PB CONSULT
ENVIRONMENTAL MANAGEMENT SERVICES

BOTANICAL ASSESSMENT

BASS DIII BERRIES (PTY) LTD

PROPOSED DEVELOPMENT OF A NEW DAM AND AGRICULTURAL LAND ON PORTION 12 OF THE FARM SCHERPE HEUVEL NO. 481, WORCESTER BREEDE VALLEY LOCAL MUNICIPALITY, WESTERN CAPE PROVINCE

11 February 2021

P.J.J. Botes (Pr.Sci.Nat: 400184/05)

Registered Professional Botanical, Environmental and Ecological Scientist

22 Buitekant Street
Bredasdorp
7280

Cell: 082 921 5949
Fax: 086 611 0726
Email: peet@pbconsult.co.za

EXECUTIVE SUMMARY

VEGETATION TYPE

Robertson Karoo (Figure 5)

Classified as "Least Threatened" (GN 1002, December 2011). More recently the 2018 National Biodiversity Assessment (NBA) was published. Robertson Karoo vegetation remains classified as "Least Threatened" in terms of the 2018 NBA.

VEGETATION ENCOUNTERED

Five different potential development areas were investigated (Figures 6 – 10) on the property namely:

- Area 1 (evaluated for potential agricultural development, approximately 10.8 ha) located on the lower slopes of a series of hills The vegetation on the site was fairly uniform and can be described as a dense low succulent shrubland on deeper loamy to clayey soils (with almost no rocky content).
- Area 2 refers to areas identified for potential future agricultural expansion (of which portions might be used);
- The "Dam site" refers to an area that will be impacted by the proposed dam enlargement;
- The "Office area" refers to a small area that might be impacted by the proposed location of the future offices;
- Lastly the waaisand area refers to an area refers to an area considered for sand abstraction to be used during the construction of the dam.

At least three plant communities were observed. On deeper loamy to clayey soils, with few surface rocks visible (Area 1, the dam site and portions of Area 2) a higher denser succulent dominated vegetation was encountered with *Tylecodon paniculatus* and *Euphorbia mauritanica* & *E. burmannii* prominent. On shallower soils dominated by scattered rocks (portions of Area 2 and the Office site) lower succulent dominated vegetation was encountered dominated by *Euphorbia burmannii*, *Osteospermum sinuatum*, *Galenia africana* in combination with other succulents like *Drosanthemum*-, *Lampranthus*- and *Tetragonia* species. On the deep sandy "waaisand" areas a sparser vegetation cover was encountered dominated by the weedy pioneer *Galenia africana*, with *Cotula microglossa* (another weedy species) also common, while *Hermannia trifurca* was observed occasionally.

CONSERVATION PRIORITY AREAS

According to the WCBSP (Figure 11), the Waaisand area (see the red circle in Figure 11) falls within a terrestrial CBA, while the rest of the property is considered an ecological support area. However, the Waaisand area will be located within an areas already disturbed, while most of the proposed sites within the ECA were chosen to overlap existing disturbed areas.

In addition, according to Van Wyk & Smith (2001), the farm and all of the surrounding areas, fall within the Worcester-Robertson Karoo Centre of endemism (**Error! Reference source not found.** However, the more recent Western Cape Biodiversity Spatial Plan (2017) also aims at the conservation of important corridors and local priority areas. As such the finer scale maps given in the WCBSP were used as basis to identify priority conservation areas within the Worcester-Robertson Karoo and on the farm itself.

CONNECTIVITY

All of the proposed development footprints are basically located on the edge or adjacent to existing development footprints and is not expected to add significantly to the existing impact on connectivity to the surrounding area, where connectivity is still very good.

LAND-USE

All of the development footprints are located on land owned by the applicant and zoned for agricultural use. Although it is likely that these areas were utilized as natural grazing in years past, no livestock farming is currently practice. Smaller game like duiker is still likely to be present.

PROTECTED PLANT SPECIES

Botanically the most prominent feature of the sites was the presence of two "heuweltjies" and the presence of a 3-4 Gwarrie trees in Area 1. One species of Iridaceae, protected in terms of the WCNCBA was also observed (on the heuweltjies).

MAIN CONCLUSION

The proposed development will result in the transformation of less than 20 ha natural veld located in Robertson Karoo vegetation, which is not considered vulnerable. However, it will impact on a small area within a CBA (which is already disturbed) and other areas within an ESA (some of which are also disturbed). The landowner took the precaution to discuss the project with the EAP before any final decisions was made. As a result the proposed footprint areas were chosen with impact minimisation in mind. Finally specialist was asked to look at larger areas and to recommend specific areas that might be more suitable for development than others.

According to the impact assessment given in Table 5 the development (without mitigation) is expected to result in a **Medium** impact, mainly as a result of the potential impact on CBA and ESA's, but can be reduced to **Low** through simple and very viable mitigation options.

With the correct mitigation it is unlikely that the development will contribute significantly to any of the following:

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

WITH THE AVAILABLE INFORMATION IT IS RECOMMENDED THAT PROJECT BE APPROVED, WITH THE PROPOSED MITIGATION ACTIONS.

NO-GO OPTION

The No-Go option is not likely to result in a "no-impact" scenario, for it will have a negative socio-economic impact (and slow degradation may still continue). The blue-berry industry is very worker intensive and requires a large work force per hectare produce. Bass Diii will export its blue-berries which mean that they will have to comply with a large number of agricultural audits (e.g. Global GAP, SIZA Environmental etc.) all of which aims at sustainable development and work force education.

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 PB Consult have no interest in secondary or downstream development as a result of the authorization of this proposed 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. PB Consult reserve 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 en environmental legal compliance audits.

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

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

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

DECLARATION OF INDEPENDENCE

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

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

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

Note: The terms of reference must be attached.

Signature of the specialist:

PB Consult (Sole Proprietor)

Name of company:

25 January 2021

Date:

CONTENTS

LIST OF FIGURES

LIST OF TABLES:

LIST OF PHOTOS:

1. INTRODUCTION

Bass Diii Berries (Pty) Ltd (also known as Kenmoor farm) refers to Portion 12 of the farm Scherpe Heuvel No. 481 (Worcester). The property is located within an area often referred to as the Worcester-Robertson Karoo. The farm itself is located about halfway between Roberts and Worcester on the Eilandia road (a secondary gravel road) between the R60 (Robertson – Worcester road) and the R43 (Villiersdorp – Worcester road). United Exports recently bought the farm and intend to replant the existing agricultural land (vineyard, orchards and wheat production areas) to blue berries (over time). They would also like to extent the existing agricultural area slightly and enlarge a small catchment dam to the top of the farm as a fully-fledged irrigation dam (to allow gravity feed irrigation, which will reduce pump costs significantly).

The farm is approximately 296.24 ha in size (CapeFarmMapper) of which about 150 ha is already developed (agriculture and associated infrastructure). The proposed development will result in an added footprint, fewer than 20 ha, which will impact on remaining natural veld of the Robertson Karoo Vegetation type. The proposed project will trigger listed activities under the National Environmental Management Act, (Act 107 of 1998) (NEMA) and the EIA regulations (as amended). EnviroAfrica was appointed to perform the NEMA EIA application and PB Consult was appointed to conduct a botanical assessment of potential development areas.

The land owner in consultation with the EAP identified potential areas for development, mainly positioned to complement the existing agricultural infrastructure, but also taking impact minimisation recommendations from the EAP and slope into account. These larger areas were taken as the study area (potential development footprint) for this assessment in which alternatives was identified for potential development. The purpose of which was to minimise the impact on potential significant vegetation types and/or plant species.

According to the 2011 "*List of ecosystems that are threatened and in need of protection*" (GN 1002, December 2011), the Robertson Karoo vegetation type is considered "Least Threatened", a status which it maintained in the 2018 National Biodiversity Assessment (Skowno, 2019). The proposed footprint (on recommendations from the EAP) was chosen to overlap areas that show signs of existing disturbance (wherever possible), but some of the areas still also still supports succulent Karoo vegetation in relative good condition.

1.1. TERMS OF REFERENCE

The terms of reference for this appointment were to:

- Evaluate the proposed site(s) in order to determine whether any significant botanical features will be impacted as a result of the proposed development.
- Determine and record the position of any plant species of special significance (e.g. protected tree species, or rare or endangered plant species) that should be avoided or that may require "search & rescue" intervention.

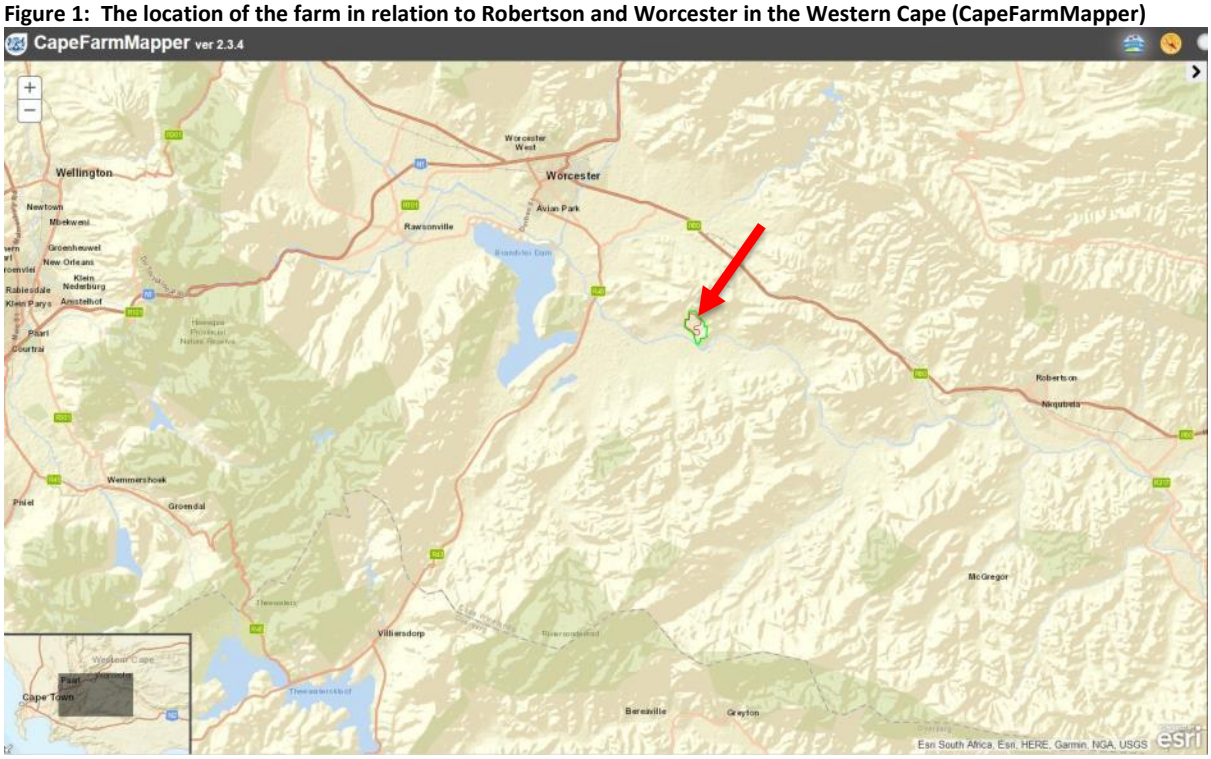
- Locate and record sensitive areas from a botanical perspective within the proposed development footprint that may be interpreted as obstacles to the proposed development.
- Make recommendations on impact minimization should it be required
- Consider short- to long-term implications of impacts on biodiversity and highlight irreversible impacts or irreplaceable loss of species.

