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**AVIFAUNAL REPORT AS PART OF THE ENVIRONMENTAL  
IMPACT ASSESSMENT AND AUTHORISATION PROCESS  
FOR THE PROPOSED 75MW THERMAL POWER DUAL  
FUEL FACILITY AND ASSOCIATED INFRASTRUCTURE AS  
PART OF THE HYPERION PV FACILITY, NEAR KATHU,  
NORTHERN CAPE PROVINCE**

**Prepared for**

**Hyperion Solar Hybrid (Pty) Ltd.**

**January 2021**

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<b>Report reference:</b>	<b>STS 200057</b>



**SAS Environmental Group of Companies**

## EXECUTIVE SUMMARY

In 2018 and 2019, Simon Todd from 3 Foxes Biodiversity Solutions undertook an Avifauna Specialist assessment as part of the Environmental Impact Assessment (EIA) process for the proposed development of a solar facility and associated infrastructure; hereafter referred to as the “focus area”. The aim of the current assessment, undertaken by Scientific Terrestrial Services (STS), was to provide input/ specialist opinion into the validity of the previous results undertaken by Simon Todd in 2019 for the proposed Solar Farm Development. This follows from a change in the proposed layout of 2019 and hence, it was deemed necessary by the proponent that the layout changes be checked to ensure any changes in impacts on avifauna are accurately assessed and mitigation measures provided in terms of the new layout.

The high-level walk through by STS confirmed Simon Todd’s descriptions of the avifaunal component associated with the focus area. As no landscape altering changes have occurred to the local habitat it is considered that the previous assessment retains its validity and is an accurate description of the local environment in terms of its avifaunal component. Minor discrepancies between STS and Simon Todd are noted in terms of the proposed red-listed/SCC for marginal species, however, these do largely correspond with one another. The focus area sensitivity depicted by 3 Foxes Biodiversity Solutions is accurate and STS agrees with this sensitivity.

In terms of development implications, the loss of habitat from the proposed development will not result in significant impacts on the avifaunal assemblage given that the local avifaunal diversity within the focus area is considered low. No impacts on a National Scale are anticipated to occur from the Thermal Plant.



## TABLE OF CONTENTS

<b>EXECUTIVE SUMMARY .....</b>	<b>i</b>
<b>TABLE OF CONTENTS .....</b>	<b>ii</b>
<b>LIST OF FIGURES .....</b>	<b>iii</b>
<b>LIST OF TABLES .....</b>	<b>iii</b>
<b>LIST OF ACRONYMS .....</b>	<b>iv</b>
<b>GLOSSARY OF TERMS .....</b>	<b>v</b>
<b>1 INTRODUCTION .....</b>	<b>1</b>
1.1 Project Scope .....	6
1.2 Assumptions and Limitations .....	6
1.3 Legislative Requirements .....	7
<b>2 ASSESSMENT APPROACH .....</b>	<b>8</b>
2.1 General Approach .....	8
<b>3 RESULTS OF THE DESKTOP ANALYSIS .....</b>	<b>8</b>
3.1 Conservation Characteristics of the focus area based on National and Provincial Datasets .....	8
<b>4 SPECIALIST STATEMENT .....</b>	<b>17</b>
4.1 Verification of Previous Studies and Summary of Site Results .....	17
4.2 Verification of SCC on site .....	18
<b>5 IMPACTS AND PROPOSED MANAGEMENT MEASURES .....</b>	<b>20</b>
5.1 Avifaunal Impact Assessment .....	21
5.1.1 Avifaunal Impact Assessment Results .....	21
5.1.2 Possible Cumulative Impacts .....	24
<b>6 CONCLUSION .....</b>	<b>28</b>
<b>REFERENCES .....</b>	<b>29</b>
<b>APPENDIX A: Legislative Requirements and Indemnity .....</b>	<b>30</b>
<b>APPENDIX B: Impact Assessment Methodology .....</b>	<b>35</b>
<b>APPENDIX C: Vegetation Types .....</b>	<b>38</b>
<b>APPENDIX D: Specialist information .....</b>	<b>39</b>



## LIST OF FIGURES

Figure 1:	Digital satellite image depicting the focus area in relation to the surrounding areas. ....	3
Figure 2:	Location of the focus area depicted on a 1:50 000 topographical map in relation to the surrounding area. ....	4
Figure 3:	The proposed infrastructure layout within the focus area. ....	5
Figure 4:	The remaining extent of the Kathu Bushveld (Least Concern), according to the National Biodiversity Assessment (NBA, 2018). ....	12
Figure 5:	Protected areas within a 5 km and 10 km radius of the focus area, according to SAPAD (Q2, 2020). ....	13
Figure 6:	Northern Cape Critical Biodiversity areas associated with the focus area and the associated infrastructure. ....	14
Figure 7:	Centres of endemism of the Northern Cape Province: the focus area indicated by the yellow circle (NPSDF, 2012). ....	15
Figure 8:	Development corridors of the Northern Cape Province: the focus area is indicated by the yellow circle (NPSDF, 2012). ....	16

## LIST OF TABLES

Table 1:	Summary of the terrestrial conservation characteristics for the focus area (Quarter Degree Square (QDS) 2723CA). ....	9
Table 2:	A summary of historic and current data obtained from SABAP2 (2730_2300 and 2730_2305 pentads). ....	19
Table 3:	Activities and Aspects likely to impact on the avifaunal assemblage associated with the focus area. ....	20
Table 4:	Impact on the avifaunal habitat, diversity, and SCC resulting from the proposed Access Road. ....	22
Table 5:	Impact on the avifaunal habitat, diversity, and SCC resulting from the proposed Thermal Plant. ....	23
Table 6:	Cumulative impacts associated with the loss of avifaunal habitat, diversity and SCC arising from the proposed PV development activities. ....	26



## LIST OF ACRONYMS

AIP	Alien Invasive Plant
BGIS	Biodiversity Geographic Information Systems
BODATSA	Botanical Database of Southern Africa
CARA	Conservation of Agricultural Resources Act, 1983, [Act 43 of 1983]
CBAs	Critical Biodiversity Areas
CR	Critically Endangered
DEFF	Department of Environment, Forestry and Fisheries
EAP	Environmental Assessment Practitioner
E-GIS	Environmental Geographical Information Systems
EIA	Environmental Impact Assessment
EN	Endangered
ESA	<b>Ecological Support Area</b>
GIS	Geographic Information System
GWC	Griqualand West Centre
Ha	Hectares
IBA	Important Bird and Biodiversity Area
IEM	Integrated Environmental Management
IUCN	International Union for the Conservation of Nature
MAP	Mean Annual Precipitation
MAPE	Mean Annual Potential for Evaporation
MASMS	Mean Annual Soil Moisture Stress
MAT	Mean Annual Temperature
MFD	Mean Frost Days
NBA	National Biodiversity Assessment
NCNCA	Northern Cape Nature Conservation Act, 2009 [Act No. 9 of 2009]
NCPSDF	Northern Cape Provincial Spatial Development Framework
NEMA	National Environmental Management Act, 1998, [Act 107 of 1998]
NEMBA	National Environmental Management: Biodiversity Act, 2004, [Act 10 of 2004]
NFA	National Forest Act, 1998, [Act 84 of 1998, as amended]
NPAES	National Protected Areas Expansion Strategy
PES	Present Ecological State
QDS	Quarter Degree Square
RDL	Red Data listed
SABAP2	South African Bird Atlas Project 2
SACAD	South Africa Conservation Area Database
SANBI	South African National Biodiversity Institute
SAPAD	South Africa Protected Area Database
SCC	Species of Conservation Concern
STS	Scientific Terrestrial Services
SWSAs	Surface Water Strategic Water Source Area
TOPS	Threatened or Protected Species
VU	Vulnerable



## GLOSSARY OF TERMS

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

<b>Alien species (syn. exotic species; non-native species)</b>	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 (as per the definition in NEMBA)</b>	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 (as per the definition in NEMBA)</b>	A geographic region which has in terms of section 40(1) been determined as a bioregion for the purposes of this Act;
<b>Critical Biodiversity Area (CBA)</b>	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>Ecological Support Area (ESA)</b>	An ESA provides connectivity and important ecological processes between CBAs and is therefore important in terms of habitat conservation.
<b>Habitat (as per the definition in NEMBA)</b>	A place where a species or ecological community naturally occurs.
<b>Important Bird and Biodiversity Area (IBA)</b>	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 (as per the definition in NEMA)</b>	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>Least Threatened</b>	Least threatened ecosystems are still largely intact.
<b>Native species (syn. indigenous species)</b>	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).



<b>Red Data listed (RDL) species</b>	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.
<b>Species of Conservation Concern (SCC)</b>	<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 fauna:</b> A list of faunal SCC as identified by the Threatened or Protected Species list (2007) is available for the Northern Cape (Schedule 1). 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 (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; and</li> <li>- The 2015 Eskom Red Data Book of Birds of South Africa, Lesotho and Swaziland.</li> </ul>



# 1 INTRODUCTION

In 2018 and 2019, Simon Todd from 3 Foxes Biodiversity Solutions undertook a Faunal, Floral and Avifaunal Specialist assessment as part of the Environmental Impact Assessment (EIA) process for the proposed development of a solar facility and associated infrastructure<sup>1</sup>; hereafter referred to as the “focus area”. The aim of the current assessment, undertaken by Scientific Terrestrial Services (STS), was to provide input/ specialist opinion into the validity of the previous results undertaken by Simon Todd in 2019 for the proposed Solar Farm Development. This follows from a change in the proposed layout of 2019 and hence, it was deemed necessary by the proponent that the layout changes be checked to ensure any changes in impacts on avifauna are accurately assessed and mitigation measures provided in terms of the new layout.

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

The proposed development will encompass the following infrastructure (Figure 3):

- Reciprocating gas engines;
- Access road;
- Truck entrance and parking;
- Regasification plant and fuel preparation plant;
- Dry cooling system for operating oils/chemicals;
- Fuel off-loading facility;
- Fuel storage facility;
- Water demineralisation;
- Raw water and treated water storage tank;
- Oily water separator and storm water drainage system; and
- Cabling, O&M building, fencing warehouse and workshops.

The purpose of this report is to update the previously defined specialist avifaunal report of the area from 1) a desktop conservation database perspective, and 2) based on high-level,

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<sup>1</sup> Scoping and environmental impact assessment for the proposed Hyperion Solar Development 1 - 4 and associated infrastructure near Kathu, Northern Cape: Fauna & Flora specialist EIA phase report. Produced for Savannah Environmental by Simon Todd (*Pri. Sci. Nat.*), March 2019.





