PB CONSULT
ENVIRONMENTAL MANAGEMENT SERVICES

BOTANICAL SCAN & TERRESTRIAL BIODIVERSITY COMPLIANCE STATEMENT

UPINGTON LOW-COST HOUSING: SITE 2

THE PROPOSED DEVELOPMENT OF LOW-COST HOUSING ON ERVEN 5414, 21907 & 26627 UPINGTON
DAWID KRUIPER MUNICIPALITY, NORTHERN CAPE PROVINCE.

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EXECUTIVE SUMMARY

Dawid Kruiper Municipality (Northern Cape Province) is in urgent need of developing new areas for low-cost housing (LCH) or formalising areas that has already been occupied or partially occupied in and around Upington. The proposed Upington Site 2 is one of the areas identified for LCD development. It falls within the Paballelo township area, to the northwest of the Upington CBD. The proposed development footprint will be less than 15 ha and will overlap Erf 21907 and partially overlap Erven 5414 & 266627 (Upington), within the existing Upington urban edge. In this case the **whole footprint is already transformed because of illegal settlement**. **No natural veld remains within the proposed footprint, apart from weedy species and hardy pioneer species.** To the northeast of the property (remaining portion of Erf 26627) disturbed natural veld remains within the rocky areas between the proposed development and the Loboria industrial area. A desktop study and field investigation were performed to assess the terrestrial biodiversity within the proposed study area and to identify the ecological characteristics and sensitivity of the site.

VEGETATION TYPE & STATUS	According to the South African vegetation map (2018) (Mucina & Rutherford, 2006), the study area would originally have been covered by Kalahari Karroid Shrubland (Figure 5). Kalahari Karroid Shrubland are classified as "**Least Threatened**" in terms of the "*Revised List of ecosystems that are threatened and in need of protection*" (GN 47526 of 18 November 2022).
HABITAT CONDITIONS AND DIVERSITY	The whole footprint had already been transformed because of illegal housing developments (squatters) and no natural veld of any significance remains within the proposed study area. However, from historical google images, confirmed during the site visit, it does not seem as if the development within the footprint impacted on any significant landscape feature. Within the footprint the landscape is very homogenous with little variation over the site itself. It does not seem to have contained any rocky outcrops, watercourses or any other biophysical feature that might have resulted in special habitats for fauna or flora.
LAND-USE	The site falls within the Upington urban edge and had already been transformed because of illegal settlement. There is an urgent need within the Dawid Kruiper Municipal area to formalize these settlements to ensure better service delivery.
VEGETATION ENCOUNTERED	Kalahari Karroid Shrubland are classified as "**Least Threatened**" in terms of the "*Revised List of ecosystems that are threatened and in need of protection*" (GN 47526 of 18 November 2022). The vegetation is described as a disturbed to very disturbed version of Karroid Shrubland. The whole footprint had already been transformed because of illegal settlement and no natural veld of any significance remains within the proposed study area. The original settlement may have impacted on a several NCNCA protected species, but the veld is likely to have been in disturbed status (before the settlement) and it is considered highly unlikely that the illegal settlement would have contribute significantly to the loss of vegetation type or associated habitat.
THREATENED AND PROTECTED PLANT SPECIES	No red-data or nationally protected plant species were observed within the proposed footprint. One weedy disturbance indicator species, protected in terms of the NCNCA was observed within the footprint (Refer to Table 2). Outside of the footprint several NCNCA protected species was observed (Table 1) and some of them might have occurred on the site. But according to the DEA Screening tool report, the relative plant species theme sensitivity is considered of low sensitivity, which is supported by the findings of this assessment.
FAUNA & AVI-FAUNA	No evidence in the form of tracks, faeces or even burrows of any other indigenous fauna (e.g., small game) were observed within the footprint area, although it is expected that reptile's (like gecko's, agama's, skinks, and snakes) and some of the smaller mammals like rodents might still occur in the larger area. The veld was very homogeneous and habitat variety or diversity within the footprint area is low to very low. The lack of rocky hills or outcrops within the development area would preclude a variety of species from the site. There are also no suitable habitats for amphibian species within the footprint

area (Refer to Heading 4.5.1).

The animal species theme sensitivity is considered high sensitive because the site falls within the potential distribution range of both the **Lanner Falcon** and the **Ludwig's Bustard**. The Lanner Falcon may hunt and even roost in the vicinity, but it is highly unlikely that Ludwig's Bustard will venture so close to the urban edge. It is also considered unlikely that this relatively small-scale development, located in an area surrounded by built-up areas would have had any significant additional impact on Lanner Falcon's hunting or roosting areas (Refer to Table 3).

With regards **to this project the sensitivity rating should be low sensitive**

CONSERVATION PRIORITY AREAS

According to the Northern Cape critical biodiversity areas maps, the proposed cemetery expansion area will NOT overlap any critical biodiversity area or ecological support areas as identified within the 2016 Northern Cape CBA maps (Figure 6)**.**

According to the DEA Screening tool report, the relative terrestrial biodiversity theme sensitivity is considered of low sensitivity, which is supported by the findings of this assessment (Refer to Table 10).

WATER COURSES AND WETLANDS

There are no watercourses or wetlands identified within the study area.

MAIN CONCLUSION

According to the **NEMA EIA Sensitivity** scan for the site the Terrestrial Biodiversity Theme Sensitivity is **low sensitive** and does not overlap any CBA or ESA.

The Terrestrial biodiversity assessment (Table 10) aims to take all the discussion under Section 4 into account, including the scale of the proposed project, the fact that the vegetation is not vulnerable or endangered as well as all the other reasons discussed throughout this document.

According, Table 10, the main impacts associated with the proposed development will be:

- A potential Low impact on a NCNCA protected and endangered plant species; and
- A potential Low impact on vulnerable Avi-Fauna species.

Because of the location, the scale and the condition of the surrounding vegetation even the cumulative impact given in Table 10 remains **Low**.

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

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

According to the DEA Screening tool report, the relative terrestrial biodiversity theme sensitivity is considered of low sensitivity, which is supported by the findings of this assessment.