2. STUDY AREA

2.1. LOCATION & LAYOUT

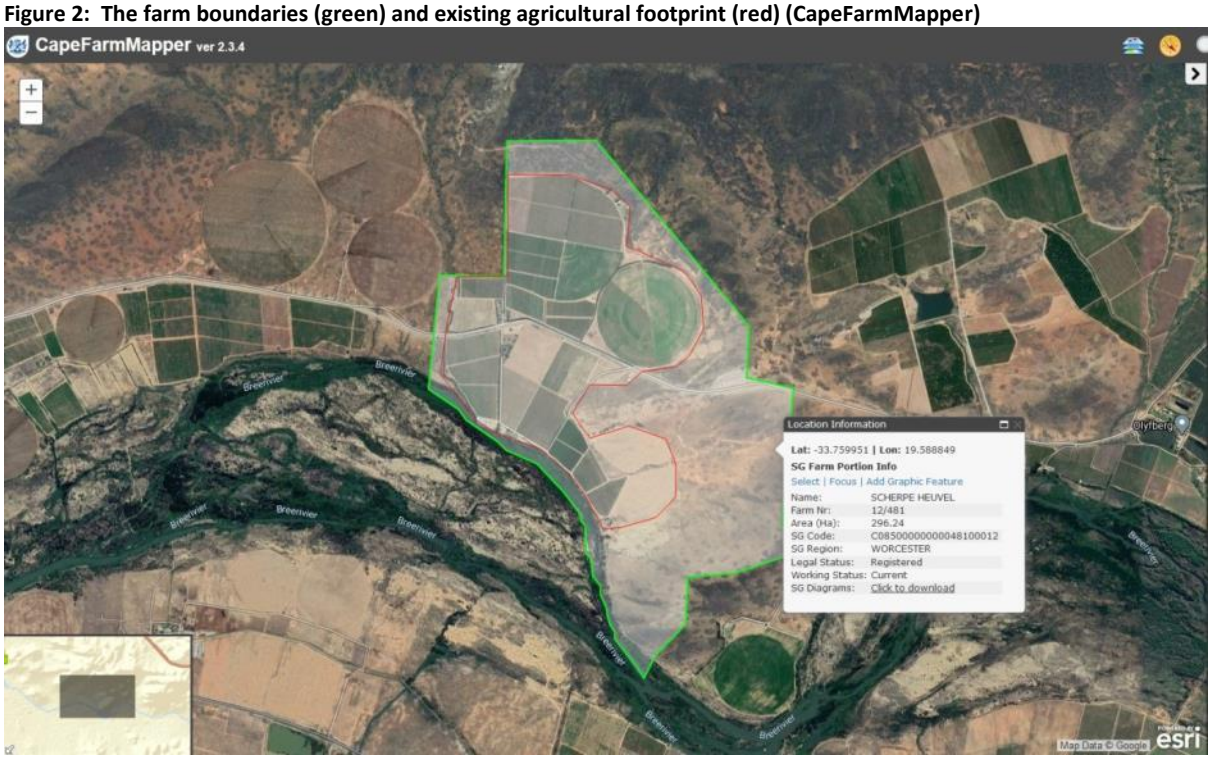
Bass Diii Farm, previously known as Kenmoor farm refers to Portion 12 of the Farm Scherpe Heuvel no. 481 (Worcester). It is located about halfway between Roberts and Worcester on the Eilandia road (a secondary gravel road) between the R60 (Robertson – Worcester road) and the R43 (Villiersdorp – Worcester road) (Figure 1). The farm falls within the Breede Valley Local Municipality (Cape Winelands District Municipality) of the Western Cape Province.

Figure 1: The location of the farm in relation to Robertson and Worcester in the Western Cape (CapeFarmMapper)



The property is approximately 296.24 ha in size (CapeFarmMapper) of which approximately 150 ha is already developed (agriculture and associated infrastructure) (Figure 2). The landowner would like to upgrade the small existing dam into a suitable irrigation dam as well as to develop additional areas for agricultural purposes. The footprint for the proposed additional developments will be less than 20 ha, of which the dam itself will cover approximately 6 ha (portions of which is already disturbed). The additional agricultural land will be located within the areas evaluated as part of this study (Refer to Figure 3).

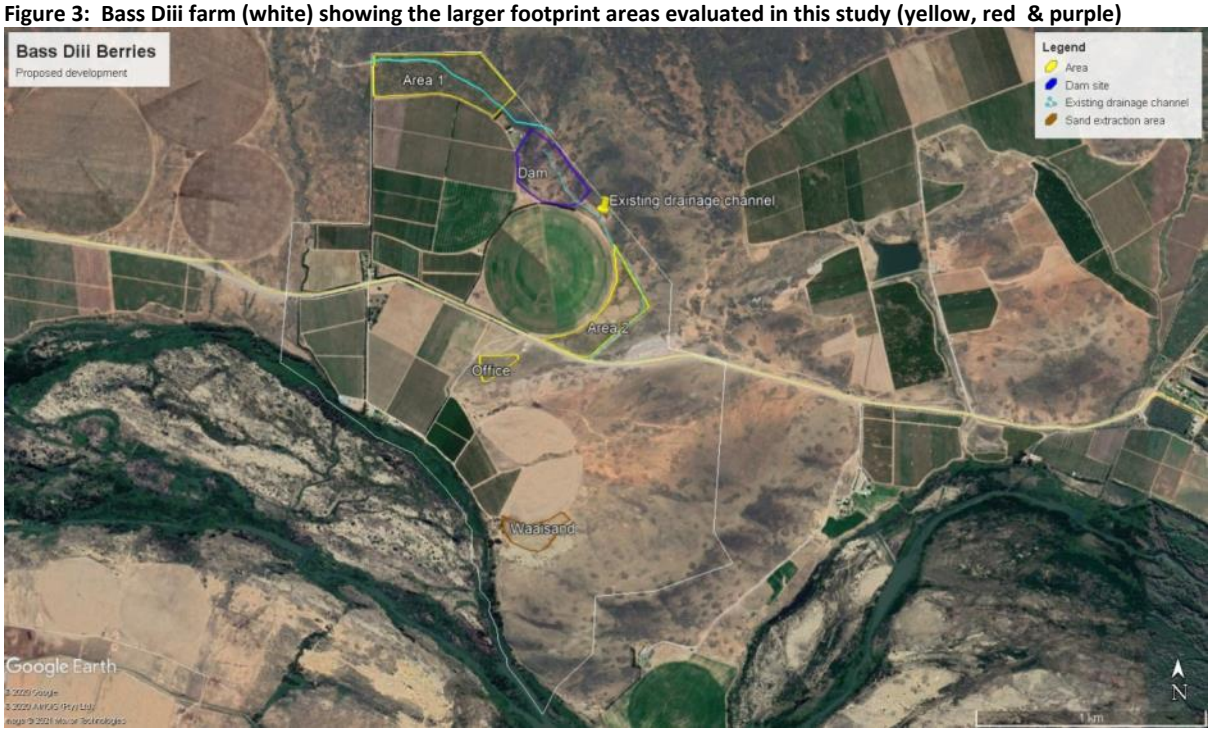
Figure 2: The farm boundaries (green) and existing agricultural footprint (red) (CapeFarmMapper)



2.2. THE STUDY AREA

Figure 3, shows the larger footprint evaluated during this study. Area 1 is still covered in remaining natural veld in good condition. Portions of Area 2 shows signs of previous physical disturbance (it could not quite be determined what the reasons for the disturbance was, but it might have been historical storage- or laydown areas for farm implements).

Figure 3: Bass Diii farm (white) showing the larger footprint areas evaluated in this study (yellow, red & purple)



The Office site is located on top of a small rounded knoll, which is generally in good condition. The proposed footprint, however, overlaps areas that had been subject to past disturbances (which include a dumping site and excavated open areas). The Waaisand area represents an area of moving windblown sand which also shows signs of disturbance (probably used as a source of sandy material for use on the farm by the previous owners).

2.3. TOPOGRAPHY AND CLIMATE

The Robertson Karoo is a semi-arid area, restricted to sections of the flat to gently undulating Breede River Valley, which is fringed by the surrounding Cape Folded Mountains. Altitudes vary from 200 – 400 m. The climate is typically Mediterranean with hot summers and cold winters, with occasional light frost in low lying areas (while the surrounding mountains might be covered in snow). Occasional warm Bergwinds may intensify the summer heat. Rainfall occur mostly during winter and although winter precipitation is low the run-off from the surrounding mountains (where rainfall is much higher) can be plentiful as evidenced by the many streams, the Breede River and its major tributaries, the Riviersonderend- and Hex- Rivers (Van Wyk & Smith, 2001).

The hottest part of the year is during summer (October to March), with January normally being the warmest month with an average temperature of 23.2°C and maximum temperatures reaching 30°C. Winters can be cold with frost in the low-lying areas, while July is normally the coldest month with average temperatures of 11.7°C. Average annual precipitation is about 336 mm which falls mainly during the winter months, with June normally the wettest month of the year, while January normally is the driest month of the year (Refer to Table 1). (www.climate-data.org).

Table 1: Weather averages for Robertson (www.climate-data.org)

	January	February	March	April	May	June	July	August	September	October	November	December
Avg. Temperature (°C)	23.2	22.9	21.5	18.1	14.7	12.3	11.7	12.5	14.6	17.2	20	21.9
Min. Temperature (°C)	15.6	15.6	14.4	11.3	8	5.4	4.8	5.7	7.7	10.2	12.7	14.3
Max. Temperature (°C)	30.8	30.2	28.6	25	21.4	19.3	18.7	19.3	21.6	24.3	27.3	29.5
Avg. Temperature (°F)	73.8	73.2	70.7	64.6	58.5	54.1	53.1	54.5	58.3	63.0	68.0	71.4
Min. Temperature (°F)	60.1	60.1	57.9	52.3	46.4	41.7	40.6	42.3	45.9	50.4	54.9	57.7
Max. Temperature (°F)	87.4	86.4	83.5	77.0	70.5	66.7	65.7	66.7	70.9	75.7	81.1	85.1
Precipitation / Rainfall (mm)	11	14	23	40	35	43	40	36	22	29	22	21

2.4. GEOLOGY AND SOILS

The Worcester-Robertson Karoo is underlain by a complex mosaic of various rock strata, the diversity of which is also reflected in the soils of the region (Van Wyk & Smith, 2001). According to the Mucina & Rutherford (2006), the geology and soils can be described as shale of the Devonian Ceres and Bidouw Subgroups (Bokkeveld Group, Cape Supergroup) as well as diamictite and shale of

the Carboniferous Dwyka and Ecca Groups (Karoo Sequence). Jurassic Enon conglomerates occur as well.

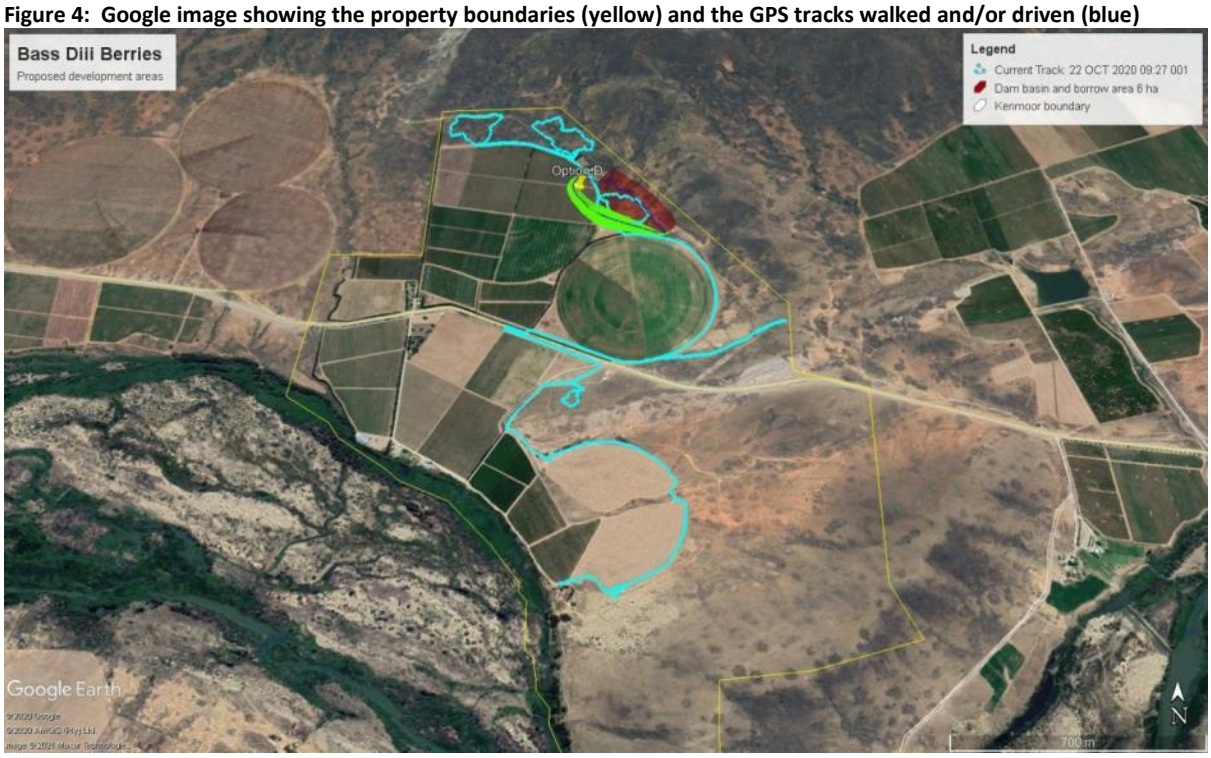
The soils are deep, red, apedal and loamy to loamy-sandy with a high clay and sodium content. Fc land type is representative of half of the region, while Fb and Ic are of lesser importance.

