# BOTANICAL & TERRESTRIAL BIODIVERSITY SCAN
# (Revision 1)

# DE KUILEN CHRISTIAN RESORT

**THE PROPOSED ESTABLISHMENT OF THE DE KUILEN RESORT ON PORTION 2 OF THE FARM DE KUILEN 451, KAMIESKROON.**
**KAMIESBERG LOCAL MUNICIPALITY, NORTHERN CAPE PROVINCE.**


**PREPARED FOR:**

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**22 March 2024**

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# *EXECUTIVE SUMMARY*

The Farm De Kuilen 451/2 is located about 15km west of Kamieskroon, up the Kamiesberg Pass into the Kamiesberg Mountains. Portion 2 of the Farm De Kuilen 451 is about 1038 ha in size. It is proposed that accommodation units and an area of commercial nature with associated infrastructure, that can be used to cater weddings and conferences be developed on Portion 2 of the Farm De Kuilen No 451. The structure will be placed within the demarcated resort area of approximately 110 ha. The accommodation units may include a guest house, a restaurant, a café, camping site, caravan park, holiday flats or built units. The weddings and conference facility may include a restaurant/catering facilities to serve guests and any other ancillary use linked to the accommodation.

The proposed infrastructure will have little additional impact on the remaining natural veld, as almost all of the proposed buildings will be located on existing agricultural land.

**VEGETATION TYPE & STATUS**

According to the South African vegetation map (2018) (Mucina & Rutherford, 2006), the proposed development might impact on two vegetation types, namely Namaqualand Granite Renosterveld (blue in Figure 6) or Namaqualand Blomveld. Both these vegetation type are still classified as "Least Threatened" (GN. No. 2747 of 18 November 2022).

However, it is important to note that in their fine-scale assessment of the vegetation of the Kamiesberg uplands Helme & Desmet (2006) suggests that the Granite Renosterveld should be considered "Vulnerable" because of transformation resulting from agriculture, heavy grazing and trampling. In this same report the area from Groot Tuin to De Kuilen and Bovlei (3018AA) have been mentioned as one of the most important areas of Renosterveld.

**WATER COURSES AND WETLANDS**

According to the **DFFE Screening Tool** report for the footprint area (Appendix 2), the relative Aquatic biodiversity theme sensitivity is considered of **Very High sensitivity**.

A Freshwater Specialist has been appointed to evaluate the aquatic biodiversity theme and will thus not be discussed in this report.

**SPECIAL HABITATS**

The Kamiesberg is described as a broken plateau with an elevation above 1 200 m, characterized by massive granite domes among granite hills and sandy plains. The farm itself is characterized by smaller granite hills (koppies) with sandy plains in-between. Almost all of these sandy plains had been transformed into agricultural land. The proposed infrastructure will have little additional impact on the granite hills, and almost all of the proposed buildings will be located on existing agricultural land.

**LAND-USE**

The study area belongs to the applicant and had been used for agriculture and intensive grazing over a long period of time.

**VEGETATION ENCOUNTERED**

According to the South African vegetation map (2018) (Mucina & Rutherford, 2006), the proposed development might impact on two vegetation types, namely Namaqualand Granite Renosterveld (blue in Figure 6) or Namaqualand Blomveld. Both these vegetation type are still classified as "Least Threatened".

- The wedding & conference centrum: Originally this area would have supported Namaqualand Granite Renosterveld (Refer to Figure 6). The site is almost still part of the farm yard and have been transformed over time by agriculture and associated practices (Photo 7). Nothing remains of the original vegetation, apart from several bulb species (**Photo 6**Photo 5) and a few hardy *Lycium* and *Searsia* shrubs (Photo 7). The impact on vegetation type and plant species will be negligible.
- House 1: The site would have been covered by Namaqualand Blomveld but had been ploughed in the past (Figure 10). As a result, the impact on vegetation type and plant species will be negligible.
- House 2 is located on a small elevated sandy patch surrounded by granite koppies (Figure 10). Of all the houses, this is the only house that will have a direct impact on remaining natural veld (Namaqualand Granite Renosterveld) (Photo 10), which had been identified as a CBA. The construction of House 2 would have resulted in small impact on vegetation type (within a CBA) and may potentially have an impact on two Red-listed species observed in the granite hills to the south of this site (Refer to Table 9). However, the footprint of the proposed house (based on the foundations and area cleared) is relatively small (seems to be less than 140 $m^2$)

and contained within the sandy area in between the rocky outcrops.
- Houses 3 – 5, are or will be located within existing agricultural fields (refer to Figure 10) and will not result in any additional impact on vegetation.

**CONSERVATION PRIORITY AREAS**

**CBA's:** According to the 2016, Northern Cape critical biodiversity areas maps, most of the proposed developments will impact on a critical biodiversity area (Figure 7) (Holness & Oosthuysen, 2016). However, the developments will overlap existing agricultural land, and will have very little additional impact on remaining natural veld.

**Centres of Endemism**: The De Kuilen Resort falls within the Kamiesberg Centre of Endemism (Van Wyk & Smith, 2001) but is not expected to have significant direct impact on this centre of endemism, since the proposed layout will have very little additional impact on the remaining natural veld.

**CONNECTIVITY**

The proposed infrastructure will have little additional impact on the granite hills, and almost all of the proposed buildings will be located on existing agricultural land. As a result, the additional impact on connectivity will be minimal.

**THREATENED AND PROTECTED PLANT SPECIES**

Table 9 gives a list of the plant species encountered during this study. It is important to note that the species list is only based on a one-day site visit. It is likely that some species (especially annuals and geophytes) might have been missed. However, the author is confident that a good understanding of the vegetation was achieved and confidence in the findings is high.

According to the **DFFE Environmental Screening Tool** report for this site (Appendix 2), the **plant species theme sensitivity is considered Medium Sensitive**, because of the potential presence of several medium sensitive plant species. Most of these species would have been in flower at the time of the study but none of these species were observed during the site visit. However, two Near Threatened, red-listed plant species were observed as well as ten (10) Northern Cape Nature Conservation Act, protected species.

The proposed wedding/conference facility might impact on several bulb species (Refer to Heading 5.3), while House 2 might impact on the red-listed species (Refer to Heading 5.4.3). The **Medium Sensitive plant species theme is supported** by this study, but it **could be easily reduced to Low Sensitivity with mitigation**.

**FAUNA & AVI-FAUNA**

According to the **DFFE Environmental Screening Tool** report for this site (Appendix 2), the **animal species theme sensitivity is considered High Sensitive**, because of the potential occurrence of several medium to high sensitive rated bird and insect species that might be encountered in the study area (Refer to Table 11 for a discussion of these species).

The proposed development will impact mainly on existing agricultural land. The impact on indigenous vegetation will be low to negligible. As a result, with regards to this project the sensitivity rating should be **Low Sensitive**.

**MAIN CONCLUSION**

According to the DFFE National Web Based Environmental Screening Tool the relative Terrestrial Biodiversity theme sensitivity is considered of **Very High Sensitivity**, because of the potential impact on:

- Critical Biodiversity Areas (CBA's) (Refer to the discussion under Heading 7.1 above)
- Areas included in the protected areas expansion strategy (Sanparks) (Refer to the discussions under Heading 7.1, above)

However, the proposed development will have very little additional impact on natural vegetation. Apart from one house, all of the infrastructure had been located on existing agricultural land (or transformed land). The impact on the Centre of Endemism (natural veld), the CBA and Connectivity will be very low to negligible. Because of the low impact on natural veld the impact on red-listed species and other sensitive species is also very low.

As a result, the **Terrestrial Biodiversity Theme** according to the impact assessment (refer to Table 12) is considered **Low Sensitive** (even without mitigation). The impact assessment also suggests that the accumulated impact can be reduced through mitigation (Refer to the recommendations under Heading 8).

**With proper mitigation, it is thus considered 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 species.
- Loss of ecosystem connectivity.

**Based on the data collected and analyzed for the proposed development, no fatal flaws or any other obstacles were found with respect to the flora, vegetation, fauna, and terrestrial biodiversity.**

**WITH THE AVAILABLE INFORMATION IT IS RECOMMENDED THAT THE PROJECT BE APPROVED WITH THE MITIGATION ACTIONS AS DESCRIBED UNDER HEADING 8.**

**MAIN MITIGATION RECOMMENDATIONS**

Refer Heading 8, for a copy of all recommendations.

1. All efforts must be made to protect all remaining natural veld, especially the remaining natural veld associated with the granite hills and slopes (covered by Namaqualand Granite Renosterveld).

# DETAILS OF THE AUTHOR

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**SPECIALIST**: Peet J.J. Botes
**SACNASP REG. NO.:** **400184/05** *(Registered Professional Botanical, Environmental and Ecological Scientists with SACNASP as required in terms of Section 18(1)(a) of the Natural Scientific Professions Act, 2003, since 2005).*

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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 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.

# *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:

6 October 2023

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) |
| VU | Vulnerable |

# 1. INTRODUCTION

Kamieskroon is a small town in the Northern Cape, located on the N7, between Garies and Springbok, in the Kamiesberg Local Municipality. The Farm De Kuilen 451/2 is located about 15km west of Kamieskroon, up the Kamiesberg Pass into the Kamiesberg Mountains. Portion 2 of the Farm De Kuilen 451 is about 1038 ha in size. It is proposed that accommodation units and an area of commercial nature with associated infrastructure, that can be used to cater weddings and conferences be developed on Portion 2 of the Farm De Kuilen No 451. The structure will be placed within the demarcated resort area of approximately 110 ha. The accommodation units may include a guest house, a restaurant, a café, camping site, caravan park, holiday flats or built units. The weddings and conference facility may include a restaurant/catering facilities to serve guests and any other ancillary use linked to the accommodation.

Three of the proposed five houses the wedding- and conference facility will be located within or on the edge of agricultural land. Only two of the proposed houses will impact on potential natural veld. According to 2018 Vegetation map of South Africa, the proposed development may impact on **Namaqualand Granite Renosterveld** and **Namaqualand Blomveld**. Both vegetation types have been classified as "Least Threatened", in terms of the "*Revised National list of ecosystems that are threatened and in need of protection*" (GN. No. 2747 of 18 November 2022).

According to the 2016 Northern Cape critical biodiversity areas maps (Holness & Oosthuysen, 2016) almost the whole farm (even some of the existing agricultural land) has been identified as critical biodiversity areas. There are also potential watercourses and wetlands expected on the property.

The DFFE screening report for the proposed site, compiled by Mr Bernard de Witt from EnviroAfrica on the 14th of April 2023, 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**.

A freshwater specialist had been appointed to evaluate the aquatic biodiversity theme (which is also considered **Very Hight Sensitive**).

## 1.1. LEGISLATION GOVERNING THIS REPORT

EnviroAfrica was appointed as the applicant to facilitate the NEMA EIA application for the proposed project. PB Consult was appointed by EnviroAfrica to conduct a botanical and 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 study were to undertake a visit to the study area and compile a specialist report that assesses the potential impacts on *Botanical and Terrestrial Biodiversity* features of the proposed development.

Study should address:

- Habitat sensitivity;
- Threatened ecosystems (including critical biodiversity areas and ecological support areas);
- Flora and fauna species of conservation concern;
- Any significant botanical or other terrestrial biodiversity features that might be impacted because of the proposed development as identified in the DFFE Screening Report for the site.
- Potential direct and cumulative impacts resulting from the proposed development on the receiving environment.

## 2. STUDY AREA

### 2.1. LOCATION & LAYOUT

Kamieskroon is a small town, between Garies and Springbok on the N7, within the Kamiesberg Local Municipality of the Northern Cape Province (Figure 1). Portion 2 of the Farm De Kuilen 451 (about 1038 ha in size), is located about 15km west of Kamieskroon, up the Kamiesberg pass onto the Kamiesberg Mountains. The study refers to a 110 ha portion of the Farm De Kuilen 415/2 (Figure 2).