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

DETAILS OF THE AUTHOR

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

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INDEPENDENCE & CONDITIONS

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

RELEVANT QUALIFICATIONS & EXPERIENCE OF THE AUTHOR

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

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

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

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

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

DECLARATION OF INDEPENDENCE

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

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

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

Note: The terms of reference must be attached.

Signature of the specialist:

PB Consult (Sole Proprietor)

Name of company:

13 April 2023

Date:

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ABBREVIATIONS

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

1. INTRODUCTION

Dawid Kruiper Municipality (Northern Cape Province) is in urgent need of developing new areas for low-cost housing (LCH) or formalising areas that has already been occupied or partially occupied in and around Upington. The proposed Upington Site 2 is one of the areas identified for LCD development. It falls within the Paballelo township area, to the northwest of the Upington CBD. The proposed development footprint will be less than 15 ha and will overlap Erf 21907 and partially overlap Erven 5414 & 266627 (Upington), within the existing Upington urban edge. In this case the whole footprint is already transformed because of illegal settlement. No natural veld remains within the proposed footprint, apart from weedy species and hardy pioneer species. To the northeast of the property (remaining portion of Erf 26627) disturbed natural veld remains within the rocky areas between the proposed development and the Loboria industrial area.

The site used to be covered with natural veld, although this veld was mostly likely already disturbed because of constant human related impacts. According to the vegetation map of South Africa (2012), only one vegetation type will be impacted, namely Kalahari Karroid Shrubland, a vegetation type that is considered "Least Threatened" in terms of the revised national list of ecosystems that are threatened and in need of protection (2022). The proposed development will not impact on any ecological support areas or critical biodiversity areas (CBA 2) based on the 2016 Northern Cape critical biodiversity areas maps (Holness & Oosthuysen, 2016).

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

- The relative Animal species theme sensitivity is considered of **high sensitivity**;
- The relative Plant species theme sensitivity is considered of low sensitivity;
- The relative Terrestrial Biodiversity theme sensitivity is considered of low sensitivity.

The relative Archaeological and cultural heritage theme (VERY HIGH SENSITIVITY) and Palaeontology theme (Medium sensitivity) are not discussed in this report.

The vegetation in the Northern Cape is just starting to recover from the recent drought period (which lasted more than 7 years), while remaining veld near towns and small settlements in the Northern Cape are almost always degraded to some extent because of grazing pressures and other anthropogenic impacts. The proposed development is not expected to have been any different, and the vegetation (before occupation) was most likely already disturbed to very disturbed Karroid Shrubland.

1.1. LEGISLATION GOVERNING THIS REPORT

EnviroAfrica was appointed the Dawid Kruiper Municipality to facilitate the NEMA EIA application for the proposed project. PB Consult was appointed by EnviroAfrica to conduct a terrestrial biodiversity scan of the proposed footprint area.

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

- The National Environmental Management Act, Act. 107 of 1998 (NEMA);
- The "Protocol for the Specialist Assessment and Minimum report content requirements for environmental impacts on terrestrial biodiversity" in terms of Sections 24(5)(a) and (h) and 44 of the NEMA (Government Notice No. 320 of 20 March 2020).
- The National Environmental Management: Biodiversity Act, Act 10 of 2004, which allows for the conservation of endangered ecosystems and restriction of activities according to the status of the ecosystem;
- The National Forest Act, Act 84 of 1998, which provide a list of protected trees species in SA;
- The Northern Cape Nature Conservation Act, Act 9 of 2009, which provide extensive lists of protected fauna & flora species in the Northern Cape.

1.2. TERMS OF REFERENCE

The terms of reference for this appointment were to:

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

1.3. ACTIVITY DESCRIPTION

Because of population growth, the Dawid Kruiper Municipality is in urgent need of establishing areas for further low-cost housing development within the Upington urban edge. Several areas had been identified by the Municipality for LCH development, some of which are already occupied or partially occupied by illegal squatters. The proposed Upington Site 2 refers to the formalization of an area already occupied by low-cost housing that was illegally erected.

The proposed development had led to the transformation of less than 15 ha of disturbed Kalahari Karroid Shrubland (a vegetation type not considered vulnerable or endangered). The development will impact on Municipal property.

2. STUDY AREA & APPROACH

2.1. LOCATION & LAYOUT

Upington is the main town within the Dawid Kruiper Local Municipality of the Northern Cape province of South Africa. It is located on the N14 about 40km east of Keimoes. Paballelo is one of the town extensions to the northwest of Upington CBD (Figure 1).

Figure 1: The location of the proposed development (indicated by the arrow) in relation to the town of Upington.

The proposed development will be less than 15 ha in size and will overlap Erf 21907 and overlap portions of Erven 5415 and 26627, all within the existing urban edge of the Paballelo town extension of Upington (Figure 2). The property adjoins the existing housing developments to the south, west and northeast. To the east and north remaining natural veld are still observed (Figure 2).

Figure 2: Google image showing the proposed development boundaries (red).

2.2. CLIMATE

Climate in this part of the Kalahari is essentially continental with almost no effect of the ameliorating influences from the oceans. Rainfall is low and unreliable, peaking in December to March. Droughts are unpredictable and often prolonged. Summers are hot during the day and cold during the night, while winters are cold with temperature extremes ranging from -5°C in winter to 43°C in summer. However, rainfall intensity can be high (e.g., episodic thunderstorm storm events). Upington has a desert climate, with hardly any rains. The average rainfall is given as 86 mm per year with and it is dry for more than 311 days a year (https://www.besttimetovisit.co.za/south-africa/Upington-3498186/).

Figure 3: Average temperature and rainfall for Upington (https://www.besttimetovisit.co.za/south-africa/Upington-3498186/)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Temperature (°C)	35	34	32	27	24	19	19	22	26	30	32	34
Precipitation (mm)	16	17	12	11	4	2	2	1	4	3	3	11

2.3. TOPOGRAPHY

The proposed footprint is relatively small and located on an almost level plain with a slight slope (4.1%) from east to west, at about 832m above mean sea level. Topography and slope are not expected to have any significant effect on fauna and flora species encountered.

