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BIODIVERSITY REPORT AS PART OF THE ENVIRONMENTAL IMPACT ASSESSMENT AND AUTHORISATION PROCESS FOR 75 MW 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

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EXECUTIVE SUMMARY

In 2018 and 2019, Simon Todd from 3 Foxes Biodiversity Solutions undertook a Fauna & Flora 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 biodiversity 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 faunal and floral communities associated with the focus area, with the habitat not experiencing any significant changes since the previous assessment was undertaken. However, Simon Todd describes the site as being of low sensitivity, whereas STS would recommend an intermediate sensitivity classification.

In terms of development implications, the loss of habitat from the proposed development will not result in significant impacts on floral and faunal communities given that biodiversity outside of the direct footprint is preserved through strict adherence to mitigation measures although cumulative habitat loss in the greater region area must be considered.

TABLE OF CONTENTS

EXECUTIVE SUMMARY ..... **i**
TABLE OF CONTENTS ..... **ii**
LIST OF FIGURES ..... **iii**
LIST OF TABLES ..... **iii**
LIST OF ACRONYMS ..... **iv**
GLOSSARY OF TERMS ..... **v**
1 INTRODUCTION **1**
1.1 Project Scope 6
1.2 Assumptions and Limitations 6
1.3 Legislative Requirements 7
2 ASSESSMENT APPROACH **8**
2.1 General Approach 8
3 RESULTS OF THE DESKTOP ANALYSIS **8**
3.1 Conservation Characteristics of the focus area based on National and Provincial Datasets 8
4 SPECIALIST STATEMENT **18**
4.1 Verification of Previous Studies and Summary of Site Results 18
4.2 Verification of SCC on site 19
5 IMPACTS AND PROPOSED MANAGEMENT MEASURES **21**
6 Floral Impact Assessment **22**
6.1 Floral Impact Assessment Results 22
6.2 Possible Cumulative Impacts 25
7 Faunal Impact Assessment **27**
7.1 Faunal Impact Assessment Results 27
7.2 Possible Cumulative Impacts 30
8 CONCLUSION **32**
REFERENCES **33**
APPENDIX A: Legislative Requirements and Indemnity **36**
APPENDIX B: Impact Assessment Methodology **41**
APPENDIX C: Vegetation Types **44**
APPENDIX D: Specialist information **45**

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: Northern Cape Critical Biodiversity areas associated with the focus area and the associated infrastructure. 15
Figure 8: Centres of endemism of the Northern Cape Province: the focus area indicated by the yellow circle (NPSDF, 2012). 16
Figure 9: Development corridors of the Northern Cape Province: the focus area is indicated by the yellow circle (NPSDF, 2012). 17
Figure 10: Representative photos of the vegetation on site. 19

LIST OF TABLES

Table 1: Summary of the terrestrial conservation characteristics for the focus area (Quarter Degree Square (QDS) 2723CA). 9
Table 2: Activities and Aspects likely to impact on the faunal and floral resources of the focus area. 21
Table 3: Impact on the floral habitat, diversity, and SCC resulting from the proposed Access Road 23
Table 4: Impact on the floral habitat, diversity, and SCC resulting from the proposed PV Solar Plant and associated infrastructure. 24
Table 5: Cumulative impacts associated with the floral habitat, diversity and SCC arising from the proposed development activities. 26
Table 6: Impact on the faunal habitat, diversity, and SCC resulting from the proposed Access Road 28
Table 7: Impact on the faunal habitat, diversity, and SCC resulting from the proposed PV Solar Plant and associated infrastructure. 29
Table 8: Cumulative impacts associated with the faunal habitat, diversity and SCC arising from the proposed development activities 31

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	Ecological Support Area
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].

Alien species (syn. exotic species; non-native species)	A species that is present in a region outside its natural range due to human actions (intentional or accidental) that have enabled it to overcome biogeographic barriers.
Biological diversity or Biodiversity (as per the definition in NEMBA)	The variability among living organisms from all sources including, terrestrial, marine, and other aquatic ecosystems and the ecological complexes of which they are part and includes diversity within species, between species, and of ecosystems.
Biome - as per Mucina and Rutherford (2006); after Low and Rebelo (1998).	A broad ecological spatial unit representing major life zones of large natural areas – defined mainly by vegetation structure, climate, and major large-scale disturbance factors (such as fires).
Bioregion (as per the definition in NEMBA)	A geographic region which has in terms of section 40(1) been determined as a bioregion for the purposes of this Act;
Bush encroachment	The increase in density of (usually native) woody plants so that the natural equilibrium of the woody plant layer (trees and shrubs) and herbaceous (grass and forb) layer densities is shifted in favour of trees and shrubs.
Critical Biodiversity Area (CBA)	A CBA is an area considered important for the survival of threatened species and includes valuable ecosystems such as wetlands, untransformed vegetation, and ridges.
Corridor	A dispersal route or a physical connection of suitable habitats linking previously unconnected regions.
Disturbance	A temporal change, either regular or irregular (uncertain), in the environmental conditions that can trigger population fluctuations and secondary succession. Disturbance is an important driver of biological invasions.
Ecoregion	An ecoregion is a "recurring pattern of ecosystems associated with characteristic combinations of soil and landform that characterise that region".
Endangered	Organisms in danger of extinction if causal factors continue to operate.
Endemic species	Species that are only found within a pre-defined area. There can therefore be sub-continental (e.g., southern Africa), national (South Africa), provincial, regional, or even within a particular mountain range.
Ecological Support Area (ESA)	An ESA provides connectivity and important ecological processes between CBAs and is therefore important in terms of habitat conservation.
Habitat (as per the definition in NEMBA)	A place where a species or ecological community naturally occurs.
Important Bird and Biodiversity Area (IBA)	The IBA Programme identifies and works to conserve a network of sites critical for the long-term survival of bird species that: are globally threatened, have a restricted range, are restricted to specific biomes/vegetation types or sites that have significant populations.
Indigenous vegetation (as per the definition in NEMA)	Vegetation occurring naturally within a defined area, regardless of the level of alien infestation and where the topsoil has not been lawfully disturbed during the preceding ten years.
Integrity (ecological)	The integrity of an ecosystem refers to its functional completeness, including its components (species) its patterns (distribution) and its processes.
Invasive species	Alien species that sustain self-replacing populations over several life cycles, produce reproductive offspring, often in very large numbers at considerable distances from the parent and/or site of introduction, and have the potential to spread over long distances.
Listed alien species	All alien species that are regulated in South Africa under the National Environmental Management: Biodiversity Act, 2004 (Act 10 of 2004), Alien and Invasive Species (A&IS) Regulations, 2014.
Least Threatened	Least threatened ecosystems are still largely intact.

Native species (syn. indigenous species)	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).
Red Data listed (RDL) species	According to the Red List of South African plants (http://redlist.sanbi.org/) and the International Union for Conservation of Nature (IUCN), organisms that fall into the Extinct in the Wild (EW), critically endangered (CR), Endangered (EN), Vulnerable (VU) categories of ecological status.
Species of Conservation Concern (SCC)	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. **Specifically related to flora**: A list of floral SCC for the Northern Cape is available under Schedule 2 of the Northern Cape Nature Conservation Act (Act No. 9 of 2009), comprising SANBI Red Data Listed species. Additional datasets and sources that were also taken into consideration included: - The National Environmental Management: Biodiversity Act (Act No.10 of 2004) (NEMBA) Threatened or Protected Species (TOPS) list (NEMBA, Notice 389 of 2013); - The Botanical Database of Southern Africa (BODATSA) to obtain plant names and floristic details (http://posa.sanbi.org); and - The List of Protected Tree Species (GN 809 of 2014) under the National Forest Act (Act 84 of 1998). **Specifically related to fauna**: A list of faunal SCC as identified by the Threatened or Protected Species list (2007) is available for the Northern Cape. Additional datasets and sources that were also taken into consideration included: - 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; - The Atlas and Red List of the Reptiles of South Africa, Lesotho, and Swaziland.

1 INTRODUCTION

In 2018 and 2019, Simon Todd from 3 Foxes Biodiversity Solutions undertook a Fauna & Flora Specialist assessment as part of the Environmental Impact Assessment (EIA) process for the proposed development of a solar facility and associated infrastructure[1]; 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 biodiversity 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 Gaetses 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 facility;
- 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, warehouses and workshops.

[1] 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.

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

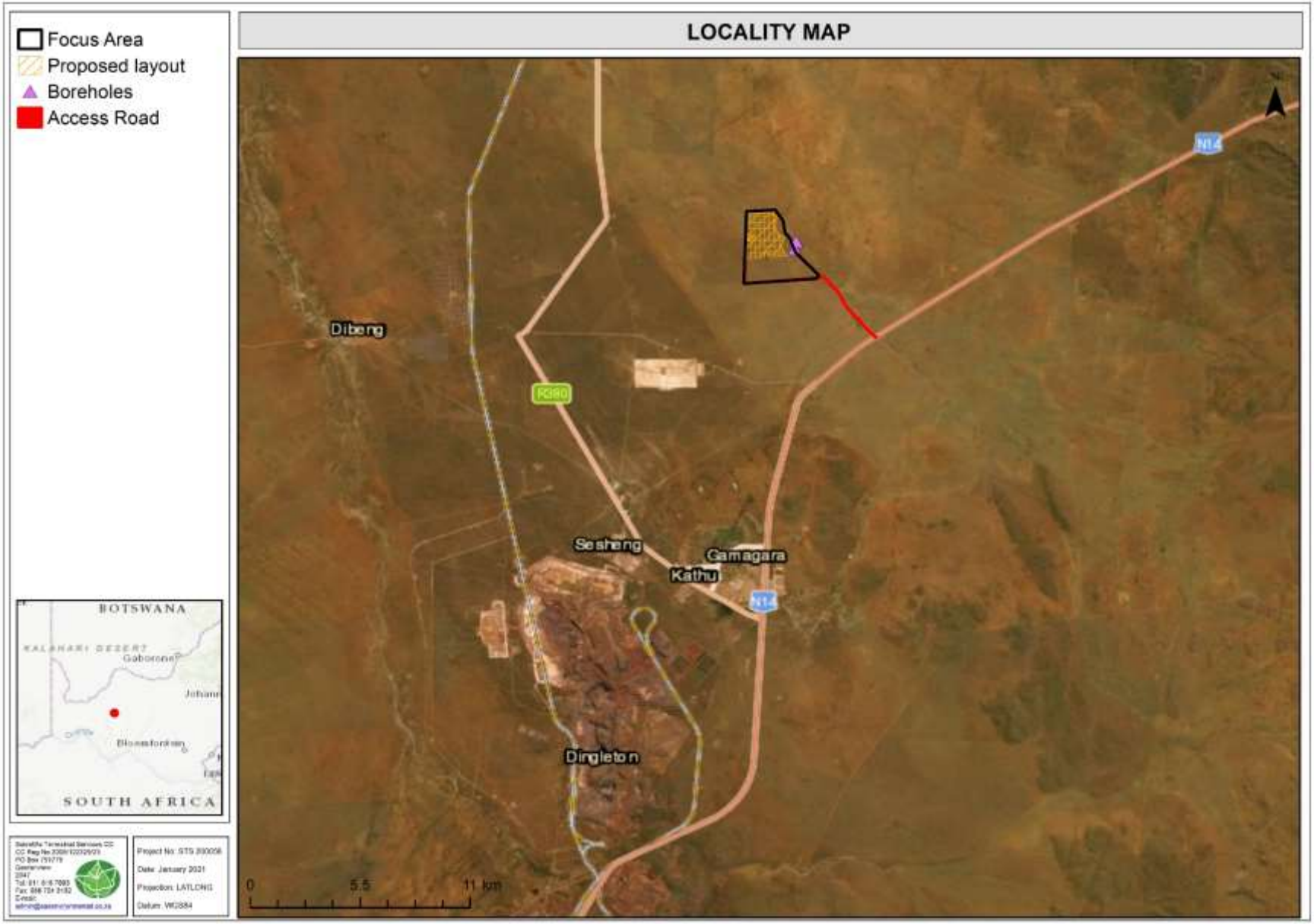

Figure 1: Digital satellite image depicting the focus area in relation to the surrounding areas.

