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**BIODIVERSITY SCOPING REPORT AS PART OF THE  
ENVIRONMENTAL IMPACT ASSESSMENT AND  
AUTHORISATION PROCESS FOR THE PROPOSED  
DIAMOND PROSPECTING AND BULK SAMPLING  
PROJECTS IN THE RICHTERSVELD, NORTHERN CAPE  
PROVINCE**

**Prepared for**

**NDI Geological Consulting Services (Pty) Ltd.**

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SAS Environmental Group of Companies

## EXECUTIVE SUMMARY

Scientific Terrestrial Services (STS) was appointed to conduct a desktop terrestrial biodiversity assessment as part of the Environmental Impact and Authorisation process for the proposed diamond prospecting and bulk sampling activities within and along the Orange River, situated near the town of Sendelingsdrif, Northern Cape Province. The proposed prospecting and bulk sampling activities include seven (7) prospecting pockets within two greater Prospecting Right Application Areas (PRAA). The south western area is referred to as PRAA 1 where prospecting pockets 1, 2 3A and 3B are located and PRAA 2, further north and east where the prospecting pockets 4, 5 and 6 are located. The PRAA 1 and PRAA 2 and the associated prospecting pockets are hereafter collectively referred to as the “focus area”. This report provides the desktop results for the scoping phase of the project.

During the desktop analysis it was established that PRAA 2 and prospecting pockets 4, 5 and 6 are located within a protected area (namely the Richtersveld National Park and the Richtersveld Cultural Botanical Landscape). According to the Mining and Biodiversity Guidelines (2013) and the National Environmental Management: Protected Areas Act, 2003 (Act No. 57 of 2003) (NEMPAA), these areas are legally protected, and mining herein is prohibited. PRAA 1 and prospecting pockets 1, 2, 3A and 3B fall within areas categorised as a Critical Biodiversity Area 1, in which further expansion of surface-mining is prohibited. Moreover, prospecting pockets 2, 3A and 3B are located within an area identified as Highest Biodiversity Importance and therefore mining poses a high risk to the sensitive habitat and associated floral and faunal species within these areas. It is deemed likely that these areas could also be considered no-go areas from a biodiversity perspective due to the high impact and potential loss of irreplaceable habitat.

Several plant species that are protected under Schedule 2 (Protected Species) of the Northern Cape Nature Conservation Act, 2009 (Act No. 9 of 2009), and the National Forest Act, 1998 (Act 84 of 1998) were identified as having the potential to be located within the focus area. As these species are provincially important, should they be present within the focus area and the prospecting activities commence, they will need to be rescued and relocated to a similar habitat near the focus area. Thus, a field assessment would be required to establish whether suitable habitat exists within the surrounding area to support these species. Several faunal SCC, as identified by the Threatened or Protected Species list of 2015 as it relates to the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) which have potential distribution ranges that encompass the focus area. A comprehensive field investigation would be required to determine the habitat suitability of these species prior to commencement of prospecting activities.

From a terrestrial biodiversity management point of view and considering the relevant databases researched, there are significant risks associated with the proposed diamond prospecting activities within the focus area. The potential significant impacts are attributed to the placement of the prospecting pockets within an endangered ecosystem, namely the Lower Gariep Alluvial Vegetation. Furthermore, this risk is further increased, especially for prospecting pockets 4, 5 and 6, which fall within a Protected Area, and CBA1. The focus area also falls within the Gariep Centre of Plant Endemism (GC) which is associated with a high diversity of endemic plant species. As such, range restricted endemic plants will be threatened by the proposed prospecting activities.

Following the desktop analysis of the biodiversity within the focus area, it is determined that a full comprehensive biodiversity assessment (preferably within all seasons) will need to be undertaken to determine the sensitivity and the potential impacts to the focus areas.



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## LIST OF ACRONYMS

<b>AIP</b>	Alien Invasive Plant
<b>BGIS</b>	Biodiversity Geographic Information Systems
<b>CARA</b>	Conservation of Agricultural Resource Act
<b>CBA</b>	Critical Biodiversity Area
<b>CR</b>	Critically Endangered
<b>EAP</b>	Environmental Assessment Practitioner
<b>EIA</b>	Environmental Impact Assessment
<b>EN</b>	Endangered
<b>ESA</b>	Ecological Support Area
<b>GIS</b>	Geographic Information System
<b>GPS</b>	Global Positioning System
<b>Ha</b>	Hectares
<b>IBA</b>	Important Bird Area
<b>IEM</b>	Integrated Environmental Management
<b>IUCN</b>	International Union for the Conservation of Nature
<b>MAP</b>	Mean Annual Precipitation
<b>MAPE</b>	Mean Annual Potential for Evaporation
<b>MASMS</b>	Mean Annual Soil Moisture Stress
<b>MAT</b>	Mean Annual Temperature
<b>MFD</b>	Mean Frost Days
<b>NBA</b>	National Biodiversity Assessment (2011)
<b>NCNCA</b>	Northern Cape Nature Conservation Act, 2009 (Act No. 9 of 2009)
<b>NCPSDF</b>	Northern Cape Provincial Spatial Development Framework
<b>NEMA</b>	National Environmental Management Act, 1998 (Act No. 107 of 1998)
<b>NEMBA</b>	National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004)
<b>NEMPAA</b>	National Environmental Management: Protected Areas Act, 2003 (Act No. 57 of 2003)
<b>NPAES</b>	National Protected Areas Expansion Strategy
<b>NT</b>	Near Threatened
<b>PES</b>	Present Ecological State
<b>POC</b>	Probability of Occurrence
<b>PRAA</b>	Prospecting Right Application Area
<b>QDS</b>	Quarter Degree Square (1:50,000 topographical mapping references)
<b>RDL</b>	Red Data List
<b>SABAP 2</b>	Southern African Bird Atlas 2
<b>SACAD</b>	South Africa Conservation Areas Database
<b>SANBI</b>	South African National Biodiversity Institute
<b>SAPAD</b>	South Africa Protected Area Database
<b>SCC</b>	Species of Conservation Concern
<b>SKEP</b>	Succulent Karoo Programme
<b>STS</b>	Scientific Terrestrial Services CC
<b>TOPS</b>	Threatened or Protected Species list as per NEMBA 2015
<b>TSP</b>	Threatened Species Programme
<b>VU</b>	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].

<b>Alien species</b> (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.
<b>Biological diversity or Biodiversity</b> (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.
<b>Biome - as per Mucina and Rutherford (2006); after Low and Rebelo (1998).</b>	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).
<b>Bioregion</b> (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;
<b>Bush encroachment</b>	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.
<b>CBA</b> (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.
<b>Corridor</b>	A dispersal route or a physical connection of suitable habitats linking previously unconnected regions.
<b>Disturbance</b>	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.
<b>Ecoregion</b>	An ecoregion is a "recurring pattern of ecosystems associated with characteristic combinations of soil and landform that characterise that region".
<b>Endangered</b>	Organisms in danger of extinction if causal factors continue to operate.
<b>Endemic species</b>	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.
<b>ESA</b> (Ecological Support Area)	An ESA provides connectivity and important ecological processes between CBAs and is therefore important in terms of habitat conservation.
<b>Habitat</b> (as per the definition in NEMBA)	A place where a species or ecological community naturally occurs.
<b>IBA</b> (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.
<b>Indigenous vegetation</b> (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.
<b>Integrity (ecological)</b>	The integrity of an ecosystem refers to its functional completeness, including its components (species) its patterns (distribution) and its processes.
<b>Invasive species</b>	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.
<b>Listed alien species</b>	All alien species that are regulated in South Africa under the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004), Alien and Invasive Species (A&I) Regulations, 2016.
<b>Least Threatened</b>	Least threatened ecosystems are still largely intact.



<p><b>Native species (syn. indigenous species)</b></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><b>RDL (Red Data listed) species</b></p>	<p>According to the Red List of South African plants (<a href="http://redlist.sanbi.org/">http://redlist.sanbi.org/</a>) 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><b>SCC (Species of Conservation Concern)</b></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><b>Specifically related to flora:</b> 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"> <li>- The Botanical Database of Southern Africa (BODATSA) to obtain plant names and floristic details (<a href="http://posa.sanbi.org/">http://posa.sanbi.org/</a>); and</li> <li>- The List of Protected Tree Species (GN 809 of 2014) under the National Forest Act, 1998 (Act No. 84 of 1998).</li> </ul> <p><b>Specifically related to fauna:</b> 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"> <li>- The National Environmental Management: Biodiversity Act, 2004 (Act No.10 of 2004) (NEMBA) Threatened or Protected Species (TOPS) list (NEMBA, Notice 389 of 2013);</li> <li>- The International Union for Conservation of Nature (IUCN) Red List of Threatened Species;</li> <li>- The 2015 Eskom Red Data Book of Birds of South Africa, Lesotho and Swaziland; and</li> <li>- The Atlas and Red List of the Reptiles of South Africa, Lesotho, and Swaziland.</li> </ul>





# 1 INTRODUCTION

Scientific Terrestrial Services (STS) was appointed to conduct a biodiversity assessment as part of the Environmental Impact and Environmental Authorisation (EIA) process for the proposed diamond prospecting and bulk sampling activities within and along the Orange River, situated near the town of Sendelingsdrif, Northern Cape Province. The proposed prospecting and bulk sampling activities include seven (7) prospecting pockets within two greater Prospecting Right Application Areas (PRAA). The south western area is referred to as PRAA 1 where prospecting pockets 1, 2 3A and 3B are located, and PRAA 2, further north and east where the prospecting and bulk sampling pockets 4, 5 and 6 are located. The PRAA 1 and PRAA 2 and the associated prospecting pockets are hereafter collectively referred to as the “focus area”. This report includes a desktop screening assessment as part of the Scoping Phase of the Environmental Impact Assessment (EIA) process.

The individual prospecting pockets cover approximately 640 ha. These areas are located within the Richtersveld Metropolitan Municipality which is an administrative area of the Namakwa District Municipality. The focus area is situated approximately 10 km northeast of the town of Sendelingsdrif, adjacent to the Orange River and bordering Namibia. The location and extent of the focus area, comprising of PRAA 1 and PRAA 2 and their associated prospecting pockets are indicated in Figures 1 and 2.

Samara Mining (Pty) Ltd intends to prospect for alluvial diamonds within the floodline of the Orange River. Prospecting for such resources will thus require the excavation of several trenches to obtain the bulk samples required. An expected ten trenches, each 100 m x 25 m x 4 m, are anticipated to be excavated per prospecting pocket. The volume of overburden/waste to be removed will be 2500 m<sup>3</sup> on each excavation and the Volume of resource bearing gravel to be abstracted will be 7500 m<sup>3</sup> for each excavation.

The processing of excavated samples will entail the use of 8 x 18 feet rotary pans with a minimum and maximum tonnage of 45 and 56 respectively, subject to the Gravel Specific Gravity. From the rotary pans, concentrate will be pumped to a vacuum and filter system for further processing which will remove the dirt, filter the water to a drinkable standard and either release it back into the Orange River or supply surrounding communities with water by pumping it into the municipal reservoirs. As such, further development of associated infrastructure to support the prospecting includes:

- Ablution facilities;
- Access roads;





- Diesel storage facilities;
- Fences;
- Office sites;
- Plant sites; and
- Vehicle parking areas.

The active channel Orange River is 30-40 m wide, however the riverbed is approximately 300-400 m wide. No prospecting will take place within 50m of the active channel. It is proposed that eighty per cent (80%) of the riverbed will be worked dry; Samara will make small temporary diversions in the river to prospect (working in a phased manner with concurrent rehabilitation). No blasting will be required as part of prospecting activities, and there will be no processing in the riverbed only on the Orange River active channel embankment or within 50m thereof. Only machinery and associated pumps will be located within the active channel and associated banks.

The proposed prospecting, which is expected to be undertaken over a period of three (3) years, is located on the Orange River, an area historically known for diamond mining. As such, no alternative for prospecting has been explored.

The purpose of this report is to identify and describe the terrestrial ecology of the focus area making use of provincial and national desktop datasets to inform the scoping phase. This report, after consideration and description of the ecological integrity of the focus area, must guide the future studies to be undertaken by the specialist as well as guide the Environmental Assessment Practitioner (EAP) and authorities on the studies required in the EIA phase.



