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**FAUNAL AND FLORAL ECOLOGICAL ASSESSMENT AS
PART OF THE ENVIRONMENTAL ASSESSMENT AND
AUTHORISATION PROCESS FOR A PROPOSED
OVERHEAD POWERLINE FOR THE HYPERION HYBRID
FACILITY, NEAR KATHU, NORTHERN CAPE PROVINCE**

Prepared for

Hyperion Solar Hybrid (Pty) Ltd.

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EXECUTIVE SUMMARY

Scientific Terrestrial Services (STS) was appointed to conduct a biodiversity assessment as part of the Basic Assessment (BA) process for the proposed development of an overhead powerline to connect the proposed Hyperion Hybrid Facility to the existing Eskom Kalbas substation, near the town of Kathu, Northern Cape Province, henceforth referred to as the “focus area”. The focus area consists of a 132kV overhead powerline (OHPL) and an associated 300 m corridor. This report includes a desktop screening assessment and faunal and floral ecological assessment as part of the Environmental Impact Assessment (EIA) process.

During the field assessment, one habitat unit was identified within the focus area, namely the Kathu Bushveld. Within the Kathu Bushveld habitat unit, suitable habitat exists to support an array of floral and faunal species. Overall, the condition of the habitat is good, although there is evidence that the area has experienced some form of degradation. Indigenous plant species dominated the focus area, and only one alien invasive plant (AIP) species was identified at the time of assessment, namely *Prosopis glandulosa* (Glandular Mesquite, Not Listed), indicating the very low level of alien plant impacts within the focus area.

During the field assessment no floral SCC (i.e. Red Data Listed plants), as defined in Section 52(2) of the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEMBA), were observed within the focus area. However, two protected trees, namely *Vachellia erioloba* and *V. haematoxylon*, as defined under The National Forest Act, 1998 (Act No. 84 of 1998, amended 2001) were recorded within focus area. Furthermore, the focus area provides suitable habitat for the protected tree species, *Bosica albitrunca*. This species was identified within the surrounding area and as such has the potential to disperse and establish within the focus area. Permits provided by the Department of Environment, Forestry and Fisheries (DEFF) will be required should any of the protected species be removed, destroyed, or relocated. If a walkdown of the focus area is conducted prior to the commencement of construction activities, and these species are rescued and relocated (if encountered), the anticipated impact on their populations will be minimal.

The focus area provides suitable habitat to support several faunal SCC. Potential faunal SCC are unlikely to permanently reside within the focus area, as many require large areas to forage and survive. However, smaller Arachnid SCC such as *Opisthophthalmus carinatus* (Robust Burrowing Scorpion), *O. wahlbergii* (Kalahari Burrower) and *Pterinochilus* spp (Golden-brown baboon spiders) may occur within the footprint areas and as such will be at increased risk from the associated development activities. Any faunal SCC located within the focus area will likely require provincial and possibly national permits to relocate them prior to the commencement of construction activities.

Following the ecological assessment of the biodiversity within the focus area, the impacts associated with the proposed development activities were determined. The impacts on the floral and faunal habitat, diversity and SCC are considered to range from medium-low to low significance impacts prior to the implementation of mitigation measures. With mitigation fully implemented all impacts can be reduced to low to very-low significance impacts. No significant impacts¹ on the biodiversity associated with the focus area are anticipated for the proposed development.

It is the opinion of the ecologists that this study provides the relevant information required in order to implement Integrated Environmental Management (IEM) and to ensure that the best long-term use of the ecological resources in the study area will be made in support of the principle of sustainable development.



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LIST OF ACRONYMS

| | |
|---------|--|
| AIP | Alien Invasive Plant |
| BGIS | Biodiversity Geographic Information Systems |
| CARA | Conservation of Agricultural Resource Act |
| CBA | Critical Biodiversity Area |
| CR | Critically Endangered |
| EAP | Environmental Assessment Practitioner |
| EIA | Environmental Impact Assessment |
| EN | Endangered |
| ESA | Ecological Support Area |
| GIS | Geographic Information System |
| GPS | Global Positioning System |
| Ha | Hectares |
| IBA | Important Bird Area |
| IEM | Integrated Environmental Management |
| IUCN | International Union for the Conservation of Nature |
| MAP | Mean Annual Precipitation |
| MAPE | Mean Annual Potential for Evaporation |
| MASMS | Mean Annual Soil Moisture Stress |
| MAT | Mean Annual Temperature |
| MFD | Mean Frost Days |
| NBA | National Biodiversity Assessment (2011) |
| NCNCA | Northern Cape Nature Conservation Act, 2009 (Act No. 9 of 2009) |
| NCPSDF | Northern Cape Provincial Spatial Development Framework |
| NEMA | National Environmental Management Act (Act 107 of 1998) |
| NEMBA | National Environmental Management: Biodiversity Act (Act 10 of 2004) |
| NPAES | National Protected Areas Expansion Strategy |
| NT | Near Threatened |
| OHPL | Overhead powerline |
| PES | Present Ecological State |
| POC | Probability of Occurrence |
| QDS | Quarter Degree Square (1:50,000 topographical mapping references) |
| RDL | Red Data List |
| SABAP 2 | Southern African Bird Atlas 2 |
| SACAD | South Africa Conservation Areas Database |
| SANBI | South African National Biodiversity Institute |
| SAPAD | South Africa Protected Area Database |
| SCC | Species of Conservation Concern |
| STS | Scientific Terrestrial Services CC |
| TOPS | Threatened or Protected Species |
| TSP | Threatened Species Programme |
| VU | Vulnerable |



GLOSSARY OF TERMS

Most definitions are based on terms and concepts elaborated by Richardson et al. (2011), Hui and Richardson (2017) and Wilson et al. (2017), with consideration to their applicability in the South African context, especially South African legislation [notably the National Environmental Management: Biodiversity Act, 2004 (Act no. 10 of 2004), and the associated Alien and Invasive Species (A&I) Regulations, 2014].

| | |
|--|--|
| Alien species (syn. exotic species; non-native species) | A species that is present in a region outside its natural range due to human actions (intentional or accidental) that have enabled it to overcome biogeographic barriers. |
| Biological diversity or Biodiversity (as per the definition in NEMBA) | The variability among living organisms from all sources including, terrestrial, marine, and other aquatic ecosystems and the ecological complexes of which they are part and includes diversity within species, between species, and of ecosystems. |
| Biome - as per Mucina and Rutherford (2006); after Low and Rebelo (1998). | A broad ecological spatial unit representing major life zones of large natural areas – defined mainly by vegetation structure, climate, and major large-scale disturbance factors (such as fires). |
| Bioregion (as per the definition in NEMBA) | A geographic region which has in terms of section 40(1) been determined as a bioregion for the purposes of this Act; |
| Bush encroachment | The increase in density of (usually native) woody plants so that the natural equilibrium of the woody plant layer (trees and shrubs) and herbaceous (grass and forb) layer densities is shifted in favour of trees and shrubs. |
| CBA (Critical Biodiversity Area) | A CBA is an area considered important for the survival of threatened species and includes valuable ecosystems such as wetlands, untransformed vegetation, and ridges. |
| Corridor | A dispersal route or a physical connection of suitable habitats linking previously unconnected regions. |
| Disturbance | A temporal change, either regular or irregular (uncertain), in the environmental conditions that can trigger population fluctuations and secondary succession. Disturbance is an important driver of biological invasions. |
| Ecoregion | An ecoregion is a "recurring pattern of ecosystems associated with characteristic combinations of soil and landform that characterise that region". |
| Endangered | Organisms in danger of extinction if causal factors continue to operate. |
| Endemic species | Species that are only found within a pre-defined area. There can therefore be sub-continental (e.g. southern Africa), national (South Africa), provincial, regional, or even within a particular mountain range. |
| ESA (Ecological Support Area) | An ESA provides connectivity and important ecological processes between CBAs and is therefore important in terms of habitat conservation. |
| Habitat (as per the definition in NEMBA) | A place where a species or ecological community naturally occurs. |
| IBA (Important Bird and Biodiversity Area) | The IBA Programme identifies and works to conserve a network of sites critical for the long-term survival of bird species that: are globally threatened, have a restricted range, are restricted to specific biomes/vegetation types or sites that have significant populations. |
| Indigenous vegetation (as per the definition in NEMA) | Vegetation occurring naturally within a defined area, regardless of the level of alien infestation and where the topsoil has not been lawfully disturbed during the preceding ten years. |
| Integrity (ecological) | The integrity of an ecosystem refers to its functional completeness, including its components (species) its patterns (distribution) and its processes. |
| Invasive species | Alien species that sustain self-replacing populations over several life cycles, produce reproductive offspring, often in very large numbers at considerable distances from the parent and/or site of introduction, and have the potential to spread over long distances. |
| Listed alien species | All alien species that are regulated in South Africa under the National Environmental Management: Biodiversity Act, 2004 (Act 10 of 2004), Alien and Invasive Species (A&I) Regulations, 2016. |
| Least Threatened | Least threatened ecosystems are still largely intact. |



| | |
|--|---|
| <p>Native species (syn. indigenous species)</p> | <p>Species that are found within their natural range where they have evolved without human intervention (intentional or accidental). Also includes species that have expanded their range as a result of human modification of the environment that does not directly impact dispersal (e.g. species are still native if they increase their range as a result of watered gardens, but are alien if they increase their range as a result of spread along human-created corridors linking previously separate biogeographic regions).</p> |
| <p>RDL (Red Data listed) species</p> | <p>According to the Red List of South African plants (http://redlist.sanbi.org/) and the International Union for Conservation of Nature (IUCN), organisms that fall into the Extinct in the Wild (EW), critically endangered (CR), Endangered (EN), Vulnerable (VU) categories of ecological status.</p> |
| <p>SCC (Species of Conservation Concern)</p> | <p>The term SCC in the context of this report refers to all RDL (Red Data) and IUCN (International Union for the Conservation of Nature) listed threatened species as well as protected species of relevance to the project.</p> <p>Specifically related to flora: A list of floral SCC for the Northern Cape is available under Schedule 2 of the Northern Cape Nature Conservation Act, 2009 (Act No. 9 of 2009), comprising SANBI Red Data Listed species. Additional datasets and sources that were also taken into consideration included:</p> <ul style="list-style-type: none"> - The Botanical Database of Southern Africa (BODATSA) to obtain plant names and floristic details (http://posa.sanbi.org/); and - The List of Protected Tree Species (GN 809 of 2014) under the National Forest Act, 1998 (Act No. 84 of 1998). <p>Specifically related to fauna: A list of faunal SCC as identified by the Threatened or Protected Species list (2007) is available for the Northern Cape. Additional datasets and sources that were also taken into consideration included:</p> <ul style="list-style-type: none"> - The National Environmental Management: Biodiversity Act, 2004 (Act No.10 of 2004) (NEMBA) Threatened or Protected Species (TOPS) list (NEMBA, Notice 389 of 2013); - The International Union for Conservation of Nature (IUCN) Red List of Threatened Species; and - The 2015 Eskom Red Data Book of Birds of South Africa, Lesotho and Swaziland; - The Atlas and Red List of the Reptiles of South Africa, Lesotho, and Swaziland. |



1. INTRODUCTION

1.1 Background

Scientific Terrestrial Services (STS) was appointed to conduct a biodiversity assessment as part of the Basic Assessment (BA) process for the proposed development of an overhead powerline to connect the proposed Hyperion Hybrid Facility to the existing Eskom Kalbas substation, near the town of Kathu, Northern Cape Province, henceforth referred to as the “focus area”. The focus area consists of a 132kV overhead powerline (OHPL) and an associated 300 m corridor. This report includes a desktop screening assessment and faunal and floral ecological assessment as part of the Environmental Impact Assessment (EIA) process.

The focus area is in the Gamagara Metropolitan Municipality which is an administrative area of the John Taolo Gaetse District Municipality. The focus area is situated approximately 15 km north of the town of Kathu, 11 km northeast of the Sishen Airport, and approximately 5 km northwest of the N14 national route. The location and extent are indicated in Figures 1 and 2.

The focus area will consist of the following infrastructure (Figure 3):

- 132kV OHPL; and
- 300 m corridor (the exact location of the overhead powerline (OHPL) was not known at the time of the assessment, therefore a 300m corridor was assessed).

This report, after consideration and the description of the ecological integrity of the focus area, must guide the Environmental Assessment Practitioner (EAP), regulatory authorities and developing proponent, by means of the presentation of results and recommendations, as to the ecological viability of the proposed development activities.



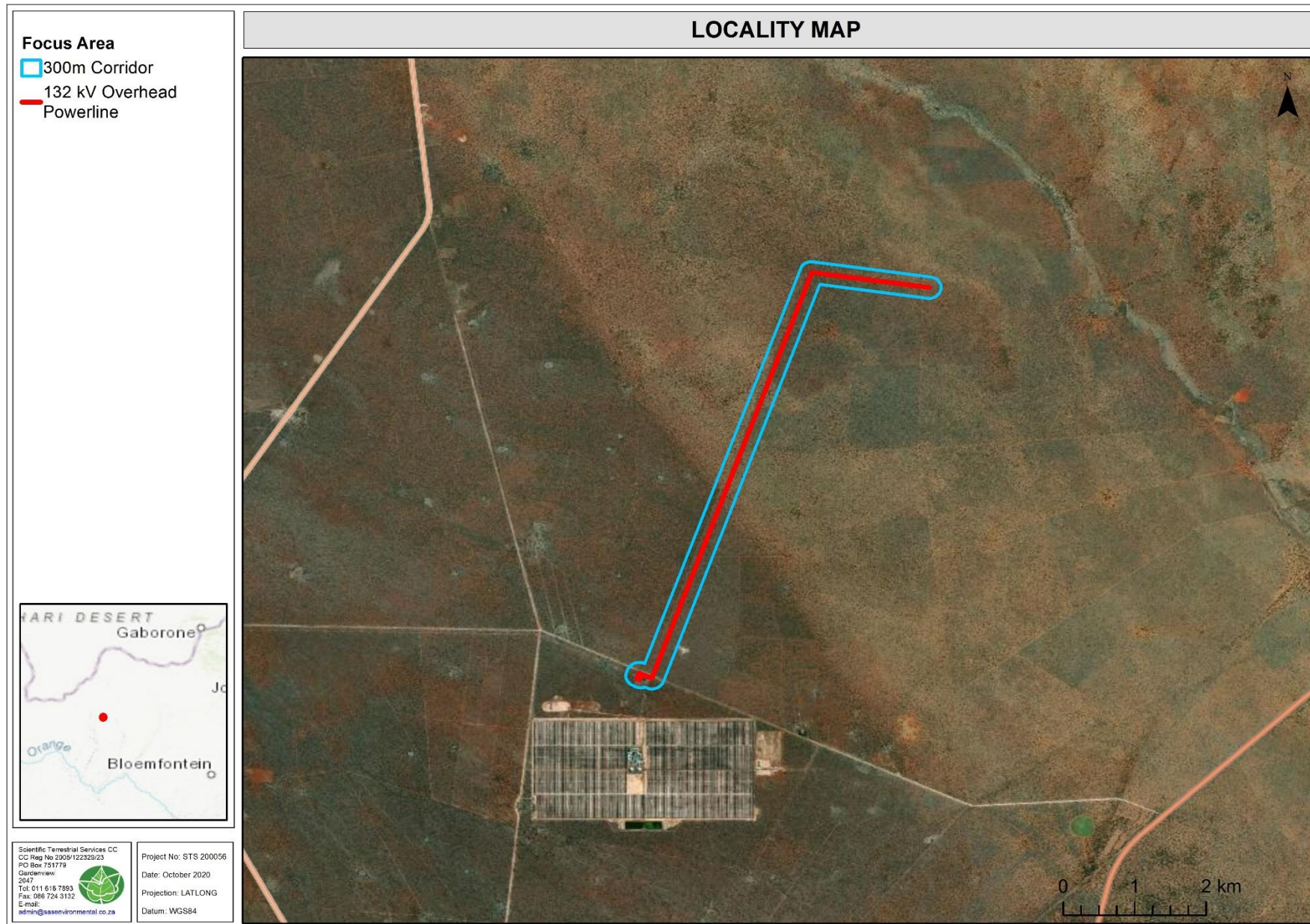


Figure 1: Digital Satellite image depicting the location of the focus area in relation to surrounding areas.



1.2 Project Scope

Specific outcomes in terms of this report are outlined below:

- To define the Present Ecological State (PES) of the terrestrial ecological resources associated with the focus area;
- To determine and describe habitats, communities and ecological state of the focus area;
- To conduct a faunal and floral Species of Conservation Concern (SCC) assessment, including potential for such species to occur within the focus area;
- To identify and consider all sensitive landscapes including rocky ridges, wetlands, and any other ecologically important features, if present; and
- To determine the environmental impacts that the construction of the proposed development might have on the terrestrial ecology associated with the focus area, as well as potential impacts on the ecology due to activities related to the proposed development and to develop mitigation and management measures for all phases of the development.

1.3 Assumptions and Limitations

The following assumptions and limitations are applicable to this report:

- The ecological assessment is confined to the focus area and immediate surrounding area and does not include the neighbouring and adjacent properties; these were however considered as part of the desktop assessment;
- With ecology being dynamic and complex, some aspects (some of which may be important) may have been overlooked. It is, however, expected that most floral and faunal communities have been accurately assessed and considered;
- Due to the often secretive nature and habits of most faunal taxa and the time (season) of the assessment, it is unlikely that all species would have been observed during a field assessment of limited duration. Therefore, site observations were compared with literature studies where necessary;
- Sampling by its nature, means that not all individuals are assessed and identified. Some species and taxa within the focus area may have been missed during the assessment; and
- The data presented in this report are based on a site visit, undertaken during October 2020. A more accurate assessment would require that assessments take place in all seasons of the year. However, on-site data was significantly augmented with all



available desktop data, and the findings of this assessment are considered to be an accurate reflection of the ecological characteristics of the focus area.

1.4 Legislative Requirements

The following legislative requirements were considered during the assessment:

- The Constitution of the Republic of South Africa, 1996¹;
- National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA);
- National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEMBA);
- Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983) (CARA);
- Government Notice R598 Alien and Invasive Species Regulations as published in the Government Gazette 37885 dated 1 August 2014 as it relates to the National Environmental Management Biodiversity Act, 1998 (Act No.107 of 1998);
- Government Notice 536 List of Protected Tree Species as published in the Government Gazette 41887 dated 7 October 2018 as it relates to the National Forest Act, 1998 (Act No. 84 of 1998);
- The National Forest Act, 1998 (Act No. 84 of 1998, as amended in October 2011) (NFA);
- The Northern Cape Nature Conservation Act, 2009 (Act No. 9 of 2009) (NCNCA); and
- The Northern Cape Provincial Spatial Development Framework (NCPSDF) as developed 2011 to meet the requirements of the Northern Cape Planning and Development Act, 1998 (Act No.7 of 1998) and the Municipal Systems Act, 2000 (Act No. 32 of 2000).

The details of each of the above, as they pertain to this study, are provided in Appendix B of this report.

2. ASSESSMENT APPROACH

2.1 General Approach

Maps and digital satellite images were generated prior to the field assessment to determine broad habitats, vegetation types and potentially sensitive sites. The biodiversity desktop assessment is confined to the focus area and does not include the neighbouring and adjacent

¹ Since 1996, the Constitution has been amended by seventeen amendments acts. The Constitution is formally entitled the 'Constitution of the Republic of South Africa, 1996'. It was previously also numbered as if it were an Act of Parliament – Act No. 108 of 1996 – but since the passage of the Citation of Constitutional Laws Act, neither it nor the acts amending it are allocated act numbers



properties, although the sensitivity of surrounding areas is included on the respective maps. Relevant databases and documentation that were considered during the assessment of the focus area included ²:

- The National Protected Areas Expansion Strategy (NPAES) focus areas for Protected Area Expansion, 2009 (Formally and Informally Protected Areas):
- South African Conservation Areas Database, Quarter 4 (SACAD, 2019);
- The South African Protected Areas Database, Quarter 4 (SAPAD, 2019);
- Northern Cape Critical Biodiversity Areas (2016);
- Mucina and Rutherford, 2012 and 2018:
 - Biomes, Bioregions and Vegetation Type(s);
- The National Threatened Ecosystems (2011);
- The National Biodiversity Assessment (NBA, 2018);
- Important Bird and Biodiversity Areas (IBAs) (2015), in conjunction with the South African Bird Atlas Project (SABAP2); and
- The International Union for Conservation of Nature (IUCN).

The field assessment took place during October 2020 to determine the ecological status of the focus area and to “ground-truth” the results of the desktop assessment. Results of the field assessment is presented in Sections 4 and 5.

2.2 Sensitivity Mapping

All the ecological features of the focus area were considered, and sensitive areas were delineated with the use of a Global Positioning System (GPS). In addition, identified locations of SCC and SANBI protected species were also marked by means of GPS. A Geographic Information System (GIS) was used to project these features onto aerial photographs and topographic maps.

² Datasets obtained from:

- SANBI BGIS (2019). The South African National Biodiversity Institute - Biodiversity GIS (BGIS) [online]. URL: <http://bgis.sanbi.org> as retrieved in 2019; and
- Department of Environmental Affairs (DEA) Environmental Geographical Information Systems (E-GIS) website. URL: <https://egis.environment.gov.za/>



3. RESULTS OF THE DESKTOP ANALYSIS

3.1 Conservation Characteristics of the Focus area based on national and provincial databases

The following section contains data accessed as part of the desktop assessment and are presented as a “dashboard” report below (Table 1). The dashboard report aims to present concise summaries of the data on as few pages as possible to allow for improved assimilation of results by the reader to take place. Where required, further discussion and interpretation are provided.

