Blacksmith	*Vanellus*	*armatus*		
54	Lapwing	Crowned	*Vanellus*	*coronatus*		
55	Lark	Sabota	*Calendulauda*	*sabota*		
56	Martin	Brown-throated	*Riparia*	*paludicola*		
57	Martin	Rock	*Ptyonoprogne*	*fuligula*		
58	Mousebird	Red-faced	*Urocolius*	*indicus*		
59	Mousebird	White-backed	*Colius*	*colius*		
60	Pigeon	Speckled	*Columba*	*guinea*		
61	Pipit	African	*Anthus*	*cinnamomeus*		
62	Plover	Three-banded	*Charadrius*	*tricollaris*		
63	Prinia	Black-chested	*Prinia*	*flavicans*		
64	Quelea	Red-billed	*Quelea*	*quelea*		
65	Robin-Chat	Cape	*Cossypha*	*caffra*		
66	Sandgrouse	Namaqua	*Pterocles*	*namaqua*		
67	Scrub Robin	Karoo	*Cercotrichas*	*coryphoeus*		
68	Shrike	Red-backed	*Lanius*	*collurio*		
69	Sparrow	Cape	*Passer*	*melanurus*		
70	Sparrow	House	*Passer*	*domesticus*		
71	Sparrow	Southern Grey-headed	*Passer*	*diffusus*		
72	Spurfowl	Cape	*Pternistis*	*capensis*		
73	Starling	Cape	*Lamprotornis*	*nitens*		
74	Starling	Wattled	*Creatophora*	*cinerea*		
75	Stilt	Black-winged	*Himantopus*	*himantopus*		
76	Stork	Black	*Ciconia*	*nigra*	**VU**	**LC**
77	Sunbird	Dusky	*Cinnyris*	*fuscus*		
78	Swallow	Barn	*Hirundo*	*rustica*		
79	Swallow	Greater Striped	*Cecropis*	*cucullata*		
80	Swallow	White-throated	*Hirundo*	*albigularis*		
81	Swift	African Palm	*Cypsiurus*	*parvus*		
82	Swift	Alpine	*Tachymarptis*	*melba*		

No.	Common Group	Common species	Genus	Species	Regional	Global
83	Swift	Little	*Apus*	*affinis*		
84	Swift	White-rumped	*Apus*	*caffer*		
85	Thrush	Karoo	*Turdus*	*smithi*		
86	Wagtail	African Pied	*Motacilla*	*aguimp*		
87	Wagtail	Cape	*Motacilla*	*capensis*		
88	Warbler	African Reed (Old, Use Common Reed Warbler)	*Acrocephalus*	*baeticatus*		
89	Warbler	Lesser Swamp	*Acrocephalus*	*gracilirostris*		
90	Warbler	Namaqua	*Phragmacia*	*substriata*		
91	Weaver	Sociable	*Philetairus*	*socius*		
92	Weaver	Southern Masked	*Ploceus*	*velatus*		
93	Wheatear	Capped	*Oenanthe*	*pileata*		
94	White-eye	Orange River	*Zosterops*	*pallidus*		
95	Whydah	Pin-tailed	*Vidua*	*macroura*		

APPENDIX 3: CURRICULUM VITAE – P.J.J. BOTES

Curriculum Vitae: Peet JJ Botes

Address: 22 Buitekant Street, Bredasdorp, 7280; **Cell**: 082 921 5949

Nationality:	South African
ID No.:	670329 5028 081
Language:	Afrikaans / English
Profession:	Environmental Consultant & Auditing
Specializations:	Botanical & Biodiversity Impact Assessments
	Environmental Compliance Audits
	Environmental Impact Assessment
	Environmental Management Systems
Qualifications:	**BSc** (Botany & Zoology), with Nature Conservation III & IV as extra subjects; Dept. of Natural Sciences, Stellenbosch University 1989.
	Hons. BSc (Plant Ecology), Stellenbosch University, 1989
	More than 20 years of experience in the Environmental Management Field (Since 1997 to present).
Professional affiliation:	Registered Professional Botanical, Environmental and Ecological Scientist at SACNASP (South African Council for Natural Scientific Professions) since 2005.
SACNAP Reg. No.:	400184/05

BRIEF RESUME OF RELEVANT EXPERIENCE

1997-2005: Employed by the Overberg Test Range (a Division of Denel), responsible for managing the environmental department of OTB, developing and implementing an ISO14001 environmental management system, ensuring environmental compliance, performing environmental risk assessments with regards to missile tests and planning the management of the 26 000 ha of natural veld, working closely with CapeNature (De Hoop Nature Reserve).