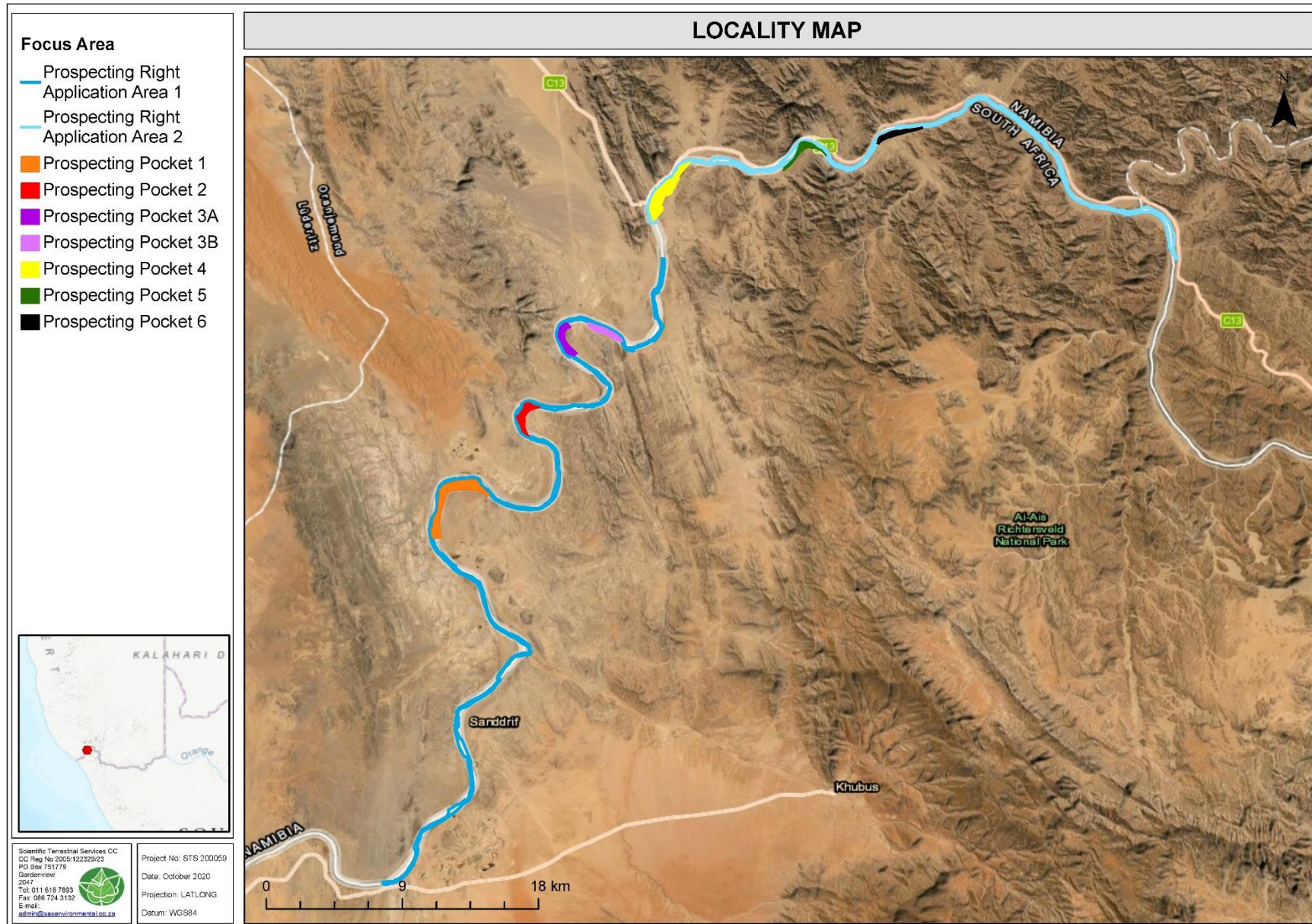


Figure 1: Digital satellite image depicting the focus area (indicating the various pockets) in relation to the surrounding areas.





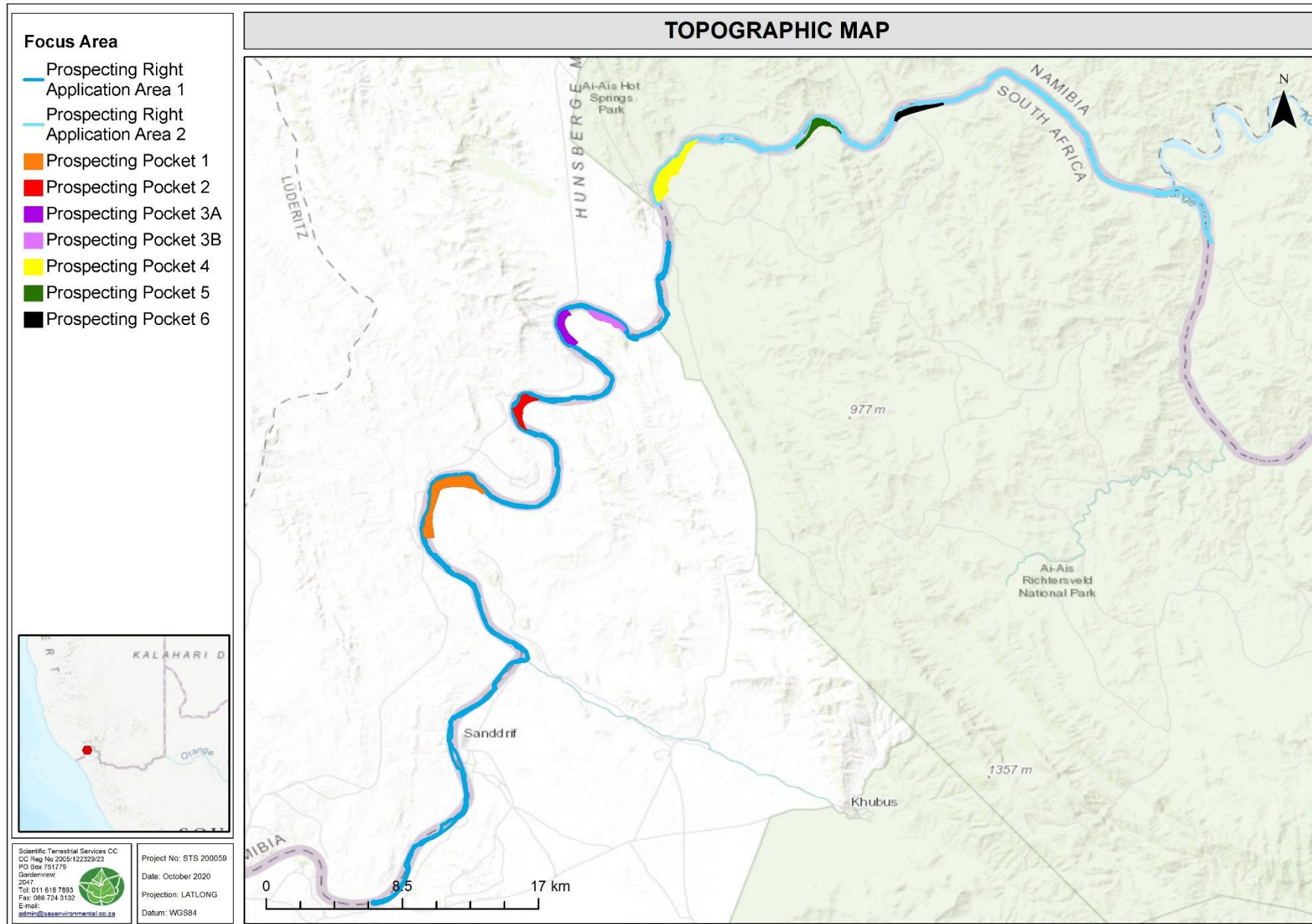


Figure 2: Location of the focus area (indicating the various pockets) depicted on a topographical map in relation to the surrounding area.



## 1.1 Project Scope

Specific outcomes in terms of the Scoping Phase report are as follows:

- Compile a desktop assessment with all relevant information as presented by SANBI's Biodiversity Geographic Information Systems (BGIS) website (<http://bgis.sanbi.org>), including the National Threatened Ecosystem Database (2011), the Northern Cape Nature Conservation Act, 2009 (Act No. 9 of 2009); and the Northern Cape Provincial Spatial Development Framework;
- Compile a report presenting the results and findings of the scoping assessment; as well as identify potential impacts associated with the proposed prospecting activities; and
- Present the plan of study for the EIA phase of the project including the methods of assessment to be used.

## 1.2 Assumptions and Limitations

The following assumptions and limitations apply to this report:

- The terrestrial ecological desktop assessment is confined to the focus area and did not include the neighbouring and adjacent properties, although the sensitivity of surrounding areas is included on the respective maps;
- This scoping phase study was undertaken as a desktop assessment only, and as such, the information gathered must be considered with caution, as inaccuracies and data capturing errors are often present within these databases. Since this information forms part of the scoping phase, this desktop assessment is considered to provide adequate information for informed decision making and to inform the Plan of Study for the EIA phase; and
- To comply with the Northern Cape Department of Environment and Nature Conservation requirements, a site visit has been scheduled for the summer season<sup>1</sup>. Findings of the site assessment, as well as an impact assessment, will be included as part of the EIA phase report.

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<sup>1</sup> The summer season is best for sampling floral species as it is when most species are in flower making for more accurate species identification.



### 1.3 Legislative Requirements

The following legislative requirements were considered during the assessment:

- The Constitution of the Republic of South Africa, 1996<sup>2</sup>;
- 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);
- National Environmental Management: Protected Areas Act, 2003 (Act No. 57 of 2003) (NEMPAA);
- Government Notice 635 List of Protected Tree Species as published in the Government Gazette 41887 dated 6 December 2019 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 December 2019 (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 Desktop Study

A desktop assessment was compiled with all relevant information as presented by the SANBI's Biodiversity GIS website (<http://bgis.sanbi.org>). Relevant databases and documentation that were considered during the assessment of the focus area included:

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<sup>2</sup> 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



- NPAES Focus Areas for Protected Area Expansion, 2009:
  - Formally and Informally Protected Areas;
- South Africa Conservation Area Database, Quarter 4, 2019;
- The South Africa Protected Area Database, Quarter 4, 2019;
- Mucina and Rutherford, 2012 & 2018 (beta version):
  - Biomes;
  - Bioregions; and
  - Vegetation Type(s).
- National Biodiversity Assessment, 2018;
- The National Web-based Screening Tool, 2020;
- Important Bird and Biodiversity Areas (IBAs), 2015, in conjunction with the South African Bird Atlas Project (SABAP2);
- The Northern Cape Critical Biodiversity Areas (2016); and
- The Northern Cape Provincial Spatial Development Framework (2000)

## **2.2 General Approach**

To accurately determine the PES of the focus area and capture comprehensive data with respect to faunal and floral taxa, the following methodology was used:

- Maps and digital satellite images were consulted during the desktop analysis to determine broad habitats, vegetation types and potentially sensitive sites; and
- Relevant databases were considered during the assessment of the focus area included the South African National Biodiversity Institute (SANBI) Threatened Species Programme (TSP), the Northern Cape Critical Biodiversity Areas (2016), The Northern Cape Provincial Spatial Development Framework (2000), Mucina and Rutherford (2000), National Biodiversity Assessment (2011), Important Bird Areas in conjunction with the South African Bird Atlas Project (SABAP 2) (2015), the International Union for Conservation of Nature (IUCN), and Pretoria National Herbarium Computer Information Systems (PRECIS).



### **3 RESULTS OF THE DESKTOP ANALYSIS**

#### ***3.1 Conservation Characteristics of the focus area based on National and Provincial Datasets***

The following table contains data accessed as part of the desktop assessment. It is important to note that although all data sources used provide useful and often verifiable, high-quality data, the various databases do not always provide an entirely accurate indication of the focus area's actual biodiversity characteristics.





**Table 1: Summary of the terrestrial conservation characteristics for the focus area.**

DETAILS OF THE FOCUS AREA IN TERMS OF MUCINA & RUTHERFORD (2012 AND 2018)				
<b>BIOME</b>	The focus area falls within the following biomes: <b>Desert</b> and <b>Azonal Vegetation</b> .		<b>BIOREGION</b>	Southern Namib Desert Bioregion, the Gariep Desert Bioregion, and the Alluvial Vegetation Bioregion.
VEGETATION TYPE (Figure 3)				
<p>The entire focus area falls within four vegetation types, namely the Lower Gariep Alluvial Vegetation (Azonal Vegetation Biome), the Western Gariep Hills Desert (Desert Biome), the Richtersveld Sheet Wash Desert (Desert Biome), and the Noms Mountain Desert (Desert Biome).</p> <p><u>Prospecting pockets 1, 2, 3A, 3B and 5</u>: fall largely within the Lower Gariep Alluvial Vegetation type (encompassing most of each prospecting pockets area), with small sections of each prospecting pocket bordering the Western Gariep Hills Desert vegetation type.</p> <p><u>Prospecting pocket 4</u>: falls exclusively within the Lower Gariep Alluvial Vegetation type.</p> <p><u>Prospecting pocket 6</u>: falls within three vegetation types, namely the Lower Gariep Alluvial Vegetation type (making up most of the pocket area), and small sections bordering each of the Richtersveld Sheet Wash Desert and Noms Mountain Desert.</p>				
DESCRIPTION OF THE VEGETATION TYPE RELEVANT TO THE FOCUS AREA (MUCINA & RUTHERFORD 2006)				
<b>DISTRIBUTION</b>	<p><u>Lower Gariep Alluvial Vegetation</u>: Northern Cape Province</p> <p><u>Noms Mountain Desert</u>: Northernmost part of the Richtersveld National Park, east of Sendelingsdrif, north of Koeroegab and the Kook River, south of the Orange River.</p> <p><u>Richtersveld Sheet Wash Desert</u>: Northeastern part of the Richtersveld National Park, south of Kook River and north of the Springbokvlakte and Tatasberg including the mountains of Rooiberg, Richtersberg, Claim Peak and Nabasberg.</p> <p><u>Western Gariep Hills Desert</u>: In the triangle between Sendelingsdrif, Kuboes and Sanddrif in the northern Richtersveld</p>		<b>ALTITUDE (m)</b>	<p><u>Lower Gariep Alluvial Vegetation</u>: 0 – 1 000</p> <p><u>Noms Mountain Desert</u>: 100–600</p> <p><u>Richtersveld Sheet Wash Desert</u>: 100 – 882</p> <p><u>Western Gariep Hills Desert</u>: 60 - 360</p>
<b>CLIMATE</b>	The information presented below describes the general climate that each of the above-mentioned vegetation types experiences.			
	<u>Lower Gariep Alluvial Vegetation associated with all Prospecting pockets</u> : Region with very arid (desert) to subarid (semidesert) climate and erratic, unimodal (winter-rainfall) regime in the extreme west (near the Orange River mouth). Prospecting pockets 1, 2, 3A, 3B, 4, 5, and 6 are all found within this vegetation type.			
	MAP (mm): 131	MAT (°C): 19.2	MFD (days): 14	MAPE (mm): 2 888
	Noms Mountain Desert which borders prospecting pocket 6 only: MAP approximately 45–60 mm. Variable, transitional climate between winter and summer rainfall.			
	MAP (mm): 306	MAT (°C): 13.6	MFD (days): 62	MAPE (mm): 2 402
<u>Richtersveld Sheet Wash Desert which borders prospecting pocket 6 only</u> : Very variable, transitional between summer and winter rainfall.				
MAP (mm): 45 – 70	MAT (°C): NA (Highs can exceed 50°C occasionally)	MFD (days): Rare	MAPE (mm): NA	MASMS (%): NA