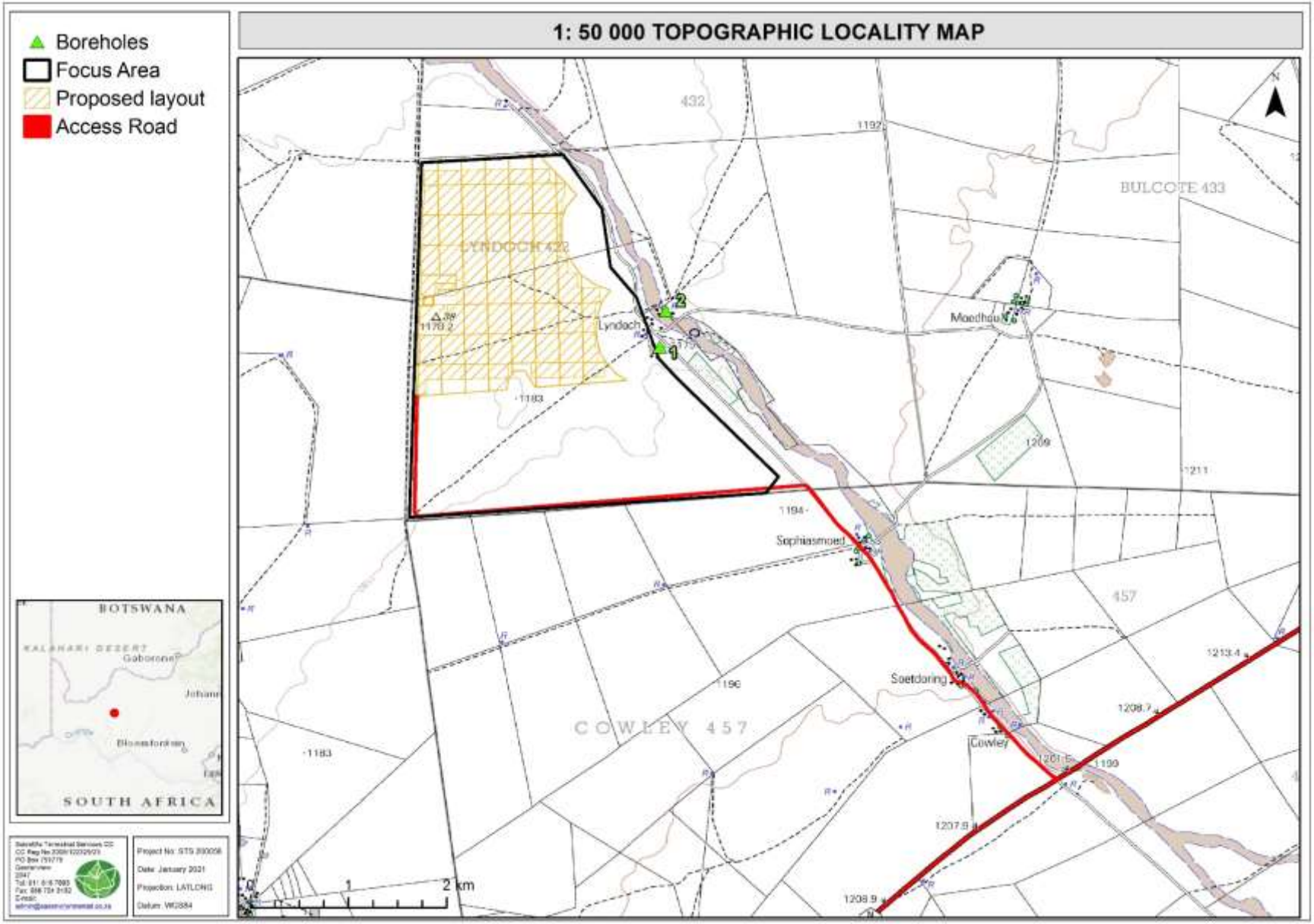

Figure 2: Location of the focus area depicted on a 1:50 000 topographical map in relation to the surrounding area.

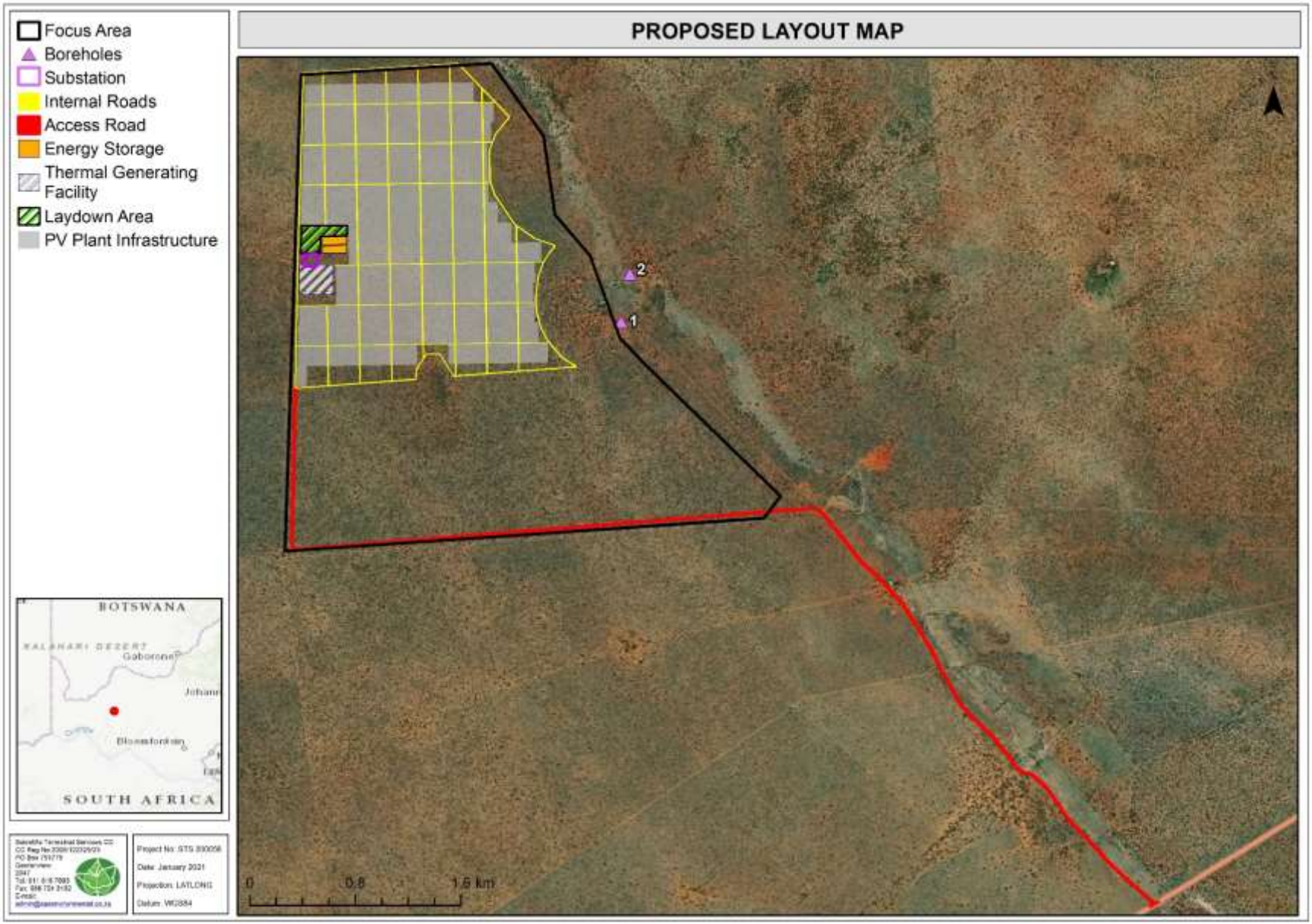

Figure 3: The proposed infrastructure layout within the focus area.

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/), 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 biodiversity of the focus area, including the presence or potential for faunal and floral Species of Conservation Concern (SCC); and
- To identify potential impacts associated with the proposed Thermal Generating Facility.

1.2 Assumptions and Limitations

The following assumptions and limitations apply to this report:

- The terrestrial ecological desktop assessment is confined to the focus area and did not include the neighbouring and adjacent properties, although the sensitivity of surrounding areas is included on the respective background maps;
- STS did not undertake any site assessments for the solar farm, however a high-level walk through was undertaken on the 28th 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 on the 21st of July 2018 (winter) as well as on the 29th, 30th and 31st of January 2019 and then the 26th of February (summer). The high-level walkthrough undertaken by STS occurred on the 28th of October 2020 (spring). With such a such seasonal variation on site assessments, it is expected that most floral and faunal

communities were accurately assessed and considered, with all relevant online sources and background information utilised to improve on the overall understanding of the subject property's ecology; and

- Sampling, by its nature, means that not all areas are assessed and thus not all faunal and floral individuals 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[2];
- 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.

[2] 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 not 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).

<table>
<tr><th colspan="2">CONSERVATION DETAILS PERTAINING TO THE AREA OF INTEREST (VARIOUS DATABASES)</th><th colspan="7">DETAILS OF THE AREA OF INTEREST IN TERMS OF MUCINA & RUTHERFORD (2006, 2018, 2012)</th></tr>
<tr><td rowspan="4">NBA (2018):

1) Ecosystem Threat Status
2) Ecosystem Protection Level</td><td rowspan="4">NBA 2018 dataset (Figure 4):
The focus area is located within the Kathu Bushveld which is considered a Least Concern ecosystem and is currently Poorly Protected.