Please note that the regional geology is described in some detail in the dam viability report done by DJ Hagen & Associates for this project (Hagen, 2020).

3. EVALUATION METHOD

Two site visits were performed of which the first (on the 23rd of July 2020) was to discuss the proposed project with the EAP and landowners and to make preliminary recommendations on placement, based on desktop studies and on-site verification. The botanical survey was conducted on the 22nd of October 2020. The timing of the site visit was excellent as it was just after the area received some good winter rains and also within the window of the main flowering period.

Figure 4: Google image showing the property boundaries (yellow) and the GPS tracks walked and/or driven (blue)



Desktop studies coupled with a site survey were performed. Spatial information from online databases such as SANBI BGIS, CapeFarmMapper and Google Earth were used to evaluate the site in terms of vegetation type(s) expected, potential significant features that might be encountered (e.g. variations in soil type, rocky outcrops etc.) and obvious differences in landscape or vegetation densities, which might indicate differences in plant community or species composition. Expected plant species lists were prepared and species of special significance were flagged (to be used as reference during the site visit).

The following general conclusions were drawn on completion of the desktop assessment:

- The site and surrounding areas still seems to support natural vegetation;
- The vegetation type is expected to be Robertson Karoo, considered "*least threatened*" in terms of the National list of threatened terrestrial ecosystems (2011) (The more resent 2018 National Spatial Biodiversity Assessment still lists Robertson Karoo as "*least threatened*") Refer to Heading 4.2).
- According to the 2016 Northern Cape Critical Biodiversity Map (Refer to Heading 4.3);
    - the proposed agricultural areas (Area 1 and Area 2 in Figure 3) as well as the Office site will impact on terrestrial Ecological Support Areas (ESA);
    - the dam site will overlap both terrestrial and aquatic ESA's, while
    - the sand extraction site will potentially impact on a Critical Biodiversity Area.
- According to Van Wyk & Smith (2001) the site falls within the Worcester-Robertson Centre of endemism (Refer to Heading 4.4).

The survey was conducted by walking the site and examining, marking and photographing any area of interest (Refer to Figure 4). A hand-held Garmin GPSMAP 62s was used to track the sampling route and for recording waypoints of locations of specific importance. During the survey notes, together with a photographic record, were compiled for the vegetation and landscape. The author endeavoured to identify and locate all significant biodiversity features, special plant species and or specific soil conditions which might indicate special botanical features (e.g. rocky outcrops or silcrete patches).

4. THE VEGETATION

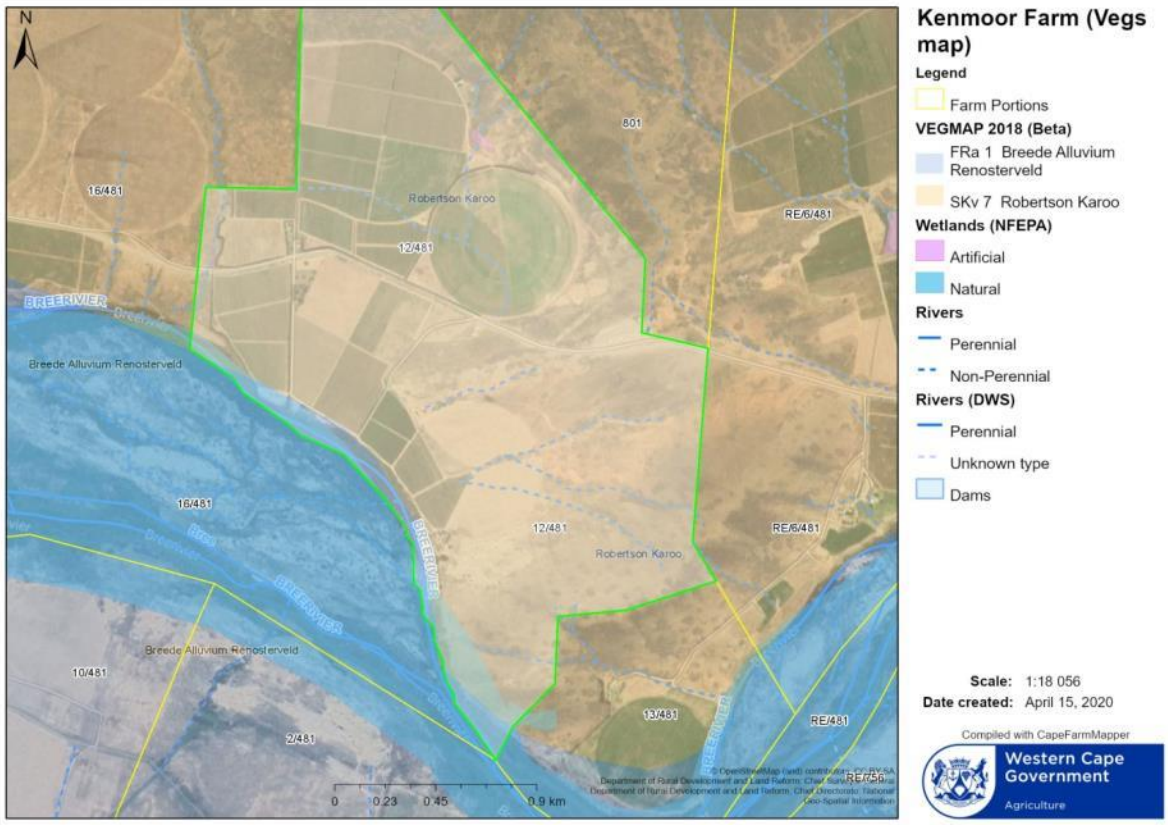
Acocks (1953) classified the vegetation of the Worcester-Robertson Karoo broadly as comprising predominantly Karroid Broken Veld (Little Karoo variation), with smaller patches of Mountain Renosterveld in the southwest and Coastal Renosterveld penetrating the Breede River Valley from the east (Swellendam area). The vegetation is distinguished by the greater number of succulent species like *Tylecodon paniculatus* and *Aloe microstigma*, which can dominate large areas of the landscape. An interesting feature of this Karoo veld is the presence of circular zoogenic soil mounds or heuweltjies, the formation of which is attributed to harvester termites (Van Wyk & Smith, 2001). The Worcester-Robertson Karoo is unique in the sense that it has been subject to a study concerned with the future conservation of natural vegetation, by assessing the threats to its survival and identifying priority conservation areas as early as 1990 (Wood, 1990) and has benefited considerably from these findings (Van Wyk & Smith, 2001).

In accordance with the 2018 Vegetation map of South Africa, Lesotho and Swaziland (Mucina & Rutherford, 2006), the proposed footprint(s) will only one impact on one broad vegetation type, namely **Robertson Karoo** (Figure 5), a vegetation type classified as "Least Threatened" in terms of the NEM: BA "*national list of ecosystems that are threatened and in need of protection*" (GN 1002, December 2011).

More recently the 2018 National Biodiversity Assessment (NBA) was published (Skowno *et al.*, 2019a & Skowno *et a*l, 2019b). Although the findings of the 2018 NBA it is not yet formally adopted by

NEM: BA in terms of regulations it is important to consider these findings. However, Robertson Karoo vegetation remains classified as "Least Threatened" in terms of the 2018 NBA.

Figure 5: Vegetation map of South Africa (2018), showing the expected vegetation types



4.1. THE VEGETATION IN CONTEXT

Robertson Karoo is a subtype of the Succulent Karoo and is characterised by the dominance of succulent plant species, and by several endemic plants and animals. 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 covers a flat to gently undulating plain, with some hilly and "broken" veld, mostly situated to the west and south of the escarpment, and north of the Cape Fold Belt, but it includes a series of valleys embraced by the west-east stretching Cape Fold Mountain ranges and the upper regions of the Breede River Valley (in the rain shadow of the Cape Fold Belt mountains). The altitude is mostly below 800 m, but in the east it may reach 1 500 m. A variety of geological units occur in the region. There is little difference between the soils of the Succulent Karoo and Nama Karoo Biomes - both are lime-rich, weakly developed soils on rock (Mucina *et al*, 2006).

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, of which the Vygies (Mesembryanthemaceae) and Stonecrops (Crassulaceae) are particularly prominent. 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 Karoo used to support millions of antelope, mainly springbuck, but also numerous other larger antelope (and other grazing animal). These animals roamed the vast plains of the Karoo, utilizing different selections of plants and allowing for long "rest" periods as they move around, and as a result preventing overgrazing (Shearing, 1994). 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. However, much soil 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).

4.2. VEGETATION ENCOUNTERED

At the time of the study the Robertson area had recently received good rains, which reflected positively in the veld in terms of species encountered and those in flower. In total 5 different areas were investigated on the property namely:

- Area 1 and Area 2 refers to areas identified for potential future agricultural expansion (of which portions might be used);
- The dam site refers to an area that will be impacted by the proposed dam enlargement;
- The new office area refers to a small area that might be impacted by the proposed location of the future offices;
- Lastly the waaisand area refers to an area refers to an area considered for sand abstraction to be used during the construction of the dam.

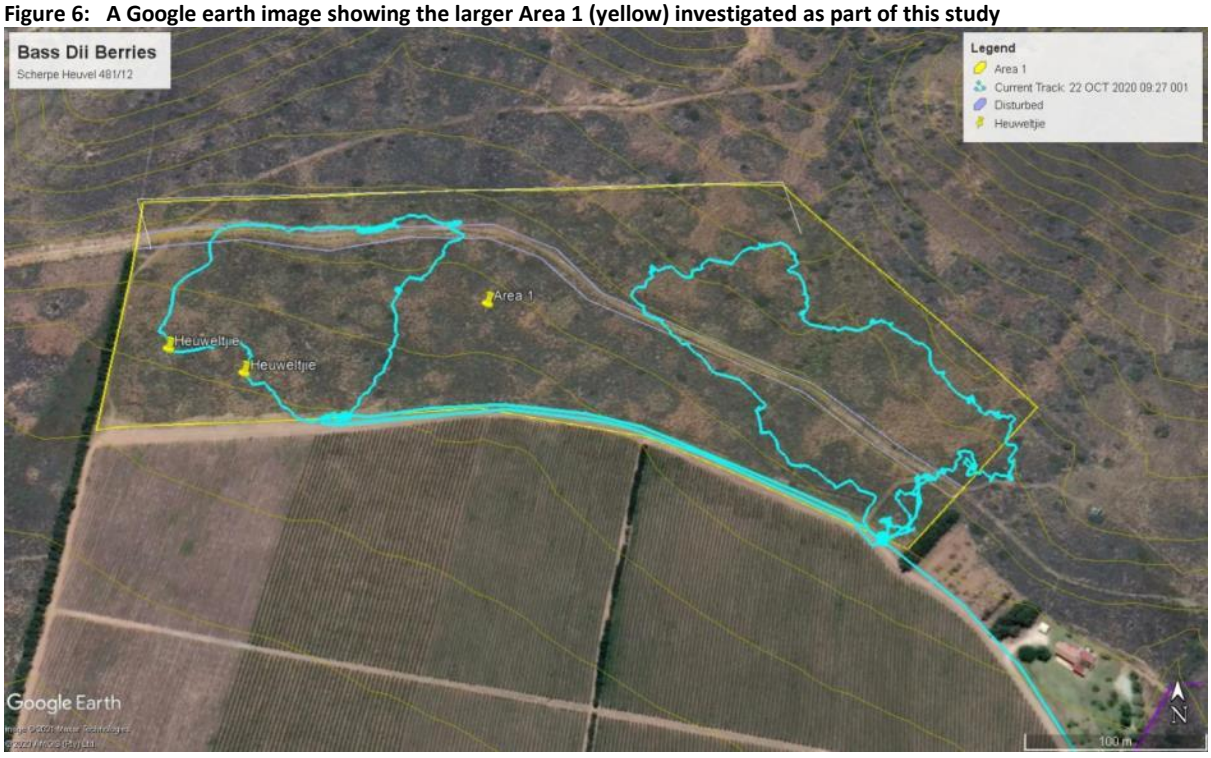
Photo 1: *Cotyledon orbiculata,* observed occasionally in Area 1

At least three plant communities were observed. On deeper loamy to clayey soils, with few surface rocks visible (Area 1, the dam site and portions of Area 2) a higher denser succulent dominated vegetation was encountered with *Tylecodon paniculatus* and *Euphorbia mauritanica* & *E. burmannii* prominent. On shallower soils dominated by scattered rocks (portions of Area 2 and the Office site) a lower succulent dominated vegetation was encountered dominated by *Euphorbia burmannii*, *Osteospermum sinuatum*, *Galenia africana* in combination with other succulents like *Drosanthemum*-, *Lampranthus*- and *Tetragonia* species. On the deep sandy "waaisand" areas a very sparse vegetation cover was encountered dominated by the weedy pioneer *Galenia africana*, with *Cotula microglossa* (another weedy species) also common, while *Hermannia trifurca* was also observed.