2.4. GEOLOGY & SOILS

According to Mucina and Rutherford (2006) and the SANBI Biodiversity Geographical Information System, the geology and soils for this area is described as Cenozoic Kalahari Group sands and small patches also on calcrete outcrops and screes on scarps of intermittent rivers (mekgacha). Dwyka Group tillites outcrops found in places. The soils are deep, red-yellow, apedal, freely drained, with a high base status, typical of Ae land type.

The soils on site were for the most part shallow sandy soils with outcrops with a slight rocky outcrop to the east of the site (outside of the proposed footprint).

2.5. APPROACH & METHODOLOGY

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

Plant species lists (of the expected plant species for this vegetation type) were prepared and species

of special significance were flagged (for the site visit).

Figure 4: Google overview, showing the study area and the routes walked during the site visit.

A one-day site visit was performed on the 3rd of April 2023. The site assessment survey was conducted by walking the site and sampling the vegetation, using a modified approach, based on the Braun-Blanquet vegetation survey method (Werger, 1974). During the site visit terrestrial features- and plants of specific significance was, marked, and photographed (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, and photographic records were collected. The author endeavoured to identify and locate all significant botanical features, including special plant species and or specific soil conditions which might indicate special botanical features (e.g., rocky outcrops or heuweltjies) and watercourses.

2.5.1. ASSUMPTIONS AND UNCERTAINTIES

The findings are based on a one-day site visit (not long-term repetitive sampling), which means that it is likely that some plant species might have been missed (not visible or in flower). The timing of the site visit was reasonable (within the summer rainfall period) and both geophytes and herbaceous plants were visible. Essentially all perennial plants were identifiable and a good understanding of the status of the vegetation and plant species in the study areas were obtained and confidence in the findings are high. There should be no limiting factors which could significantly alter the outcome of this study. It is unlikely that a full botanical assessment will result in any additional findings that would have a significant impact on the outcome.

3. DESKTOP ASSESSMENT

3.1. BROAD-SCALE VEGETATION EXPECTED

According to the South African vegetation map (2018) (Mucina & Rutherford, 2006), the proposed footprint enlargement will only impact on one vegetation type, namely Kalahari Karroid Shrubland (Figure 5).

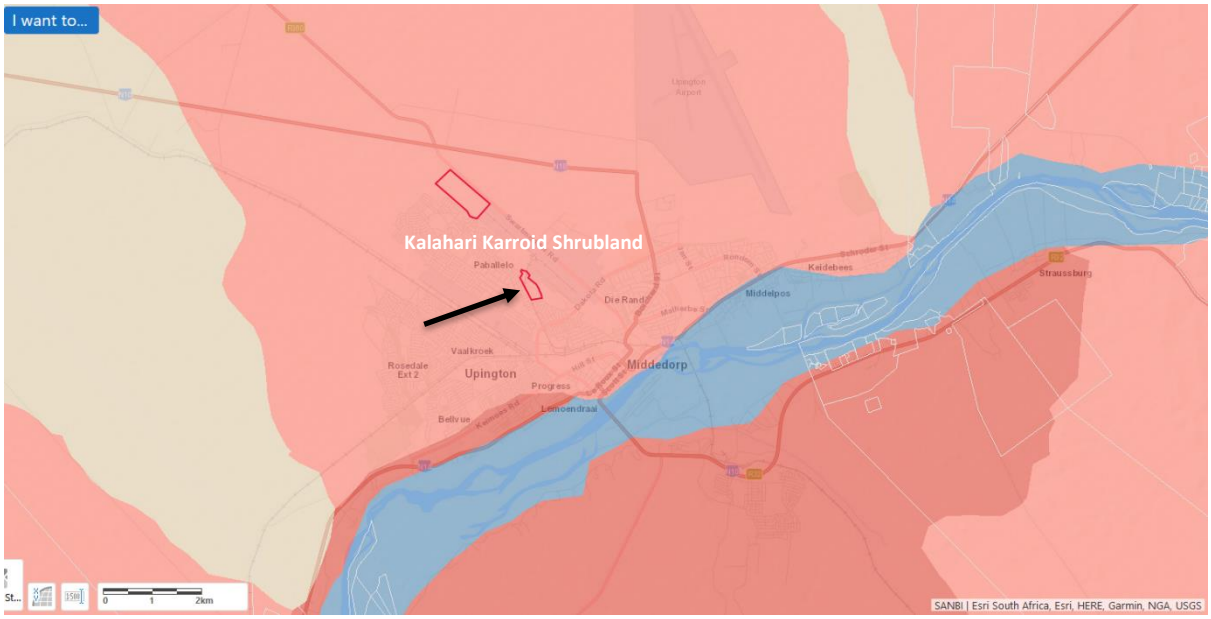

Figure 5: Vegetation map of South Africa (2012), showing the expected vegetation type (SANBI BGIS)

Mucina & Rutherford (2006) describe this vegetation as occurring in the Northern Cape Province, typically forming belts alternating with Gordonia Duneveld on the plains northwest of Upington, through Lutzputs and Noenieput to the Paballelo/Mier area. It is described as a low karroid shrubland on flat, gravel plains, where Karoo-related elements (shrubs) meet with northern floristic elements, indicating a transition to the Kalahari region and sandy soils.

Kalahari Karroid Shrubland has been classified as "**Least Threatened**" in terms of the "*Revised List of ecosystems that are threatened and in need of protection*" (GN 47526 of 18 November 2022), promulgated in terms of the National Environmental Management Biodiversity Act, Act 10 of 2004. However, very little of this vegetation type is statutorily conserved (apart from a small portion within the Augrabies Falls National Park). Very little of this vegetation had been transformed, but these belts were often the preferred route for early roads, which promoted the introduction of alien invasive species.

3.2. ECOLOGICAL DRIVERS & FUNCTIONING

Kalahari Karroid Shrubland is part of the Nama-Karoo Biome, which is a large arid landlocked region on the central plateau of the western half of South Africa, extending into Namibia. It is flanked by the Succulent Karoo to the west and south, desert to the northwest, arid Kalahari Savanna to the north, Grassland to the northeast, Albany Thicket to the southeast and small parts of Fynbos to the south.