Ecosystem types are categorised as “not protected”, “poorly protected”, “moderately protected” and “well protected” based on the proportion of each ecosystem type that occurs within a protected area recognised in the National Environmental Management: Protected Areas Act, 2003 (Act No. 57 of 2003) (NEMPAA), and compared with the biodiversity target for that ecosystem type.

The ecosystem protection level status is assigned using the following criteria:
i. If an ecosystem type has more than 100% of its biodiversity target protected in a formal protected area either a or b, it is classified as well protected,
ii. When less than 100% of the biodiversity target is met in formal a or b protected areas it is classified it as moderately protected,
iii. If less than 50% of the biodiversity target is met, it is classified it as poorly protected, and
iv. If less than 5% it is hardly protected.</td><td>Biome</td><td colspan="5">The focus area is situated within the Savanna Biome.</td></tr>
<tr><td>Bioregion</td><td colspan="5">The focus area is located within the Eastern Kalahari Bushveld Bioregion.</td></tr>
<tr><td>Vegetation Type</td><td colspan="5">The focus area is situated within the Kathu Bushveld.</td></tr>
<tr><td>Climate</td><td colspan="5">Summer and autumn rainfall with very dry winters.</td></tr>
<tr><td></td><td></td><td>MAP* (mm)</td><td>MAT* (°C)</td><td>MFD* (Days)</td><td>MAPE* (mm)</td><td>MASMS* (%)</td></tr>
<tr><td></td><td></td><td>300</td><td>18.5</td><td>27</td><td>2 883</td><td>85</td></tr>
<tr><td>National Threatened Ecosystems[3] (2011)</td><td>The focus area is located within an ecosystem that is currently considered to be Least Concern. Least Concern ecosystems have not experienced a significant loss of natural habitat or deterioration in condition.</td><td>Altitude (m)</td><td colspan="5">960 –1 300</td></tr>
<tr><td>IBA (2015)</td><td>The focus area is not located within 10 km of an Important Bird and Biodiversity Area.</td><td>Distribution</td><td colspan="5">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.</td></tr>
<tr><td colspan="2"></td><td>Conservation</td><td colspan="5">Least threatened. Target 16%. None conserved in statutory conservation areas. More than 1% already transformed, including the iron ore mining locality at Sishen, one of the biggest open-cast mines in the world. Erosion is very low.</td></tr>
<tr><td colspan="2"></td><td>Geology & Soils</td><td colspan="5">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.</td></tr>
</table>

[3] 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.

SAPAD (2020, Q2); SACAD (2020, Q2); NPAES (2009). Figure 5	The South African Protected Areas Database (SAPAD, 2020 Q2)[4], indicate that the **Khathu Forest Nature Reserve** is located within 10 km from the focus area. The South African Conservation Areas Database (SACAD, 2020 Q2)[5] 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.	**Vegetation & landscape features**	Medium-tall tree layer with *Vachellia erioloba* in places, but mostly open and including *Boscia albitrunca* as the prominent trees. Shrub layer generally most important with, for example, *Senegalia mellifera*, *Diospyros lycioides* and *Lycium hirsutum*. Grass layer is variable in cover.

NATIONAL WEB BASED ENVIRONMENTAL SCREENING TOOL (2020)	
The screening tool is intended to allow for pre-screening of sensitivities in the landscape to be assessed within the EA process. This assists with implementing the mitigation hierarchy by allowing developers to adjust their proposed development footprint to avoid sensitive areas	
Animal species theme	For the animal species theme, the entire focus area is considered to have a **medium sensitivity**. The triggered sensitivity is due to the presence of *Sagittarius serpentarius* (Secretary bird).
Plant species theme	For the plant species theme, the entire focus area is considered to have a **low sensitivity**.
Terrestrial biodiversity theme	For the terrestrial biodiversity theme, the focus area is considered to have a **very high sensitivity**. The triggered sensitivity features include an Ecological Support Areas (ESA).
STRATEGIC WATER SOURCE AREAS FOR SURFACE WATER (2017)	
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.	
Name & Criteria	The focus area is **not** within 10 km of a Strategic Water Source Area.

[4] **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).

[5] **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)
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. According to the Northern Cape Critical Biodiversity Areas (2016) database, most of the focus area is located within areas categorised as **Other Natural Areas**, with small sections along the eastern boundary located within an **Ecological Support Area**. The Northern Cape Critical Biodiversity Areas (2016) database also includes the "**reasons**" 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). According to this Northern Cape CBA Reasons layer, the triggering biodiversity and ecological features include the below: - Kathu Bushveld - Conservation Areas - All natural wetlands and all natural rivers - Landscape Structural Elements.	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. 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 *et al.* 2019). 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.

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.

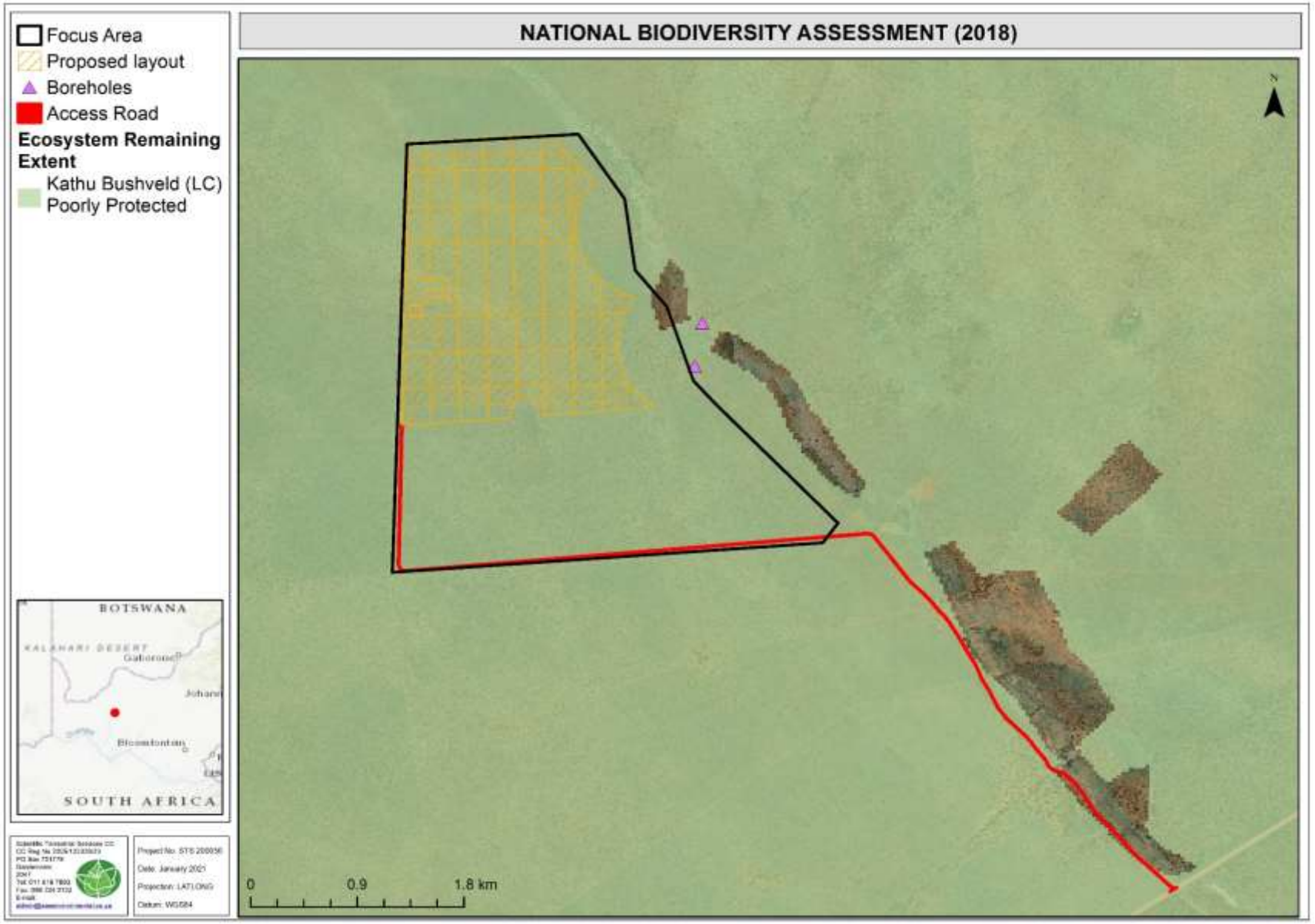

Figure 4: The remaining extent of the Kathu Bushveld (Least Concern), according to the National Biodiversity Assessment (NBA, 2018).

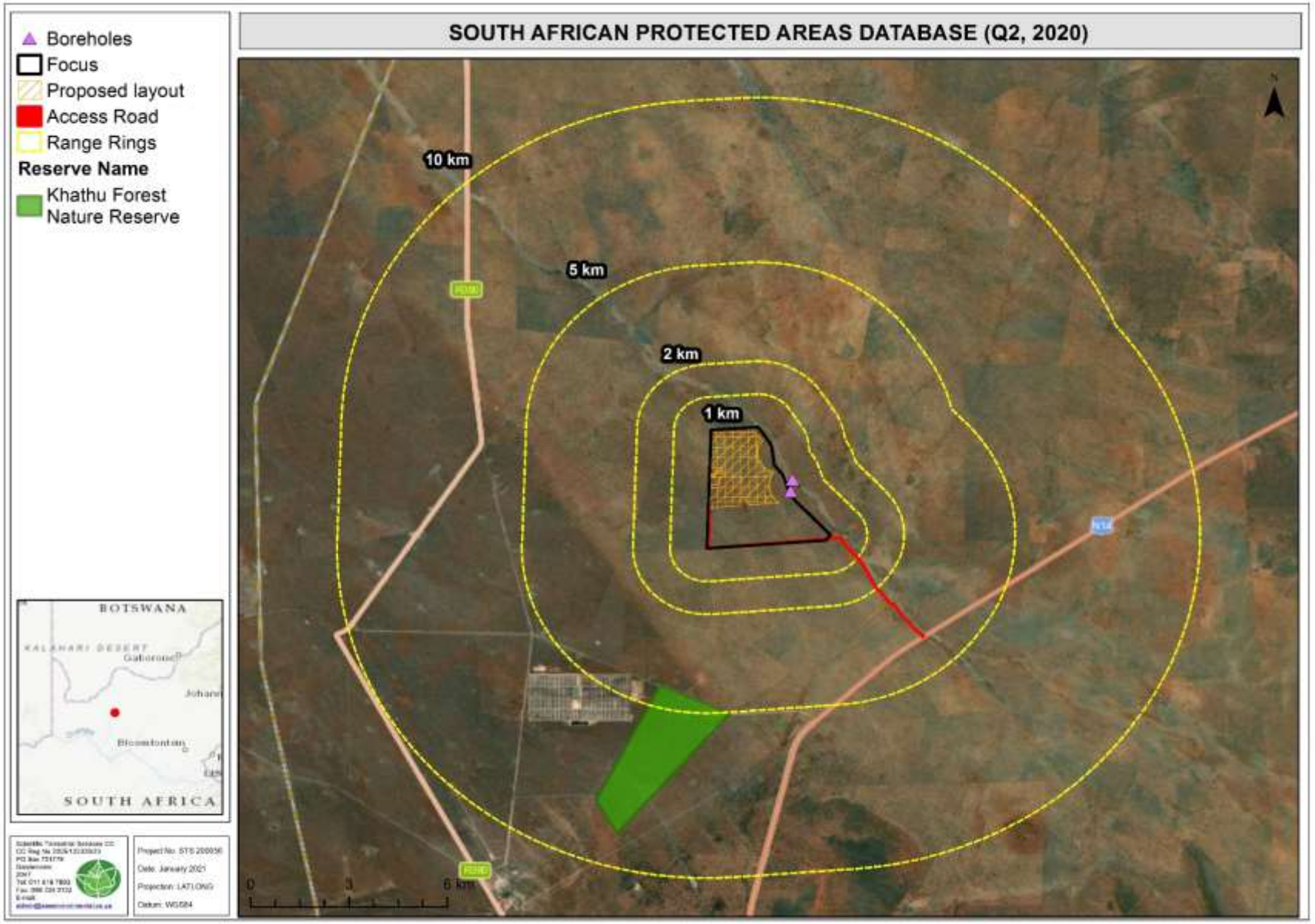

Figure 5: Protected areas within a 5 km and 10 km radius of the focus area, according to SAPAD (Q2, 2020).