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Table 1: Summary of the terrestrial conservation characteristics for the focus area (Quarter Degree Square (QDS) 2723CA).

| CONSERVATION DETAILS PERTAINING TO THE AREA OF INTEREST (VARIOUS DATABASES) | | DETAILS OF THE AREA OF INTEREST IN TERMS OF MUCINA & RUTHERFORD (2006, 2018, 2012) | | | | |
|--|--|--|--|-----------|-------------|------------|
| <p>NATIONAL BIODIVERSITY ASSESSMENT (NBA): Ecosystem types are categorised as “not protected”, “poorly protected”, “moderately protected” and “well protected” based on the proportion of each ecosystem type that occurs within a protected area recognised in the National Environmental Management: Protected Areas Act, 2003 (Act no. 57 of 2003) (NEMPAA), and compared with the biodiversity target for that ecosystem type. the ecosystem protection level status is assigned using the following criteria:</p> <ol style="list-style-type: none"> I. if an ecosystem type has more than 100% of its biodiversity target protected in a formal protected area either a or b, it is classified as well protected, II. when less than 100% of the biodiversity target is met in formal a or b protected areas it is classified it as moderately protected, III. if less than 50% of the biodiversity target is met, it is classified it as poorly protected, and IV. if less than 5% it is hardly protected. | | Biome | The focus area is situated within the Savanna Biome . | | | |
| | | Bioregion | The focus area is located within the Eastern Kalahari Bushveld Bioregion . | | | |
| | | Vegetation Type | The focus area is situated within the Kathu Bushveld . | | | |
| | | Climate | Summer and autumn rainfall with very dry winters. | | | |
| | | | MAP* (mm) | MAT* (°C) | MFD* (Days) | MAPE* (mm) |
| | | 300 | 18.5 | 27 | 2 883 | 85 |
| | | Altitude (m) | 960 –1 300 | | | |
| <p>NBA (2018):</p> <ol style="list-style-type: none"> 1) Ecosystem Threat Status 2) Ecosystem Protection Level | <p><u>NBA 2018 dataset (Figure 4):</u> The focus area is located within the Kathu Bushveld which is considered a Least Concern ecosystem and is currently Poorly Protected.</p> | Distribution | Northern Cape Province: Plains from Kathu and Dibeng in the south, through Hotazel, vicinity of Frylinckspan to the Botswana border roughly between Van Zylsrus and McCarthysrus. | | | |
| | | Conservation | Least threatened. Target 16%. None conserved in statutory conservation areas. More than 1% already transformed, including the iron ore mining locality at Sishen, one of the biggest open-cast mines in the world. Erosion is very low. | | | |
| <p>National Threatened Ecosystems (2011) Figure 4</p> | <p>The focus area is located within an ecosystem that is currently considered to be Least Concern. Least Concern (LC) ecosystems have not experienced a significant loss of natural habitat or deterioration in condition.</p> <p>For Environmental Impact Assessments (EIAs), the 2011 National list of Threatened Ecosystems remains the trigger for a Basic Assessment in terms of Listing Notice 3 of the EIA Regulations published under the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA).</p> | Geology & Soils | Aeolian red sand and surface calcrete, deep (>1.2 m) sandy soils of Hutton and Clovelly soil forms. Land types mainly Ah and Ae, with some Ag. | | | |
| | | Vegetation & landscape features | Medium-tall tree layer with <i>Acacia erioloba</i> in places, but mostly open and including <i>Boscia albitrunca</i> as the prominent trees. Shrub layer generally most important with, for example, <i>A. mellifera</i> , <i>Diospyros lycioides</i> and <i>Lycium hirsutum</i> . Grass layer is variable in cover. | | | |
| IBA (2015) | The focus area is not located within a 10km radius an Important Bird Area. | | | | | |
| SAPAD (2019, Q3); SACAD (2019, Q3); NPAES (2009). Figure 5 | The South African Protected Areas Database (SAPAD, 2019), the South African Conservation Areas Database (SACAD, 2019), and the National Protected Areas Expansion Strategy (NPAES, 2009) indicate that the Khatu Forest Nature is located within a 10km zone from the focus area. | | | | | |



| NORTHERN CAPE CRITICAL BIODIVERSITY AREAS (2016) (FIGURE 6) | | NORTHERN CAPE PROVINCIAL SPATIAL DEVELOPMENT FRAMEWORK (NCPSTDF, 2019) (FIGURE 7 & 8) | |
|--|--------------------------------|---|--|
| <p>According to the Northern Cape Critical Biodiversity Areas (2016) database, most of the focus area is located within areas categorised as Other Natural Areas. However, the southern portion of the 300 m corridor is located within an Ecological Support Area.</p> | | <p>The NCPSTDF is to function as an innovative strategy that will apply sustainability principles to all forms of land use management throughout the Northern Cape as well as to facilitate practical results, as it relates to the eradication of poverty and inequality and the protection of the integrity of the environment.</p> <p>The focus area is located within the Griqualand West Centre (GWC) of plant endemism (Figure 6). This semi-arid region is broadly described as Savanna, forming part of the Eastern Kalahari Bushveld Bioregion. Studies investigating the endemism of the centre report at least 23 plant species that have restricted distributions (Frisby <i>et al.</i> 2019).</p> <p>The focus area also falls within the Gamagara corridor (Figure 7). The Gamagara Corridor comprises the mining belt of the John Taolo Gaetsewe and Siyanda districts and runs from Lime Acres and Danielskuil to Hotazel in the north. The corridor focuses on the mining of iron and manganese.</p> | |
| NATIONAL WEB BASED ENVIRONMENTAL SCREENING TOOL (2020) | | | |
| <p>The screening tool is intended to allow for pre-screening of sensitivities in the landscape to be assessed within the EA process. This assists with implementing the mitigation hierarchy by allowing developers to adjust their proposed development footprint to avoid sensitive areas</p> | Terrestrial Biodiversity Theme | For the terrestrial biodiversity theme, the focus area is considered to have a very high sensitivity . The triggered sensitivity features include an Ecological Support Area (ESA). | |
| | Plant Species Theme | For the plant species theme, the entire focus area is considered to have a low sensitivity . | |
| | Animal Species Theme | For the animal species theme, the entire focus area is considered to have a medium sensitivity . The triggered sensitivity is due to the presence of <i>Sagittarius serpentarius</i> (Secretary bird). | |
| STRATEGIC WATER SOURCE AREAS FOR SURFACE WATER (2017) | | | |
| <p>Surface Water SWSAs are defined as areas of land that supply a disproportionate (i.e. relatively large) quantity of mean annual surface water runoff in relation to their size. They include transboundary areas that extend into Lesotho and Swaziland. The sub-national water source areas (WSAs) are not nationally strategic as defined in the report but were included to provide a complete coverage.</p> | Name & Criteria | The focus area is not within 10 km of a Strategic Water Source Area. | |

NBA = National Biodiversity Assessment; NPAES = National Protected Areas Expansion Strategy; SAPAD = South African Protected Areas Database; IBA = Important Bird Area; MAP – Mean annual precipitation; MAT – Mean annual temperature; MAPE – Mean annual potential evaporation; MFD = Mean Frost Days; MASMS – Mean annual soil moisture stress (% of days when evaporative demand was more than double the soil moisture supply).



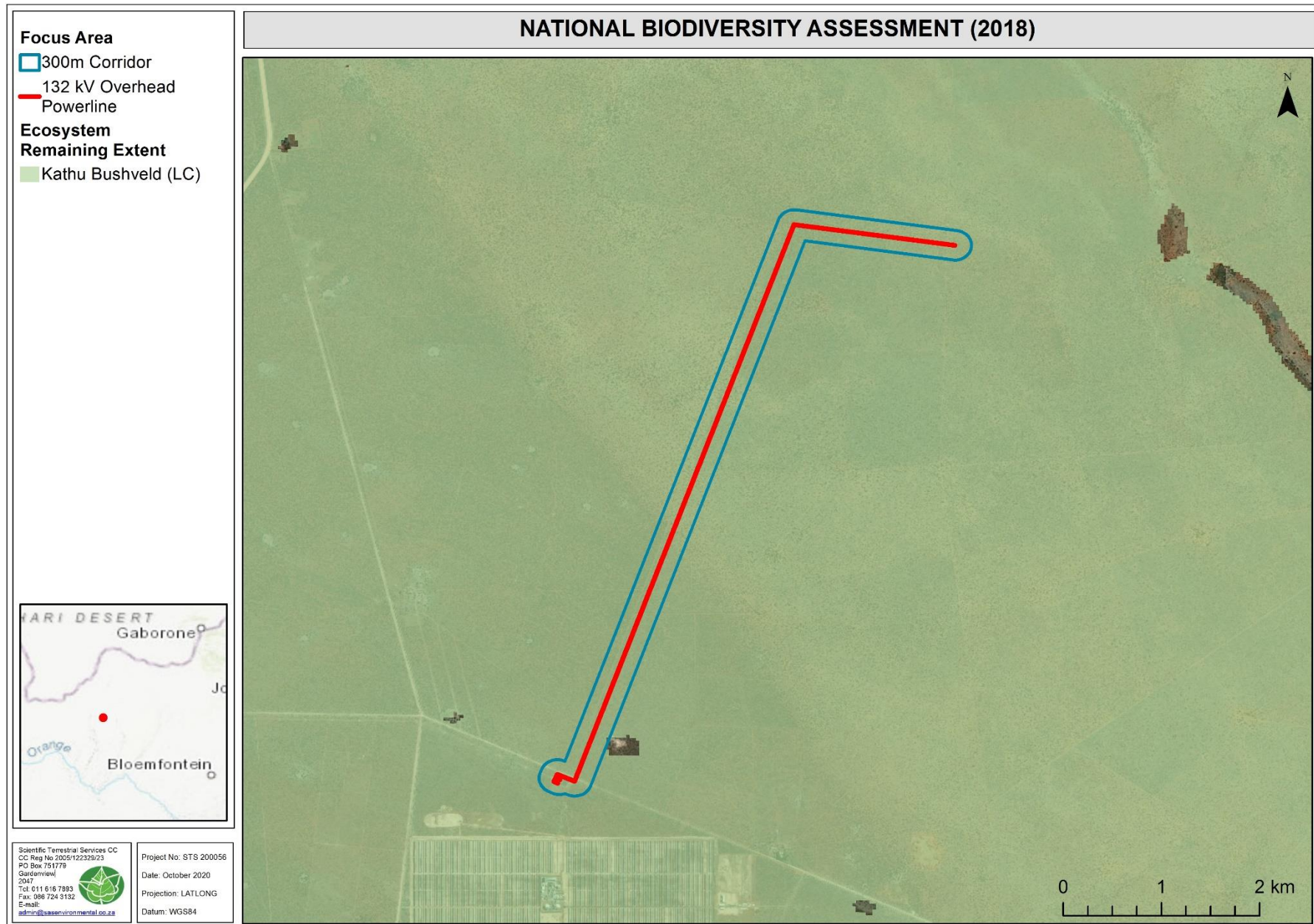


Figure 3: The remaining extent of the Endangered Egoli Granite Grassland, according to the National Biodiversity Assessment (NBA, 2018).



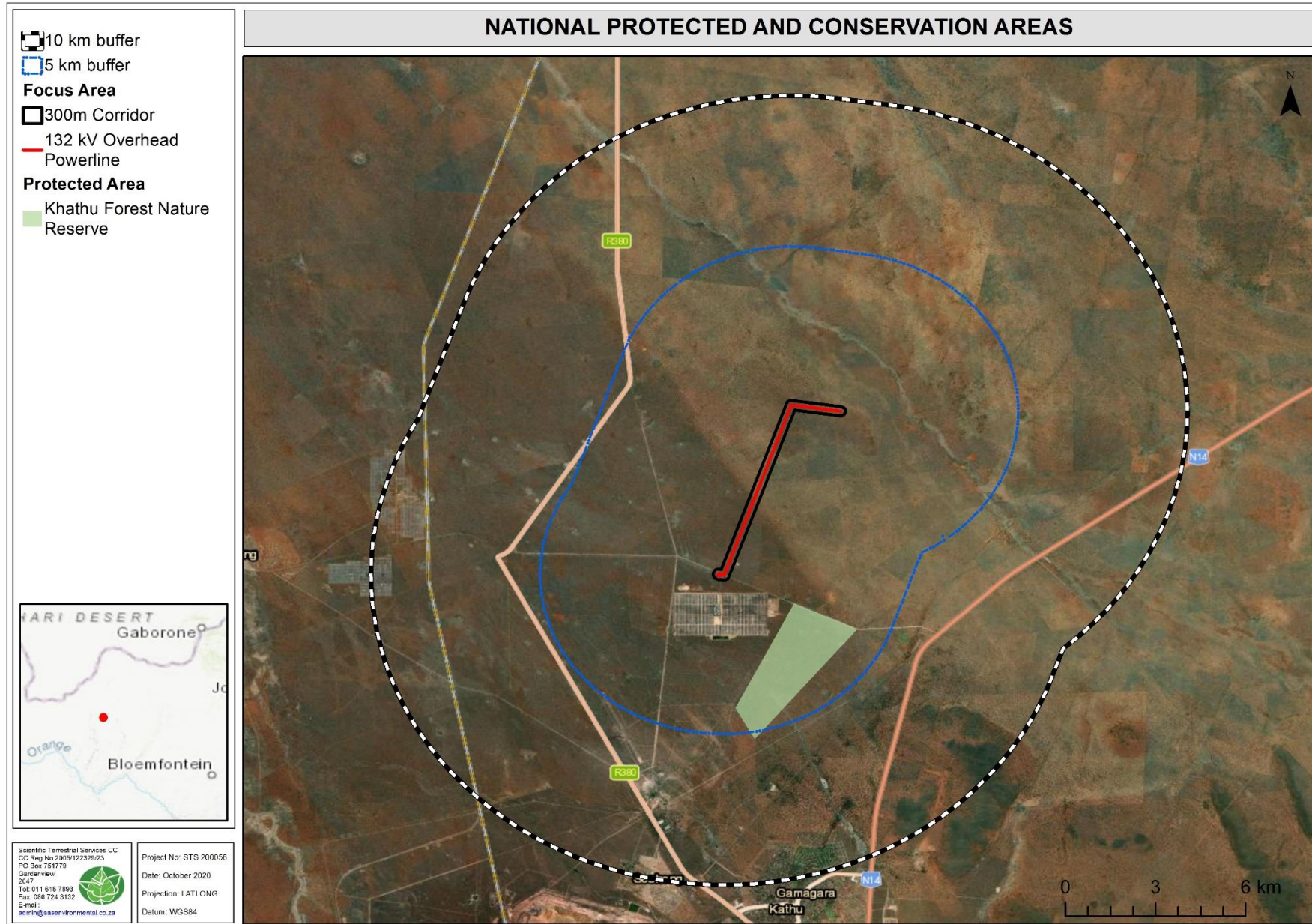


Figure 4: Protected areas within a 5 km and 10 km radius of the focus area, according to SAPAD (Q4, 2019), SACAD (Q4, 2019) and NPAES (2009).



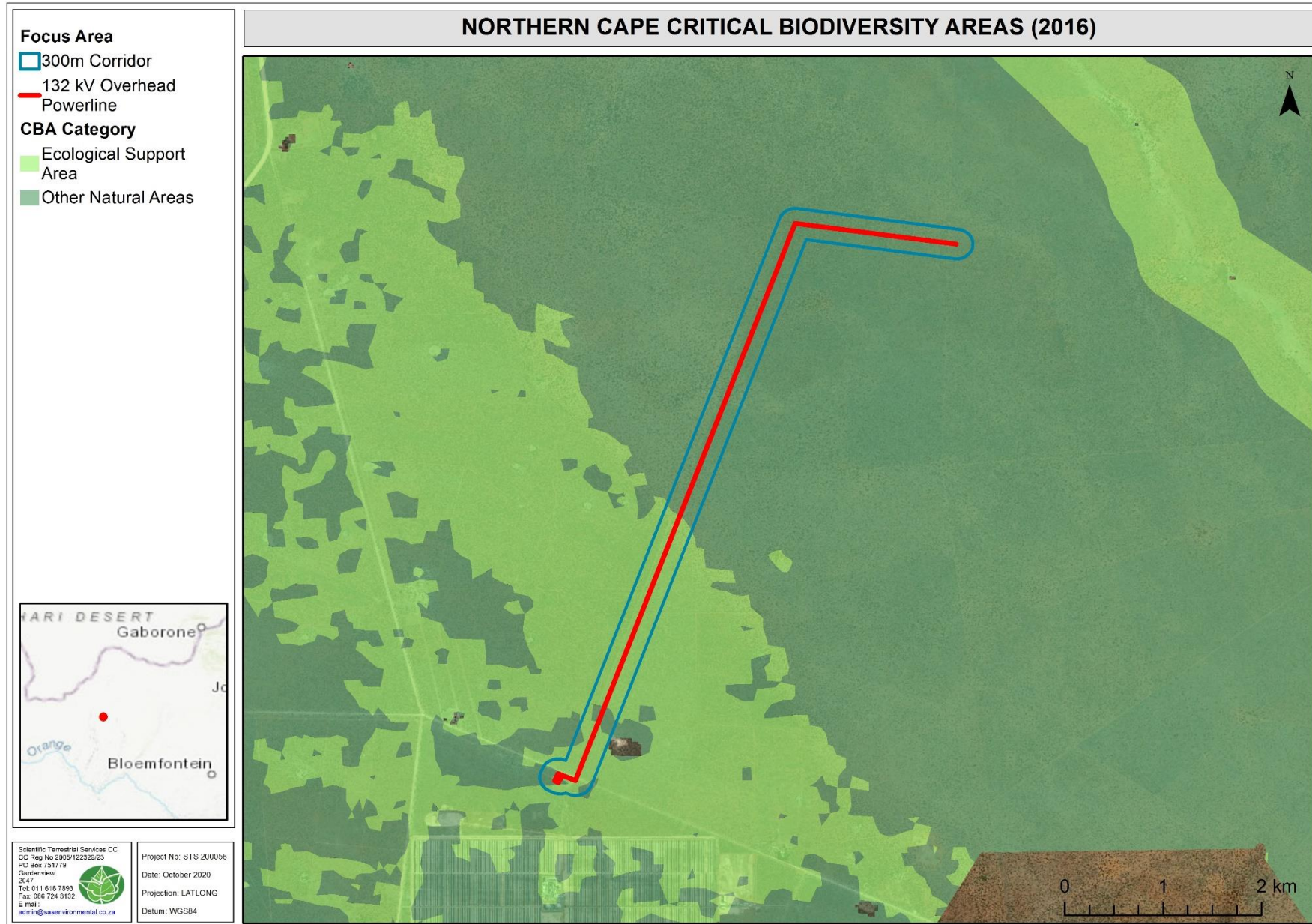


Figure 5: Northern Cape Critical Biodiversity areas associated with the focus area and the associated infrastructure.



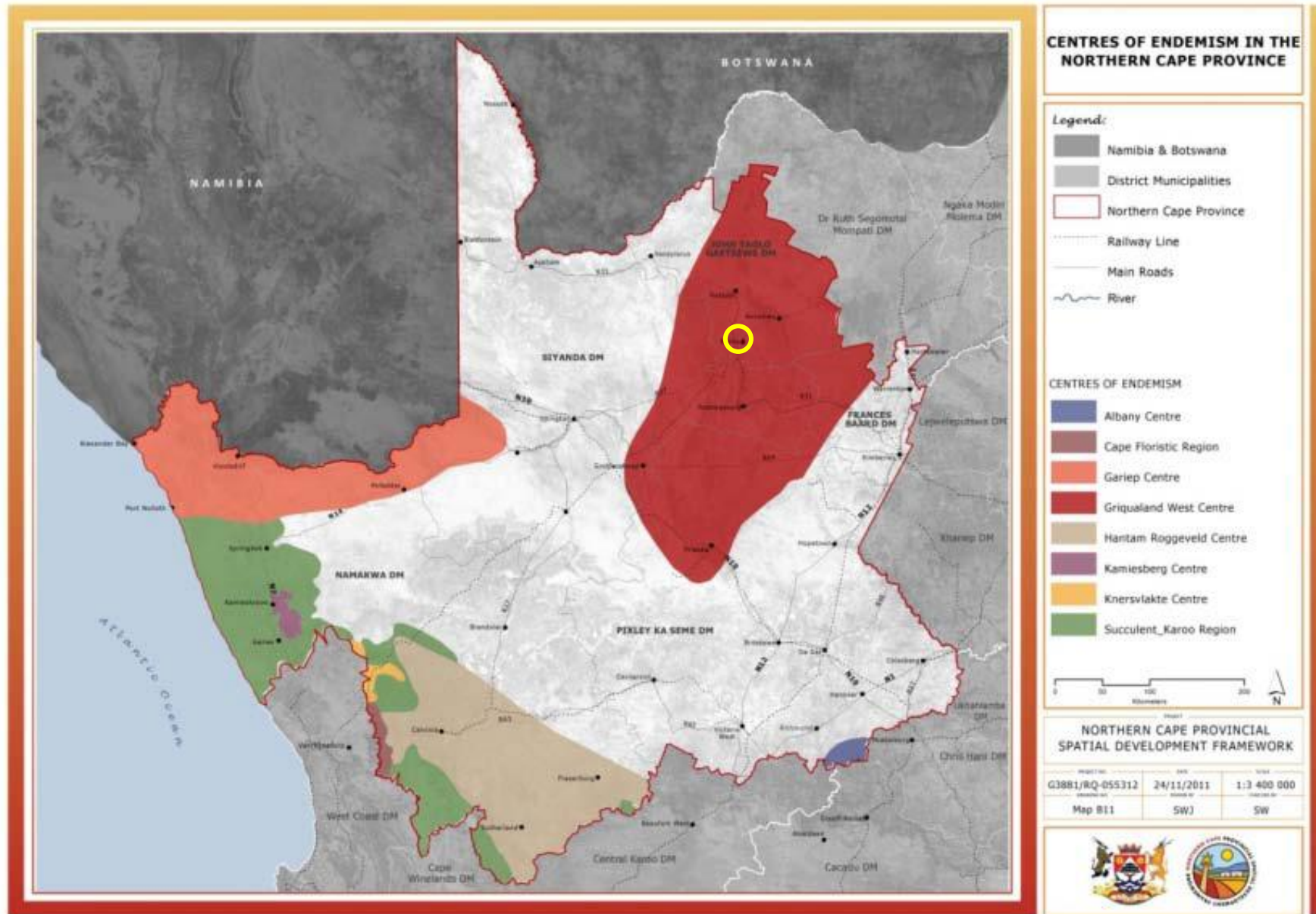


Figure 6: Centers of endemism of the Northern Cape Province: the focus area indicated by the yellow circle (NPSDF, 2012).



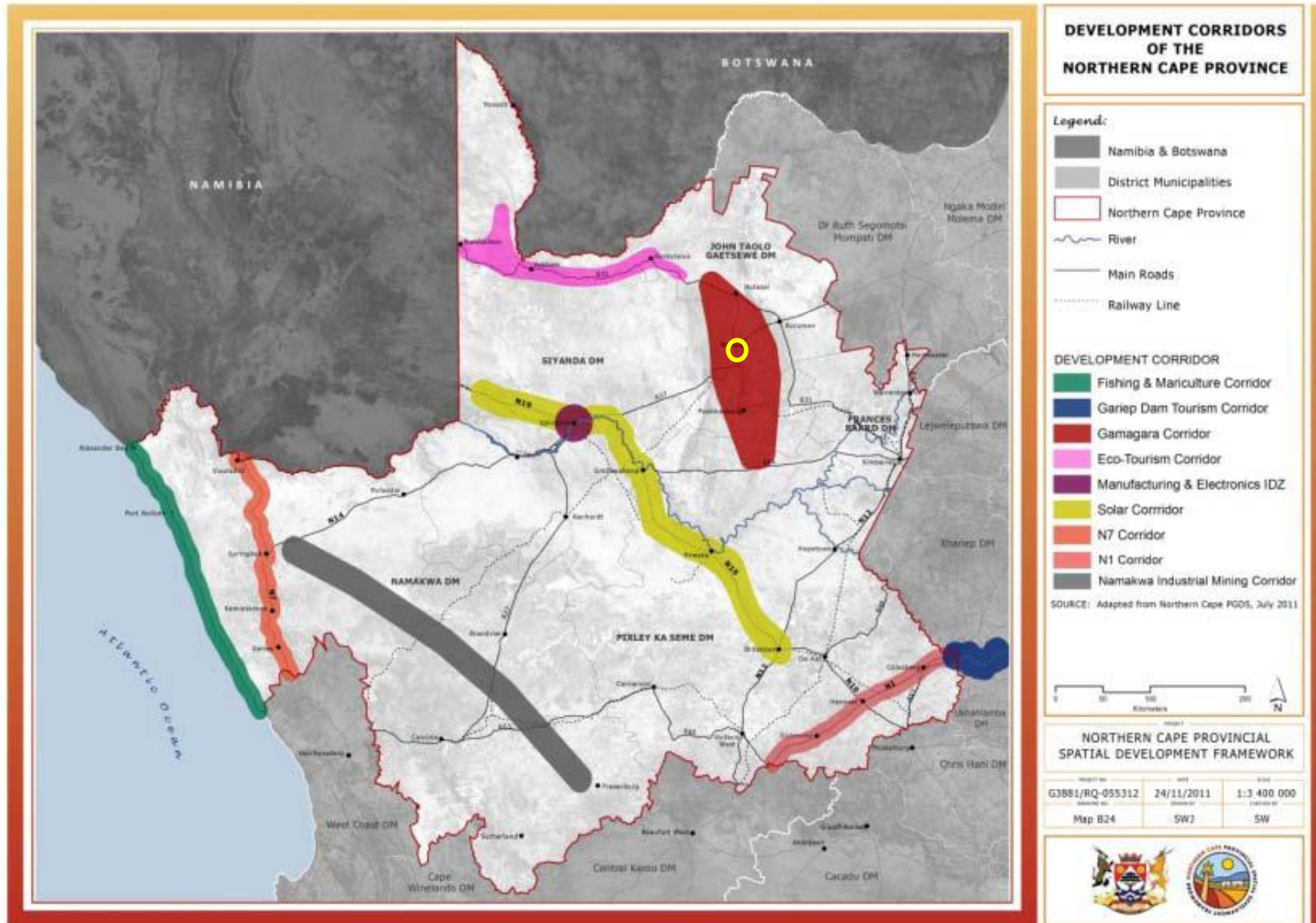


Figure 7: Development corridors of the Northern Cape Province: the focus area is indicated by the yellow circle (NPSDF, 2012).



4. RESULTS OF THE FLORAL ASSESSMENT

4.1 Habitat Units within the Focus area

Overall, the habitat unit within the focus area is typical of the Kathu Bushveld vegetation type as described by Mucina & Rutherford (2006), i.e. the reference state. Mucina and Rutherford (2006) describe the Kathu Bushveld as having an open, medium-tall tree layer in which *Bosica albitrunca* often dominants. The unit has a well-defined shrub layer (e.g. *Diospyros lycioides* and *Senegalia mellifera*), however, the grass layer is somewhat variable. The vegetation unit is considered largely intact as only 2% of the unit has been transformed. Although described as least concern, the vegetation unit has started becoming increasingly fragmented owing to the recent escalation of mining and solar development activities within the area (3 Foxes Biodiversity Solution, March 2019). The biodiversity of the focus area can thus be defined under one broad habitat unit, namely Kathu Bushveld. A depiction of the habitat unit within the focus area is presented in Figure 9 below.

The Kathu Bushveld habitat unit was largely dominated by *Tarchonanthus camphoratus* and *Vachellia haematoxylon*. Other woody species found within the unit included *Vachellia erioloba*, *Senegalia mellifera* and *Ziziphus mucronata*. Although well-defined, the density of the shrub layer was low. Dominant shrub species included *Asparagus larycinus*, *Acacia hebeclada* and *Lantana rugosa*. The grass layer is dominated by *Aristida meridionalis*, *Cynodon dactylon*, *Eragrostis lehmanniana* and *Aristida congesta* subsp. *congesta*.