	Western Gariiep Hills Desert which borders prospecting pockets 1, 2, 3A, 3B and 5: Predominantly winter rainfall with MAP from about 45–60 mm.				
	MAP (mm): 45 - 60	MAT (°C): NA (Highs can exceed 50°C occasionally)	MFD (days): 0	MAPE (mm): NA	MASMS (%): NA
<b>CONSERVATION</b>	<p><u>Lower Gariiep Alluvial Vegetation</u> (Prospecting pockets 1, 2, 3A, 3B, 4, 5, and 6 are all found within this vegetation type.): Endangered. Target 31%. About 6% statutorily conserved in the Richtersveld and Augrabies Falls National Parks. Some 50% transformed for agricultural purposes (vegetables and grapes) or alluvial diamond mining. <i>Prosopis</i> species, <i>Nicotiana glauca</i> and <i>Argemone ochroleuca</i> can invade the alluvia in places.</p> <p><u>Noms Mountain Desert</u> (Prospecting pocket 6 is located within this vegetation type): Least threatened. Target 34%. 100% statutorily conserved in the Richtersveld National Park. The unit has a high conservation value due to high concentration of endemic taxa of the East Gariiep CE. Very little transformed but there is some diamond mining at Oenas, close to the Orange River. Domestic grazing is permitted in the park in terms of its status as a contractual park. This unit contains one of the largest aggregations of <i>Pachypodium namaquanum</i>. It is also found across the border in Namibia where it is, at least in part, protected within the Ai-Ais National Park.</p> <p><u>Richtersveld Sheet Wash Desert</u> (Prospecting pocket 6 is located within this vegetation type): Least threatened. Target 34%. 100% statutorily conserved in the Richtersveld National Park. Also found across the border in Namibia, where it is (at least in part) protected within the Ai-Ais National Park. High conservation value due to its concentration of endemics of the East Gariiep CE. Very little transformed. Grazing of private herds is permitted in the park in terms of its status as a contractual park.</p> <p><u>Western Gariiep Hills Desert</u> (Prospecting pockets 1, 2, 3A, 3B, 5, and 6 are all found within this vegetation type): Target 28%. Some 11% statutorily conserved in the Richtersveld National Park. About 1% transformed by several active and historical mines. The unit has a high conservation value due to its endemic and other localised species and recommendations have been made to SANParks to incorporate most of it into the Richtersveld National Park. Elsewhere within the unit, Cornellskop has been declared a Natural Heritage Site. The unit also occurs at least to some extent in Namibia where most of it is protected within the Sperrgebiet National Park.</p>				
<b>GEOLOGY &amp; SOILS</b>	<p><u>Lower Gariiep Alluvial Vegetation</u> (Prospecting pockets 1, 2, 3A, 3B, 4, 5, and 6 are all located within this vegetation type): Recent alluvial deposits of the Orange River supporting soil forms such as Dundee and Oakleaf. The river cuts through a great variety of Precambrian metamorphic rocks. Ia land type. Subject to floods, especially in summer, caused by high precipitation on the highveld.</p> <p><u>Noms Mountain Desert</u> (Prospecting pocket 6 borders this vegetation type): Predominantly calc-alkaline, acid, and intermediate metavolcanic rocks and quartzitic metasediments of the De Hoop Subgroup (Orange River Group). Also, granodiorite, adamellite, leucogranite, tonalite and diorite of the Vioolsdrif Intrusive Suite (Mokolian Erathem) are found. Hardly any deep soils developed. Land type Ic.</p> <p><u>Richtersveld Sheet Wash Desert</u> (Prospecting pocket 6 borders this vegetation type): Granodiorite and adamellite of the Vioolsdrif Suite dominate the area together with the metavolcanics and metasediments of the De Hoop Subgroup of the Orange River Group (Mokolian). Granite of the Tatasberg Pluton (part of the Kuboos-Bremen Suite) also features. Very rocky substrate, with very shallow to no soils. Sands occur in valley bottoms. Land type Ic.</p> <p><u>Western Gariiep Hills Desert</u> (Prospecting pockets 1, 2, 3A, 3B, 5, and 6 all border this vegetation type): Metasediments of the Gariiep Supergroup dominate this area. They include quartzite, limestone, dolomite, diamictite and schist which occur in a structurally complex succession, making up the Port Nolloth Group (Namibian). Mispah and Glenrosa soils dominate, with lime generally present in the entire landscape. The dominant land type is Fc.</p>				
<b>VEGETATION &amp; LANDSCAPE FEATURES</b>	<p><u>Lower Gariiep Alluvial Vegetation</u> (Prospecting pockets 1, 2, 3A, 3B, 4, 5, and 6 are all located within this vegetation type): Flat alluvial terraces and riverine islands supporting a complex of riparian thickets (dominated by <i>Ziziphus mucronata</i>, <i>Euclea pseudebenus</i> and <i>Tamarix usneoides</i>), reed beds with <i>Phragmites australis</i> as well as flooded grasslands and herblands populating sand banks and terraces within and along the river.</p> <p><u>Noms Mountain Desert</u> (Prospecting pocket 6 borders this vegetation type): Most of the unit is formed by rugged, generally low mountains with bare rock and very sparse vegetation. Habitats differ according to topography, rock type and climate (see below). On the rocks, succulents like <i>Aloe dichotoma</i>, <i>Ceraria namaquensis</i>, <i>Pachypodium namaquanum</i>, <i>Tylecodon hallii</i>, <i>Commiphora capensis</i>, <i>Zygophyllum segmentatum</i>, <i>Schwantesia herrei</i>, but also the rare <i>Portulacaria armiana</i> occur. In the valley bottoms, <i>Dicoma capensis</i>, <i>Pharnaceum croceum</i>, <i>Dimorphotheca polyptera</i>, <i>Mesembryanthemum gariusanum</i>, <i>Sesuvium sesuvioides</i>, <i>Euphorbia</i></p>				



	<p><i>phylloclada</i>, <i>Leucophrys mesocoma</i> and <i>Stipagrostis namaquensis</i> are frequent. Relatively more mesic vegetation occurs towards the upper end of the moisture gradient from the hyperarid Orange River Valley to higher altitudes and in some of the gorges.</p> <p><u>Richtersveld Sheet Wash Desert</u> (Prospecting pocket 6 borders this vegetation type): Rugged mountain ranges with bare rock and valleys some of which (e.g. lower Gannakouriep River) form deep canyons. At high altitudes vegetation cover is sparse; plant cover (including <i>Commiphora capensis</i>, <i>Aloe dichotoma</i>, <i>Tylecodon hallii</i>, <i>Schwantesia herrei</i>, <i>Euphorbia gariiepina</i> and <i>E. virosa</i>) is more conspicuous in some gorges and on slopes covered with a mixture of boulders and rubble. On valley bottoms within this vegetation unit sparse grassland mainly with <i>Leucophrys mesocoma</i> and <i>Stipagrostis namaquensis</i> occur, but also <i>Stipagrostis obtusa</i> and <i>S. ciliata</i>, after good rains combined with rich populations of opportunistic life forms like <i>Mesembryanthemum gariusanum</i> (sometimes flowering in masses), <i>Dicoma capensis</i>, <i>Pharnaceum croceum</i>, <i>Dimorphotheca polyptera</i>, <i>Sesuvium sesuvioides</i> and <i>Euphorbia phylloclada</i>. But also see remarks under Dg 3 Richtersveld Sheet Wash Desert.</p> <p><u>Western Gariiep Hills Desert</u> (Prospecting pockets 1, 2, 3A, 3B, 5, and 6 all border this vegetation type): Very heterogeneous broken landscape, mostly hilly but including some smaller and larger plains. Some of the plains are covered by quartz gravel, others by loamy sand or by gravel from different rocks, with strong contrasts between different mosaic elements. The main vegetation unit includes quartz fields, which are covered by dwarf cushions of the <i>Brownanthus pubescens</i> community and the <i>Hartmanthus pergamentaceus</i> community (Jürgens 2004), the latter being restricted to this unit. The undulating hills, especially on southwestern slopes, are covered by the <i>Ruschianthemum gigas</i> desert shrubland community (Jürgens 2004), while rocky outcrops sometimes support populations of the spectacular <i>Aloe pillansii</i> (e.g. Cornellskop).</p>
<b>CONSERVATION DETAILS PERTAINING TO THE FOCUS AREA (VARIOUS DATABASES)</b>	
<p><b>NATIONAL THREATENED ECOSYSTEMS (2011) (Figure 3)</b></p>	<p>According to the National Threatened Ecosystem Dataset, the vegetation types within the focus area include Noms Mountain Desert, the Richtersveld Sheet Wash Desert, and the Western Gariiep Hills Desert, of which are all considered <b>Least Threatened (LC)</b>. However, the Lower Gariiep Alluvial Vegetation is considered <b>Endangered (EN)</b>.</p> <p>In terms of the Prospecting pockets:</p> <ul style="list-style-type: none"> <li>• Prospecting pockets 1, 2, 3A, 3B and 5 all fall within both the Lower Gariiep Alluvial Vegetation type (<b>EN</b>), and the Western Gariiep Hills Desert vegetation type (<b>LC</b>);</li> <li>• Prospecting pocket 4 falls exclusively within the Lower Gariiep Alluvial Vegetation type (<b>EN</b>); and</li> <li>• Prospecting pocket 6 falls within the Lower Gariiep Alluvial Vegetation type (<b>EN</b>), the Richtersveld Sheet Wash Desert (<b>LC</b>) and Noms Mountain Desert (<b>LC</b>).</li> </ul> <p>Endangered ecosystems have lost significant habitat or experienced significant deterioration to the overall condition, with a loss of structure and function. Any further loss or deterioration should be avoided.</p>
<p><b>NATIONAL BIODIVERSITY ASSESSMENT (2018)</b></p>	<p>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 Protected Areas Act, 2003 (Act No. 57 of 2003), and compared with the biodiversity target for that ecosystem type. The ecosystem protection level status is assigned using the following criteria:</p> <ul style="list-style-type: none"> <li>• 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;</li> <li>• When less than 100% of the biodiversity target is met in formal A or B protected areas it is classified it as Moderately Protected;</li> <li>• If less than 50% of the biodiversity target is met, it is classified it as Poorly Protected; and</li> <li>• If less than 5% it is Hardly Protected.</li> </ul> <p>The Focus Areas falls within the remaining extent of Noms Mountain Desert (LC), and the Richtersveld Sheet Wash Desert (LC) are all considered <b>well protected</b>, whereas the Lower Gariiep Alluvial Vegetation (EN) and the Western Gariiep Hills Desert (LC) are <b>poorly protected</b>.</p> <p>In terms of the prospecting pockets:</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 2014, as amended and published under the National Environmental Management Act, 1998 (Act No. 107 of 1998). However, the updated 2018 ecosystem threat status have been considered in the assessment of impact significance in EIAs.</p>		<ul style="list-style-type: none"> <li>• Prospecting pockets 1, 2, 3A, 3B and 5 all fall within both the Lower Gariep Alluvial Vegetation type, and the Western Gariep Hills Desert vegetation type, both of which are considered to be <b>poorly protected</b>;</li> <li>• Prospecting pocket 4 falls exclusively within the Lower Gariep Alluvial Vegetation type which is <b>poorly protected</b>; and</li> <li>• Prospecting pocket 6 falls within the Lower Gariep Alluvial Vegetation type (<b>poorly protected</b>), the Richtersveld Sheet Wash Desert and Noms Mountain Desert both of which are <b>well protected</b>.</li> </ul>
<p><b>SAPAD (2019, Q4); SACAD (2019, Q4); NPAES (2009) (Figure 4)</b></p>	<p>According to the National Protected Areas Expansion Strategy (NPAES, 2009) database, the South African Protected Area Database (SAPAD, 2019) and the South African Conservation Areas Database (SACAD, 2019) the focus area falls within a 10 km buffer of the following protected areas: the <b>Richtersveld Cultural Botanical Landscape</b> and the <b>Richtersveld National Park</b>. It should be noted that prospecting pockets 4, 5 and 6 are all located within both the Richtersveld Cultural and Botanical Landscape and the Richtersveld National Park.</p> <p>The Richtersveld Cultural and Botanical Landscape was declared a World Heritage Site by UNSECO in 2007.</p>		
<p><b>IBA (2015)</b></p>	<p>The Focus Area is <b>not</b> located within an Important Bird and Biodiversity Area (IBA, 2015), nor is it located within 10 km of an IBA.</p>		
<p><b>NORTHERN CAPE CRITICAL BIODIVERSITY AREAS (2016) (FIGURE 5)</b></p>			
<p><b>PROTECTED AREA</b></p>	<p>Prospecting pockets 4, 5 and 6 are located within a <b>Protected Area</b>, namely the Richtersveld Cultural and Botanical Landscape and the Richtersveld National Park.</p> <p>Protected Areas are declared or recognized in terms of the National Environmental Management: Protected Areas Act, 2003 (Act No. 57 of 2003) (NEMPAA). Since protected areas have been secured through legal means and are mainly managed for biodiversity conservation, these areas contribute to meeting biodiversity targets for those biodiversity features that fall within their boundaries. Protected areas have formal long-term protection for important biodiversity and landscape features. Together with CBAs, protected areas ensure that a viable representative sample of all ecosystems types and species can persist. The management objectives of protected areas are that the area must stay in largely natural ecological condition, however management objectives within a protected area must be determined by the Protected Area Management Plan.</p>		
<p><b>CRITICAL BIODIVERSITY AREA (CBA) CATEGORY 1</b></p>	<p>Prospecting pockets 1, 2 3A and 3B are located within a <b>Category 1 CBA</b>.</p> <p>CBA1 areas consist of intact, undisturbed ecosystems. A CBA is an area that must remain in good ecological condition to meet biodiversity targets for ecosystem types, species of special concern of ecological processes. CBAs can meet biodiversity targets for terrestrial and / or aquatic features. CBA Category 1 are areas that are irreplaceable or near irreplaceable for meeting biodiversity targets. There are no or very few other options for meeting biodiversity targets for this area. Mining is not a compatible land use within a CBA1.</p> <p>These areas were identified as being a CBA1 for a number of reasons: The area has a high value for climate resilience, it supports several threatened species, it maintains important landscape structural elements, it is within a NPAES (National Protected Areas Expansion Strategy) protected area, within a SKEP (Succulent Karoo Programme) expert area (i.e. geographic priority areas identified as the most efficient locations for achieving conservation targets), within a river area, within a wetland area, within a World Heritage Site, and within a protected area buffer.</p>		