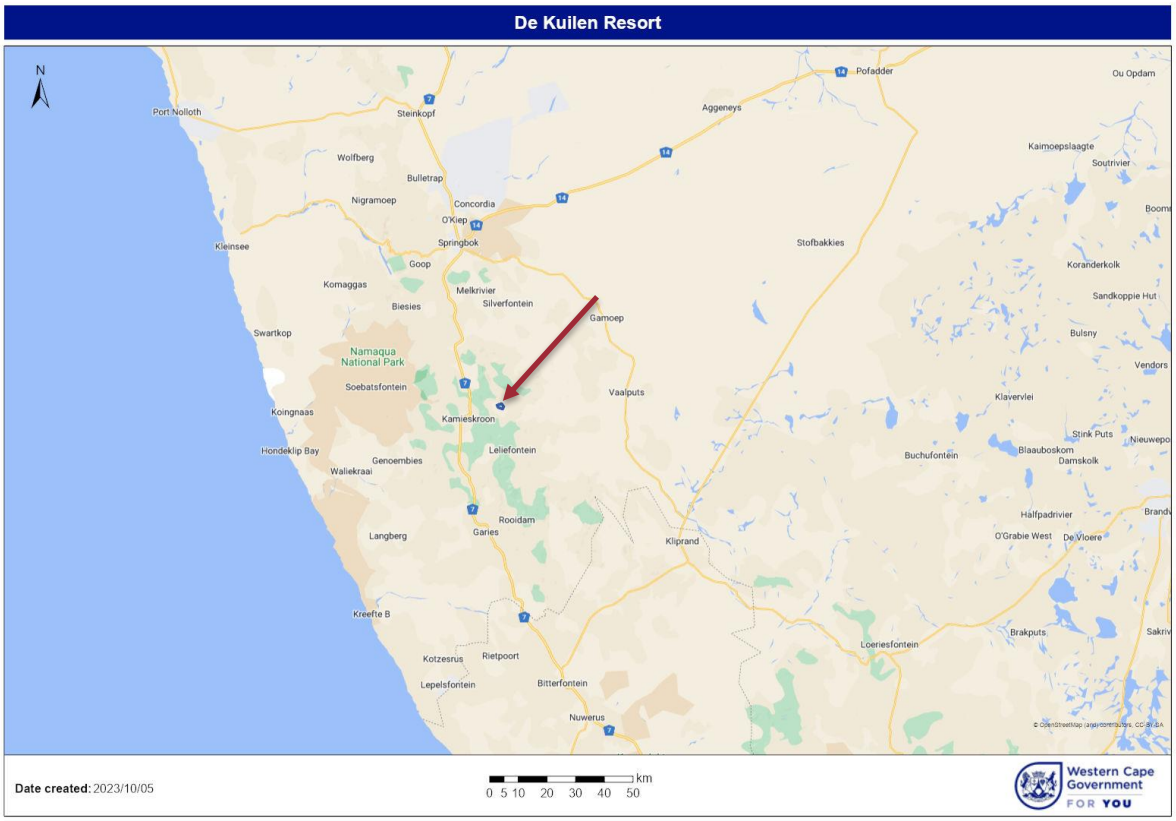



**Figure 1: A map showing the location of the study area (blue) in relation to Kamieskroon in the Northern Cape Province.**

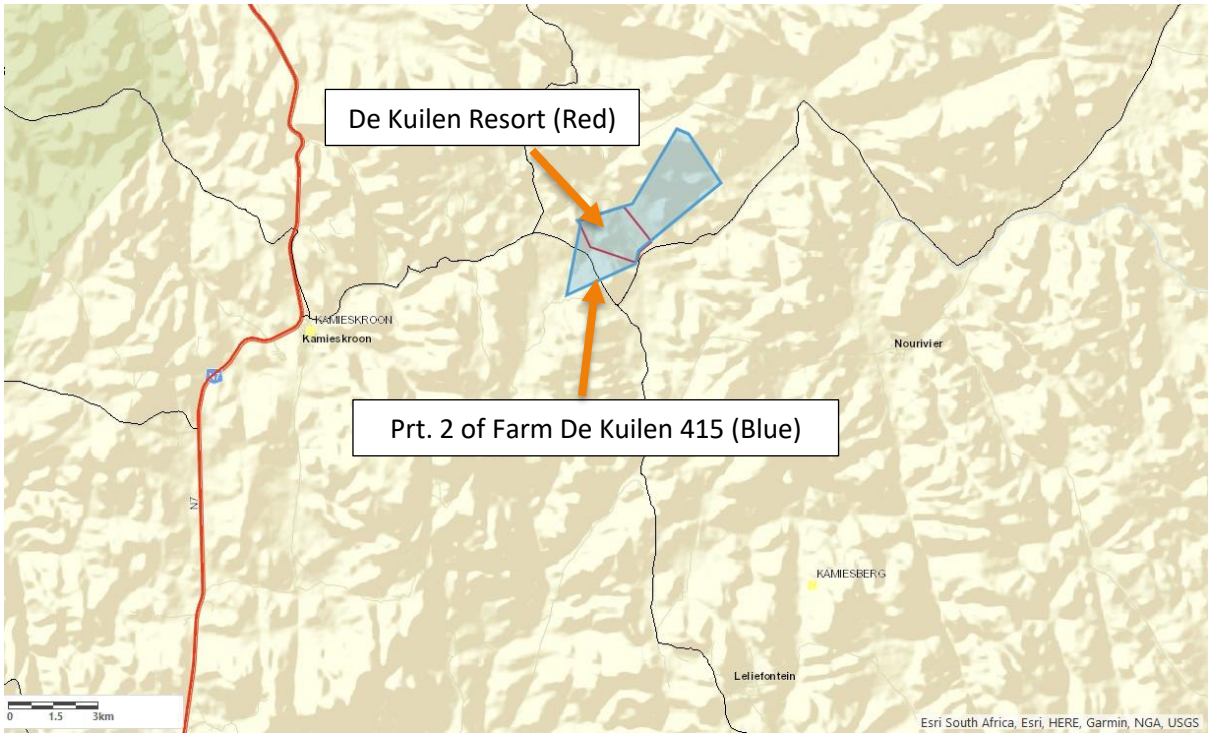



**Figure 2: Street map view, showing the location of the Farm (blue) in relation to Kamieskroon as well as the location of the proposed Resort (red) within the farm.**


**Figure 3: Google image showing the location of the 5 new houses (yellow) and the Wedding/Conference building (green)**

It is proposed that accommodation units and an area of commercial nature with associated infrastructure, that can be used to cater weddings and conferences be developed on Portion 2 of the Farm De Kuilen No 451. The structure will be placed within the demarcated resort area of approximately 110 ha. The accommodation units may include a guest house, a restaurant, a café,

camping site, caravan park, holiday flats or built units. The weddings and conference facility may include a restaurant/catering facilities to serve guests and any other ancillary use linked to the accommodation. Apart from two of the houses, which might impact slightly on natural veld, all of the remaining features will be located in existing agricultural fields or on the edge of these fields. Table 1 gives the approximate GPS co-ordinate for each location.

NS. Please note that the construction on some of these buildings had started before the applicant realised that the larger footprint might trigger NEMA EIA activities. At present, all construction activities is halted to submit an NEMA EIA application.

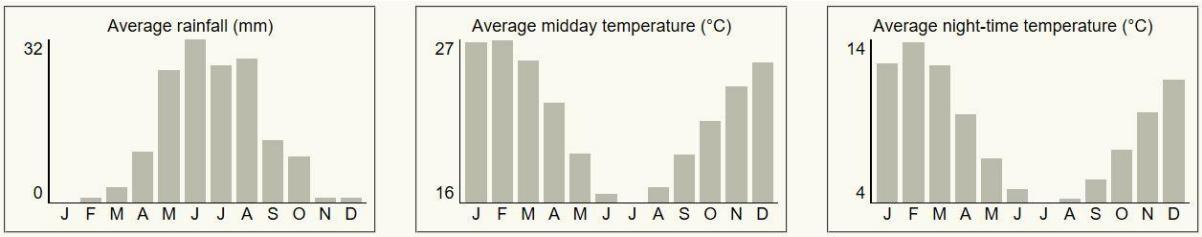
**Table 1: Co-ordinates of the proposed De Kuilen Resort development (WGS 84 format)**

| DESCRIPTION | CO-ORDINATE |
|---|---|
| The existing farm house location | S30° 11' 13.3" E18° 02' 52.4" |
| The wedding/conference facility (not constructed) | S30° 11' 10.3" E18° 02' 53.2" |
| House 1 (partially constructed) | S30° 10' 23.5" E18° 02' 29.1" |
| House 2 (foundations established) | S30° 10' 26.4" E18° 02' 19.3" |
| House 3 (not constructed) | S30° 10' 27.7" E18° 02' 08.3" |
| House 4 (not constructed) | S30° 10' 35.1" E18° 02' 07.9" |
| House 5 (partially constructed) | S30° 10' 46.5" E18° 02' 16.3" |

## 2.2. CLIMATE

The Kamiesberg Municipal area is unusual among desert areas in that although it is arid, it is characterized by relatively reliable rainfall patters, although minimal (50–400 mm/year), with frost being rare. Rain is usually accompanied by heavy dewfall and fog and more than 60% of the rain arrives between May and September. The presence of the cold Atlantic Ocean in the west not only moderates temperatures throughout Namaqualand (mean summer temperature 30°C), but also provides an additional sources of moisture in the form of coastal fog and heavy dew experienced in winter months. Bergwinds during winter can result in temperatures of up to 40 C. After a winter of adequate rainfall, springtime can bring widespread and spectacular flower shows, mainly of the Asteraceae, Brassicaceae Aizoaceae, Scrophulariaceae, Poaceae, Liliaceae and Amaryllidaceae (NDBSP, 2008).

**Table 2: Average rainfall and temperatures (www.saexplorer.co.za)**




Kamieskroon normally receives about 150 mm of rain per year and because it receives most of its rainfall during winter it has a Mediterranean climate. The charts above shows the average rainfall and temperature values for Kamieskroon per month. It receives the lowest rainfall (0 mm) in January and the highest (32 mm) in June. Average midday temperatures for Kamieskroon range from 16°C in July to 26.9°C in February. The region is the coldest during July with temperatures of 4.3°C on average during the night (www.saexplorer.co.za/south-africa/climate).

However, the Kamiesberg is a broken plateau with an elevation above 1 200 m and is characterized by massive granite domes among granite hills and sandy plains. It receives winter rain of which at least 80% falls between April and September. Because of its higher altitude, the Kamiesberge have a notably higher precipitation (averaging about 400 mm per annum) and lower temperatures than surrounding areas (with typical annual rainfall of between 100 – 200 mm) (Van Wyk & Smith, 2001).

## 2.3. TOPOGRAPHY

The De Kuilen Resort study area is located at an elevation of approximately 1 040 m above mean sea level. The new houses will be located on areas almost level (varying between 1 020 to 1 060 m above sea level). The new wedding and conference facilities will be on the lowest point of the farm, near to the existing farm house (and the entrance to the farm) (at just over 1 000m above sea level). Although, there are water courses and wetlands near the proposed developments, none of them will be directly impacted by the construction footprint of any of these facilities (refer to the Freshwater Specialist Report submitted as part of the NEMA EIA application for this project).

However, on the farm itself there are a number of rocky outcrops still covered by natural veld (most of which should be Namaqualand Granite Renosterveld. The natural veld will only be impacted by the locations of House 1 & House 2. The highest elevation of these rocky outcrops (or granite koppies) remains under 1 100 m above sea level.

## 2.4. GEOLOGY & SOILS

The Kamiesberg or Kamiesberge is a mountain range of jumbled granite inselbergs dotted over sandy plains and centred on Kamieskroon in Namaqualand in South Africa. It stretches for about 140 km from Garies in the south to Springbok in the north and forms a plateau between the Sandveld of the Cape West Coast and Bushmanland in the east, with the Hardeveld of the mountainous central Kamiesberg escarpment in the midst (Twidale, 1981). The soils of the Kamiesberg comprises mainly of a complex mix of granite and gneiss rocks that weathers into coarse sand or fine gravel (Manning, 2008). According to Mucina & Rutherford (2006) the soils associated within the study area can be described as freely drained, red and yellow structureless soils with a high base status (Figure 4).