Within the Kathu Bushveld habitat unit, suitable habitat exists to support an array of floral and faunal species. Overall the condition of the habitat is considered to be good, although there is evidence that the area has experienced some form of degradation especially as *T. camphoratus*, often an indicator of poor veld condition, is somewhat prolific within the area (3 Foxes Biodiversity Solution, March 2019).



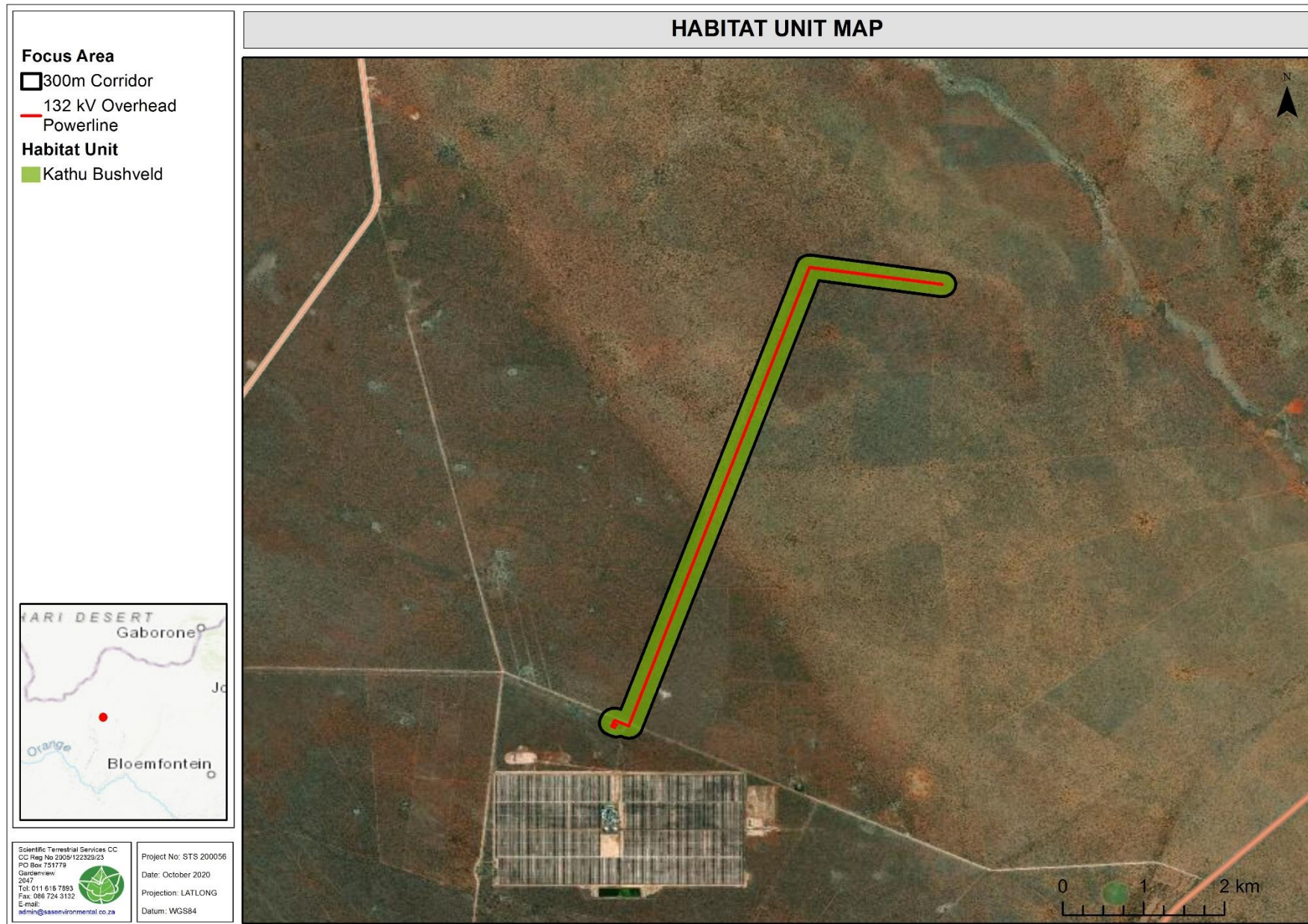





Figure 8: Habitat units encountered within the focus area.



Table 2: Summary of results of the floral assessment.

| Kathu Bushveld Habitat Sensitivity | Intermediate |
|---|--------------|
| <div data-bbox="716 335 1456 702" style="text-align: center;"> <p>Floral SCC 5 4 3 2 1 0</p> <p>Presence of Unique Landscape</p> <p>Floral Diversity</p> <p>Habitat Integrity</p> <p>Conservation Status</p> </div> | |
| Representative photographs of the habitat within the focus area | |
| <div style="display: flex; justify-content: space-around; align-items: center;">    </div> <p style="text-align: center;">Left: <i>Elephantorrhiza elephantina</i> Middle: <i>Tarchonanthus camphoratus</i> Right: <i>Vachellia erioloba</i></p> | |



SCC Discussion

No nationally threatened SCC (i.e. Red Data Listed plants), as defined in NEMBA Section 52(2), were recorded during the site assessment. However, the NFA protected tree species, *Vachellia erioloba*, and *V.haematoxylon* were observed within this habitat unit. Permits will have to be obtained from DEFF for the individuals of *V. erioloba*, and *V.haematoxylon* that will have to be removed for construction to proceed. These trees occur fairly abundantly throughout the habitat unit. Furthermore, the protected tree, *Boscia albitrunca*, was identified within in the immediate area surrounding of the focus area. As such, the potential for dispersal and thus the establishment of this species within the focus area is a possibility. Before the commencement of any development activities within the focus area, a walk-through should be conducted to ensure this species is not present. If its presence within the focus area is confirmed, permits will have to be obtained from DEFF for the individuals that will have to be removed for construction to proceed.

Ecological Discussion

From a floral perspective, the Kathu Bushveld habitat unit has experienced a small degree of degradation. Despite this, the habitat unit still provides a good representation of the reference vegetation type. Indigenous plant species dominated the focus area, and only one alien invasive plant (AIP) species was identified at the time of assessment, namely *Prosopis glandulosa* (Glandular Mesquite, Not Listed), indicating the very low level of alien plant impacts within the focus area. In particular, the focus area was largely dominated by *Tarchonanthus camphoratus* and *V. haematoxylon*, with some areas where *V. erioloba* and/or *Senegalia mellifera* become dominant. The dominance of *T. camphoratus* is an indication of a poorer veld condition, further indicating that the focus area has experienced small amounts of degradation.

The focus area supported a wide array of indigenous species and overall diversity was moderately high. Common woody species found throughout the focus area included *Zizyphus mucronata*, *Searsia ciliata*, and *Diospyros lycioides* subsp. *lycioides*. In terms of the graminoid layer, the focus area was largely dominated by *Schmidtia pappophoroides*, *Cynodon dactylon*, *Eragrostis lehmanniana* and *Aristida congesta* subsp. *congesta*. The shrub layer was poorly represented, and the density and diversity of shrubs was fairly low but included species such as *Asparagus laricinus*, *Asparagus retrofractus*, and *Lantana rugosa*. Several forbs were also identified and included *Dicoma schinzii*, *Elephantorrhiza elephantina*, *Indigofera daleoides* var. *daleoides* and *Gisekia pharnacioides* var. *pharnacioid*.

Although there is existing infrastructure to the south of the focus area, no edge effects are observed as a result of the proximity of the focus area to this existing infrastructure, and the associated pressures resulting from the presence of human processes. The absence of edge effects allows for the ongoing natural functioning of the habitat unit, as evident by the intact vegetation layers (e.g. the intact woody layer) and the high diversity of floral species within the unit.

Parts of the focus area are located within Ecological Support Areas (ESAs). These areas are required to be maintained in an ecologically functional state to support Critical Biodiversity Areas and/or Protected Areas. The remaining areas of the focus area were in other natural areas, which consist of natural or semi-natural areas that are not required to meet biodiversity targets or support natural ecological processes. The proposed development is likely to impact on the habitat present and negatively affect suitable habitat for species, especially that of the NFA listed tree species *V. erioloba*, and *V.haematoxylon*. However, given the nature of the proposed development, habitat corridors are not anticipated to be greatly affected, and therefore the dispersal ability of such species within the focus area are not anticipated to be of great concern.

Business Case and Conclusion:

The overall sensitivity of the habitat unit is of **intermediate sensitivity**. Development within the focus area will result in the loss of habitat for several floral species, as well as the loss of a high number of protected tree species. Protected plant species, where possible, are to be relocated to suitable habitat in the area. Permits for the removal/ destruction of protected plants are to be obtained from the relevant authorities prior to the commencement of development activities. It is recommended that once the layout/ development plans for the proposed focus area have been finalised, that a walk down of the area be conducted to ascertain the exact presence and numbers of protected plant species. Furthermore, during development activities, all mitigation measures are to be strictly enforced to ensure that the surrounding environment is not impacted upon through edge effects or careless veld clearing and dumping activities.

Important considerations:

- Although only one AIP was found on site, it should be noted that AIP species favour disturbed habitat and can easily proliferate in such conditions, thus increasing the chance of the proliferation thereof within the focus area and surrounding habitat. As such, it is recommended that throughout the project phases, monitoring for AIP species is implemented to ensure that, in the case of AIP species establishment, they do not spread to adjacent areas where they do not yet occur;



- The proposed development is likely to impact on several species listed under the National Forest Act, 1998 (Act No. 84 of 1998), namely *V. erioloba*, and *V. haematoxylon*. Permits will have to be obtained from DEFF for the individuals of *V. erioloba*, and *V. haematoxylon* that will have to be removed for construction to proceed. These trees occur fairly abundantly throughout the habitat unit; and
- According to the Northern Cape Critical Biodiversity (2016) database, the focus area is located within an ESA, an area which supports the ecological functioning of protected areas or critical biodiversity areas or provides important ecological infrastructure. Given the small amounts of degradation, and thus fairly intact habitat of the habitat unit, mitigation measure must be implemented to ensure the value of these areas are not greatly affected.

DRAFT FOR COMMENT



4.2 Floral Species of Conservation Concern Assessment

Threatened/protected species are species that are facing a high risk of extinction. Any species classified in the IUCN categories Critically Endangered (CR), Endangered (EN) or Vulnerable (VU) is a threatened species. Furthermore, SCC are species that have a high conservation importance in terms of preserving South Africa's high floristic diversity and include not only threatened species, but also those classified in the categories Extinct in the Wild (EW), Regionally Extinct (RE), Near Threatened (NT), Critically Rare, Rare and Declining.

An assessment considering the presence of any plant species of concern, as well as suitable habitat to support any such species was undertaken. The SANBI PRECIS RDL plants database was consulted for the Quarter Degree Square (QDS) 2723CA to obtain historical floral SCC observations. The Northern Cape Nature Conservation Act, 2009 (Act No. 9 of 2009) (NCNCA), the 2015 TOPS list of the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004), as was the Protected tree species listed within Section 15 (1) of the National Forest Act (1998, as amended in October 2011), were taken into consideration (see Appendix F for a full list of potential SCC within the focus area).

The following protected species were observed within the study area at the time of assessment:

- *V. erioloba*; and
- *V. haematoxylon*.

The focus area was observed to have a large and healthy population of *Vachellia erioloba*, and *Vachellia haematoxylon* trees, with individuals throughout ranging from between 1 m in height to larger than 4 m. A large majority of the tree individuals are below 2 m in height. The removal, relocation or destruction of these species will require permits as stipulated within the National Forest Act, 1998 (Act No. 84 of 1998, as amended in October 2011) (NFA). As such construction activities cannot commence until such permits are in place. It is recommended that as far as is possible, these trees remain in their original locations and are incorporated into landscape plans. Where this is not feasible, trees should be relocated to suitable habitat in the surrounding area. Destruction of tree species should only be entertained as a last option should none of the abovementioned alternatives be feasible. It should also be noted that an additional protected tree, *Boscia albitrunca*, was identified within in the immediate area surrounding the focus area. The habitat within the focus area also provides suitable habitat to support the presence of *B. albitrunca*. As such, the potential for dispersal and thus the establishment of this species within the focus area is a possibility. Before the commencement of any development activities within the focus area, a walk-through should be conducted to ensure this species is not present. If its presence within the focus area is confirmed, permits



will have to be obtained from DEFF for the individuals that will have to be removed for construction to proceed. Furthermore, should any SCC as listed under Schedule 1 and Schedule 2 of the Northern Cape Nature Conservation Act, 2009 (Act No. 9 of 2009) (NCNCA), or the 2015 TOPS list of the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) be located within areas designated for clearing activities, these individuals are to be relocated to suitable habitat in the surrounding area by a specialist.

4.3 Alien and Invasive Plant Species

During the floral assessment, only one alien and invasive floral species was identified within the focus area and is listed in the table below.

Table 3: Dominant alien vegetation species identified during the field assessment.

| Species | Common name | Area of Origin | NEMBA listing | Growth form |
|----------------------------|----------------|----------------|---------------|-------------|
| <i>Prosopis glandulosa</i> | Honey Mesquite | North America | N/L | Tree |

* National Environmental Management: Biodiversity Act (Act 10 of 2004) (NEMBA): Alien and Invasive Species Regulations, GN R586 of 2016

Category 1a – Invasive species that require compulsory control.

Category 1b – Invasive species that require control by means of an invasive species management programme.

Category 2 – Commercially used plants that may be grown in demarcated areas, provided that there is a permit and that steps are taken to prevent their spread.

Category 3 – Ornementally used plants that may no longer be planted. Existing plants may remain, except within the flood line of watercourses and wetlands, if all reasonable steps are taken to prevent their spread (Bromilow, 2001).

N/L - Not Listed and not categorised

From the table above, it is clear that the focus area has remained largely unaffected by alien plant species. The very low alien plant diversity is most likely attributed to i) the aridity of the region, with very limited habitat for the proliferation of alien plant species, and ii) the area being in a location that is fairly unutilised by human activity. Despite this, there is an increased risk that further alien plant proliferation may occur during developmental activities such as *Nicotiana glauca*, *Argemone ochroleuca*, *Gomphrena celosioides* and *Verbesina encelioides*. As such, in accordance with the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004): Alien and Invasive Species Regulations, GN R586 of 2016, all listed alien invasive plant species need to be controlled and removed during operational and rehabilitation activities. Ongoing maintenance activities conducted within the proposed development area must include the ongoing control of alien plant species.



5. RESULTS OF THE FAUNAL ASSESSMENT

5.1 *Habitat Description*

Kathu Thornveld

The Kathu Thornveld habitat unit within the focus area provides intermediary levels of habitat for faunal species whilst it appears that in the past that the habitat unit has been subjected to some form of disturbance (refer to Section 4.1).





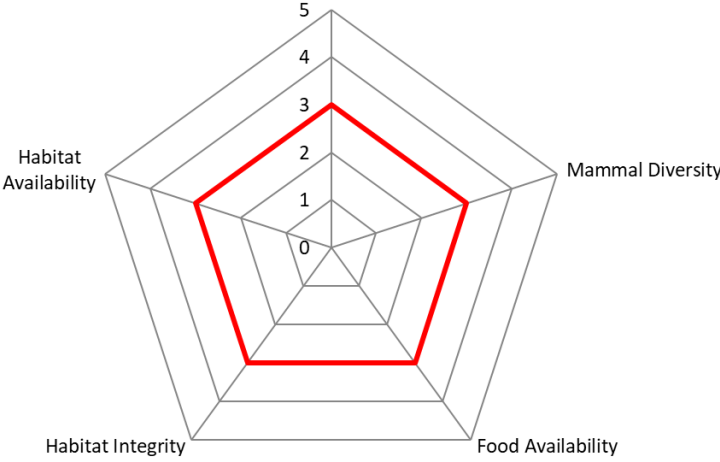
The Kathu Thornveld is associated with the more arid regions of South Africa, and as such only faunal species well adapted to these dry and sometimes harsh conditions can survive. The habitat within the focus area varied in terms of structure and is characteristic of the vegetation type as described in Mucina and Rutherford (2006). The vegetation within the focus area comprises of a characteristic herbaceous layer, dominated by short to medium-high shrubs and interspersed with larger woody species. This vegetation structure provides varying degrees of habitat for all classes of faunal species, from fossorial and ground-dwelling species to those that tend to be more arboreal. As mentioned, species living in these arid environments must be well adapted to surviving long periods of time without water. The focus area does not traverse any surface water areas and as such, does not pose a threat to these scattered yet important features.

Further discussions are presented in the dashboards below pertaining to the various faunal species classes, the habitat suitability for faunal species, food and water resources as drivers of faunal abundance as well as Species of Conservation Concern (SCC) that may occur within the focus area, including those species included in the NEMBA Threatened or Protected Species listings, 2015 (TOPS) and the Northern Cape Nature Conservation Act, 2009 (Act No. 9 of 2009) (NCNCA).



5.2 Mammals

Table 4: Field assessment results pertaining to mammal species within the focus area.

| | | | | |
|--|--|---------------------|---|--|
| Faunal Class: Mammal | Mammal Habitat Sensitivity | Intermediate | | |
| Notes on photograph: Top left: <i>Elephantulus intufi</i> (Bushveld Sengi); Top right: <i>Hystrix africae australis</i> (Porcupine) spoor; Bottom Left: <i>Lepus capensis</i> (Cape Hare); Bottom Right: <i>Sylvicapra grimmia</i> (Common Duiker) spoor. | | |   | |
| Mammal Sensitivity Graph: | | |   | |
| <div style="text-align: center;"> <p>Mammal Sensitivity</p> <p>Mammal SCC</p>  </div> | | | | |
| Faunal SCC/ Endemics/ TOPS | <p>No mammal SCC were recorded during the site assessment undertaken. The majority of mammal SCC in these arid regions are often secretive and not often seen, as such signs such as scat, spoor and in the case of some species burrows were searched. Habitat conditions indicate that several SCC may utilise the focus area, either permanently or during foraging forays. These species include: <i>Otocyon megalotis</i> (Bat-eared Fox, TOPS), <i>Felis nigripes</i> (Black-footed Cat, VU), <i>Smutsia temminckii</i> (Ground Pangolin, VU), <i>Orycteropus afer</i> (Aardvark, TOPS listed), <i>Atelerix frontalis</i> (South African Hedgehog, VU), <i>Poecilogale albinuch</i> (African Striped Weasel, Specially Protected), <i>Ictonyx striatus</i> (Striped Polecat, Specially Protected), <i>Vulpus chama</i> (Cape Fox, Specially Protected and TOPS).</p> <p><i>Parahyaena brunnea</i> (Brown Hyaena, NT) and <i>Panthera pardus</i> (Leopard, VU) must be mentioned, although it is considered very unlikely that either of these species will occur within the focus area. These species are often highly persecuted by local landowners which will likely preclude them from the focus area.</p> | | | |


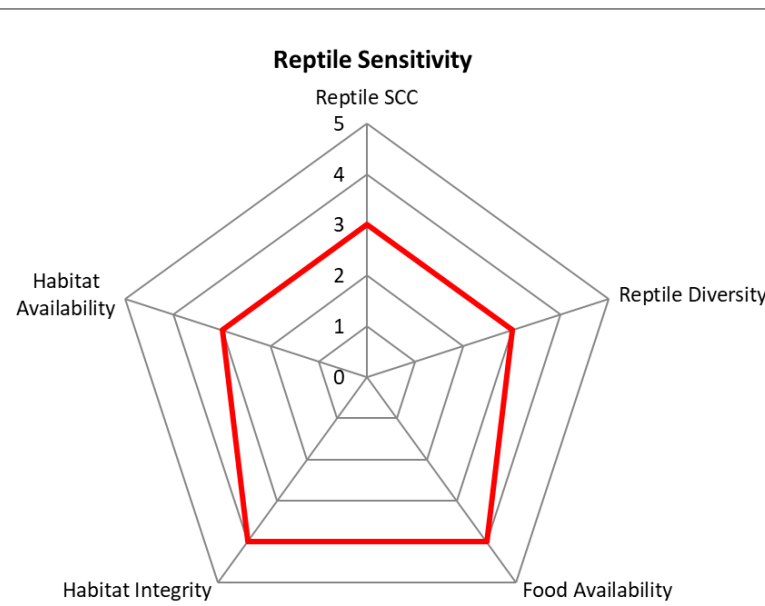


| | |
|--------------------------|---|
| Faunal Discussion | Food resources are highly cyclical and seasonal due to the arid nature of the region. As such, during the late winter and early summer months, as observed, food resources become very limited due to the die back of many herbaceous species. Following good rains, the herbaceous and woody layers recover, providing increased food resources. This cyclical nature of food resource availability in turn affects the abundance and diversity of mammal species within and surrounding the focus area. Moreover, the focus area is comprised of a single habitat unit and as the overall extent and habitat diversity is low, this will lead to similar species occurring throughout. During the site assessment, it was evident that the overall habitat and resources within the focus area are unlikely to support an increased diversity of species, this was confirmed through the limited mammal sightings and limited evidence of occurrence (spoor and dung). Species that were observed include <i>Hystrix africae australis</i> (Porcupine), <i>Sylvicapra grimmia</i> (Common Duiker), <i>Cynictis penicillata</i> (Yellow mongoose) and <i>Tragelaphus strepsiceros</i> (Kudu) amongst others. Many of these species are likely to only traverse the focus area whilst foraging as they need to forage over greater distances to obtain suitable nourishment within this arid environment. |
| Conclusion | Overall, the focus area is considered to have an intermediate mammal sensitivity. Previous land uses such as livestock farming as well as potentially increased fire intensities has led to a decrease in the overall habitat suitability. Farm fences further can limit mammal species movement and hinder habitat connectivity; however, this is more applicable to medium and large mammals as smaller mammals are less hindered by these obstacles. The construction of the powerline will require vegetation clearance and loss of habitat within the finalised tower footprints; however the overall physical footprint of the powerline (towers) is expected to be small, whilst vegetation between the towers will remain intact. As such, the overall loss of habitat resulting from the construction of the powerline is unlikely to lead to extensive impacts to the current mammal diversity and abundance in the region. |



5.3 Herpetofauna

Table 5: Field assessment results pertaining to herpetofauna within the focus area.

| | | | |
|--|--|--------------|--|
| Faunal Class: Herpetofauna | Reptile Habitat Sensitivity | Intermediate |  |
| <p>Notes on Photograph: Top left: <i>Trachylepis occidentalis</i> (Western Three-striped skink); Top right: <i>Pedioplanis namaquensis</i> (Namaqua Sand Lizard); Bottom: <i>Pedioplanis lineocellata lineocellata</i> (Spotted Sand Lizard).</p> | | | |
| <p>Reptile Sensitivity Graph:</p>  | | | |
| <p>Faunal SCC/ Endemics/ TOPS/</p> | <p>No reptile SCC were observed during the field assessment. There is a possibility that <i>Python sebae</i> (African Rock Python, TOPS) may occur in the focus area. African Rock pythons often utilise burrows dug by Aardvark and other burrowing species to breed in and escape to when disturbed. The only amphibian SCC that may potentially occur on site is that of <i>Pyxicephalus adspersus</i> (Giant Bullfrog, NT). The focus area however lies at the margin of the known distribution of this species, furthermore it has not been recorded from any of the quarter degree squares associated with the focus area, suggesting that it is unlikely to occur there</p> | | |