2005-2010: Joined Enviroscientific, as an independent environmental consultant specializing in wastewater management, botanical and biodiversity assessments, developing environmental management plans and strategies, environmental control work as well as doing environmental compliance audits and was also responsible for helping develop the biodiversity part of the Farming for the Future audit system implemented by Woolworths. During his time with Enviroscientific he performed more than 400 biodiversity and environmental legal compliance audits.

2010-2017: Joined EnviroAfrica, as an independent Environmental Assessment Practitioner and Biodiversity Specialist, responsible for Environmental Impact Assessments, Biodiversity & Botanical specialist reports and Environmental Compliance Audits. During this time Mr Botes compiled more than 70 specialist Biodiversity & Botanical impact assessment reports ranging from agricultural-, infrastructure pipelines- and solar developments.

2017-Present: Establish a small independent consultancy (PB Consult) specialising in Environmental Audits, Biodiversity and Botanical specialist studies as well as Environmental Impact Assessment.

LIST OF MOST RELEVANT BOTANICAL & BIODIVERSITY STUDIES

Botes. P. 2007:	Botanical assessment. Schaapkraal, Erf 644, Mitchell's Plain. A preliminary assessment of the vegetation in terms of the Fynbos Forum: Ecosystem guidelines. 13 November 2007.
Botes. P. 2008:	Botanical assessment. Schaapkraal Erf 1129, Cape Town. A preliminary assessment of the vegetation using the Fynbos Forum Terms of Reference: Ecosystem guidelines for environmental Assessment in the Northern Cape. 20 July 2008.
Botes, P. 2010(a):	Botanical assessment. Proposed subdivision of Erf 902, 34 Eskom Street, Napier. A Botanical scan and an assessment of the natural vegetation of the site to assess to what degree the site contributes towards conservation targets for the ecosystem. 15 September 2010.
Botes, P. 2010(b):	Botanical assessment. Proposed Loeriesfontein low cost housing project. A preliminary Botanical Assessment of the natural veld with regards to the proposed low cost housing project in/adjacent to Loeriesfontein, taking into consideration the National Spatial Biodiversity Assessment of South Africa. 10 August 2010.
Botes, P. 2010(c):	Botanical assessment: Proposed Sparrenberg dam, on Sparrenberg Farm, Ceres. . A Botanical scan and an assessment of the natural vegetation of the site. 15 September 2010.
Botes, P. 2011:	Botanical scan. Proposed Cathbert development on the Farm Wolfe Kloof, Paarl (Revised). A botanical scan of Portion 2 of the Farm Wolfe Kloof No. 966 (Cathbert) with regards to the proposed Cathbert Development, taking into consideration the National Spatial Biodiversity Assessment of South Africa. 28 September 2011.
Botes, P. 2012(a):	Proposed Danielskuil Keren Energy Holdings Solar Facility on Erf 753, Danielskuil. A Biodiversity Assessment (with botanical input) taking into consideration the findings of the National Spatial Biodiversity Assessment of South Africa. 17 March 2012.
Botes, P. 2012(b):	Proposed Disselfontein Keren Energy Holdings Solar Facility on Farm Disselfontein no. 77, Hopetown. A Biodiversity Assessment (with botanical input) taking into consideration the findings of the National Spatial Biodiversity Assessment of South Africa. 28 March 2012.
Botes, P. 2012(c):	Proposed Kakamas Keren Energy Holdings Solar Facility on Remainder of the Farm 666, Kakamas. A Biodiversity Assessment (with botanical input) taking into consideration the findings of the National Spatial Biodiversity Assessment of South Africa. 13 March 2012.
Botes, P. 2012(d):	Proposed Keimoes Keren Energy Holdings Solar Facility at Keimoes. A Biodiversity Assessment (with botanical input) taking into consideration the findings of the National Spatial Biodiversity Assessment of South Africa. 9 March 2012.
Botes, P. 2012(e):	Proposed Leeu-Gamka Keren Energy Holdings Solar Facility on Portion 40 of the Farm Kruidfontein no. 33, Prince Albert. A Biodiversity Assessment (with botanical input) taking into consideration the findings of the National Spatial Biodiversity Assessment of South Africa. 27 March 2012.
Botes, P. 2012(f):	Proposed Mount Roper Keren Energy Holdings Solar Facility on Farm 321, Kuruman. A Biodiversity Assessment (with botanical input) taking into consideration the findings of the National Spatial Biodiversity Assessment of South Africa. 28 March 2012.
Botes, P. 2012(g):	Proposed Whitebank Keren Energy Holdings Solar Facility on Farm no. 379, Kuruman. A Biodiversity Assessment (with botanical input) taking into consideration the findings of the National Spatial Biodiversity Assessment of South Africa. 27 March 2012.