In South Africa, only the Desert Biome has a higher variability in annual rainfall and only the Kalahari Savanna greater extremes in temperature. The Nama-Karoo receives most of its rainfall in summer, especially in late summer (Mucina *et. al*., 2006).

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

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

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

3.3. CRITICAL BIODIVERSITY AREAS & ECOLOGICAL CORRIDORS

The Northern Cape CBA Map (2016) identifies biodiversity priority areas, called Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs), which, together with protected areas, are important for the persistence of a viable representative sample of all ecosystem types and species as well as the long-term ecological functioning of the landscape (Holness & Oosthuysen, 2016). The 2016 Northern Cape Critical Biodiversity Area (CBA) Map updates, revises and replaces all older systematic biodiversity plans and associated products for the province (including the Namakwa District Biodiversity Sector Plan, 2008). Priorities from existing plans such as the Namakwa District Biodiversity Plan, the Succulent Karoo Ecosystem Plan, National Estuary Priorities, and the National Freshwater Ecosystem Priority Areas were incorporated. Targets for terrestrial ecosystems were based on established national targets, while targets used for other features were aligned with those used in other provincial planning processes.

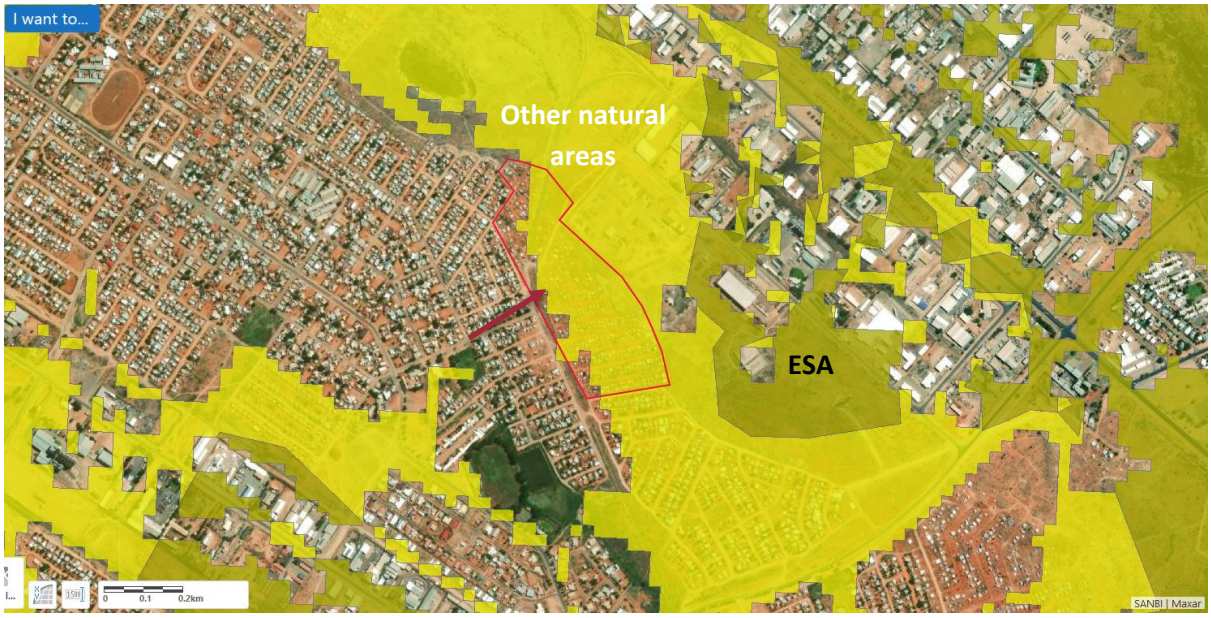

Figure 6: Northern Cape CBA map (2016) showing the study area and associated critical biodiversity areas.

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

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

According to the Northern Cape critical biodiversity areas maps, the proposed cemetery expansion area will **NOT** overlap any critical biodiversity areas or ecological support areas as identified within the 2016 Northern Cape CBA maps (Figure 6)**.**

3.4. POTENTIAL IMPACT ON CENTERS OF ENDEMISM

According to Van Wyk & Smith (2001) the proposed development will not impact on any recognised centre of endemism. The Gariep Centre is located to the west, associated with Augrabies, Pella and Onseepkans along the border of South Africa and Namibia, while the Griqualand West Centre of Endemism starts to the east of Upington in the Northern Cape Province.

4. SITE SENSITIVITY EVALUATION

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

The following sensitivity evaluation is based on expected terrestrial features of significance identified through the desktop studies and personal observation made during the physical site visit.

4.1. HABITAT CONDITIONS & DIVERSITY

The whole footprint had already been transformed because of illegal housing developments (squatters) and no natural veld of any significance remains within the proposed study area. However, from historical google images, confirmed during the site visit, it does not seem as if the development within the footprint impacted on any significant landscape feature. Within the footprint the landscape is very homogenous with little variation over the site itself. It does not seem to have contained any rocky outcrops, watercourses or any other biophysical feature that might have resulted in special habitats for fauna or flora.

To the north-east of the site a rocky area was observed, which was not yet impacted by the existing housing developments. Although disturbed (crisscrossed by footpaths used as a shortcut to the industrial area to the north and northeast) it still supports a relatively good vegetation cover.

4.2. VEGETATION ENCOUNTERED

The proposed footprint area is already transformed as a result of the illegal settlement (low-cost housing) and its associated erven. Within the footprint area no natural veld of any significance remains. The site, most likely, would have been covered by disturbed (because of the surrounding urban development) Karroid Shrubland. Within the site only weedy or pioneer species remained.

The area to the north of the site was also transformed, by what seems to be large scale earthworks (Photo 4). To the north-east (along the foothills of the rocky outcrop area) and outside of the footprint area some natural veld remained (Photo 6) containing several species that would have been expected within the footprint area. It included species such as *Justicia australis*, *Phaeoptilum spinosum, Kleinia longiflora, Mesembryanthemum fastigiatum* (a disturbance indicator species), *M. subnodosum*

(=Psilocaulon) *Kewa salsoloides, Tetraena decumbens, Senegalia mellifera,* including the alien invasive *Prosopis* species scattered throughout the surrounding veld (Photo 1, 2, 4 & 6).