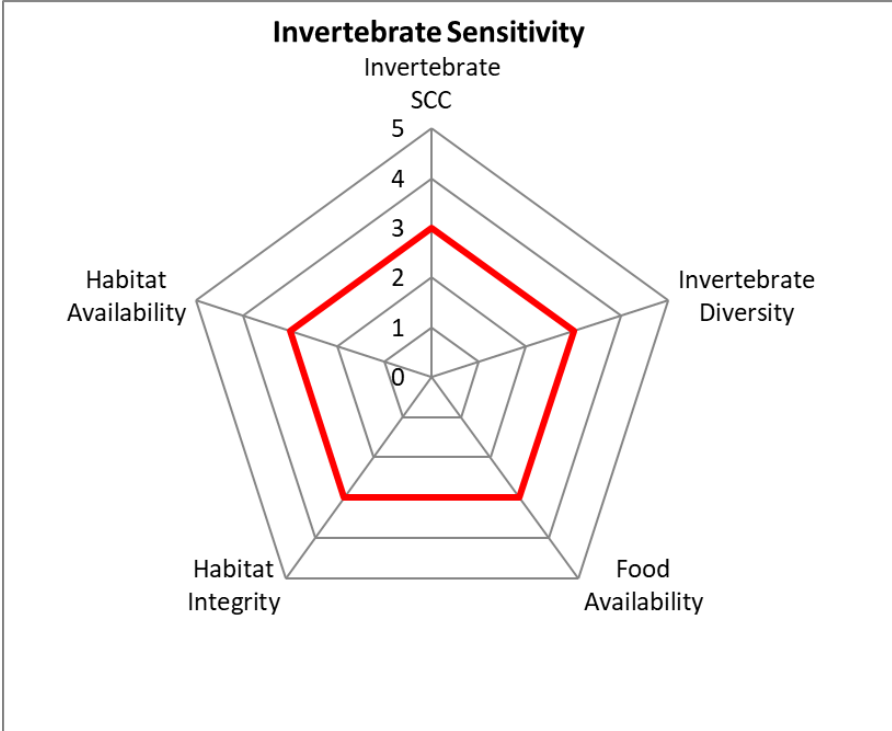




| | |
|--------------------------|---|
| Faunal Discussion | <p>Reptiles: The focus area is expected to have an intermediate reptile diversity, with three species (above) being observed during the assessment. Reptiles are inherently secretive in nature, seeking shelter or moving away before they can be observed, which makes it difficult to accurately assess reptile diversity. The focus area is well utilised by reptiles as sufficient burrows and vegetation structure are available for habitation, however rocky areas that would provide additional niche habitat are lacking. As such, although the focus area may potentially provide habitat to a large diversity of species, the homogenous sandy substrate of the focus area and lack of additional niche habitats will likely exclude several of these potential species. Reptile species previously observed within the area (3Foxes Biodiversity Solutions, 2019) include <i>Naja nivea</i> (Cape Cobra), <i>Bitis arietans arietans</i> (Puff Adder), <i>Lygodactylus capensis capensis</i> (Cape Gecko), <i>Psammophylax tritaeniatus</i> (Striped Skaapstekker), <i>Psammobates oculifer</i> (Serrated Tent Tortoise) and <i>Agama aculeata</i> (Ground Agama) amongst others. Many of these species rely on suitably food resources, predominantly sourced from small mammal and invertebrate populations, and as such the overall diversity and abundance of these species within the focus are will fluctuate seasonally in accordance to the available food supplies and rainfall patterns.</p> <p>Amphibians: The focus area lies within or near the range of approximately 10 amphibian species, however there are no natural (seasonal or permanent) water or artificial earth dams within the focus area. These areas of either permanent or seasonal, provided they are long standing enough, are for the most part necessary for amphibians to breed within, bar a small number of amphibians who are capable of breeding outside of any water source. The overall abundance and diversity of amphibian species within the focus area will be largely restricted due to the lack of permanent or seasonal water bodies within or immediately adjacent to the focus area. Only amphibian species which are relatively independent of water are likely to occur in the focus area. Species previously recorded in the surrounding areas (3Foxes Biodiversity Solutions, 2019) include <i>Amietophrynus garmani</i> (Eastern Olive Toad) and <i>Breviceps adspersus</i> (Bushveld Rain Frog), both of which may potentially occur within the focus area.</p> |
| Conclusion | <p>Although a limited reptile assemblage of herpetofauna was observed within the focus area, it is still important to ensure that the impacts from the development of the powerline are kept as low as possible, ensuring that no excessive vegetation clearance takes place and that as far as possible, no soils disturbance occurs outside that of the prescribed tower footprint areas. The construction of the powerline will result in the displacement of reptile species from the direct footprint areas, however, these impacts are expected to be localised, with the remaining natural areas still able to meet the habitat requirements of the current herpetofauna.</p> |



5.4 Invertebrates

Table 6: Field assessment results pertaining to invertebrates within the focus area.

| Faunal Class: Invertebrates | Insect Habitat Sensitivity | Intermediate | | |
|---|---|--------------|--|--|
| <p>Notes on Photograph: Top: Left - <i>Cynthia cardui</i> (Painted Lady) (left) and <i>Passalidius fortipes</i> (Burrowing ground beetle) (right). Middle: <i>Sternocera</i> sp (Giant Jewel Bug) (left) and <i>Zonocerus elegans</i> (Elegant Grasshopper) (right). Bottom: Solifugae observed within some leaf litter (left) and <i>Uroplectes carinatus</i> (right) observed within the focus area.</p> | | |  | |
| <p>Insect Sensitivity Graph:</p>  <p>Invertebrate Sensitivity</p> <p>Invertebrate SCC</p> <p>5 4 3 2 1 0</p> <p>Habitat Availability</p> <p>Invertebrate Diversity</p> <p>Habitat Integrity</p> <p>Food Availability</p> | | |   | |
| <p>Faunal SCC/ Endemics/ TOPS/</p> | <p>No insect or arachnid SCC were observed during the site assessment however <i>Opisththalmus carinatus</i> (Robust Burrowing Scorpion) and <i>O. wahlbergii</i> (Kalahari Burrower) which are listed in Schedule 2 of the NCNCA (2009) as protected, are known to occur within the region and may occur within the focus area. Furthermore, it is possible that <i>Pterinochilus</i> spp (Golden-brown baboon spiders) may occur within the focus area.</p> | | | |



| | |
|--------------------------|--|
| Faunal Discussion | Invertebrate diversity of the focus area was considered intermediate, however the abundance levels therein of invertebrate species will likely increase during the more favourable seasons, notably following good rains. Rain is often an extremely important environmental cue for invertebrates to breed or in some instances such as with insects enter a new stage within their life cycles. The net increase in insect species results in increased food resources for arachnids as well as other faunal species. As such, insects are considered an important indicator of the environmental health of habitats, whilst also fulfilling key ecological functions within the ecosystem. Coleopterans, Orthopterans and Hymenopterans were the most abundant insect species within the focus area. Suitable habitat for invertebrates, notably species well adapted to living in sandy substrates and the arid thornveld of the region is provided throughout the focus area. Niche habitats for specialist invertebrate species was limited as the topography was flat with no natural ridges or rocky locations that are often favoured by many larger ground dwelling arachnid species. The homogeneity of the vegetation is likely mimicked by the invertebrate species assemblage; therefore, it is expected that mostly common insect species will be encountered within focus area due to the lack of specialist or niche habitat. |
| Conclusion | Suitable habitat for common invertebrates is provided throughout the focus area, notably those species well adapted to the arid and sandy substrates of the region. The proposed development of the powerline will result in the clearance of vegetation and will result in the loss of habitat and potential food resources for invertebrate species within the proposed footprints. Although these impacts are unavoidable, they can be suitably minimised by ensuring that they are localised only to the demarcated footprint areas of the powerline poles. This will ensure that the overall project poses a limited threat to invertebrate species along the proposed route, notably that of the burrowing and ground dwelling invertebrates. |



5.5 Faunal Species of Conservation Concern Assessment

During field assessments, it is not always feasible to identify or observe all species within an area, largely due to the secretive nature of many faunal species, possible low population numbers or varying habits of species. As such, and to specifically assess an area for faunal SCC, a Probability of Occurrence (POC) matrix is used, utilising several factors to determine the probability of faunal SCC occurrence within the focus area. Species listed in Appendix G whose known distribution ranges and habitat preferences include the focus area were taken into consideration. The species listed below are considered to have an increased probability of occurring within or being affected by the focus area.

Table 7: Faunal SCC that obtained a POC score of 60% or more.

| Scientific Name | Common Name | POC % |
|-----------------------------------|-----------------------------|-------|
| Genus <i>Pterinochilus</i> | Golden-brown baboon spiders | 60% |
| <i>Opisthophthalmus carinatus</i> | Robust Burrowing Scorpion | 60% |
| <i>Opisthophthalmus wahlbergi</i> | Kalahari Burrower Scorpion | 60% |
| <i>Python sebae</i> | African Rock Python | 60% |
| <i>Felis nigripes</i> | Black-footed Cat | 70% |
| <i>Smutsia temminckii</i> | Ground Pangolin | 60% |
| <i>Orycteropus afer</i> | Aardvark | 80% |
| <i>Atelerix frontalis</i> | South African Hedgehog | 60% |
| <i>Poecilogale albinuch</i> | African Striped Weasel | 60% |
| <i>Ictonyx striatus</i> | Striped Polecat | 70% |
| <i>Vulpus chama</i> | Cape Fox | 60% |
| <i>Otocyon megalotis</i> | Bat-eared Fox | 70% |

The focus area falls within the known distribution ranges of the above-listed arachnid SCC and there is suitable habitat to support these species. These arachnid SCC are protected by the NCNCA because of illegal collection of specimens for the pet trade as well as the loss of habitat through mining and other developments in the region. As they are not highly mobile species, often retreating to their burrows when disturbed or during the heat of the day, they are placed at increased risk during ground clearing activities. For these specific species it is recommended that a site walk down of the final footprint area is undertaken prior to any vegetation clearance and earth works taking place. Should any species be observed, they are to be carefully relocated to nearby habitat which is similar to that from where they were removed. Such relocation activities may require permits from national or provincial levels and will likely need to be overseen by a suitably qualified specialist. The remaining SCC listed above are all largely mobile species and unlikely to reside permanently within the focus area. As such, at the onset of activities it is likely, should they be in the area, they will move off on their own accord with little risk or harm done to them. However, should any of the above



species be located denning or nesting within the focus area, no further activities are to take place until a suitably qualified specialist has been consulted.

Due to the possible presence of faunal SCC and suitable habitat within the focus area, it can be concluded that the proposed development may potentially impact upon faunal SCC in the region, however given the small size of the footprint areas and suitable habitat in the adjacent properties, these impacts can be suitably managed. Should any faunal SCC listed in Appendix C of this report be encountered during the development of the proposed activities, all operations must be stopped immediately, and a biodiversity specialist must be consulted in order to determine the best way forward.

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6. SENSITIVITY MAPPING

The figure below conceptually illustrates the areas considered to be of increased ecological sensitivity. The areas are depicted according to their sensitivity in terms of the presence or potential for floral and faunal SCC, habitat integrity and levels of disturbance, threat status of the habitat type, the presence of unique landscapes and overall levels of diversity. The table below presents the sensitivity of each identified habitat unit along with an associated conservation objective and implications for development.

Table 8: A summary of sensitivity of the habitat unit and implications for development.

| Habitat Unit | Sensitivity | Conservation Objective | Development Implications |
|----------------|--------------|--|--|
| Kathu Bushveld | Intermediate | Preserve and enhance biodiversity of the habitat unit and surrounds while optimising development potential within the designated focus area. | <p>Development activities in this area are unlikely to have a significant impact on the receiving environment, provided that all mitigation measures are adhered to, and that the construction footprint is kept as small as possible. The relevant permits will need to be obtained for all plant species protected under NFA (and potentially other species protected under the NCNCA) that will be removed/destroyed during development activities. Relevant permits should also be obtained for any protected faunal species within the footprints should they need relocation.</p> <p>Development options: The proposed development will directly impact on the Kathu Bushveld. The proposed powerline development will thus result in the loss of floral and faunal diversity, habitat, and SCC. As far as is feasible, development should be restricted to the authorised footprint only and all potential edge effects on any adjacent, more sensitive habitat units must be strictly managed and controlled. Where possible, disturbances within the focus area that fall outside of the direct footprint should be managed to increase/return diversity and ecological functioning.</p> |



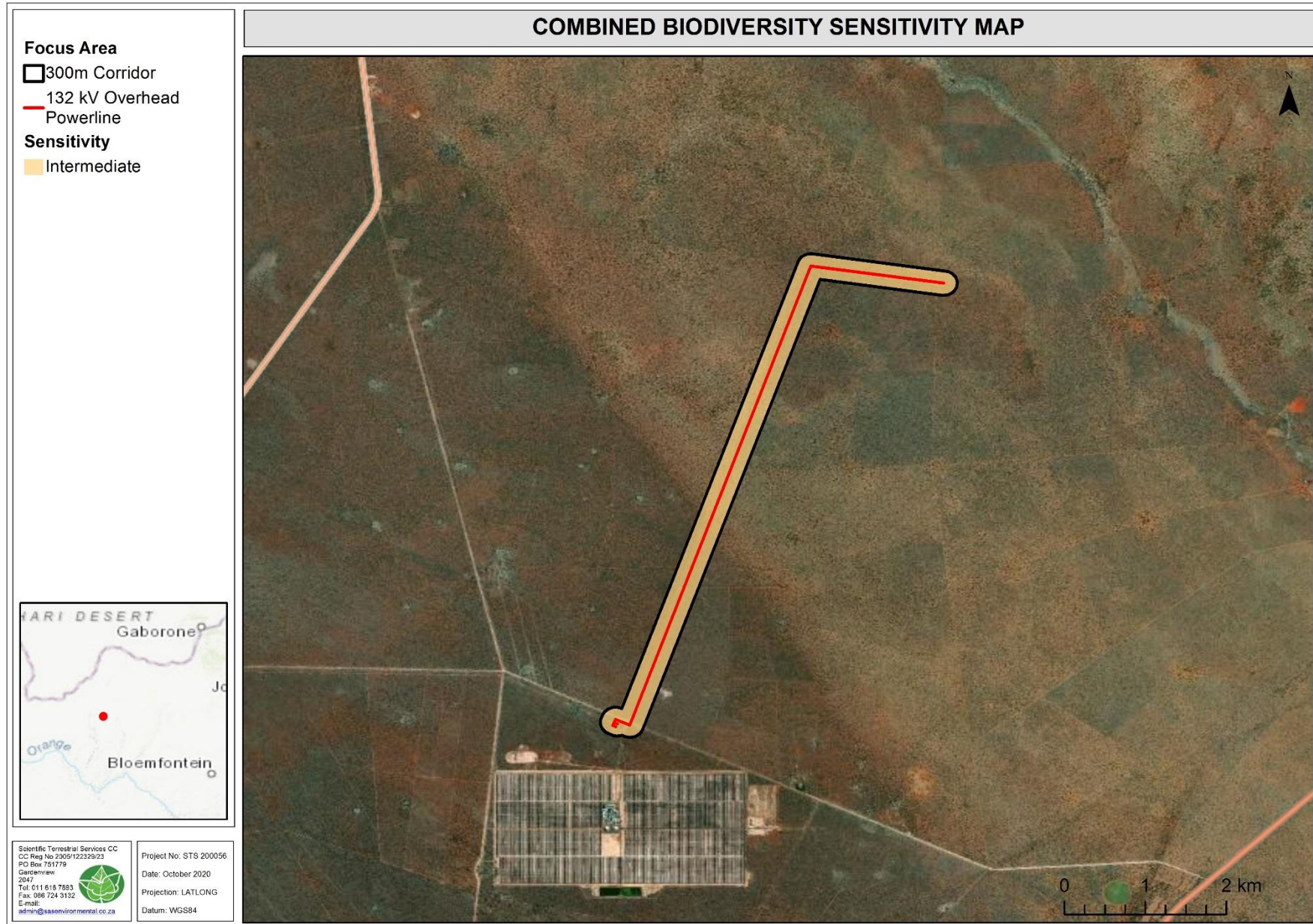


Figure 9: Combined sensitivity map of the focus area for fauna and flora.



7. IMPACT ASSESSMENT

The sections below provide the significance of perceived impacts on the floral and faunal ecology of the focus area. An impact discussion and assessment of all potential pre-construction, construction, operational and maintenance phase impacts are provided in Section 7.1 and 7.2. All mitigatory measures required to minimise the perceived impacts are presented in Section 7.3.

The table below indicates the perceived risks to floral and faunal species associated with the activities pertaining to the proposed development.

Table 9: Activities and Aspects likely to impact on the faunal and floral resources of the focus area.

| ACTIVITIES AND ASPECTS REGISTER | |
|---------------------------------|--|
| Pre-Construction Phase | |
| - | Potential failure to relocate floral or faunal SCC to suitable habitat outside the development footprint. |
| - | Impact: Loss of faunal or floral SCC within the development footprint areas in the focus area. |
| - | Potential failure to obtain permits for protected tree species that must be removed during the construction phase. |
| - | Impact: Loss of floral SCC within the development footprint areas in the focus area. |
| - | Inconsiderate planning, infrastructure placement and design, leading to the loss of potential sensitive floral and faunal species and/or habitat for such species, as well as unnecessary edge effect impacts on areas outside of the proposed development footprint. |
| - | Impact: Degradation and modification of the receiving environment, loss of faunal and floral habitat. |
| - | Potential failure to design and implement an Alien and Invasive Plant (AIP) Management/Control plan before the commencement of construction activities, resulting in the spread of AIPs from the development footprint to surrounding natural habitat. |
| - | Impact: Spreads of AIPs, leading to potential loss of floral species diversity from surrounding natural habitat. |
| Construction Phase | |
| - | Site clearing and the removal of vegetation. |
| - | Impact: Loss of faunal and floral habitat, diversity, and the possible loss of floral SCC. |
| - | Potential failure to monitor the success of relocated floral SCC. |
| - | Impact: Loss of SCC individuals. |
| - | Proliferation of AIP species that colonise in areas of increased disturbances and that outcompete native species, including the further transformation of adjacent natural habitat. |
| - | Impact: Loss of favourable faunal and floral habitat outside of the direct development footprint, including a decrease in species diversity and a potential loss of faunal and floral SCC. |
| - | Dumping and laydown of construction material within areas where no construction is planned thereby leading to habitat disturbance - allowing the establishment and spread of AIPs and further alteration of faunal habitat. |
| - | Impact: Loss of preferred faunal and floral habitat, diversity and SCC as AIPs outcompete the indigenous plant species in these disturbed areas. |
| - | Potential overexploitation through the trapping and/or hunting of faunal species, including faunal SCC, beyond the direct footprint area. |
| - | Impact: Local loss of faunal abundance and diversity. |
| - | Potentially poorly managed edge effects: <ul style="list-style-type: none"> • Ineffective rehabilitation of compacted areas, bare soils, or eroded areas leading to continual proliferation of AIP species in disturbed areas and subsequent spread to surrounding natural areas altering the floral habitat; and • Compaction of soils outside of the focus area due to indiscriminate driving of construction vehicles through natural vegetation. |
| - | Impact: Loss of floral and faunal habitat, diversity, and SCC within the direct footprint of the proposed development. Loss of surrounding floral and faunal diversity and floral SCC through the displacement of indigenous flora by AIP species - especially in response to disturbance in natural areas. |



ACTIVITIES AND ASPECTS REGISTER

- Possible increased fire frequency during construction.
- **Impact:** Loss or alteration of floral and faunal habitat and species diversity.
- Dust generated during construction and operational activities accumulating on the surrounding floral individuals, altering the photosynthetic ability of plants³ and potentially further decreasing optimal growing/re-establishing conditions.
- **Impact:** Declines in plant functioning leading to loss of floral species and habitat for optimal growth.

Operational and Maintenance Phases

- Potential failure to monitor the success of relocated floral SCC.
- **Impact:** Loss of SCC individuals.
- Increased introduction and proliferation of alien plant species due to a lack of maintenance activities, or poorly implemented and monitored AIP Management programme, leading to ongoing displacement of natural vegetation outside of the footprint area.
- **Impact:** Ongoing or permanent loss of faunal and floral habitat, diversity, and potential SCC.
- Increased human presence in the area as part of maintenance activities, potentially leading to illegal harvesting/ collection of medicinal plants, the persecution of fauna, or an increased risk of fire frequency impacting on floral and faunal communities in the surrounding natural habitat.
- **Impact:** Loss of faunal and floral habitat, medicinal flora, and SCC, as well as overall species diversity within the local area.

7.1 Floral Impact Assessment

7.1.1 Floral Impact Assessment Results

The below table indicates the perceived risks to the floral ecology associated with all phases of the proposed development. The table also provides the findings of the impact assessment undertaken with reference to the perceived impacts prior to the implementation of mitigation measures and following the implementation of mitigation measures. The mitigated results of the impact assessment have been calculated on the premise that all mitigation measures as stipulated in this report are adhered to and implemented. Should such actions not be adhered to, it is highly likely that post-mitigation impact scores will increase.

³ Sett, R. (2017). Responses in plants exposed to dust pollution. Horticulture International Journal, 1(2), 00010.).



Table 10: Impact on the floral habitat, diversity, and SCC from the proposed development activities per habitat.

| Habitat Unit | UNMANAGED | | | | | | | Significance | MANAGED | | | | | | | Significance |
|---|-----------------------|--------------------------------------|----------|---------------|--------------------|------------|-------------|------------------|-----------------------|--------------------------------------|----------|---------------|--------------------|------------|-------------|--------------|
| | Probability of Impact | Sensitivity of receiving environment | Severity | Spatial Scale | Duration of Impact | Likelihood | Consequence | | Probability of Impact | Sensitivity of receiving environment | Severity | Spatial Scale | Duration of Impact | Likelihood | Consequence | |
| PRE-CONSTRUCTION PHASE | | | | | | | | | | | | | | | | |
| Impact of floral Habitat and Diversity | | | | | | | | | | | | | | | | |
| Kathu Bushveld Habitat | 4 | 3 | 3 | 3 | 4 | 7 | 10 | 70 Medium-low | 2 | 3 | 2 | 2 | 2 | 5 | 6 | 30 Low |
| Impact on Floral SCC | | | | | | | | | | | | | | | | |
| Kathu Bushveld Habitat | 4 | 3 | 3 | 3 | 4 | 7 | 10 | 70 Medium-low | 4 | 3 | 2 | 2 | 2 | 7 | 6 | 42 Low |
| CONSTRUCTION PHASE | | | | | | | | | | | | | | | | |
| Impact of floral Habitat and Diversity | | | | | | | | | | | | | | | | |
| Kathu Bushveld Habitat | 4 | 3 | 3 | 3 | 4 | 7 | 10 | 70 Medium-low | 2 | 3 | 2 | 2 | 3 | 5 | 7 | 35 Low |
| Impact on Floral SCC | | | | | | | | | | | | | | | | |
| Kathu Bushveld Habitat | 4 | 3 | 3 | 3 | 4 | 7 | 10 | 70 Medium-low | 3 | 3 | 2 | 1 | 3 | 6 | 6 | 36 Low |
| OPERATIONAL AND MAINTENANCE PHASE | | | | | | | | | | | | | | | | |
| Impact of floral Habitat and Diversity | | | | | | | | | | | | | | | | |
| Kathu Bushveld Habitat | 2 | 3 | 3 | 2 | 4 | 5 | 9 | 45 Low | 2 | 3 | 2 | 1 | 3 | 5 | 6 | 30 Low |
| Impact on Floral SCC | | | | | | | | | | | | | | | | |
| Kathu Bushveld Habitat | 3 | 3 | 3 | 2 | 3 | 6 | 8 | 48 Low | 2 | 3 | 2 | 2 | 2 | 5 | 6 | 30 Low |



7.1.2 Impact Discussion

The direct impact of the proposed development on the floral ecology of the focus area is not anticipated to be detrimental, with impact significance varying between medium-low and low for the Kathu Bushveld Habitat unit prior to the implementation of mitigation measures. If mitigation measures are implemented, the impact significance for the focus area is anticipated to be low. A low level of impact on floral SCC is anticipated due to the unfavourable habitat and the observed absence thereof from the focus area.

Due to the focus areas location within a rural, and relatively undisturbed region, the surrounding natural vegetation within the local region is likely to be impacted by the proposed development. Vegetation clearing activities, an increased number of vehicles moving within the focus area, as well as increased edge effects, will all collectively create an ideal scenario for the proliferation of alien invasive plant species, which will result in a further disturbance of the terrestrial habitat. As part of the rehabilitation actions, disturbed areas not within the development footprint must be rehabilitated appropriately and AIP establishment controlled within such areas.

7.1.2.1 Impact on Floral Habitat and Diversity

The impact assessment was undertaken on all aspects of floral ecology deemed likely to be affected by the proposed development. The proposed development will result in the clearance of vegetation that is of intermediate sensitivity.

The floral communities associated with the Kathu Bushveld habitat unit are well represented in the focus area and in the surrounding region. As such a significant loss of floral communities is not anticipated. The proposed development will result in the loss of indigenous species, but the impact will be localised within the footprint area and no regional (provincial) impacts on floral communities are anticipated. All protected tree individuals that were recorded within the habitat will require permits for relocation before construction begins.

7.1.2.2 Impacts on Floral SCC

The impact assessment was undertaken on all aspects of floral ecology deemed likely to be affected by the proposed development. The proposed development will result in the clearance of several NFA protected tree species. As such, the impact significance for floral SCC varied between medium-low and low for the Kathu Bushveld Habitat unit prior to the implementation



of mitigation measures. Provided that strict mitigation measures are implemented, the impact on protected floral species and their associated communities could be localised.