NATIONAL WEB BASED ENVIRONMENTAL SCREENING TOOL (2020)			
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.			
PLANT SPECIES	No information was provided in the screening assessment.	TERRESTRIAL SENSITIVITY	No information was provided in the screening assessment.
ANIMAL SPECIES	No information was provided in the screening assessment.		
MINING & BIODIVERSITY GUIDELINES (2013) (FIGURE 6)			
Legally Protected	<p>Prospecting pockets 4, 5 and 6 are located within a legally protected area according to the Mining and Biodiversity Guidelines. This is attributed to the location of the prospecting pockets both near the Orange River and within protected areas (namely the Richtersveld Cultural and Botanical Landscape and the Richtersveld National Park).</p> <p><b>Risk for mining:</b> Mining prohibited.</p> <p><b>Implications for mining:</b> Mining projects cannot commence as mining is legally prohibited. Although mining is prohibited in Protected Areas, it may be allowed in Protected Environments if both the Minister of Mineral Resources and Minister of Environmental Affairs approve it.</p>		
Highest Biodiversity Importance	<p>Prospecting pockets 2, 3A and 3B are located within areas considered to be of Highest Biodiversity Importance. This is likely attributed to the location of the pockets alongside the Orange River.</p> <p><b>Risk for mining:</b> Highest risk for mining.</p> <p><b>Implications for mining:</b> Environmental screening, EIAs and their associated specialist studies should focus on confirming the presence and significance of these biodiversity features, and to provide a site-specific basis on which to apply the mitigation hierarchy to inform regulatory decision making for mining, water use licences, and environmental authorisations. If they are confirmed, the likelihood of a fatal flaw for new mining projects is very high due to the significance of the biodiversity features in these areas and the associated ecosystem services.</p>		
High Biodiversity Importance	<p>Prospecting pocket 1 is located within area considered to be of High Biodiversity Importance.</p> <p><b>Risk for mining:</b> High risk to mining</p> <p><b>Implications for mining:</b> An environmental impact assessment should include an assessment of optimum, sustainable land use for a particular area and will determine the significance of the impact on biodiversity. Mining options may be limited in these areas, and red flags for mining projects are possible. Authorisations may set limits and specify biodiversity offsets that would be written into licence agreements and/or authorisations.</p>		



<b>NORTHERN CAPE PROVINCIAL SPATIAL DEVELOPMENT FRAMEWORK (NCPSDF, 2019) (FIGURE 7 &amp; 8)</b>	
The NCPSDF 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.	
The Focus area is located within the <b>Gariiep Centre (GC) of plant endemism</b> (Figure 7). This centre of endemism encompasses the Richtersveld and extends northwards into Namibia's Sperrgebiet, and supports approximately 355 endemic plant species (Simmons <i>et al.</i> 1998). The area does not fall within a development corridor (Figure 7 & 8))	
<b>STRATEGIC WATER SOURCE AREAS FOR SURFACE WATER (2017)</b>	
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.	
<b>NAME AND CRITERIA</b>	The focus area <b>is not</b> located within 10 km of a Strategic Water Source Area.

**CBA = Critical Biodiversity Area, ESA = Ecological Support Area, IBA = Important Bird and Biodiversity Area, MAP = Mean Annual Precipitation, MAT = Mean Annual Temperature, MFD = Mean Frost Days, MAPE = Mean Annual Potential for Evaporation, MASMS = Mean Annual Soil Moisture Stress, NBA = National Biodiversity Assessment, NPAES = National Protected Areas Expansion Strategy, SACAD = South African Conservation Areas Database, SAPAD = South African Protected Areas Database.**





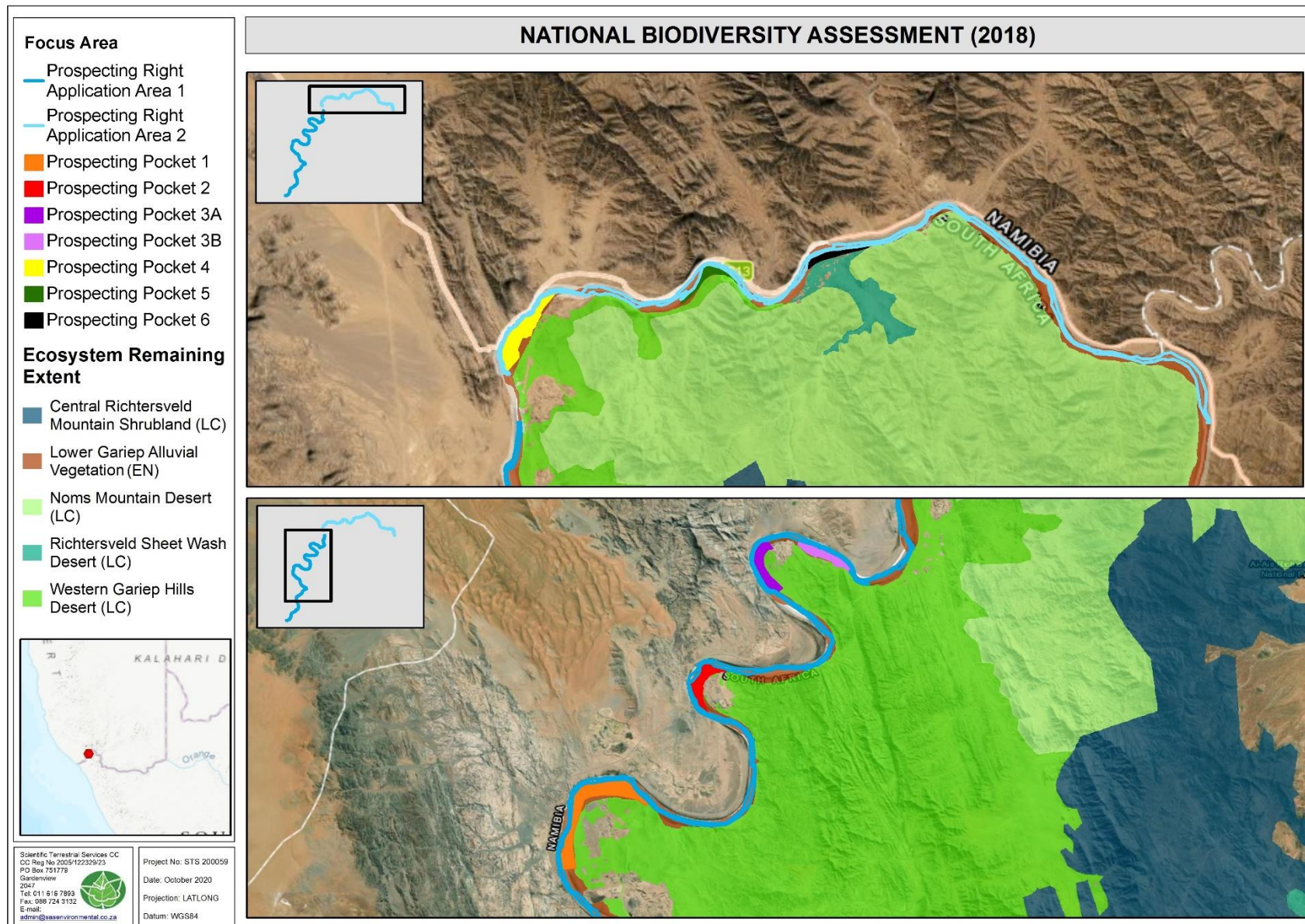


Figure 3: The remaining extent of the vegetation types associated with the focus area, according to the National Biodiversity Assessment (NBA, 2018).





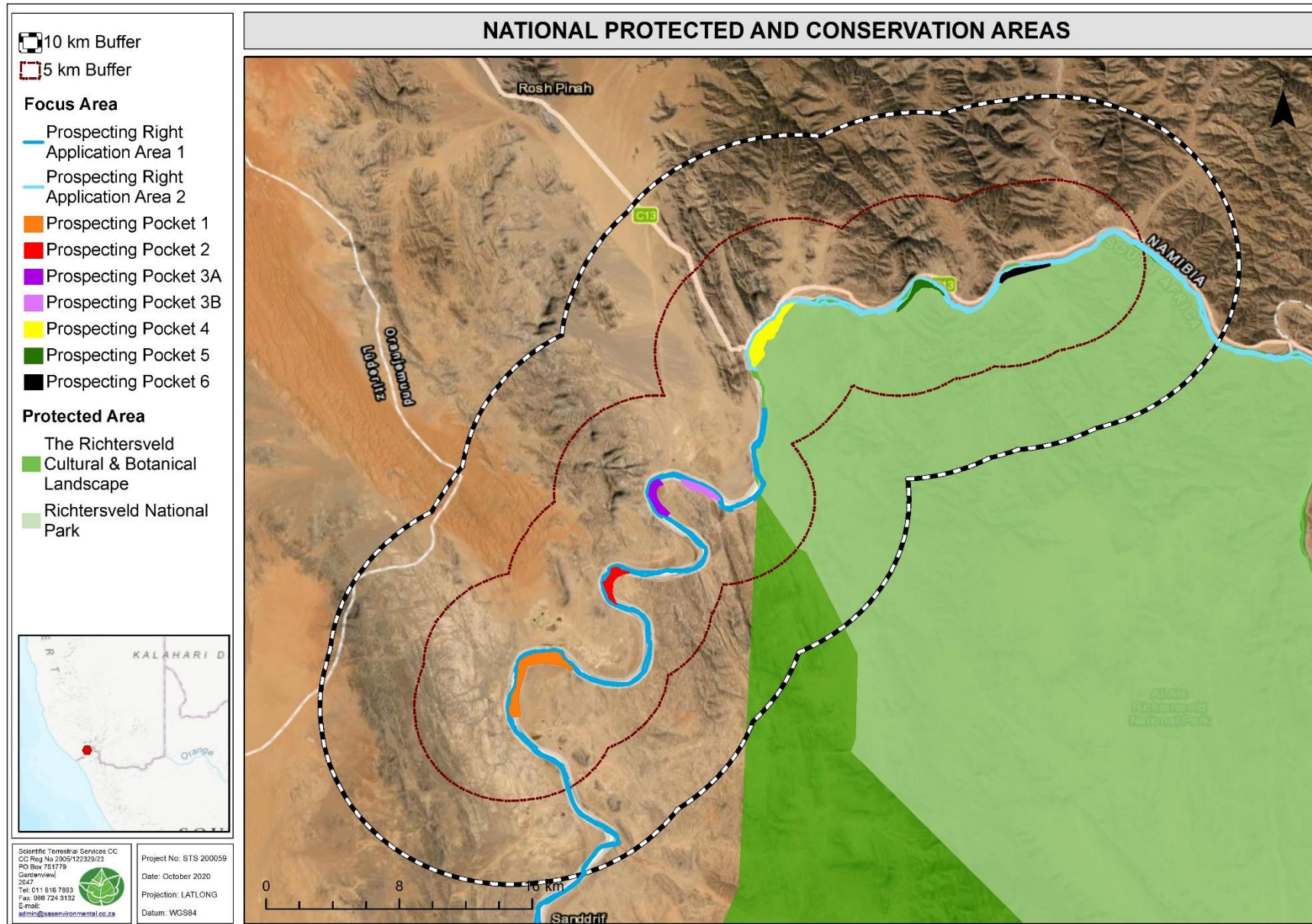


Figure 4: Protected areas within a 5 km and 10 km radius of the focus area, according to SAPAD (Q4, 2019), SACAD (Q4, 2019) and NPAES (2009).





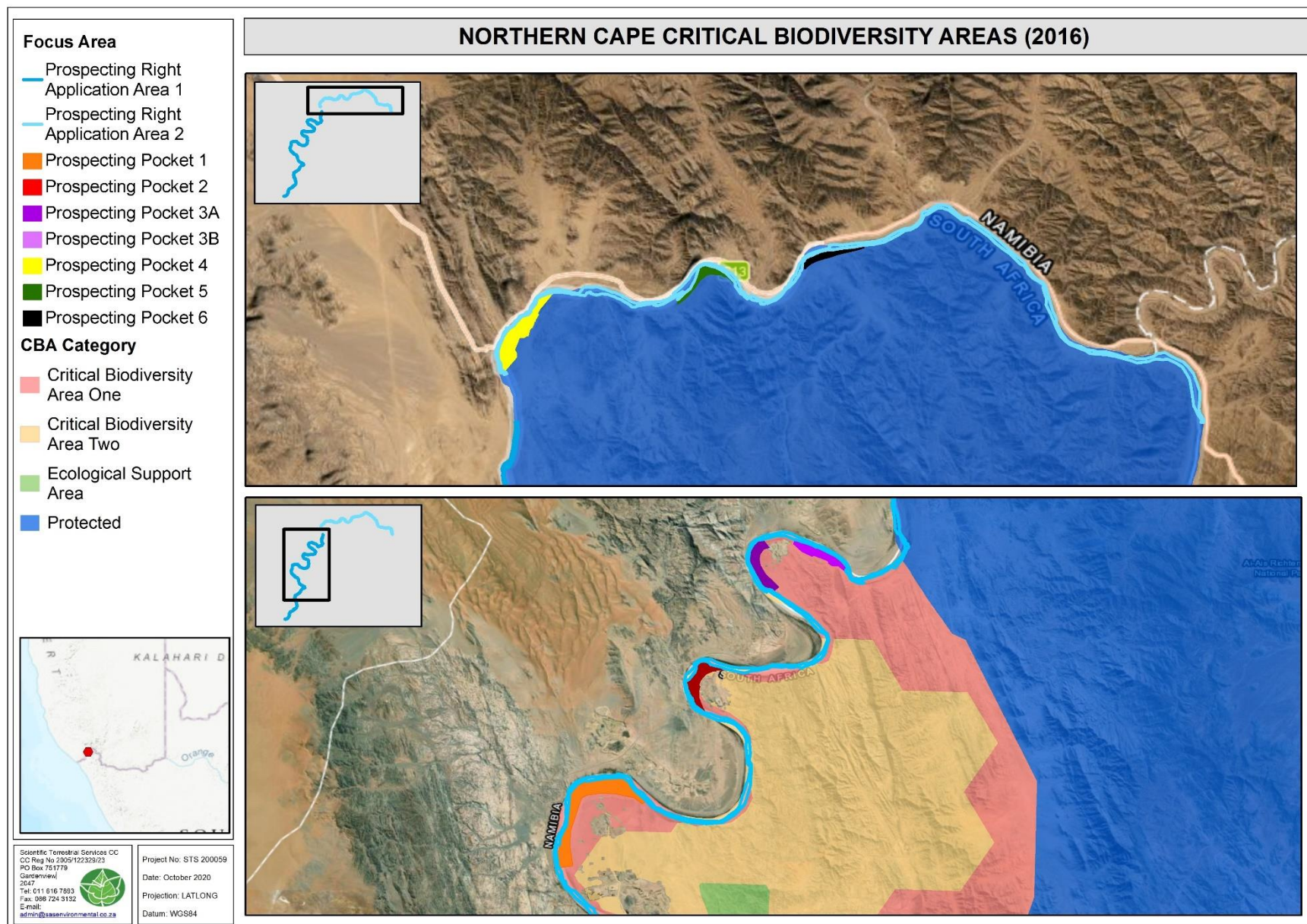


Figure 5: Northern Cape Critical Biodiversity areas associated with the focus area and the associated infrastructure.