One young *Vachellia erioloba* individual (about 2.5m in height) was observed to the northwest of the site, while several *Boscia foetida* individuals (Photo 2) were observed in the surrounding veld to the northwest and northeast of the site.

Photo 1: Some of the remaining vegetation encountered to the northwest of the site (outside of the footprint). *Justicia australis* in the foreground with *Phaeoptilum spinosum* to the left and a *Prosopis* tree in the middle to the back). Note the ploughed lands behind the *Prosopis* tree.

Photo 2: Remaining natural veld to the north of the property (outside of the footprint area). Note the various disturbances and disturbance indicator species such as *Salsola kali*. In the background a *Boscia foetida* can be observed.

Photo 3: A typical view of existing housing within the footprint area. Note that even unoccupied erven had been cleared of vegetation.

Photo 4: The disturbed area to the north of the development footprint, between the proposed development site and the industrial area to its north.

Photo 5: A view over the proposed development footprint looking from the southeast to the northwest over the site (the developed area). Note the disturbed earthworks in the foreground (which is the same as that in the background of Photo4).

Photo 6: Looking from the south-eastern boundary of the development footprint to the northeast onto the rocky outcrop to east of the development footprint (between the development footprint and the industrial area to the north).

Within the footprint area almost the whole site had been cleared of any vegetation to allow for access roads, cleared erven and housing (Photo 3, 5 and 7 – 8). Almost the only plants remaining are weedy or pioneer species such as *Salsola kali*, *Tribulus terrestris* (dubbeltjie), *Tetraena simplex, Limeum aethiopicum* and *Mesembryanthemum guerichianum* (soutslaai). Along the old railway line to the south of the property (Photo 8) a few hardy indigenous shrubs still resist, such as *Phaeoptilum spinosum, Justicia australis* but the remainder of the site had been totally transformed.

Photo 7: Looking from the south to north over the site along one of the access roads in between buildings. Note the rocky outcrop behind the development (the same outcrop showed in Photo 6).

Photo 8: Looking from north to south along the southern boundary of the site. Note the few remaining shrubs along the train rails to the right of picture (*Phaeoptilum spinosum)*. To the back of the picture two Prosopis trees can be observed.

4.3. FLORA ENCOUNTERED

Table 1 gives a list of the plant species encountered within the footprint as well as some of the plants observed outside of the footprint (marked with an asterisk). It is important to note that the species list is only based on a one-day site visit. It is likely that some species (especially annuals and geophytes) might have been missed. However, the author is confident that a good understanding of the vegetation was achieved and confidence in the findings is high. No red-listed plant species was observed, but three (3) species protected in terms of the NCNCA was observed, of which only one (a weedy disturbance indicator) was within the footprint area.

Table 1: List of plant species observed within the proposed development footprint.

NO.	SPECIES NAME	FAMILY	STATUS	LOCATION
1.	*Aptosimum spinescens**	SCROPHULARIACEAE	LC	Occasionally observed in the grassy bottom layer.
2.	*Aristida adscensionis **	POACEAE	LC	Small grass
3.	*Aristida congesta*	POACEAE	LC	Small grass
4.	*Blepharis mitrata **	ACANTHACEAE	LC	A spiny, dwarf shrub, only observed near the quarzitic outcrop.

NO.	SPECIES NAME	FAMILY	STATUS	LOCATION
5.	*Boscia foetida* *	BRASSICACEAE (CAPPARACEAE)	LC All *Boscia* species protected in terms of Schedule 2 of NCNCA	Only 1 scruffy multi-stemmed shrubs observed within the footprint.
6.	*Enneapogon desvauxii*	POACEAE	LC	Small short perennial grass.
7.	*Euphorbia gariepina* *	EUPHORBIACEAE	LC	A dwarf succulent occasionally seen within the quarzitic outcrops.
8.	*Geigeria ornativa*	ASTERACEAE	LC	Dwarf shrub occasionally seen throughout.
9.	*Justicia austalis*	ACANTHACEAE	LC	Common throughout.
10.	*Kewa salsoloides* *	KEWACEAE	LC	Dwarf shrub commonly observed on the quarzitic outcrop.
11.	*Kleinia longiflora* *	ASTERACEAE	LC	A medium succulent observed in deeper sandy areas.
12.	*Limeum aethiopicum*	LIMEACEAE	LC	A dwarf shrub, observed in the quarzitic outcrop.
13.	*Mesembryanthemum guerichianum*	AIZOACEAE	LC Protected in terms of schedule 2 of the NCNCA	An herb with succulent leaves, often a disturbance indicator.
14.	*Mesembryanthemum fastigiatum* *	AIZOACEAE	LC Protected in terms of schedule 2 of the NCNCA	A low growing herb, often a disturbance indicator.
15.	*Phaeoptilum spinosum*	NYCTAGINACEAE	LC	Occasionally observed in deeper sandy areas.
16.	*Prosopis* species	FABACEAE	**Alien invasive plant species**	Occasionally observed.
17.	*Salsola kali*	AMARANTHACEAE	Weed	A spiny annual weed common in physically disturbed areas.
18.	*Senegalia mellifera* *	FABACEAE	LC	A very thorny shrub, occasionally observed in deeper sandy areas.
19.	*Tetraena decumbens* *	ZYGOPHYLACEAE	LC	A spreading shrub, occasionally observed.
20.	*Tetraena simplex*	ZYGOPHYLACEAE	LC	A mat-forming succulent annual plant, occasionally observed.
21.	*Tribulus terrestris*	ZYGOPHYLLACEAE	LC Weedy species	A prostrate weedy species, very common throughout.

4.4. THREATENED AND PROTECTED PLANT SPECIES

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

but are still of conservation concern (SANBI, 2015).

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

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

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

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

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

- No species protected in terms of the NFA was observed.

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

- **One (1) species protected in terms of the NCNCA was observed within the footprint (Refer to Table 1).** Recommendations on impact minimisation are given in Table 2.

Table 2: Plant species protected in terms of the NCNCA encountered within the study area.