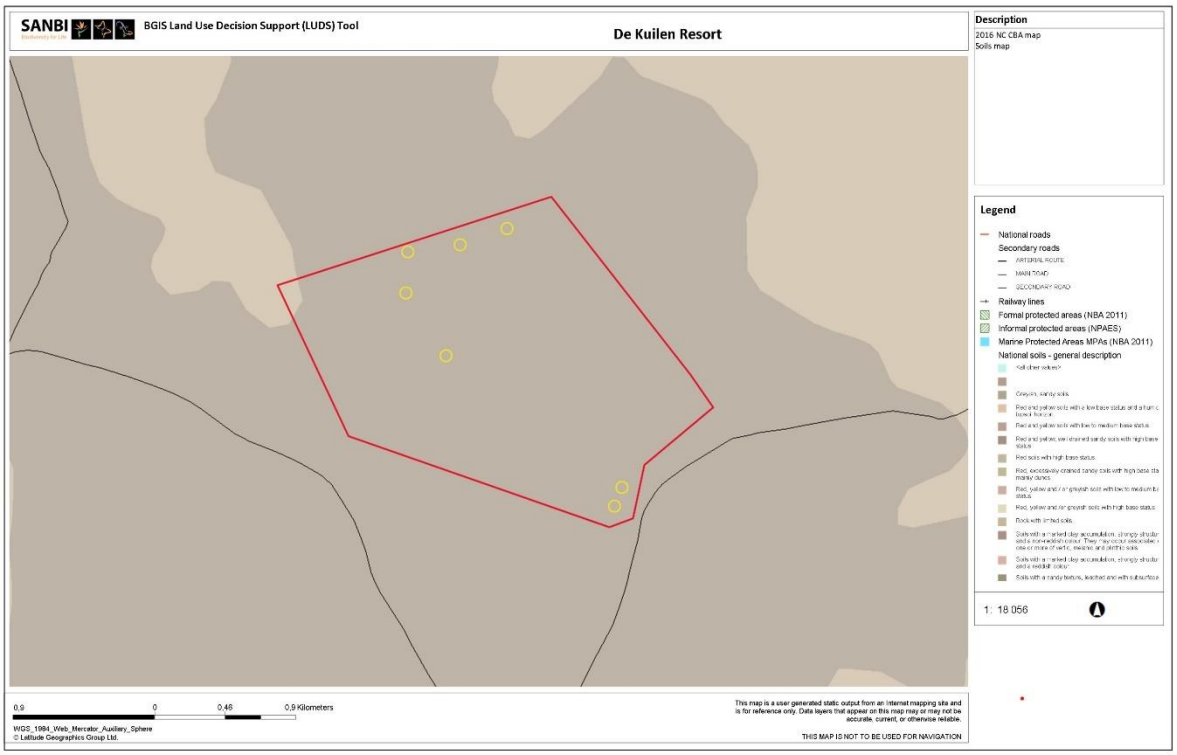



**Figure 4: The national soils map, showing the proposed development footprint (study area)**

# 3. METHODS

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 analysis of the study area and its immediate surroundings. Using the DFFE screening tool report as basis, 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 screening tool.

This information was used to prepare a study area map, which is used as a reference during the physical site visit. Plant 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 31st of July 2023. The site survey was conducted over

a 4-hour period, by walking the site and sampling the vegetation, using a modified approach, based on the Braun-Blanquet vegetation survey method (Werger, 1974).

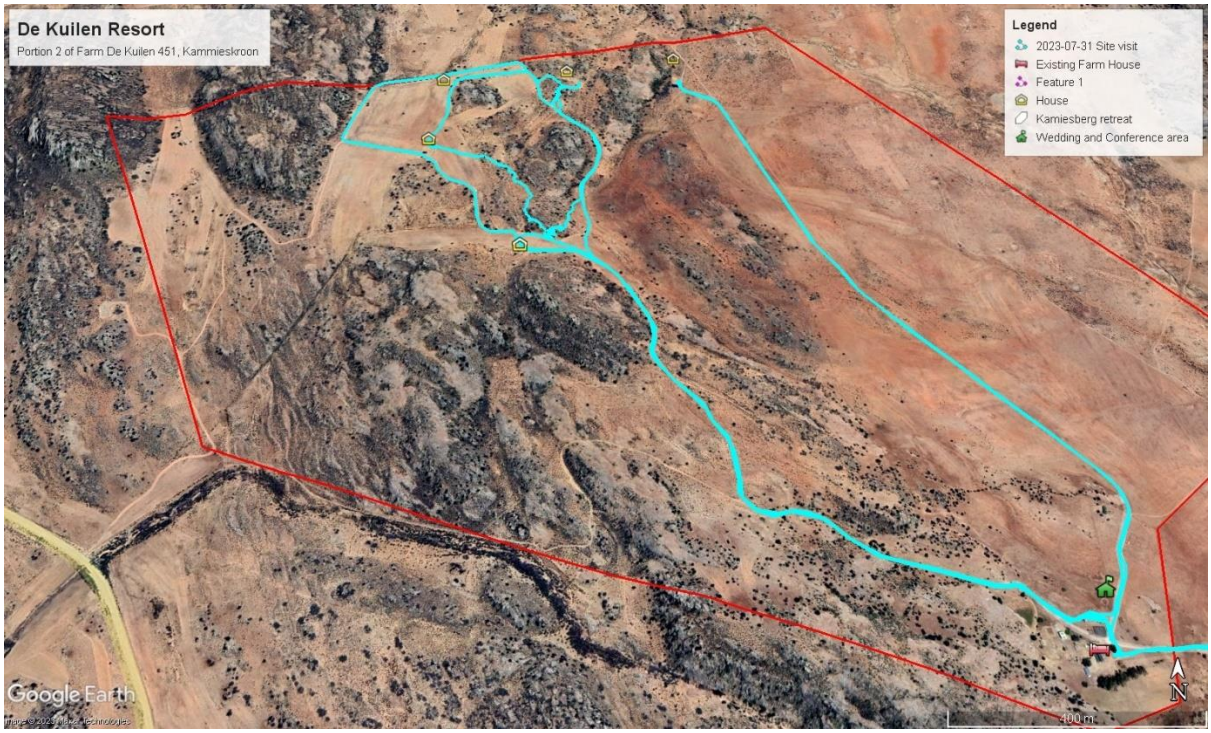



**Figure 5: Google overview, showing the study area (red)and the routes walked during the site visit.**

Protected or other special plants and any terrestrial feature of significance was, marked by waypoints and/or on the study map, and photographed (Figure 5). A hand-held Garmin GPSMAP 62s 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 or soil condition, which might indicate special botanical features (e.g., rocky outcrops, watercourses or heuweltjies), were visited. Efforts was also made to ensure that the plant species list was as complete as possible.

## 3.3. 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. However, the timing of the site visit was reasonable in that the Namaqualand received good rains earlier this season and almost all of the species were in flower (the Namaqualand flowering seasons was just starting). Essentially all perennial plants were identifiable and 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 (especially since the impact on natural veld will be very limited). It is unlikely that a full botanical assessment will result in any additional findings that would have a significant impact on the outcome.

## 3.4. IMPACT ASSESSMENT METHOD

The concept of environmental impact assessment in terms of the National Environmental Management Act, Act 107 of 1998 (NEMA) and the Environmental Impact Assessment (EIA) was developed to identify and evaluate the nature of potential impact to determine whether an activity is likely to cause significant environmental impact on the environment. 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 within the study area to identify special or significant environmental features which might be impacted by the proposed development.

The Ecosystem Guidelines for Environmental Assessment (De Villiers *et. al*., 2005), were used to evaluate the botanical 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.

### 3.4.1. 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) |
|---|

### 3.4.2. 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 3 for categories used).

***Likelihood*** refers to the probability of the specific impact occurring because of the proposed activity (Refer to Table 4, for categories used).

***Duration*** refers to the length in time during which the activity is expected to impact on the environment (Refer to Table 5).

***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 6).

***Severity*** refers to the direct physical or biophysical impact of the activity on the surrounding environment should it occur (Refer to Table 7).

**Table 3: 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 4: Categories used for evaluating likelihood.**

| LIKELHOOD | |
|---|---|
| **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 5: 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 6: 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 7: 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. |

### 3.4.3. 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 8. 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 8: 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

The results of the desktop analysis is given underneath.

## 4.1. BROAD-SCALE VEGETATION EXPECTED

According to the South African vegetation map (2018) (Mucina & Rutherford, 2006), the proposed development might impact on two vegetation types, namely Namaqualand Granite Renosterveld (blue in Figure 6) or Namaqualand Blomveld. Both these vegetation type are still classified as "Least Threatened", in terms of the "*Revised National list of ecosystems that are threatened and in need of protection*" (GN. No. 2747 of 18 November 2022).

However, it is important to note that in their fine-scale assessment of the vegetation of the Kamiesberg uplands Helme & Desmet (2006) suggests that the Granite Renosterveld should be considered "Vulnerable" because of transformation resulting from agriculture, heavy grazing and trampling. In this same report the area from Groot Tuin to De Kuilen and Bovlei (3018AA) have been mentioned as one of the most important areas of Renosterveld.

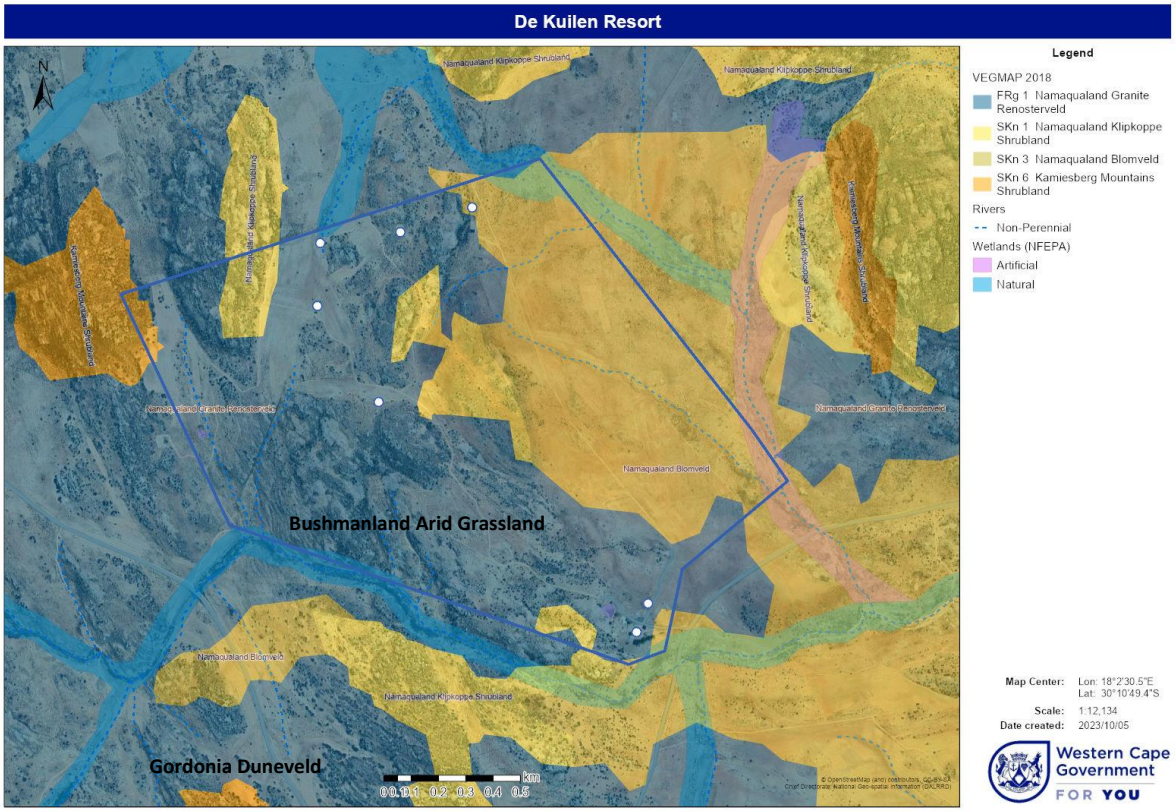



**Figure 6: Vegetation map of South Africa (2012), showing the expected vegetation type (SANBI BGIS)**

## 4.2. ECOLOGICAL DRIVERS & FUNCTIONING

The study area falls within the Succulent-Karoo Biome (the fourth largest Biome in South Africa); a semi-desert region with a strong maritime influence characterized by even, mild climate, that

interfaces with the Fynbos Biome (with which it also shares its greatest floristic affinity) to the south and east, the Nama-Karoo to the north and west and the Desert Biome to the north.