7.1.2.3 Probable Residual Impacts

Even with extensive mitigation, residual impacts on the receiving floral ecological environment are deemed likely. The following points highlight the key latent impacts that have been identified:

- Destruction of ecologically intact habitat outside of the authorised development;
- Permanent loss of and altered floral species diversity outside of the focus area, including loss of favourable habitat for SCC;
- Loss of NFA protected tree species resulting from increased vegetation clearing and/or harvesting in the region; and
- Potential AIP proliferation into adjacent natural vegetation communities.

7.1.2.4 Cumulative Impacts

A significant threat for the floral ecology within the focus area is the potential proliferation of AIP species and particularly a potential for indigenous bush encroachment, resulting in the overall loss of native floral communities within the local area. The proposed development will also increase the movement of humans within the area and could lead to increased harvesting of floral SCC and / or the degradation of floral habitat due to continued exposure to anthropogenic disturbances.

Development activities within the focus area will entail the loss of floral species because of vegetation clearing within the construction footprint. The habitat unit has been impacted upon historically because of mismanagement and the overutilisation of the veld, resulting in the current intermediate sensitivity of the area. However, the focus area is still capable of providing habitat to several NFA protected species. Cognisance must be given to the fact that the development is for that of a powerline and as such should not require total habitat clearance along the planned route, only that of the designated footprint areas and potentially tall trees that may contact the overhead powerline. As such the impact associated with the loss of floral habitat is medium-low (70) during the construction phase, and low for the operational phase prior to mitigation being implemented. Should effective mitigation take place, the impact can be lowered to low significance levels during the construction and operational phases, respectively.



Table 11: Cumulative impacts associated with the floral habitat, diversity and SCC arising from the proposed development activities

| Nature: Impact on protected species and associated habitats due to cumulative loss and fragmentation of habitat. The development of the powerline to connect the existing substation to the solar facility will contribute to cumulative floral impacts which relates to impact on species diversity and their associated habitats. | | |
|---|--|--|
| | Overall impact of the proposed project considered in isolation | Cumulative impact of the project and other projects in the area |
| Extent | Local (1) | Local (2) |
| Duration | Very short (1) | Permanent (5) |
| Magnitude | Low (4) | Low to Moderate (5) |
| Probability | Probable (3) | Probable (3) |
| Significance | Low (18) | Medium (36) |
| Status (positive or negative) | Negative | Negative |
| Reversibility | Moderate | Moderate |
| Irreplaceable loss of resources? | Low | Low |
| Can impacts be mitigated? | The cumulative impacts of the proposed project can be mitigated if mitigation measures are implemented, e.g. vegetation maintenance, AIP clearing and prevention and/or control of bush encroachment (to name a few). However, longer-term cumulative impacts are more likely to result from other developments in the area that will result in larger areas of vegetation clearing. | |
| Mitigation: | | |
| <ul style="list-style-type: none"> ➤ Several Protected plant taxa that are protected under Schedule 2 (Protected Species) of the Northern Cape Nature Conservation Act (Act No. 9 of 2009) have the potential to be found within the study area. As such, if any such species are removed and relocated as part of the construction activities, the success of relocation must be monitored during the operational phase to ensure as a higher probability of success. Negative cumulative impacts on SCC can be lowered if harvesting of SCC is prevented and where feasible, this should be an important long-term management goal; ➤ Linear developments are often corridors along which disturbances occur and AIPs spread. The proposed project should thus manage disturbances and AIPs along the entire extent as well as within a 30 m buffer surrounding the powerline. This will decrease the potential for AIPs to become a significant threat to indigenous flora; ➤ Bush encroachment should be managed to avoid a further cumulative loss of favourable habitat for floral communities in the area; ➤ All soils compacted because of maintenance activities should be ripped and reprofiled to natural levels and revegetated with indigenous vegetation. Establishment of reintroduced vegetation within such disturbed areas must be monitored as part of maintenance activities to ensure no cumulative loss of floral habitat; ➤ No dumping of waste should take place during maintenance activities, especially not within any sensitive habitat or areas designated as "open space; and ➤ Vehicles should be restricted from travelling in sensitive environments. Where possible, monitoring and maintenance should occur on foot. | | |



7.2 Faunal Impact Assessment

7.2.1 Faunal Impact Assessment Results

The below table indicates the perceived risks to the faunal ecology associated with all phases of the proposed powerline development and operation. The table also provides the findings of the impact assessment undertaken with reference to the perceived impacts prior to the implementation of mitigation measures and following the implementation of mitigation measures. The mitigated results of the impact assessment have been calculated on the premise that all mitigation measures as stipulated in this report are adhered to and implemented. Should such actions not be adhered to, it is highly likely that post-mitigation impact scores will increase.

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Table 12: Impact on the faunal habitat, diversity and SCC arising from the proposed development activities.

| Habitat Unit | UNMANAGED | | | | | | | Significance | MANAGED | | | | | | | Significance |
|---|-----------------------|--------------------------------------|----------|---------------|--------------------|------------|-------------|--------------|-----------------------|--------------------------------------|----------|---------------|--------------------|------------|-------------|--------------|
| | Probability of Impact | Sensitivity of receiving environment | Severity | Spatial Scale | Duration of Impact | Likelihood | Consequence | | Probability of Impact | Sensitivity of receiving environment | Severity | Spatial Scale | Duration of Impact | Likelihood | Consequence | |
| PRE-CONSTRUCTION PHASE | | | | | | | | | | | | | | | | |
| Impact of Faunal Habitat and Diversity | | | | | | | | | | | | | | | | |
| Kathu Bushveld Habitat | 4 | 3 | 2 | 2 | 3 | 7 | 7 | 49 | 2 | 3 | 1 | 2 | 2 | 5 | 5 | 25 |
| | | | | | | | | Low | | | | | | | | Very Low |
| Impact on Faunal SCC | | | | | | | | | | | | | | | | |
| Kathu Bushveld Habitat | 4 | 3 | 2 | 2 | 3 | 7 | 7 | 49 | 2 | 3 | 1 | 2 | 2 | 5 | 5 | 25 |
| | | | | | | | | Low | | | | | | | | Very Low |
| CONSTRUCTION PHASE | | | | | | | | | | | | | | | | |
| Impact of Faunal Habitat and Diversity | | | | | | | | | | | | | | | | |
| Kathu Bushveld Habitat | 4 | 3 | 2 | 2 | 3 | 7 | 7 | 49 | 3 | 3 | 1 | 1 | 2 | 6 | 4 | 24 |
| | | | | | | | | Low | | | | | | | | Very Low |
| Impact on Faunal SCC | | | | | | | | | | | | | | | | |
| Kathu Bushveld Habitat | 4 | 3 | 2 | 2 | 3 | 7 | 7 | 49 | 2 | 3 | 1 | 1 | 2 | 5 | 4 | 20 |
| | | | | | | | | Low | | | | | | | | Very Low |
| OPERATIONAL AND MAINTENANCE PHASE | | | | | | | | | | | | | | | | |
| Impact of Faunal Habitat and Diversity | | | | | | | | | | | | | | | | |
| Kathu Bushveld Habitat | 2 | 3 | 2 | 1 | 3 | 5 | 6 | 30 | 2 | 3 | 1 | 1 | 2 | 5 | 4 | 20 |
| | | | | | | | | Low | | | | | | | | Very Low |
| Impact on Faunal SCC | | | | | | | | | | | | | | | | |
| Kathu Bushveld Habitat | 2 | 3 | 2 | 1 | 3 | 5 | 6 | 30 | 2 | 3 | 1 | 1 | 2 | 5 | 4 | 20 |
| | | | | | | | | Low | | | | | | | | Very Low |



7.2.2 Impact Discussion

The proposed construction and operation of the powerline is expected to have a limited impact on faunal communities (species diversity and overall abundance). The habitat along the proposed route is largely intact however and as such supports (habitat and food resources) several faunal species. The proposed powerline will, however, have a small, actualised footprint area, with only the areas for the towers necessitating vegetation clearance. These tower footprints are unlikely to be large and as such large tracts of vegetation do not need to be cleared, provided correct planning is undertaken. The remaining vegetation between and surrounding the tower footprints will ensure that any species displaced from the cleared footprint areas will still have sufficient and suitable habitat to retreat to and inhabit.

7.2.2.1 Loss of Faunal Habitat and Ecological Structure

The proposed development of the powerline will result in a loss of faunal habitat within the footprint areas of the powerline towers. As these footprints will be small the impact stemming from the loss of habitat in these areas is expected to be low, provided mitigation measures are implemented. Provided all vegetation between the towers remains intact and is not impacted upon, the powerline is unlikely to have a significant impact to the overall levels of available faunal habitat nor on the overall ecological structure and habitat connectivity.

7.2.2.2 Impact on Important Faunal Species of Conservation Concern

No faunal SCC were directly observed within the focus area; however, several SCC do have an increased probability of occurring within the focus area. The smaller arachnid SCC may occur within the focus area on a permanent basis whilst the large more mobile SCC are likely to occur periodically within the focus area, either whilst foraging or as a thoroughfare.

It is imperative that vegetation clearance is kept to a minimum and that prior to any clearance activities taking place, the footprint areas be actively searched (walkdown) for the presence of SCC, notably that of the smaller arachnid species and that of any burrows that may be utilised by SCC. Should any SCC be observed, all mitigation measures as stipulated in Section 7.3 must be adhered to. A suitably qualified ecologist and the provincial authorities should also be contacted to advise on the best route forward.



7.2.2.3 Probable Residual Impacts

Even with extensive mitigation, residual impacts on the receiving faunal ecological environment are deemed likely. The following points highlight the key residual impacts that have been identified:

- Continued loss of faunal habitat through improperly controlled edge effects and AIP proliferation; and
- Potential loss of and altered faunal species diversity, abundance, and SCC due to increased personnel within the focus area.

7.2.2.4 Possible Cumulative Impacts

The region in which the focus area is located has already been subjected to extensive agricultural and mining activities in the past. More recently the region has seen a surge in the development of renewable energy operations, notably solar farms, and related infrastructures such as powerlines and roads. Agricultural practices are still ongoing within the region and within the properties that the focus area traverses, whilst mining activities and the development of other solar farms is occurring to the south, north and west of the focus area. All these developments have already led to a loss of habitat and faunal species diversity and abundance in the region. The development of the proposed powerline will result in the small and localised loss of habitat along the proposed route; however, this habitat loss will lead to the displacement of faunal species. Although this displacement is not expected to be significant, it will be occurring within a region that has, and still is, experiencing larger scale species displacement due to surrounding developments. As such, displaced species will be competing for remaining habitat and food resources with other species who have also been displaced. Habitat and food resources are finite, and as such the continued displacement and shrinking of available habitat will likely lead to an overall decrease in species abundances and potentially diversity, as species will compete with each other for the remaining areas in which to inhabit.

Table 13: Cumulative impacts associated with the faunal habitat, diversity and SCC arising from the proposed development activities

| Nature: Impact on protected faunal species and their associated habitat due to cumulative loss and partial fragmentation of habitat. | | |
|---|--|--|
| | Overall impact of the proposed project considered in isolation | Cumulative impact of the project and other projects in the area |
| Extent | Local (1) | Local (2) |
| Duration | Very short (1) | Permanent (4) |
| Magnitude | Low (4) | Moderate (4) |
| Probability | Probable (3) | Probable (3) |
| Significance | Low (18) | Medium (36) |
| Status (positive or negative) | Negative | Negative |
| Reversibility | Moderate | Moderate |
| Irreplaceable loss of resources? | Low | Low |
| Can impacts be mitigated? | The cumulative impacts of the proposed project can be mitigated if mitigation measures are implemented. However, longer-term cumulative impacts are more | |



| | |
|--|--|
| | likely to result from other developments in the area that will result in larger areas of vegetation clearing and subsequently habitat loss for faunal species. |
| <p>Mitigation:</p> <ul style="list-style-type: none"> ➤ Rehabilitation of any disturbed sites must be undertaken and monitored to ensure that habitat and food resources are reinstated as far as possible; ➤ Vegetation (grasses and small shrubs) should be allowed to grow under the pylons in order to ensure that partial habitat is provided for faunal species in these areas. This will help minimise the cumulative impacts as some species will be able to re-inhabit these areas. ➤ AIPs should be managed if they appear along the powerline route, notably in the disturbed areas; ➤ Bush encroachment should be managed to avoid a further cumulative loss of favourable habitat for faunal communities in the area; ➤ No dumping of waste should take place during maintenance activities, especially not within any sensitive habitat or areas designated as “open space; and ➤ Vehicles should be restricted from travelling in sensitive environments. Where possible, monitoring and maintenance should occur on foot or along the designated roads. | |

7.3 Integrated Impact Mitigation

The table below highlights the key, general integrated mitigation measures that are applicable to the proposed development to suitably manage and mitigate the ecological impacts that are associated with all phases of the proposed powerline development.

Provided that all management and mitigation measures are implemented, as stipulated in this report, the overall risk to floral and faunal diversity, habitat and SCC can be mitigated and minimised.

Table 14: A summary of the mitigatory requirements for the biodiversity associated with the focus area.

| | |
|---|---|
| Project phase | Pre-construction Phase |
| Impact Summary | Loss of floral and faunal habitat, species, and SCC |
| Proposed mitigation and management measures: | |
| <p>Floral and Faunal Habitat and Diversity</p> <ul style="list-style-type: none"> • Minimise loss of indigenous vegetation where possible through planning and where necessary by incorporating the sensitivity of the biodiversity report as well as other specialist studies; • Ensure that no development occurs outside of the planned development footprint; and • Prior to the commencement of construction activities, an AIP Management/Control Plan should be compiled for implementation: <ul style="list-style-type: none"> - Removal of alien invasive species should preferably commence during the pre-construction phase and continue throughout the construction and operational phases. AIPs should be cleared within the focus area before any vegetation clearing activities commence, thereby ensuring that no AIP propagules are spread, or soils contaminated with AIP seeds during the construction phase; and - An AIP Management/Control Plan should be implemented by a qualified professional. No chemical control of AIPs to occur without a certified professional. | |
| <p>Floral and Faunal SCC</p> <ul style="list-style-type: none"> • All floral and faunal SCC and protected tree species that will be affected by the construction activities, must be marked and where possible, relocated to suitable habitat surrounding the disturbance footprint. Permits might be required from provincial and national authorities and DEFF; | |
| Project phase | Construction Phase |



| | |
|---|--|
| Impact Summary | Loss of floral and faunal habitat, species and SCC |
| Proposed mitigation and management measures: | |
| Development footprint | |
| <ul style="list-style-type: none"> • The construction footprint must be kept as small as possible to minimise the impact on the surrounding environment (edge effect management); • Removal of vegetation must be restricted to what is absolutely necessary and should remain within the approved development footprint; • Clearing of vegetation should take place in a phased manner. This will allow for faunal species within the focus area to flee and avoid harm; • Smaller species such as scorpions and reptiles will be less mobile during rainfall events and cold days (winter) and as such will not readily be able to move out of an area ahead of ground clearing activities. As such should any be observed in the construction site during clearing and construction activities, they are to be carefully and safely moved to an area of similar habitat outside of the disturbance footprint. Construction personnel are to be educated about these species and instructed not to kill them. Smaller scorpion species and harmless reptiles should be carefully relocated by a suitably nominated construction person. For larger venomous snakes, a suitably trained specialist, or on-site personnel, should be contacted to carry out the relocation of the species, should it not move off on its own; • Vehicles should be restricted to travelling only on designated roadways to limit the ecological footprint of the construction activities. Additional road construction should be limited to what is absolutely necessary, and the footprint thereof kept to a minimal; • No collection of floral SCC must be allowed by construction personnel; • No hunting or trapping of faunal species is to be allowed by construction personnel; • Informal fires by construction personnel should be prohibited, and no uncontrolled fires whatsoever should be allowed; • Care should be taken during the construction and operation of the proposed development to limit edge effects to surrounding natural habitat. This can be achieved by: <ul style="list-style-type: none"> - Demarcating all footprint areas during construction activities; - No construction rubble or cleared alien invasive species are to be disposed of outside of demarcated areas, and should be taken to a registered waste disposal facility; - All soils compacted because of construction activities should be ripped and profiled and reseeded; and - Manage the spread of AIP species, which may affect remaining natural habitat within surrounding areas; • Appropriate sanitary facilities must be provided during the construction of the development and must be removed to an appropriate waste disposal site; • No dumping of litter, rubble or cleared vegetation on site should be allowed. Infrastructure and rubble removed because of the construction activities should be disposed of at an appropriate registered dump site away from the development footprint. No temporary dump sites should be allowed in areas with natural vegetation. It is advised that waste disposal containers and bins be provided during the construction phase for all construction rubble and general waste. Vegetation cuttings must be carefully collected and disposed of at a separate waste facility; • If any spills occur, they should be immediately cleaned up to avoid soil contamination that can hinder floral rehabilitation later down the line. Spill kits should be kept on-site within workshops. In the event of a breakdown, maintenance of vehicles must take place with care, and the recollection of spillage should be practised, preventing the ingress of hydrocarbons into the topsoil; and • Upon completion of construction activities, it must be ensured that no bare areas remain, and that indigenous species be used to revegetate the disturbed area. | |
| Alien Vegetation | |
| <ul style="list-style-type: none"> • Edge effects arising from the proposed development, such as erosion and alien plant species proliferation, which may affect adjacent natural areas, need to be strictly managed. Specific mention in this regard is made of Category 1b AIP species (as listed in the NEMBA Alien species lists, 2016), in line with the NEMBA Alien and Invasive Species Regulations (2014); • Ongoing alien and invasive plant monitoring and clearing/control should take place throughout the construction and operational phase of the development, and a 30m buffer surrounding the footprint and disturbed areas should be regularly checked for AIP proliferation and to prevent spread into surrounding natural areas; and • Alien vegetation that is removed must not be allowed to lay on unprotected ground as seeds might disperse upon it. All cleared plant material to be disposed of at a licensed waste facility which complies with legal standards. | |
| Floral and Faunal SCC | |
| <ul style="list-style-type: none"> • The relocation success of floral SCC should be monitored during the construction phase to ensure immediate actions can be taken if it becomes evident that relocation is not successful; • No collection of floral or faunal SCC or medicinal floral species must be allowed by construction personnel; | |



- Edge effect control needs to be implemented to prevent further degradation and potential loss of floral and faunal SCC outside of the proposed development footprint area;
- No trapping or hunting of fauna whatsoever must be allowed; and
- Should the presence of any faunal SCC be noted, or their breeding sites be located, notably ground dwelling or nesting species, within the development footprint a suitably qualified specialist should be consulted on the best way to proceed.

| | |
|---|--|
| Project phase | Operational and Maintenance Phase |
| Impact Summary | Loss of floral and faunal habitat, species and SCC |
| Proposed mitigation and management measures: | |

Development footprint

- Disturbed areas are to be rehabilitated to a similar state as that of pre-disturbance conditions. Where this is not possible due to operational and maintenance requirements, it is recommended that at a minimum a suitable herbaceous layer is maintained within the footprint of the powerline towers so as to ensure that no erosion occurs; and
- At a minimum a short herbaceous layer must be maintained around all powerline towers so that a semblance of faunal habitat is reinstated in these areas;

Alien Vegetation

- Edge effects arising from the proposed development, such as erosion and alien plant species proliferation, which may affect adjacent natural areas, need to be strictly managed. Specific mention in this regard is made of Category 1b AIP species (as listed in the NEMBA Alien species lists, 2016), in line with the NEMBA Alien and Invasive Species Regulations (2014) (Appendix F of this report);
- Ongoing alien and invasive plant monitoring and clearing/control should take place throughout the operational phase, and the project perimeters should be regularly checked for AIP establishment to prevent spread into surrounding natural areas; and
- Alien vegetation that is removed must not be allowed to lay on unprotected ground as seeds might disperse upon it. All cleared plant material to be disposed of at a licensed waste facility, which complies with legal standards.

Floral and Faunal SCC

- Monitoring of relocation success should continue for at least three years after the completion of the construction phase, or until it is evident that the species have established self-sustaining populations.



8. CONCLUSION

Scientific Terrestrial Services (STS) was appointed to conduct a biodiversity assessment as part of the Basic Assessment (BA) process for the proposed development of an overhead powerline, near the town of Kathu, Northern Cape Province, henceforth referred to as the “focus area”. The focus area consists of a 132kV overhead powerline (OHPL) and an associated 300 m corridor. This report includes a desktop screening assessment and faunal and floral ecological assessment as part of the Environmental Impact Assessment (EIA) process.

The focus area is located within a rural, and fairly undisturbed area within the Northern Cape. As such, the surrounding areas consist largely of natural veld and is in relatively good condition although there is evidence of small amounts of degradation (3 Foxes Biodiversity Solution, March 2019). During the field assessment, one habitat unit was identified within the focus area, namely the Kathu Bushveld habitat and is deemed to be of intermediate sensitivity for fauna and flora.

No South African National Biodiversity Institute (SANBI) Red Data Listed plant species were observed during the field assessment. However suitable habitat does exist for the presence of these species. Two NFA species were encountered within the focus area, namely *V. erioloba*, and *V. haematoxylon* were identified on site. Furthermore, *B. albitrunca* was identified within the surrounding habitat. Thus, the potential for dispersal and of this species and subsequent establishment thereof within the focus area is a possibility. The focus area, given the natural habitat, can support several faunal SCC. Not all faunal SCC are likely to permanently reside within the focus area, as many require large areas to forage and survive. However, smaller Arachnid SCC such as *Opisthophthalmus carinatus* (Robust Burrowing Scorpion), *O. wahlbergii* (Kalahari Burrower) and *Pterinochilus* spp (Golden-brown baboon spiders) may occur within the footprint areas and as such will be at increased risk from ground clearing activities. Permits will be required from DEFF for the individual trees that will have to be removed for construction to proceed whilst any faunal SCC located will likely require provincial and possibly national permits to relocate them prior to construction activities. Furthermore, should any SCC as listed under Schedule 1 and Schedule 2 of The Northern Cape Nature Conservation Act, 2009 (Act No. 9 of 2009) (NCNCA), or the 2015 TOPS list of the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) that are identified during the walk-through of the areas designated for clearing activities, these individuals are to be relocated to suitable habitat in the surrounding area by a specialist.



Following the ecological assessment of the biodiversity within the focus area, the impacts associated with the proposed development activities were determined. The impacts on the floral and faunal habitat, diversity and SCC are considered to range from medium-low to low significance impacts prior to the implementation of mitigation measures. With mitigation fully implemented all impacts can be reduced to low and very low significance impacts. No significant impacts⁴ on the biodiversity associated with the focus area are anticipated for the proposed development.

It is the opinion of the ecologists that this study provides the relevant information required in order to implement Integrated Environmental Management (IEM) and to ensure that the best long-term use of the ecological resources in the focus area will be made in support of the principle of sustainable development.

⁴ **Significant impact:** An impact that may have a notable effect on one or more aspects of the environment or may result in non-compliance with accepted environmental quality standards, thresholds or targets (DEA *et. Al*, 2017).



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APPENDIX A: Legislative Requirements and Indemnity

The Constitution of the Republic of South Africa, 1996

The environment and the health and well-being of people are safeguarded under the Constitution of the Republic of South Africa, 1996 by way of section 24. Section 24(a) guarantees a right to an environment that is not harmful to human health or well-being and to environmental protection for the benefit of present and future generations. Section 24(b) directs the state to take reasonable legislative and other measures to prevent pollution, promote conservation, and secure the ecologically sustainable development and use of natural resources (including water and mineral resources) while promoting justifiable economic and social development. Section 27 guarantees every person the right of access to sufficient water, and the state is obliged to take reasonable legislative and other measures within its available resources to achieve the progressive realisation of this right. Section 27 is defined as a socio-economic right and not an environmental right. However, read with section 24 it requires of the state to ensure that water is conserved and protected and that sufficient access to the resource is provided. Water regulation in South Africa places a great emphasis on protecting the resource and on providing access to water for everyone.

The National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA)

The National Environmental Management Act, 1998 (Act 107 of 1998) (NEMA) and the associated Environmental Impact Assessment (EIA) Regulations (GN R326 as amended in 2017 and well as listing notices 1, 2 and 3 (GN R327, R325 and R324 of 2017), state that prior to any development taking place which triggers any activity as listed within the abovementioned regulations, an environmental authorisation process needs to be followed. This could follow either the Basic Assessment process or the Environmental Impact Assessment process depending on the nature of the activity and scale of the impact.

The National Environmental Management Biodiversity Act, 2004 (Act No. 10 of 2004) (NEMBA)

The objectives of this act are (within the framework of NEMA) to provide for:

- The management and conservation of biological diversity within the Republic of South Africa and of the components of such diversity;
- The use of indigenous biological resources in a sustainable manner;
- The fair and equitable sharing among stakeholders of the benefits arising from bio prospecting involving indigenous biological resources;
- To give effect to ratify international agreements relating to biodiversity which are binding to the Republic;
- To provide for cooperative governance in biodiversity management and conservation; and
- To provide for a South African National Biodiversity Institute to assist in achieving the objectives of this Act.