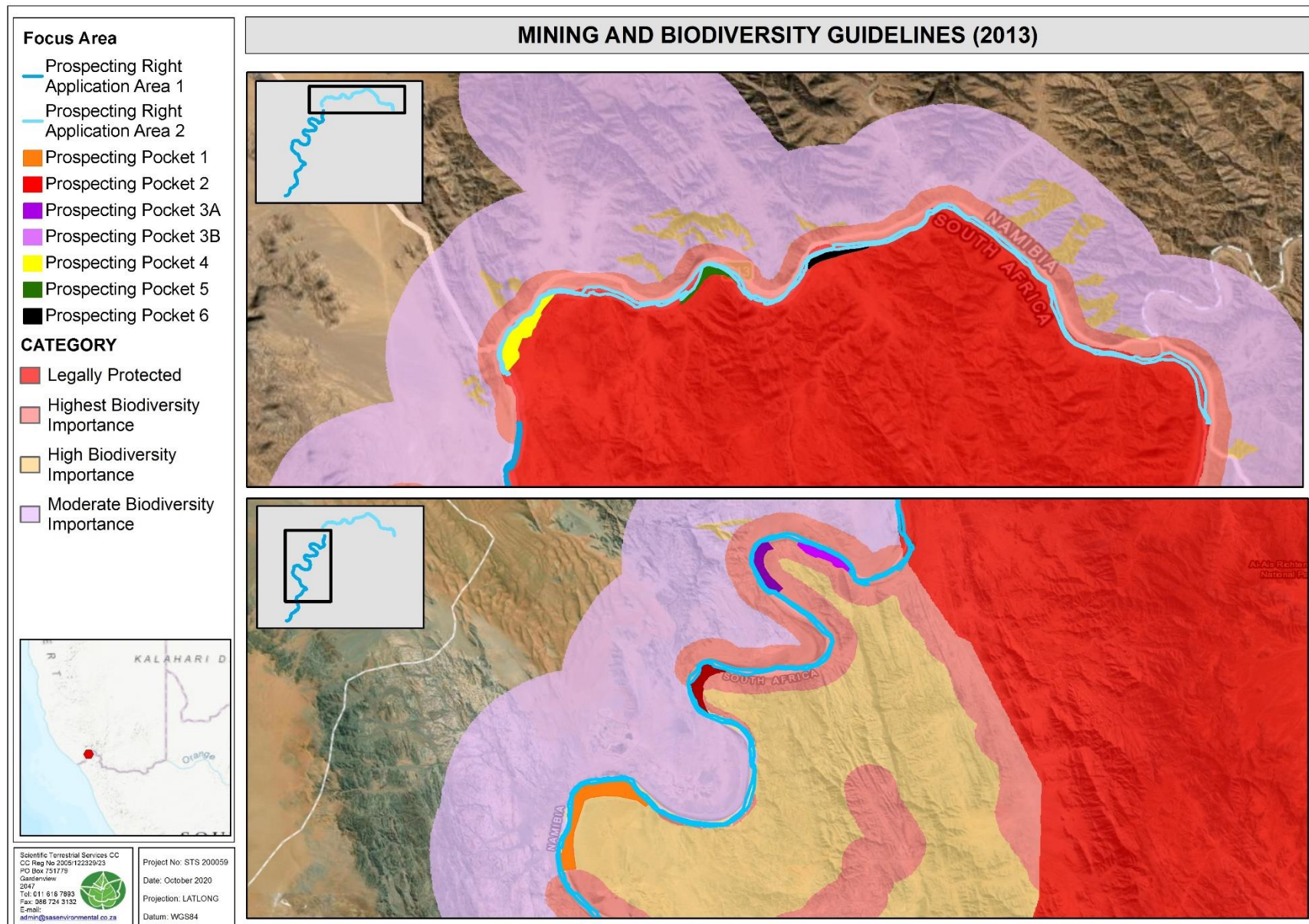


Figure 6: Biodiversity importance of the focus area according to the Mining and Biodiversity Guidelines (2013).



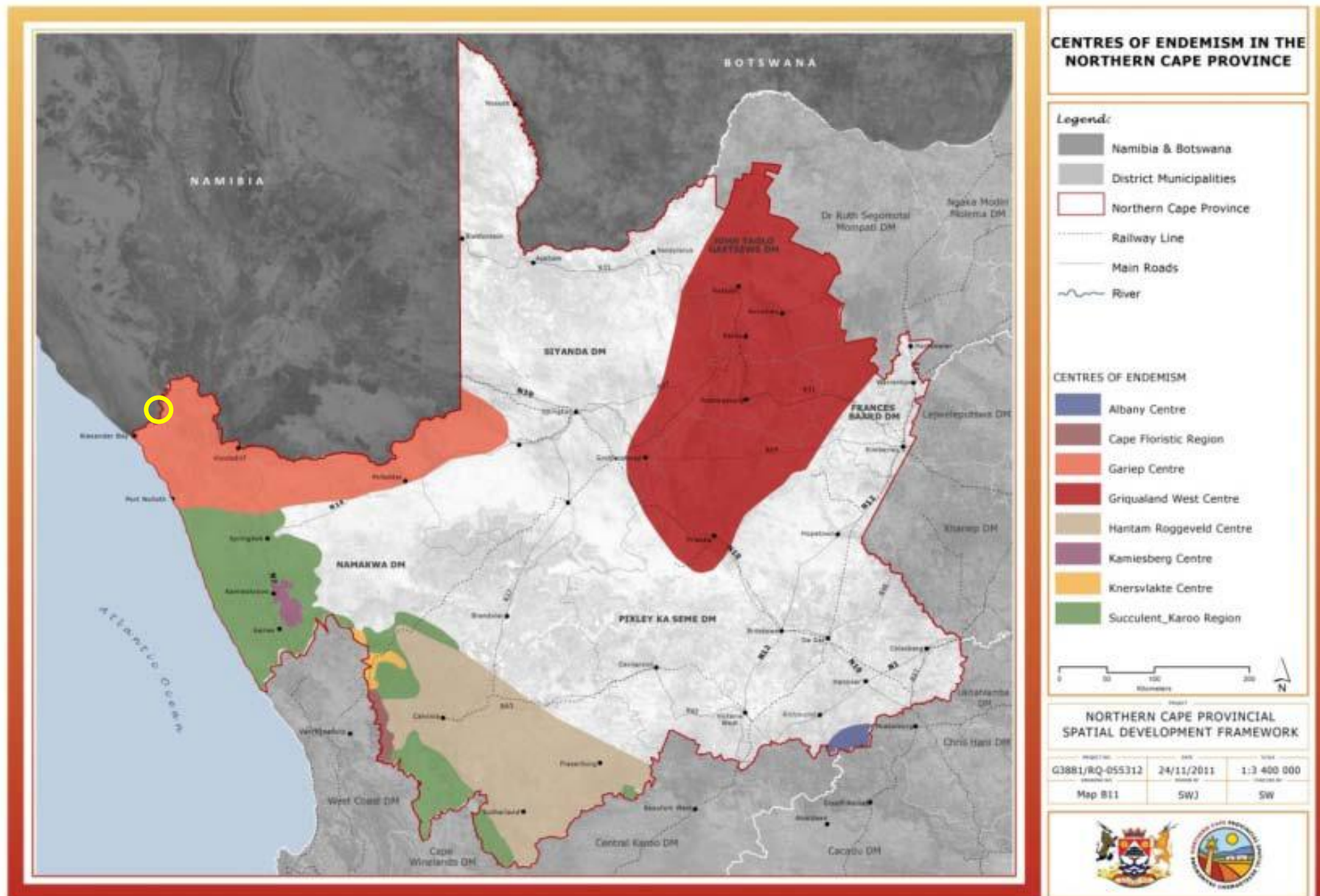


Figure 7: Biodiversity importance of the focus area according to the Mining and Biodiversity Guidelines (2013).





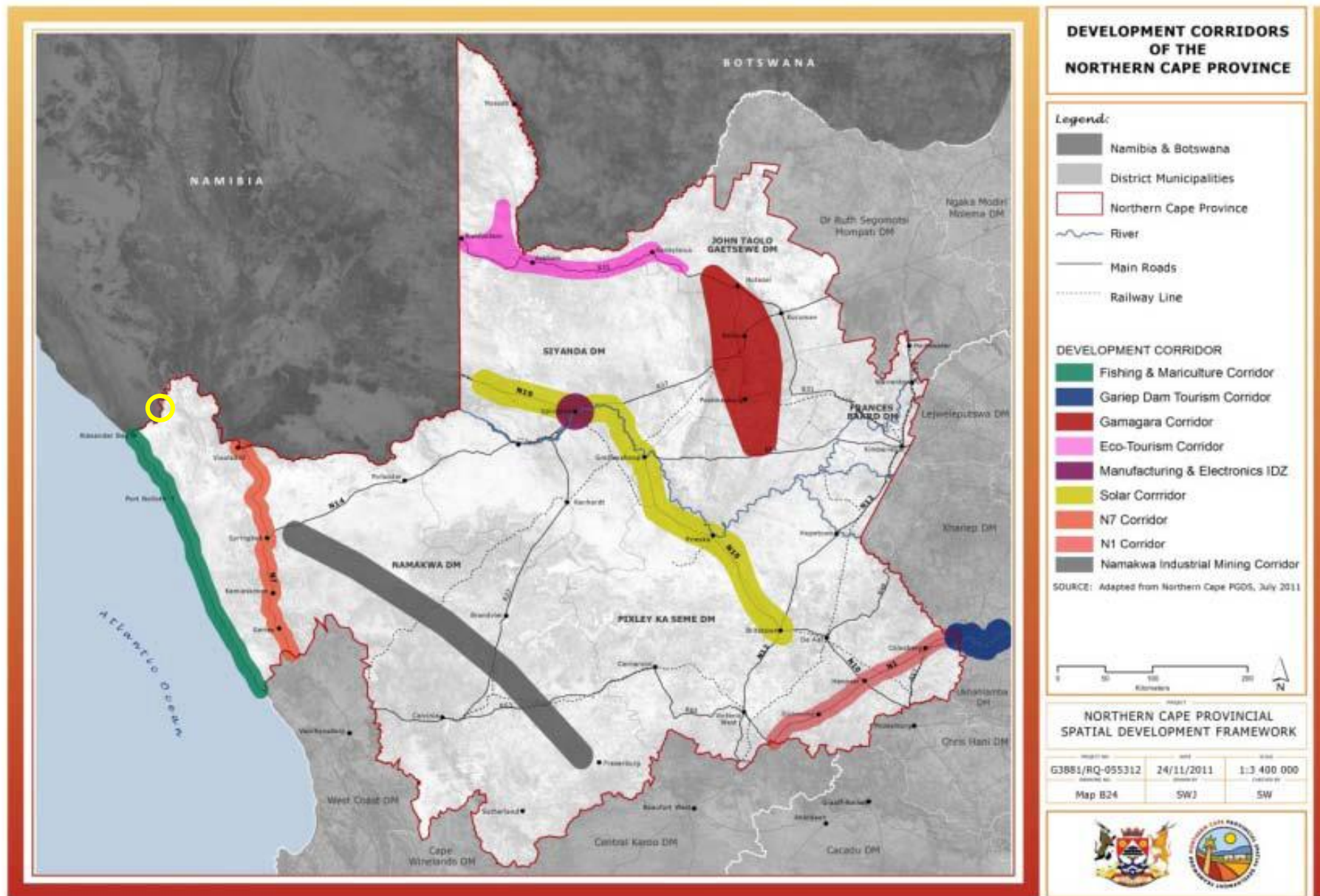


Figure 8: Development corridors of the Northern Cape Province: the focus area is indicated by the yellow circle (NPSDF, 2012).