Globally there are few other places than can claim to be as biologically distinct as the Succulent Karoo Biome. It is unrivalled in its status as the world's only entirely arid region diversity hotspot and has a high diversity of dwarf leaf-succulent shrubs. "Vygies" or members of the Aizoaceae are particularly prominent, with "spurges" or Euphorbiaceae and "stone crops" or Crassulaceae and succulent members of the Asteraceae, Iridaceae and Hyacinthaceae also prominent. The Succulent Karoo Biome has an equal status to the other biomes in South Africa – it is not a subtype of "a Karoo Biome."

The Succulent Karoo Biome is primarily determined by the presence of low winter rainfall and extreme summer aridity. Rainfall varies between 20 and 290 mm per year. Because the rains in this area are cyclonic (and not thunderstorms) the erosive power is far less than of the summer rainfall biomes. During summer, temperatures in excess of 40°C are common. The vegetation is dominated by dwarf, succulent shrubs. Mass flowering displays of annuals (mainly Daisies, Asteraceae) occur in spring, often on degraded or fallow lands. Grasses are rare, except in some sandy areas, and are of the C3 type. The number of plant species (mostly succulents) is very high and unparalleled elsewhere in the world for an arid area of this size. Of importance in the area are heuweltjies, raised mounds of calcium-rich soil, thought to have been created by termites. (Mucina *et al*, 2006).

The Succulent Karoo has little agricultural potential due to the lack of water. The scarcity of grasses limits grazing, and the low carrying capacity requires extensive supplementary feeds. In addition, much of its topsoil has been lost from the biome, through sheet erosion, as a consequence of nearly 200 years of grazing. Tourism, on the other hand, is a major industry with the coastal scenery and the spring mass flower displays the main attractions, while mining, although to a lesser degree is also important, especially in the north (Mucina *et al*, 2006).

Lastly it is important to note that less than 0.5% of the Succulent Karoo Biome is formally conserved. The high species richness, high number of rare and Red Data Book species and unique global status of the biome require urgent conservation attention (Mucina *et al*, 2006).

## 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.

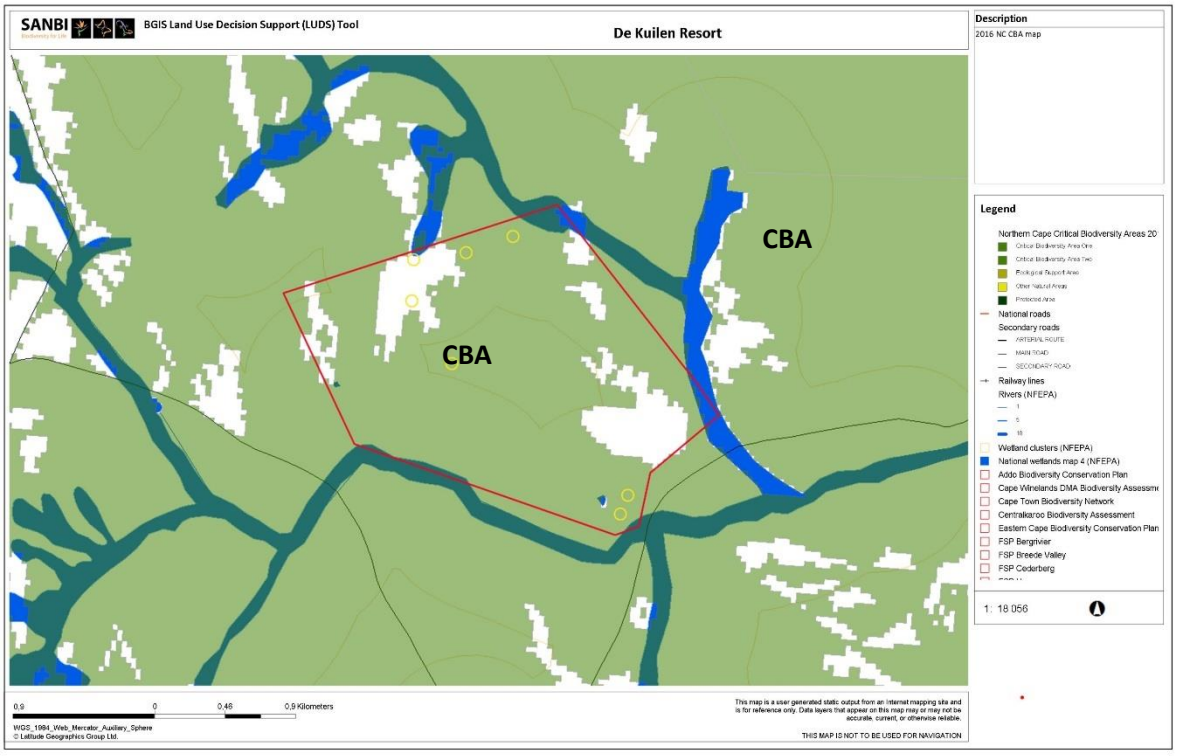



**Figure 7: Northern Cape CBA map (2016) showing the study area and associated critical biodiversity areas.**

According to the 2016, Northern Cape critical biodiversity areas maps, most of the proposed developments will impact on a critical biodiversity area (Figure 7) (Holness & Oosthuysen, 2016). However, the developments will overlap existing agricultural land, and will have very little additional impact on remaining natural veld.

## 4.4. WATERCOURSES AND WETLANDS

According to the **DFFE Screening Tool** report for the footprint area (Appendix 2), the relative Aquatic biodiversity theme sensitivity is considered of **Very High sensitivity**.

A Freshwater Specialist has been appointed to evaluate the aquatic biodiversity theme and will thus not be discussed in this report.

## 4.5. POTENTIAL IMPACT ON CENTERS OF ENDEMISM

The Kamiesberg centre (KBC) of endemism is named after the Kamiesberg Mountains, just east of Kamieskroon and comprises the entire Kamiesberg Mountain Range (Refer to **Error! Reference source not found.**). The vegetation of these mountains (especially the high-altitude regions ) show remarkable resemblance with that of the Cape Fynbos Region and it is generally regarded as an outlier of the Cape Floristic Region (Van Wyk & Smith, 2001). The KBC is recognized as one of several areas of high endemism within the Succulent Karoo Region, which is one of the globally important sites of plant diversity and endemism recognized by the WWF and one of the world's 25 hotspots (Mittermeier *et. al.* 2000; in Van Wyk & Smith, 2001). The KBC extents from near Garies in the south, to the basin of the Buffels River in the north (about 60km north). Eastwards the region gradually merges, through a series of lower ridges, into the Bushmanland Plateau (not a distinct boundary). The Kamiesberg itself forms the western edge of the extensive interior plateau of the subcontinent and comprises the highest region in the Namaqualand (Van Wyk & Smith, 2001).

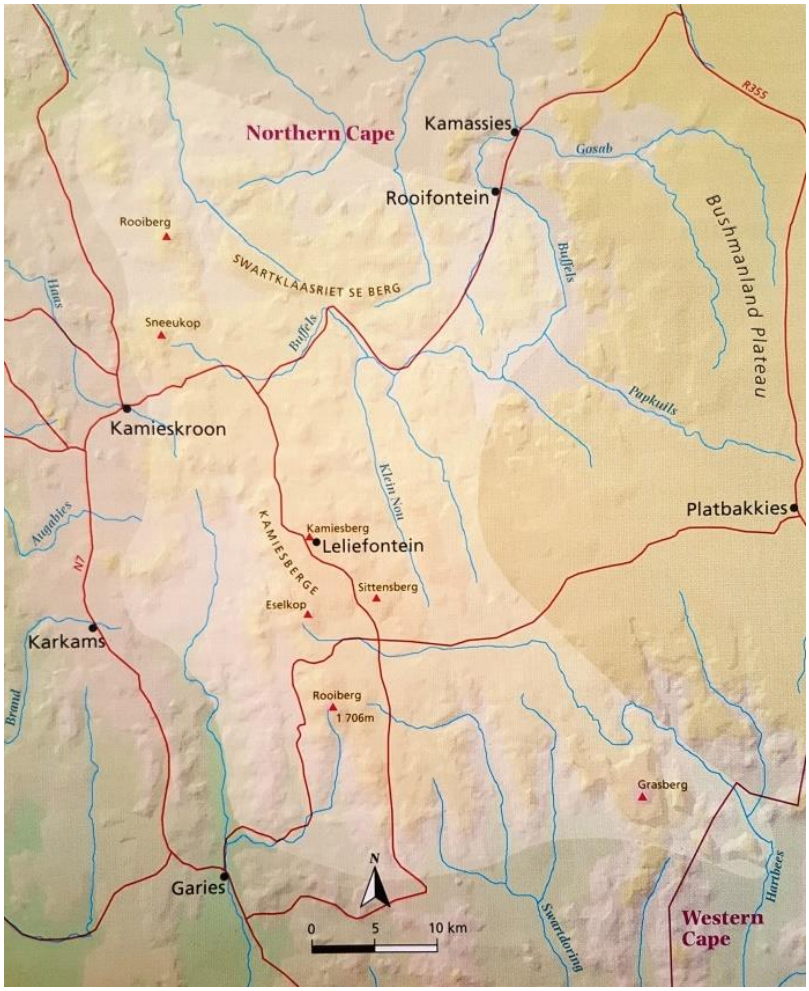



**Figure 8: Kamiesberg Centre of endemism (highlighted), from Van Wyk & Smith (2001).**

Most of the KBC endemics are confined to the Fynbos and Renosterveld. According to Hilton-Taylor (1996) (in Van Wyk & Smith, 2001), about 79 endemic plant species can be found within the Kamiesberg range, with the Family Iridaceae, particularly well represented. Succulent endemism is surprisingly low, especially since it is surrounded by Succulent Karoo Vegetation. The

KBC is the only centre of endemism where, apart from one exception, all the known succulent endemics belong to one family (Mesembryanthemaceae). The affinity of the high-altitude flora of the KBC clearly lies with the Cape Floristic Region (CFR), all three of the characteristic families of the CFR (Restionaceae, Ericaceae and Proteaceae) present in the KBC, as well as several genera that have their present centres of diversity in the Cape (Van Wyk & Smith, 2001).

Much of the KBC is communal land, used mainly for stock farming. By 1938 it was already noted that the vegetation in many parts of the Kamiesberg had been degraded as a result of severe overgrazing by sheep, goats and donkeys. Since then, the vegetation had deteriorated further, which was compounded by farmers implementing short interval burns in order to improve grazing. This had an extremely negative effect, especially on the Mountain Fynbos, with complete destruction of natural vegetation quite common around settlements in the region. As a result, the KBC is regarded as having among the highest conservation priorities of all centres of endemism in the Succulent Karoo (Van Wyk & Smith, 2001).

The De Kuilen Resort falls within the Kamiesberg Centre, but is not expected to have significant direct impact on this centre of endemism, since the proposed layout will have very little additional impact on the remaining natural veld.

# 5. VEGETATION

Namaqualand Granite Renosterveld is described as occurring on plateaus, low mountains, and broken veld of this typical granite landscape. It is usually covered by dense, 1–1.5 m tall shrublands dominated by renosterbos (*Elytropappus rhinocerotis*) and other, mainly shrubs (mainly asteraceous species such as *Euryops* & *Arctotis*. Overgrazing can be seen by the increase in cover of karoo elements. Fallow land or abandoned ploughed fields often present spectacular annual floral displays (Mucina & Rutherford, 2006).

Namaqualand Blomveld occurs on the level, or slightly undulating, sedimentary surfaces between these rocky granitic hills and mountains, such as wide plains and broad valleys with dry channels of intermittent water courses. The vegetation is described covered by sparse dwarf shrubs dominated by succulent or ericoid leaves. Geophytes, ephemeral herbs and in places also low, spreading, leaf-succulents often results in spectacular flower displays (hence the name of the unit) during wet years (Mucina & Rutherford, 2006).