This act alludes to the fact that management of biodiversity must take place to ensure that the biodiversity of the surrounding areas are not negatively impacted upon, by any activity being undertaken, in order to ensure the fair and equitable sharing among stakeholders of the benefits arising from indigenous biological resources.

Furthermore, a person may not carry out a restricted activity involving either:

- a) A specimen of a listed threatened or protected species;
- b) Specimens of an alien species; or
- c) A specimen of a listed invasive species without a permit.

The National Forest Act, 1998 (Act No. 10 of 1998), as amended in October 2011 (NFA)

According to the department of Department of Environment, Forestry and Fisheries (DEFF) (previously the Department of Agriculture, Forestry and Fisheries (DAFF)) ©2019 website (<https://www.daff.gov.za/daffweb3/>):

"In terms of the National Forests Act of 1998 certain tree species (types of trees) can be identified and declared as protected. The Department of Water Affairs and Forestry followed an objective, scientific and participative process to arrive at the new list of protected tree species, enacted in 2004. All trees occurring in natural forests are also protected in terms of the Act. Protective actions take



place within the framework of the Act as well as national policy and guidelines. Trees are protected for a variety of reasons, and some species require strict protection while others require control over harvesting and utilization.”

Applicable sections of the NFA pertaining to the proposed project include the below:

Section 12:

Declaration of trees as protected

- 1) The Minister may declare-
 - a. particular tree,
 - b. a particular group of trees,
 - c. a particular woodland; or
 - d. trees belonging to a particular species, to be a protected tree, group of trees, woodland or species.
- 2) The Minister may make such a declaration only if he or she is of the opinion that the tree, group of trees, woodland or species is not already adequately protected in terms of other legislation.
- 3) In exercising a discretion in terms of this section, the Minister must consider the principles set out in section 3(3) of the NFA.

Section 15(1):

No person may cut, disturb, damage or destroy any protected tree or possess, collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree or any forest product derived from a protected tree, except under a licence granted by the Minister or in terms of an exemption from the provisions of this subsection published by the Minister in the Gazette.

Contravention of this declaration is regarded as a first category offence that may result in a person who is found guilty of being sentenced to a fine or imprisonment for a period up to three years, or both a fine and imprisonment.

Government Notice 598 Alien and Invasive Species Regulations (2014), including the Government Notice 864 Alien Invasive Species List as published in the Government Gazette 40166 of 2016, as it relates to the National Environmental Management Biodiversity Act, 2004 (Act No 10 of 2004)

NEMBA is administered by the Department of Environmental Affairs and aims to provide for the management and conservation of South Africa's biodiversity within the framework of the NEMA. In terms of alien and invasive species. This act in terms of alien and invasive species aims to:

- Prevent the unauthorized introduction and spread of alien and invasive species to ecosystems and habitats where they do not naturally occur,
- Manage and control alien and invasive species, to prevent or minimize harm to the environment and biodiversity; and
- Eradicate alien species and invasive species from ecosystems and habitats where they may harm such ecosystems or habitats.

Alien species are defined, in terms of the National Environmental Management: Biodiversity Act, 2004 (Act no 10 of 2004) as:

- (a) A species that is not an indigenous species; or
- (b) An indigenous species translocated or intended to be translocated to a place outside its natural distribution range in nature, but not an indigenous species that has extended its natural distribution range by natural means of migration or dispersal without human intervention.

Categories according to NEMBA (Alien and Invasive Species Regulations, 2017):

- **Category 1a:** Invasive species that require compulsory control;
- **Category 1b:** Invasive species that require control by means of an invasive species management programme;
- **Category 2:** Commercially used plants that may be grown in demarcated areas, provided that there is a permit and that steps are taken to prevent their spread; and
- **Category 3:** Ornamentally used plants that may no longer be planted.



The Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983) (CARA)

Removal of the alien and weed species encountered in the application area must take place in order to comply with existing legislation (amendments to the regulations under the CARA, 1983 and Section 28 of the NEMA, 1998). Removal of species should take place throughout the construction and operation, phases.

National Environmental Management: Protected Areas Act, 2003 (Act No. 57 of 2003) (NEMPAA)

This act was developed in 2003 for the protection and conservation of ecologically viable areas representative of South Africa's biological diversity and its natural landscapes and seascapes

Restricted activities involving national and protected parks:

48(1) Despite other legislation, no person may conduct commercial prospecting, mining, exploration, production, or related activities—

- (a) in a special nature reserve, national park, or nature reserve
- (b) in a protected environment without the written permission of the Minister and the Cabinet member responsible for minerals and energy affairs; or
- (c) in a protected area referred to in section 9(b), (c) or (d).

Northern Cape Provincial Spatial Development Framework (NCPSDF, 2019)

The Northern Cape Provincial Spatial Development Framework (NCPSDF) was developed in 2011 to meet the requirements of the Northern Cape Planning and Development Act, 1998 (Act 7 of 1998) and the Municipal Systems Act, 2000 (Act 32 of 2000).

The Northern Cape Nature Conservation Act (NCNCA, Act No 9 of 2009)

The purpose of this Act is to provide for the sustainable utilisation of wild animals, aquatic biota and plants; to provide for the implementation of the Convention on International Trade in Endangered Species of Wild Fauna and Flora; to provide for offences and penalties for contravention of the Act; to provide for the appointment of nature conservators to implement the provisions of the Act; to provide for the issuing of permits and other authorisations; and to provide for matters connected therewith.

Restricted activities involving specially protected plants:

49(1) No person may, without a permit –

- (a) Pick;
- (b) Import;
- (c) Export;
- (d) Transport;
- (e) Possess;
- (f) Cultivate; or
- (g) Trade in,

A specimen of a specially protected plant

Restricted activities involving protected plants

50 (1) Subject to the provision of section 52, no person may, without a permit –

- (a) Pick;
- (b) Import;
- (c) Export;
- (d) Transport;
- (e) Cultivate; or
- (f) Trade in,

A specimen of a protected plant.



Indemnity and Terms of use of this Report

The findings, results, observations, conclusions, and recommendations given in this report are based on the author's best scientific and professional knowledge as well as available information. The report is based on survey and assessment techniques which are limited by time and budgetary constraints relevant to the type and level of investigation undertaken and STS CC and its staff reserve the right to modify aspects of the report including the recommendations if, and when, new information may become available from ongoing research or further work in this field, or pertaining to this investigation.

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DRAFT FOR COMMENT



APPENDIX B: Floral Method of assessment

Floral Species of Conservational Concern Assessment

Prior to the site visit, a record of floral SCC and their habitat requirements was developed for the focus area, which includes consulting the National Web-based Environmental Screening Tool. Because not all SCC have been included in the Screening Tool layers (e.g. NT and DD taxa), it remains important for the specialist to be on the lookout for additional SCC. For this study, two primary sources were consulted and are described below.

The National Web-Based Environmental Screening Tool

The Screening Tool was accessed to obtain a list of potentially occurring species of conservation concern for the focus area. Each of the themes in the Screening Tool consists of theme-specific spatial datasets which have been assigned a sensitivity level namely, “*low*”, “*medium*”, “*high*” and “*very high*” sensitivity. The four levels of sensitivity are derived and identified in different ways, e.g. for **confirmed** areas of occupied habitat for SCC a Very High and High Sensitivity is assigned and for areas of suitable habitat where SCC may occur based on spatial models only, a Medium Sensitivity is assigned. The different sensitivity ratings pertaining to the Plant [and Animal] Protocols are described below⁵:

- **Very High:** Habitat for species that are endemic to South Africa, where all the known occurrences of that species are within an area of 10 km² are considered Critical Habitat, as all remaining habitat is irreplaceable. Typically, these include species that qualify under Critically Endangered (CR), Endangered (EN), or Vulnerable (VU) D criteria of the IUCN or species listed as Critically/ Extremely Rare under South Africa’s National Red List Criteria. For each species reliant on a Critical Habitat, all remaining suitable habitat has been manually mapped at a fine scale.
- **High:** Recent occurrence records for all threatened (CR, EN, VU) and/or rare endemic species are included in the high sensitivity level. Spatial polygons of suitable habitat have been produced for each species by intersecting recently collected occurrence records (those collected since the year 2000) that have a spatial confidence level of less than 250 m with segments of remaining natural habitat.
- **Medium:** Model-derived suitable habitat areas for threatened and/or rare species are included in the medium sensitivity level. Two types of spatial models have been included. The first is a simple rule-based habitat suitability model where habitat attributes such as vegetation type and altitude are selected for all areas where a species has been recorded to occur. The second is a species distribution model which uses species occurrence records combined with multiple environmental variables to quantify and predict areas of suitable habitat. The models provide a probability-based distribution indicating a continuous range of habitat suitability across areas that have not been previously surveyed. A probability threshold of 75% for suitable habitat has been used to convert the modelled probability surface and reduce it into a single spatial area which defines areas that fall within the medium sensitivity level.
- **Low:** Areas where no SCC are known or expected to occur.

BRAHMS Online Website

The Botanical Database of Southern Africa (BODATSA) is accessed to obtain plant names and floristic details (<http://posa.sanbi.org/>) for species of conservation concern within a selected boundary;

- This website provides access to South African plant names (taxa), specimens (herbarium sheets) and observations of plants made in the field (botanical records). Data is obtained from the Botanical Database of Southern Africa (BODATSA), which contains records from the

⁵ More details on the use of the Screening Tool for Species of Conservation Concern can be found in the below resources:

- South African National Biodiversity Institute (SANBI). 2020. Draft Species Environmental Assessment Guideline. Guidelines for the implementation of the Terrestrial Flora (3c) & Terrestrial Fauna (3d) Species Protocols for environmental impact assessments in South Africa. South African National Biodiversity Institute, Pretoria. Version 1.0.
- The National Web based Environmental Screening Tool website:
<https://screening.environment.gov.za/screeningtool/#/pages/welcome>



- National Herbarium in Pretoria (PRE), the Compton Herbarium in Cape Town (NBG & SAM) and the KwaZulu-Natal Herbarium in Durban (NH).
- Information on habitat requirements etc. is obtained from the SANBI Red List of South African Plants website (<http://redlist.sanbi.org/>).
- Typically, data is extracted for the Quarter Degree Square (QDS) in which the focus area is situated but where it is deemed appropriate, a larger area can be included.

Throughout the floral assessment, special attention was paid to the identification of any of these SCC as well as the identification of suitable habitat that could potentially support these species.

The Probability of Occurrence (POC) for each floral SCC is described:

- **“Confirmed”**: if observed during the survey;
- **“High”**: if within the species’ known distribution range and suitable habitat is available;
- **“Medium”**: if either within the known distribution range of the species or if suitable habitat is present; or
- **“Low”**: if the habitat is not suitable and falls outside the distribution range of the species.

The accuracy of the POC is based on the available knowledge about the species in question, with many of the species lacking in-depth habitat research.

Vegetation Surveys

When planning the timing of a floristic survey, it is important to remember that the primary objective is not an exhaustive species list but rather to ensure that sufficient data are collected to describe all the vegetation communities present in the area of interest, to optimise the detection of SCC and to assess habitat suitability for other potentially occurring SCC (SANBI, 2020).

The vegetation survey incorporates the subjective (or stratified) sampling method. Subjective sampling is a sampling technique in which the specialist relies on his or her own professional experience when choosing sample sites within the focus area. This allows representative recordings of floral communities and optimal detection of SCC. Subjective sampling is used to consider different areas (or habitat units) which are identified within the main body of a habitat/focus area.

One of the problems with random sampling, another popular sampling method, is that random samples may not cover all areas of a focus area equally and thus increase the potential to miss floral SCC. Random sampling methods also tend to require more time in the field to locate the amount of SCC that can be detected using subjective sampling methods - In the context of an EIA where time constraints are often restrictive, priority needs to be given to collecting data in the shortest time possible without compromising the efficiency of locating SCC (SANBI, 2020).

Floral Habitat Sensitivity

The floral habitat sensitivity of each habitat unit was determined by calculating the mean of five different parameters which influence floral communities and provide an indication of the overall floristic ecological integrity, importance, and sensitivity of the habitat unit. Each of the following parameters are subjectively rated on a scale of 1 to 5 (1 = lowest and 5 = highest):

- **Floral SCC**: The confirmed presence or potential for floral SCC or any other significant species, such as endemics, to occur within the habitat unit;
- **Unique Landscapes**: The presence of unique landscapes or the presence of an ecologically intact habitat unit in a transformed region;
- **Conservation Status**: The conservation status of the ecosystem or vegetation type in which the habitat unit is situated based on local, regional and national databases. Whether the habitat is representative of a Critical Biodiversity Area or forms part of an Ecological Support Area is also taken into consideration;
- **Floral Diversity**: The recorded floral diversity compared to a suitable reference condition such as surrounding natural areas or available floristic databases; and
- **Habitat Integrity**: The degree to which the habitat unit is transformed based on observed disturbances which may affect habitat integrity.

Each of these values contribute equally to the mean score, which determines the floral habitat sensitivity class in which each habitat unit falls. A conservation and land-use objective is also assigned to each



sensitivity class which aims to guide the responsible and sustainable utilization of the habitat unit in question. To present the results use is made of spider diagrams to depict the significance of each aspect of floral ecology for each vegetation type. The different classes and land-use objectives are presented in the table below:

Table A1: Floral habitat sensitivity rankings and associated land-use objectives.

| Score | Rating significance | Conservation objective |
|-----------|---------------------|---|
| 1 < 1.5 | Low | Optimise development potential. |
| ≥1.5 <2.5 | Moderately low | Optimise development potential while improving biodiversity integrity of surrounding natural habitat and managing edge effects. |
| ≥2.5 <3.5 | Intermediate | Preserve and enhance biodiversity of the habitat unit and surrounds while optimizing development potential. |
| ≥3.5 <4.5 | Moderately high | Preserve and enhance the biodiversity of the habitat unit, limit development and disturbance. |
| ≥4.5 ≤5.0 | High | Preserve and enhance the biodiversity of the habitat unit, no-go alternative must be considered. |



APPENDIX C: Faunal Method of Assessment

It is important to note that due to the nature and habits of fauna, varied stages of life cycles, seasonal and temporal fluctuations along with other external factors, it is unlikely that all faunal species will have been recorded during the site assessment. The presence of human habitation nearby the focus area and the associated anthropogenic activities may have an impact on faunal behaviour and in turn the rate of observations.

Mammals

Mammal species were recorded during the field assessment with the use of visual identification, spoor, call and dung. Specific attention was paid to mammal SCC as listed by the IUCN, 2015.

Avifauna

The Southern African Bird Atlas Project 2 database (<http://sabap2.adu.org.za/>) was compared with the recent field survey of avifaunal species identified on the focus area. Field surveys were undertaken utilising visual observation and bird call identification techniques in order to accurately identify avifaunal species. Specific attention was given to avifaunal SCC listed on a regional and national level, as well as those identified by the International Union for the Conservation of Nature (IUCN).

Reptiles

During the field assessment, suitable applicable habitat areas (rocky outcrops and fallen dead trees) were inspected for the presence of reptiles, and any individuals encountered were identified. The data gathered during the assessment along with the habitat analysis provided an accurate indication of which reptile species are likely to occur on the focus area. Specific attention was given to reptile SCC listed on a regional and national level, as well as those identified by the International Union for the Conservation of Nature (IUCN).

Amphibians

Identifying amphibian species is done by the use of direct visual identification along with call identification technique. Amphibian species flourish in and around wetland, riparian and moist grassland areas. It is unlikely that all amphibian species will have been recorded during the site assessment, due to their cryptic nature and habits, varied stages of life cycles and seasonal and temporal fluctuations within the environment. The data gathered during the assessment along with the habitat analysis provided an accurate indication of which amphibian species are likely to occur within the focus area as well as the surrounding area. Specific attention was given to amphibian SCC listed on a regional and national level, as well as those identified by the International Union for the Conservation of Nature (IUCN).

Invertebrates

Whilst conducting transects through the focus area, all insect species visually observed were identified, and where possible photographs taken.

It must be noted however that due to the cryptic nature and habits of insects, varied stages of life cycles and seasonal and temporal fluctuations within the environment, it is unlikely that all insect species will have been recorded during the site assessment period. Nevertheless, the data gathered during the assessment along with the habitat analysis provided an accurate indication of which species are likely to occur in the focus area at the time of survey. Specific attention was given to insect SCC listed on a regional and national level, as well as those identified by the International Union for the Conservation of Nature (IUCN).

Arachnids

Suitable applicable habitat areas (rocky outcrops, sandy areas and fallen dead trees) where spiders and scorpions are likely to reside were searched. Rocks were overturned and inspected for signs of



these species. Specific attention was paid to searching for Mygalomorphae arachnids (Trapdoor and Baboon spiders) as well as potential SCC species within the focus area.

Faunal Species of Conservational Concern Assessment

The Probability of Occurrence (POC) for each faunal SCC was determined using the following four parameters:

- Species distribution;
- Habitat availability;
- Food availability; and
- Habitat disturbance.

The accuracy of the calculation is based on the available knowledge about the species in question. Therefore, it is important that the literature available is also considered during the calculation.

Each factor contributes an equal value to the calculation.

| Scoring Guideline | | | | |
|--|-----------------|------------------------------|-----------------|--------------------------|
| Habitat availability | | | | |
| No Habitat | Very low | Low | Moderate | High |
| 1 | 2 | 3 | 4 | 5 |
| Food availability | | | | |
| No food available | Very low | Low | Moderate | High |
| 1 | 2 | 3 | 4 | 5 |
| Habitat disturbance | | | | |
| Very High | High | Moderate | Low | Very Low |
| 1 | 2 | 3 | 4 | 5 |
| Distribution/Range | | | | |
| Not Recorded | | Historically Recorded | | Recently Recorded |
| 1 | | 3 | | 5 |
| [Habitat availability + Food availability + Habitat disturbance + Distribution/Range] / 20 x 100 = POC% | | | | |

Faunal Habitat Sensitivity

The sensitivity of the focus area for each faunal class (i.e. mammals, birds, reptiles, amphibians and invertebrates) was determined by calculating the mean of five different parameters which influence each faunal class and provide an indication of the overall faunal ecological integrity, importance and sensitivity of the focus area for each class. Each of the following parameters are subjectively rated on a scale of 1 to 5 (1 = lowest and 5 = highest):

- **Faunal SCC:** The confirmed presence or potential for faunal SCC or any other significant species, such as endemics, to occur within the habitat unit;
- **Habitat Availability:** The presence of suitable habitat for each class;
- **Food Availability:** The availability of food within the focus area for each faunal class;
- **Faunal Diversity:** The recorded faunal diversity compared to a suitable reference condition such as surrounding natural areas or available faunal databases; and
- **Habitat Integrity:** The degree to which the habitat is transformed based on observed disturbances which may affect habitat integrity.

Each of these values contributes equally to the mean score, which determines the suitability and sensitivity of the focus area for each faunal class. A conservation and land-use objective is also assigned to each sensitivity class which aims to guide the responsible and sustainable utilisation of the focus area in relation to each faunal class. The different classes and land-use objectives are presented in the table below:



Table C1: Faunal habitat sensitivity rankings and associated land-use objectives.

| Score | Rating significance | Conservation objective |
|------------|---------------------|---|
| 1.0 < 1.5 | Low | Optimise development potential. |
| ≥1.5 <2.5 | Moderately low | Optimise development potential while improving biodiversity integrity of surrounding natural habitat and managing edge effects. |
| ≥2.5 <3.5 | Intermediate | Preserve and enhance biodiversity of the habitat unit and surrounds while optimising development potential. |
| ≥3.5 <4.5 | Moderately high | Preserve and enhance the biodiversity of the habitat unit, limit development and disturbance. |
| ≥4.5 ≤ 5.0 | High | Preserve and enhance the biodiversity of the habitat unit, no-go alternative must be considered. |

DRAFT FOR COMMENT



APPENDIX D: Impact Assessment Methodology

In order for the Environmental Assessment Practitioner (EAP) to allow for sufficient consideration of all environmental impacts, impacts were assessed using a common, defensible method of assessing significance that will enable comparisons to be made between risks/impacts and will enable authorities, stakeholders and the client to understand the process and rationale upon which risks/impacts have been assessed. The method to be used for assessing risks/impacts is outlined in the sections below.

The first stage of risk/impact assessment is the identification of environmental activities, aspects and impacts. This is supported by the identification of receptors and resources, which allows for an understanding of the impact pathway and an assessment of the sensitivity to change. The definitions used in the impact assessment are presented below.

- An **activity** is a distinct process or task undertaken by an organisation for which a responsibility can be assigned. Activities also include facilities or infrastructure that is possessed by an organisation.
- An **environmental aspect** is an 'element of an organizations activities, products and services which can interact with the environment'⁶. The interaction of an aspect with the environment may result in an impact.
- **Environmental risks/impacts** are the consequences of these aspects on environmental resources or receptors of particular value or sensitivity, for example, disturbance due to noise and health effects due to poorer air quality. In the case where the impact is on human health or wellbeing, this should be stated. Similarly, where the receptor is not anthropogenic, then it should, where possible, be stipulated what the receptor is.
- **Receptors** can comprise, but are not limited to, people or human-made systems, such as local residents, communities and social infrastructure, as well as components of the biophysical environment such as wetlands, flora and riverine systems.
- **Resources** include components of the biophysical environment.
- **Frequency of activity** refers to how often the proposed activity will take place.
- **Frequency of impact** refers to the frequency with which a stressor (aspect) will impact on the receptor.
- **Severity** refers to the degree of change to the receptor status in terms of the reversibility of the impact; sensitivity of receptor to stressor; duration of impact (increasing or decreasing with time); controversy potential and precedent setting; threat to environmental and health standards.
- **Spatial extent** refers to the geographical scale of the impact.
- **Duration** refers to the length of time over which the stressor will cause a change in the resource or receptor.

The significance of the impact is then assessed by rating each variable numerically according to the defined criteria. Refer to Table 3. The purpose of the rating is to develop a clear understanding of influences and processes associated with each impact. The severity, spatial scope and duration of the impact together comprise the consequence of the impact and when summed can obtain a maximum value of 15. The frequency of the activity and the frequency of the impact together comprise the likelihood of the impact occurring and can obtain a maximum value of 10. The values for likelihood and consequence of the impact are then read off a significance-rating matrix and are used to determine whether mitigation is necessary⁷.

The assessment of significance is undertaken twice. Initial, significance is based on only natural and existing mitigation measures (including built-in engineering designs). The subsequent assessment considers the recommended management measures required to mitigate the impacts. Measures such as demolishing infrastructure, and reinstatement and rehabilitation of land, are considered post-mitigation.

The model outcome of the impacts was then assessed in terms of impact certainty and consideration of available information. The Precautionary Principle is applied in line with South Africa's National Environmental Management Act, 1998 (Act No. 107 of 1998) in instances of uncertainty or lack of information, by increasing assigned ratings or adjusting final model outcomes. In certain instances

⁶ The definition has been aligned with that used in the ISO 14001 Standard.

⁷ Some risks/impacts that have low significance will however still require mitigation.



where a variable or outcome requires rational adjustment due to model limitations, the model outcomes have been adjusted.