## 4 POTENTIAL IMPACTS AND PROPOSED MANAGEMENT MEASURES

### 4.1 Description of potential impacts associated with the proposed prospecting activities and associated infrastructure

Several potential risks to the receiving environment by the proposed prospecting activities have been identified and are presented in the bullets below:

**Table 2: Summary of the potential risks to the receiving environment associated with the proposed prospecting activities within the focus area.**

<p>Potential impacts associated with all prospecting pockets</p>	<ul style="list-style-type: none"> <li>➤ Prospecting activities, site and vegetation clearing and construction activities will lead to habitat destruction and disturbance within the focus area and thus the associated prospecting pockets and will lead to the loss of floral and faunal communities, consequently impacting on the faunal and floral biodiversity within the focus and impacting upon the overall conservation targets of the defined CBAs;</li> <li>➤ Prospecting activities within the centres of endemism will lead to the loss and fragmentation of already range-restricted species throughout the area. Furthermore, as many of these species are provincially protected, prospecting activities within the area will lead to the loss of species with legal protection;</li> <li>➤ Alteration, degradation, loss, or destruction of faunal and floral habitat with specific mention to the following:             <ul style="list-style-type: none"> <li>• The act of prospecting itself will result in fragmentation and habitat loss of both floral and faunal species. Moreover, such activities will result in the loss of floral and faunal species within the affected areas. Permanent surface scarring resulting from prospecting activities will reduce favourable habitat for floral and faunal species;</li> <li>• Prospecting activities within the river and riparian zone will lead to a loss of favourable foraging habitat for avifauna and bats both in and adjacent to the prospecting areas;</li> <li>• Prospecting activities will lead to impacts both in and downstream of the pockets for faunal species who are reliant on instream habitat and food resources;</li> <li>• Vehicles are likely to impact the habitat during construction, operation, and rehabilitation, resulting in habitat loss. Vehicular movement and prospecting activities could additionally cause increased erosion, leading to poor growth and establishing conditions for floral species and, consequently, providing sub-optimal habitat conditions for faunal species;</li> <li>• Dumping of construction and operational waste materials in the surrounding habitat will result in the loss of floral and faunal habitat as well as potential impacts to the surrounding habitat, which is likely to push faunal species out of their current home ranges, resulting in an increased competition for space and resources within the focus area and in the surrounding area;</li> <li>• Earthworks may lead to increased runoff and erosion resulting in a further loss of faunal and floral habitat and increased sedimentation of the Orange River;</li> <li>• Risk of discharge of contaminated water from prospecting operations has a high likelihood of causing some degree of contamination to the receiving environment as well as Orange River leading to altered floral and faunal habitat both in the immediate areas as well as downstream of the Orange River;</li> <li>• Any diversion and/or destruction within and around the Orange River will result in the significant loss of surrounding landscape features, and faunal habitat, impacting upon faunal species diversity and abundance;</li> </ul> </li> </ul>
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	<ul style="list-style-type: none"> <li>• Erosion resulting from prospecting activities may increase runoff and sediment loads to the Orange River and impact on water quality, hence both fauna and flora within the area could be negatively affected;</li> <li>➤ Introduction of foreign material (e.g. soil) may lead to the further introduction of alien invader species, impacting on the floral characteristics of the focus area. Furthermore, given the location of the prospecting activities alongside the Orange River, an additional pathway for the spread of alien invader species is posed; alien invader propagules<sup>3</sup> can easily be carried downstream of the Orange River resulting in the potential prolific spread of such species outside of the focus area;</li> <li>➤ Increased personnel on site may result in an increased risk of harvesting/overutilization of species of conservation concern (SCC) species. Moreover, increased personnel within the focus area inherently brings an increased risk of poaching activities, threatening the current faunal populations;</li> <li>➤ The Richtersveld Mountains, in which the focus area is located, has the highest diversity of succulent plants in the world (4 849 species, of which 1 940 are endemic). As such, the area has a rich ecotourism industry. Prospecting within such areas, may lead to habitat and species losses within the area as personnel and individuals posing as mine personnel may move into the surrounding areas in order to harvest these species illegally.</li> </ul>
<p>Specific potential impacts associated with prospecting pockets 1, 2, 3A and 3B..</p>	<ul style="list-style-type: none"> <li>➤ These prospecting areas have been recorded to support several threatened species (both floral and faunal), prospecting activities will pose a risk to these species stemming from the loss of both suitable habitat and the loss of species themselves both within and adjacent to the prospecting sites.</li> </ul>
<p>Specific potential impacts associated with prospecting pockets 4, 5 and 6.</p>	<ul style="list-style-type: none"> <li>➤ All prospecting pockets are associated with the endangered Lower Gariep Alluvial Vegetation type. This vegetation type has already experienced a large degree of transformation, with a remaining 47 % of natural vegetation left (Mucina &amp; Rutherford, 2006). A small degree, some 6% of this vegetation type is protected within two protected areas, namely the Augrabies Falls National Park and the Richtersveld National Park within which prospecting pockets 4, 5 and 6 are located. As such, prospecting activities within the prospecting pockets, especially that of prospecting pockets 4, 5, and 6, pose a threat to this vegetation type. Loss of habitat within this endangered ecosystem will further impact on the floral and faunal communities within the ecosystem. An estimated 11 endemic species are found within the lower Gariep Alluvial Vegetation, which having already restricted distributions will be at <b>further risk of fragmentation</b> especially as the prospecting pockets will pose potential barriers to the dispersal of such species throughout the vegetation type.</li> </ul>

Please note that the above list is not exhaustive. Additional impacts will need to be identified during a detailed impact assessment.

## 5 LEGAL IMPLICATIONS

The following summarises legal considerations and implications as indicated by the various biodiversity databases that must be considered in terms of the viability of the various prospecting pockets:

- The focus area is associated with both **Critical Biodiversity Area (CBA1)** and **Protected Areas**, according to the Northern Cape Critical Biodiversity Areas (2016) database. According to Namakwa Bioregional Plan in terms of the National

<sup>3</sup> A propagule is any material that functions in propagating an organism. Propagation can occur sexually (e.g. through dispersal of seeds and spores) or asexually through stem cuttings.





Environmental Management: Biodiversity Act, NEMBA 2004 (Act No. 10 of 2004), strictly no mining activities are allowed within these regions. No biodiversity offsets are possible for developments that result in the transformation of natural habitat (e.g. cropping and mining) irrespective of anticipated restoration success;

- Prospecting pockets 1, 2, 3A, and 3B all fall within 10 km of a protected area, namely the **Richtersveld Cultural Botanical Landscape** (UNSECO World Heritage Site) and the **Richtersveld National Park** and prospecting pockets 4, 5, and 6 all fall directly within the boundary of these protected areas. According to NEMPAA Section 48 (1) prospecting and mining activities are prohibited within protected areas, especially national parks;
- According to the Northern Cape Province Spatial Development Framework (NCPSDF), the focus area is located within the Gariep Centre (GWC) of plant endemism, an area which supports an outstanding species diversity and endemism. This region supports approximately 355 endemic plant species, several of which are protected under Schedule 2 (Protected Species) of the Northern Cape Nature Conservation Act, 2009 (Act No. 9 of 2009);
- Prospecting pockets 4, 5 and 6 are located within a legally protected area in which mining is not permitted, as specified by the Mining and Biodiversity Guidelines (2013) and by the Protected Areas Act, 2003 (Act No. 57 of 2003);
- Several floral species (e.g. *Astridia herrei* (a Critically endangered endemic) and *Conophytum bilobum* (a near threatened endemic)) that are protected under Schedule 2 (Protected Species) of the Northern Cape Nature Conservation Act, 2009 (Act No. 9 of 2009) have the potential to be located within the focus area and within all the prospecting pockets. A full list of species can be viewed in Table F1 (Appendix F). It is important that a comprehensive field assessment be undertaken to determine the presence and the possibility of occurrence for all protected species;
- Several protected tree species, *Boscia albitrunca*, *Vachellia erioloba* and *Euclea pseudebenus*, according to The National Forest Act, 1998 (Act No. 84 of 1998) are likely to be located throughout the focus area and within the prospecting pockets. In terms of this act, protected tree species may not be cut, disturbed, damaged or destroyed and their products may not be possessed, collected, removed, transported, exported, donated, purchased or sold - except under licence granted by the DEFF, or a delegated authority; and
- Several faunal SCC such as *Cistugo seabrae* (Angolan Hairy Bat, NT) *Torgos tracheliotos* (Lappet-faced Vulture, VU), *Phoeniconaias minor* (Lesser



Flamingo, NT), *Otocyon megalotis* (Bat-eared Fox), *Parahyaena brunnea* (Brown Hyaena, NT), *Aonyx capensis* (Cape Clawless Otter, NT), *Equus zebra hartmannae* (Hartmann's Mountain Zebra, VU), *Panthera pardus* (Leopard, VU) have been recorded within the Richtersveld National Park, whilst some of these species may also occur outside of the park along the Orange River. Many of these species are endemic to the region, thus their restricted distributions and movement may be threatened by fragmentation and habitat destruction resulting from prospecting and bulk sampling activities. It is important that a comprehensive field assessment (preferably within all seasons) be undertaken to determine the presence and the possibility of occurrence for all protected species.

## 6 A PLAN OF STUDY FOR EIA PHASE

Specific outcomes in terms of the EIA phase report are presented in the points below:

- A field assessment of the focus area. Two field assessments of three and 14 days each (including travel time) will be undertaken
- To identify and consider all sensitive landscapes including rocky ridges, alluvial sand banks, riparian areas, the river itself and/or any other special features;
- The terrestrial ecological assessment will focus on:
  - Conducting a Species of Conservational Concern (SCC) assessment, including potential for species to occur within the focus area;
  - Providing floral and faunal inventories of species that were encountered on within each prospecting pocket and the greater focus area;
  - Describing the spatial significance of the proposed prospecting activities with regards to surrounding natural areas;
  - Describing floral habitats, communities and ecological state of the proposed prospecting activities as is determined on site;
  - Identifying dominant floral and faunal species for each habitat type;
  - Focus will be given to identifying areas of severe alien and invader encroachment and listing Category 1, 2 and 3 species in terms of GN No. 864 Alien and Invasive Species List, 2016: National Environmental Management Biodiversity Act, 2004 (Act No. 10 of 2004) (NEMBA);
  - Specific focus will also be given to establishing the presence of RDL and protected fauna and flora as listed within the IUCN List, relevant protected species listed under Schedule 2 (Protected Species) of the Northern Cape



Nature Conservation Act, 2009 (Act No. 9 of 2009), the National Forest Act, 1998 (Act No. 84 of 1998). and the TOPS list of NEMBA.

- The reports produced will include a detailed impact assessment of all identified significant risks, including cumulative impacts on ecological assemblages in the region; and
- Recommendations on the management and mitigation measures (including opportunities and constraints) with regards to the prospecting activities and associated construction and operation activities, will be provided to manage and mitigate impacts on the terrestrial ecology of the area.

Please refer to Appendix C for the method of assessment.

## 7 CONCLUSION

Scientific Terrestrial Services (STS) was appointed to conduct a biodiversity assessment as part of the Environmental Impact and Environmental Authorisation (EA) process for the proposed diamond prospecting on the Orange River, situated near the town of Sendelingsdrif, Northern Cape Province. The proposed prospecting and bulk sampling activities include seven prospecting pockets within two greater Prospecting Right Application Areas (PRAA). The south western area is referred to as PRAA 1 where prospecting pockets 1, 2 3A and 3B are located and PRAA 2, further north and east where the prospecting and bulk sampling pockets 4, 5 and 6 are located. The PRAA 1 and PRAA 2 and the associated prospecting pockets are hereafter collectively referred to as the “focus area”. This report provides the desktop results for the scoping phase of the project.

Based on the preliminary desktop assessment, the prospecting pockets were found to largely fall within the **endangered** Lower Gariep Alluvial Vegetation type which is poorly protected. According to the Northern Cape Critical Biodiversity Areas (2016) database, the focus area was identified as falling within a **Critical Biodiversity Area (CBA1)** and within a **Protected Area** (namely both the Richtersveld Cultural and Botanical Landscape and the Richtersveld National Park). Prospecting pockets 1, 2, 3A and 3B all fall within a CBA1 area, whereas prospecting pockets 4, 5, and 6 are located within a protected area. Protected and CBA1 areas consist of intact, undisturbed ecosystems. According to Namakwa Bioregional Plan in terms of the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004), strictly no mining is allowed within these regions.



Prospecting pocket 1 is located within area considered to be of High Biodiversity Importance. Although legally mining cannot be prohibited in this area, the placement of the mining infrastructure within these areas of increased biodiversity importance could lead to high risks to the receiving biodiversity. Prospecting pockets 4, 5 and 6 are located within a legally protected area in which mining is not permitted, as specified by the Mining and Biodiversity Guidelines (2013) and by the Protected Areas Act, 2003 (Act No. 57 of 2003). As such, prospecting pockets 4, 5 and 6 can be considered as no-go areas from a biodiversity perspective due to their location within a legally Protected Area and must therefore be avoided.

Moreover, prospecting pockets 2, 3A and 3B are located considered to be of Highest Biodiversity Importance and therefore poses a high risk for mining. If the presence and significance of these biodiversity features are confirmed during the site assessment, it is deemed likely that these areas could also be considered no-go areas from a biodiversity perspective due to the high impact and potential loss of irreplaceable habitat.

From the outset it is essential to consider that this ecosystem is extremely ecologically important and sensitive and that the proposed prospecting and bulk sampling activities pose a very significant risk to the ecology and biodiversity of the area. It is thus deemed essential that all aspects of the proposed prospecting and bulk sampling activities are considered in extensive detail and all aspects are exceptionally well planned and executed. It must also be noted from the outset that significant constraints are likely to be placed on the activity to conserve the environment, as a minimum, if the development is authorised to proceed at all.



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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, at their sole discretion, 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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## APPENDIX B - Floral Method of Assessment to be used during the EIA phase

### *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 below<sup>4</sup>:

- **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 km<sup>2</sup> 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;

<sup>4</sup> 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>



- 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 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 to be used during the EIA phase

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 using 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
<b>[Habitat availability + Food availability + Habitat disturbance + Distribution/Range] / 20 x 100 = POC%</b>				

## 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.



## 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'<sup>5</sup>. 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 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 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 necessary<sup>6</sup>.