## 5.1. THE VEGETATION ENCOUNTERED

The Kamiesberg is described as a broken plateau with an elevation above 1 200 m, characterized by massive granite domes among granite hills and sandy plains. The farm itself is characterized by smaller granite hills (koppies) with sandy plains in-between. Almost all of these sandy plains had been transformed into agricultural land. The proposed development includes the construction of 5 new houses, as well as a wedding/conference facility. Apart from two of the houses, which might impact slightly on natural veld, all of the remaining features will be located in existing agricultural fields or on the edge of these fields. The proposed infrastructure will have little additional impact on the granite hills, and almost all of the proposed buildings will be located on existing agricultural land.

## 5.2. VEGETATION OF THE GRANITE HILLS (KOPPIES)

The granite hills within the study area was still covered by medium shrub layer, dominated by a combination of shrubs such as *Dicerothamnus rhinocerotis, Pteronia incana, Pentzia incana, Pteronia* cf. *villosa, Eriocephalus microphyllus, Calobota sericea, Asparagus capensis, Lycium cinereum* and *Euryops lateriflorus.* Larger shrubs such as *Searsia undulata* was common, while *Searsia horrida* and *Maytenus oleoides* were observed occasionally. Scattered in between these shrubs, other shrubs like *Ballota africana, Felicia filifolia, Galenia africana* (disturbed edges), *Helichrysum* cf. *tricostatum, Hermannia disermifolia, Muraltia spinosa, Osteospermum grandiflorum, Othonna* cf. *macrophylla, Othonna* species, *Roepera foetida* and *Tetragonia fruticosa* were also observed (Photo 1 to Photo 3).

Within these shrubs, climbers such as *Asparagus asparagoides, Cyphia longiflora* and *Microloma sagittatum* were observed occasionally. Geophytes and other smaller shrubs and herbs such as *Acanthopsis carduifolia, Brunsvigia cf. orientalis, Colchicum circinatum, Eriospermum paradoxum, Massonia depressa, Oxalis obtusa* and *Oxalis pes-caprae* were observed in shady areas, or open areas between these shrubs. It must be noted that as a result of the recent good rains, a fair number of seedlings were just starting to show (amongst them Mesembryanthemum species and various herbs). Unfortunately, they were still too small to identify with any accuracy.


**Photo 1:** Looking from east to west onto the northern part of the granite hills. Note the disturbed status of the vegetation in the foreground.


**Photo 2:** One of the few remaining sandy areas higher up within the granite hills. Again, the open disturbed nature of the vegetation suggests that it had been impacted by the recent drought and livestock grazing.

In general, the natural veld protected within the granite hills seems to be in fair condition, although the species composition would have been impacted by the recent prolonged drought period (more than 7-years, which had just been broken) and continues grazing by livestock (over a long period of time) (Photo 2).


**Photo 3:** The vegetation encountered on the slopes of the granite hills. *Searsia undulata* to the left.

A study done by Anderson & Hoffman (2007) in the Kamiesberg mountain range showed that heavy grazing is likely to result in a significant species compositional shift away from large woody and succulent shrubs, and an associated increase in dwarf shrubs and herbaceous perennial plants on the sandy lowland habitats, while a reduction in perennial grass was recorded in the rocky upland habitats.


**Photo 4:** Disturbed veld to the west of the granite hills dominated by Renosterbos, *Pteronia*- and *Calobota* species.

## 5.3. OLD FIELDS AND FALLOW LAND

Because of the good winter rains, the fields/fallow land showed good stands of several geophytes and herb species, including *Conicosia elongata, Colchicum capense* subsp*. ciliolatum, Hessea breviflora, Ifloga candida, Oxalis kamiesbergensis, Oxalis namaquana, Oxalis obtusa,* while several herbs (which should include several Asteraceae) were just starting to emerge. It was clear that the recent drought and livestock grazing had an impact on species composition (even in areas not ploughed).


**Photo 5:** Fallow land showing a rich display of various bulb species. In the foreground, the flowers of Hessea breviflora is just past and seedpods are starting to show, while the white flowers in the background are *Colchicum capense*.


**Photo 6:** Some of the fallow land to the west of the property, where the wedding & conference centrum will be constructed.

## 5.4. POTENTIAL IMPACT ON VEGETATION BY THE PROPOSED STRUCTURES

The proposed development includes the construction of 5 new houses, as well as a wedding/conference facility. Apart from two of the houses, which might impact slightly on natural veld, all of the remaining features will be located in existing agricultural fields or on the edge of these fields. Table 1 gives GPS co-ordinates for each location.

### 5.4.1. THE WEDDING-/CONFERENCE FACILITIES

The wedding & conference centrum will be located just north-northeast of the existing farm house and farmyard (Figure 9). Originally this area would have supported Namaqualand Granite Renosterveld (Refer to Figure 6). The site is almost still part of the farm yard and have been transformed over time by agriculture and associated practices (Photo 7).

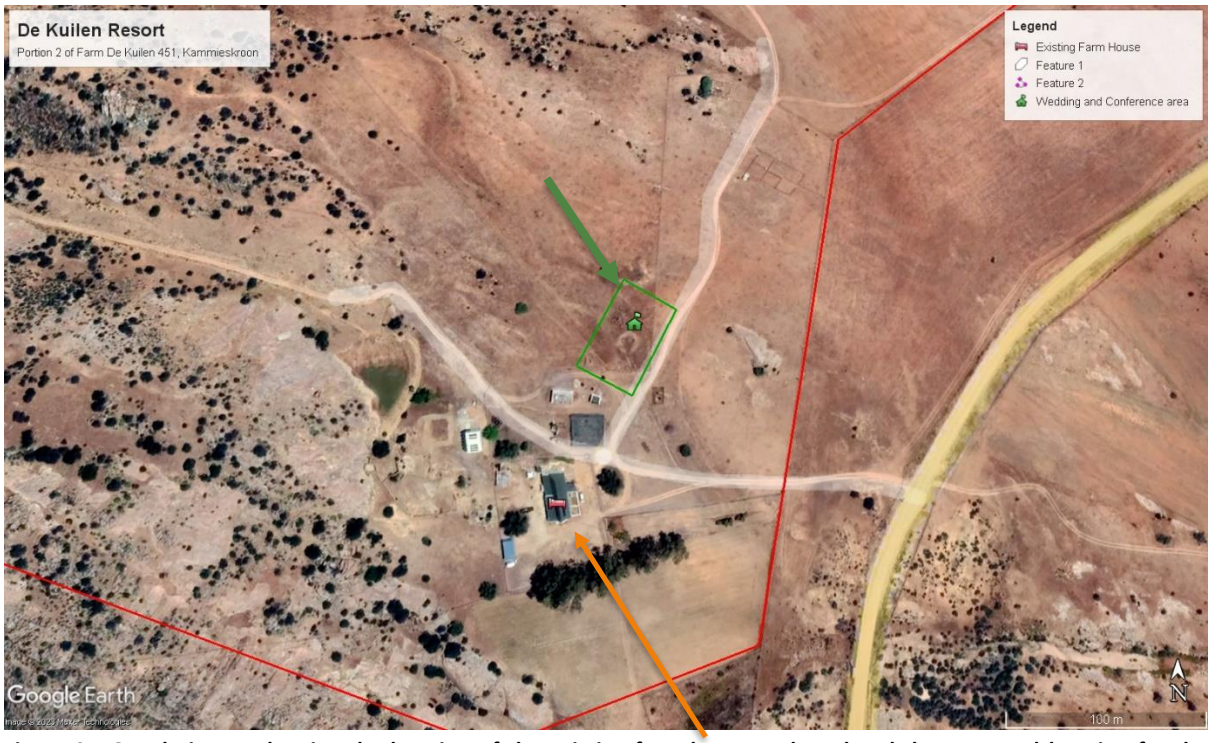



**Figure 9: Google image showing the location of the existing farm house and yard and the proposed location for the wedding/conference facility (green).**


**Photo 7:** A photo showing the remaining vegetation in the proposed location for the wedding/conference centrum.

The site can be best described as old fields or fallow land. Nothing remains of the original vegetation, apart several bulb species (**Photo 6**Photo 5) and a few hardy *Lycium* and *Searsia* shrubs (Photo 7). The impact on vegetation type and plant species will be negligible.

### 5.4.2. HOUSE 1

Historical google images shows that the location on which House 1 is located, had been ploughed in the past, at least up until 2003 (Refer to Figure 10). Since then, it seems to have been laying fallow. According to the SA Vegetation map (Figure 6) the site would, originally, have been covered by Namaqualand Blomveld.

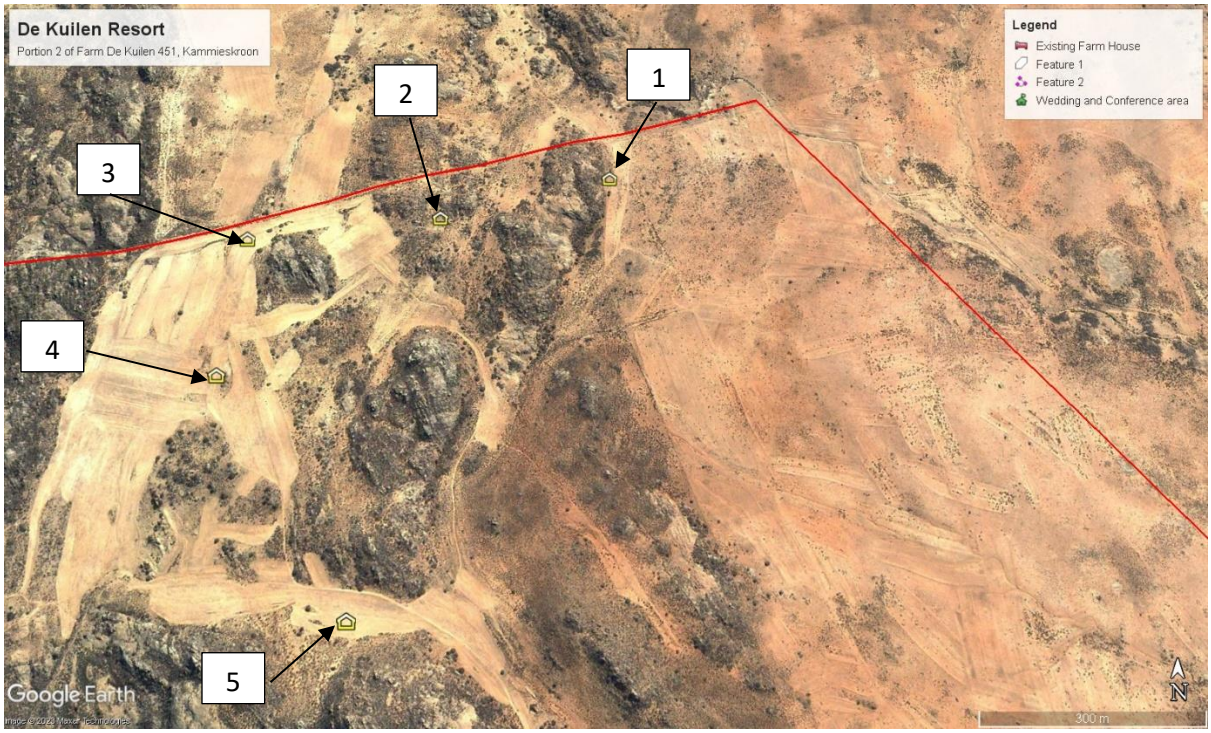



**Figure 10: Historical Google image (2003), showing the location of the various houses (1 – 5)**


**Photo 8:** House 1, located to the northeast of the study area.

In this case the house had already been constructed (Photo 8). Since the site had been ploughed a shrub layer had recovered (look to the left of Photo 9), but it is still dominated by *Dicerothamnus*

*rhinocerotis* (a disturbance indicator species) and a few hardy shrubs such as*, Lycium cinereum, Eriocephalus microphyllus, Asparagus capensis* and *Searsia undulata.* Bulb species was reduced to common species such as *Oxalis* and *Colchicum*. The expected Mesembryanthemum species (e.g., *Drosanthemum, Leipoldtia, Rushica, Aridaria* etc.), none was to be seen. In addition, all the areas that used to be covered by Namaqualand Blomveld (including the location of House 1) are either under cultivation or had been impacted by continuous grazing over a long period of time.