Botes, P. 2012(h): Proposed Vanrhynsdorp Keren Energy Holdings Solar Facility on Farm Duinen Farm no. 258, Vanrhynsdorp. A Biodiversity Assessment (with botanical input) taking into consideration the findings of the National Spatial Biodiversity Assessment of South Africa. 13 April 2012.

Botes, P. 2012(i): Askham (Kameelduin) proposed low cost housing, Mier Municipality Residential Project, Northern Cape. A preliminary Biodiversity & Botanical scan in order to identify significant environmental features (and to identify the need for additional studies if required. 1 November 2012.

Botes, P. 2013(a): Groot Mier proposed low cost housing, Mier Municipality Residential Project, Northern Cape. A preliminary Biodiversity & Botanical scan in order to identify significant environmental features (and to identify the need for additional studies if required. January 2013.

Botes, P. 2013(b): Loubos proposed low cost housing, Mier Municipality Residential Project, Northern Cape. A preliminary Biodiversity & Botanical scan in order to identify significant environmental features (and to identify the need for additional studies if required. January 2013.

Botes, P. 2013(c): Noenieput proposed low cost housing, Mier Municipality Residential Project, Northern Cape. A preliminary Biodiversity & Botanical scan in order to identify significant environmental features (and to identify the need for additional studies if required. January 2013.

Botes, P. 2013(d): Paballelo proposed low cost housing, Mier Municipality Residential Project, Northern Cape. A preliminary Biodiversity & Botanical scan in order to identify significant environmental features (and to identify the need for additional studies if required. January 2013.

Botes, P. 2013(e): Welkom proposed low cost housing, Mier Municipality Residential Project, Northern Cape. A preliminary Biodiversity & Botanical scan in order to identify significant environmental features (and to identify the need for additional studies if required. January 2013.

Botes, P. 2013(f): Zypherfontein Dam Biodiversity & Botanical Scan. Proposed construction of a new irrigation dam on Portions 1, 3, 5 & 6 of the Farm Zypherfontein No. 66, Vanrhynsdorp (Northern Cape) and a scan of the proposed associated agricultural enlargement. September 2013.

Botes, P. 2013(g): Onseepkans Canal: Repair and upgrade of the Onseepkans Water Supply and Flood Protection Infrastructure, Northern Cape. A Biodiversity & Botanical scan in order to identify significant environmental features (and to identify the need for additional studies if required). August 2013.

Botes, P. 2013(h): Biodiversity scoping assessment with regards to a Jetty Construction on Erf 327, Malagas (Matjiespoort). 24 October 2013.

Botes, P. 2013(i): Jacobsbaai pump station and rising main (Saldanha Bay Municipality). A Botanical Scan of the area that will be impacted by the proposed Jacobsbaai pump station and rising main. 30 October 2013.

Botes, P. 2014(a): Brandvlei Bulk Water Supply: Proposed construction of a 51 km new bulk water supply pipeline (replacing the existing pipeline) from Romanskolk Reservoir to the Brandvlei Reservoir, Brandvlei (Northern Cape Province). A preliminary Biodiversity & Botanical scan in order to identify significant environmental features (and to identify the need for additional studies if required). 24 February 2014.