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

<sup>5</sup> The definition has been aligned with that used in the ISO 14001 Standard.

<sup>6</sup> Some risks/impacts that have low significance will however still require mitigation.



information, by increasing assigned ratings or adjusting final model outcomes. In certain instances 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

<b>Probability of impact</b>	<b>RATING</b>
Highly unlikely	1
Possible	2
Likely	3
Highly likely	4
Definite	5
<b>Sensitivity of receiving environment</b>	<b>RATING</b>
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

<b>Severity of impact</b>	<b>RATING</b>
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
<b>Spatial scope of impact</b>	<b>RATING</b>
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
<b>Duration of impact</b>	<b>RATING</b>
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
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 impacts<sup>7</sup> 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. Mitigation measures have been developed to address issues in all phases throughout the life of the operation from planning, through to construction and operation.

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<sup>7</sup> Mitigation measures should address both positive and negative impacts





## APPENDIX E - Vegetation Types

### Western Gariiep Hills Desert (Dn 5)



**Figure E1: Dn 5 Western Gariiep Hills Desert:** Extraordinary spring flower display (2006) with *Gazania lichtensteinii* (pale yellow form), *Ammellus manus* and *Didelta carnosus* var. *carnosus* dominant on hills near Anniskop south of Sendelingsdrif in the Richtersveld. The sparse shrubland contains various species of *Euphorbia*, *Sarcocaulon*, *Cephalophyllum*, *Cheiridopsis* and *Zygophyllum*. The White quartz patches are the habitat of a *Brownanthus pubescens* community. Trees of the rare *Aloe pillansii* are visible in the background. Image by L. Mucina.

**Remarks:** The distribution of *Brownanthus pubescens*, *Dracophilus dealbatus*, *Ectadium virgatum*, *Euphorbia herrei*, *Juttadinteria deserticola*, *Leipoldtia alborosea*, *Portulacaria pygmaea*, *Psammophora modesta*, *Rhynchosia emarginata*, *Ruschianthemum gigas*, *Sarcocaulon flavescens*, *S. multifidum* and *Zygophyllum schreiberanum* is limited to this unit and the adjacent Western Gariiep Lowlands Desert and parts of the Sperrgebiet National Park in Namibia along the northern bank of the Orange River. Although the unit falls within the Desert Biome, single outcrops at higher altitudes (up to 538 m) and south- to southwest-facing slopes show transition to the adjacent units of the Succulent Karoo.

**Table E1: Floristic species of Western Gariiep Hills Desert (Mucina & Rutherford, 2012).**

Plant Community	Species
<b>Dominant and typical floristic species</b>	
<b>Woody Layer</b>	
<b>Trees</b>	<b>Succulent tree:</b> <i>Aloe pillansii</i> (d).
<b>Shrubs</b>	<b>Stem- &amp; Leaf-succulent Shrubs:</b> <i>Brownanthus pubescens</i> (d), <i>Portulacaria pygmaea</i> . <b>Stem-succulent Shrubs:</b> <i>Euphorbia chersina</i> , <i>E. ephedroides</i> , <i>E. gummifera</i> , <i>Sarcocaulon crassicaule</i> , <i>S. multifidum</i> . <b>Leaf-succulent Shrubs:</b> <i>Ruschia inconspicua</i> (d), <i>Ruschianthemum gigas</i> (d), <i>Anacampseros papyracea</i> , <i>Cephalophyllum numeesensis</i> , <i>Cheiridopsis robusta</i> , <i>C. verrucosa</i> , <i>Didelta carnosus</i> var. <i>carnosus</i> , <i>Dracophilus dealbatus</i> , <i>Eberlanzia ebracteata</i> , <i>Hypertelis salsoloides</i> , <i>Othonna cylindrica</i> , <i>O. opima</i> , <i>Ruschia glauca</i> , <i>Senecio sarcoides</i> , <i>Zygophyllum prismatocarpum</i> , <i>Z. schreiberanum</i> . <b>Low Shrub:</b> <i>Aptosimum spinescens</i> .
<b>Forb layer</b>	
<b>Herbs</b>	<b>Succulent Herbs:</b> <i>Mesembryanthemum hypertrophicum</i> , <i>M. pellitum</i> , <i>Zygophyllum simplex</i> . <b>Annual Herbs:</b> <i>Gazania lichtensteinii</i> (d), <i>Tripteris microcarpa</i> (d), <i>Amellus nanus</i> , <i>Gorteria corymbosa</i> , <i>Oncosiphon piluliferum</i> . Graminoid: <i>Stipagrostis obtusa</i> . <b>Geophytic Herb:</b> <i>Trachyandra muricata</i> .



\*(d) is for dominant

**Noms Mountain Desert (Dg 1)**



**Figure E2: Dg 1 Noms Mountain Desert:** Sheet-wash plains (with scattered *Boscia albitrunca*) from the foreground to the mountainous Noms Desert. *Aloe dicotoma*, *Pachypodium namaquanum*, *Zygophyllum cylindricum*, and other plants are found on the seemingly barren mountain slopes. Image by N Jürgens.

**Remarks:** Within the unit there is a climatic gradient, running from the hottest and driest parts along the Orange River to the relatively humid transition to the Succulent Karoo north and northwest of the Kodas Peak and the Koeroegabvlakte. In these more humid and cooler parts at higher altitude, vegetation units and taxa belonging to the Succulent Karoo (see Jürgens 2004) also occur (e.g. *Brownanthus pseudoschlichtianus*, *Cheiridopsis robusta*, *Ceraria fruticulosa*). These forms scattered patches of SKr 1 Central Richtersveld Mountain Shrubland, which cannot be mapped at present. The unit shares many of the endemics of the East Gariep Centre (Jürgens 1991) e.g. *Brownanthus nucifer*, *Tylecodon hallii*, *Schwantesia herrei*, some *Euphorbia gariepina*, *Mesembryanthemum gariusanum*. *Portulacaria armiana* occurs here and in a very limited area north of the Orange River.

**Table E2: Floristic species of the Noms Mountain Desert (Mucina & Rutherford, 2012).**

Plant Community	Species
<b>Dominant and typical floristic species</b>	
<b>Woody Layer</b>	
<b>Trees</b>	<b>Succulent tree:</b> <i>Aloe pillansii</i> (d). <b>Small Trees:</b> <i>Boscia albitrunca</i> , <i>Schotia afra</i> .
<b>Shrubs</b>	<b>Stem- &amp; Leaf-succulent Shrubs:</b> <i>Brownanthus pseudoschlichtianus</i> (d), <i>B. nucifer</i> , <i>Ceraria namaquensis</i> , <i>Psilocaulon subnodosum</i> , <i>Senecio sarcooides</i> , <i>Tylecodon buchholzianus</i> , <i>T. hallii</i> . <b>Stem-succulent Shrubs:</b> <i>Commiphora capensis</i> , <i>Euphorbia decussata</i> , <i>E. dregeana</i> , <i>E. gariepina</i> , <i>E. guerichiana</i> , <i>E. gummifera</i> , <i>E. virosa</i> , <i>Kleinia longiflora</i> , <i>Othonna arbuscula</i> , <i>O. opima</i> , <i>Pachypodium namaquanum</i> , <i>Sarcocaulon crassicaule</i> . <b>Leaf-succulent Shrubs:</b> <i>Aloe gariepensis</i> , <i>Ceraria fruticulosa</i> , <i>Cheiridopsis robusta</i> , <i>Crassula sladenii</i> , <i>Drosanthemum floribundum</i> , <i>D. inornatum</i> , <i>D. otzenianum</i> , <i>Eberlanzia ebracteata</i> , <i>E. schneideriana</i> , <i>Hypertelis salsoloides</i> , <i>Leipoldtia grandifolia</i> , <i>Portulacaria armiana</i> , <i>Prenia tetragona</i> , <i>Ruschia leucosperma</i> , <i>R. subaphylla</i> , <i>Schwantesia herrei</i> , <i>Zygophyllum microcarpum</i> , <i>Z. prismatocarpum</i> , <i>Z. retrofractum</i> , <i>Z. segmentatum</i> . <b>Other Shrubs:</b> <i>Sisyndite sparteae</i> (d), <i>Adenolobus gariepensis</i> , <i>Aptosimum spinescens</i> , <i>Calicorema capitata</i> , <i>Chrysocoma schlechteri</i> , <i>Dyerophytum africanum</i> , <i>Eriocephalus ericoides</i> , <i>Euryops multifidus</i> , <i>Gaillonia crocyllis</i> , <i>Hermannia stricta</i> , <i>Hermbstaedtia glauca</i> , <i>Indigofera pungens</i> , <i>Jamesbrittenia fruticosa</i> , <i>Kissenia capensis</i> , <i>Monechma mollissimum</i> , <i>Montinia caryophyllacea</i> , <i>Peliostomum leucorrhizum</i> , <i>Pteronia lucilioides</i> .



Forb layer	
Herbs	<b>Perennial Herbs:</b> <i>Acanthopsis disperma</i> , <i>Dicoma capensis</i> , <i>Forsskaolea candida</i> , <i>Pharnaceum croceum</i> . <b>Geophytic Herb:</b> <i>Trachyandra muricata</i> . <b>Succulent Herbs:</b> <i>Mesembryanthemum gariusanum</i> , <i>Trianthema triquetra</i> . <b>Annual Herbs:</b> <i>Dimorphotheca sinuata</i> , <i>Gazania lichtensteini</i> , <i>Leysera tenella</i> , <i>Oncosiphon piluliferum</i> , <i>Tripteris microcarpa</i> .
Graminoid layer	
Graminoids	<i>Leucophrys mesocoma</i> (d), <i>Cyperus marginatus</i> , <i>Stipagrostis ciliata</i> , <i>S. namaquensis</i> .

\*(d) is for dominant



### Richtersveld Sheet Wash Desert (Dg 3)



**Figure E3: Dg 3 Richtersveld Sheet Wash Desert:** The springbokvlakte in the valley and the Kwaggarug Mountain Desert in the background as viewed from Tatasberg. Image by L Mucina.

**Remarks:** This vegetation unit shares many of the endemics of the East Gariep CE, (e.g. *Mesembryanthemum gariusanum*). The unit shares several species with the Dg 6 Helskloof Canyon Desert in which sheet washes also occur. The Springbokvlakte houses the largest patch of the unit and its species composition shows slight deviations from other parts of the unit. Sheet wash features are found in many other Desert units at a wide variety of scales, often at a scale so detailed that it is not possible to separate them out at the mapping scale. Various forms of sheet wash features occur, from those in the winter-rainfall areas to those of the summer-rainfall areas (i.e. Dg 9 Eastern Gariep Plains Desert), from those largely sandy to those with significant amounts of colluvial material (e.g. Dg 6 Helskloof Canyon Desert). These features will have to receive further attention in future mapping work.

**Table E3: Floristic species of the Noms Mountain Desert (Mucina & Rutherford, 2012).**

Plant Community	Species
<b>Dominant and typical floristic species</b>	
<b>Woody Layer</b>	
<b>Trees</b>	<b>Small Trees:</b> <i>Boscia albitrunca</i> , <i>B. foetida</i> , <i>Euclea pseudebenus</i> , <i>Maerua gilgii</i> , <i>M. schinzii</i> , <i>Parkinsonia africana</i> , <i>Schotia afra</i> .
<b>Shrubs</b>	<b>Stem-succulent Shrub:</b> <i>Euphorbia phylloclada</i> . <b>Leaf-succulent Shrubs:</b> <i>Prenia tetragona</i> , <i>Zygophyllum microcarpum</i> . <b>Other Shrubs:</b> <i>Sisyndite spartea</i> (d), <i>Adenolobus gariensis</i> , <i>Calicorema capitata</i> , <i>Codon royenii</i> , <i>Dyerophytum africanum</i> , <i>Gaillonia crocylis</i> , <i>Kissenia capensis</i> , <i>Monechma mollissimum</i> , <i>Solanum namaquense</i> .
<b>Forb layer</b>	
<b>Herbs</b>	<b>Perennial Herbs:</b> <i>Cleome angustifolia</i> subsp. <i>diandra</i> , <i>Rogeria longiflora</i> . <b>Geophytic Herb:</b> <i>Trachyandra muricata</i> . <b>Succulent Herb:</b> <i>Mesembryanthemum gariusanum</i> (d). <b>Annual Herbs:</b> <i>Pharnaceum croceum</i> , <i>Sesuvium sesuvioides</i> , <i>Trichodesma africanum</i>
<b>Graminoid layer</b>	
<b>Graminoids</b>	<i>Leucophrys mesocoma</i> (d), <i>Stipagrostis ciliata</i> (d), <i>S. namaquensis</i> (d), <i>S. obtusa</i> .
<b>Biogeographically Important Taxon</b>	
<i>Euphorbia gregaria</i> . One large population on the lower Springbokvlakte between the Tatasberg and Grasdrif forms the only known population in South Africa west of Vioolsdrif and is the southwestern outlier of the large distribution area in southern Namibia and the vicinity of the Orange River Valley between Vioolsdrif and Kakamas.	

\*(d) is for dominant





**Lower Gariep Alluvial Vegetation (Aza 3)**



**Figure E4: Aza 3 Lower Gariep Alluvial Vegetation:** Alluvial grasslands with *Cynodon dactylon* and riparian thickets with *Tamarix usneoides* on rocky banks of the Orange River at Grasdrif (Richtersveld National Park). Image by L Mucina.