NO.	SPECIES NAME	COMMENTS	Search & rescue recommendations
1.	*Mesembryanthemum guerichianum* **Schedule 2 protected**	Common in disturbed areas within the site as well as the surrounding disturbed veld.	This plant is a weedy pioneer species, mostly growing in disturbed areas. It is not vulnerable or endangered. No search & rescue needed.

4.5. FAUNA AND AVI-FAUNA

No fauna or avi-fauna screening was done as part of this study, but observations were made during the site visit. The proposed footprint area falls within the Upington urban edge (an area already subject to illegal development), almost surrounded by built-up and industrial areas. It is subject to almost constant human activity. The vegetation itself has been transformed and apart from insects, rodents and a few smaller reptile species, the site itself is not expected to support any significant remaining fauna or even avi-fauna (smaller birds might still pass through this area, and apart from birds adapted to build-up areas, it is highly unlikely that any other bird species will nest within the site due to the lack of protective habitat and constant human activity).

According to the **NEMA EIA Sensitivity** scan for the site generated by PB Consult on the 4th of April 2023 the following sensitivity ratings may be applicable:

- Animal Species Theme Sensitivity is **HIGH SENSITIVE** because of the potential presence of two bird species, namely the Lanner Falcon and Ludwig's Bustard discussed under Heading 4.5.4;
- Terrestrial Biodiversity Theme Sensitivity is low sensitive because of it being located within a CBA 2. The CBA is discussed under Heading 3.3.

4.5.1. MAMMALS

The nearby Kalahari is well-known for its small and large herbivores such as blue wildebeest, springbok, eland, and red hartebeest. However, as mentioned above, because of its location (almost surrounded by urban development), the continuous presence of humans, the lack of protective habitat and the poor status of the remaining vegetation it is highly unlikely that any significant fauna or avi-fauna will frequent the site. Most mammals, reptiles, and avi-fauna (except those that have adapted to built-up areas) would have been displaced or moved away over time. No evidence in the form of tracks, faeces or even burrows of any other indigenous fauna (e.g., small game) were observed within the footprint area. Three listed terrestrial mammals may occur in the area namely the Honey Badger, *Mellivora capensis* (Endangered), the Brown Hyaena, *Hyaena brunnea* (Near Threatened) and the Black-footed cat, *Felis nigripes* (Vulnerable). While it is possible that the Honey Badger and the Black-footed cat may still occur in the surrounding areas (away from the urban area), it is highly unlikely that the Brown Hyaena is still present in the near vicinity of Upington as this species is often purposely or inadvertently persecuted. All these species have a wide national distribution, and the development footprint will not result in a significant extent of habitat loss for these species.

4.5.2. REPTILES

According to the SARCA database, 39 reptile species are known from the larger, which suggests that reptile diversity is likely to be moderate to low. As there are no rocky outcrops or trees within the site, only species associated with sandy substrates is likely to be present. A relatively wide variety of reptile species can be expected to occur in the surrounding area (outside of the urban edge), including various skinks, agamas and barking geckos (none was observed within the site). No RDB-listed reptile species are known from the area and there do not appear to be any broad habitats at the site which would be of high significance for reptiles.

Because of the disturbed nature of the site and it being surrounded by built-up areas it is highly unlikely that the proposed development will result in any significant additional impact on reptiles in general or in terms of habitat loss (especially since there are no listed or range-restricted reptiles expected in this area).

4.5.3. AMPHIBIANS

The site lies within the distribution range of 10 amphibian species. The only listed species which may occur at the site is the Giant Bullfrog, *Pyxicephalus adspersus*, which is listed as Near Threatened. This species is however associated with pans or wetland areas. The aridity of the site and the lack of natural pans or other water sources reduces and almost eliminates any natural habitat for most amphibian species. As a result, impacts on amphibians are likely to be local in extent and of low significance.

4.5.4. AVI-FAUNA

According to the Southern Africa Bird Atlas Project (SABAP 2) data sets, 140 bird species are known from the broad area surrounding the site (https://sabap2.birdmap.africa/). This includes 2 IUCN listed species, the Lanner Falcon, (*Falco biarmicus*). The animal species theme sensitivity is considered high sensitive because the site falls within the potential distribution range of both the **Lanner Falcon** and the **Ludwig's Bustard** (*Neotis ludwigii*).

Table 3: Animal species theme according to the NEMA EIA Sensitivity Scan results.

SENSITIVITY	FEATURES	MOTIVATION
High	Aves – *Falco biarmicus*	The Lanner falcon appears to be decreasing at a rate that satisfies the population-trend criterion for regionally Vulnerable. It occurs widely but sparsely throughout South Africa, Lesotho and Swaziland, with the highest densities recorded in Western Cape and KwaZulu-Natal. The species is a partial seasonal migrant, and there is a post-breeding exodus from the core breeding range in the eastern sour grasslands (December-January), with apparent movements westwards in the non-breeding season into Fynbos, Nama Karoo and southern Kalahari, returning May-June (van Zyl et al. 1994). It generally favours open grassland, cleared or open woodland and agricultural land and hunts mainly birds, especially doves, pigeons and chickens (Birdlife International, 2023). The bird may potentially hunt in the area and its surroundings especially for doves, pigeons etc. However, it is considered unlikely that this relatively small-scale development, located in an area surrounded by built-up areas would have had any significant additional impact on its hunting pastures or roosting areas. With regards to the is project the sensitivity rating is considered to be **low sensitive**.
Medium	Aves – *Neotis ludwigii*	Ludwig's Bustard is a near endemic and classified as endangered because of a projected rapid population decline. It has a large range centred on the dry biomes of the Karoo and Namib in southern Africa, being found in the extreme south-west of **Angola**, western **Namibia** and in much of **South Africa** (Del Hoyo *et al.* 1996, Anderson 2000). Today if occurs predominantly in the dry Karoo region of South Africa (Herold, 1988), but historically its distribution is believed to have extended to the eastern and north-eastern portions of the Grassland Biome (Brooke, 1984). This species inhabits open lowland and upland plains with grass and light thornbush, sandy open shrub veld and semi-desert in the arid and semi-arid Namib and Karoo biomes. The breeding season spans from August-December, with the species nesting on bare ground with a clutch of 2-3 eggs (Del Hoyo *et al.* 1996, Jenkins & Smallie 2009) The bird may potentially feed and nest in the surrounding area, but it is highly unlikely that it will venture so close to the urban edge. With regards to the is project the sensitivity rating is considered to be **low sensitive**.