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



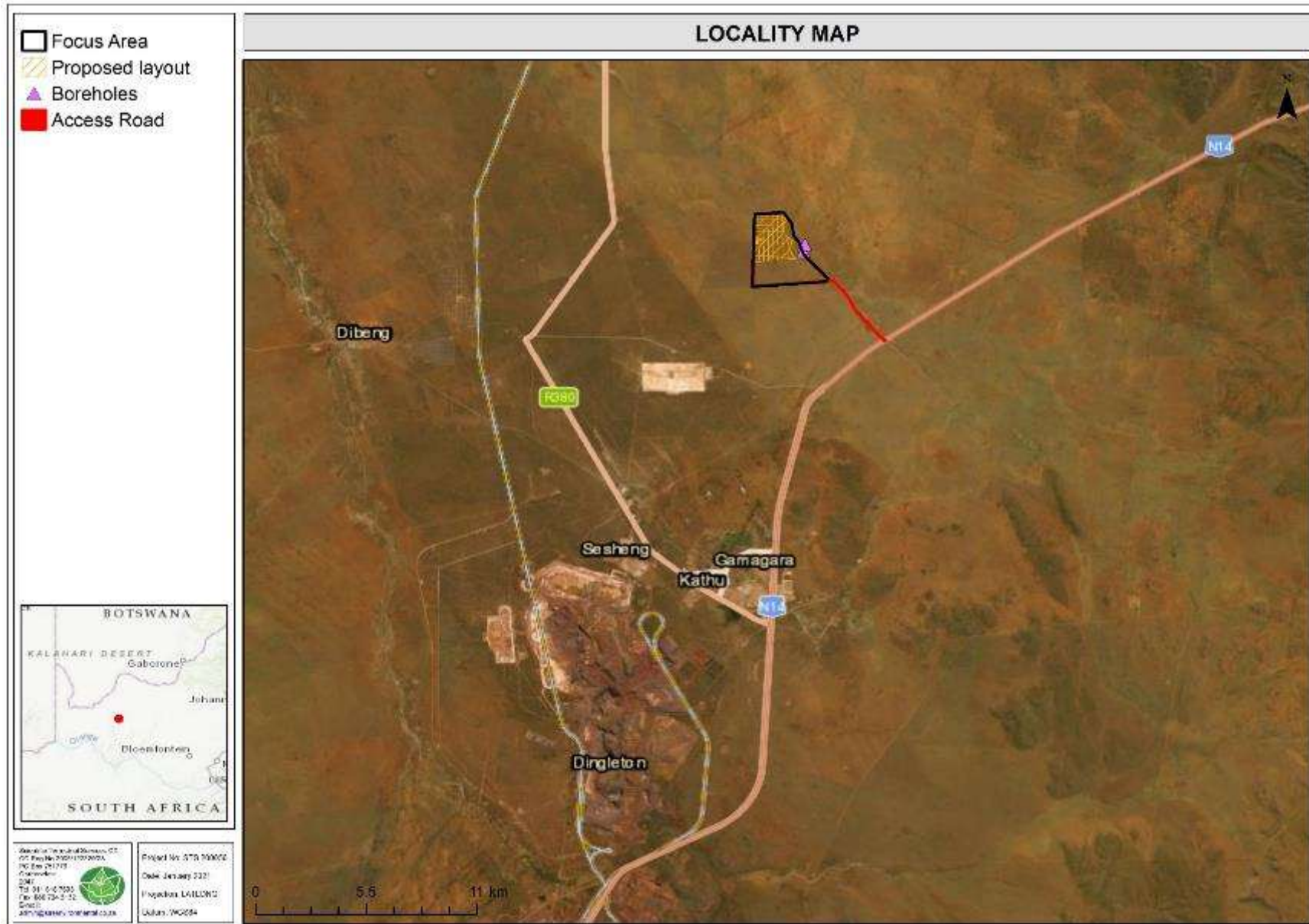


Figure 1: Digital satellite image depicting the focus area in relation to the surrounding areas.



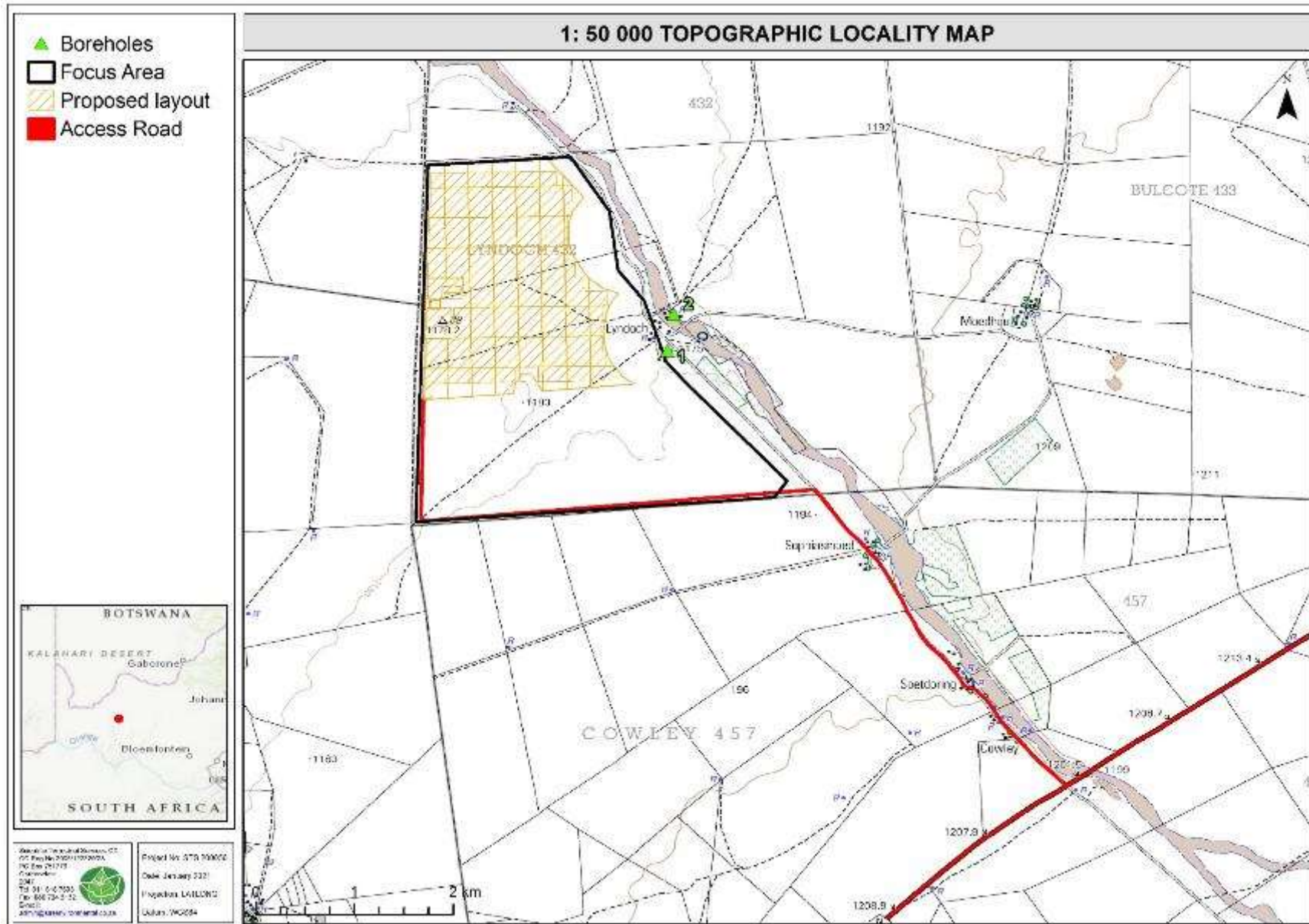


Figure 2: Location of the focus area depicted on a 1:50 000 topographical map in relation to the surrounding area.



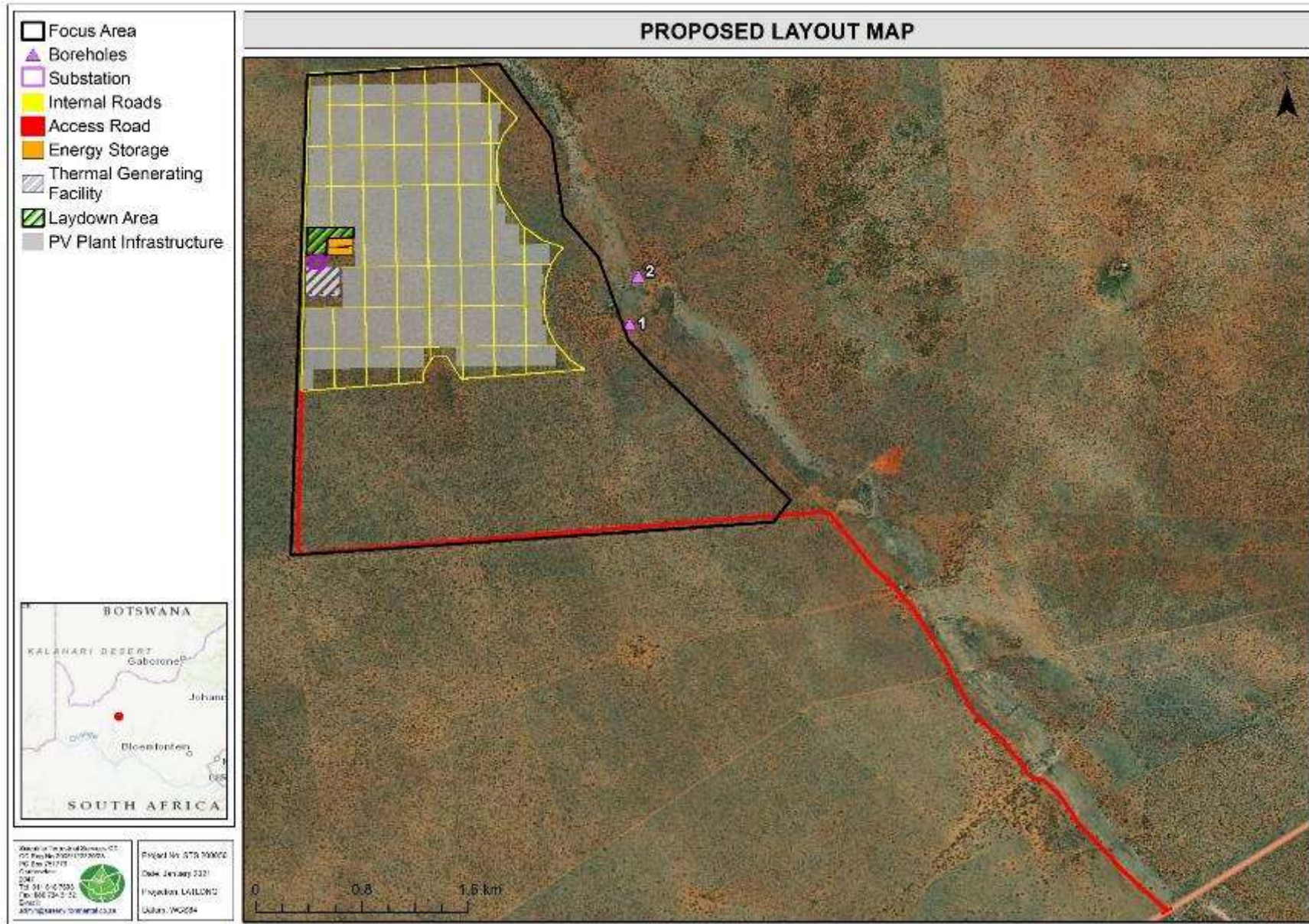


Figure 3: The proposed infrastructure layout within the focus area.



## 1.1 Project Scope

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

- To update the desktop study with all relevant information as presented by South African National Biodiversity Institute's (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), the Northern Cape Provincial Spatial Development Framework, and the Environmental Geographical Information Systems (E-GIS) databases (<https://egis.environment.gov.za/>), The National Environmental Management: Biodiversity Act (Act No.10 of 2004) (NEMBA) Threatened or Protected Species (TOPS) list (NEMBA, Notice 389 of 2013), The International Union for Conservation of Nature (IUCN) Red List of Threatened Species; and The 2015 Eskom Red Data Book of Birds of South Africa, Lesotho and Swaziland, to gain background information on the physical habitat and potential floral and faunal ecology associated with the focus area;
- To provide a statement that confirms and/or updates the habitats, communities, and the ecological state of the avifauna of the focus area, including the presence or potential for avifaunal Species of Conservation Concern (SCC); and
- To identify potential impacts associated with the proposed development.

## 1.2 Assumptions and Limitations

The following assumptions and limitations apply to this report:

- The avifaunal 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 background maps;
- STS did not undertake any site assessments for the solar farm, however a high-level walk through was undertaken on the 28<sup>th</sup> of October 2020, covering the currently proposed solar area layout and road, to verify the previous studies undertaken in 2018/2019. As such, background data (desktop) and literature studies (previous studies undertaken in the area) were used to further infer terrestrial species composition and sensitivities in relation to the available habitat;
- With ecology being dynamic and complex, some aspects (some of which may be important) may have been overlooked. The initial site visits undertaken by Simon Todd



took place from the 13<sup>th</sup> to the 16<sup>th</sup> of August 2018 (winter) as well as from the 29<sup>th</sup> to the 31 of January 2019. The high-level walkthrough undertaken by STS occurred on the 28<sup>th</sup> of October 2020 (spring). With such a such seasonal variation on site assessments, it is expected that the avifaunal community was accurately assessed and considered, and with all relevant online sources and background information utilised will improve on the overall understanding of the focus areas avifaunal ecology; and

- Sampling, by its nature, means that not all areas are assessed and thus some avifaunal species may not have been identified. Some species and taxa associated with the study area may have been missed during the previous studies as well as the STS high-level walk through.

### 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>;
- The National Environmental Management Act, 1998, (Act 107 of 1998) (NEMA);
- The National Environmental Management: Biodiversity Act, 2004, (Act 10 of 2004) (NEMBA);
- The Conservation of Agricultural Resources Act, 1983, (Act 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 NEMBA;
- Government Notice 536 List of Protected Tree Species as published in the Government Gazette 41887 dated 7 October 2018 as it relates to the National Forest Act, 1998 (Act No. 84 of 1998);
- The National Forest Act, 1998, (Act 84 of 1998, as amended) (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 7 of 1998) and the Municipal Systems Act, 2000 (Act 32 of 2000).