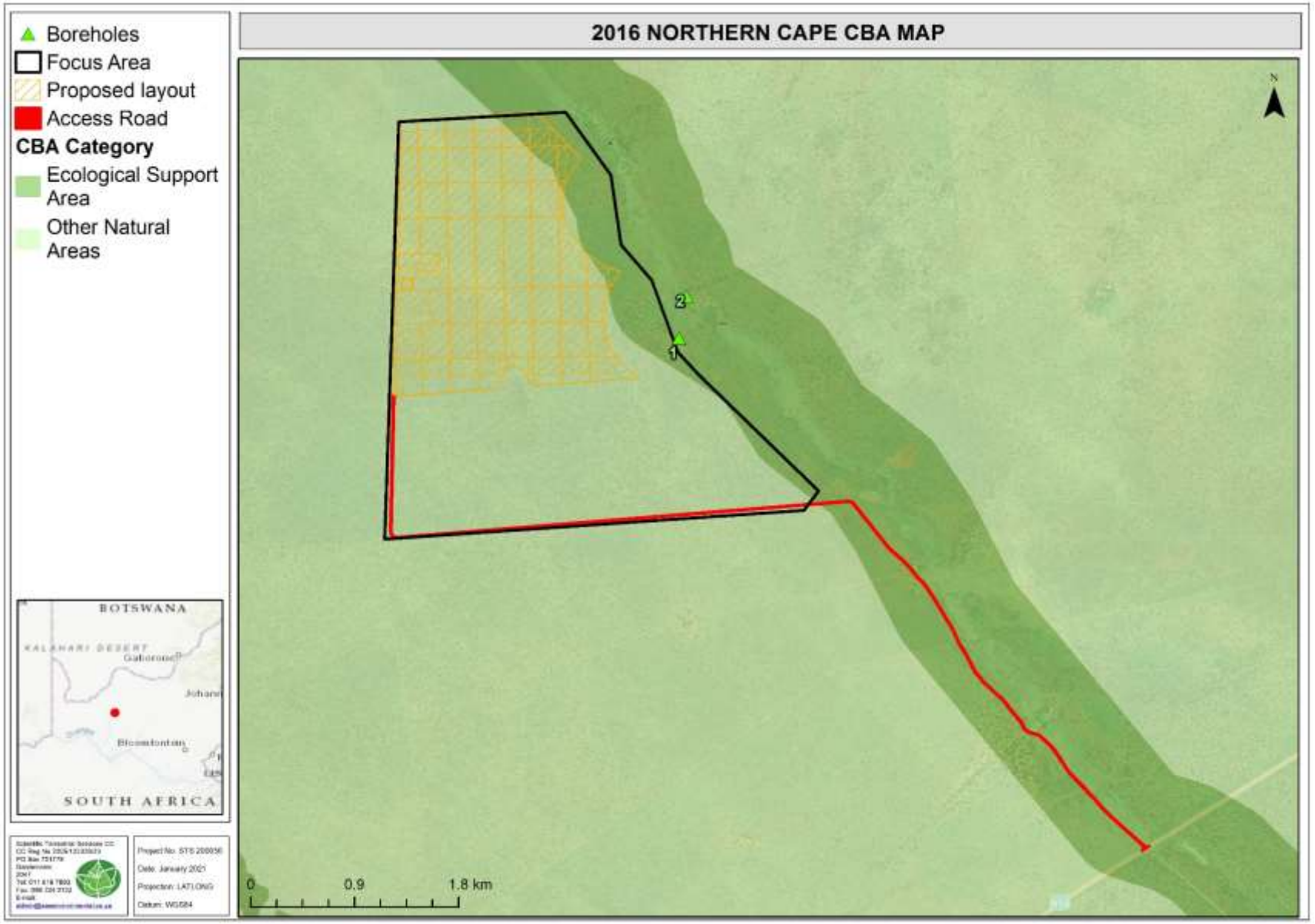

Figure 6: Northern Cape Critical Biodiversity areas associated with the focus area and the associated infrastructure.

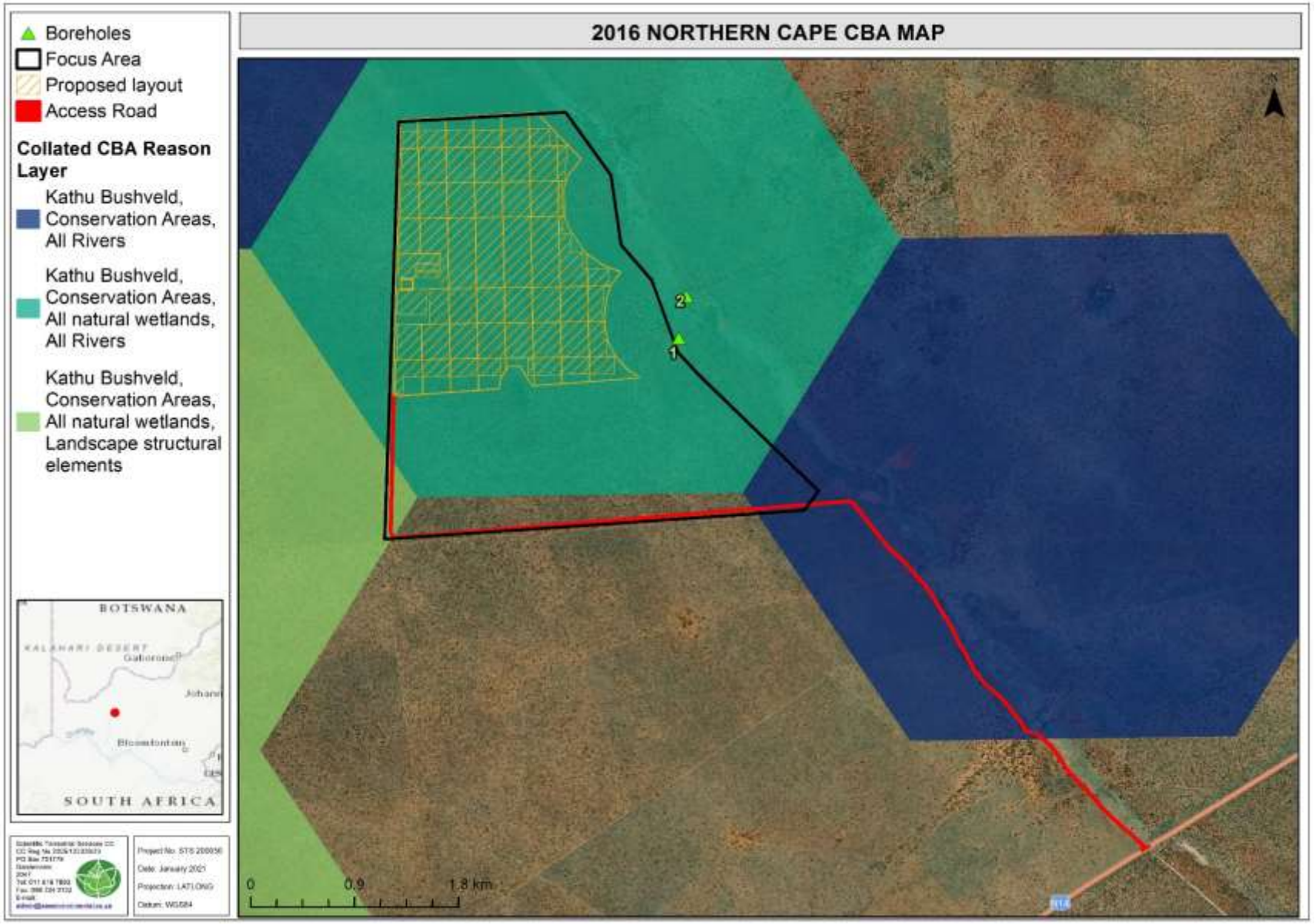

Figure 7: Northern Cape Critical Biodiversity areas associated with the focus area and the associated infrastructure.