Table D1: Criteria for assessing significance of impacts

LIKELIHOOD DESCRIPTORS

| Probability of impact | RATING |
|---|---------------|
| Highly unlikely | 1 |
| Possible | 2 |
| Likely | 3 |
| Highly likely | 4 |
| Definite | 5 |
| Sensitivity of receiving environment | RATING |
| Ecology not sensitive/important | 1 |
| Ecology with limited sensitivity/importance | 2 |
| Ecology moderately sensitive/ important | 3 |
| Ecology highly sensitive /important | 4 |
| Ecology critically sensitive /important | 5 |

CONSEQUENCE DESCRIPTORS

| Severity of impact | RATING |
|---|---------------|
| Insignificant / ecosystem structure and function unchanged | 1 |
| Small / ecosystem structure and function largely unchanged | 2 |
| Significant / ecosystem structure and function moderately altered | 3 |
| Great / harmful/ ecosystem structure and function largely altered | 4 |
| Disastrous / ecosystem structure and function seriously to critically altered | 5 |
| Spatial scope of impact | RATING |
| Activity specific/ < 5 ha impacted / Linear developments affected < 100m | 1 |
| Development specific/ within the site boundary / < 100ha impacted / Linear developments affected < 100m | 2 |
| Local area/ within 1 km of the site boundary / < 5000ha impacted / Linear developments affected < 1000m | 3 |
| Regional within 5 km of the site boundary / < 2000ha impacted / Linear developments affected < 3000m | 4 |
| Entire habitat unit / Entire system/ > 2000ha impacted / Linear developments affected > 3000m | 5 |
| Duration of impact | RATING |
| One day to one month | 1 |
| One month to one year | 2 |
| One year to five years | 3 |
| Life of operation or less than 20 years | 4 |
| Permanent | 5 |



Table D2: Significance Rating Matrix.

| LIKELIHOOD (Frequency of activity + Frequency of impact) | CONSEQUENCE (Severity + Spatial Scope + Duration) | | | | | | | | | | | | | | |
|---|---|----|----|----|----|----|----|----|-----|-----|-----|-----|-----|-----|----|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | |
| 2 | 4 | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 20 | 22 | 24 | 26 | 28 | 30 | |
| 3 | 6 | 9 | 12 | 15 | 18 | 21 | 24 | 27 | 30 | 33 | 36 | 39 | 42 | 45 | |
| 4 | 8 | 12 | 16 | 20 | 24 | 28 | 32 | 36 | 40 | 44 | 48 | 52 | 56 | 60 | |
| 5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 | 55 | 60 | 65 | 70 | 75 | |
| 6 | 12 | 18 | 24 | 30 | 36 | 42 | 48 | 54 | 60 | 66 | 72 | 78 | 84 | 90 | |
| 7 | 14 | 21 | 28 | 35 | 42 | 49 | 56 | 63 | 70 | 77 | 84 | 91 | 98 | 105 | |
| 8 | 16 | 24 | 32 | 40 | 48 | 56 | 64 | 72 | 80 | 88 | 96 | 104 | 112 | 120 | |
| 9 | 18 | 27 | 36 | 45 | 54 | 63 | 72 | 81 | 90 | 99 | 108 | 117 | 126 | 135 | |
| 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 110 | 120 | 130 | 140 | 150 | |

Table D3: Positive/Negative Mitigation Ratings.

| Significance Rating | Value | Negative Impact Management Recommendation | Positive Impact Management Recommendation |
|---------------------|---------|---|--|
| Very high | 126-150 | Critically consider the viability of proposed projects Improve current management of existing projects significantly and immediately | Maintain current management |
| High | 101-125 | Comprehensively consider the viability of proposed projects Improve current management of existing projects significantly | Maintain current management |
| Medium-high | 76-100 | Consider the viability of proposed projects Improve current management of existing projects | Maintain current management |
| Medium-low | 51-75 | Actively seek mechanisms to minimise impacts in line with the mitigation hierarchy | Maintain current management and/or proposed project criteria and strive for continuous improvement |
| Low | 26-50 | Where deemed necessary seek mechanisms to minimise impacts in line with the mitigation hierarchy | Maintain current management and/or proposed project criteria and strive for continuous improvement |
| Very low | 1-25 | Maintain current management and/or proposed project criteria and strive for continuous improvement | Maintain current management and/or proposed project criteria and strive for continuous improvement |

The following points were considered when undertaking the assessment:

- Risks and impacts were analysed in the context of the *project's area of influence* encompassing:
 - Primary project site and related facilities that the client and its contractors develops or controls;
 - Areas potentially impacted by cumulative impacts for any existing project or condition and other project-related developments; and
 - Areas potentially affected by impacts from unplanned but predictable developments caused by the project that may occur later or at a different location.
- Risks/Impacts were assessed for all stages of the project cycle including:
 - Pre-construction;
 - Construction; and
 - Operation.
 - If applicable, transboundary or global effects were assessed.
 - Individuals or groups who may be differentially or disproportionately affected by the project because of their *disadvantaged* or *vulnerable* status were assessed.
 - Particular attention was paid to describing any residual impacts that will occur after rehabilitation.



Mitigation measure development

The following points present the key concepts considered in the development of mitigation measures for the proposed development.

- *Mitigation and performance improvement measures* and actions that address the risks and impacts⁸ are identified and described in as much detail as possible.
- Measures and actions to address negative impacts will favour avoidance and prevention over minimisation, mitigation or compensation.
- Desired outcomes are defined, and have been developed in such a way as to be *measurable events with performance indicators, targets and acceptable criteria* that can be tracked over *defined periods*, with estimates of the *resources* (including human resource and training requirements) *and responsibilities for implementation*.

Recommendations

Recommendations were developed to address and mitigate impacts associated with the proposed development. These recommendations also include general management measures which apply to the proposed development as a whole. Mitigation measures have been developed to address issues in all phases throughout the life of the operation from planning, through to construction and operation.

⁸ Mitigation measures should address both positive and negative impacts



APPENDIX E: Vegetation Types

Kathu Bushveld (SVk 12)



Figure E1: SVk 12 Kathu Bushveld: Open savanna dominated by *Vachellia erioloba*, *Senegalia mellifera* and *Grewia Flava* with low cover of *Stipagrostis ciliata* against the red sand east of Oupos, in the Kuruman District north of Kathu. Image by M.C. Rutherford.

Remarks: One of the most strikingly dominant areas of tall *V. erioloba* is centred on the town of Kathu, which was built around many of these trees.

Table E1: Floristic species of *The Kathu Bushveld* (Mucina & Rutherford, 2012).

| Plant Community | Species |
|---|---|
| Dominant and typical floristic species | |
| Woody Layer | |
| Trees | Small Tree: <i>Senegalia erubescens</i> (d), <i>Boscia albitrunca</i> (d), <i>Terminalia sericea</i> . Tall Tree: <i>Vachellia erioloba</i> |
| Shrubs | Tall Shrub: <i>Diospyros lycioides</i> subsp. <i>lycioides</i> (d), <i>Dichrostachys cinerea</i> , <i>Grewia flava</i> , <i>Gymnosporia buxifolia</i> , <i>Rhigozum brevispinosum</i> . Low Shrubs: <i>Aptosimum decumbens</i> , <i>Grewia retinervis</i> , <i>Nolletia arenosa</i> , <i>Sida cordifolia</i> , <i>Tragia dioica</i> .. Succulent Shrub: <i>Kalanchoe rotundifolia</i> , <i>Talinum cafferum</i> . |
| Forb layer | |
| Herbs | <i>Acrotome inflata</i> , <i>Erlangea misera</i> , <i>Gisekia africana</i> , <i>Heliotropium ciliatum</i> , <i>Hermbstaedtia fleckii</i> , <i>H. odorata</i> , <i>Limeum fenestratum</i> , <i>L. viscosum</i> , <i>Lotononis platycarpa</i> , <i>Senna italica</i> subsp. <i>arachoides</i> , <i>Tribulus terrestris</i> . |
| Gramminoid layer | |
| Graminoids | <i>Aristida meridionalis</i> (d), <i>Brachiaria nigropedata</i> (d), <i>Centropodia glauca</i> (d), <i>Eragrostis lehmanniana</i> (d), <i>Schmidtia pappophoroides</i> (d), <i>Stipagrostis ciliata</i> (d), <i>Aristida congesta</i> , <i>Eragrostis biflora</i> , <i>E. chloromelas</i> , <i>E. heteromera</i> , <i>E. pallens</i> , <i>Melinis repens</i> , <i>Schmidtia kalahariensis</i> , <i>Stipagrostis uniplumis</i> , <i>Tragus berteronianus</i> . |

*(d) is for dominant



APPENDIX F: Floral SCC

South Africa uses the internationally endorsed [IUCN Red List Categories and Criteria](#) in the Red List of South African plants. This scientific system is designed to measure species' risk of extinction. The purpose of this system is to highlight those species that are most urgently in need of conservation action. 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. Because the Red List of South African plants is used widely in South African conservation practices such as systematic conservation planning or protected area expansion, we use an amended system of categories designed to highlight those species that are at low risk of extinction but of conservation concern.

Definitions of the national Red List categories

Categories marked with ^N are non-IUCN, national Red List categories for species not in danger of extinction but considered of conservation concern. The IUCN equivalent of these categories is Least Concern (LC).

- **Extinct (EX)** A species is Extinct when there is no reasonable doubt that the last individual has died. Species should be classified as Extinct only once exhaustive surveys throughout the species' known range have failed to record an individual.
- **Extinct in the Wild (EW)** A species is Extinct in the Wild when it is known to survive only in cultivation or as a naturalized population (or populations) well outside the past range.
- **Regionally Extinct (RE)** A species is Regionally Extinct when it is extinct within the region assessed (in this case South Africa), but wild populations can still be found in areas outside the region.
- **Critically Endangered, Possibly Extinct (CR PE)** Possibly Extinct is a special tag associated with the category Critically Endangered, indicating species that are highly likely to be extinct, but the exhaustive surveys required for classifying the species as Extinct has not yet been completed. A small chance remains that such species may still be rediscovered.
- **Critically Endangered (CR)** A species is Critically Endangered when the best available evidence indicates that it meets at least one of the five IUCN criteria for Critically Endangered, indicating that the species is facing an extremely high risk of extinction.
- **Endangered (EN)** A species is Endangered when the best available evidence indicates that it meets at least one of the five IUCN criteria for Endangered, indicating that the species is facing a very high risk of extinction.
- **Vulnerable (VU)** A species is Vulnerable when the best available evidence indicates that it meets at least one of the five IUCN criteria for Vulnerable, indicating that the species is facing a high risk of extinction.
- **Near Threatened (NT)** A species is Near Threatened when available evidence indicates that it nearly meets any of the IUCN criteria for Vulnerable and is therefore likely to become at risk of extinction in the near future.
- ^N**Critically Rare** A species is Critically Rare when it is known to occur at a single site but is not exposed to any direct or plausible potential threat and does not otherwise qualify for a category of threat according to one of the five IUCN criteria.
- ^N**Rare** A species is Rare when it meets at least one of four South African criteria for rarity but is not exposed to any direct or plausible potential threat and does not qualify for a category of threat according to one of the five IUCN criteria. The four criteria are as follows:
 - Restricted range: Extent of Occurrence (EOO) <500 km², OR
 - Habitat specialist: Species is restricted to a specialized microhabitat so that it has a very small Area of Occupancy (AOO), typically smaller than 20 km², OR
 - Low densities of individuals: Species always occurs as single individuals or very small subpopulations (typically fewer than 50 mature individuals) scattered over a wide area, OR
 - Small global population: Less than 10 000 mature individuals.
- **Least Concern** A species is Least Concern when it has been evaluated against the IUCN criteria and does not qualify for any of the above categories. Species classified as Least Concern are considered at low risk of extinction. Widespread and abundant species are typically classified in this category.



- **Data Deficient - Insufficient Information (DDD)** A species is DDD when there is inadequate information to make an assessment of its risk of extinction, but the species is well defined. Listing of species in this category indicates that more information is required, and that future research could show that a threatened classification is appropriate.
- **Data Deficient - Taxonomically Problematic (DDT)** A species is DDT when taxonomic problems hinder the distribution range and habitat from being well defined, so that an assessment of risk of extinction is not possible.
- **Not Evaluated (NE)** A species is Not Evaluated when it has not been evaluated against the criteria. The national Red List of South African plants is a comprehensive assessment of all South African indigenous plants, and therefore all species are assessed and given a national Red List status. However, some species included in [Plants of southern Africa: an online checklist](#) are species that do not qualify for national listing because they are naturalized exotics, hybrids (natural or cultivated), or synonyms. These species are given the status Not Evaluated and the reasons why they have not been assessed are included in the assessment justification.

Table F1: Floral SCC expected to occur within the QDS 2723CA in which the focus area is located. Additional information on species threat status as defined in The Red List of South African Plants (<http://redlist.sanbi.org/index.php>) is presented. Species presented below are protected under Schedule 2 (Protected Species) of the Northern Cape Nature Conservation Act, 2009 (Act No. 9 of 2009).

| Scientific Name | IUCN | Growth form | Habitat description | POC |
|---|------|---------------------------------|--|--------|
| Family: AIZOACEAE - All species | | | | |
| <i>Trianthesa parvifolia</i> | LC | Succulent; Herb | It occurs in open sandy, stony, or gravelly soils, often in disturbed places, 500-1600 m | Low |
| <i>Plinthus sericeus</i> | LC | Dwarf Shrub | Free State, Northern Cape, North West | Low |
| <i>Mestoklema arboriforme</i> | LC | Succulent | Free State, Northern Cape | Low |
| <i>Nananthus aloides</i> | LC | Succulent | It occurs on granite slopes, in gravelly sand or acid humus. At a fruiting stage, the ripening capsules re-orientate themselves to a spreading or suberect position, then mature capsules split open and seeds are dispersed locally by shaking action of wind. Flowers are pollinated by birds. | Medium |
| <i>Trichodiadema pomeridianum</i> | LC | Succulent | Eastern Cape, Free State, Northern Cape, North West, Western Cape | Low |
| <i>Plinthus karoocicus</i> | LC | Dwarf Shrub | Eastern Cape, Free State, Northern Cape, North West | Low |
| <i>Prepodesma orpenii</i> | LC | Succulent | Northern Cape | Low |
| Family: AMARYLLIDACEAE - All Species (except those listed in Schedule 1) | | | | |
| <i>Haemanthus humilis</i> | LC | Geophyte; | Eastern Cape, Free State, Gauteng, KwaZulu-Natal, Mpumalanga | Low |
| <i>Nerine laticoma</i> | LC | Geophyte; | Eastern Cape, Free State, Gauteng, Limpopo, Mpumalanga, Northern Cape, North West | Low |
| Family: APOCYNACEAE - All Species (except those listed in Schedule 1) | | | | |
| <i>Raphionacme velutina</i> | LC | Succulent; Geophyte; Herb | Gauteng, KwaZulu-Natal, Limpopo, Northern Cape, North West | Low |
| <i>Fockea angustifolia</i> | LC | Succulent; Climber | Free State, KwaZulu-Natal, Limpopo, Northern Cape, North West | Low |
| <i>Stapelia olivacea</i> | LC | Succulent | Eastern Cape, Free State, Northern Cape, Western Cape | Low |



| | | | | |
|--|----|---------------------------------|---|-----------|
| <i>Microlooma armatum</i> | LC | Dwarf Shrub; Shrub | Wide-range of shrubby habitats, in Namibia it is rarer and appears to be restricted to specific rock formations. | Low |
| <i>Piранthus decipiens</i> | LC | Succulent | Free State, Northern Cape, North West | Low |
| <i>Acokanthera oppositifolia</i> | LC | Shrub; tree | Eastern Cape, Gauteng, KwaZulu-Natal, Limpopo, Mpumalanga, North West, Western Cape | Low |
| <i>Cynanchum viminale</i> | LC | Climber | It is endemic to South Africa, where it occurs in the north-eastern parts of the Northern Cape and western Free State. | Medium |
| <i>Brachystelma circinatum</i> | LC | Succulent; Geophyte | Eastern Cape, Free State, Gauteng, KwaZulu-Natal, Limpopo, Mpumalanga, Western Cape | Low |
| <i>Gomphocarpus fruticosus</i> | LC | Herb; Shrub | Dry sandy soils in open or disturbed places. | High |
| <i>Gomphocarpus tomentosus</i> | LC | Herb; Shrub | Widespread across the central and north-eastern interior of South Africa, extending northwards within southern Africa to southern Angola, Zimbabwe and southern Mozambique. | Medium |
| Family: ASPHODELACEAE - All Species (except those listed in Schedule 1) | | | | |
| <i>Bulbine abyssinica</i> | LC | Succulent; Geophyte; Herb | Eastern Cape, Free State, Gauteng, KwaZulu-Natal, Limpopo, Mpumalanga, Northern Cape, North West, Western Cape | Low |
| <i>Trachyandra laxa</i> | LC | Succulent; Geophyte | Northern Cape, North West | Low |
| <i>Aloe grandidentata</i> | LC | Succulent; Herb | It occurs on rocky ridges in karroid shrubland and Kalahari thornveld. | Medium |
| <i>Bulbine narcissifolia</i> | LC | Succulent; Geophyte; Herb | Eastern Cape, Free State, Gauteng | Low |
| <i>Aloe claviflora</i> | LC | Succulent; Herb | Well drained areas on rocky slopes or flat stony areas at the margins of Kalahari thornveld. Usually, but not always, on calcrete. | Medium |
| <i>Bulbine frutescens</i> | LC | Succulent; Dwarf Shrub | Eastern Cape, Free State, Gauteng, KwaZulu-Natal, Limpopo, Mpumalanga, Northern Cape, North West, Western Cape | Low |
| Family: CAPPARACEAE - All <i>Boscia</i> Species | | | | |
| <i>Boscia albitrunca</i> | LC | tree | Free State, Gauteng, KwaZulu-Natal, Limpopo, Mpumalanga, Northern Cape, North West | Confirmed |
| Family: CARYOPHYLLACEAE - All <i>Dianthus</i> Species | | | | |
| <i>Dianthus namaensis</i> | LC | Herb | Northern Cape | Low |
| Family: CELASTRACEAE - All <i>Gymnosporia</i> Species | | | | |
| <i>Gymnosporia buxifolia</i> | LC | Shrub; tree | Eastern Cape, Free State, Gauteng, KwaZulu-Natal, Limpopo, Mpumalanga, Northern Cape, North West, Western Cape | Low |
| Family: CRASSULACEAE - All Species (except those listed in Schedule 1) | | | | |



| | | | | |
|--|----|---------------------------|--|--------|
| <i>Kalanchoe brachyloba</i> | LC | Succulent; Shrub | Free State, Gauteng, KwaZulu-Natal, Limpopo, Mpumalanga, Northern Cape, North West | Low |
| <i>Crassula capitella</i> | LC | Succulent; Herb | Eastern Cape, Free State, Western Cape | Low |
| <i>Kalanchoe lanceolata</i> | LC | Succulent; Shrub | Gauteng, Limpopo, Mpumalanga, North West | Low |
| <i>Kalanchoe rotundifolia</i> | LC | Succulent; Dwarf Shrub | Eastern Cape, Free State, Gauteng, KwaZulu-Natal, Limpopo, Mpumalanga, Northern Cape, North West | Low |
| Family: EUPHORBIACEAE - All <i>Euphorbia</i> Species and <i>Alchornea laxiflora</i> | | | | |
| <i>Euphorbia mauritanica</i> | LC | Succulent | Flats and stony slopes. | Medium |
| <i>Euphorbia rhombifolia</i> | LC | Succulent; Shrub | It occurs on stony slopes and flats. | Medium |
| <i>Euphorbia crassipes</i> | LC | Succulent; Shrub | Namibia to Kliprand, Pofadder, Prieska and Kimberley. | Low |
| <i>Euphorbia juttae</i> | LC | Succulent; Dwarf Shrub | Gravelly flats. | Low |
| <i>Euphorbia spartaria</i> | LC | Succulent; Shrub | Northern Cape | Low |
| <i>Euphorbia avasmontana</i> | LC | Succulent | Arid rocky slopes. | Low |
| <i>Euphorbia inaequilatera</i> | LC | Succulent | Eastern Cape, Free State, Gauteng, KwaZulu-Natal, Limpopo, Mpumalanga, Northern Cape, North West, Western Cape | Low |
| <i>Euphorbia duseimata</i> | LC | Succulent; Dwarf Shrub | Free State, Northern Cape, North West | Low |
| Family: IRIDACEAE - All Species (except those listed in Schedule 1) | | | | |
| <i>Babiana bainesii</i> | LC | Geophyte; Herb | Limpopo, Northern Cape, North West | Medium |
| <i>Gladiolus permeabilis</i> | LC | Geophyte; Herb | Deep sandy soils and kalahari dunes, low karroid shrubland, rocky outcrops in short, dry grassland, and open woodland. | Medium |
| <i>Moraea polystachya</i> | LC | Geophyte; Herb | Eastern Cape, North West, Western Cape | Low |
| <i>Moraea pallida</i> | LC | Geophyte; Herb | Open grassland and bushveld, sometimes in wetlands or rocky sites. | Medium |
| <i>Lapeirousia littoralis</i> | LC | Geophyte; Herb | Flats with deep red sandy soils. | Medium |
| Family: ORCHIDACEAE - All Species (except those listed in Schedule 1) | | | | |
| <i>Disperis macowanii</i> | LC | Geophyte; Herb | Eastern Cape, KwaZulu-Natal, Limpopo, Western Cape | Low |
| Family: OXALIDACEAE - All <i>Oxalis</i> Species | | | | |
| <i>Oxalis depressa</i> | LC | Succulent; Geophyte | Eastern Cape, Free State, Gauteng, KwaZulu-Natal, Limpopo, Mpumalanga, Northern Cape, North West | Low |
| <i>Oxalis lawsonii</i> | LC | Geophyte | Free State, Northern Cape, North West | Low |
| Family: SCROPHULARIACEAE - All <i>Jamesbrittenia</i>, <i>Diascia</i>, <i>Halleria</i>, <i>Manulea</i>, <i>Nemesia</i>, and <i>Phyllopodium</i> species, <i>Polycarena filiformis</i> and <i>Chaenostoma longipedicellatum</i> | | | | |



| | | | | |
|------------------------------------|----|--------------------|---------------|-----|
| <i>Jamesbrittenia integerrima</i> | LC | Herb; Dwarf Shrub | Northern Cape | Low |
| <i>Jamesbrittenia atropurpurea</i> | LC | Shrub; Dwarf Shrub | Northern Cape | Low |
| <i>Jamesbrittenia aurantiaca</i> | LC | Herb | Northern Cape | Low |

CR PE = Critically Endangered (Possibly Extinct); EN= Endangered; EW = Extinct in the Wild; NT = Near Threatened; VU= Vulnerable; P= Protected LC = Least Concern; NT = Not Evaluated.

Table F2: TOPS plant list for the floral species expected to occur within the Northern Cape.

| Family | Scientific Name | Habitat | Growth Form | Threat Status |
|----------------|---|--|-----------------|---------------|
| Aizoaceae | <i>Cheiridopsis peculiaris</i> | Gravels and shale derived from metamorphic rocks of the Namaqualand Complex | Succulent | CR |
| Aizoaceae | <i>Conophytum herreanthus</i> subsp. <i>Herreanthus</i> | Quartz patches | Succulent | CR |
| Asphodelaceae | <i>Aloidendron pillansii</i> | Succulent Karoo shrubland on dry, rocky dolomite and gneiss hillsides. | Succulent, Tree | EN |
| Amaryllidaceae | <i>Haemanthus graniticus</i> | Namaqualand Klipkoppe Shrubland or Namaqualand Granite Renosterveld. | Geophyte | EN |
| Aizoaceae | <i>Lithops dorotheae</i> | Fine-grained, sheared, feldspathic quartzite | Succulent | EN |
| Asphodelaceae | <i>Aloidendron dichotomum</i> | On north-facing rocky slopes (particularly dolomite) in the south of its range. Any slopes and sandy flats in the central and northern parts of range. | Succulent, Tree | VU |
| Amaryllidaceae | <i>Brunsvigia herrei</i> | Succulent Karoo Shrubland, granitic soils on flats and sometimes in deposits of fairly large stones. | Geophyte | VU |
| Aizoaceae | <i>Conophytum bachelorum</i> | Rocky outcrops | Succulent | VU |
| Aizoaceae | <i>Conophytum ratum</i> | Spongy quartz soil. | Succulent | VU |
| Amaryllidaceae | <i>Gethyllis grandiflora</i> | Sandy and or stony soils in arid karroid shrubland. | Geophyte | VU |
| Amaryllidaceae | <i>Gethyllis namaquensis</i> | Coastal dunes and gravelly mountain slopes in succulent karoo shrubland. | Geophyte | VU |
| Amaryllidaceae | <i>Brunsvigia josephinae</i> | Heavy clay soils. | Geophyte | VU |
| Asphodelaceae | <i>Aloe krapohlana</i> | Occurs in the extremely arid northern regions of the Succulent Karoo, on clay, stony (mostly quartzitic) and sandy soils on flats and slopes. | Herb, Succulent | P |
| Amaryllidaceae | <i>Cyrtanthus herrei</i> | Deeply shaded rock ledges on south-facing rocky slopes. | Bulb | P |
| Aizoaceae | <i>Sceletium tortuosum</i> | Quartz patches and is usually found growing under shrubs in partial shade. | Succulent | P |
| Pedaliaceae | <i>Harpagophytum procumbens</i> | Well drained sandy habitats in open savanna and woodlands. | Herb | P |

CR= Critically Endangered, EN= Endangered, VU= Vulnerable, P= Protected



Table F3: List of potential plant SCC for the QDS 2527AA derived from current literature for vegetation found in the area as well as the international IUCN Red Data list, the South African Red Data List, and the Botanical Database of Southern Africa (BODATSA; <http://posa.sanbi.org/>).

| Family | Scientific Name | IUCN | Growth form | POC |
|-------------|-------------------------|------|-------------|--------|
| Acanthaceae | <i>Barleria media</i> | VU | Herb | Medium |
| Cleomaceae | <i>Cleome conrathii</i> | NT | Herb | Medium |

CR PE = Critically Endangered (Possibly Extinct); EN= Endangered; EW = Extinct in the Wild; NT = Near Threatened; VU= Vulnerable; P= Protected LC = Least Concern; POC = Probability of Occurrence.