4.2.1. Area 1: Potential agri-enlargement

Area 1 is located in the north-western corner of the property and represents a portion of the remaining natural veld along the northern boundary of the property. It is about 10.8 ha in size (Refer to Figure 6). The site is located on the lower slopes of a small series of hills. It rises from the south and south-west the north and north-east with altitudes varying from about 245 m in the south-west to 260 m in the north-east. The only physical disturbance on the site was a cut-off trench through its northern portion, probably for protection of the agricultural area lower down (Refer to the purple area in Figure 6).

Figure 6: A Google earth image showing the larger Area 1 (yellow) investigated as part of this study



This was also the only area where heuweltjies (circular zoogenic soil mounds) was observed, two of which was observed in the western corner of the property (Figure 6). Moore & Picker, 1991 (in Van Wyk & Smith 2001) made the surprising discovery that some of these mounds (found in the Karoo) may be up to 4 000 years old. The vegetation on these mounds usually differs slightly from the surrounding vegetation and in Robertson Karoo is characterised by *Lycium cinereum*, with *Euphorbia mauritanica*, *Galenia africana* and *Pteronia incana* as dominants. Other species that are commonly

encountered on these mounds are the succulents *Tylecodon paniculatus*, *Aloe microstigma*, *Crassula subaphylla* and *Drosanthemum delicatulum* (Van Wyk & Smith, 2001).

The vegetation on the site was fairly uniform and can be described as a dense medium-low succulent shrubland on deeper loamy to clayey soils (with almost no rocky content). Two stratums were normally present. The bottom stratum was the most prominent stratum with a vegetation cover of between 70-80%, reaching up to 0.5 m in height and dominated by succulents in combination with various Asteraceae species (e.g. *Pteronia incana*). The top stratum consisted off larger shrubs and small trees scattered throughout the landscape (sometimes forming bush-clumps), which could reach up to 1.5 m in height, dominated by *Euphorbia burmannii, E. mauritanica* and *Tylecodon paniculatus* (Botterboom). On the edges of the site, next to drainage lines a third stratum was encountered in the form of Gwarrie trees (*Euclea undulata)* bush clumps that could reach a height of up to 2.5 m, most often in combination with *Searsia undulata* & *S. glauca, Asparagus suaveolens* and *Lycium ferocissimum*.

NB: Gwarrie trees are very long-lived, with most plants being hundreds if not thousands of years old, although it may not appear as such as their above-ground trunks are not especially large. However, they have large underground stems, which could survive for centuries, re-sprouting only after good rains (when damaged). Seedlings of these trees are very rare in the wild, suggesting they have established during times of higher rainfall (Vlok & Schutte-Vlok, 2015). This makes them especially conservation worthy and potentially one of the most significant aspects of this veld (together with the presence of the heuweltjies).

Photo 2: A typical view of the vegetation encountered within Area 1. Note the dense succulent stands in the foreground, the *Euphorbia mauritanica* in the middle and the *Euclea undulata* tree in the far back.

The bottom stratum was usually dominated by a variation of *Galenia africana* (Kraalbos), *Dicerothamnus rhinocerotis* (Renosterbos), in combination with several succulent species like *Mesembryanthemum-, Drosanthemum-* and *Lampranthus* species and Asteraceae like *Pteronia* and *Eriocephalus* species.

Other species observed within Area 1 includes: the large geophyte, *Albuca setosa* (Diktamarak), *Asparagus suaveolens, Aspalathus spinosa, Atriplex lindleyi* & *A. semibaccata* (both naturalised weeds), *Ballota africana,* the small geophyte *Colchicum volutare, Cotula microglossa, Cotyledon orbiculata, Crassula subaphylla, Crotalaria cf. lebeckioides,* the striking *Drosanthemum* cf. *ambiguum, D.* cf. *delicatulum, D.* cf. *nitidum D. micans, Eriocephalus africanus & E. brevifolius,* the medium sized tree *Euclea undulata, Euphorbia burmannii* & *E mauritanica, Felicia filifolia* subsp.

filifolia, Freesia refracta, Helichrysum splendidum, Indigofera cf. *heterophylla, Lampranthus corralliflorus, Lycium ferocissimum, Mesembryanthemum junceum, Mesembryanthemum splendens, Oedera squarrosa, Pentzia incana, Pteronia paniculata, Pteronia glauca, Pteronia incana, Roepera foetida, Ruschia* cf. *caroli, Ruschia cf. multiflora Ruschia* species*, Salsola aphylla, Searsia tomentosa, Senecio junceus, Tetragonia fruticosa,* the parasitic *Viscum capense* and *Wahlenbergia nodosa.*

Photo 3: Area 1: Note the botterboom (*Tylecodon paniculatus*) and kraalbos (*Galenia africana*) in the foreground.

Photo 4: Area 1: One of the bush clumps next to a small drainage line. Typically the bush is "anchored" by *Euclea undulata* with a mixture of *Searsia*- and *Lycium* species around the edges.

Of all the sites investigated this was the best preserved site in terms of natural vegetation and was still covered by succulent dominated natural vegetation in excellent condition, although the presence of a number of disturbance indicator plants like *Galenia africana* indicates that it might have been subject to past disturbances (probably grazing). However, the presence of species such as Rooisaadgras (*Ehrharta calycina*) suggests that it might be recuperating.

If portions of this site is to be developed, it is recommended that the development footprint remains south of the existing cut-off trench (Photo 5) marked in Figure 6 and even here the development should aim at minimum footprint Portions of Area 2 should be the first option for development (refer to Heading 4.2.3., underneath). This will allow for the protection of at least a portion of this vegetation and will also ensure that a remaining natural corridor linkage to the west, east and north of the site. In addition, the slope also increases significantly above the trench line, which might lead to future erosion (as is evident in the dam site).

Photo 5: The cut-off trench in the northern portion of Area 1 (looking from east to west along the trench).

4.2.2. The proposed Dam site

The proposed dam site is located to the south-east of Area 1, along the northern boundary of the property. The dam basin and borrow areas will potentially impact on approximately 6 ha of remaining natural veld (Red area in Figure 7). Just like Area1, the site sits along the lower slopes of a small series of hills, benefiting from at least two drainage lines running into the existing dam (as well as the cut-off trenches east and west of the dam site).

Figure 7: Google image showing the area to be impacted by the proposed dam (red) and existing disturbance (purple)

Large portions of this site are already disturbed probably resulting from the historic construction activities (cut-off trenches and the small dam) in combination with sheet erosion, which might have resulted from the past activities (Refer to the purple areas in Figure 7). The remaining natural veld also reflects this disturbance through a much lower vegetation cover and the presence and dominance of various disturbance indicator plant species. However, along the edges of the water

courses patches of thick dense vegetation could still be found, as well as patches of remaining veld on undisturbed soils.

The vegetation was expected to be similar to that of Area 1 (and does share a lot of species), because of the similar soils. However, large portions of this site had been degraded to such an extent that these areas are now often dominated by hardy pioneer species such *Galenia africana* or *Mesembryanthemum junceum*. *Mesembryanthemum splendens* was also common while *Cotula microglossa* and both *Atriplex* species could usually be seen within and along the edges of disturbed areas (Photo 6).

Near the drainage lines, *Lycium ferocissimum* and *Euphorbia mauritanica* were most often the larger shrubs, but still dominated by *Galenia africana*, but species like *Pteronia incana*, *Ballota africana, Roepera foetida* were also sometimes observed.

Photo 6: A view over the existing dam site. Note the dominance of *Galenia africana* with *Mesembryanthemum junceum* in the foreground

In areas less disturbed, vegetation similar to that observed in Area 1 was encountered, but with *Tylecodon paniculatus* often more dominant higher up on the slopes (Photo 7). *Euphorbia burmannii* was common together with a number of the same succulents as observed in Area 1, including the striking *Drosanthemum micans,* while species like *Berkheya angustifolia, B. cruciata, Gazania rigida, Otholobium* cf. *spicatum* and the interesting climber *Cysticapnos vesicaria* (Photo 8) were observed for the first time.

Photo 7: To the north of the existing dam less disturbed vegetation was encountered, similar to that in Area 1, but with *Tylecodon paniculatus* often more dominant.

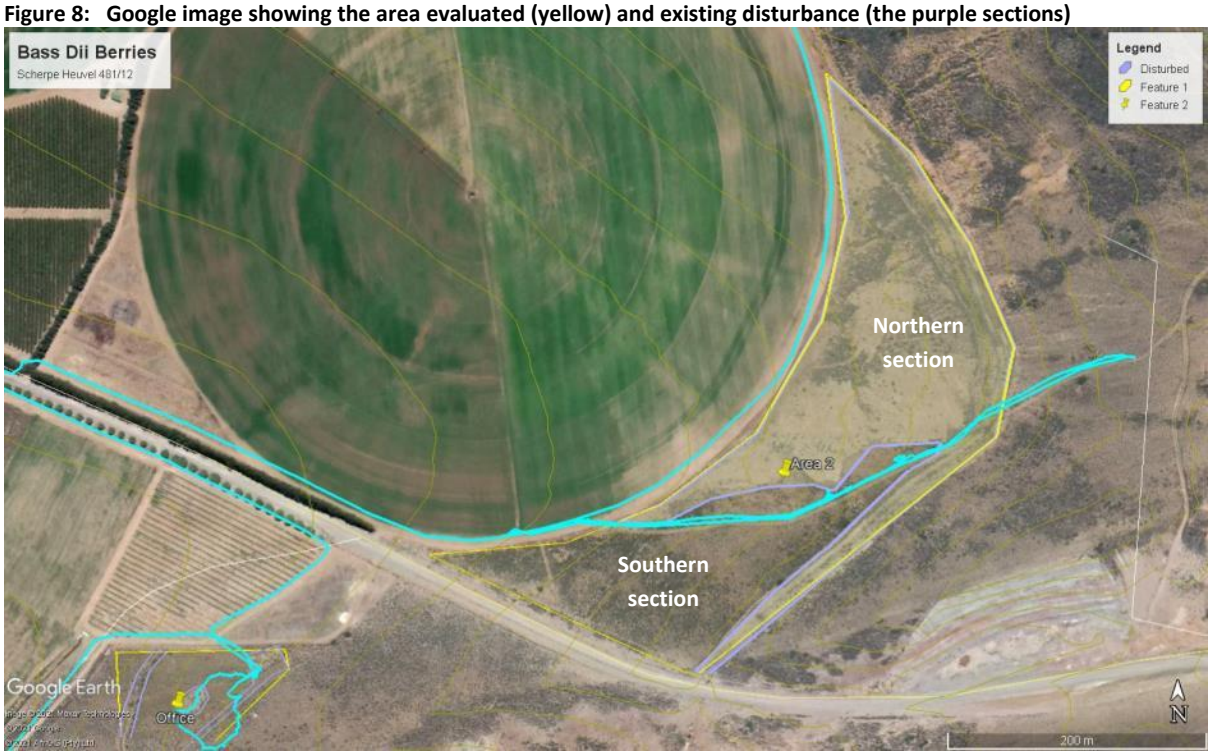
Photo 8: *Cysticapnos vesicaria*

In general the proposed dam site was much less pristine than Area 1 and the dam enlargement footprint will impact mostly on already disturbed areas (refer to Figure 7).