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

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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.



## 2 ASSESSMENT APPROACH

### 2.1 General Approach

The high-level walk through took place during October 2020 to verify the ecological status of the focus area (as described by Simon Todd), and to “ground-truth” the results of the desktop assessment.

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:

- The National Protected Areas Expansion Strategy (NPAES):
  - Formally and Informally Protected Areas (2010)
  - Focus areas for protected area expansion (2010)
- The South Africa Conservation Area Database (SACAD), Quarter 2, 2020;
- The South Africa Protected Area Database (SAPAD), Quarter 2, 2020;
- Mucina and Rutherford, 2012 & 2018 (final version):
  - Biomes;
  - Bioregions; and
  - Vegetation Type(s).
- The National Biodiversity Assessment (NBA), 2018;
- The National Web-based Screening Tool, 2020;
- The Important Bird and Biodiversity Areas (IBAs) dataset, 2015, in conjunction with the South African Bird Atlas Project 2 (SABAP2);
- The Northern Cape Critical Biodiversity Areas (2016); and
- The Northern Cape Provincial Spatial Development Framework (2000).

## 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 (Quarter Degree Square (QDS) 2723CA).**

CONSERVATION DETAILS PERTAINING TO THE AREA OF INTEREST (VARIOUS DATABASES)		DETAILS OF THE AREA OF INTEREST IN TERMS OF MUCINA & RUTHERFORD (2006, 2018, 2012)					
<p><b>NBA (2018):</b></p> <p>1) <b>Ecosystem Threat Status</b></p> <p>2) <b>Ecosystem Protection Level</b></p>	<p>NBA 2018 dataset (Figure 4): The focus area is located within the Kathu Bushveld which is considered a <b>Least Concern</b> ecosystem and is currently <b>Poorly Protected</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 National Environmental Management: Protected Areas Act, 2003 (Act No. 57 of 2003) (NEMPAA), and compared with the biodiversity target for that ecosystem type.</p>	<b>Biome</b>	The focus area is situated within the <b>Savanna Biome</b> .				
	<p>The ecosystem protection level status is assigned using the following criteria:</p> <ul style="list-style-type: none"> <li>i. If an ecosystem type has more than 100% of its biodiversity target protected in a formal protected area either a or b, it is classified as well protected,</li> <li>ii. When less than 100% of the biodiversity target is met in formal a or b protected areas it is classified it as moderately protected,</li> <li>iii. If less than 50% of the biodiversity target is met, it is classified it as poorly protected, and</li> <li>iv. If less than 5% it is hardly protected.</li> </ul>	<b>Bioregion</b>	The focus area is located within the <b>Eastern Kalahari Bushveld Bioregion</b> .				
		<b>Vegetation Type</b>	The focus area is situated within the <b>Kathu Bushveld</b> .				
		<b>Climate</b>	Summer and autumn rainfall with very dry winters.				
			<b>MAP* (mm)</b>	<b>MAT* (°C)</b>	<b>MFD* (Days)</b>	<b>MAPE* (mm)</b>	<b>MASMS* (%)</b>
			300	18.5	27	2 883	85
		<b>Altitude (m)</b>	960 –1 300				
		<b>Distribution</b>	Northern Cape Province: Plains from Kathu and Dibeng in the south, through Hotazel, vicinity of Frylinckspan to the Botswana border roughly between Van Zylsrus and McCarthysrus.				
<b>Conservation</b>	<b>Least threatened</b> . Target 16%. None conserved in statutory conservation areas. More than 1% already transformed, including the iron ore mining locality at Sishen, one of the biggest open-cast mines in the world. Erosion is very low.						
<b>National Threatened Ecosystems<sup>3</sup> (2011)</b>	The focus area is located within an ecosystem that is currently considered to be <b>Least Concern</b> . Least Concern ecosystems have not experienced a significant loss of natural habitat or deterioration in condition.	<b>Geology &amp; Soils</b>	Aeolian red sand and surface calcrete, deep (>1.2 m) sandy soils of Hutton and Clovelly soil forms. Land types mainly Ah and Ae, with some Ag.				
<b>IBA (2015)</b>	The focus area <b>is not</b> located within 10 km of an Important Bird and Biodiversity Area.						

<sup>3</sup> 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 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><b>SAPAD (2020, Q2); SACAD (2020, Q2); NPAES (2009). Figure 5</b></p>	<p>The South African Protected Areas Database (SAPAD, 2020 Q2)<sup>4</sup>, indicate that the <b>Khathu Forest Nature Reserve</b> is located within 10 km from the focus area.</p> <p>The South African Conservation Areas Database (SACAD, 2020 Q2)<sup>5</sup> and the National Protected Areas Expansion Strategy (NPAES, 2009) do not indicate any additional protected areas or conservation areas within 10 km of the focus area.</p>	<p><b>Vegetation &amp; landscape features</b></p>	<p>Medium-tall tree layer with <i>Vachellia erioloba</i> in places, but mostly open and including <i>Boscia albitrunca</i> as the prominent trees.</p> <p>Shrub layer generally most important with, for example, <i>Senegalia mellifera</i>, <i>Diospyros lycioides</i> and <i>Lycium hirsutum</i>. Grass layer is variable in cover.</p>
<p><b>NATIONAL WEB BASED ENVIRONMENTAL SCREENING TOOL (2020)</b></p>			
<p>The screening tool is intended to allow for pre-screening of sensitivities in the landscape to be assessed within the EA process. This assists with implementing the mitigation hierarchy by allowing developers to adjust their proposed development footprint to avoid sensitive areas</p>			
<p><b>Animal species theme</b></p>	<p>For the animal species theme, the entire focus area is considered to have a <b>medium sensitivity</b>. The triggered sensitivity is due to the presence of <i>Sagittarius serpentarius</i> (Secretary bird).</p>		
<p><b>Plant species theme</b></p>	<p>For the plant species theme, the entire focus area is considered to have a <b>low sensitivity</b>.</p>		
<p><b>Terrestrial biodiversity theme</b></p>	<p>For the terrestrial biodiversity theme, the focus area is considered to have a <b>very high sensitivity</b>. The triggered sensitivity features include an Ecological Support Areas (ESA).</p>		
<p><b>STRATEGIC WATER SOURCE AREAS FOR SURFACE WATER (2017)</b></p>			
<p>Surface Water Strategic Water Source Area (SWSAs) are defined as areas of land that supply a disproportionate (i.e. relatively large) quantity of mean annual surface water runoff in relation to their size. they include transboundary areas that extend into Lesotho and Swaziland. The Sub-National Water Source Areas (WSAs) are not nationally strategic as defined in the report but were included to provide a complete coverage.</p>			
<p><b>Name &amp; Criteria</b></p>	<p>The focus area is <b>not</b> within 10 km of a Strategic Water Source Area.</p>		

<sup>4</sup> **SAPAD (2020):** The definition of protected areas follows the definition of a protected area as defined in the National Environmental Management: Protected Areas Act, (Act 57 of 2003). Chapter 2 of the National Environmental Management: Protected Areas Act, 2003 sets out the “System of Protected Areas”, which consists of the following kinds of protected areas - 1. Special nature reserves; 2. National parks; 3. Nature reserves; 4. Protected environments (1-4 declared in terms of the National Environmental Management: Protected Areas Act, 2003); 5. World heritage sites declared in terms of the World Heritage Convention Act; 6. Marine protected areas declared in terms of the Marine Living Resources Act; 7. Specially protected forest areas, forest nature reserves, and forest wilderness areas declared in terms of the National Forests Act, 1998 (Act No. 84 of 1998); and 8. Mountain catchment areas declared in terms of the Mountain Catchment Areas Act, 1970 (Act No. 63 of 1970).

<sup>5</sup> **SACAD (2020):** The types of conservation areas that are currently included in the database are the following: 1. Biosphere reserves, 2. Ramsar sites, 3. Stewardship agreements (other than nature reserves and protected environments), 4. Botanical gardens, 5. Transfrontier conservation areas, 6. Transfrontier parks, 7. Military conservation areas and 8. Conservancies.



NORTHERN CAPE CRITICAL BIODIVERSITY AREAS (2016) (FIGURE 6 AND 7)	NORTHERN CAPE PROVINCIAL SPATIAL DEVELOPMENT FRAMEWORK (NCPSDF, 2019) (FIGURE 8 & 9)
<p>The Northern Cape CBA map identifies biodiversity priority areas, called Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs) which, together with protected areas, are important for the persistence of a viable representative sample of ecosystems and species, as well as the long-term ecological functioning of the landscape as a whole.</p> <p>According to the Northern Cape Critical Biodiversity Areas (2016) database, most of the focus area is located within areas categorised as <b>Other Natural Areas</b>, with small sections along the eastern boundary located within an <b>Ecological Support Area</b>.</p> <p>The Northern Cape Critical Biodiversity Areas (2016) database also includes the “<b>reasons</b>” layer, which is based on the planning units used in the spatial analysis, and provides a list of biodiversity and ecological features found in each planning unit, which contribute to the biodiversity target (CBA Map Reason Metadata).</p> <p>According to this Northern Cape CBA Reasons layer, the triggering biodiversity and ecological features include the below:</p> <ul style="list-style-type: none"> <li>- Kathu Bushveld</li> <li>- Conservation Areas</li> <li>- All natural wetlands and all natural rivers</li> <li>- Landscape Structural Elements.</li> </ul>	<p>The NCPSDF is to function as an innovate strategy that will apply sustainability principles to all forms of land use management throughout the Northern Cape as well as to facilitate practical results, as it relates to the eradication of poverty and inequality and the protection of the integrity of the environment.</p> <p>The focus area is located within the Griqualand West Centre (GWC) of plant endemism (Figure 8). This semi-arid region is broadly described as savanna, forming part of the eastern Kalahari Bushveld Bioregion. Studies investigating the endemism of the centre report at least 23 plant species that have restricted distributions (Frisby <i>et al.</i> 2019).</p> <p>The focus area also falls within the Gamagara Corridor (Figure 9). The Gamagara Corridor comprises the mining belt of the John Taolo Gaetsewe and Siyanda Districts and runs from lime acres and Danielskuil to Hotazel in the north. The corridor focuses on the mining of iron and manganese.</p>

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.



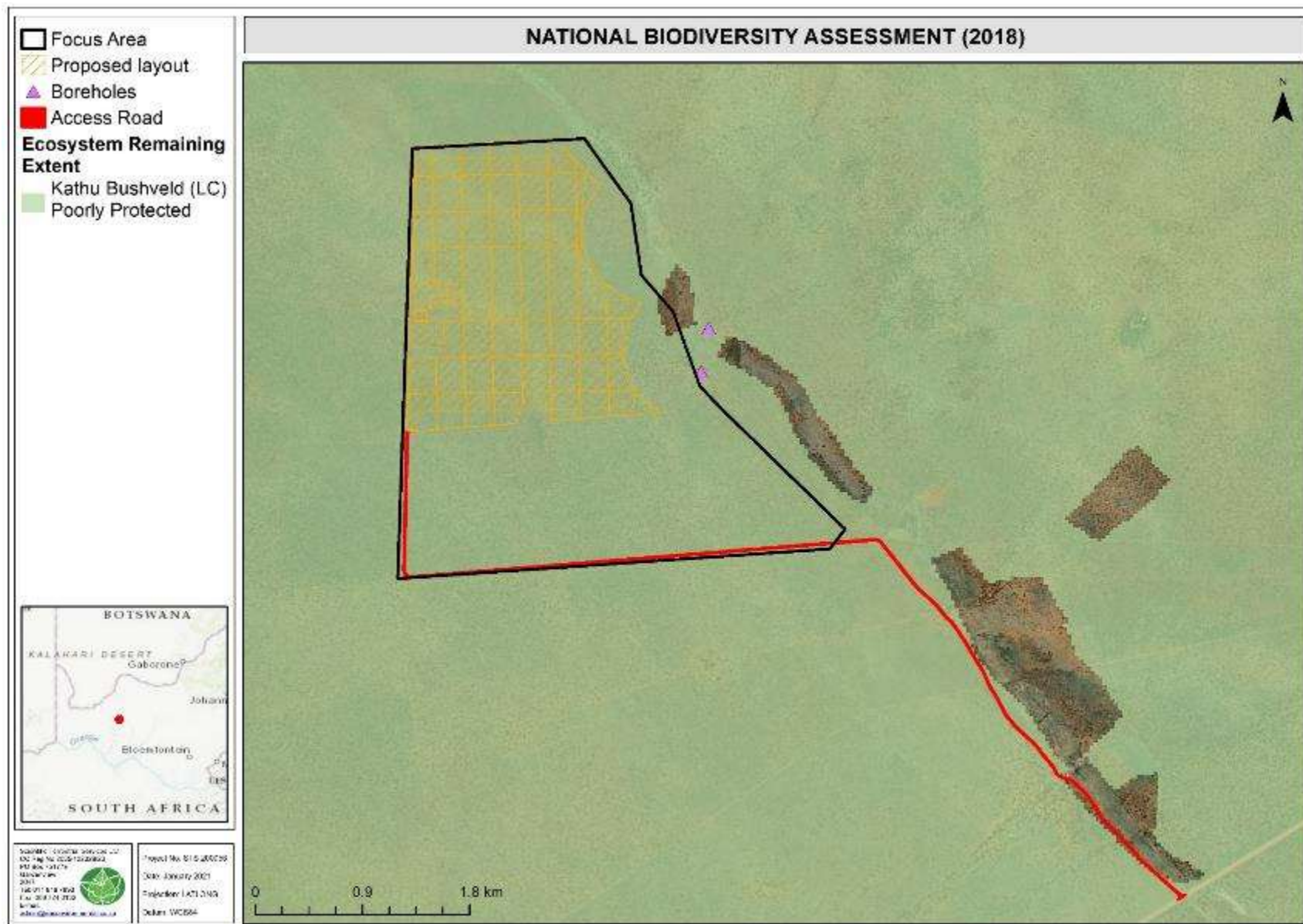


Figure 4: The remaining extent of the Kathu Bushveld (Least Concern), according to the National Biodiversity Assessment (NBA, 2018).