Botes, P. & McDonald Dr. D. 2014: Loeriesfontein Bulk Water Supply: Proposed construction of a new bulk water supply pipeline and associated infrastructure from the farm Rheeboksfontein to Loeriesfontein Reservoir, Loeriesfontein. Botanical scan of the proposed route to determine the possible impact on vegetation and plant species. 30 May 2014.

Botes, P. 2014(b): Kalahari-East Water Supply Scheme Extension: Phase 1. Proposed extension of the Kalahari-East Water Supply Scheme and associated infrastructure to the Mier Municipality, ZF Mgcawu District Municipality, Mier Local Municipality (Northern Cape Province). Biodiversity & Botanical scan of the proposed route to determine the possible impact on biodiversity with emphasis on vegetation and plant species. 1 July 2014.

Botes, P. 2014(c): The proposed Freudenberg Farm Homestead, Farm no. 419/0, Tulbagh (Wolseley Area). A Botanical scan of possible remaining natural veld on the property. 26 August 2014.

Botes, P. 2014(d): Postmasburg WWTW: Proposed relocation of the Postmasburg wastewater treatment works and associated infrastructure, ZF Mgcawu District Municipality, Tsantsabane Local Municipality (Northern Cape Province). Biodiversity and botanical scan of the proposed pipeline route and WWTW site. 30 October 2014.

Botes, P. 2015(a): Jacobsbaai pump station and rising main (Saldanha Bay Municipality) (Revision). A Botanical Scan of the area that will be impacted by the proposed Jacobsbaai pump station and rising main. 21 January 2015.

Botes, P. 2015(b): Steenkampspan proving ground. Proposed establishment of a high speed proving (& associated infrastructure) on the farm Steenkampspan (No. 419/6), Upington, ZF Mgcawu (Siyanda) District

Municipality, Northern Cape Province. Biodiversity and Botanical Scan of the proposed footprint. 20 February 2015.

Botes, P 2015(c): Proposed Bredasdorp Feedlot, Portion 10 of Farm 159, Bredasdorp, Cape Agulhas Municipality, Northern Cape Province. A Botanical scan of the area that will be impacted. 28 July 2015.

Botes, P. 2016(a): OWK Raisin processing facility, Upington, Erf 151, Kenhardt, Northern Cape Province. A Botanical scan of the proposed footprint. 26 May 2016.

Botes, P. 2016(b): Onseepkans Agricultural development. The proposed development of ±250 ha of new agricultural land at Onseepkans, Northern Cape Province. Biodiversity and Botanical Scan. January 2016.

Botes, P. 2016(c): Henkries Mega-Agripark development. The proposed development of ±150 ha of high potential agricultural land at Henkries, Northern Cape Province. Biodiversity and Botanical Scan of the proposed footprint. 28 February 2016.

Botes, P. 2016(d): Proposed Namaqualand Regional Water Supply Scheme high priority bulk water supply infrastructure upgrades from Okiep to Concordia and Corolusberg. Biodiversity Assessment of the proposed footprint. March 2016.

Botes, P. 2017: The proposed new Namaqua N7 Truck Stop on Portion 62 of the Farm Biesjesfontein No. 218, Springbok, Northern Cape Province. Botanical scan of the proposed footprint. 10 July 2017.

Botes, P. 2018(a): Kamiesberg Bulk Water Supply – Ground water desalination, borehole- and reservoir development, Kamiesberg, Northern Cape Province. Botanical scan of the proposed footprint. 20 February 2018

Botes, P. 2018(b): Rooifontein Bulk Water Supply – Ground water desalination, borehole- and reservoir development, Rooifontein, Northern Cape Province. Botanical scan of the proposed footprint. 23 February 2018

Botes, P. 2018(c): Paulshoek Bulk Water Supply – Ground water desalination, borehole- and reservoir development, Paulshoek, Northern Cape Province. Botanical scan of the proposed footprint. 27 March 2018.

Botes, P. 2018(d): Kakamas Wastewater Treatment Works Upgrade – Construction of a new WWTW and rising main, Khai !Garib Local Municipality, Northern Cape Province. Botanical assessment of the proposed footprint. 1 August 2018.

Botes, P. 2018(e): Kakamas Bulk Water Supply – New bulk water supply line for Kakamas, Lutzburg & Cillie, Khai !Garib Local Municipality, Northern Cape Province. Botanical assessment of the proposed footprint. 4 August 2018.