4.2.3. Area 2: Potential agri-enlargement

Area 2 is located in the north-eastern corner of the farm (above the Eilandia road) next to the north-easternmost pivot area. The area investigated was about 6.44 ha in size (Refer to Figure 8) and slopes from west, to the east and south-east with altitudes varying from about 220 m in the west to 240 m in the north-east.

Figure 8: Google image showing the area evaluated (yellow) and existing disturbance (the purple sections)



The site itself can easily be divided into two vegetation communities (resulting from soil differences) (Photo 10). It is important to note that in the Karoo shrub species change with different soils soil conditions and aspect (Vlok & Vlok-Schutte, 2015). The top or northern section (refer to the purple disturbed area in Figure 8) has deeper sandy soils with vegetation similar to that in Area 1 and the Dam site (Photo 9). The southern section (undisturbed area) is located on a rocky intrusion with

shallow shale soils with a very high stone component, supporting a much lower vegetation community (Photo 10 & Photo 11).

Photo 9: A view over the disturbed northern section of Area 2, showing the deeper sandy soils as well as historic disturbance.

The vegetation encountered in the northern section on deeper sandy soils (portions even suggesting windblown sands) supported a disturbed version of the vegetation found in Area 1 and was again dominated by *Galenia africana* in combination with a number of other Aizoaceae (mostly disturbance indicator species). The reason for the disturbance was hard to pinpoint, but it might be that the wind-blown sandy soils was historically skimmed of the top to be used on other sections of the farm (e.g. erosion management), for it does not seem as if the area was previously ploughed.

Photo 10: A photo showing the clear delineation between the disturbed section (to the lower right) and the lower vegetation along the shallower rocky soils.

Photo 11: The lower vegetation encountered in Area 2, on a shallow shale soils with high rock content.

The lower almost mono-stratum succulent dominated vegetation encountered on the rocky shale soils is precisely the same vegetation encountered at the proposed office site, both of which are

located on the same rocky intrusion. This plant community shares many species with that of the vegetation encountered on the deeper soils of Area 1, but succulent elements were also encountered.

This community was not dominated by single species by rather by a combination of Asteraceae species like *Osteospermum sinuatum*, *Berkheya angustifolia*, *Felicia filifolia* and *Pteronia paniculata* in combination with both *Euphorbia mauritanica* and *E. burmannii* and a variation of succulent like *Drosanthemum micans* and *Lampranthus coralliflorus*. *Tylecodon paniculatus* was much less prominent and usually smaller. In between these slightly larger shrubs, *Crassula muscosa, Haworthia arachnoidea, Quaqua mammillaris* (Photo 12)*, Oedera squarrosa,* was observed for the first time, while *Crassula subaphylla* was quite common. The striking *Drosanthemum micans* was still present as was *Drosanthemum* cf. *delicatulum, Viscum capense, Wahlenbergia nodosa* and *Cotula microglossa.* Another interesting plant observed for the first time (although mostly along the road verges) was the kankerbossie, *Lessertia frutescens*.

Photo 12: *Quaqua mammillaris,* with fruit, observed in Area 2.

In conclusion, the northern section of this veld is mostly disturbed, while the southern section (on shallower rocky soils) is almost pristine. Any further development should aim to utilise the northern section and minimise the impact on the southern portion. Fortunately, the slope and rockiness of the shallower rocky soils should discourage development to some degree.

4.2.4. New Offices area

The land owner would also like to build an office building (with parking). The area identified is located on a rocky hill, south of the Eilandia road and just east of the existing agricultural areas). The area investigated was about 1.1 ha in size (Refer to Figure 9) and overlook the southern portion of the farm (the altitude from about 200 m in the south-west to 210 m in the ridge.

The site is located on an extension of the rocky intrusion (ridge) encountered in the southern section of Area 2 (as described above). The vegetation is the same and for that reason not discussed again. In terms of vegetation, the larger site still supports a relatively uniform low succulent /daisy veld in good condition. However, the area shows various physical disturbances (e.g. rock dumps, old pipeline routes and small excavations, Photo 13 & Photo 14) as well as an old household waste dumping site (the various disturbed areas are indicated by the purple areas in Figure 13).

Figure 9: Google image showing the area evaluated (yellow) and existing disturbance (the purple sections)

In conclusion: To minimise impact, the new office buildings should aim to incorporate the existing disturbed areas as much as possible, with roads also utilising existing tracks. Clean-up of the waste items will also add significantly to environmental improvement.

Photo 13: A of the farm from the small hill (koppie) at the chosen office area. Note the rock dumps in the front and further disturbances to the left in the background, but also the remaining natural veld inbetween.

Photo 14: The lower disturbed area on the site.

4.2.5. "Waaisand" area

At the foothills of a series of larger hills to the south-east of the property a relative large (approximately 5.1 ha) area of wind-blown sand or "waaisand" had accumulated over the years (Photo 15). For construction purposes of the dam, the engineers proposed to excavate sandy material from already disturbed portions of this site (the excavations will have a footprint of about 0.5 ha in size) (Refer to Figure 10). The site rises from the west to the east with altitudes varying from about 200 m in the west to 21 m in the east. The proposed footprint mostly overlaps an area that has already been disturbed over time (sand borrow area, Photo 16) (Refer to the purple area in Figure 10).

Figure 10: A Google image showing the larger Area 1 (red) investigated and the existing disturbance footprint (purple)

The area evaluated was for the most part already subject to sand extraction activities in the past, the physical footprints of which are still very much evident. As a result the vegetation had been impacted to some degree, but on the other hand the vegetation cover over most of this area consists mostly of hardy and pioneer species. The landscape was dominated by hardy *Galenia africana* (kraalbos) shrubs forming tussocks of stabilised sand and also probably acting as nursing plants for other species to establish itself.

Photo 15: The kraalbos dominated waaisand area with its typical tussocks of vegetation.

Photo 16: Some of the existing excavations within the waaisand area.

Although the vegetation cover can only be described as open, it was slightly better covered (25-40%) than expected. Apart from kraalbos, almost the only other plant species observed were, *Hermannia trifurca* (occasionally) and the common *Cotula microglossa* showing its yellow flowers in between the kraalbos or along the edges of the disturbed areas. A few *Lycium oxycarpum* in flower was also observed, but much lower and away from the site.

The proposed waaisand borrow area overlaps an already disturbed area and it should not add significantly to the existing impact on the area. It would however, be wise to remove the top layer of bushes and afterwards place it on top of the excavated area (it needs not be replanted, just mixed in with the top layer of sand in order to help with sand binding and to replace some seeds back in the soil).

4.3. CRITICAL BIODIVERSITY AREAS MAPS

The 2017 Western Cape Biodiversity Spatial Plan (WCBSP) includes a map of biodiversity importance for the entire province, covering both the terrestrial and freshwater realms, as well as major coastal and estuarine habitats (Pool-Stanvliet, 2017). The WCBSP is the product of a systematic biodiversity plan that delineates, on a map, Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs), which require safeguarding to ensure the continued existence and functioning of species and ecosystems, including the delivery of ecosystem services.

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 in order 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.

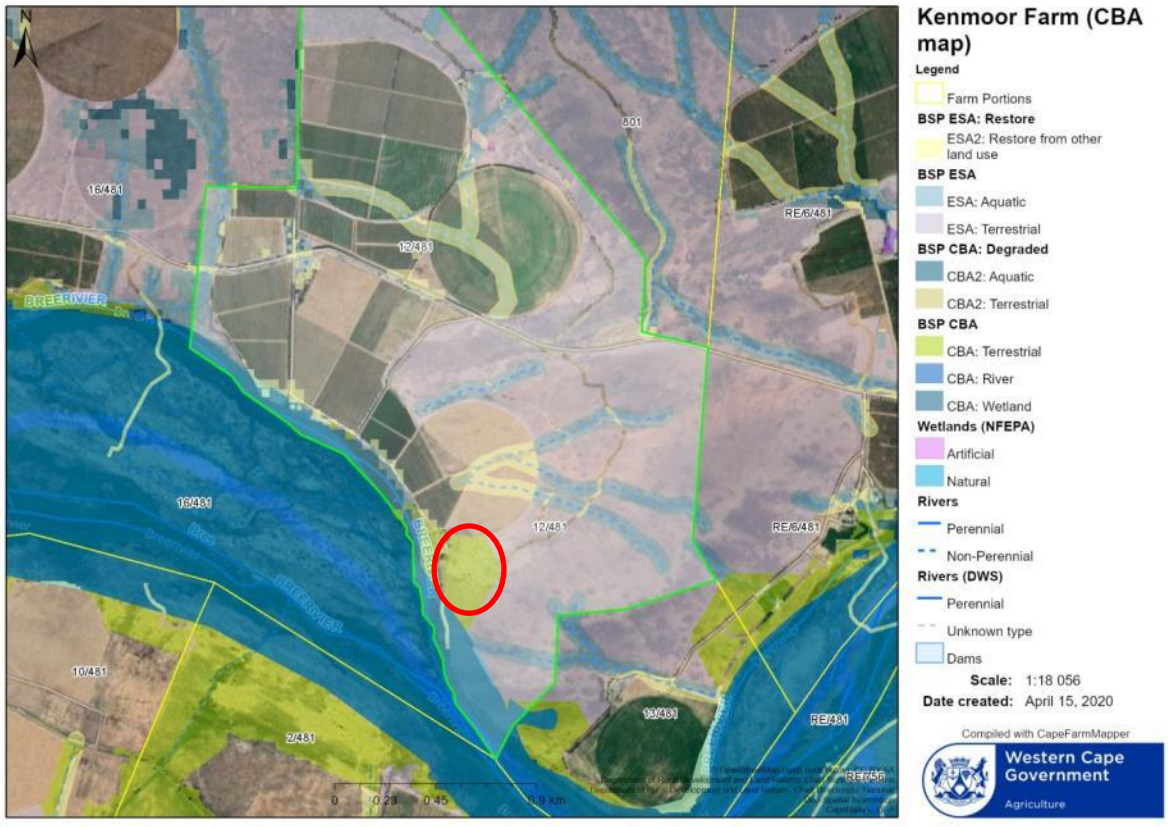
- **Critical biodiversity areas (CBA's)** are areas of the landscape that need to be maintained in a natural or near-natural state in order to ensure the continued existence and functioning of species and ecosystems and the delivery of ecosystem services. In other words, if these areas are not maintained 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.

- **<u>Ecological support areas (ESA's)</u>** 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.

From a land-use planning perspective it is useful to think of the difference between CBA's and ESA's in terms of where in the landscape the biodiversity impact of any land-use activity action is most significant:

- For CBA's the impact on biodiversity of a change in land-use that results in a change from the desired ecological state is most significant locally at the point of impact through the direct loss of a biodiversity feature (e.g. loss of a populations or habitat).
- For ESA's a change from the desired ecological state is most significant elsewhere in the landscape through the indirect loss of biodiversity due to a breakdown, interruption or loss of an ecological process pathway (e.g. removing a corridor results in a population going extinct elsewhere or a new plantation locally results in a reduction in stream flow at the exit to the catchment which affects downstream biodiversity).