As a result, the impact on vegetation type and plant species will be negligible.


**Photo 9:** Old fields to the left of House 1, showing Renosterbos dominated veld. All the veld in the vicinity of this building shows clear signs of continuous grazing over a long period of time..

### 5.4.3. HOUSE 2

House 2 is located on a small elevated sandy patch surrounded by granite koppies (Figure 10). Of all the houses, this is the only house that will have a direct impact on remaining natural veld (Namaqualand Granite Renosterveld) (Photo 10), which had been identified as a CBA. The vegetation that was impacted is expected to be similar to that described under Heading 5.2 (Granite hills). However, the sandy areas between the rocky hills were normally degraded to some degree as a result of grazing practices (but the degraded status could also be ascribed to the recent prolonged drought – most likely it will be a combination of the two).


**Photo 10:** House 2, showing the location of the house within the granite hills.

The construction of House 2 would have resulted in small impact on vegetation type (within a CBA) and may potentially have an impact on two Red-listed species observed in the granite hills to the south

of this site (Refer to Table 9). However, the footprint of the proposed house (based on the foundations and area cleared) is relatively small (seems to be less than 140 $m^2$) and contained within the sandy area in between the rocky outcrops.

### 5.4.4. HOUSES 3 - 5

Houses 3 – 5, are or will be located within existing agricultural fields (refer to Figure 10) and will not result in any additional impact on vegetation. According to the CBA map, House 5 will overlap the CBA area, but it is clear from historical Google Images (Figure 10) that the site was already under agriculture before 2003).


**Photo 11:** The proposed location for House 3. No actual construction work commenced.


**Photo 12:** The proposed location of House 4. Although, material had been delivered, no actual construction had commenced.


**Photo 13:** House 5, located within existing agricultural fields. The main building had been constructed.

## 5.5. FLORA ENCOUNTERED

Table 9 gives a list of the plant species observed during the site visit. It is important to note that the species list is based on a one-day site visit (not repetitive sampling over the various seasons) and it is likely that some species might have missed. It is also important to note that the Northern Cape (including the Kamiesberg) is just starting to recover from a severe 7-year drought period. However, the author is confident that a good understanding of the vegetation was achieved and confidence in the findings is relatively high. Two red-listed plant species and 10 NCNCA protected species were observed.

**Table 9: List of plant species observed within the proposed development footprint.**

| NO. | SPECIES NAME | FAMILY | STATUS | LOCATION |
|---|---|---|---|---|
| 1. | *Acanthopsis carduifolia* | ACANTHACEAE | LC | Small, spiny shrub - occasional in granite slopes |
| 2. | *Asparagus asparagoides* | ASPARAGACEAE | LC | A spineless scrambling shrub occasionally in granite slopes. |
| 3. | *Asparagus capensis* | ASPARAGACEAE | LC | Katdoring – commen on lower granite slopes/blomveld. |
| 4. | *Babiana* species (not in flower) | IRIDACEAE | Protected in terms of schedule 2 of the NCNCA | Small bulb with 3-4 fan-like leaves (occasional-on granite slopes) |
| 5. | *Ballota africana* | LAMIACEAE | LC | Kattekruie – occasionally in granite slopes (shady areas) |
| 6. | *Brunsvigia* cf. *orientalis* (only leaves) | AMARYLLIDACEAE | LC<br>Protected in terms of schedule 2 of the NCNCA | Maartblom – relatively common in sandy patches throughout. |
| 7. | *Calobota sericea* | FABACEAE | LC | Fluitjiesbos - common on the granite slopes. |
| 8. | *Colchicum capense* subsp. *ciliolatum* | COCHICACEAE | LC | Kokerdoosblom – Abundant in disturbed sandy soils (ploughed) |
| 9. | *Colchicum* cf. *scabromarginatum* | COLCHICACEAE | LC | Flat growing herb with a corm. Occasionally in granite slopes. |
| 10. | *Colchicum circinatum* | COLCHICACEAE | LC | Skuite – flat growing herb with a corm. Occasionally in granite slopes. |
| 11. | *Conicosia elongata* | AIZOACEAE | LC<br>Protected in terms of schedule 2 of the NCNCA | Varkiesknol – occasionally observed in disturbed sand soils (ploughed). |
| 12. | *Cyphia longiflora* | LOBELIACEAE | NT<br>(Near Threatened) | Bourou - a herbaceous climber occasionally observed. |
| 13. | *Dicerothamnus rhinocerotis* | ASTERARCEAE | LC | Renosterbos – dominant on lower granite slopes/blomveld. |
| 14. | *Eriocephalus microphyllus* | ASTERACEAE | LC | Katoenbos – Common on lower and upper granite slopes. |
| 15. | *Eriospermum paradoxum* | RUSCACEAE | LC | Haasklossie – rarely observed in granite slopes. |
| 16. | *Euryops lateriflorus* | ASTERACEAE | LC | Soetrapuis – Common on the granite slopes. |
| 17. | *Felicia filifolia* | ASTERACEAE | LC | Persbergdraaibos – small shrub occasional in granite slopes. |
| 18. | *Galenia africana* | AIZOACEAE | LC<br>Protected in terms of schedule 2 of the NCNCA | Kraalbos – common on the edges of ploughed land and lower granite slopes. |
| 19. | *Helichrysum* cf. *tricostatum* | ASTERACEAE | NT<br>Near threatened | Heuningbos – rarely in the granite slopes (within other shrubs). |
| 20. | *Hermannia disermifolia* | MALVACEAE | LC | Jeukbos – occasionally on granite slopes. |

| NO. | SPECIES NAME | FAMILY | STATUS | LOCATION |
|---|---|---|---|---|
| 21. | *Hessea breviflora* | AMARYLLIDACEAE | LC<br>Protected in terms of schedule 2 of the NCNCA | Occasional in disturbed sandy soils (ploughed) |
| 22. | *Ifloga candida* | ASTERACEAE | LC | Small annual herb – occasional in disturbed sandy soils. |
| 23. | *Lycium cinereum* | SOLANACEAE | LC | Kriedoring – Occasional on lower granite slopes. |
| 24. | *Massonia depressa* | HYACINTACEAE | LC | Botterkannetjie – abundant in disturbed sandy soils (ploughed). |
| 25. | *Maytenus oleoides* | CELASTRACEAE | LC | Klipkershout – occasionally on granite slopes |
| 26. | *Microloma sagittatum* | APOCYNACEAE | LC | Bokhoringtjie – slender climber occasionally in granite slopes. |
| 27. | *Muraltia spinosa (=Nylandtia)* | POLYGALACEAE | LC | Skilpadbessie – Thorny shrub, occasionally in granite slopes. |
| 28. | *Osteospermum grandiflorum* | ASTERACEAE | LC | Muishondbos – occasional in granite slopes. |
| 29. | *Othonna* cf. *macrophylla* | ASTERACEAE | LC | Bokkool – occasional on granite slopes. |
| 30. | *Othonna* species | ASTERACEAE | | Scrambling herb, occasional growing within larger shrubs. |
| 31. | *Oxalis kamiesbergensis* | OXALIDACEAE | LC<br>Protected in terms of schedule 2 of the NCNCA | Small purple suring – occasional in sandy soils. |
| 32. | *Oxalis namaquana* | OXALIDACEAE | LC<br>Protected in terms of schedule 2 of the NCNCA | Small suring, - in disturbed sandy soils. |
| 33. | *Oxalis obtusa* | OXALIDACEAE | LC<br>Protected in terms of schedule 2 of the NCNCA | Suring – relatively abundant in disturbed sandy soils (ploughed) |
| 34. | *Oxalis pes-caprae* | OXALIDACEAE | LC<br>Protected in terms of schedule 2 of the NCNCA | Langbeensuring – relatively common in sandy soils. |
| 35. | *Pentzia incana* | ASTERACEAE | LC | Gansogiebos – Common in granite slopes. |
| 36. | *Pteronia* cf. *villosa* | ASTERACEAE | LC | Occasionally in the granite slopes. |
| 37. | *Pteronia incana* | ASTERACEAE | LC | Common in rocky in granite slopes throughout. |
| 38. | *Roepera foetida* | ZYGOPHYLACEAEA | | Skilpadbos - observed on lower granite slopes. |
| 39. | *Searsia horrida* | ANACARDIACEAE | LC | Rooidoring – occasionally in granite slopes. |
| 40. | *Searsia undulata* | ANACARDIACEAE | LC | Taaibos – found in granite slopes and sandy areas. |
| 41. | *Tetragonia fruticosa* | AIZOACEAE | LC<br>Protected in terms of schedule 2 of the NCNCA | Slaaibos – common within the granite slopes. |
| 42. | *Zaluzianskya benthamiana* | SCROPHULARIACEAE | LC | Annual herb – rarely observed on granite slopes. |

According to the **DFFE Environmental Screening Tool** report for this site (Appendix 2), the **plant species theme sensitivity is considered Medium Sensitive**, because of the potential presence of several medium sensitive plant species. It includes a number of Sensitive Species with unique identifiers (which had been obtained from SANBI data request) (Refer to Appendix 2, page 14 & 15

for a list of these species). Most of these species would have been in flower at the time of the study but none of these species were observed during the site visit. However, two Near Threatened, red-listed plant species were observed as well as ten (10) Northern Cape Nature Conservation Act, protected species.

The proposed wedding/conference facility might impact on several bulb species (Refer to Heading 5.3), while House 2 might impact on the red-listed species (Refer to Heading 5.4.3). The **Medium Sensitive plant species theme is supported** by this study, but it **could be easily reduced to Low Sensitivity with mitigation**.

## 5.6. 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).

Table 10 gives a summary of threatened and protected species observed within the study area.

**Table 10: Threatened or protected plant species observed within the study area.**

| | SPECIES OBSERVED | STATUS |
|---|---|---|
| **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). | Two red-listed species were observed – Refer to Table 9. | Both species are considered "Near Threatened" |
| **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). | N/a | No NEMBA protected species 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). | N/a | No NFA protected species observed. |
| **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 gives 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). | Ten (10) Northern Cape Nature Conservation Act, protected species were observed – Refer to Table 9. | All of these were Schedule 2 protected species and most of them are common species with a wide distribution range. |

# 6. FAUNA AND AVI-FAUNA

No fauna or avi-fauna screening was done as part of this study, but observations were made during the site visit. The study area falls within the Kamiesberg mountain range, often described as a mountain range of jumbled granite inselbergs dotted over sandy plains and centred on Kamieskroon. It stretches for about 140 km from Garies in the south to Springbok in the north and forms a plateau between the Sandveld of the Cape West Coast and Bushmanland in the east.

Faunal diversity changes through space and time and are directly influenced by anthropogenic activities, including animal husbandry (i.e., overgrazing by livestock) and human settlements (e.g., transformation of land) (Tilman et al., 1997; Chapin *et al*., 2000).

## 6.1. FAUNA

The winter rains in Namaqualand once attracted vast annual migration herds of grazers and browsers from the interior of the country, but these free-roaming herds of springbok, hartebeest, wildebeest, eland, and zebra are now restricted to game farms and reserves. The Namaqualand resident mammal fauna comprises mostly smaller species, including a dozen species of rats, mice, gerbils and other rodents (Manning, 2008). Endemism rates for invertebrates are high, and many unique and remarkable adaptive insects can be found in this region, including the scorpion, of which 22 are already known to be endemic to the Namakwa District Municipality (NDBSP, 2008). Of importance in some areas of the Namaqualand are the “heuweltjies”, raised mounds of calcium-rich soil, thought to have been created by termites, often supporting distinctive plant communities. (www.plantzafrica.com). As with insects, there is an abundance of reptiles and snakes in the region, many of which are near endemic (including the Namaqua dwarf adder, which is the smallest of Africa’s adders, measuring between 20-25 cm), as well as a few unique frogs such as the endemic rain frog, the marbled rubber frog and the paradise toad (NDBSP, 2008). According to the Namakwa District Biodiversity Sector Plan (2008) the Goegap Nature Reserve (which is part of the Kamiesberg Range), is home to 45 mammals, 25 reptiles, 3 amphibians as well as an interesting array of plant life. Mammal species include gemsbok, springbok, Hartman's zebra, bat eared foxes and aardwolf.