5. IMPACT ASSESSMENT METHOD

The concept of environmental impact assessment in terms of the National Environmental Management Act, Act 107 of 1998 (NEMA) and the Environmental Impact Assessment (EIA) was developed to identify and evaluate the nature of potential impact to determine whether an activity is likely to cause significant environmental impact on the environment. The concept of significance is at the core of impact identification, evaluation and decision making, but despite this the concept of significance and the method used for determining significance remains largely undefined and open to interpretation (DEAT, 2002).

The objective of this study was to evaluate the remaining biodiversity of the study area to identify significant environmental features which might have been impacted because 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.

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

5.1.1. CRITERIA USED

***Conservation value*:** Conservation value refers to the intrinsic value of an attribute (e.g., an ecosystem, a vegetation type, a natural feature or a species) or its relative importance towards the conservation of an ecosystem or species or even natural aesthetics. Conservation status is based on habitat function, its vulnerability to loss and fragmentation or its value in terms of the protection of habitat or species (Refer to Table 4 for categories used).

Likelihood refers to the probability of the specific impact occurring because of the proposed activity (Refer to Table 5, for categories used).

Duration refers to the length in time during which the activity is expected to impact on the environment (Refer to Table 6).

Extent refers to the spatial area that is likely to be impacted or over which the impact will have influence, should it occur (Refer to Table 7).

Severity refers to the direct physical or biophysical impact of the activity on the surrounding environment should it occur (Refer to Table 8).

Table 4: Categories used for evaluating conservation status.

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

Table 5: Categories used for evaluating likelihood.

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

Table 6: Categories used for evaluating duration.

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

Table 7: Categories used for evaluating extent.

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

Table 8: Categories used for evaluating severity.

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

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 to allow the competent authority to make informed decisions. Specialist studies must advise the environmental assessment practitioner (EAP) on the significance of impacts in his field of specialty. To do this, the specialist must identify all potentially significant environmental impacts, predict the nature of the impact, and evaluate the significance of that impact should it occur.

Potential significant impacts are evaluated, using the method described above, to determine its potential significance. The potential significance is then described in terms of the categories given in Table 9. Mitigation options are evaluated, and comparison is then made (using the same method) of potential significance before mitigation and potential significance after mitigation (to advise the EAP).

Table 9: Categories used to describe significance rating (adjusted from DEAT, 2002)

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

6. SITE SENSITIVITY DISCUSSION

The proposed development footprint is located on an area (<15 ha) already transformed because of illegal development. No natural veld of any significance remains within the footprint area.

HABITAT CONDITIONS AND DIVERSITY: The whole footprint had already been transformed because of illegal housing developments (squatters) and no natural veld of any significance remains within the proposed study area. However, from historical google images, confirmed during the site visit, it does not seem as if the development within the footprint impacted on any significant landscape feature. Within the footprint the landscape is very homogenous with little variation over the site itself. It does not seem to have contained any rocky outcrops, watercourses or any other biophysical feature that might have resulted in special habitats for fauna or flora.

LAND-USE: The whole footprint had already been transformed because of illegal settlement. There is an urgent need within the Dawid Kruiper Municipal area to formalize these settlements to ensure better service delivery.

VEGETATION: Kalahari Karroid Shrubland are classified as "**Least Threatened**" in terms of the "*Revised List of ecosystems that are threatened and in need of protection*" (GN 47526 of 18 November 2022). The vegetation is described as a disturbed to very disturbed version of Karroid Shrubland. The whole footprint had already been transformed because of illegal settlement and no natural veld of any significance remains within the proposed study area.

The original settlement may have impacted on a several NCNCA protected species, but the veld is likely to have been in disturbed status (before the settlement) and it is considered highly unlikely that the illegal settlement would have contribute significantly to the loss of vegetation type or associated habitat.

THREATENED AND PROTECTED PLANT SPECIES: No red-data or nationally protected plant species were observed within the proposed footprint. One weedy disturbance indicator species, protected in terms of the NCNCA was observed within the footprint (Refer to Table 2).

Outside of the footprint several NCNCA protected species was observed (Table 1) and some of them might have occurred on the site. But according to the DEA Screening tool report, the relative plant species theme sensitivity is considered of low sensitivity, which is supported by the findings of this assessment.

FAUNA AND AVI-FAUNA: No evidence in the form of tracks, faeces or even burrows of any other indigenous fauna (e.g., small game) were observed within the footprint area, although it is expected that reptile's (like gecko's, agama's, skinks, and snakes) and some of the smaller mammals like rodents might still occur in the larger area. The veld was very homogeneous

and habitat variety or diversity within the footprint area is low to very low. The lack of rocky hills or outcrops within the development area would preclude a variety of species from the site. There are also no suitable habitats for amphibian species within the footprint area (Refer to Heading 4.5.1).

The animal species theme sensitivity is considered high sensitive because the site falls within the potential distribution range of both the **Lanner Falcon** and the **Ludwig's Bustard**. The Lanner Falcon may hunt and even roost in the vicinity, but it is highly unlikely that Ludwig's Bustard will venture so close to the urban edge. It is also considered unlikely that this relatively small-scale development, located in an area surrounded by built-up areas would have had any significant additional impact on Lanner Falcon's hunting or roosting areas (Refer to Table 3).

With regards **to this project the sensitivity rating should be low sensitive.**

CRITICAL BIODIVERSITY AREAS: According to the Northern Cape critical biodiversity areas maps, the proposed cemetery expansion area will NOT overlap any critical biodiversity area or ecological support areas as identified within the 2016 Northern Cape CBA maps (Figure 6)**.**

According to the DEA Screening tool report, the relative terrestrial biodiversity theme sensitivity is considered of low sensitivity, which is supported by the findings of this assessment (Refer to Table 10).