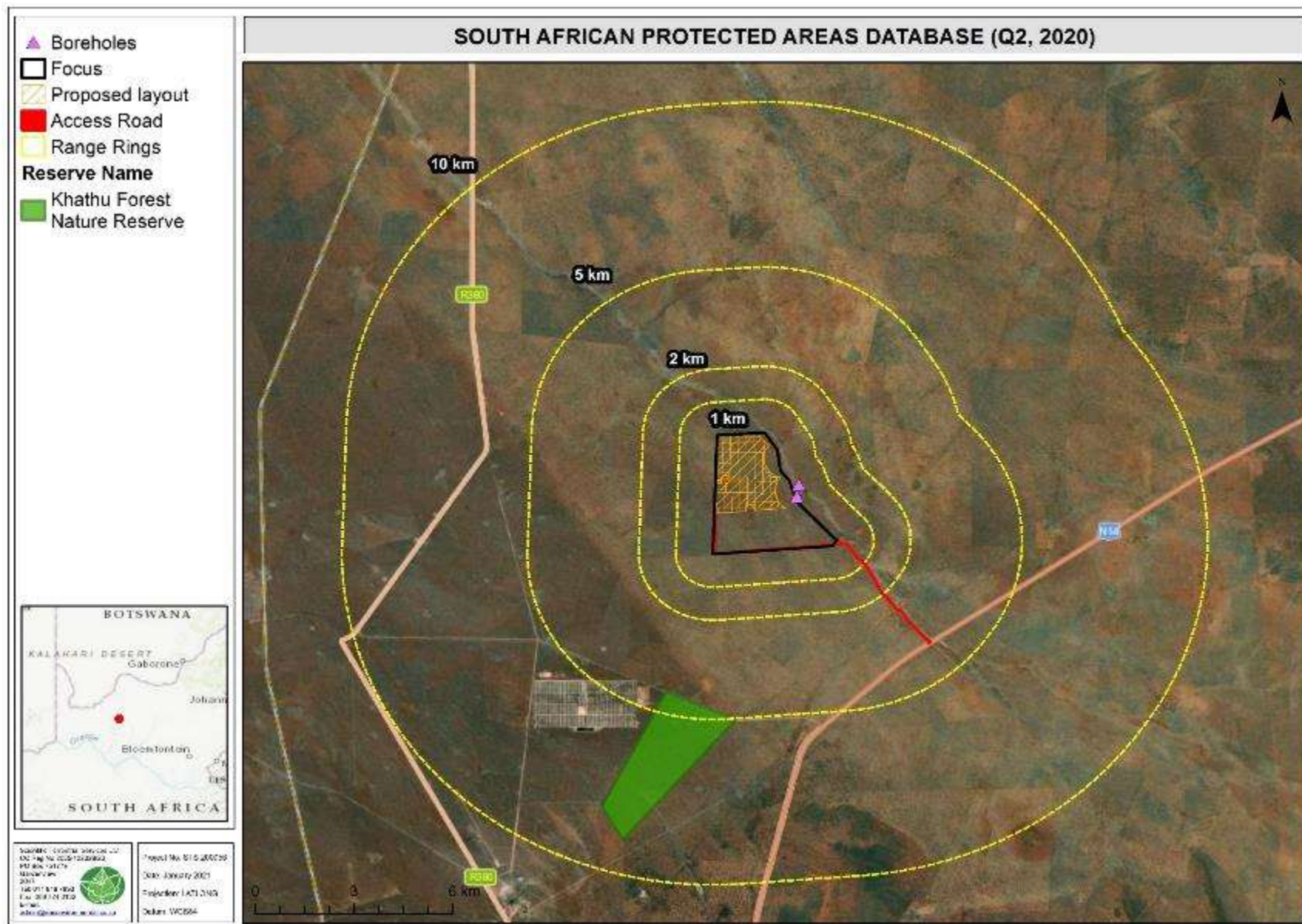


Figure 5: Protected areas within a 5 km and 10 km radius of the focus area, according to SAPAD (Q2, 2020).



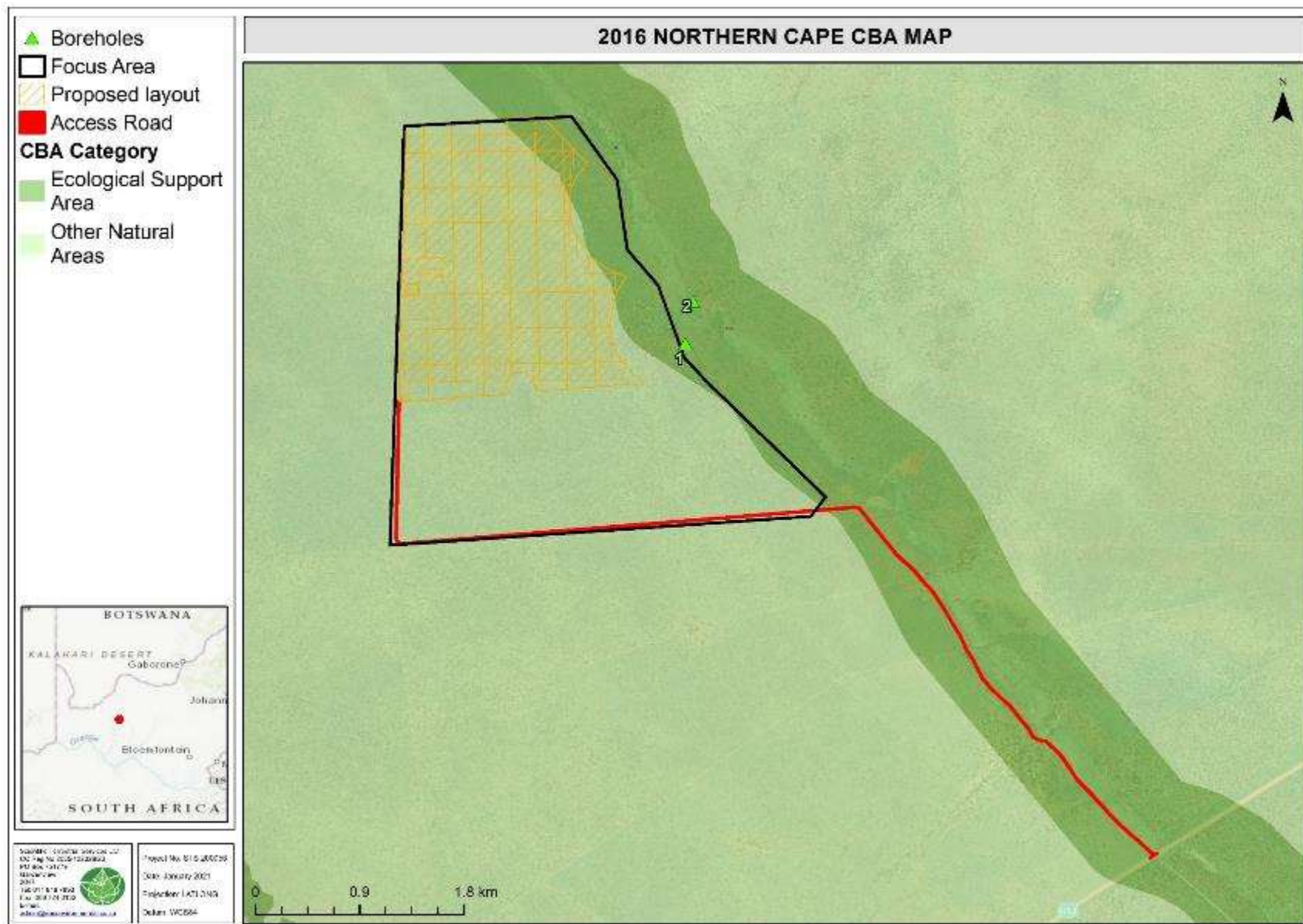


Figure 6: Northern Cape Critical Biodiversity areas associated with the focus area and the associated infrastructure.



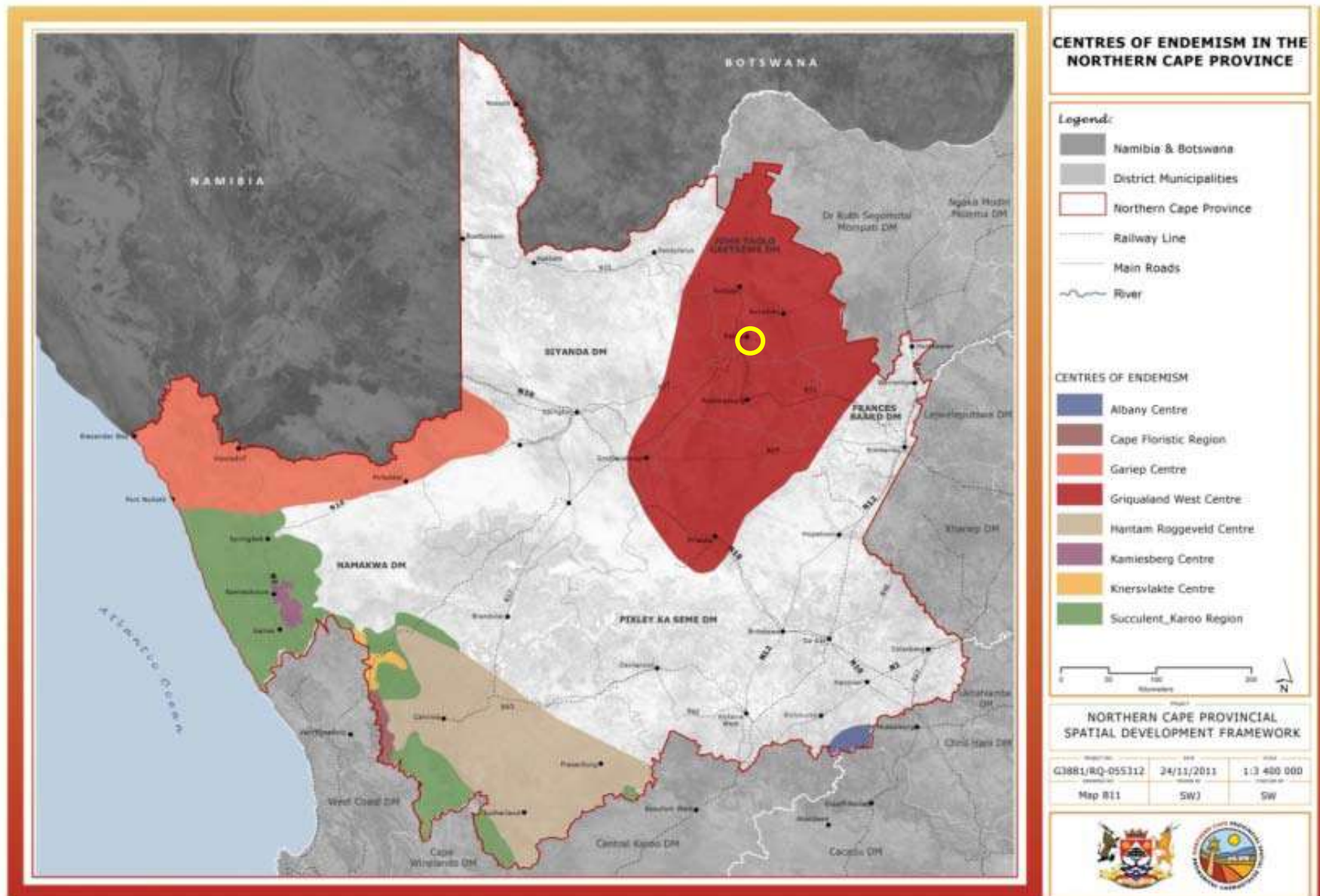


Figure 7: Centres of endemism of the Northern Cape Province: the focus area indicated by the yellow circle (NPSDF, 2012).