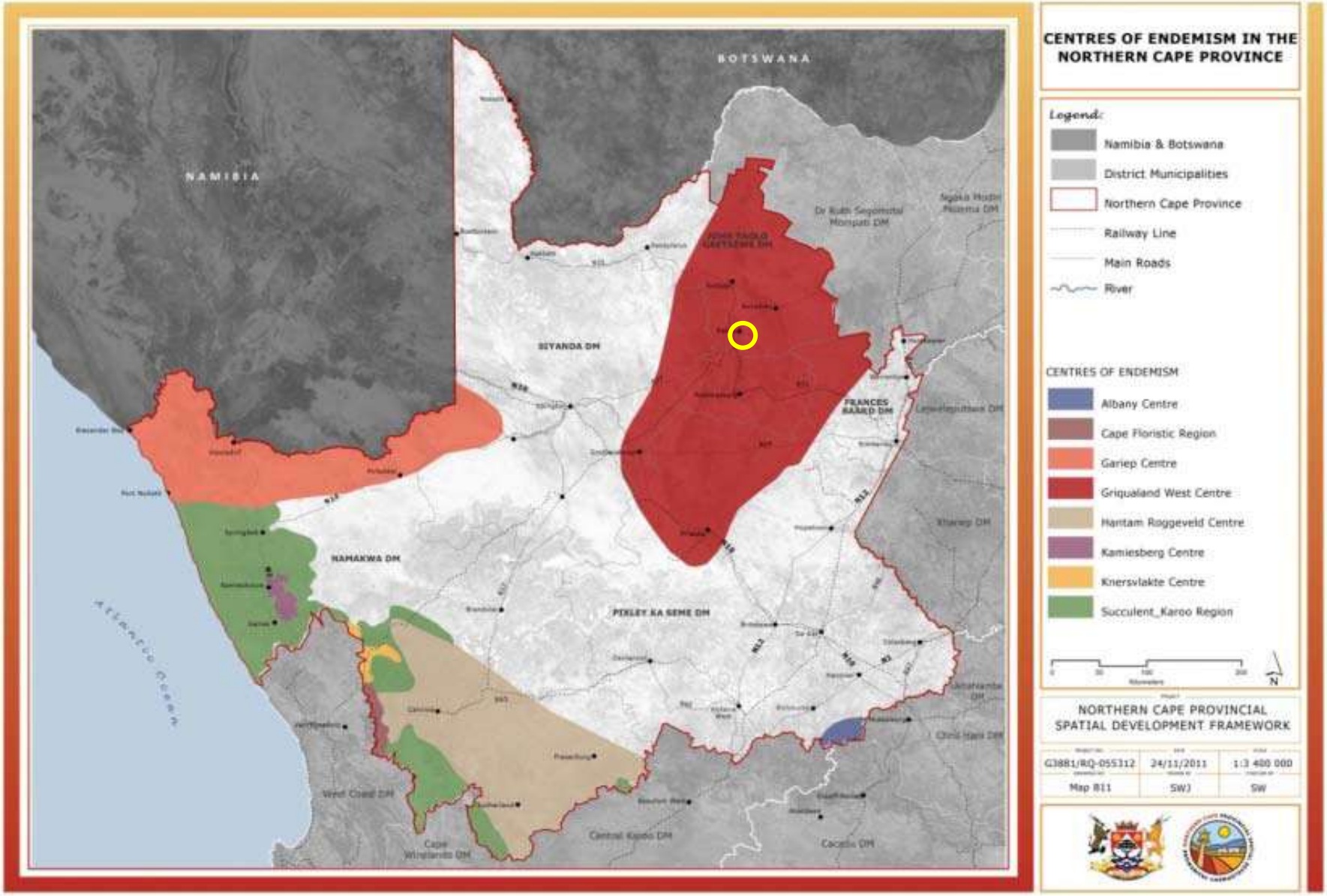

Figure 8: Centres of endemism of the Northern Cape Province: the focus area indicated by the yellow circle (NPSDF, 2012).

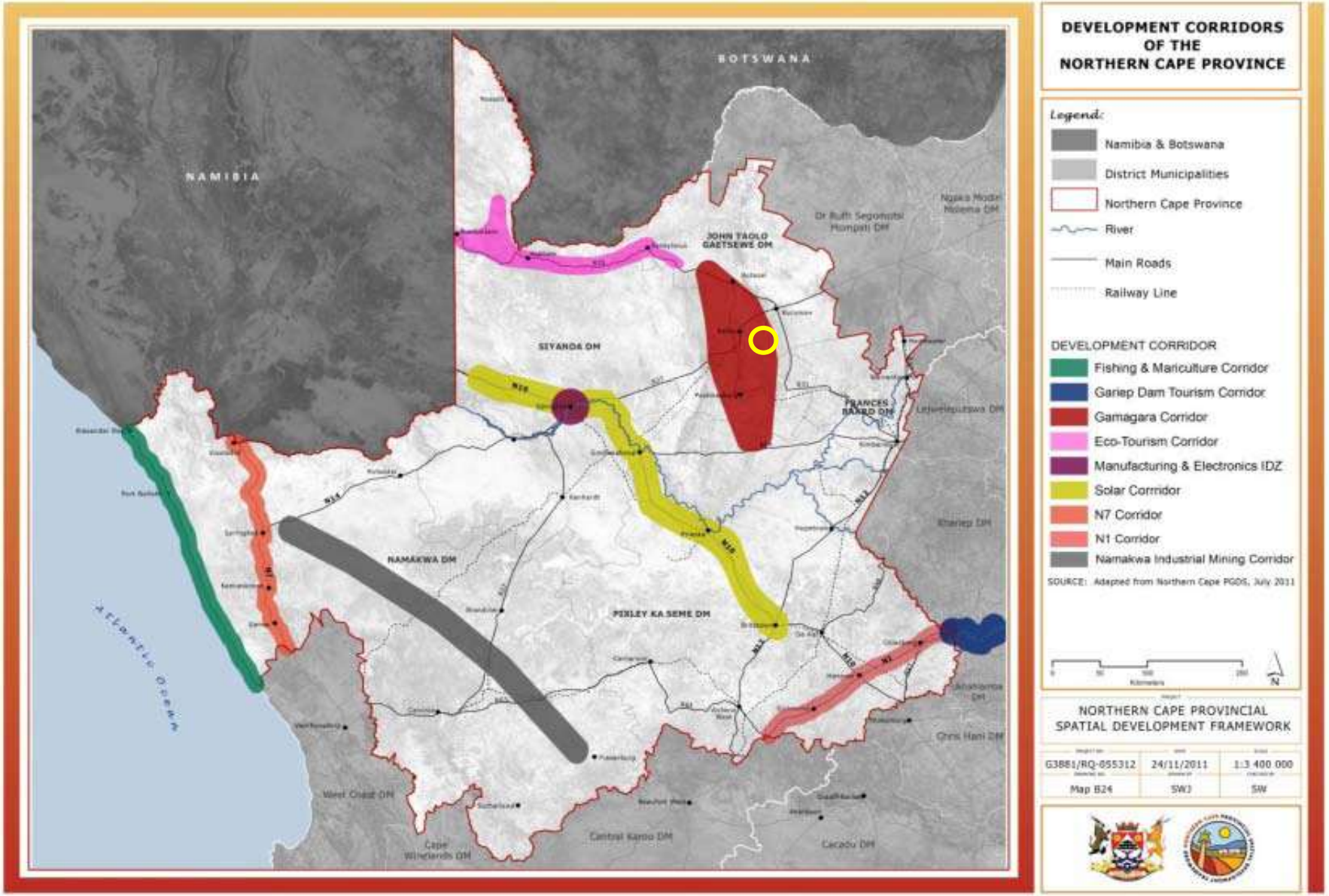

Figure 9: Development corridors of the Northern Cape Province: the focus area is indicated by the yellow circle (NPSDF, 2012).

4 SPECIALIST STATEMENT

The high-level walk through by STS confirmed Simon Todd's descriptions of faunal and floral communities associated with the focus area, with the habitat not experiencing any significant changes since the previous assessment was undertaken. However, Simon Todd describes the site to be of low sensitivity, whereas STS would recommend an intermediate sensitivity classification.

4.1 Verification of Previous Studies and Summary of Site Results

The previous assessment described the vegetation associated with the focus area comprising of Kathu Bushveld throughout. 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 type due to mining and solar PV development in the region.

The site has a moderate abundance of *Vachellia erioloba* with a high abundance of *Vachellia haematoxylon*, especially within the southern half of the current footprint. These tree species are protected under the National Forest Act, 1998, (Act 84 of 1998, as amended) (NFA). The vegetation can be described as tall open shrubland (Figure 10), where the dominant vegetation cover included tall shrubs such as *Gymnosporia buxifolia, Senegalia mellifera* subsp*. detinens, Tarchonanthus camphoratus, Vachellia haematoxylon* and *Vachellia hebeclada* subsp*. hebeclada.* Dwarf shrubs were also well represented, with forbs, graminoids and succulents less prominent. The overall floral diversity was intermediate to moderately high, depending on habitat conditions, with the northern section less diverse due to historic impacts (likely fire-related). As such, the loss of a relatively high number of floral species, including protected trees, cannot be avoided.

As noted in the previous studies, the focus area is likely to harbour an intermediate diversity of faunal species, with the habitat mostly being inhabited by commonly occurring species widespread within the vegetation types and region. No notable changes in habitat for fauna or the habitat suitability was observed during the high-level walk through. A such it is concluded that the results as per the previous studies for fauna are still valid and are an appropriate

reflection of the current faunal environment.

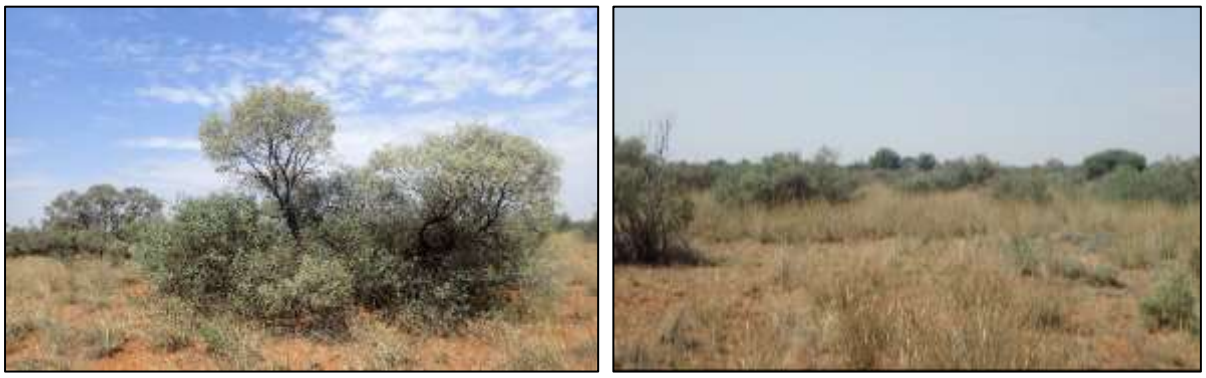

Figure 10: Representative photos of the vegetation / habitat on site.

4.2 Verification of SCC on site

SCC for this assessment includes species listed under Section 15(1) of the National Forest Act, 1998 (Act 84 of 1998) (NFA), the Threatened or Protected Species (TOPS) Regulations (GN 255 of 2015) under Section 56 of the National Environmental Management: Biodiversity Act, 2004 (Act 10 of 2004) (NEMBA), as well as species of provincial importance such as Specially Protected [Schedule 1, Section 49(1)] and Protected Species [Schedule 2, Section 50(1)] under the Northern Cape Nature Conservation Act, 2009 (Act No. 9 of 2009) (NCNCA).