Figure 11: Critical Biodiversity Areas Map (2017) showing the Bass Diii farm (CapeFarmMapper)



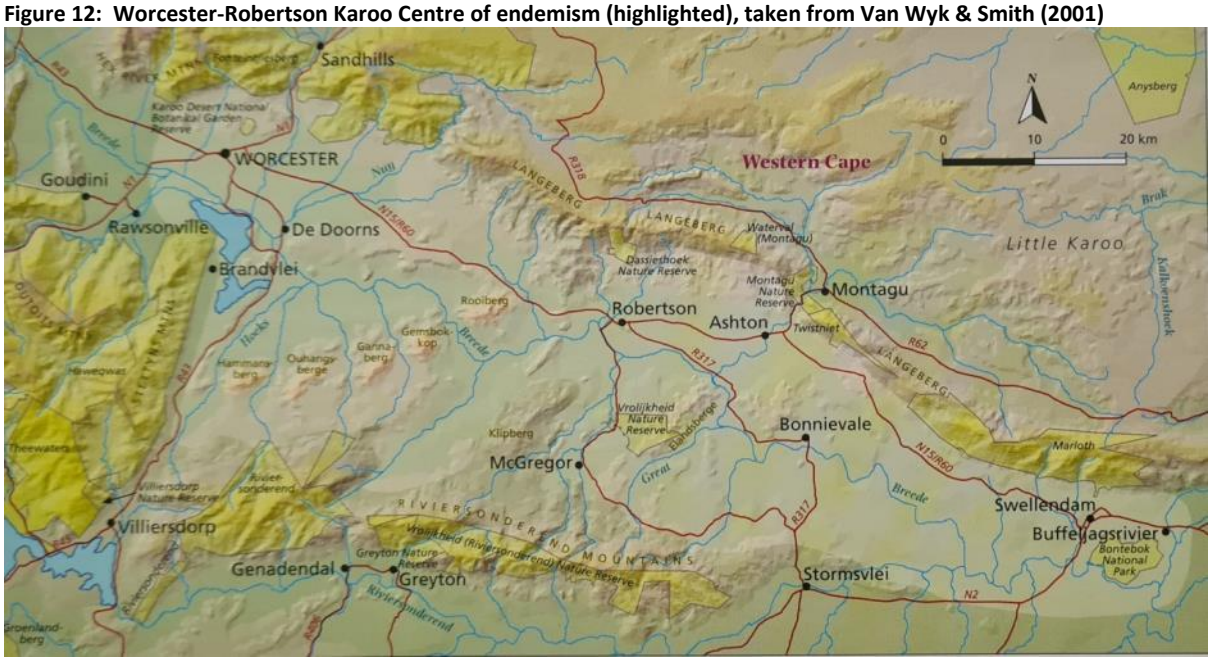
According to the WCBSP (Figure 11), the Waaisand area (see the red circle in Figure 11) falls within a <u>terrestrial CBA,</u> while the rest of the property is considered an ecological support area.

4.4. POTENTIAL IMPACT ON CENTRES OF ENDEMISM

According to Van Wyk & Smith (2001), the farm and all of the surrounding areas, fall within the Worcester-Robertson Karoo Centre of endemism (**Error! Reference source not found.**), which is named after the two main towns in the Middle Breede River Valley. The Karoo, or land of thirst (the Khoekhoe name for this area), refers to the extensive semi-desert region covering most of the central and western parts of South Africa. The WRKC is one of the subdivisions of the Karoo and forms part of the Succulent Karoo Region, which is recognised as an important centre of plant diversity. Unlike the Little Karoo, the WRKC has up until now received little attention. According to Van Wyk & Smith (2001), the WRKC was not included by Hilton-Taylor (1994a & 1996) among his local centres of high floristic endemism and also not by a number of other studies. Priority conservation areas were subsequently identified by Wood (1990).

Van Wyk & Smith (2001) defines the WRKC wide valley extending from about Worcester in the west to the vicinity of Swellendam in the east, bounded by the Du Toitskloof-, Stettyn, Riviersonderend-, Hex River- and Langeberg Mountains. The 600 m contour line is generally taken as the upper boundary of this centre. The valley is traversed by the Breede River and its subsidiaries. The vegetation is usually of Succulent Karoo affinity, but grades into Renosterveld where the rainfall is higher. The valley is underlain by a complex mosaic of various rock strata.

Figure 12: Worcester-Robertson Karoo Centre of endemism (highlighted), taken from Van Wyk & Smith (2001)



The WRKC has been subject to a comprehensive study concerned with the future conservation in the region done by Wood (1990). Agricultural development represents the greatest threat to this centre of endemism, but fortunately agriculture is limited by the availability of water. Alien invasive plants pose a threat along the Breede River and in the vicinity of the Brandvlei dam (Van Wyk en Smith, 2001).

The more recent Western Cape Biodiversity Spatial Plan (2017), however, also aims at the conservation of important corridors and local priority areas. As such the finer scale maps given in the WCBSP were used as basis to identify priority conservation areas within the Worcester-Robertson Karoo and on the farm itself (Refer to Heading 4.3).

4.5. FLORA ENCOUNTERED

Table 2 gives a list of the plant species encountered during this study. Because of the limitations (single site visits) it is likely that a number of annuals and geophytes might have been missed, but the author is confident that a good understanding of the vegetation was achieved and confidence in the findings is high.

Thirty (66) different plant species where identified of which eighteen (18) is South African endemics, and two (2) are naturalised weeds. No red-listed species were observed (SANBI, 2016).

Table 2: Species checklist of flora observed within the study areas

No.	Species name	FAMILY	Status	Additional notes
1.	*Albuca setosa*	HYACINTHACEAE	LC	Large geophyte
2.	*Aspalathus spinosa*	FABACEAE	LC	Thorny shrub
3.	*Asparagus suaveolens***	ASPARAGACEAE	LC	Scrambler / shrub
4.	*Atriplex lindleyi*	AMARANTHACEAE	Naturalised weed	Small shrub/herb
5.	*Atriplex semibaccata*	AMARANTHACEAE	Naturalised weed	Prostrate herb
6.	*Ballota africana*	LAMIACEAE	LC	Dwarf shrub/herb
7.	*Berkheya angustifolia*	ASTERACEAE	LC	Thorny shrub
8.	*Berkheya cruciata*	ASTERACEAE	LC	Thorny Shrub
9.	*Colchicum volutare*	COLCHICACEAE	LC	Small geophyte
10.	*Cotula microglossa*(**)*	ASTERACEAE	LC	Herb
11.	*Cotyledon orbiculata*	CRASSULACEAE	LC (SA endemic)	Succulent shrub
12.	*Crassula muscosa*	CRASSULACEAE	NE	Dwarf succulent
13.	*Crassula subaphylla*	CRASSULACEAE	LC	Straggling succulent
14.	*Crotalaria* cf. *lebeckioides*	FABACEAE	LC (SA endemic)	Medium shrub
15.	*Cysticapnos vesicaria*	FUMARIACEAE	LC	Climber / herb
16.	*Dicerothamnus rhinocerotis (=Elytropappus rhinocerotis)*	ASTERACEAE	LC	Pioneer shrub
17.	*Drosanthemum* cf. *ambiguum*	AIZOACEAE	LC (SA endemic)	Succulent
18.	*Drosanthemum* cf. *delicatulum*	AIZOACEAE	LC (SA endemic)	Succulent
19.	*Drosanthemum* cf. *nitidum*	AIZOACEAE	LC	Succulent
20.	*Drosanthemum hispidum**	AIZOACEAE	LC	Succulent
21.	*Drosanthemum micans*	AIZOACEAE	LC (SA endemic)	Succulent
22.	*Ehrharta calycina***	POACEAE	LC	Slender graminoid
23.	*Eriocephalus africanus*	ASTERACEAE	LC	Medium shrub
24.	*Eriocephalus brevifolius*	ATERACEAE	LC (SA endemic)	Small Shrub
25.	*Euclea undulata*	EBENACEAE	LC	Small tree
26.	*Euphorbia burmannii*	EUPHORBIACEAE	LC	Succulent shrub
27.	*Euphorbia mauritanica***	EUPHORBIACEAE	LC	Succulent shrub
28.	*Felicia filifolia* subsp. *filifolia***	ASTERACEAE	LC	Shrub
29.	*Freesia refracta **	IRIDACEAE	LC All Iridaceae protected in terms of the WCNCB	Geophyte
30.	*Galenia africana*(**)*	AIZOACEAE	LC	Medium shrub

No.	Species name	FAMILY	Status	Additional notes
31.	*Gazania rigida**	ASTERACEAE	LC	Prostrate herb
32.	*Haworthia arachnoidea*	ASPHODELACEAE	NE (SA endemic)	Dwarf succulent
33.	*Helichrysum splendidum*	ASTERACEAE	LC	Herb / shrub
34.	*Hermannia trifurca*	MALVACEAE	LC	Medium shrub
35.	*Indigofera* cf. *heterophylla*	FABACEAE	LC (SA endemic)	Prostrate shrub
36.	*Lampranthus* cf. *haworthii*	AIZOACEAE	LC (SA endemic)	Succulent
37.	*Lampranthus coralliflorus***	AIZOACEAE	LC (SA endemic)	Succulent
38.	*Lessertia frutescens*	FABACEAE	LC	Small shrub
39.	*Lycium ferocissimum*	SOLANACEAE	LC	Medium Shrub
40.	*Lycium oxycarpum*	SOLANACEAE	LC (SA endemic)	Large Shrub
41.	*Melolobium* cf. *candicans* (no flowers)	FABACEAE	LC	Shrub
42.	*Mesembryanthemum junceum*(**)*	AIZOACEAE	LC (SA endemic)	Succulent
43.	*Mesembryanthemum nitidum*	AIZOACEAE	LC (WC & EC endemic)	Succulent
44.	*Mesembryanthemum splendens***	AIZOACEAE	LC	Succulent
45.	*Oedera squarrosa*	ASTERACEAE	LC	Shrub
46.	*Osteospermum sinuatum***	ASTERACEAE	LC	Shrub
47.	*Otholobium* cf. *spicatum*	FABACEAE	LC	Woody shrub
48.	*Pentzia incana*	ASTERACEAE	LC	Medium shrub
49.	*Pteronia glauca*	ASTERACEAE	LC	Medium shrub
50.	*Pteronia incana*	ASTERACEAE	LC	Shrub
51.	*Pteronia paniculata*	ASTERACEAE	LC (WC & NC endemic)	Shrub
52.	*Quaqua mammillaris*	APOCYNACEAE	LC	Dwarf succulent
53.	*Roepera foetida** (=Zygophyllum foetidum)*	ZYGOPHYLLACEAE	LC	Scrambling herb / succulent
54.	*Ruschia* cf. *caroli*	AIZOACEAE	LC (SA endemic)	Succulent
55.	*Ruschia* cf. *multiflora***	AIZOACEAE	LC (SA endemic)	Succulent
56.	*Ruschia* species	AIZOACEAE		Succulent
57.	*Salsola aphylla***	AMARANTHACEAE	LC	Woody shrub
58.	*Searsia glauca*	ANACARDACEAE	LC	Large shrub
59.	*Searsia tomentosa*	ANACARDACEAE	LC	Large shrub
60.	*Searsia undulata*	ANACARDACEAE	LC	Small Tree
61.	*Senecio junceus*	ASTERACEAE	LC	Succulent herb
62.	*Smicrostigma viride*	AIZOACEAE	LC (SA endemic)	Succulent
63.	*Tetragonia fruticosa*	AIZOACEAE	LC	Succulent herb
64.	*Tylecodon paniculatus***	CRASSULACEAE	LC	Succulent shrub
65.	*Viscum capense*	SANTALACEAE	LC	Succulent parasite
66.	*Wahlenbergia nodosa*	CAMPANULACEAE	LC (SA endemic)	Medium shrub

* Abundance of these species is often seen as a disturbance indicator (although they can play a vital role in soil protection through its rapid germination and spread) (Vlok & Schutte-Vlok, 2015).

** Plants observed on “heuweltjies”.

4.6. 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 a SANBI uses an amended system of categories in order to highlight species that may be of low risk of extinction but are still of conservation concern (SANBI, 2015).

In the Western Cape, species of conservation concern are protected in terms of national and provincial legislation, namely:

- 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).
- National Forest Act, Act 84 of 1998, provides for the protection of forests as well as specific tree species through the "*List of protected tree species*" (GN 908 of 21 November 2014).
- Western Cape Nature Conservation Board Act, Act 15 of 1998 (WCNCBA), provides for the protection of "*endangered flora*" (Schedule 3) and "*protected flora*" (Schedule 4).

4.6.1. Protected species observed

- **No red-listed species** was encountered, although a number of South African endemics were observed (refer to Table 2) (SANBI, 2020).
- **No NEM: BA protected species was observed.**
- **No NFA protected species was observed**.
- **One plant protected in terms of the WCNCBA** was encountered, namely *Freesia refracta*, of which one plant was encountered on one of the "heuweltjies". In terms of Schedule 4 of the WCNCBA all species in the Family Iridaceae are considered protected flora.

5. IMPACT ASSESSMENT METHOD

The objective of this study was to evaluate the botanical value of the study area in order to identify significant environmental resources that might be impacted as a result of the 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

5.1. 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 (Refer to Table 3).