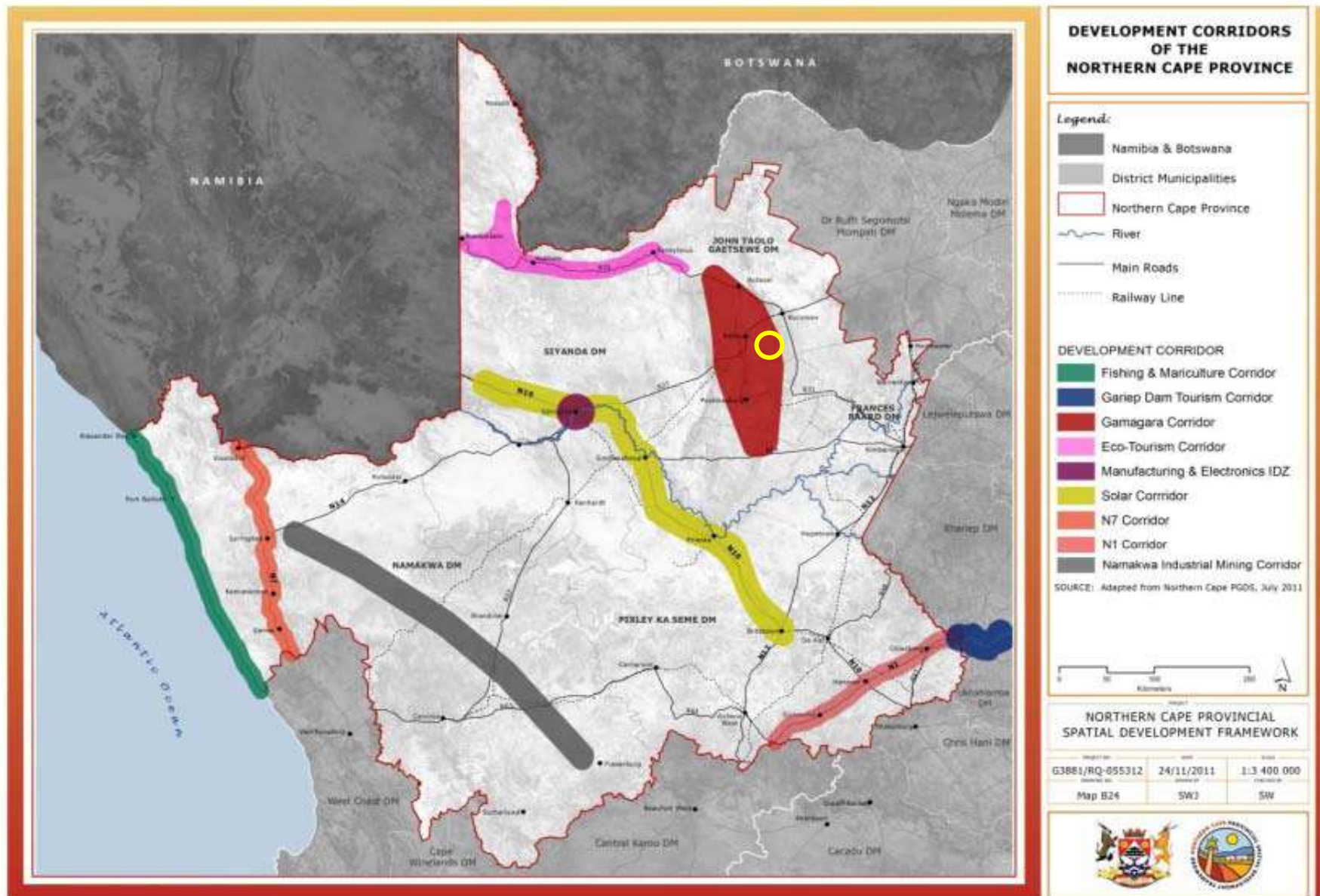


Figure 8: Development corridors of the Northern Cape Province: the focus area is indicated by the yellow circle (NPSDF, 2012).



## 4 SPECIALIST STATEMENT

The high-level walk through by STS confirmed Simon Todd's description of the avifaunal community associated with the focus area, with the habitat not experiencing any significant changes since the previous assessment was undertaken. Thus, STS agrees with the medium sensitivity derived by Simon Todd for the focus area and believes the report is still valid to be used for determining the avian habitat and assemblage composition within this area. Minor differences in opinion regarding avian SCC do however exist between STS and Simon Todd. 3 Foxes Biodiversity Solutions indicates the potential for 14 SCC (Section 4.1) to occur within the focus area while STS suggests 11 SCC (Section 4.2) potentially utilize the focus area. Contentious species are those who have a very low possibility of finding suitable habitat on site or are those whose distributions have contracted since SABAP 1.

### 4.1 Verification of Previous Studies and Summary of Site Results

The previous assessment described the vegetation associated with the focus area to consist of Kathu Bushveld. The sensitivity from a floral perspective is considered Low for most of the focus area with a sliver along the Vlermuisleegte River being considered Medium sensitivity. This vegetation type is not currently considered threatened from a national database perspective (refer to status in the NBA 2018 dataset – Figure 4) nor is it associated with any threatened ecosystems or endemic species. The Kathu Bushveld vegetation type, as described by Mucina and Rutherford (2006), is a relatively restricted vegetation type, but is currently still largely intact. There has, however, been an increase in development footprint within this vegetation due to mining and solar PV developments in the region.

Simon Todd noted that much of the focus area consists of *Tarchonanthus camphoratus* scrub suitable for hosting the typical Kalahari bioregion Avifaunal assemblage. He further indicated that most of the large *Vechellia* trees in the focus area had been destroyed by a fire in 2009, reducing habitat/structural heterogeneity and possibly the floral sensitivity score. Of their broader study area which expanded to the east and south of the focus area, the focus area was considered to be of the lowest floral sensitivity and the most suitable for the proposed development. 3 Foxes Biodiversity Solutions did state that the sensitivity from a floral perspective reflects the current situation and not the potential sensitivity in the long term.

3 Foxes Biodiversity Solutions noted that approximately 220 bird species are known from the broader project sites and its surrounds. Of those species fourteen were considered SCC/red-listed (10 – Threatened and 4 – Near-threatened). The most important of which are the





Critically Endangered White-backed Vulture - *Gyps africanus*, the Martial Eagle - *Polemaetus bellicosus* (EN) and Lanner Falcon – *Falco biarmicus* (VU). Another species, Kori Bustard – *Ardeotis kori* (NT), was observed on the site and habitat for its persistence there was noted. Marginal habitat suitability is considered for the following species: Secretarybird - *Sagittarius serpentarius* (VU), European Roller - *Coracias garrulus* (NT) and Burchell's Courser - *Cursorius rufus* (VU). The remaining species are of least concern for the project: Bateleur - *Terathopius ecaudatus* (EN), Ludwig's Bustard – *Neotis ludwigii* (EN), Black Harrier – *Circus maurus* (EN), Verreaux's Eagle – *Aquila verreauxii* (VU), Ludwig's Bustard – *Neotis ludwigii* (EN), Black Stork - *Ciconia nigra* (VU), Abdim's Stork – *Ciconia abdimii* (NT) and Maccoa Duck - *Oxyura maccoa* (NT) as their preferred habitat does not correspond with on site characteristics. Furthermore, during their survey they noted 1 endemic species (Pied Starling - *Lamprotornis bicolor*), 5 near endemic species (Fiscal Flycatcher - *Sigelus silens*, Karoo Thrush - *Turdus smithi*, Fairy Flycatcher - *Stenostira scita*, Black-headed Canary - *Serinus alario* and Black Harrier - *Circus maurus*) and 2 biome restricted species (Kalahari Scrub-robin - *Cercotrichas paena* and Burchell's Sandgrouse - *Pterocles burchelli*).

During the previous assessment a low diversity of avifauna were noted within the focus area, largely comprising of common species. The most abundant species observed were Scaly-feathered Finch - *Sporopipes squamifrons*, Black-chested Prinia - *Prinia flavicans*, Kalahari Scrub-robin – *Erythropygia paena*, and Chestnut-vented Warbler - *Sylvia subcaeruleum*. Other species included: Violet-eared Waxbill - *Granatina granatina*, Ant-eating Chat - *Myrmecocichla formicivora*, Fork-tailed Drongo - *Dicrurus adsimilis*, Yellow Canary - *Crithagra flaviventris* and Brown-crowned - *Tchagra Tchagra australis*.

## 4.2 Verification of SCC on site

SCC for this assessment includes species listed under; the Threatened or Protected Species (TOPS) Regulations (GN 151 of 2007) under Section 56 of the National Environmental Management: Biodiversity Act, 2004 (Act 10 of 2004) (NEMBA), the International Union for Conservation of Nature (IUCN) Red List of Threatened Species, The 2015 Eskom Red Data Book of Birds of South Africa, Lesotho and Swaziland; as well as species of provincial importance such as Specially Protected [Schedule 1, Section 49(1)] under the Northern Cape Nature Conservation Act, 2009 (Act No. 9 of 2009) (NCNCA). Each species regional status as listed within the 2015 Eskom Red Data Book of Birds of South Africa, Lesotho and Swaziland (Taylor et al, 2015) is indicated.



The following table indicates the a list of SCC which STS considers most likely to occur within the study area. This list varies slightly from the SCC list prepared by 3 Foxes Biodiversity Solutions.

**Table 2: A summary of historic and current data obtained from SABAP2 (2730\_2300 and 2730\_2305 pentads).**

Common Name	Scientific Name	Regional Status (Taylor et al, 2015)	Reporting Rate (%)	
			SABAP2 2730_2300 (4 cards)	SABAP2 2730_2305 (4 cards)
Abdim's Stork	<i>Ciconia abdimii</i>	NT	-	-
White-backed Vulture	<i>Gyps africanus</i>	CR	-	-
Ludwig's Bustard	<i>Neotis ludwigii</i>	EN	-	-
Lappet-faced Vulture	<i>Torgos tracheliotos</i>	EN	-	-
Black Stork	<i>Ciconia nigra</i>	VU	-	-
European Roller	<i>Coracias garrulus</i>	NT	-	-
Lanner Falcon	<i>Falco biarmicus</i>	VU	-	-
Martial Eagle	<i>Polemeatus bellicosus</i>	EN	-	-
Tawny Eagle	<i>Aquila rapax</i>	EN	-	-
Burchell's courser	<i>Cursorius rufus</i>	VU	-	-
Kori Bustard	<i>Ardeotis kori</i>	NT	25	25

NA= Not Assessed, NT= Near Threatened, VU= Vulnerable and EN= Endangered and CR=Critically Endangered.

Only a single SCC as listed by 3 Fox Solutions and STS was confirmed during the field investigation (*Ardeotis kori* (Kori Bustard, NT)). Another SCC was observed yet the species could not be confirmed, a large Vulture, almost certainly a *Gyps africanus* (White-backed Vulture, CR) was observed flying to the east of the study area. The presence of several other SCC within the area is deemed possible, although the focus area will likely only be utilised for foraging as opposed to breeding in most cases. The following SCC are considered likely to utilise the focus area for foraging *Neotis ludwigii* (Ludwig's Bustard, EN), *Torgos tracheliotos* (Lappet-faced Vulture, EN), *Coracias garrulus* (European Roller, NT) and *Falco biarmicus* (Lanner Falcon, VU) at any given point in time. Habitat characteristics indicated that potential breeding habitat for the following species may occur within the focus area: *Polemeatus bellicosus* (Martial Eagle, EN), *Aquila rapax* (Tawny Eagle EN), *Cursorius rufus* (Burchell's courser, VU) and *Sagittarius serpentarius* (Secretarybird, VU). The habitat observed within the focus is marginal for both *Ciconia abdimii* (Abdim's Stork, NT) and *Ciconia nigra* (Black Stork, VU) which may utilise the focus area intermittently when favourable conditions present themselves within the study area.