Botes, P. 2018(f): Wagenboom Weir & Pipeline – Construction of a new pipeline and weir with the Snel River, Breede River Local Municipality, Northern Cape Province. Botanical assessment of the proposed footprint. 7 August 2018.

Botes, P. 2018(g): Steynville (Hopetown) outfall sewer pipeline – Proposed development of a new sewer outfall pipeline, Hopetown, Northern Cape Province. Botanical assessment of the proposed footprint. 8 October 2018.

Botes, P. 2018(h): Tripple D farm agricultural development – Development of a further 60 ha of vineyards, Erf 1178, Kakamas, Northern Cape Province. Botanical assessment of the proposed footprint. 8 October 2018.

Botes, P. 2018(i): Steynville (Hopetown) outfall sewer pipeline – Proposed development of a new sewer outfall pipeline, Hopetown, Northern Cape Province. Botanical assessment of the proposed footprint. 8 October 2018.

Botes, P. 2019(a): Lethabo Park Extension – Proposed extension of Lethabo Park (Housing Development) on the remainder of the Farm Roodepan No. 70, Erf 17725 and Erf 15089, Roodepan Kimberley. Sol Plaaitje Local Municipality, Northern Cape Province. Botanical assessment of the proposed footprint (with biodiversity inputs). 15 May 2019.

Botes, P. 2019(b): Verneujkpan Trust agricultural development – The proposed development of an additional ±250 ha of agricultural land on Farms 1763, 2372 & 2363, Kakamas, Northern Cape Province. 27 June 2019.

Botes, P. 2020(a): Gamakor & Noodkamp Low cost housing – Botanical Assessment of the proposed formalization of the Gamakor and Noodkamp housing development on the remainder and portion 128 of the Farm Kousas No. 459 and Ervin 1470, 1474 and 1480, Gordonia road, Keimoes. Kai !Gariep Local Municipality, Northern Cape Province. 6 February 2020.

Botes, P. 2020(b): Feldspar Prospecting & Mining, Farm Rozynen Bosch 104, Kakamas. Botanical assessment of the proposed prospecting and mining activities on Portion 5 of The Farm Rozynen Bosch No. 104, Kakamas, Khai !Garib Local Municipality, Northern Cape Province. 12 February 2020.

Botes, P. 2020(c): Boegoeberg housing project – Botanical assessment of the proposed formalization and development of 550 new erven on the remainders of farms 142 & 144 and Plot 1890, Boegoeberg settlement, !Kheis Local Municipality, Northern Cape Province. 1 July 2020.

Botes, P. 2020(d): Komaggas Bulk Water supply upgrade – Botanical assessment of the proposed upgrade of the existing Buffelsrivier to Komaggas BWS system, Rem. of Farm 200, Nama Khoi Local Municipality, Northern Cape Province. 8 July 2020.

Botes, P. 2020(e): Grootdrink housing project – Botanical assessment of the proposed formalization and development of 370 new erven on Erf 131, Grootdrink and Plot 2627, Boegoeberg Settlement, next to Grootdrink, !Kheis Local Municipality, Northern Cape Province. 14 July 2020.

Botes, P. 2020(f): Opwag housing project – Botanical assessment of the proposed formalization and development of 730 new erven on Plot 2642, Boegoeberg Settlement and Farm Boegoeberg Settlement NO.48/16, Opwag, !Kheis Local Municipality, Northern Cape Province. 16 July 2020.

Botes, P. 2020(g): Wegdraai housing project – Botanical assessment of the Proposed formalization and development of 360 new erven on Erven 1, 45 & 47, Wegdraai, !Kheis Local Municipality, Northern Cape Province. 17 July 2020.

Botes, P. 2020(h): Topline (Saalskop) housing project – Botanical assessment of the pproposed formalization and development of 248 new erven on Erven 1, 16, 87, Saalskop & Plot 2777, Boegoeberg Settlement, Topline, !Kheis Local Municipality, Northern Cape Province. 18 July 2020.

Botes, P. 2020(i): Gariep housing project – Botanical assessment of the proposed formalization and development of 135 new erven on Plot 113, Gariep Settlement, !Kheis Local Municipality, Northern Cape Province. 20 July 2020.