The results of the floral and faunal SCC verification are summarised below:

- No nationally threatened floral SCC [i.e. Red Data Listed (RDL) plants], in terms of the NEMBA Section 56, were observed during the site assessment, nor were any species observed from the NEMBA Threatened or Protected Species (TOPS) list for the Northern Cape Province. Suitable habitat is however available for *Harpagophytum procumbens* (LC):
    - Before vegetation clearing commences, a thorough walkdown of the focus area must be conducted during the flowering period when species can be better detected (November - April) to establish the number of individuals that could be affected by the proposed development;
    - If species are found on site, permits from the Department of Environment, Forestry and Fisheries (DEFF) should be obtained to remove / destroy these species prior to any vegetation clearing taking place;
- No nationally or provincially threatened or protected faunal species were observed on site. Although having gone undetected during the field survey, there remains a probability that some of these species may occur within the focus area. 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;

- The previous studies indicated the low possibility that the focus area may be inhabited by species such as *Smutsia temminckii* (Ground Pangolin, VU) and *Atelerix frontalis* (South African Hedgehog, VU) however at low densities and that the development is unlikely to impact on these species;
- The proposed development is unlikely, as stated in the previous studies, to alter the biodiversity within the region or lead to the loss of species on a large scale. Habitat loss will be limited to that of the proposed footprint areas only;
- The focus area was associated with a high abundance of tree species protected under the NFA, including the Camel Thorn, *Vachellia erioloba* and the Gray Camel Thorn, *Vachellia haematoxylon*. The Shephard Tree, *Boscia albitrunca* was observed within the surrounding areas:
    - Section 15(1) of the NFA states that “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 license granted by the Minister or in terms of an exemption from the provisions of this subsection published by the Minister in the Gazette.” and that “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.”;
    - Permits from the Department of Environment, Forestry and Fisheries (DEFF) should be obtained before any vegetation clearing may take place; and
- Additional SCC for the focus area includes species not necessarily threatened but that are regionally important and thus protected under the NCNCA:
    - No Specially Protected [Schedule 1, Section 49(1)] species were recorded on site, however, seven (7) Protected Species [Schedule 2, Section 50(1)] were recorded within the focus area. An additional five (5) Protected Species were recorded in the surrounding areas;
    - Subject to the provision of section 52 of the NCNCA, 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;
    - Permits from Department of Environment and Nature Conservation (DENC) should be obtained before any vegetation clearing may take place.

5 IMPACTS AND PROPOSED MANAGEMENT MEASURES

The sections below provide the significance of perceived impacts on the floral and faunal ecology that will stem from the Thermal Generating Facility and the proposed Access Road (refer to Figure 3 for the proposed layout map). Because the remainder of the proposed infrastructure has not changed, the impact assessment outcomes of Simon Todd's assessment are still valid. The layout changes regarding the Thermal Facility and Access Road will thus be the only focus of the impact assessment.

An impact discussion and assessment of all potential pre-construction, construction, operational and maintenance phase impacts are provided in Section 5.1 and 5.2. All mitigatory measures required to minimise the perceived impacts are also presented in Section 5.1 and 5.2.

The table below indicates the perceived risks to floral and faunal species associated with the activities pertaining to the proposed Thermal Facility of 5 ha.

Table 2: Activities and Aspects likely to impact on the faunal and floral resources of the focus area.

ACTIVITIES AND ASPECTS REGISTER
Pre-Construction Phase
- Potential failure to relocate floral or faunal SCC to suitable habitat outside the development footprint. - **Impact**: Loss of faunal or floral SCC within the development footprint areas in the focus area.
- Potential failure to obtain permits for nationally and provincially protected species that must be removed during the construction phase. - **Impact**: Uncontrolled and / or unauthorised loss of floral SCC within the development footprint areas in the focus area.
Construction Phase
- Site clearing and the removal of vegetation. - **Impact:** Loss of faunal and floral habitat, diversity, and the loss of floral SCC.
- Potential failure to monitor the success of relocated floral SCC. - **Impact:** Loss of SCC individuals.
- Proliferation of AIP species **and especially indigenous bush encroaching species** (e.g., *Diospyrous lycoides*, *Senegalia mellifera* subsp. *detinens, Tarchonanthus camphoratus* and *Vachellia hebeclada* subsp. *hebeclada*) that colonise in areas of increased disturbances and poor veld conditions, outcompeting native species, including the further transformation of adjacent natural habitat. See images below. - **Impact:** Loss of favourable faunal and floral habitat outside of the direct development footprint, including a decrease in species diversity and a potential loss of faunal and floral SCC.



ACTIVITIES AND ASPECTS REGISTER
- 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. - **Impact:** Loss of preferred faunal and floral habitat, diversity and SCC as AIPs outcompete the indigenous plant species in these disturbed areas.
- Potential overexploitation through harvesting of floral SCC, the trapping and/or hunting of faunal species, including faunal SCC, beyond the direct footprint area. - **Impact:** Local loss of floral species, faunal abundance and diversity.
- Potentially poorly managed edge effects: • Ineffective rehabilitation of compacted areas, bare soils, or eroded areas leading to continual proliferation of AIP species and bush encroachers in disturbed areas and subsequent spread to surrounding natural areas altering the floral habitat; and • Compaction of soils outside of the focus area due to indiscriminate driving of construction vehicles through natural vegetation. - **Impact:** Loss of floral and faunal habitat, diversity, and SCC within the direct footprint of the proposed development. Loss of surrounding floral and faunal diversity and floral SCC through the displacement of indigenous flora by AIP species - especially in response to disturbance in natural areas.
- Possible increased fire frequency during construction. - **Impact:** Loss or alteration of floral and faunal habitat and species diversity.
- Dust generated during construction and operational activities accumulating on the surrounding floral individuals, altering the photosynthetic ability of plants[6] and potentially further decreasing optimal growing/re-establishing conditions. - **Impact:** Declines in plant functioning leading to loss of floral species and habitat for optimal growth.
Operational and Maintenance Phases
- Potential failure to monitor the success of relocated floral SCC. - **Impact:** Loss of SCC individuals.
- Increased introduction and proliferation of alien plant species and bush encroachers due to a lack of maintenance activities, or poorly implemented and monitored AIP Management programme, leading to ongoing displacement of natural vegetation outside of the footprint area. - **Impact:** Ongoing or permanent loss of faunal and floral habitat, diversity, and potential SCC.
- Increased human presence in the area as part of maintenance activities, potentially leading to Illegal harvesting/ collection of floral SCC, the persecution of fauna, or an increased risk of fire frequency impacting on floral and faunal communities in the surrounding natural habitat. - **Impact:** Loss of faunal and floral habitat, medicinal flora, and SCC, as well as overall species diversity within the local area.

5.1 Floral Impact Assessment

5.1.1 Floral Impact Assessment Results

The below tables indicate the perceived risks to the floral 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.

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

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 3) and that of the rest of the proposed activities (Table 4). Cumulative impacts are discussed in 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 floral communities along this section. 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 but seeing that the road follows along the property fence, habitat fragmentation is reduced and the overall impact to floral communities is lowered. Linear developments have the potential to act as a conduit of spread for AIPs and bush encroaching species, especially if disturbances along these developments are not regularly monitored. If no mitigation measures are implemented, the impact on floral 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 3: Impact on the floral habitat, diversity, and SCC resulting from the proposed Access Road.

Nature: *Impact on floral habitat and diversity, and floral SCC*

What causes the effect: Vegetation clearing associated with the construction of a new access road (approximately 5 km long with a width of 9 m).
What will be affected: Local loss of vegetation, protected trees and potentially occurring provincially protected and/or threatened floral individuals.
How will it be affected: Local loss of floral diversity associated with the focus area and potentially the clearance of protected and/or threatened flora. The current design allows for minimal habitat loss as a large section of the proposed Access Road includes an upgrade of an existing road. Habitat fragmentation is also reduced due to the road being aligned with the property fence.

	Without mitigation	**With mitigation**
Extent	Local (2)	Local (1)
Duration	Permanent (5)	Long-term (4)
Magnitude	Moderate (4)	Low (2)
Probability	Highly Probable (4)	Highly Probable (4)
Significance	**Medium (44)**	**Low (28)**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources?	Low	Low
Can impacts be mitigated?	Yes (to an extent)	

Mitigation:

- The construction and upgrade of the proposed Access Road must limit vegetation clearing to the approved footprint area and must prevent footprint creep that will result in the loss of additional floral species. 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 prevent effects of habitat fragmentation;
- 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 if the vegetation;
- Removal of alien invasive species should preferably commence during the pre-construction phase and continue throughout the construction, operational, maintenance phases. 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. Their propagules (any part of the plant that can result in the reproduction of the specimen) must not be allowed to spread to natural vegetation along the section of the Access Road that requires new construction. AIP control

is increasingly important along road construction as linear developments form corridors along which AIPs can more readily spread; ➢ Vehicles must remain along existing and/or approved roads during all phases of the project and must not be allowed to drive recklessly, impacting on adjacent natural vegetation; and ➢ Prior to construction activities, the proposed Access Road section that requires new construction must undergo a walkdown to identify and mark all potentially occurring floral SCC – i.e., NFA protected flora, nationally protected flora and threatened flora. These individuals, if present, must be marked for relocation (where feasible) or permit application for their clearance.
Residual Impacts: Even with extensive mitigation, residual impacts on the receiving floral ecological environment are deemed likely. The following points highlight the key residual impacts that have been identified: ➢ Permanent loss of and altered floral species diversity 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); ➢ The ongoing risk of loss of SCC/protected floral species with increased human presence; and ➢ Disturbed areas are not adequately rehabilitated, resulting in ongoing loss of floral habitat, species diversity and SCC/protected floral species.

The construction of the proposed Thermal Generating Facility is approximately five (5) ha. This will result in a local loss of floral diversity and habitat, including the loss of some individuals of protected tree species. The direct impact of the proposed Thermal Generating Facility on the floral ecology of the focus area, including impacts on floral SCC, will have a **medium** impact significance for the Kathu Bushveld Habitat unit if no mitigation measures are implemented. If mitigation measures are implemented, the impact significance for the focus area is anticipated to be **low**.

Table 4: Impact on the floral habitat, diversity, and SCC resulting from the proposed Thermal Generating Facility.

Nature: *Impact on floral habitat and diversity, and floral SCC*

What causes the effect: Vegetation clearing associated with the construction of the proposed Thermal Generating Facility – footprint area of approximately five (5) ha.
What will be affected: Local loss of Kathu Bushveld of intermediate sensitivity as well as a small number of individuals of NFA protected tree species. Potentially occurring provincially protected and nationally threatened flora could be affected.
How will it be affected: Vegetation clearance will result in the local loss of floral habitat and diversity. Floral SCC will be minimally affected by the Thermal Generating Facility when assessed apart from the entire Solar Farm footprint Thermal Generating Facility. No nationally threatened ecosystems will be lost, and no endemic species were recorded within the footprint.

	Without mitigation	**With mitigation**
Extent	Local (2)	Local (1)
Duration	Permanent (5)	Long-term (4)
Magnitude	Moderate (6)	Minor (2)
Probability	Highly Probable (4)	Probable (3)
Significance	**Medium (52)**	**Low (21)**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	Moderate
Irreplaceable loss of resources?	Moderate	Moderate
Can impacts be mitigated?	This impact cannot be well mitigated because the loss of vegetation and individuals of protected tree species is unavoidable and is a certain outcome of the development.	