Although most of these SCC had gone undetected during the field survey, there remains a probability that some of these species may occur within the focus area even if temporarily. Many of these species will likely self-relocate at the start of construction activities and as such it is unlikely that rescue and relocation permits (NEMBA or NCNCA) will be required, however, should avian nests be observed within any of the larger trees they should be monitored. If necessary permits regarding their destruction or removal will be required from NCNCA or DEFF.

## 5 IMPACTS AND PROPOSED MANAGEMENT MEASURES

The sections below provide the significance of perceived impacts on the avifaunal ecology of the focus area (refer to Figure 3 for the proposed layout map).

An impact discussion, assessment and associated mitigation measures for all potential impacts associated with the construction and operation of the access road and Thermal Plant (Thermal Generating facility) are provided in Section 5.1.1 whilst the cumulative impact assessment and mitigation measures for the propose solar facility are presented in Section 5.1.2.

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

**Table 3: Activities and Aspects likely to impact on the avifaunal assemblage associated with the focus area.**

ACTIVITIES AND ASPECTS REGISTER	
Pre-Construction Phase	
<ul style="list-style-type: none"> <li>- Potential failure to implement the required mitigation measures before and at the commencement of construction activities:                             <ul style="list-style-type: none"> <li>• Potential failure to have a Rehabilitation Plan, anti-collision measures or a relocation plan developed before the commencement of the development of the Thermal Plant.</li> </ul> </li> <li>- <b>Impact:</b> Long-term or permanent degradation and modification of the receiving environment, loss of SCC and avifauna habitat.</li> </ul>	
<ul style="list-style-type: none"> <li>- Inconsiderate planning, infrastructure placement and design, leading to the loss of potential sensitive avifaunal species and/or habitat for such species, as well as unnecessary edge effect impacts on areas outside of the proposed development footprint.</li> <li>- <b>Impact:</b> Degradation and modification of the receiving environment, loss of avifaunal habitat.</li> </ul>	
<ul style="list-style-type: none"> <li>- Potential inadequate design of infrastructure and transmission lines increasing the possibility of birds being electrocuted by or colliding with infrastructure. Lastly, bird nests may also be a potential fire risk and their presence needs to be monitored as a potential hazard.</li> <li>- <b>Impact:</b> Long-term collision and electrocution risks to SCC species leading to a reduction in SCC diversity and the risk of fire within the facility.</li> </ul>	
Construction Phase	
<ul style="list-style-type: none"> <li>- Site clearing and the removal of vegetation.</li> <li>- <b>Impact:</b> Loss of habitat, diversity, and the potential loss of avifaunal SCC.</li> </ul>	
<ul style="list-style-type: none"> <li>- Dumping and laydown of construction material within areas where no construction is planned thereby leading to habitat disturbance - allowing the establishment and spread of AIPs and bush encroachers, and further alteration of faunal habitat.</li> </ul>	



<b>ACTIVITIES AND ASPECTS REGISTER</b>	
-	<b>Impact:</b> Loss of preferred avifaunal habitat, diversity and potential SCC as AIPs outcompete the indigenous plant species (avifaunal habitat) in these disturbed areas.
-	Potential failure to concurrently rehabilitate bare or disturbed sites as soon as the construction activities have occurred will potentially result in loss of viable soils, increasing erosion risk and/or permitting the proliferation of AIPs.
-	<b>Impact:</b> Long-term loss of favourable habitat for historically recorded avifaunal species. Loss of avifaunal diversity and potential SCC which will disperse into the surrounding area in search of favourable habitat.
-	Potentially poorly managed edge effects.
-	<b>Impact:</b> Further loss of avian habitat, diversity, and SCC within the areas adjacent to the footprint of the proposed development.
-	Possible increased fire frequency during construction.
-	<b>Impact:</b> Loss or alteration of avifaunal habitat and species diversity.
-	Additional pressure on avifaunal habitat as a result of an increased human presence associated with the proposed development, contributing to: <ul style="list-style-type: none"> <li>• Potential hunting/trapping/removal/collection of avifaunal species; and</li> <li>• Increased human activity will lead to the displacement and/or loss of potential avifaunal SCC.</li> </ul>
-	<b>Impact:</b> Further disturbance of avifaunal species and potentially habitat outside of the footprint area.
-	Increased risk of collisions with the project infrastructure and/or electrocution while perching on the pylons or powerlines.
-	<b>Impact:</b> Local loss of avifaunal species and SCC leading to decrease in avifaunal abundance and diversity.
<b>Operational and Maintenance Phases</b>	
-	Ineffective rehabilitation of exposed and impacted areas potentially leading to limited vegetation regrowth and AIP proliferation and a possible reduction of avifaunal diversity and occurrence of potential avifaunal SCC over the long-term.
-	<b>Impact:</b> Permanent loss of avifaunal habitat, diversity and SCC, and a higher likelihood of edge effect impacts on adjacent and nearby natural avifaunal habitat. Further reduction of available habitat in the long-term, compounding the limiting factors to avifaunal assemblages.
-	Poorly implemented and monitored AIP Management programme leading to the introduction and proliferation of AIP species.
-	<b>Impact:</b> Disturbance and potential loss of surrounding avifaunal habitat, diversity and SCC.
-	Increased risk of collisions with the project infrastructure and/or electrocution while perching on the pylons or powerlines (potential fire risk).
-	<b>Impact:</b> Local loss of avifaunal SCC abundance and diversity.
-	Potential overexploitation through the removal and/or collection of important or sensitive avifaunal SCC on the property.
-	<b>Impact:</b> Local loss of avifaunal SCC abundance and diversity.

## 5.1 Avifaunal Impact Assessment

### 5.1.1 Avifaunal Impact Assessment Results

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



Due to dissimilar anticipated impacts and different planned placement areas, the impact tables are split between the perceived impacts from the proposed Access Road (Table 4) and that of the rest of the proposed activities (Table 5).

The proposed access road will include an upgrade of an existing 3.6 km T26 gravel road (i.e., a road upgrade) which turns out from the N14 and will thus have minimal impacts on avifauna. Only once the proposed access road enters the focus area will its construction result in vegetation clearance and habitat fragmentation. The proposed width of 9 m for the access road will lead to the local loss of vegetation and thus avian habitat but seeing that the road follows along the property fence, habitat fragmentation is reduced lowering the impacts. Vehicle collisions with avifauna may increase as a result of the proposed facility due to an increase in vehicle movement to and from the focus area. If no mitigation measures are implemented, the impact on avifaunal habitat, diversity and SCC is likely to be of **medium significance**. With mitigation measures in place, the impact significance can be reduced to **low levels**.

**Table 4: Impact on the avifaunal habitat, diversity, and SCC resulting from the proposed Access Road.**

<b>Nature:</b> <u>Impact on avifaunal habitat, diversity and avifaunal SCC</u>		
<b>What causes the effect:</b> Vegetation clearing associated with the construction of a new access road (approximately 5 km long with a width of 9 m).		
<b>What will be affected:</b> Local loss of avian habitat within the footprint and species currently inhabiting the footprint area.		
<b>How will it be affected:</b> Local clearing of vegetation will result in the minor loss of avian habitat adjacent the existing gravel road within the focus area. The current design allows for minimal habitat loss as a large section of the proposed Access Road includes an upgrade of an existing road. An increased probability of avian collisions with vehicles is also anticipated.		
	<b>Without mitigation</b>	<b>With mitigation</b>
<b>Extent</b>	Local (1)	Local (1)
<b>Duration</b>	Permanent (5)	Long-term (4)
<b>Magnitude</b>	Moderate (4)	Low (2)
<b>Probability</b>	Highly Probable (4)	Probable (3)
<b>Significance</b>	<b>Medium (40)</b>	<b>Low (21)</b>
<b>Status (positive or negative)</b>	Negative	Negative
<b>Reversibility</b>	Moderate	High
<b>Irreplaceable loss of resources?</b>	Low	Low
<b>Can impacts be mitigated?</b>	Mostly.	
<b>Mitigation:</b>		
<ul style="list-style-type: none"> <li>➤ The construction and upgrade of the proposed Access Road must limit vegetation clearing to the approved footprint area whilst avoiding footprint creep that will result in the loss of additional avian habitat. Additional road construction should be limited to what is absolutely necessary, and the footprint thereof kept to a minimal. Any temporary roads should be rehabilitated as soon as they are no longer in use to limit the effects of habitat fragmentation;</li> <li>➤ The section of the Access Road that will require new construction must, as far as possible, be aligned to existing fences so to avoid fragmentation of the vegetation;</li> <li>➤ Removal of alien invasive species should preferably commence during the pre-construction phase and continue throughout the construction and operational phases in order to limit damaging changes to the local avian habitat. AIPs were recorded along the existing T26 gravel road and during the road upgrade, these species must be cleared and disposed of at a registered waste facility. AIP control is increasingly important along road construction as linear developments form corridors along which AIPs can more readily spread; and</li> </ul>		



<ul style="list-style-type: none"> <li>➤ Vehicles must remain along existing and/or approved roads during all phases of the project and must not be allowed to drive recklessly (a speed limit of 40km/h is recommended).</li> </ul>
<p><b>Residual Impacts:</b> Even with extensive mitigation, residual impacts on the receiving environment are deemed likely. The following points highlight the key residual impacts that have been identified:</p> <ul style="list-style-type: none"> <li>➤ Permanent loss of and altered avifaunal habitat due to long-term nature of the project and the potential for alien vegetation and bush encroaching to become extensive along linear developments over time (increased human movement) which may reduce the suitability of avian habitat within the focus area;</li> <li>➤ The potential loss of SCC/protected avifaunal species with increased human presence; and</li> <li>➤ Disturbed areas are not adequately rehabilitated, resulting in ongoing degradation of avian habitat, species diversity and SCC.</li> </ul>

The construction of the Thermal Plant encompasses an area of approximately 5 ha. This will result in a local loss of avian habitat within a medium sensitivity habitat which has the potential to host several SCC. The destruction of habitat will result in the relocation of birds inhabiting the focus area into adjacent habitat, which will result in increased competition for resources. Furthermore, the potential for bird collisions with vehicles or electrocution or collisions with infrastructure will be increased as a result of the development. The potential for birds or their nests to result in shorts circuits or sparks which can result in a fire, is also increased. The direct impact of the proposed development on the avian ecology of the focus area, including impacts on avian SCC, will have a **high** impact significance for the focus area if no mitigation measures are implemented. If mitigation measures are implemented, the impact significance for the focus area is anticipated to be **medium**.