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

Table 3: Categories and criteria used for the evaluation of the significance of a potential impact

ASPECT / CRITERIA	LOW (1)	MEDIUM/LOW (2)	MEDIUM (3)	MEDIUM/HIGH (4)	HIGH (5)
CONSERVATION VALUE Refers to the intrinsic value of an attribute 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	The attribute is transformed, degraded not sensitive (e.g. Least threatened), with unlikely possibility of species loss.	The attribute is in good condition but not sensitive (e.g. Least threatened), with unlikely possibility of species loss.	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.	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.	The attribute is considered critically endangered or is part of a proclaimed provincial or national protected area.
LIKELIHOOD Refers to the probability of the specific impact occurring as a result of the proposed activity	Under normal circumstances it is almost certain that the impact will not occur.	The possibility of the impact occurring is very low, but there is a small likelihood under normal circumstances.	The likelihood of the impact occurring, under normal circumstances is 50/50, it may or it may not occur.	It is very likely that the impact will occur under normal circumstances.	The proposed activity is of such a nature that it is certain that the impact will occur under normal circumstances.
DURATION Refers to the length in time during which the activity is expected to impact on the environment.	Impact is temporary and easily reversible through natural process or with mitigation. Rehabilitation time is expected to be short (1-2 years).	Impact is temporary and reversible through natural process or with mitigation. Rehabilitation time is expected to be relative short (2-5 years).	Impact is medium-term and reversible with mitigation, but will last for some time after construction and may require on-going mitigation. Rehabilitation time is expected to be longer (5-15 years).	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 on-going mitigation. Rehabilitation time is expected to be longer (15-50 years).	The impact is expected to be permanent.
EXTENT Refers to the spatial area that is likely to be impacted or over which the impact will have influence, should it occur.	Under normal circumstances the impact will be contained within the construction footprint.	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.	Under normal circumstances the impact might extent outside of the property boundaries and will affect surrounding land owners or –users, but still within the local area (e.g. within a 50 km radius).	Under normal circumstances the impact might extent to the surrounding region (e.g. within a 200 km radius), and will regional land owners or –users.	Under normal circumstances the effects of the impact might extent to a large geographical area (>200 km radius).
SEVERITY Refers to the direct physical or biophysical impact of the activity on the surrounding environment should it occur.	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.	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.	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.	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.	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.

5.2. SIGNIFICANCE CATEGORIES

The formal NEMA EIA application process was developed to assess the significance of impacts on the surrounding environment (including socio-economic factors), associated with any specific development proposal in order 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. In order 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, in order to determine its potential significance. The potential significance is then described in terms of the categories given in Table 4.

Table 4: 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 as a result 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 as a result 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 either 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 fairly 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 cannot be mitigated and usually result in very severe effects, beyond site boundaries, national or international.

6. DISCUSSING BOTANICAL SENSITIVITY

The aim is to determine the vulnerability of a habitat to a specific impact. In order to do so, the sensitivity of the habitat should be determined by identifying and assessing the most significant environmental aspects of the site against the potential impact(s). For this development the following biodiversity aspects were considered:

- **Location**: All of the proposed developments are located on the same property. The total expansion footprint will be less than 20 ha. The proposed development areas were chosen with insets from the EAP (with the purpose of impact minimisation). Both the potential agricultural expansion areas were chosen to link (located next to) with existing agricultural land. Area 1 is probably the most sensitive of all the sites (in terms of remaining natural veld). About half of Area 2 is already disturbed, while the remaining natural veld is located on rocky shale ridge with a steeper slope. The proposed dam expansion will impact mostly on disturbed veld. The proposed office site overlaps some disturbed areas and natural veld. The proposed sand extraction site was chosen to overlap an area already disturbed as a result of previous activities.
- **Activity**: The proposed activity is expected to result in a permanent transformation of less than 20 ha of natural veld, overlapping areas of disturbed veld as well as veld in good condition.
- **Geology & Soils**: The proposed development of Area 1 is likely to impact on two heuweltjies. No heuweltjies or are special habitat linked was observed in any of the other sites, apart from the windblown sand (waaisand) patch within which the sand extraction site will be located.
- **Land use and cover**: All of the development footprints are located on land owned by the applicant and zoned for agricultural use. Although it is likely that these areas were utilized as natural grazing in years past, no livestock farming is currently practice. Smaller game like duiker is still likely to be present.
- **Vegetation status**: The proposed development footprints will only impact one vegetation type, namely Robertson Karoo (Figure 6). The vegetation type is considered "least threatened" and only a small percentage had been transformed, but it still needs further formal protection.
- **Conservation priority areas**: According to the WCBSP (Figure 11), the Waaisand area (see the red circle in Figure 11) falls within a terrestrial CBA, while the rest of the property is considered an ecological support area. In addition, according to Van Wyk & Smith (2001), the farm and all of the surrounding areas, fall within the Worcester-Robertson Karoo Centre of endemism (**Error! Reference source not found.** However, the more recent Western Cape Biodiversity Spatial Plan (2017) also aims at the conservation of important corridors and local priority areas. As such the finer scale maps given in the WCBSP were used as basis to identify priority conservation areas within the Worcester-Robertson Karoo and on the farm itself.
- **Connectivity**: All of the proposed development footprints are basically located on the edge or adjacent to existing development footprints and is not expected to add significantly to the existing impact on connectivity to the surrounding area, where connectivity is still very good.
- **Watercourses and wetlands**: A freshwater specialist was appointed to address this aspect.
- **Protected or endangered plant species**: Botanically the most prominent feature of the sites was the presence of two "heuweltjies" and the presence of a 3-4 Gwarrie trees in Area 1. One species of Iridaceae, protected in terms of the WCNCBA was also observed (on the heuweltjies).
- **Alien and Invasive Plant species**: No significant alien and invasive species were observed.

6.1. IMPACT ASSESSMENT

Table 5 rates the significance of environmental impacts associated with the proposed development. For each aspect, the worst case scenario (of the combined sites) were taken as "*without mitigation*" with reference to specific mitigation actions given for the specific site mitigation actions required when scoring "*with mitigation*". It also evaluates the expected accumulative effect of the proposed development as well as the No-Go option.

Table 5: Impact assessment associated with the proposed development

Impact assessment								
Aspect	**Mitigation**	**CV**	**Lik**	**Dur**	**Ext**	**Sev**	**Significance**	Short discussion
Geology & soils: Potential impact on special habitats (e.g. true quartz or "heuweltjies")	Without mitigation	3	3	4	1	2	30	Robertson Karoo is known for its complex mosaic of soils of which at least three different types (influencing plant species composition) were observed. Two heuweltjies were also observed in Area 1.
	With mitigation	3	3	4	1	1	27	Refer to the site specific recommendations under Heading 7.1.
Landuse and cover: Potential impact on socio-economic activities.	Without mitigation	2	2	2	1	1	12	The property belongs to the applicant and is likely to have a positive socio-economic impact through job creation (the blue-berry industry is work intensive).
	With mitigation	1	1	2	1	1	5	Ensure that the local population benefits when opportunities for work arises.
Vegetation status: Loss of vulnerable or endangered vegetation and associated habitat.	Without mitigation	4	3	4	2	2	44	The transformation of <20ha of Robertson Karoo (not threatened), of which areas are already disturbed, but located within an ESA and the Waaisand area within a CBA.
	With mitigation	3	2	3	1	1	21	Refer to the site specific recommendations under Heading 7.1.
Conservation priority: Potential impact on protected areas, CBA's, ESA's or Centre's of Endemism.	Without mitigation	4	5	4	2	2	52	The transformation of <20ha of Robertson Karoo (not threatened), of which areas are already disturbed, but located within an ESA and the Waaisand area within a CBA.
	With mitigation	3	3	3	1	1	24	Refer to the site specific recommendations under Heading 7.1.
Connectivity: Potential loss of ecological migration corridors.	Without mitigation	4	2	3	2	2	36	The footprints will link with existing agricultural areas and is not expected to add significantly to the existing impact on connectivity.
	With mitigation	3	2	2	1	1	18	Refer to the site specific recommendations under Heading 7.1.
Watercourses and wetlands: Potential impact on natural water courses and it's ecological support areas.	Without mitigation						0	A freshwater specialist was appointed to evaluate these aspects.
	With mitigation						0	
Protected & endangered plant species:	Without mitigation	4	5	4	2	2	52	No red-listed plants were observed, although a number of SA endemic species were encountered as well as one Iridaceae protected in terms of the WCNCBA.

Potential impact on threatened or protected plant species.	With mitigation	3	4	3	1	1	27	Refer to the site specific recommendations under Heading 7.1.
Invasive alien plant species: Potential invasive plant infestation as a result of the activities.	Without mitigation	0	0	0	0	0	0	No significant invasive alien plants observed (apart from weedy species) within the various footprints. The Breede River, however, is heavily infested.
	With mitigation	0	0	0	0	0	0	N/a for this development. The landowner had already implemented an alien eradication program along the river (with inputs from DoA).
Veld fire risk: Potential risk of veld fires as a result of the activities.	Without mitigation	4	2	2	2	2	32	Veld fire risk medium to low.
	With mitigation	3	1	2	1	1	15	Address fire danger throughout construction.
Cumulative impacts: Cumulative impact associated with proposed activity.	Without mitigation	4	5	4	2	2	52	The transformation of <20ha of Robertson Karoo (not threatened), of which areas are already disturbed, but located within an ESA and the Waaisand area within a CBA.
	With mitigation	3	4	4	1	1	30	Refer to the site specific recommendations under Heading 7.1.
The "No-Go" option: Potential impact associated with the No-Go alternative.	Without mitigation	4	3	3	3	2	44	No development will result in no immediate disturbance. However, the vegetation type is not considered threatened, although portions have been included in CBA (already disturbed area). Erosion may still impact some of these areas, while the absence of grazing by livestock will have a positive impact on the natural vegetation.
	With mitigation						0	

According Table 5, the main impacts associated with the proposed development will be:

- The potential impact on CBA and ESA areas;
- The potential impact on protected and conservation worthy plant species (including the heuweltjies and Gwarrie trees);

However, the proposed footprint will be relatively small (<20 ha) chosen to overlap already disturbed areas where-ever possible.

The No-Go option is not likely to result in a “no-impact” scenario, for it will have a negative socio-economic impact (and slow degradation may still continue). The blue-berry industry is very worker intensive and requires a large work force per hectare produce. Bass Diii will export its blue-berries which mean that they will have to comply with a large number of agricultural audits (e.g. Global GAP, SIZA Environmental etc.) all of which aims at sustainable development and work force education.

The cumulative impact (without mitigation) is expected to be **Medium**, mainly as a result of the potential impact on CBA and ESA’s, but can be reduced to **Low** through simple and very viable mitigation options.

7. IMPACT MINIMISATION RECOMMENDATIONS

The proposed development will result in the transformation of less than 20 ha natural veld located in Robertson Karoo vegetation, which is not considered vulnerable. However, it will impact on a small area within a CBA (which is already disturbed) and other areas within an ESA (some of which are also disturbed). The landowner took the precaution to discuss the project with the EAP before any final decisions was made. As a result the proposed footprint areas were chosen with impact minimisation in mind. Finally specialist was asked to look at larger areas and to recommend specific areas that might be more suitable for development than others.

Probably the two most significant botanical observations made relates to a number of Gwarrie trees (*Euclea undulata)* observed along the outer edges of Area 1 as well as the twee heuweltjies observed in the south-western corner of Area 1.

Euclea undulata trees are very long-lived, with most plants being hundreds if not thousands of years old, although it may not appear as such as their above-ground trunks are not especially large. However, they have large underground stems, which could survive centuries, only re-sprouting after good rains (when damaged). Gwarrie seedlings are very rare in the wild, suggesting they have established during times of higher rainfall (Vlok & Schutte-Vlok, 2015). This makes them especially conservation worthy and potentially one of the most significant aspects of this veld.

According to the impact assessment given in Table 5 the development (without mitigation) is expected to result in a **Medium** impact, mainly as a result of the potential impact on CBA and ESA's, but can be reduced to **Low** through simple and very viable mitigation options.