Mitigation:

- Minimise loss of indigenous vegetation where possible through planning and where necessary by incorporating the sensitivity of the biodiversity report as well as other specialist studies;
- Ensure that no development occurs outside of the planned development footprint;
- 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.
- Prior to the commencement of construction activities, an AIP Management/Control Plan should be compiled for implementation. An AIP Management/Control Plan should be implemented by a qualified professional. No uncertified chemicals may be used for chemical control of AIPs. Trained personnel to be used for the application of chemical control or for the use of dangerous tools / machinery if mechanical clearing is to be pursued.
- All floral and faunal SCC and protected tree species that will be affected by the construction activities, must be marked and where possible, relocated to suitable habitat surrounding the disturbance footprint. Permits might be required from provincial (DENC) and national authorities such as DEFF;
- Removal of vegetation must be restricted to what is absolutely necessary and should remain within the approved development footprint. It is recommended that vegetation only be cleared where infrastructure will be placed;
- 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;
- 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 of floral or faunal SCC or medicinal floral species 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 floral ecological environment are deemed likely. The following points highlight the key latent impacts that have been identified:

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

5.1.2 Possible Cumulative Impacts

The assessment of cumulative impacts will include:

1. Looking at impacts on the receiving environment both within the focus area and beyond; and
2. Assessing impacts not just of the proposed Thermal Facility, but will include impacts on receiving environment stemming from the entire proposed Solar Farm development.

A threat for the floral ecology within the focus area is the potential ongoing proliferation of AIP species and particularly a potential for indigenous bush encroachment, resulting in the overall loss of native floral communities within the local area. Such impacts combined with similar

impacts in the region will contribute to an increased loss of this vegetation type. The proposed development will also increase the movement of humans within the area and could lead to increased harvesting of floral SCC and / or the degradation of floral habitat due to continued exposure to anthropogenic disturbances.

Table 5: Cumulative impacts associated with the floral habitat, diversity and SCC arising from the proposed development activities.

Nature: *Impact on protected species and associated habitats due to cumulative loss and fragmentation of habitat.*

What causes the effect: Development of the Solar Farm which includes an area of just over 300 ha, as opposed to the 5 ha footprint of just the Thermal Facility. Increased human movement in the area, 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).
What will be affected: Integrity of the remaining natural vegetation within the focus area and surrounding areas as AIPs and bush encroaching spreads, as well as loss of certain floral communities that are harvested more frequently as human movement becomes more prominent in the area.
How will it be affected: Overall reduction in extent of the remaining Kathu Bushveld vegetation type on a local to regional scale. Numbers of protected floral species can become less abundant if displaced by AIPs and bush encroacher species. Harvesting of floral SCC is a potential that can result in overall lower species diversities for the local areas.

	Overall impact of the proposed Thermal Facility considered in isolation	**Cumulative impact of the entire Solar Farm project and other projects in the area**
Extent	Local (1)	Regional (3)
Duration	Long-term (4)	Long-term (4)
Magnitude	Minor (2)	High (8)
Probability	Probable (3)	Most Likely (4)
Significance	**Low (21)**	**Medium (60)**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	Moderate
Irreplaceable loss of resources?	Moderate	Moderate
Can impacts be mitigated?	The development will contribute to cumulative impacts on habitat loss and transformation in the area. Although large numbers of protected trees would be affected, these are the dominant trees of the area and cumulative impacts on their populations would be intermediate. The cumulative impacts of the proposed project can be mitigated if mitigation measures are implemented, e.g., vegetation maintenance, AIP clearing and prevention and/or control of bush encroachment (to name a few).	

Mitigation:

- Several floral species that are protected under Schedule 2 (Protected Species) of the Northern Cape Nature Conservation Act (Act No. 9 of 2009) were recorded within the focus area and surrounding areas, with numerous others having the potential to be found within the focus area. If any such species are removed and relocated as part of the construction activities, the success of relocation must be monitored during the operational phase to ensure a higher probability of success. Negative cumulative impacts on SCC can be lowered if harvesting of SCC is prevented and where feasible, this should be an important long-term management goal;
- Linear developments are often corridors along which disturbances occur and AIPs spread. The proposed project should thus manage disturbances and AIPs along the proposed access road along with a 30 m buffer. This will decrease the potential for AIPs to become a significant threat to indigenous flora in the rest of the focus area as well as in adjacent natural habitats;
- Bush encroachment should be managed to avoid a further cumulative loss of favourable habitat for floral communities in the area, which can be achieved through limiting disturbances during the maintenance phase;
- All soils compacted because of maintenance activities should be ripped and reprofiled to natural levels and revegetated with indigenous vegetation. Establishment of reintroduced vegetation within such disturbed areas must be monitored as part of maintenance activities to ensure no cumulative loss of floral habitat;
- No dumping of waste should take place during maintenance activities, especially not within any sensitive habitat; and

- Vehicles should be restricted from travelling in sensitive environments. Where possible, monitoring and maintenance should occur on foot.

5.2 Faunal Impact Assessment

5.2.1 Faunal Impact Assessment Results

The below table indicates the perceived risks to the faunal ecology associated with all phases of the proposed access road and the Thermal Generating Facility development and operation. 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.

The project plans entail the development of a Thermal Generating Facility and an associated access road. As such, each one of these developments were separately assessed in terms of impacts and mitigation measures. Impacts associated with the access road are presented in Table 6 and whilst the impacts associated with the Thermal Generating Facility are presented in Table 7. Cumulative impacts are discussed in Table 8.

The proposed access road will include an upgrade and widening of an existing 3.6 km T26 gravel road (i.e., a road upgrade) which turns out from the N14. As this is an already existing road which is regularly used, the upgrade and tarring of this road is expected to have minimal impacts on faunal diversity along this section. Once the proposed access road deviates from the existing road and travels adjacent to the proposed Thermal Generating Facility, its construction will result in a greater degree of vegetation clearance and habitat fragmentation. The proposed access road will lead to the local loss of vegetation but seeing that the road follows along the property fence, habitat fragmentation is reduced and the overall impact to faunal communities is lowered. Linear developments have the potential to act as movement corridors for poachers / subsistence hunters who use these routes to access new areas to set out snares. As such, suitable access control and personnel management must be undertaken to ensure that such does not occur. If no mitigation measures are implemented, the impact on floral 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 6: Impact on the faunal habitat, diversity, and SCC resulting from the proposed Access Road.

Nature: *Impact on fauna habitat and diversity, and fauna SCC*

What causes the effect: Vegetation clearing associated with the construction of a new access road (approximately 5 km long with a width of 9 m).
What will be affected: Local loss of faunal habitat and species diversity within the footprint area as well as immediately adjacent to the footprint area. Species movement patterns and habitat utilisation through habitat fragmentation may also occur.
How will it be affected: Local loss of habitat will lead to a decline in faunal diversity associated with the footprint area. The current design of the road will result in minimal habitat loss as a large section of the proposed Access Road includes an upgrade of an existing road. Habitat fragmentation is also reduced due to the road being aligned with the property fence which already pose a barrier to movement for some faunal species. Faunal species diversity may further be impacted upon due to faunal collisions with vehicles along the route.

	Without mitigation	With mitigation
Extent	Local (2)	Local (2)
Duration	Long-term (4)	Medium-term (3)
Magnitude	Moderate (4)	Low (2)
Probability	Highly Probable (4)	Probable (3)
Significance	**Medium (40)**	**Low (21)**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	Moderate
Irreplaceable loss of resources?	Low	Low
Can impacts be mitigated?	Yes (to an extent)	

Mitigation:

- Keep the proposed access road footprint to an absolute minimum and use existing road networks as far as possible;
- Clearly demarcate the areas to be cleared and do not deviate from this footprint;
- Monitor and control alien plant growth along the entire route in line with mitigation set out in the floral impact section (Section 5.1);
- Vehicles should not be allowed to exceed 40km/h along the road in order to minimise the risk of faunal collisions;
- Suitable storm water planning must be done to ensure that water runoff from the road does not lead to erosion of the verges and additional habitat loss;
- Any faunal species found along the route that do not naturally relocate themselves during vegetation clearing and operational activities must be carefully relocated to similar habitat outside of the disturbance footprint;
- In the unlikely event that species encountered do not self-relocate and are listed as protected/ endangered, a permit must be obtained where/ if applicable from the relevant authority and the relocation should be undertaken by a suitably qualified specialist;
- All soils compacted because of maintenance activities should be ripped and reprofiled to natural levels and revegetated with indigenous vegetation. Establishment of reintroduced vegetation within such disturbed areas must be monitored as part of maintenance activities to ensure no cumulative loss of floral habitat;
- No dumping of waste should take place during maintenance activities, especially not within any sensitive habitat or open space natural areas; and
- Vehicles should be restricted from travelling in sensitive environments. Where possible, monitoring and maintenance should occur on foot.

Residual Impacts:

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

- Permanent loss of and altered faunal species diversity in the areas immediately adjacent to the road, alien plant growth leading to further habitat loss and the increased risk of poaching/snaring of species as the road provides easy access to these areas;
- The potential for ongoing loss of SCC/protected faunal species due to increased human presence; and
- Disturbed areas are not adequately rehabilitated, resulting in ongoing loss of faunal habitat, species diversity and SCC.

The construction of the of the Thermal Generating Facility encompasses an area of approximately five (5) ha. The construction will result in the clearance of vegetation (faunal habitat), the displacement of faunal species from the area and the potential reduction of species abundance in the immediate area. All this is expected to occur at a highly localised level with impacts not extending beyond this provided all mitigation measures are implemented and the site is suitably managed. The direct impact of the proposed development on the faunal ecology of the focus area, including impacts on floral SCC, will have a **medium** impact significance if no mitigation measures are implemented. If mitigation measures are implemented, the impact significance for the focus area is still anticipated to be **Low**.

Table 7: Impact on the faunal habitat, diversity, and SCC resulting from the Thermal Generating Facility.

Nature: *Impact on fauna habitat, diversity and fauna SCC*

What causes the effect: Vegetation (faunal habitat) clearing associated with the construction of the proposed Thermal Generating Facility – footprint area of approximately 5 ha.
What will be affected: Loss of faunal habitat and species (diversity and abundance) within the footprint area, potentially extending into the immediate surrounding areas.
How will it be affected: Vegetation clearance will result in the local loss of habitat which will lead to a decrease in species abundance and potentially species diversity in the area. However, there is sufficient suitable habitat, often in better condition, in the surrounding areas to support these faunal species that will be displaced from the proposed footprint. Faunal SCC may be impacted upon slightly should they occur in, or temporarily utilise the footprint area, however faunal SCC that may occur in the footprint should naturally relocate to suitable surrounding habitat at the onset of vegetation clearance activities.