**Table E4: Floristic species of the Lower Gariep Alluvial Vegetation (Mucina & Rutherford, 2012).**

Plant Community	Species
<b>Dominant and typical floristic species</b>	
<b>Woody Layer</b>	
<b>Trees</b>	<b>Small Trees (Riparian thickets):</b> <i>Acacia karroo</i> (d), <i>Euclea pseudebenus</i> (d), <i>Salix mucronata</i> subsp. <i>mucronata</i> (d), <i>Schotia afra</i> var. <i>angustifolia</i> (d), <i>Ziziphus mucronata</i> (d), <i>Acacia erioloba</i> , <i>Combretum erythrophyllum</i> , <i>Ficus cordata</i> , <i>Maerua gilgii</i> , <i>Prosopis glandulosa</i> var. <i>glandulosa</i> , <i>Searsia lancea</i> .
<b>Shrubs</b>	<b>Tall Shrubs (Riparian thickets):</b> <i>Gymnosporia linearis</i> (d), <i>Tamarix usneoides</i> (d), <i>Ehretia rigida</i> , <i>Euclea undulata</i> , <i>Sisyndite spartea</i> . <b>Low Shrub:</b> <i>Asparagus larinicus</i> . <b>Woody Climber (Riparian thickets):</b> <i>Asparagus retrofractus</i> . <b>Succulent Shrub:</b> <i>Lycium bosciifolium</i> . <b>Herb:</b> <i>Chenopodium olukondae</i> . <b>Reed beds</b> Megagraminoid: <i>Phragmites australis</i> (d). <b>Low Shrubs (flooded grasslands and herblands):</b> <i>Tetragonia schenckii</i> (d), <i>Litogyne gariepina</i> . <b>Graminoids:</b> <i>Cynodon dactylon</i> (d), <i>Setaria verticillata</i> (d), <i>Cenchrus ciliaris</i> , <i>Cyperus laevigatus</i> , <i>Eragrostis echinochloidea</i> , <i>Leucophrys mesocoma</i> , <i>Polypogon monspeliensis</i> , <i>Stipagrostis namaquensis</i>
<b>Forb layer</b>	
<b>Herbs</b>	<i>Amaranthus praetermissus</i> , <i>Coronopus integrifolius</i> , <i>Frankenia pulverulenta</i> , <i>Gnaphalium confine</i> , <i>Pseudognaphalium luteo-album</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 <sup>N</sup> 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.
- <sup>N</sup>**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.
- <sup>N</sup>**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 km<sup>2</sup>, 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 km<sup>2</sup>, 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 the Northern Cape Nature Conservation Act, 2009 (Act No. 9 of 2009).**

Species	IUCN	Diagnostic Characteristic	Ecology
<b>Schedule 2 Protected Species</b>			
<b>FAMILY AIZOACEAE (MESEMBRYANTHEMACEAE) - all species except those listed in Schedule 1</b>			
<i>Antimima intervallis</i>	LC	Succulent	Endemic
<i>Antimima paripetala</i>	LC	Succulent	Endemic
<i>Astridia herrei</i>	CR	Succulent; dwarf shrub	Endemic
<i>Cephalophyllum goodii</i>	LC	Succulent	Endemic
<i>Cephalophyllum numeesense</i>	DD	Succulent	Endemic
<i>Cephalophyllum regale</i>	LC	Succulent	Endemic
<i>Cheiridopsis acuminata</i>	NT	Succulent	Endemic
<i>Cheiridopsis pilosula</i>	LC	Succulent	Endemic
<i>Cheiridopsis speciosa</i>	LC	Succulent	Endemic
<i>Conophytum bilobum</i>	NA	Succulent	Endemic
<i>Conophytum bilobum</i>	NE	Succulent	Endemic
<i>Conophytum breve</i>	LC	Succulent	Endemic
<i>Conophytum flavum</i>	LC	Succulent	Endemic
<i>Conophytum meyeri</i>	LC	Succulent	Endemic
<i>Conophytum obscurum</i>	LC	Succulent	Endemic
<i>Galenia collina</i>	LC	Dwarf shrub	Endemic
<i>Hereroa pallens</i>	LC	Succulent	Endemic
<i>Leipoldtia compacta</i>	LC	Succulent	Endemic
<i>Leipoldtia frutescens</i>	VU	Succulent	Endemic
<i>Mesembryanthemum amplexens</i>	NA	Succulent	Endemic
<i>Mesembryanthemum decurvatum</i>	NA	Succulent	Endemic
<i>Mesembryanthemum occidentale</i>	NA	Succulent	Endemic
<i>Mesembryanthemum pallens</i>	NA	Succulent	Endemic
<i>Mitrophyllum clivorum</i>	LC	Succulent	Endemic



<i>Ruschia cradockensis</i>	LC	Succulent	Endemic
<i>Ruschia glauca</i>	LC	Succulent	Endemic
<i>Ruschia middlemostii</i>	LC	Succulent; shrub	Endemic
<i>Ruschia senaria</i>	LC	Succulent	Endemic
<i>Schlechteranthus hallii</i>	LC	Succulent	Endemic
<i>Schwantesia herrei</i>	LC	Succulent	Endemic
<i>Tetragonia echinata</i>	LC	Succulent; herb	Endemic

**Schedule 2 Protected Species**

**FAMILY AMARYLLIDACEAE - all species except those listed in Schedule 1**

<i>Amaryllis paradisiicola</i>	VU	Geophyte	Endemic
<i>Gethyllis britteniana</i>	VU	Geophyte	Endemic
<i>Gethyllis grandiflora</i>	LC	Geophyte	Endemic

**Schedule 2 Protected Species**

**FAMILY APOCYNACEAE - all species except those listed in Schedule 1**

<i>Orbea namaquensis</i>	LC	Succulent	Endemic
<i>Richtersveldia columnaris</i>	VU	Succulent	Endemic
<i>Quaqua linearis</i>	LC	Succulent; dwarf shrub	Endemic
<i>Tromotriche herrei</i>	NT	Succulent	Endemic

**Schedule 2 Protected Species**

**FAMILY ASPHODELACEAE - all species except those listed in Schedule 1**

<i>Aloidendron dichotomum</i>	VU	Succulent	Near-endemic
<i>Aloidendron pillansii</i>	EN	Succulent	Near-endemic
<i>Aloidendron ramosissimum</i>	VU	Succulent	Near-endemic
<i>Bulbine hallii</i>	DD	Succulent; geophyte; herb	Endemic
<i>Bulbine pendens</i>	LC	Succulent; geophyte; herb	Endemic
<i>Gasteria pillansii</i>	LC	Succulent; herb	Endemic
<i>Trachyandra aridimontana</i>	EN	Succulent; dwarf shrub	Endemic
<i>Trachyandra paniculata</i>	LC	Succulent; geophyte	Endemic

**Schedule 2 Protected Species**

**FAMILY CRASSULACEAE - all species except those listed in Schedule 1**

<i>Crassula columella</i>	LC	Succulent; herb	Endemic
<i>Tylecodon striatus</i>	LC	Succulent; dwarf shrub	Endemic

**Schedule 2 Protected Species**

**FAMILY FABACEAE - *Rhynchosia emarginata***

<i>Rhynchosia emarginata</i>	EN	shrub	Endemic
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**Schedule 2 Protected Species**

**FAMILY HYACINTHACEAE - *Ornithogalum decusmontium***

<i>Ornithogalum decusmontium</i>	LC	Geophyte	Endemic
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**Schedule 2 Protected Species**

**FAMILY HYACINTHACEAE - all species except those listed in Schedule 1**

<i>Babiana lobata</i>	EN	Geophyte; herb	Endemic
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<i>Tritonia marlothii</i>	VU	Geophyte; herb	Endemic
<b>Schedule 2 Protected Species</b>			
<b>FAMILY OXALIDACEAE - all species except those listed in Schedule 1</b>			
<i>Oxalis nivea</i>	LC	Geophyte	Endemic

**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, NA= not known.

**Table F2: The TOPS plant list for floral species within the Northern Cape.**

Family	Scientific Name	Region	Threat Status
Aizoaceae	<i>Cheiridopsis peculiaris</i>	NC	CR
	<i>Conophytum herreanthus</i> subsp. <i>Herreanthus</i>	NC	CR (now Extinct in the Wild)
	<i>Lithops dorotheae</i>	NC	EN
	<i>Sceletium tortuosum</i>	EC, NC, WC	P (LC)
Amaryllidaceae	<i>Brunsvigia josephinae</i>	EC, NC, WC	VU
	<i>Haemanthus graniticus</i>	NC	EN
Asphodelaceae	<i>Aloe krapohlana</i>	NC	P
Hyacinthaceae	<i>Drimia sanguinea</i>	FS, GP, LP, MP, NW, NC	P (NT)
Pedaliaceae	<i>Harpagophytum procumbens</i>	FS, LP, NC, NW	P (LC)

**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.





## APPENDIX G - Faunal SCC

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

**Table G1: List of faunal species (TOPS (2015)) or within other relevant databases, expected to occur within the Northern Cape.**

Scientific Name	Common Name	Threat Status
<b>Reptiles</b>		
<i>Cordylus imkeae</i>	Rooiberg Girdled Lizard	P
<i>Cordylus macropholis</i>	Large-scaled Lizard	P
<i>Homopus signatus</i>	Speckled tortoise	VU
<i>Pachydactylus goodi</i>	Good's Gecko	VU
<i>Pachydactylus rangei</i>	Namib Web-footed Gecko	*CR
<b>Invertebrates</b>		
<i>Opisthophthalmus ater</i>	Steinkopf Burrowing Scorpion	CR
<i>Opisthophthalmus carinatus</i>	Burrowing Scorpion	*P
<i>Opisthophthalmus wahlbergii</i>	Wahlbergs Burrowing Scorpion	*P
<i>Hadogenes phyllodes</i>	Rock Scorpion	*P
<i>Hadogenes tityrus</i>	Rock Scorpion	*P
<b>Mammals</b>		
<i>Acinonyx jubatus</i>	Cheetah	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>Manis temminckii</i>	Pangolin	VU
<i>Orycteropus afer</i>	Aardvark	P
<i>Panthera pardus</i>	Leopard	*VU
<b>Avifauna</b>		
<i>Anthropoides paradiseus</i>	Blue Crane	P
<i>Aquila rapax</i>	Tawny Eagle	EN
<i>Ardeotis kori</i>	Kori Bustard	P
<i>Gyps africanus</i>	White-backed Vulture	CR
<i>Gyps coprotheres</i>	Cape Vulture	EN
<i>Neophron percnopterus</i>	Egyptian Vulture	CR
<i>Neotis ludwigii</i>	Ludwig's Bustard	EN
<i>Polemaetus bellicosus</i>	Martial Eagle	EN
<i>Terathopus ecaudatus</i>	Bateleur	EN
<i>Torgos tracheliotos</i>	Lappet-faced Vulture	EN
<i>Cursorius rufus</i>	Burchell's Courses	*VU
<i>Aquila verreauxii</i>	Verreaux's Eagle	*VU
<i>Falco biarmicus</i>	Lanner Falcon	*VU
<i>Pelecanus rufescens</i>	Pink-backed Pelican	*VU



<i>Sterna caspia</i>	Caspian Tern	*VU
<i>Calendulauda barlowi</i>	Barlow's Lark	*NT

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CR= Critically Endangered, EN=Endangered, NT=Near Threatened, VU=Vulnerable, P=Protected, \*=Other databases or legislation.



## APPENDIX H - Specialist information

### DETAILS, EXPERTISE AND CURRICULUM VITAE OF SPECIALISTS

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

Samantha-Leigh Jamison	(PhD Candidate (Plant Science) (University of Pretoria)
Kim Marais	BSc (Hons) Zoology (University of the Witwatersrand) 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:	Kim Marais		
Postal address:	PO. Box 751779, Gardenview		
Postal code:	2047	Cell:	071 413 2245
Telephone:	011 616 7893	Fax:	086 724 3132
E-mail:	<a href="mailto:kim@sasenvgroup.co.za">kim@sasenvgroup.co.za</a>		
Qualifications	BSc (Hons) Zoology (University of the Witwatersrand) BSc (Zoology and Conservation) (University of the Witwatersrand)		
Registration / Associations	Registered Professional Scientist at South African Council for Natural Scientific Professions (SACNASP) Member of South African Wetland Forum		

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:	<a href="mailto:stephen@sasenvgroup.co.za">stephen@sasenvgroup.co.za</a>		
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

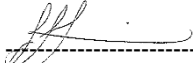
I, Samantha-Leigh Daniels, declare that -

- 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



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Signature of the Specialist

I, Kim Marais, 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



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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 **KIM MARAIS****

### PERSONAL DETAILS

Position in Company	Senior Scientist Water Resource Manager
Joined SAS Environmental Group of Companies	2015

### MEMBERSHIP IN PROFESSIONAL SOCIETIES

Professional member of the South African Council for Natural Scientific Professions (SACNASP – Reg No. 117137/17)  
Member of the Western Cape Wetland Forum (WCWF)

### EDUCATION

#### Qualifications

BSc (Hons) Zoology (University of the Witwatersrand)	2012
BSc (Zoology and Conservation) (University of the Witwatersrand)	2011

#### Short Courses

Aquatic and Wetland Plant Identification (Cripsis Environment)	2019
Tools for Wetland Assessment (Rhodes University)	2018
Certificate in Environmental Law for Environmental Managers (CEM)	2014
Certificate for Introduction to Environmental Management (CEM)	2013

### KEY SPECIALIST DISCIPLINES

#### Biodiversity Assessments

- Biodiversity Action Plans (BAP)
- Alien and Invasive Control Plans (AICP)
- Faunal Eco Scans
- Faunal Impact Assessments

#### Freshwater Assessments

- Desktop Freshwater Delineation
- Freshwater Verification Assessment
- Freshwater (wetland / riparian) Delineation and Assessment
- Freshwater Eco Service and Status Determination
- Rehabilitation Assessment / Planning
- Watercourse Maintenance and Management Plans
- Freshwater Offset Plan

#### Aquatic Ecological Assessment and Water Quality Studies

- Riparian Vegetation Integrity (VEGRAI)
- Water quality Monitoring
- Riverine Rehabilitation Plans

#### Legislative Requirements, Processes and Assessments

- Water Use Applications (Water Use Licence Applications / General Authorisations)
- Water Use Audits
- Freshwater Resource Management and Monitoring as part of EMPR and WUL conditions
- Public Participation processes





## 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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Managing Director: Jacana Environmental  
Tel: 015 291 4015