Approximately 90% of Namaqualand is used for livestock grazing and production, with the remainder comprising of mining, agriculture and urban development NDBSP (2008). This is also true for the Kamiesberg. The study area is likely to include a number of smaller mammal species, like hare, rats, mice and gerbils and possibly klipspringer, steenbok, fox, porcupine, caracal and rock dassie. There is also expected to be several reptiles and snakes, especially in the rocky granite hills (lots of hiding places). The proposed development will not have any additional direct impact on wetlands or watercourses (thus very little impact on amphibians).

In addition, the proposed development will mainly impact on existing agricultural land and will have very little additional impact on these rocky granite hills. The impact on fauna is thus expected to be low to negligible.

## 6.2. AVI-FAUNA

In common with other desert areas, the avifauna (birdlife) of Namaqualand is dominated by ground-

living species like larks, chats, sandgrouse, korhaans and bustards. Although naturally sparse, many of these birds are very interesting in particular in their adaption to the extreme ecological conditions associated with the Succulent Karoo (Manning, 2008). According to the Namaqualand District Biodiversity Sector Plan (2008), the Goegap Reserve host up to 94 bird species. Typical species that can be expected in the Namaqualand includes the common Ostrich, White Pelican, Greater Flamingo, Blackheaded Heron, Southern Black Korhaan, Cape Spurfowl, African Sacred Ibis, South African Shelduck, Pied Crow, Blacksmith Lapwing, Namaqua Sandgrouse, Jackal Buzzard, Southern Pal Chanting Goshawk, Rock Kestrel, Bokmakierie, Pale-winged Starling, White-backed Mousebird, Namaqua Dove, Ant –eating Chat, Cape Weaver, Cape Sparrow, Yellow Canary, Malachite Sunbird and the Southern Double-collared Sunbird.

Again, because the proposed development will mainly impact on existing agricultural land and will have very little additional impact on these rocky granite hills, the potential impact on avi-fauna is expected to be low to negligible.

## 6.3. DFFE ANIMAL SPECIES SENSITIVITY

According to the **DFFE Environmental Screening Tool** report for this site (Appendix 2), the **animal species theme sensitivity is considered High Sensitive**, because of the potential occurrence of several medium to high sensitive rated bird and insect species that might be encountered in the study area (Refer to Table 11 for a discussion of these species).

**Table 11: Animal species theme according to the NEMA EIA Sensitivity Scan results.**

| FEATURES & SENSITIVITY | DISCUSSION & EVALUATION |
|---|---|
| Aves – High<br>*Falco biarmicus*<br>(Lanner Falcon) | 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. The species is a partial seasonal migrant, and there is a post-breeding exodus from the core breeding range in the eastern sour grasslands (December-January), with apparent movements westwards in the non-breeding season into Fynbos, Nama Karoo and southern Kalahari, returning May-June (van Zyl et al. 1994). It generally favours open grassland, cleared or open woodland and agricultural land and hunts mainly birds, especially doves, pigeons and chickens (Birdlife International, 2023).<br><br>The bird may potentially hunt in the area and its surroundings, but the proposed development will impact mainly on existing agricultural land. The impact on indigenous vegetation will be low to negligible. As a result, with regards to this project the sensitivity rating should be **Low Sensitive**. |
| Aves – High<br>*Aquila verreauxii*<br>(Verreaux's Eagle) | The Verreaux's Eagle is considered regionally Vulnerable, because of suspected population size reduction of 30% over three generations (Taylor, 2015). The Eagle is found in association with Fynbos, Grassland, Savannah, Nama-Karoo and Succulent Karoo. Within these biomes, it is mainly restricted to mountainous terrain (Davies and Allan 1997) because of its hunting and breeding biology. The distribution is closely linked to the presence of Rock Hyrax *Procavia capensis* (Gargett and Mundy 1990).<br><br>It is likely that species such as the rock hyrax may be found in the granite hills on the farm and the surrounding landscape. However, the proposed development |

| FEATURES & SENSITIVITY | DISCUSSION & EVALUATION |
|---|---|
| | will impact mainly on existing agricultural land. The impact on indigenous vegetation will be low to negligible. As a result, with regards to this project the sensitivity rating should be **Low Sensitive**. |
| Aves – Medium<br>*Circus maurus*<br>(Black Harrier) | The Black harrier is an endangered bird and one of southern Africa's rarest endemic raptors. It favors Renosterveld, short Fynbos and Karoo habitat, where it breeds in shallow nests on the ground. These birds are mostly associated with larger, well-connected, and more pristine patches of veld and is often considered an indicator of well-preserved natural veld (Curtis-Scott *et. al.*, 2020).<br><br>The proposed development will impact mainly on existing agricultural land. The impact on indigenous vegetation will be low to negligible. The black harrier might hunt over this area (although even this is unlikely, because of human activity), but it is unlikely to roost or breed in this area. As a result, it is considered highly unlikely that the proposed development will have any significant impact on the breeding or feeding patterns of these birds.<br><br>With regards to the is project the sensitivity rating should be **Low Sensitive**. |
| Aves – Medium<br>*Neotis ludwigii*<br>(Ludwig's Bustard) | 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 if 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).<br><br>This species 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. The breeding season spans from August-December, with the species nesting on bare ground with a clutch of 2-3 eggs (Del Hoyo *et al.* 1996, Jenkins & Smallie 2009)<br><br>The proposed development will impact mainly on existing agricultural land. The impact on indigenous vegetation will be low to negligible. As a result, with regards to this project the sensitivity rating should be **Low Sensitive**. |
| Aves – Medium<br>*Afrotis afra*<br>(Southern Black Korhaan) | The southern black korhaan is endemic to southwestern South Africa and is also suspected of undergoing rapid population decline owning to habitat fragmentation (it is listed as vulnerable). It prefers semi-arid habitats such as grasslands, shrublands and savannas It feeds mainly on insects, such as termites, grasshoppers, and beetles, but it also eats small reptiles and plant products such as seeds, foraging on the ground and picking up food items with its bill. In the Western Cape it is uncommon to common in the remnants of renosterveld and Strandveld.<br><br>The Korhaan may feed and rest in fallow land, but since the farm is under cultivation it is considered highly unlikely that the proposed development will have any significant additional impact on the breeding or feeding potential for this bird.<br><br>With regards to the is project the sensitivity rating should be **Low Sensitive**. |
| Insecta – Medium<br>*Chrysoritis beaufortia stepheni*<br>Beaufort Opal Butterfly | Is Red Listed as "Least Concern – Rare (Habitat Specialist)". Populations are considered vulnerable or at risk of localized extinctions. This species has a slow population growth rate, or the growth rate varies depending on habitat, and there is a poor chance the wild populations will recover from exploitation (Mecenero *et. al*., 2013).<br><br>The proposed development will impact mainly on existing agricultural land. The |

| FEATURES & SENSITIVITY | DISCUSSION & EVALUATION |
|---|---|
| | impact on indigenous vegetation will be low to negligible. As a result, with regards to this project the sensitivity rating should be **Low Sensitive**. |
| Reptile – Medium<br>*Sensitive Species 32*<br>Tortoise | A tortoise endemic to South Africa and considered **Endangered** due to anthropogenic land transformation and other threats.<br><br>It occurs predominantly in the winter rainfall region of the northwestern Succulent Karoo and Fynbos biomes along the West Coast and adjacent inland of South Africa. It is found from a few metres above sea level on the West Coast to elevations of around 1,000 m in the interior at Springbok, Loeriesfontein-Calvinia, and the Cederberg Range (Boycott 1989) and shows a particular preference for rocky terrain (Loehr 2002a), which includes typical Namaqualand and Hardeveld granite koppies and typical Sandveld and Cederberg sandstone koppies and rocky ridges in the south.<br><br>The proposed development will impact mainly on existing agricultural land. The impact on indigenous vegetation will be low to negligible. As a result, with regards to this project the sensitivity rating should be **Low Sensitive**. |
| Invertebrate – Medium<br>*Brinckiella karooensis*<br>Karoo Winter Katydid | The Karoo Winter Katydid is Vulnerable under criteria B1 and B2 because its extent of occurrence and area of occupancy are small (1900 and 24 km$^2$, respectively) and the extent of its habitat are estimated to be in decline. It occurs within the Succulent Karoo which is naturally geographically restricted and under anthropogenic stress (predominantly utilized for livestock grazing). It has been recorded in the Goegap Nature Reserve.<br><br>However, the proposed development will impact mainly on existing agricultural land. The impact on indigenous vegetation will be low to negligible. As a result, with regards to this project the sensitivity rating should be **Low Sensitive**. |
| Invertebrate – Medium<br>*Brinckiella mauerbergerorum* | Mauerberger's Winter Katydid is Vulnerable under criteria B1 and B2 because its extent of occurrence and area of occupancy are small (12 000 and 40 km$^2$, respectively), it has only been recorded in ten locations, and area and extent of its habitat are estimated to be in decline (Bazelet & Naskrecki, 2013). This is a flightless grasshopper is endemic to the Succulent Karoo and Fynbos Biomes. It lives mostly on succulent shrubs.<br><br>The proposed development will impact mainly on existing agricultural land. The impact on indigenous vegetation will be low to negligible. As a result, with regards to this project the sensitivity rating should be **Low Sensitive**. |
| Invertebrate – Medium<br>*Peringueyacris namaqua*<br>Bladder grasshopper. | *Peringueyacris namaqua* is found in the Namaqualand and is assessed as Vulnerable (VU) due to a fairly restricted geographic range (less than 15,000 km²) and a limited number of locations (no more than 10) (Couldridge & Bazelet, 2018). Host plants include *Pentzia incana* and *Eriocephalus aspalathoides*. It is the smallest of the bladder grasshopper species (Dirsh 1965).<br><br>The proposed development will impact mainly on existing agricultural land. The impact on indigenous vegetation will be low to negligible. As a result, with regards to this project the sensitivity rating should be **Low Sensitive**. |

# 7. IMPACT ASSESSMENT

## 7.1. SITE SENSITIVITY DISCUSSION

The proposed development footprint will result in the transformation of 0.2 ha of natural veld for residential development (enlarging the existing urban footprint).

**Impact on special habitats**: The Kamiesberg is described as a broken plateau with an elevation above 1 200 m, characterized by massive granite domes among granite hills and sandy plains. The farm itself is characterized by smaller granite hills (koppies) with sandy plains in-between. Almost all of these sandy plains had been transformed into agricultural land. The proposed development includes the construction of 5 new houses, as well as a wedding/conference facility. Apart from two of the houses, which might impact slightly on natural veld, all of the remaining features will be located in existing agricultural fields or on the edge of these fields. The proposed infrastructure will have little additional impact on the granite hills, and almost all of the proposed buildings will be located on existing agricultural land.

**Impact on watercourses & wetlands**: According to the **DFFE Screening Tool** report for the footprint area (Appendix 2), the relative Aquatic biodiversity theme sensitivity is considered of **Very High sensitivity**. A Freshwater Specialist has been appointed to evaluate the aquatic biodiversity theme and will thus not be discussed in this report.

**Impact on land use**: The study area belongs to the applicant and had been used for agriculture and intensive grazing over a long period of time.

**Impact on vegetation**: According to the South African vegetation map (2018) (Mucina & Rutherford, 2006), the proposed development might impact on two vegetation types, namely Namaqualand Granite Renosterveld (blue in Figure 6) or Namaqualand Blomveld. Both these vegetation type are still classified as "Least Threatened".

- The wedding & conference centrum: Originally this area would have supported Namaqualand Granite Renosterveld (Refer to Figure 6). The site is almost still part of the farm yard and have been transformed over time by agriculture and associated practices (Photo 7). Nothing remains of the original vegetation, apart from several bulb species (**Photo 6**Photo 5) and a few hardy *Lycium* and *Searsia* shrubs (Photo 7). The impact on vegetation type and plant species will be negligible.
- House 1: The site would have been covered by Namaqualand Blomveld but had been ploughed in the past (Figure 10). As a result, the impact on vegetation type and plant species will be negligible.
- House 2 is located on a small elevated sandy patch surrounded by granite koppies (Figure 10). Of all the houses, this is the only house that will have a direct impact on remaining natural veld (Namaqualand Granite Renosterveld) (Photo 10), which had been identified as a CBA.