With the correct mitigation it is unlikely that the development will contribute significantly to any of the following:

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

7.1. SITE SPECIFIC RECOMMENDATIONS

Area 1: Of all the sites investigated this was the best preserved site in terms of natural vegetation and was still covered by succulent dominated natural vegetation in excellent condition, although the number presence of such a number of Kraalbos (*Galenia africana)* suggests that it have been subject to past disturbances (grazing). With regards to this site the following impact minimisation recommendations must be considered:

- Area 2 should be the first choice for further agricultural development (before considering Area 1);
- If development in Area 1 is required, it should stay below the existing cut-off trench, which will allow for the protection of more than 50% of the remaining natural veld in this and adjacent areas (on the same property) (Refer to the Orange section in Area 1 – Figure 13);

- *Euclea undulata* (Gwarrie) trees must be protected. By staying beneath the cut-off trench all of these trees will remain well outside of the development footprint;
- Ideally the area where the 2 heuweltjies were observed should also be protected, but since the fall within the most logical expansion area in this site, they were not excluded. It was taken into account that these heuweltjies are quite common just north of the site, as well as along the lower foothills in the eastern portion of this property.
- A number of Botterboom (*Tylecodon paniculatus*) and *Cotyledon* plants where observed within the footprint. As many as possible of these plants (but all small plants) should be transplanted to adjacent disturbed areas (or could be used for rehabilitation of the dam wall or even be used in the gardens of the proposed office site).
- Topsoil from this site could be used for the rehabilitation of the dam wall.

Area 2: The northern section of this veld is mostly disturbed, while the southern section (on shallower rocky soils) is almost pristine. With regards to this site the following impact minimisation recommendations must be considered:

- The development footprint should aim to stay in the already disturbed northern section of this area or in the very least to the north of the small track running almost between these two areas (refer to the Orange section marked in Area 2 - Figure 13);
- Some of the Botterboom (*Tylecodon paniculatus*), but all of the *Cotyledon* and *Haworthia* individuals must be transplanted to surrounding disturbed areas, where they must be nursed for the time it take for them to settle. It is important that the *Haworthia* individuals are replanted in similar areas from where they were taken and protected by larger plants (nursery plants as described by Vlok& Schutte-Vlok, 2015);
- Since the topsoil is already mostly disturbed (with the dominant plant now being *Galenia africana*, topsoil re-use for rehabilitation of other areas is not required;

The Dam site: In general the area is much less pristine than Area 1 and the dam enlargement footprint will impact mostly on already disturbed areas (refer to Figure 7). With regards to this site the following impact minimisation recommendations must be considered:

- A great number of Botterboom (*Tylecodon paniculatus*) plants where observed within the footprint. As many as possible of these plants (but all small plants) should be transplanted to adjacent disturbed areas (or could be used for rehabilitation of the dam itself or could even be used in the gardens of the proposed office site).
- Topsoil from the less disturbed areas must be removed to be used for the rehabilitation of the excavations and the dam wall itself.

The Office area: The site is located on an extension of the rocky intrusion (ridge) encountered in the southern section of Area 2. Most of the larger area is still covered in natural vegetation in good condition, but various physical disturbed areas were also observed (Figure 13). With regards to this site the following impact minimisation recommendations must be considered:

- The new office buildings should be placed to utilise the existing disturbed areas (thus minimising the additional disturbance footprint) (refer to the Orange section marked in the Office site area - Figure 13);

- Botterboom (*Tylecodon paniculatus*), *Cotyledon* and *Haworthia* individuals must be transplanted to surrounding disturbed areas, where they must be nursed for the time it take for them to settle. It is important that the *Haworthia* individuals are replanted in similar areas from where they were taken and protected by larger plants (nursery plants as described by Vlok& Schutte-Vlok, 2015);
- All waste items should be removed from the remaining veld;
- Topsoil must be stripped and used for the rehabilitation of the some of the other disturbed areas on the small hill or koppie.

The Waaisand area: The proposed sand extraction site was chosen to overlap an area already disturbed as a result of sand extraction. With regards to this site the following impact minimisation recommendations must be considered:

- The sand extraction must stay within the existing disturbance footprint as indicated by the Orange section of the "Waaisand" area in Figure 13;
- The top layer of bushes with some topsoil (15 – 20 cm deep) should be stripped and protected and use for rehabilitation of the site after excavations are completed (the plant parts should be mulched into or slightly buried within the top layer of soil during rehabilitation);
-

7.2. FURTHER GENERAL MITIGATION ACTIONS

The following general mitigation actions should also be implemented:

- All construction must be done in accordance with an approved construction and operational phase Environmental Management Plan (EMP), which must include the recommendations made in this report.
- A suitably qualified Environmental Control Officer must be appointed to monitor the construction phase in terms of the EMP and any other conditions pertaining to specialist studies.
- The layout of the development footprint should take the sensitivity map (Figure 13, next page) into account.
- However, if for viable reasons, the layout could not be placed outside of the above mentioned green areas, the developments must aim at minimum disturbance of the remaining natural veld;
- Search & rescue as described in the site specific recommendation above, must be done before construction may commence in each area;
- Lay-down areas or construction sites must be located within already disturbed areas on the farm;
- No unnecessary clearing of any area outside of the construction footprint may be allowed.
- An integrated waste management approach must be implemented during construction.
    - Construction related general and hazardous waste may only be disposed of at suitably approved waste disposal sites.

Figure 13: Bass Diii sensitivity map: Development should stay within the orange areas to implement the site specific mitigation recommendations

8. REFERENCES

Acocks, J.P.H. 1953. Veld types of South Africa. *Mem. Bot. Surv. .S. Afr*. No. 28: 1-192.

Anon, 2008. Guideline regarding the determination of bioregions and the preparation and publication of Bioregional Plans. April 2008. Government Notice No. 291 of 16 March 2009.

De Villiers C.C., Driver, A., Brownlie, S., Clark, B., Day, E.G., Euston-Brown, D.I.W., Helme, N.A., Holmes, P.M., Job, N. & Rebelo, A.B. 2005. Fynbos Forum Ecosystem Guidelines for Environmental Assessment in the Western Cape. Fynbos Forum, c/o Botanical Society of South Africa: Conservation Unit, Kirstenbosch, Cape Town.

DEAT, 2002. Impact significance. Integrated Environmental Management, Information series 5. Department of Environmental Affairs and Tourism (DEAT). Pretoria.

Driver A., Sink, K.J., Nel, J.N., Holness, S., Van Niekerk, L., Daniels, F., Jonas, Z., Majiedt, P.A., Harris, L. & Maze, K. 2012. National Biodiversity Assessment 2011: An assessment of South Africa's biodiversity and ecosystems. Synthesis Report. South African National Biodiversity Institute and Department of Environmental Affairs, Pretoria

Esler, K.J., Milton, S.J. & Dean, W.R.J. (eds.) 2010. Karooveld. Ekologie en bestuur (second edition). Briza Publications. Pretoria.

Hagen, D.J. & Associates. 2020. Enlarged Bass Diii Dam, Worcester. Report no. DJH097.2-R01. Unpublished report prepared for Bass Diii Berries (Pty) Ltd as part of a dam viability study. 11 November 2002.

Holness, S. & Oosthuysen, E. 2016. Critical Biodiversity Areas of the Northern Cape: Technical Report. Available from the Biodiversity GIS website at http://bgis.sanbi.org/project.asp

Manning, J. 2008. Namaqualand Eco Guide. Briza Publications. Pretoria

Mucina, L. & Rutherford, M.C. (eds.) 2006. The vegetation of South Africa, Lesotho and Swaziland. Strelitzia 19. South African National Biodiversity Institute, Pretoria.

Mucina, L., Jürgens, N., Le Roux, A., Rutherford, M.C., Schmiedel, U., Esler, K.J., Powrie, L.W., Desmet, P.G. and Milton, S.J. 2006. Succulent Karoo Biome. In Mucina, L. &Rutherford, M.C. 2006. (Eds.). The Vegetation of South Africa. Lesotho & Swaziland. Strelitzia 19. South African National Biodiversity Institute, Pretoria. Pp. 221 – 299.

Pool-Starvliet, R. 2017. Northern Cape Biodiversity Spatial Plan Handbook. Biodiversity GIS Home. http://bgis.sanbi.org.

Rouget, M., Reyers, B., Jonas, Z., Desmet, P., Driver, A., Maze, K., Egoh, B. & Cowling, R.M. 2004. South Africa National Spatial Biodiversity Assessment 2004: Technical report. Volume 1: Terrestrial Component. Pretoria: South African National Biodiversity Institute.

Shearing, D. 1994. Karoo. South African Wild Flower Guide 6. Botanical Society of South Africa. Kirstenbosch.

Skowno, A.L., Matlata, M., Slingsby, J.,Kirkwood,D., Raimondo, D.C., Von Staden, L., Holness, S.D., Lotter, M., Pence, G Daniels, F., Driver, A., Desmet, P.G., Dayaram, A. 2019b. Terrestrial ecosystem threat status assessment 2018 – comparison with 2011 assessment for provincial agencies. National Biodiversity Assessment 2018 Technical Report. South African National Biodiversity Institute, Pretoria.

Skowno, A.L., Raimondo, D.C., Poole, C.J., Fizzotti, B. & Slingsby, J.A. (eds.). 2019a. South African National Biodiversity Assessment 2018 Technical Report Volume 1: Terrestrial Realm. South

African National Biodiversity Institute, Pretoria. http://hdl.handle.net/20.500.12143/6370

South African National Biodiversity Institute. 2006. South African National Botanical Institute: Biodiversity GIS Home. http://bgis.sanbi.org (as updated).

South African National Biodiversity Institute. 2012. Vegetation map of South Africa, Lesotho and Swaziland [vector geospatial dataset] 2012.

South African National Biodiversity Institute. 2016. Botanical Database of Southern Africa (BODATSA) [dataset]. doi: to be assigned.

South African National Biodiversity Institute. 2020. Statistics: Red List of South African Plants version 2020.1. Downloaded from Redlist.sanbi.org on 2021/02/11.

Van Wyk, A.E., & Smith, G.F. 2001. Regions of floristic endemism in South Africa. A review with emphasis on succulents. Umdaus press. Hatfield.

Vlok, J. & Schutte-Vlok, A.L. 2015. Plants of the Klein Karoo (second revised edition). Umdaus Press. Hatfield.

Wood, J.C. 1990. The natural vegetation of the Robertson Karoo: An evaluation of its conservation status. Thesis presented for the degree of Master of Science at the University of Cape Town. May 1990.

APPENDIX 1: COMPLIANCE WITH APPENDIX 6 OF GN. NO. 982 (4 DECEMBER 2014)

Specialist reports

1. A specialist report prepared in terms of these regulations must contain -	
a) Details of –	**Refer to:**
(i) The specialist who prepared the report; and	Refer to Page ii & Appendix 2
(ii) The expertise of the specialist to compile a specialist report including a curriculum vitae;	Refer to Appendix 2
b) A declaration that the specialist is independent in a form as may be specified by the competent authority;	Refer to Page ii
c) An indication of the scope of, and the purpose for which the report was prepared;	Refer to Heading 1.1
d) The duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment;	Refer to Heading 3
e) A description of the methodology adopted in preparing the report or carrying out the specialist process inclusive of equipment and modelling used;	Refer to Heading 3
f) Details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructures, inclusive of a site plan identifying site alternatives;	Refer to Headings 4.1, 4.2, 4.3, 4.4, 4.6.
g) An identification of any areas to be avoided, including buffers;	Refer to Figure 13
h) A map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;	Refer to Figure 6 & Figure 11
i) A description of any assumptions made and any uncertainties or gaps of knowledge;	Refer to Heading 3
j) A description of the findings and potential implications of such findings on the impact of the proposed activity, [including identified alternatives on the environment] or activities;	Refer to Heading 6
k) Any mitigation measures for inclusion in the EMPr;	Refer to Heading 7.1
l) Any conditions for inclusion in the environmental authorization;	None
m) Any monitoring requirements for inclusion in the EMPr or environmental authorization;	Refer to Heading 7.1
n) A reasoned opinion -	
(i) [as to] whether the proposed activity, activities or portions thereof should be authorized;	Refer to the "*Main conclusion*" within the executive summary (Page i)
(iA) regarding the acceptability of the proposed activity or activities; and	
(ii) if the opinion is that the proposed activity, activities or portions thereof should be authorized, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable the closure plan;	Refer to Heading 7.1
o) A description of any consultation process that was undertaken during the course of preparing the specialist report;	N/a
p) A summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	N/a
q) Any information requested by the competent authority.	N/a
2. Where a government notice gazetted by the Minister provides for any protocol or minimum information requirement to be applied to a specialist report, the requirements as indicated in such notice will apply.	

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): Rietfontein 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, Kuruman, Erf 151, Kenhardt, Northern Cape Province. A Botanical scan of the proposed footprint. 26 May 2016.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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