	Without mitigation	With mitigation
Extent	Local (2)	Local (1)
Duration	Permanent (5)	Long-term (4)
Magnitude	Moderate (6)	Low (4)
Probability	Highly Probable (4)	Probable (3)
Significance	**Medium (52)**	**Low (27)**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	Moderate
Irreplaceable loss of resources?	Low	Low
Can impacts be mitigated?	This impact cannot be fully mitigated as the loss of vegetation within the footprint is a definite and as such will lead to the displacement of faunal species from the footprint area.	

- Keep the proposed thermal generating facility footprint to an absolute minimum and use existing road networks as far as possible;
- Clearly demarcate the areas to be cleared and do not deviate from this footprint;
- No vegetation outside of the demarcated areas is to be cleared and no faunal species in the adjacent natural are to be disturbed;
- No hunting or snaring of faunal species is allowed by personal or any people on site;
- Monitor and control alien plant growth along the entire route in line with mitigation set out in the floral impact section (Section 5.1);
- Suitable storm water planning must be done to ensure that water runoff does not lead to erosion and additional habitat loss;
- Any faunal species found within the footprint that do not naturally relocate themselves during vegetation clearing activities must be carefully relocated to similar habitat outside of the disturbance footprint;
- Where possible, herbaceous vegetation growth should be allowed to re-establish under the solar panels in order to provide soil stability and minimise soil erosion. In addition, this will allow for the reinstatement of basic habitat conditions for smaller faunal species, notably invertebrates and other ground dwelling species;
- In the unlikely event that species encountered do not self-relocate and are listed as protected/ endangered, a permit must be obtained where/ if applicable from the relevant authority and the relocation should be undertaken by a suitably qualified specialist;

➢ All soils compacted because of maintenance activities should be ripped and reprofiled to natural levels and revegetated with indigenous vegetation. Establishment of reintroduced vegetation within such disturbed areas must be monitored as part of maintenance activities to ensure no cumulative loss of floral habitat; ➢ No dumping of waste should take place during maintenance activities, especially not within any sensitive habitat or open space natural areas; and ➢ Vehicles should be restricted from travelling in sensitive environments. Where possible, monitoring and maintenance should occur on foot.
Residual Impacts: Even with extensive mitigation, residual impacts on the receiving faunal ecological environment are deemed likely. The following points highlight the key residual impacts that have been identified: ➢ Permanent loss of and altered faunal species diversity within and adjacent to the solar farm footprint, alien plant growth leading to further habitat loss and the increased risk of poaching/snaring of species as potential movement to and from the premises becomes easier; ➢ The potential for ongoing loss of SCC/protected faunal species due to increased human presence; and ➢ Disturbed areas are not adequately rehabilitated, resulting in ongoing loss of faunal habitat, species diversity and SCC.

5.2.2 Possible Cumulative Impacts

The larger region in which the focus area is located is currently being subjected to extensive agricultural and mining activities. More recently the region has seen a surge in the development of renewable energy operations, notably solar farms, and related infrastructures such as powerlines and roads. Agricultural practices (livestock and game farming) are still ongoing within the region and within the focus area, whilst mining activities and the development of other solar farms are occurring to the south and west of the focus area. All these developments have in one way or another added to the loss of habitat and faunal species diversity and abundance in the region due to vegetation clearance and/or disturbance. The development of the proposed solar facility and access road will result in the localised loss of habitat within the proposed footprints; however, this habitat loss will lead to the displacement of faunal species. Although this displacement is not expected to be significant, it will be occurring within a region that has, and still is, experiencing larger scale species displacement due to surrounding developments. As such, displaced species will be competing for remaining habitat and food resources with other species who have also been displaced, whilst some species may move into areas where persecution is higher, either naturally or anthropogenically. Habitat and food resources are finite, and as such the continued displacement and loss of available habitat will likely lead to an overall decrease in species abundances and potentially diversity, as species will compete with each other for the remaining areas in which to inhabit.

Table 8: Cumulative impacts associated with the faunal habitat, diversity and SCC arising from the proposed development activities.

Nature:

What causes the effect: Increased human movement in the area, precedent for ongoing developments in the area, poor veld management, rehabilitation and poorly implemented maintenance measures.
What will be affected: The integrity of the remaining faunal habitat within the focus area and surrounding areas as well the overall species abundance and diversity. Faunal SCC, notably habitat and foraging grounds may also be impacted upon.
How will it be affected: Reduction / loss of faunal habitat on a local and potentially regional scale. Loss of habitat and increased anthropogenic activities will lead to a decrease in faunal abundance and potentially diversity in the local area, with a low-level risk to regional population numbers, provided impacts are mitigated. Persecution and collection of faunal SCC is a potential threat that may lead to a loss of SCC diversity in the local areas which may have a knock on impact o regional population numbers and population security.

	Overall impact of the proposed project considered in isolation	Cumulative impact of the project and other projects in the area
Extent	Local (2)	Local (3)
Duration	Medium-term (3)	Long-term (4)
Magnitude	Moderate (6)	Moderate (6)
Probability	Probable (3)	Probable (3)
Significance	**Medium (33)**	**Medium (39)**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	Moderate
Irreplaceable loss of resources?	Moderate	Moderate
Can impacts be mitigated?	The development will contribute to cumulative impacts on habitat loss and transformation in the area. Although all species within the proposed footprint will be displaced, some, notably small mammals and invertebrates, may to a degree be able to recolonise the footprint during the operational phase of the solar farm, provided the herbaceous layer is allowed to re-establish amongst the panel arrays. The remaining displaced species will likely readily be accommodated in the surrounding natural areas and as such the impact from this displacement is not perceived to be detrimental to the current faunal communities in the area. The cumulative impacts of the proposed project can be mitigated to a degree provided that the mitigation measures are implemented, such as revegetation, minimising vegetation clearance and suitable AIP control measures.	

Mitigation:

- Rehabilitation of any disturbed sites must be undertaken and monitored to ensure that habitat and food resources are reinstated as far as possible;
- The herbaceous layer should be allowed to grow under and amongst the solar panel arrays in order to ensure that partial habitat is provided for faunal species in these areas. This will help minimise the cumulative impacts as some species will be able to re-inhabit these areas.
- AIPs should be managed if they appear along the powerline route, notably in the disturbed areas;
- No dumping of waste should take place during maintenance activities, especially not within any sensitive habitat or open space areas; and
- Vehicles should be restricted from travelling in sensitive environments or any open space areas where no roads exist. Where possible, monitoring and maintenance should occur on foot or along the designated roads.

6 CONCLUSION

Scientific Terrestrial Services (STS) was appointed to assess and 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 biodiversity 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 faunal and floral communities associated with the focus area, with the habitat not experiencing any significant changes since the previous assessment was undertaken. However, Simon Todd describes the site to be of low sensitivity, whereas STS would recommend an intermediate sensitivity. This dispute is likely due to methodology differences in how sensitivity is determined by STS and Simon Todd.

In terms of development implications, the loss of habitat from the proposed development will not result in significant impacts on floral and faunal communities given that biodiversity outside of the direct footprint is preserved through strict adherence to mitigation measures.

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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.

G DARD 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:

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

Cumulative Impacts Table:

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

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)xP; 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[7] 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.

[7] Mitigation measures should address both positive and negative impacts

APPENDIX C: Vegetation Types

Kathu Bushveld (SVk 12)

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

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

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

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

*(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

Samantha-Leigh Daniels	PhD Candidate (Plant Science) (University of Pretoria)
Chris Hooton	BTech Nature Conservation (Tshwane University of Technology)
Nelanie Cloete	MSc (Environmental Management) (University of Johannesburg)
Christien Steyn	MSc. Plant Science (University of Pretoria)

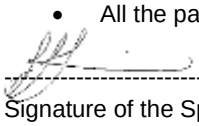
1. (a). (ii) The expertise of that specialist to compile a specialist report including a curriculum vitae

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

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

I, Samantha-Leigh Daniels, declare that -

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



Signature of the Specialist

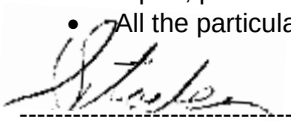
I, Christopher Hooton, declare that -

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

Signature of the Specialist

I, Stephen van Staden, declare that -

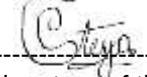
- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity 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



Signature of the Project Manager

I, Christien Steyn, declare that -

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



Signature of the Specialist

SAS ENVIRONMENTAL GROUP OF COMPANIES – SPECIALIST CONSULTANT INFORMATION

CURRICULUM VITAE OF SAMANTHA-LEIGH DANIELS

PERSONAL DETAILS

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

EDUCATION

Qualifications

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

AREAS OF WORK EXPERIENCE

South Africa – Gauteng, Mpumalanga, KwaZulu-Natal

KEY SPECIALIST DISCIPLINES

Experience

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

Training

- Plant species identification
- Herbarium usage and protocols

SAS ENVIRONMENTAL GROUP OF COMPANIES – SPECIALIST CONSULTANT INFORMATION

CURRICULUM VITAE OF CHRISTOPHER HOOTON

PERSONAL DETAILS

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

EDUCATION

Qualifications

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

Short Courses

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

AREAS OF WORK EXPERIENCE

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

KEY SPECIALIST DISCIPLINES

Biodiversity Assessments

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

Freshwater Assessments

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

SAS ENVIRONMENTAL GROUP OF COMPANIES – SPECIALIST CONSULTANT INFORMATION

CURRICULUM VITAE OF 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

DEVELOPMENT SECTORS OF EXPERIENCE

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

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

SAS ENVIRONMENTAL GROUP OF COMPANIES – SPECIALIST CONSULTANT INFORMATION

CURRICULUM VITAE OF CHRISTIEN STEYN

PERSONAL DETAILS

Position in Company	Floral Ecologist
Joined SAS Environmental Group of Companies	2018

MEMBERSHIP IN PROFESSIONAL SOCIETIES

Member of the South African Association of Botanists (SAAB)
Member of the Botanical Society of South Africa (BotSoc)

EDUCATION

Qualifications

MSc (Plant Science) (University of Pretoria)	2017
BSc (Hons) Plant Science (Invasion Biology) (University of Pretoria)	2014
BSc Environmental Science (University of Pretoria)	2013

AREAS OF WORK EXPERIENCE

South Africa – Gauteng, Mpumalanga, North West, Limpopo, KwaZulu-Natal, Northern Cape, Free State

KEY SPECIALIST DISCIPLINES

Biodiversity Assessments

- Terrestrial Ecological and Biodiversity Scoping Assessments
- Terrestrial Ecological and Biodiversity Screening Assessments
- Floral Assessments
- Input into Terrestrial Rehabilitation Plan design with the focus on the re-establishment of vegetation
- Floral Rescue and Relocation Plans
- Alien and Invasive Control Plan (AICP)
- Terrestrial Monitoring
- Protected Tree and Floral Marking and Reporting
- Desktop Studies, Mapping and Background Information Research

Training

- Alien and Invasive Plant Identification and awareness