**Table 5: Impact on the avifaunal habitat, diversity, and SCC resulting from the proposed Thermal Plant.**

<i>Nature: Impact on avian habitat, diversity and avian SCC</i>		
<b>What causes the effect:</b> Vegetation clearing and the construction of the proposed Thermal Plant and associated infrastructure – footprint area of approximately 5 ha.		
<b>What will be affected:</b> Habitat for avifauna (common species and SCC) will be lost, displacing birds from the direct footprint area. Furthermore, potentially hazardous structures will be assembled for the long term which may increase the risk of birds colliding with such structures. As the area does not encompass a significantly large area restrictions to avian movement will be limited. Avian movement may be restricted/changed through the construction of fences, particularly for ground dwelling birds such as korhaans, lapwings and bustards, which are known to become trapped in these structures.		
<b>How will it be affected:</b> Vegetation clearance will result in the local loss of avian habitat and diversity in the direct footprint. Habitat loss in the footprint area will result in the displacement of birds into adjacent habitat where resource competition will increase, however, these impacts are not anticipated to be large as the area encompasses 5 ha. Birds are also known to collide with either the overhead structures such as transmission cables which may result in the loss of SCC. Lastly, birds may also be electrocuted on power lines while perching or building nests on or inside infrastructure (which is a potential fire hazard).		
	<b>Without mitigation</b>	<b>With mitigation</b>
<b>Extent</b>	Local (2)	Local (1)
<b>Duration</b>	Permanent (5)	Long-term (4)
<b>Magnitude</b>	Moderate (6)	Low (4)
<b>Probability</b>	Probable (3)	Improbable (2)
<b>Significance</b>	<b>Medium (39)</b>	<b>Low (18)</b>
<b>Status (positive or negative)</b>	Negative	Negative
<b>Reversibility</b>	Moderate	Moderate
<b>Irreplaceable loss of resources?</b>	Moderate	Moderate
<b>Can impacts be mitigated?</b>	This impact can be mitigated as the size of the Thermal Plant covers 5 ha and is not located in an area that is particularly sensitive to avifauna. The proposed new	



	Thermal Plant will replace the current natural veld, which will increase potential risks and impacts on local avifauna while providing little opportunity for habitation.
<p><b>Mitigation:</b></p> <ul style="list-style-type: none"> <li>➤ Should any avifaunal species protected under the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) or the Northern Cape Nature Conservation Act, 2009 (Act No. 9 of 2009) or large raptor nest be encountered within the footprint area, construction should be halted and authorisation to relocate or remove the trees containing said nests must be obtained from the relevant departments;</li> <li>➤ Minimise loss of indigenous vegetation where possible by not clearing outside of the designated footprint area;</li> <li>➤ Temporary laydown areas should be located within previously transformed areas or areas that have been identified as being of low sensitivity. These areas should be rehabilitated after use.</li> <li>➤ In order to reduce bird presence within the infrastructure footprint (fenced off area), constant disturbance or harassment to any birds attempting to utilize the area (for breeding or foraging) should be initiated;</li> <li>➤ Any structures which may act as perching sites for birds should be installed with anti-perching spikes;</li> <li>➤ Infrastructure associated with the Thermal Plant may be used as shelter by avifauna, which increases their potential activity around the solar farm. Methods to reduce available shelter include: 1) Exclusion measures such as spikes, netting, panelling on ledges and holes around buildings to assist in prevention of birds taking residence, 2) Nest removal and 3) Cutting of grass within the fenced off infrastructure area should be considered depending on the major bird assemblages, as some species prefer short grass while other species prefer long grass;</li> <li>➤ Any avifaunal SCC nests that will be affected by the construction activities, must be marked and where possible, the current breeding attempt should be allowed to complete its cycle before any activities are undertaken within close proximity of the nest (depending on the species). After the breeding attempt has failed or the chick has fledged the nest should be destroyed or moved. Permits for such activities must be obtained from the relevant authorities where required;</li> <li>➤ Vehicles should be restricted to travelling only on designated roadways to limit the ecological footprint of the construction activities. Additional road construction should be avoided or, if required, must be limited to what is absolutely necessary, and the footprint thereof kept to a minimal. A strict speed limit should be maintained (40 km/h is recommended) to limit potential bird strikes;</li> <li>➤ Care should be taken during the construction and operation of the proposed development to limit edge effects to surrounding natural habitat. This can be achieved by: <ul style="list-style-type: none"> <li>• Demarcating all footprint areas during construction activities;</li> <li>• No construction rubble or cleared alien invasive species are to be disposed of outside of demarcated areas, and should be taken to a registered waste disposal facility;</li> <li>• All soils compacted because of construction activities should be ripped and profiled and reseeded; and</li> <li>• Manage the spread of AIP species, which may affect remaining natural habitat within surrounding areas;</li> </ul> </li> <li>➤ Upon completion of construction activities, it must be ensured that no soils be left bare, and that indigenous species be used to revegetate the disturbed area;</li> <li>➤ No collection, trapping or killing of avifaunal SCC must be allowed by construction and maintenance personnel; and</li> <li>➤ Disturbed areas are to be rehabilitated to a similar state as that of pre-disturbance conditions – where veld condition can be improved, it is recommended.</li> </ul>	
<p><b>Residual Impacts:</b></p> <p>Even with extensive mitigation, residual impacts on the receiving avifaunal environment are deemed likely. The following points highlight the key residual impacts that have been identified:</p> <ul style="list-style-type: none"> <li>➤ Potential loss of ecologically intact habitat outside of the authorised development;</li> <li>➤ Permanent loss of and altered avian species diversity outside of the focus area, including loss of favourable habitat for SCC;</li> <li>➤ Displacement of avifauna within the focus area will lead to competition for resources beyond the boundary of the focus area which may affect diversity and abundance of avifauna; and</li> <li>➤ Potential AIP proliferation and ongoing bush encroachment into adjacent natural vegetation communities altering avian habitat.</li> </ul>	

### 5.1.2 Possible Cumulative Impacts

The construction of the remainder of the PV Solar facility encompasses an area of approximately 340 ha. This will result in a large reduction in avian habitat within a medium



sensitivity habitat that potentially to host several SCC for both breeding and foraging habitat. The alteration of the local habitat will result in competition for resources and possible changes to the local bird community structure in adjacent habitats. Furthermore, the potential for bird collisions with vehicles or electrocution from infrastructure will be increased as a result of the development. Waterbirds may also mistake the PV facility panels for waterbodies which may lead to the loss of SCC and common avian species. The potential for birds or their nests to result in shorts circuits or sparks which can result in a fire, is also increased and may cause damage to neighbouring habitats and infrastructure. Based on the number of avifaunal SCC expected to occur within the focus area, it is likely that the location plays a role in supporting several avian SCC. As the landscape has escaped transformation and remains in a good ecological state, the loss of habitat from the proposed activities is likely to cause impacts on SCC, however, as this area is considered of medium sensitivity and it is not an important roosting, breeding or feeding location for any of the listed SCC, these impacts, with mitigation, can be reduced to acceptable levels. Moreover, many of these species could relocate to more suitable habitat adjacent the development in a region which has limited disturbance.

Most of the SCC anticipated to occur within the study area will utilise this habitat for foraging while 4 species may potentially breed within the focus area, as such uncontrolled development within the respective habitats may result in the loss of breeding habitat for these species. The proposed activities will lead to the loss of avifaunal habitat and to a reduction in the abundance of common avifauna and local reductions in potential SCC presence. This will lead to the displacement of species currently inhabiting these areas, pushing them out into the surrounding vegetated areas leading to increased competition for territories and breeding sites. Moreover, there is likely to be a knock-on dispersal affect, leading to increased resource competition and possible increased mortality rates, resulting in a decreased species abundance and possible further loss of species diversity as a residual affect. Lastly, an increase in the movement of humans within the area could lead to further degradation of avian habitat and increased trapping or conflict with avifauna due to continued exposure to anthropogenic disturbances.

The direct impact of the proposed development on the avian ecology of the focus area, including impacts on avian SCC, will have a **high** impact significance for the focus area if no mitigation measures are implemented. If mitigation measures are implemented, the impact significance for the focus area is anticipated to be **medium**.





**Table 6: Cumulative impacts associated with the loss of avifaunal habitat, diversity and SCC arising from the proposed PV development activities.**

<b>Nature:</b> <i>Impact on avian habitat, diversity and avian SCC</i>		
<p><b>What causes the effect:</b> Vegetation clearing and the construction of the proposed PV facility and associated infrastructure – footprint area of approximately 340 ha. Increased human movement in the area, a potential increased precedent for ongoing developments in the area, poor veld management or poorly implemented maintenance measures to contribute to AIP introductions and spread, ongoing bush encroachment resulting from increased disturbance (due to increased movement of people and vehicles to and from the development) which has the potential to alter the local avian habitat.</p> <p><b>What will be affected:</b> Habitat for avifauna (common species and SCC) will be lost, displacing birds from the direct footprint area. Furthermore, potentially hazardous structures will be assembled over a large area for the long term which may increase the risk of birds colliding with such structures. Avian movement may be restricted/changed through the construction of fences, particularly for ground dwelling birds such as korhaans, lapwings and bustards, which are known to become trapped in these structures. Integrity of the remaining natural vegetation within the focus area and surrounding areas as AIPs and bush encroaching spreads, which may alter avian species composition. Furthermore, increased human movement through the site may increase avian mortality through a number of channels.</p> <p><b>How will it be affected:</b> Vegetation clearance will result in the local loss of avian habitat and diversity in the direct footprint. Habitat loss in the footprint area will result in the displacement of birds into adjacent habitat where resource competition will increase which may increase mortality rates or result in changes to bird community structure. Birds are also known to collide with either the overhead structures such as transmission cables or the actual solar panels which are mistaken for water. Lastly, birds may also be electrocuted on power lines while perching or buildings nests on or inside infrastructure (which is a potential fire hazard). These may contribute to a reduction in common and SCC richness and abundance within the local environment. No impacts on a National Scale are anticipated as no important breeding, foraging or movement corridors are known within the focus area and its surrounds.</p>		
	<b>Without mitigation</b>	<b>With mitigation</b>
<b>Extent</b>	Local (3)	Local (2)
<b>Duration</b>	Permanent (5)	Long-term (4)
<b>Magnitude</b>	High (8)	Moderate (6)
<b>Probability</b>	Highly Probable (4)	Probable (3)
<b>Significance</b>	<b>High (64)</b>	<b>Medium (36)</b>
<b>Status (positive or negative)</b>	Negative	Negative
<b>Reversibility</b>	Moderate	Moderate
<b>Irreplaceable loss of resources?</b>	Moderate	Moderate
<b>Can impacts be mitigated?</b>	The development will contribute to cumulative impacts on habitat loss and transformation in the area. Although large numbers of avifaunal SCC are likely to occur within the focus area this is not considered an important foraging, breeding, roosting or movement corridor for any of these species and thus cumulative impacts on their populations are anticipated to be low.	
<b>Mitigation:</b>		
<ul style="list-style-type: none"> <li>➤ Should any avifaunal species protected under the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) or the Northern Cape Nature Conservation Act, 2009 (Act No. 9 of 2009) or large raptor nest be encountered within the footprint area, construction should be halted and authorisation to relocate or remove the trees containing said nests must be obtained from the relevant departments;</li> <li>➤ Minimise loss of indigenous vegetation where possible by not clearing outside of the designated footprint area;</li> <li>➤ Temporary laydown areas should be located within previously transformed areas or areas that have been identified as being of low sensitivity. These areas should be rehabilitated after use.</li> <li>➤ In order to reduce bird presence within the infrastructure footprint (fenced off area), constant disturbance or harassment to any birds attempting to utilize the area (for breeding or foraging) should be initiated;</li> <li>➤ Any structures which may act as perching sites for birds should be installed with anti-perching spikes;</li> <li>➤ Infrastructure associated with the solar farm may be used as shelter by avifauna, which increases their potential activity around the solar farm. Methods to reduce available shelter include: 1) Exclusion measures such as spikes, netting, panelling on ledges and holes around buildings to assist in prevention of birds taking residence, 2) Nest removal and 3) Cutting of grass within the fenced off infrastructure area should be considered depending on the major bird assemblages, as some species prefer short grass while other species prefer long grass;</li> <li>➤ Any avifaunal SCC nests that will be affected by the construction activities, must be marked and where possible, the current breeding attempt should be allowed to complete its cycle before any activities are undertaken within close proximity of the nest (depending on the species). After the breeding attempt has failed or the chick has fledged the nest should be destroyed or moved. Permits for such activities must be obtained from the relevant authorities where required;</li> </ul>		



- Vehicles should be restricted to travelling only on designated roadways to limit the ecological footprint of the construction activities. Additional road construction should be avoided or, if required, must be limited to what is absolutely necessary, and the footprint thereof kept to a minimal. A strict speed limit should be maintained (40 km/h is recommended) to limit potential bird strikes;
- Care should be taken during the construction and operation of the proposed development to limit edge effects to surrounding natural habitat. This can be achieved by:
  - Demarcating all footprint areas during construction activities;
  - No construction rubble or cleared alien invasive species are to be disposed of outside of demarcated areas, and should be taken to a registered waste disposal facility;
  - All soils compacted because of construction activities should be ripped and profiled and reseeded; and
  - Manage the spread of AIP species, which may affect remaining natural habitat within surrounding areas;
- Upon completion of construction activities, it must be ensured that no soils be left bare, and that indigenous species be used to revegetate the disturbed area;
- No collection, trapping or killing of avifaunal SCC must be allowed by construction and maintenance personnel; and
- Disturbed areas are to be rehabilitated to a similar state as that of pre-disturbance conditions – where veld condition can be improved, it is recommended.