Table F4: Protected trees as defined by The National Forest Act, 1998, (Act No. 84 of 1998) (NFA) for the QDS 2527AA. Additional information on species threat status as defined in The Red List of South African Plants (<http://redlist.sanbi.org/index.php>) is presented.

| Family | Scientific Name | IUCN | Growth form | POC |
|--------------|-------------------------------|------|-------------|-----------|
| Fabaceae | <i>Vachellia erioloba</i> | LC | Tree | Confirmed |
| Fabaceae | <i>Vachellia haematoxylon</i> | LC | Tree | Confirmed |
| Brassicaceae | <i>Boscia albitrunca</i> | LC | Tree | High |



APPENDIX G: Faunal SCC

The tables below list the faunal Species of Conservation Concern for the focus area:

Table G1: TOPS list of faunal species (2015) that may occur within the Northern Cape.

| Scientific Name | Common Name | Threat Status |
|--------------------------------|------------------------------|---------------|
| <i>Homopus signatus</i> | Speckled tortoise | VU |
| <i>Pachydactylus goodi</i> | Good's Gecko | VU |
| <i>Cordylus macropholis</i> | Large-scaled Lizard | P |
| <i>Cordylus imkeae</i> | Rooiberg Girdled Lizard | P |
| <i>Opisththalmus ater</i> | Steinkopf Burrowing Scorpion | CR |
| <i>Acinonyx jubatus</i> | Cheetah | VU |
| <i>Manis temminckii</i> | Pangolin | VU |
| <i>Ceratotherium simum</i> | Southern White Rhinoceros | P |
| <i>Crocuta crocuta</i> | Spotted Hyaena | P |
| <i>Felis nigripes</i> | Black-footed Cat | P |
| <i>Hyaena brunnea</i> | Brown Hyaena | NT |
| <i>Neophron percnopterus</i> | Egyptian Vulture | CR |
| <i>Aquila rapax</i> | Tawny Eagle | EN |
| <i>Torgos tracheliotos</i> | Lappet-faced Vulture | EN |
| <i>Gyps africanus</i> | White-backed Vulture | CR |
| <i>Gyps coprotheres</i> | Cape Vulture | EN |
| <i>Neotis ludwigii</i> | Ludwig's Bustard | EN |
| <i>Polemaetus bellicosus</i> | Martial Eagle | EN |
| <i>Terathopius ecaudatus</i> | Bateleur | EN |
| <i>Anthropoides paradiseus</i> | Blue Crane | P |
| <i>Ardeotis kori</i> | Kori Bustard | P |
| <i>Python sebae</i> | African Rock Python | P |
| <i>Orycteropus afer</i> | Aardvark | P |

CR= Critically Endangered, EN=Endangered, NT=Near Threatened, VU=Vulnerable, P=Protected



Faunal Species of Conservation Concern

Table G2: Threatened species not yet listed above that may occur in the focus area.

| Common Name | Species | NCCA 2009 Status | IUCN Status |
|-------------------------------|---------------------------------|----------------------|-------------|
| Honey badger | <i>Mellivora capensis</i> | Specially Protected | LC |
| African wild cat | <i>Felis silvestris</i> | Specially protected | LC |
| Striped polecat | <i>Ictonyx striatus</i> | Specially protected | LC |
| African striped weasel | <i>Poecilogale albinucha</i> | Specially protected | LC |
| Aardwolf | <i>Proteles cristata</i> | Specially protected | LC |
| Cape fox | <i>Vulpes chama</i> | Specially protected | LC |
| Southern African hedgehog | <i>Atelerix frontalis</i> | Specially protected | LC |
| Leopard | <i>Panthera pardus</i> | Specially protected | VU |
| Black eagle | <i>Aquila verreauxii</i> | Specially Protected | VU |
| White-backed Vulture | <i>Gyps africanus</i> | Specially Protected | CR |
| Ludwig's Bustard | <i>Neotis ludwigii</i> | Specieally protected | EN |
| Martial Eagle | <i>Polemeatus bellicosus</i> | Specially Protected | EN |
| Tawny Eagle | <i>Aquila rapax</i> | Specially Protected | EN |
| Cape Vulture | <i>Gyps coprotheres</i> | Specially Protected | EN |
| Lappet-faced Vulture | <i>Torgos tracheliotos</i> | Specially Protected | EN |
| Burchell's courses | <i>Cursorius rufus</i> | Protected | VU |
| Lanner Falcon | <i>Falco biarmicus</i> | Specially Protected | VU |
| Secretarybird | <i>Sagittarius serpentarius</i> | Specially Protected | VU |
| Kori Bustard | <i>Ardeotis kori</i> | NA | NT |
| African Rock Pipit | <i>Anthus crenatus</i> | Protected | NT |
| Burrowing scorpion | <i>Opisththalmus carinatus</i> | Specially Protected | NYBA |
| Burrowing scorpion | <i>Opisththalmus wahlbergii</i> | Specially Protected | NYBA |
| Common flap-neck chameleon | <i>Chamaeleo dilepis</i> | Specially Protected | LC |
| African rock python | <i>Python sebae</i> | Specially Protected | - |

EN = Endangered, CR = Critically Endangered, VU = Vulnerable, NT = Near Threatened, LC = Least Concern, NYBA = Not yet been assessed, NE = Not Evaluated, NA = Not applicable



APPENDIX H: Species List

Floral Species List

Table H1: Dominant floral species encountered in the Focus area. Alien species are indicated with an asterisk (*). Also indicated are species falling within an alien invasive category as per the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004): Alien and Invasive Species Regulations, 2016.

| Species | | |
|---|--|---------------------------------|
| Trees/shrubs | Forb species | Grass species |
| <i>Asparagus lariginus</i> | <i>Ammocharis coranica</i> | <i>Anthehora pubescens</i> |
| <i>Asparagus retrofractus</i> | <i>Aptosimum elongatum</i> | <i>Aristida congesta</i> |
| <i>Diospyros lycoides</i> | <i>Chrycosoma ciliata</i> | <i>Aristida meridionalis</i> |
| <i>Grewia flava</i> | <i>Dicoma schinzii</i> | <i>Brachiaria nigropedata</i> |
| <i>Lantana rugosa</i> | <i>Dimorphotheca sp.</i> | <i>Cenchrus ciliaris</i> |
| <i>Lycium hirsutum</i> | <i>Elephantorrhiza elephantina</i> | <i>Centropedia glauca</i> |
| * <i>Prosopis glandulosa var. torreyana</i> ^{NL} | <i>Felicia muricata</i> | <i>Cynodon dactylon</i> |
| <i>Senegalia mellifera subsp. detinens</i> | <i>Gisekia pharnacioides var. pharnacioid.</i> | <i>Enneapogon cenchroides</i> |
| <i>Searsia ciliata</i> | <i>Gnidia polycephala</i> | <i>Eragrostis lehmanniana</i> |
| <i>Tarchonanthus camphoratus</i> | <i>Helichrysum cerastioides</i> | <i>Eragrostis pallens</i> |
| <i>Vacehllia hebeclada</i> | <i>Indigofera daleoides var. daleoides</i> | <i>Eragrostis trichophora</i> |
| <i>Vachellia erioloba</i> | <i>Lophiocarpus polystachyus</i> | <i>Hyparrhenia hirta</i> |
| <i>Vachellia haematoxylon</i> | <i>Melolobium candicans</i> | <i>Melenis repens</i> |
| <i>Ziziphus mucronata</i> | <i>Nolletia arenosa</i> | <i>Pogonarthria squarrosa</i> |
| | <i>Pentzia globosa</i> | <i>Schmidtia pappophoroides</i> |
| | <i>Pollichia campestris</i> | <i>Stipagrostis amabilis</i> |
| | <i>Pteronia glauca</i> | <i>Stipagrostis uniplumis</i> |
| | <i>Senna italica subsp. arachoides</i> | |
| | <i>Tribulus zeyheri</i> | |

1a: Category 1a – Invasive species that require compulsory control.

1b: Category 1b – Invasive species that require control by means of an invasive species management programme.

2: Category 2 – Commercially used plants that may be grown in demarcated areas, provided that there is a permit and that steps are taken to prevent their spread.

3: Category 3 – Ornamentally used plants that may no longer be planted; existing plants may remain, except within the flood line of watercourses and wetlands, as long as all reasonable steps are taken to prevent their spread (Bromilow, 2001).

NL – Not listed



Faunal Species List

Table H2: Mammal species recorded during the field assessment.

| Scientific Name | Common Name | IUCN Status |
|---------------------------------|---------------------|-------------|
| <i>Canis mesomelas</i> | Black-backed Jackal | LC |
| <i>Sylvicapra grimmia</i> | Common duiker | LC |
| <i>Lepus capensis</i> | Cape hare | LC |
| <i>Pedetes capensis</i> | Springhare | LC |
| <i>Fukomys damarensis</i> | Damara mole rat | LC |
| <i>Galerella sanguinea</i> | Slender Mongoose | LC |
| <i>Elephantulus intufi</i> | Bushveld Sengi | LC |
| <i>Tragelaphus strepsiceros</i> | Kudu | LC |
| <i>Phacochoerus africanus</i> | Warthog | LC |
| <i>Raphicerus campestris</i> | Steenbok | LC |
| <i>Hystrix africaeaustralis</i> | Porcupine | LC |

LC = Least concerned. NT = Near Threatened, VU = Vulnerable NYBA = Not yet been assessed by the IUCN.

Table H3: Herpetofauna species recorded during the field assessment.

| Scientific name | Common Name | IUCN Status |
|----------------------------------|-----------------------------|-------------|
| <i>Pedioplanis lineoocellata</i> | Spotted sand lizard | NYBA |
| <i>Pedioplanis namaquensis</i> | Namaqua Sand Lizard | NYBA |
| <i>Trachylepis occidentalis</i> | Western Three-striped skink | NYBA |
| <i>Pseudapsis cana</i> | Mole snake | NYBA |
| <i>Naja vivea</i> | Cape Cobra | LC |
| <i>Agama aculeata</i> | Ground Agama | LC |
| <i>Psammophylax tritaeniatus</i> | Striped Skaapsteker | LC |
| <i>Ptenopus garrulus</i> | Common barking gecko | LC |
| <i>Trachylepis spilogaster</i> | Kalahari tree skink | LC |

LC = Least Concern, NYBA = Not Yet Been Assessed

Table H4: General insects recorded during the field assessment.

| Scientific Name | Common Name | IUCN Status |
|-------------------------------|-----------------------------|-------------|
| <i>Hodotermes mossambicus</i> | Northern harvester termite | NYBA |
| <i>Junonia hierta</i> | Yellow Pansy | LC |
| <i>Passalidius fortipes</i> | Burrowing ground beetle | NYBA |
| <i>Apterogyna</i> sp. | Velvet ant | NA |
| <i>Eremoides bicristatus</i> | Crested Owlfly | NYBA |
| <i>Stips</i> sp. | Ridged seed beetle | NYBA |
| <i>Gonometa postica</i> | African silk moth | NYBA |
| <i>Calidea dregii</i> | Rainbow Shield Bug | NYBA |
| <i>Catopsilia florella</i> | African Migrant | NYBA |
| <i>Belenois aurota</i> | Brown-veined White | NYBA |
| <i>Junonia orithya</i> | Eyed Pansy | NYBA |
| <i>Danaus chrysippus</i> | African Monarch | NYBA |
| <i>Colotis euippe</i> | Smokey Orange Tip | NYBA |
| <i>Eurema brigitta</i> | Broad-bordered Grass Yellow | NYBA |
| <i>Spalia</i> sp. | Sandman | NYBA |
| <i>Loxostege frustalis</i> | Karoo Moth | NYBA |
| <i>Conistica saucia</i> | Rock Grasshopper | NYBA |



| Scientific Name | Common Name | IUCN Status |
|---------------------------------|------------------|-------------|
| <i>Sphingonotus scabriculus</i> | Blue-wing | NYBA |
| <i>Acanthacris ruficornis</i> | Garden Locust | NYBA |
| <i>Gastrimargus</i> sp. | N/A | NYBA |
| <i>Rhachitopsis</i> sp | N/A | NYBA |
| <i>Systophlochius palochius</i> | Orange wing | NYBA |
| <i>Anterhynchium fallax</i> | N/A | NYBA |
| <i>Camponotus fulvopilosus</i> | Bal-byter | NYBA |
| <i>Crematogaster peringueyi</i> | Cocktail Ant | NYBA |
| <i>Pantala flavescens</i> | Wandering Glider | LC |
| <i>Mylabris oculata</i> | CMR Bean Beetle | NYBA |

LC = Least Concern, NYBA = Not yet been assessed by the IUCN

Table H5: Arachnid species recorded during the site assessment.

| Common Name | Scientific Name | IUCN Status |
|-----------------------------|----------------------------------|-------------|
| <i>Uroplectes carinatus</i> | Common Lesser-thicktail Scorpion | NA |
| Grass funnel-web spiders | <i>Agelena</i> sp. | NA |
| Sun spider | Solifugae sp | NA |

LC = Least Concern, NYBA = Not Yet Been Assessed, NA = Not applicable



APPENDIX I: Specialist Information

DETAILS, EXPERTISE AND CURRICULUM VITAE OF SPECIALISTS

1. (a) (i) Details of the specialist who prepared the report

| | |
|------------------------|--|
| Samantha-Leigh Daniels | PhD Candidate (Plant Science) (University of Pretoria) |
| Chris Hooton | BTech Nature Conservation (Tshwane University of Technology) |
| Nelanie Cloete | MSc (Environmental Management) (University of Johannesburg) Pr. Sci. Nat. |
| Stephan van Staden | MSc (Environmental Management) (University of Johannesburg) Pr. Sci. Nat. |

1. (a). (ii) The expertise of that specialist to compile a specialist report including a curriculum vitae

| | | | |
|-----------------------------|--|-------|----------------------------|
| Company of Specialist: | Scientific Terrestrial Services | | |
| Name / Contact person: | Nelanie Cloete | | |
| Postal address: | PO. Box 751779, Gardenview | | |
| Postal code: | 2047 | Cell: | 084 311 4878 |
| Telephone: | 011 616 7893 | Fax: | 011 615 6240/ 086 724 3132 |
| E-mail: | Nelanie@sasenvgroup.co.za | | |
| Qualifications | MSc Environmental Management (University of Johannesburg) MSc Botany (University of Johannesburg) BSc (Hons) Botany (University of Johannesburg) BSc (Botany and Zoology) (Rand Afrikaans University) | | |
| Registration / Associations | Professional member of the South African Council for Natural Scientific Professions (SACNASP) Member of the South African Association of Botanists (SAAB) Member of the International Affiliation for Impact Assessments (IAIAsa) South Africa group Member of the Grassland Society of South Africa (GSSA) | | |

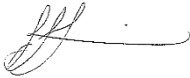
| | | | |
|-----------------------------|--|-------|----------------------------|
| Company of Specialist: | Scientific Terrestrial Services | | |
| Name / Contact person: | Stephen van Staden | | |
| Postal address: | 29 Arterial Road West, Oriel, Bedfordview | | |
| Postal code: | 2007 | Cell: | 082 442 7637 |
| Telephone: | 011 616 7893 | Fax: | 011 615 6240/ 086 724 3132 |
| E-mail: | stephen@sasenvgroup.co.za | | |
| Qualifications | MSc (Environmental Management) (University of Johannesburg) BSc (Hons) Zoology (Aquatic Ecology) (University of Johannesburg) BSc (Zoology, Geography and Environmental Management) (University of Johannesburg) | | |
| Registration / Associations | Registered Professional Scientist at South African Council for Natural Scientific Professions (SACNASP) Accredited River Health practitioner by the South African River Health Program (RHP) Member of the South African Soil Surveyors Association (SASSO) Member of the Gauteng Wetland Forum | | |



1. (b) a declaration that the specialist is independent in a form as may be specified by the competent authority

I, Samantha-Leigh Daniels, declare that -

- I act as the **independent specialist** in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the relevant legislation and any guidelines that have relevance to the proposed activity;
- I will comply with the applicable legislation;
- I have not, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct



Signature of the Specialist

I, Christopher Hooton, declare that -

- I act as the **independent specialist (reviewer)** in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the relevant legislation and any guidelines that have relevance to the proposed activity;
- I will comply with the applicable legislation;
- I have not, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct



Signature of the Specialist



I, Nelanie Cloete, declare that -

- I act as the **independent specialist (reviewer)** in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the relevant legislation and any guidelines that have relevance to the proposed activity;
- I will comply with the applicable legislation;
- I have not, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct



Signature of the Specialist

I, Stephen van Staden, declare that -

- I act as the **independent specialist (reviewer)** in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the relevant legislation and any guidelines that have relevance to the proposed activity;
- I will comply with the applicable legislation;
- I have not, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct



Signature of the Specialist





SAS ENVIRONMENTAL GROUP OF COMPANIES – SPECIALIST CONSULTANT INFORMATION

CURRICULUM VITAE OF SAMANTHA-LEIGH DANIELS

PERSONAL DETAILS

| | |
|---|--------------------|
| Position in Company | Contract Ecologist |
| Joined SAS Environmental Group of Companies | 2020 |

EDUCATION

Qualifications

| | |
|--|---------|
| PhD (Plant Science) (University of Pretoria) | Present |
| MSc (Plant Science) (University of Pretoria) | 2017 |
| BSc (Hons) Zoology & Entomology (University of Pretoria) | 2014 |
| BSC Zoology & Entomology (University of Pretoria) | 2013 |

AREAS OF WORK EXPERIENCE

South Africa – Gauteng, Mpumalanga, KwaZulu-Natal

KEY SPECIALIST DISCIPLINES

Experience

- Desktop Delineations
- Invertebrate and plant surveys along the Sani Pass as part of an ongoing research project
- Bush encroachment surveys within Mpumalanga
- Grassland Surveys at Rietvlei Nature Reserve

Training

- Plant species identification
- Herbarium usage and protocols





SAS ENVIRONMENTAL GROUP OF COMPANIES – SPECIALIST CONSULTANT INFORMATION

CURRICULUM VITAE OF CHRISTOPHER HOOTON

PERSONAL DETAILS

| | |
|---|---|
| Position in Company | Senior Scientist, Member Biodiversity Specialist |
| Joined SAS Environmental Group of Companies | 2013 |

EDUCATION

Qualifications

| | |
|---|------|
| BTech Nature Conservation (Tshwane University of Technology) | 2013 |
| National Diploma Nature Conservation (Tshwane University of Technology) | 2008 |

Short Courses

| | |
|--|------|
| Certificate – Department of Environmental Science in Legal context of Environmental Management, Compliance and Enforcement (UNISA) | 2009 |
| Introduction to Project Management - Online course by the University of Adelaide | 2016 |
| Integrated Water Resource Management, the National Water Act, and Water Use Authorisations, focusing on WULAs and IWWMPs | 2017 |

AREAS OF WORK EXPERIENCE

South Africa – Gauteng, Mpumalanga, North West, Limpopo, KwaZulu-Natal, Eastern Cape, Western Cape, Northern Cape, Free State
Africa - Zimbabwe, Sierra Leone

KEY SPECIALIST DISCIPLINES

Biodiversity Assessments

- Floral Assessments
- Faunal Assessments
- Biodiversity Actions Plan (BAP)
- Biodiversity Management Plan (BMP)
- Alien and Invasive Control Plan (AICP)
- Ecological Scan
- Protected Tree and Floral Marking and Reporting
- Biodiversity Offset Plan

Freshwater Assessments

- Freshwater Verification Assessment
- Freshwater (wetland / riparian) Delineation and Assessment
- Freshwater Eco Service and Status Determination
- Rehabilitation Assessment / Planning





SAS ENVIRONMENTAL GROUP OF COMPANIES – SPECIALIST CONSULTANT INFORMATION

CURRICULUM VITAE OF NELANIE CLOETE

PERSONAL DETAILS

| | |
|---|---|
| Position in Company | Senior Scientist, Member Botanical Science and Terrestrial Ecology |
| Joined SAS Environmental Group of Companies | 2011 |

MEMBERSHIP IN PROFESSIONAL SOCIETIES

Professional member of the South African Council for Natural Scientific Professions (SACNASP – Reg No. 400503/14)
 Member of the South African Association of Botanists (SAAB)
 Member of the International Affiliation for Impact Assessments (IAIAsa) South Africa group
 Member of the Grassland Society of South Africa (GSSA)
 Member of the Botanical Society of South Africa (BotSoc)
 Member of the Gauteng Wetland Forum (GWF)

EDUCATION

Qualifications

| | |
|---|------|
| MSc Environmental Management (University of Johannesburg) | 2013 |
| MSc Botany (University of Johannesburg) | 2007 |
| BSc (Hons) Botany (University of Johannesburg) | 2005 |
| BSc (Botany and Zoology) (Rand Afrikaans University) | 2004 |

Short Courses

| | |
|--|------|
| Certificate – Department of Environmental Science in Legal context of Environmental Management, Compliance and Enforcement (UNISA) | 2009 |
| Introduction to Project Management - Online course by the University of Adelaide | 2016 |
| Integrated Water Resource Management, the National Water Act, and Water Use Authorisations, focusing on WULAs and IWWMPs | 2017 |

AREAS OF WORK EXPERIENCE

South Africa – Gauteng, Mpumalanga, North West, Limpopo, KwaZulu-Natal, Northern Cape, Eastern Cape, Free State
Africa - Democratic Republic of the Congo (DRC)

KEY SPECIALIST DISCIPLINES

Biodiversity Assessments

- Floral Assessments
- Biodiversity Actions Plan (BAP)
- Biodiversity Management Plan (BMP)
- Alien and Invasive Control Plan (AICP)
- Ecological Scan
- Terrestrial Monitoring
- Protected Tree and Floral Marking and Reporting
- Biodiversity Offset Plan

Freshwater Assessments

- Desktop Freshwater Delineation
- Freshwater Verification Assessment
- Freshwater (wetland / riparian) Delineation and Assessment
- Freshwater Eco Service and Status Determination
- Rehabilitation Assessment / Planning
- Plant species and Landscape Plan

Legislative Requirements, Processes and Assessments

- Water Use Applications (Water Use Licence Applications / General Authorisations)
- Environmental and Water Use Audits
- Freshwater Resource Management and Monitoring as part of EMPR and WUL condition





SAS ENVIRONMENTAL GROUP OF COMPANIES – SPECIALIST CONSULTANT INFORMATION CURRICULUM VITAE OF **STEPHN VAN STADEN**

PERSONAL DETAILS

| | |
|---------------------|---|
| Position in Company | Managing member, Ecologist, Aquatic Ecologist |
| Date of Birth | 13 July 1979 |
| Nationality | South African |
| Languages | English, Afrikaans |
| Joined SAS | 2003 (year of establishment) |
| Other Business | Trustee of the Serenity Property Trust |

MEMBERSHIP IN PROFESSIONAL SOCIETIES

Registered Professional Scientist at South African Council for Natural Scientific Professions (SACNASP)
Accredited River Health practitioner by the South African River Health Program (RHP)
Member of the South African Soil Surveyors Association (SASSO) Member of the Gauteng Wetland Forum
Member of IAIA South Africa

EDUCATION

Qualifications

| | |
|--|------|
| MSc (Environmental Management) (University of Johannesburg) | 2003 |
| BSc (Hons) Zoology (Aquatic Ecology) (University of Johannesburg) | 2001 |
| BSc (Zoology, Geography and Environmental Management) (University of Johannesburg) | 2000 |
| Tools for wetland Assessment short course Rhodes University | 2016 |

COUNTRIES OF WORK EXPERIENCE

South Africa – All Provinces
Southern Africa – Lesotho, Botswana, Mozambique, Zimbabwe Zambia
Eastern Africa – Tanzania Mauritius
West Africa – Ghana, Liberia, Angola, Guinea Bissau, Nigeria, Sierra Leona
Central Africa – Democratic Republic of the Congo

PROJECT EXPERIENCE (Over 2500 projects executed with varying degrees of involvement)

- 1 Mining: Coal, Chrome, PGM's, Mineral Sands, Gold, Phosphate, river sand, clay, fluorspar
- 2 Linear developments
- 3 Energy Transmission, telecommunication, pipelines, roads
- 4 Minerals beneficiation
- 5 Renewable energy (wind and solar)
- 6 Commercial development
- 7 Residential development
- 8 Agriculture
- 9 Industrial/chemical

REFERENCES

- Terry Calmeyer (Former Chairperson of IAIA SA)
Director: ILISO Consulting Environmental Management (Pty) Ltd
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- Marietjie Eksteen
Managing Director: Jacana Environmental
Tel: 015 291 4015