The construction of House 2 would have resulted in small impact on vegetation type (within a CBA) and may potentially have an impact on two Red-listed species observed in the granite hills to the south of this site (Refer to Table 9). However, the footprint of the proposed house (based on the foundations and area cleared) is relatively small (seems to be less than 140 $m^2$) and contained within the sandy area in between the rocky outcrops.

- Houses 3 – 5, are or will be located within existing agricultural fields (refer to Figure 10) and will not result in any additional impact on vegetation.

**Impact on conservation priority areas**: **CBA's:** According to the 2016, Northern Cape critical biodiversity areas maps, most of the proposed developments will impact on a critical biodiversity area (Figure 7) (Holness & Oosthuysen, 2016). However, the developments will overlap existing agricultural land, and will have very little additional impact on remaining natural veld.
Centres of Endemism: The De Kuilen Resort falls within the Kamiesberg Centre of Endemism (Van Wyk & Smith, 2001) but is not expected to have significant direct impact on this centre of endemism, since the proposed layout will have very little additional impact on the remaining natural veld.

**Impact on connectivity**: The proposed infrastructure will have little additional impact on the granite hills, and almost all of the proposed buildings will be located on existing agricultural land. As a result, the additional impact on connectivity will be minimal.

**Impact on threatened and protected plant species**: Table 9 gives a list of the plant species encountered during this study. It is important to note that the species list is only based on a one-day site visit. It is likely that some species (especially annuals and geophytes) might have been missed. However, the author is confident that a good understanding of the vegetation was achieved and confidence in the findings is high.

According to the **DFFE Environmental Screening Tool** report for this site (Appendix 2), the **plant species theme sensitivity is considered Medium Sensitive**, because of the potential presence of several medium sensitive plant species. Most of these species would have been in flower at the time of the study but none of these species were observed during the site visit. However, two Near Threatened, red-listed plant species were observed as well as ten (10) Northern Cape Nature Conservation Act, protected species.
The proposed wedding/conference facility might impact on several bulb species (Refer to Heading 5.3), while House 2 might impact on the red-listed species (Refer to Heading 5.4.3). The **Medium Sensitive plant species theme is supported** by this study, but it **could be easily reduced to Low Sensitivity with mitigation**.

**Impact on protected fauna & avi-fauna**: According to the **DFFE Environmental Screening Tool** report for this site (Appendix 2), the **animal species theme sensitivity is considered High Sensitive**, because of the potential occurrence of several medium to high sensitive rated bird and insect species that might be encountered in the study area (Refer to Table 11 for a discussion of these species).

The proposed development will impact mainly on existing agricultural land. The impact on indigenous vegetation will be low to negligible. As a result, with regards to this project the sensitivity rating should be **Low Sensitive**.

**Indirect impacts**: Direct impacts are typically associated transformation of land, leading to land cover changes (and consequent loss of natural areas) and edge effects, whereas indirect impacts include impacts associated with the generation of waste (e.g., general or sewage) and its management. The indirect impact in this case will be minor. Because of the small size of the development footprint, the indirect impact would be Low Significant.

**Cumulative impacts**: Refer to Table 12. In this impact assessment method, cumulative impacts are calculated by using the worst scenarios for each aspect as input into the impact assessment table.

**The "No-Go" alternative**: The **"No Go" alternative** means there would be no change to the *status quo*. However, the No-Go alternative will not necessary mean no loss of vegetation or connectivity. The property is managed as a production farm, with cultivation and sheep farming the main income. The long-term impact of grazing is likely to continue. The 'No Go' alternative is included in the impact table below (Table 12).

## 7.2. TERRESTRIAL BIODIVERSITY IMPACT ASSESSMENT

The following table rates the significance of environmental impacts associated with the proposed development. It also evaluates the expected accumulative effect of the proposed development as well as the No-Go option.

**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 | 4 | 1 | 4 | 1 | 1 | 28 | Granite hills & sandy plains within the Kamiesberg Centre of Endemism and a CBA. |
| | With mitigation | 4 | 1 | 4 | 1 | 1 | 28 | There will be no or very little impact on special habitat. |
| | | | | | | | | |
| **Watercourses & Wetlands:** Potential impact on natural water resources and it's ecological support areas. | Without mitigation | | | | | | 0 | A separate freshwater assessment has been commissioned. |
| | With mitigation | | | | | | 0 | |
| | | | | | | | | |
| **Landuse and cover:** Potential impact on socio-economic activities. | Without mitigation | 2 | 1 | 4 | 1 | 1 | 14 | The property belongs to the applicant and had been used for agriculture and sheep farming over a long period of time. |
| | With mitigation | 2 | 1 | 4 | 1 | 1 | 14 | The impact is expected to have at least a short-medium term positive impact on job creation. |
| | | | | | | | | |

| Impact assessment | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Aspect** | **Mitigation** | **CV** | **Lik** | **Dur** | **Ext** | **Sev** | **Significance** | Short discussion |
| **Vegetation status:** Loss of vulnerable or endangered vegetation and associated habitat. | Without mitigation | 2 | 1 | 4 | 1 | 1 | 14 | The development will have small impact on a vegetation type considered Least Threatened. |
| | With mitigation | 2 | 1 | 4 | 1 | 1 | 14 | The impact on loss of vegetation is expected to be negligible. |
| | | | | | | | | |
| **Conservation priority:** Potential impact on protected areas, CBA's, ESA's or Centre's of Endemism. | Without mitigation | 4 | 2 | 4 | 1 | 2 | 36 | The proposed development is within the Kamiesberg Centre of Endemism, within an identified CBA. |
| | With mitigation | 4 | 1 | 4 | 1 | 1 | 28 | Refer to the mitigation recommendations (Heading 8) |
| | | | | | | | | |
| **Connectivity:** Potential loss of ecological migration corridors. | Without mitigation | 4 | 1 | 4 | 1 | 1 | 28 | The proposed development is within the Kamiesberg Centre of Endemism, within an identified CBA. |
| | With mitigation | 4 | 1 | 4 | 1 | 1 | 28 | Refer to the mitigation recommendations (Heading 8) |
| | | | | | | | | |
| **Protected & endangered plant species:** Potential impact on threatened or protected plant species. | Without mitigation | 4 | 2 | 4 | 1 | 1 | 32 | The proposed development might impact on 2 Red-Listed and 10 NCNCA protected species. |
| | With mitigation | 4 | 1 | 4 | 1 | 1 | 28 | Refer to the mitigation recommendations (Heading 8) |
| | | | | | | | | |
| **Fauna & Avi-fauna** Potential impact on mammals, reptiles, amphibians & birds. | Without mitigation | 3 | 2 | 4 | 1 | 1 | 24 | The proposed development will mainly impact on agricultural land. The impact on natural veld will be low to negligible. |
| | With mitigation | 3 | 1 | 4 | 1 | 1 | 21 | Refer to the mitigation recommendations (Heading 8). |
| | | | | | | | | |
| **Cumulative impacts:** Cumulative impact associated with proposed activity. | Without mitigation | 4 | 2 | 4 | 1 | 2 | 36 | The development of infrastructure within the Kamiesberg Centre of Endemism and within a CBA. |
| | With mitigation | 4 | 1 | 4 | 1 | 1 | 28 | Refer to the mitigation recommendations (Heading 8). |
| | | | | | | | | |
| **The "No-Go" option:** Potential impact associated with the No-Go alternative. | Without mitigation | 4 | 2 | 2 | 1 | 2 | 28 | The No-Go alternative will not necessary mean no loss of vegetation or connectivity - agricultural practices will continue (which include livestock grazing and trampling). |
| | With mitigation | | | | | | | |

According to the DFFE National Web Based Environmental Screening Tool the relative Terrestrial Biodiversity theme sensitivity is considered of **Very High Sensitivity**, because of the potential impact on:

- Critical Biodiversity Areas (CBA's) (Refer to the discussion under Heading 7.1 above)
- Areas included in the protected areas expansion strategy (Sanparks) (Refer to the discussions under Heading 7.1, above)

However, the proposed development will have very little additional impact on natural vegetation. Apart from one house, all of the infrastructure had been located on existing agricultural land (or transformed land). The impact on the Centre of Endemism (natural veld), the CBA and Connectivity will be very low to negligible. Because of the low impact on natural veld the impact on red-listed species and other sensitive species is also very low.

As a result, the **Terrestrial Biodiversity Theme** according to the impact assessment (refer to Table 12) is considered **Low Sensitive** (even without mitigation). The impact assessment also suggests that the accumulated impact can be reduced through mitigation (Refer to the recommendations under Heading 8).

**With proper mitigation, it is thus considered 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 species.
- Loss of ecosystem connectivity.

## 7.3. TERRESTRIAL BIODIVERSITY SENSITIVITY MAP

The proposed mitigation recommendations focus on the protection of all of the remaining natural veld, with emphasis on the protection of the granite hills (Refer to Figure 11, underneath).

**Figure 11: Site sensitivity map – Focusing on the protection of the remaining natural veld (with emphasis on the granite hills).**

# 8. MITIGATION RECOMMENDATIONS

The mitigation measures must focus on footprint minimisation and the protection of all of the remaining natural veld within the proposed CBA areas (Refer the Sensitivity Map - Figure 11)

1. 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.
2. All efforts must be made to protect all remaining natural veld, especially the remaining natural veld associated with the granite hills and slopes (covered by Namaqualand Granite Renosterveld).
3. All alien invasive species within the footprint and its immediate surroundings 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.
4. 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: REQUIREMENTS FOR SPECIALIST REPORTS*

Minimum Content Requirements for Botanical and Terrestrial Biodiversity Specialist Reports as per Protocol for the Specialist Assessment of Environmental Impacts on Terrestrial Biodiversity (GN 320 of 20 March 2020).

| Protocol Ref | **Botanical and Terrestrial Biodiversity Specialist Assessment Report Content** | **Section / Page** |
|---|---|---|
| 3.1.1. | Contact details of the specialist, their SACNASP registration number, their field of expertise and a curriculum vitae; | Page iv - v |
| 3.1.2. | a signed statement of independence by the specialist; | Page v |
| 3.1.3. | a statement on the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment; | Heading 3.2 |
| 3.1.4. | a description of the methodology used to undertake the site verification and impact assessment and site inspection, including equipment and modelling used, where relevant; | Heading 3.1, 3.2 & 3.3. |
| 3.1.5. | a description of the assumptions made and any uncertainties or gaps in knowledge or data as well as a statement of the timing and intensity of site inspection observations; | Heading 3.3 |
| 3.1.6. | a location of the areas not suitable for development, which are to be avoided during construction and operation (where relevant); | Heading 7.3 |
| 3.1.7. | additional environmental impacts expected from the proposed development; | Heading 7.1 |
| 3.1.8. | any direct, indirect and cumulative impacts of the proposed development; | Heading 7.1 |
| 3.1.9. | the degree to which impacts and risks can be mitigated; | Table 12 & Heading 8 |
| 3.1.10. | the degree to which the impacts and risks can be reversed; | Heading 7.1 |
| 3.1.11. | the degree to which the impacts and risks can cause loss of irreplaceable resources; | Heading 7 & 7.2 |
| 3.1.12. | proposed impact management actions and impact management outcomes proposed by the specialist for inclusion in the Environmental Management Programme (EMPr); | Heading 8 |
| 3.1.13. | a motivation must be provided if there were development footprints identified as per paragraph 2.3.6 above that were identified as having a "low" terrestrial biodiversity sensitivity and that were not considered appropriate; | NA |
| 3.1.14. | a substantiated statement, based on the findings of the specialist assessment, regarding the acceptability, or not, of the proposed development, if it should receive approval or not; and | Page iii |
| 3.1.15. | any conditions to which this statement is subjected. | N/A |

# APPENDIX 2: DFFE SCREENING REPORT

## *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.

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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.

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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.

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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.