**Residual Impacts:**

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

- Potential loss of ecologically intact habitat outside of the authorised development;
- Permanent loss of and altered avian species diversity outside of the focus area, including loss of favourable habitat for SCC;
- Displacement of avifauna within the focus area will lead to competition for resources beyond the boundary of the focus area which may affect diversity and abundance of avifauna; and
- Potential AIP proliferation and ongoing bush encroachment into adjacent natural vegetation communities altering avian habitat.
- The aggregation of numerous SEFs in a region has the potential to compound environmental impacts generally and on avifauna, and because this impact has been mostly understudied, it should be considered during the early stages of land use planning (3 Foxes Biodiversity Solutions. (2019));
- Transformation of intact habitat would contribute to the fragmentation of the landscape and would potentially disrupt the connectivity of the landscape for avifauna. This is particularly a concern with regards to species and ecosystems with limited geographical distributions (3 Foxes Biodiversity Solutions. (2019)).
- Several SCC species likely utilise the focus area and surrounding areas, with numerous other common species having the potential to be found within the focus area. If the destruction of any SCC nests is required as part of the construction activities, the relevant permits should first be attained from either the provincial department or DEFF. Negative cumulative impacts on SCC can be lowered if poaching of SCC is prevented and where feasible, this should be an important long-term management goal;
- Linear developments are often corridors along which disturbances occur and AIPs spread. The proposed project should thus manage disturbances and AIPs along the proposed access road along with a 30 m buffer. This will decrease the potential for AIPs to become a significant threat to the local habitat which could potentially alter the local avian assemblage;
- Bush encroachment should be managed to avoid a further cumulative loss of favourable habitat for avian communities in the area, which can be achieved through limiting disturbances during the maintenance phase;
- No dumping of waste should take place during maintenance activities, especially not within any sensitive habitat; and
- Vehicles should be restricted from travelling in sensitive environments and should maintain a strict adherence to speed limits. Where possible, monitoring and maintenance should occur on foot.



## 6 CONCLUSION

Scientific Terrestrial Services (STS) was appointed to re-assess the avifaunal component of the proposed Hyperion Solar Development and to update and/or add to the results of the previous studies. This follows from a change in the proposed layout of 2019 and hence, it was deemed necessary by the proponent that the layout changes be checked to ensure any changes in impacts on biodiversity is accurately portrayed and mitigated.

The high-level walk through by STS confirmed Simon Todd's descriptions of avifaunal community associated with the focus area, with the habitat not experiencing any significant changes since the previous assessment was undertaken. However, the SCC indicated by Simon Todd do differ slightly from those described by STS, largely in terms of fringe species and in no way impacts on the sensitivity ratings or impact assessment of the studies.

In terms of development implications, the loss of habitat from the proposed development will not result in significant impacts on the avifaunal community within the focus and no impacts on a National or Regional scale are anticipated to permeate from the Thermal Plant.



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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.



**Government Notice 598 Alien and Invasive Species Regulations (2014), including the Government Notice 1003 Alien Invasive Species List as published in the Government Gazette No. 43726 of 2020, 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. This act in terms of alien and invasive species aims to:

- Prevent the unauthorised 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 NEMBA 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, 2014):

- **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.

**GDARD Requirements for Biodiversity Assessments Version 3 (GDARD, 2014b).**

The biodiversity assessment must comply with the minimum requirements as stipulated by GDARD Version 3 of 2014 and must contain the following information:

- A location and description of the application site and proposed activities;
- Photographic record and description of the site characteristics and inventories of the faunal and floral species observed on site, with special mention to Red Listed species;
- Sensitivity map displaying all sensitive areas and associated buffers as listed in the Sensitivity Mapping Rules for Biodiversity Assessments section of GDARD V3 (2014); and
- A list of recommendations and mitigation measures to reduce the potential environmental impacts that the proposed development might have on the terrestrial ecology associated with the site.



## **The National Forest Act, 1998 (act 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.

## **Northern Cape Provincial Spatial Development Framework (NCPSDF, 2019)**

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

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

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

Restricted activities involving specially protected plants:

- 49(1) No person may, without a permit –
- (a) Pick;
  - (b) Import;



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

A specimen of a specially protected plant

Restricted activities involving protected plants.

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

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

A specimen of a protected plant.





## **Indemnity and Terms of use of this Report**

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

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## APPENDIX B: Impact Assessment Methodology

Impact methodology as provided by the client:

**Impacts Table:**

<b>Nature:</b>		
	<b>Without mitigation</b>	<b>With mitigation</b>
<b>Extent</b>		
<b>Duration</b>		
<b>Magnitude</b>		
<b>Probability</b>		
<b>Significance</b>		
<b>Status (positive or negative)</b>		
<b>Reversibility</b>		
<b>Irreplaceable loss of resources?</b>		
<b>Can impacts be mitigated?</b>		
<b>Mitigation:</b> ➤		
<b>Residual Impacts:</b> ➤		

**Cumulative Impacts Table:**

<b>Nature:</b>		
	<b>Overall impact of the proposed project considered in isolation</b>	<b>Cumulative impact of the project and other projects in the area</b>
<b>Extent</b>		
<b>Duration</b>		
<b>Magnitude</b>		
<b>Probability</b>		
<b>Significance</b>		
<b>Status (positive or negative)</b>		
<b>Reversibility</b>		
<b>Irreplaceable loss of resources?</b>		
<b>Can impacts be mitigated?</b>		
<b>Mitigation:</b> ➤		



Issues need to be assessed in terms of the following criteria:

- The **nature**, a description of what causes the effect, what will be affected, and how it will be affected;
- The **extent**, wherein it is indicated whether the impact will be local (limited to the immediate area or site of development), regional, national or international. A score of between 1 and 5 is assigned as appropriate (with a score of 1 being local (low) and a score of 5 being international (high));
- The **duration**, wherein it is indicated whether:
  - The lifetime of the impact will be of a very short duration (0–1 years) – assigned a score of 1;
  - The lifetime of the impact will be of a short duration (2-5 years) - assigned a score of 2;
  - Medium-term (5–15 years) – assigned a score of 3;
  - Long term (> 15 years) - assigned a score of 4;
  - Permanent - assigned a score of 5.
- The **magnitude**, quantified on a scale from 0-10, where a score is assigned:
  - 0 is small and will have no effect on the environment;
  - 2 is minor and will not result in an impact on processes;
  - 4 is low and will cause a slight impact on processes;
  - 6 is moderate and will result in processes continuing but in a modified way;
  - 8 is high (processes are altered to the extent that they temporarily cease);
  - 10 is very high and results in complete destruction of patterns and permanent cessation of processes.
- The **probability of occurrence**, which describes the likelihood of the impact actually occurring. Probability is estimated on a scale, and a score assigned:
  - Assigned a score of 1–5, where 1 is very improbable (probably will not happen);
  - Assigned a score of 2 is improbable (some possibility, but low likelihood);
  - Assigned a score of 3 is probable (distinct possibility);
  - Assigned a score of 4 is highly probable (most likely);
  - Assigned a score of 5 is definite (impact will occur regardless of any prevention measures).
- The **significance**, which is determined through a synthesis of the characteristics described above (refer formula below) and can be assessed as low, medium or high;
  - The **status**, which is described as either positive, negative or neutral;
  - The degree to which the impact can be reversed;
  - The degree to which the impact may cause irreplaceable loss of resources;
  - The degree to which the impact can be mitigated.

The **significance** is determined by combining the criteria in the following formula:

$S = (E+D+M) P$ ; where

S = Significance weighting.

E = Extent.

D = Duration.

M = Magnitude.

P = Probability.

The **significance weightings** for each potential impact are as follows:

- » **< 30 points:** Low (i.e. where this impact would not have a direct influence on the decision to develop in the area);
- » **30-60 points:** Medium (i.e. where the impact could influence the decision to develop in the area unless it is effectively mitigated);
- » **> 60 points:** High (i.e. where the impact must have an influence on the decision process to develop in the area).



**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>6</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>6</sup> Mitigation measures should address both positive and negative impacts



## APPENDIX C: Vegetation Types

### Kathu Bushveld (SVk 12)



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

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

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

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

\*(d) is for dominant.



## APPENDIX D: Specialist information

### DETAILS, EXPERTISE AND CURRICULUM VITAE OF SPECIALISTS

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

Daryl van der Merwe	MSc (Conservation Biology) (University of Cape Town)
Chris Hooton	BTech Nature Conservation (Tshwane University of Technology)
Nelanie Cloete	MSc (Environmental Management) (University of Johannesburg)

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

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

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

I, Daryl van der Merwe, 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, Christopher Hooton, declare that -

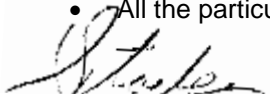
- I act as the **independent specialist (reviewer)** in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise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



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Signature of the Specialist

I, Stephen van Staden, 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 Project Manager





**SAS ENVIRONMENTAL GROUP OF COMPANIES –  
SPECIALIST CONSULTANT INFORMATION  
CURRICULUM VITAE OF DARYL VAN DER MERWE**

### PERSONAL DETAILS

Position in Company	Junior Field Biologist
Joined SAS Environmental Group of Companies	2019

### MEMBERSHIP IN PROFESSIONAL SOCIETIES

Member of the South African Environmental Observation Network (SAEON)

### EDUCATION

#### Qualifications

MSc (Conservation Biology) (University of Cape Town)	2019
BSc (Hons) Plant Science (Ecology) (University of Pretoria)	2014
BSc Environmental Science (University of Pretoria)	2013

### AREAS OF WORK EXPERIENCE

**South Africa** – Gauteng, Mpumalanga, North West, Free State, Limpopo, Western Cape and Northern Cape

### KEY SPECIALIST DISCIPLINES

#### Biodiversity Assessments

- Faunal Assessments
- Alien and Invasive Control Plan (AICP)
- Ecological Scan
- Terrestrial Monitoring
- Protected Tree and Floral Marking and Reporting

#### Legislative Requirements, Processes and Assessments

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







## SAS ENVIRONMENTAL GROUP OF COMPANIES – SPECIALIST CONSULTANT INFORMATION

### CURRICULUM VITAE OF **CHRISTOPHER HOOTON**

#### PERSONAL DETAILS

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

#### EDUCATION

##### Qualifications

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

##### Short Courses

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

#### AREAS OF WORK EXPERIENCE

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

#### KEY SPECIALIST DISCIPLINES

##### Biodiversity Assessments

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

##### Freshwater Assessments

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





## SAS ENVIRONMENTAL GROUP OF COMPANIES – SPECIALIST CONSULTANT INFORMATION

### CURRICULUM VITAE OF STEPHEN VAN STADEN

#### PERSONAL DETAILS

Position in Company	Group CEO, Water Resource Discipline Lead, Managing Member, Ecologist, Aquatic Ecologist
Joined SAS Environmental Group of Companies	2003 (year of establishment)

#### 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 the Gauteng Wetland Forum  
Member of International Association of Impact Assessors (IAIA) South Africa;  
Member of the Land Rehabilitation Society of South Africa (LaRSSA)

#### 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

##### Short Courses

Integrated Water Resource Management, the National Water Act, and Water Use Authorisations, focusing on WULAs and IWWMPs	2017
Tools for Wetland Assessment (Rhodes University)	2017
Legal liability training course (Legricon Pty Ltd)	2018
Hazard identification and risk assessment training course (Legricon Pty Ltd)	2018
Wetland Management: Introduction and Delineation (WLID1502S) (University of the Free State)	2018
Hydropedology and Wetland Functioning (TerraSoil Science and Water Business Academy)	2018

#### AREAS 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



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**DEVELOPMENT SECTORS OF EXPERIENCE**


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1. Mining: Coal, chrome, Platinum Group Metals (PGMs), mineral sands, gold, phosphate, river sand, clay, fluorspar
2. Linear developments (energy transmission, telecommunication, pipelines, roads)
3. Minerals beneficiation
4. Renewable energy (Hydro, wind and solar)
5. Commercial development
6. Residential development
7. Agriculture
8. Industrial/chemical

**KEY SPECIALIST DISCIPLINES**


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**Legislative Requirements, Processes and Assessments**

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

**Freshwater Assessments**

- Freshwater (wetland / riparian) Delineation and Assessment
- Freshwater Eco Service and Status Determination
- Rehabilitation Assessment / Planning
- Maintenance and Management Plans
- Plant Species and Landscape Plans
- Freshwater Offset Plans
- Hydropedological Assessment
- Pit Closure Analysis

**Aquatic Ecological Assessment and Water Quality Studies**

- Habitat Assessment Indices (IHAS, HRC, IHIA & RHAM)
- Aquatic Macro-Invertebrates (SASS5 & MIRAI)
- Fish Assemblage Integrity Index (FRAI)
- Fish Health Assessments
- Riparian Vegetation Integrity (VEGRAI)
- Toxicological Analysis
- Water quality Monitoring
- Screening Test
- Riverine Rehabilitation Plans

**Biodiversity Assessments**

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

**Soil and Land Capability Assessment**

- Soil and Land Capability Assessment
- Hydropedological Assessment

**Visual Impact Assessment**

- Visual Baseline and Impact Assessments
- Visual Impact Peer Review Assessments