6.1. TERRESTRIAL BIODIVERSITY IMPACT ASSESSMENT

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

Table 10: Terrestrial biodiversity impact associated with the proposed development

Impact assessment								
Aspect	**Mitigation**	**CV**	**Lik**	**Dur**	**Ext**	**Sev**	**Significance**	Short discussion
Special habitats: Potential impact on special habitats (e.g., true quartz or "heuweltjies")	Without mitigation	1	1	4	1	1	7	No special habitats observed.
	With mitigation	1	1	4	1	1	7	N/a
Watercourses & Wetlands: Potential impact on natural water resources and it's ecological support areas.	Without mitigation						0	N/a. Not watercourses or wetlands observed or expected within the proposed footprint area.
	With mitigation						0	N/a
Landuse and cover: Potential impact on socio-	Without mitigation	1	1	5	1	1	8	The site falls within the urban edge, almost surrounded by urban development and has already been transformed as a result of illegal LCH development.

Impact assessment

Aspect	Mitigation	CV	Lik	Dur	Ext	Sev	Significance	Short discussion
economic activities.	With mitigation	1	1	5	1	1	8	Search & Rescue NCNCA protected species as described in Table 3.
Vegetation status: Loss of vulnerable or endangered vegetation and associated habitat.	Without mitigation	2	2	5	1	1	18	Permanent transformation of approximately 15 ha of disturbed indigenous vegetation (least threatened), within the urban edge (already developed).
	With mitigation	2	2	5	1	1	18	No mitigation possible. The site is already transformed.
Conservation priority: Potential impact on protected areas, CBA's, ESA's or Centre's of Endemism.	Without mitigation	1	2	5	1	1	9	Permanent transformation of approximately 15ha of land within the urban edge and not overlapping a CBA or ESA.
	With mitigation	1	2	5	1	1	9	No mitigation possible. The site is already transformed.
Connectivity: Potential loss of ecological migration corridors.	Without mitigation	1	2	5	1	1	9	Permanent transformation of approximately 15ha of land within the urban edge and not overlapping a CBA or ESA and with poor connectivity.
	With mitigation	1	2	5	1	1	9	No mitigation possible. The site is already transformed.
Protected & endangered plant species: Potential impact on threatened or protected plant species.	Without mitigation	2	3	5	1	1	20	Several NCNCA protected species was observed in the surrounding areas (including *Boscia foetida)*. It is likely some of them occurred on the site.
	With mitigation	2	3	5	1	1	20	No mitigation possible. The site is already transformed.
Fauna: Potential impact on mammals, reptiles & amphibians.	Without mitigation	1	3	5	1	1	10	Transformation of <15 ha of land, within the urban edge, no special habitats or wetland areas.
	With mitigation	1	3	5	1	1	10	No mitigation possible. The site is already transformed.
Avi-fauna: Potential impact on threatened or protected bird species.	Without mitigation	2	4	5	2	1	24	The site overlaps the distribution range of two IUCN listed bird species (the Lanner Falcon and Ludwig's Bustard). Refer to Table 4.
	With mitigation	2	4	5	2	1	24	No mitigation possible. The site is already transformed.
Cumulative impacts: Cumulative impact associated with proposed activity.	Without mitigation	2	4	5	2	1	24	Permanent transformation of <15ha of land, not considered threatened or within a CBA or ESA, but which might have contained NCNCA protected species.
	With mitigation	2	4	5	2	1	24	No mitigation possible. The site is already transformed.
The "No-Go" option: Potential impact associated with the No-Go alternative.	Without mitigation	2	4	5	2	1	24	The site is already transformed and occupied by LCH. Without intervention these people will be left without services which might be even more detrimental in the long run.
	With mitigation						0	

According to the **NEMA EIA Sensitivity** scan for the site the Terrestrial Biodiversity Theme Sensitivity is **low sensitive** and does not overlap any CBA or ESA.

The Terrestrial biodiversity assessment (Table 10) aims to take all the discussion under Section 4 into account, including the scale of the proposed project, the fact that the vegetation is not vulnerable or endangered as well as all the other reasons discussed throughout this document.

According, Table 10, the main impacts associated with the proposed development will be:

- A potential Low impact on a NCNCA protected and endangered plant species; and
- A potential Low impact on vulnerable Avi-Fauna species.

Because of the location, the scale and the condition of the surrounding vegetation even the cumulative impact given in Table 10 remains **Low**.

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

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

According to the DEA Screening tool report, the relative terrestrial biodiversity theme sensitivity is considered of low sensitivity, which is supported by the findings of this assessment.

6.2. TERRESTRIAL BIODIVERSITY SENSITIVITY MAP

The proposed site is very homogenous in vegetation cover and landscape and already disturbed (transformed) because of illegal development. No specific sensitive area had been identified, which should be protected, mitigated, or regarded as a no-go area. As a result, no sensitivity map is included.

7. RECOMMENDATIONS

The proposed development site is not considered sensitive in terms of terrestrial biodiversity and had already been transformed.

- All construction must be done in accordance with an approved construction and operational phase Environmental Management Plan (EMP), which must be developed by a suitably experienced Environmental Assessment Practitioner.
- A suitably qualified Environmental Control Officer must be appointed to monitor the construction phase in terms of the EMP and any other conditions pertaining to specialist studies.
- Before any work is done the footprint must be clearly demarcated. The demarcation must aim at minimum footprint and minimisation of disturbance.
- All alien invasive species within the footprint and or within 10 m of the footprint must be removed responsibly.
    - Care must be taken with the eradication method to ensure that the removal does not impact or lead to additional impacts (e.g., spreading of the AIP due to incorrect eradication methods);
    - Care must be taken to dispose of alien plant material responsibly.
- Indiscriminate clearing of any area outside of these footprints may not be allowed.
- An integrated waste management approach must be implemented during construction.
    - Construction related general and hazardous waste may only be disposed of at approved waste disposal sites.
    - All rubble and rubbish should be collected and removed from the site to a Municipal approved waste disposal site.

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APPENDIX 1: CURRICULUM VITAE – P.J.J. BOTES

Curriculum Vitae: Peet JJ Botes

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

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

BRIEF RESUME OF RELEVANT EXPERIENCE

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

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

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

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

LIST OF MOST RELEVANT BOTANICAL & BIODIVERSITY STUDIES

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

APPENDIX 2: DEA SCREENING REPORT