



SCIENTIFIC TERRESTRIAL SERVICES

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**BIODIVERSITY ASSESSMENT FOR THE ENVIRONMENTAL
IMPACT ASSESSMENT AND AUTHORISATION PROCESS
FOR THE PROPOSED KHWARA MANGANESE
PROSPECTING RIGHT APPLICATION WITHIN AND
ADJACENT TO THE KURUMAN RIVER, HOTAZEL,
NORTHERN CAPE**

Prepared for

SLR Consulting (South Africa) (Pty) Ltd

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EXECUTIVE SUMMARY

Three broad habitat units were identified within the focus area at the time of the assessment. The Southern Kalahari Mekgacha and Kathu Bushveld habitat units are considered to be of moderately high biodiversity importance. The increased sensitivity of these habitat units is attributable to the habitat being considered largely intact, the conservation significance of these habitat units (classified as a Critical Biodiversity Area (CBA) 1), as well as the ability to support floral and faunal SCC. The Degraded Habitat unit has been associated with increased anthropogenic activities and can no longer be considered representative of either the Southern Kalahari Mekgacha or the Kathu Bushveld vegetation types. The Degraded Habitat is associated with an altered floral species composition, provide limited habitat for faunal species and is of low ecological importance.

During the field assessment a number of protected floral species were observed, namely *Vachellia erioloba* (Camel Thorn), *Vachellia haematoxylon* (Grey Camel Thorn), *Boscia albitrunca* (Shepherd's Tree), *Lessertia frutescens* subsp. *frutescens* (Cancer Bush), *Nerine laticoma* (Gifbol), *Pergularia daemia* (Trellis vine), and *Jamesbrittenia burkeana* (Bruinblommetjie). Three additional protected species also have an increased likelihood to be associated with the focus area, namely *Harpagophytum procumbens* (Devils's Claw), *Boophone disticha* (Poison Bulb), and *Babiana hypogaea* (Bobbejaankalkoentjie).

The focus area is further capable of supporting a number of faunal SCC, namely Mammals: *Otocyon megalotis* (Bat-eared fox), *Vulpes chama* (Cape fox), *Mellivora capensis* (Honey Badger), *Atelerix frontalis* (South African Hedgehog); and *Orycteropus afer* (Aardvark); Avifauna: *Ardeotis kori* (Kori Bustard), *Polemeatus bellicosus* (Martial Eagle), and *Aquila rapax* (Tawny Eagle); Reptiles: *Python natalensis* (African Rock Python); *Chamaeleo dilepis* (Common flap-neck chameleon); and Invertebrates (Arachnids): Genus: *Ceratogyrus*, *Harpactira* and *Pterinochilus* (Baboon Spiders); *Opisthophthalmus ater* (Steinkopf Burrowing Scorpion); *Opisthophthalmus carinatus* (Burrowing scorpion); and *Opisthophthalmus wahlbergii* (Burrowing scorpion). Signs for two of these SCC were observed at the time of the assessment, namely *Orycteropus afer* (Aardvark) and *Opisthophthalmus* sp. (likely *O. wahlbergii* (Burrowing scorpion)).

Based on the field assessment results the CBA status attributed to the focus area have been confirmed by the specialist. Due to the limited development footprint associated with the proposed prospecting activities (10 drill sites of 10m x 10m each), it is considered unlikely that the proposed prospecting activities will significantly impact on the ongoing functioning of the CBA. Based on the impact assessment, the proposed prospecting activities will result in medium to low significance impacts on the floral and faunal ecology prior to the implementation of mitigation measures. With mitigation fully implemented, with particular emphasis on relocation of herbaceous protected floral species occurring within the prospecting footprint, rehabilitation of the prospecting footprint and AIP control, all impacts can be reduced to low and very low significant impacts. The perceived low-level impacts associated with prospecting activities however could lead to full scale mining, which if it occurs post prospecting will have a significantly higher impact on biodiversity resources, and the functioning of the CBA.

It is, therefore, the opinion of the ecologists that the proposed prospecting activities be considered acceptable from a terrestrial ecological and biodiversity conservation point of view. It is, however, essential that all mitigation measures provided in this report as well as general good construction and rehabilitation practice, are strictly adhered to in order to minimise the impact on the focus area and immediate surroundings for the prospecting activities to have an acceptable impact.



MANAGEMENT SUMMARY

Scientific Terrestrial Services (STS) was appointed to conduct a faunal and floral ecological assessment as part of the Basic Assessment process for the proposed prospecting related activities located in or near the Kuruman River, within Portion 43 of the Farm Eersbegint 703. The focus of the proposed prospecting activities is the Kuruman River, with prospecting envisioned to occur within or in close proximity to the Kuruman River. At the time that this field assessment was undertaken, the proposed locations of the prospecting boreholes have not been finalised nor provided to the specialist. Thus, a 200 m corridor around the delineated riparian zone associated with the Kuruman River was generated in order to guide the field assessment. This 200 m corridor around the riparian zone is henceforth referred to as the “focus area”.

Specific outcomes in terms of this report are outlined below:

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

BIODIVERSITY RESULTS:

1) Desktop Assessment

- The focus area is classified as falling within the Southern Kalahari Mergacha (Least Threatened) according to Mucina & Rutherford, 2018. The National Biodiversity Assessment (2018) indicate the majority of the focus area as the remaining extent of this vegetation type. The National Threatened Ecosystems Dataset (2011) was also consulted, with this dataset not indicating any threatened ecosystems within the focus area;
- According to the Northern Cape Critical Biodiversity Area (CBA) Dataset (2016) the focus area is classified as a CBA 1¹. The majority of the focus area has been identified to be of moderately high biodiversity significance during the field assessment, and can be considered to function as a CBA within the landscape; and
- According to the Mining and Biodiversity Guidelines database (2013), the entire focus area falls within an area considered to be of Highest Biodiversity Importance².

2) Floral Assessment Results:

- Three habitat units were identified within the focus area, i.e. the Kathu Bushveld, Southern Kalahari Mergacha and the Degraded Habitat;
- The Southern Kalahari Mergacha habitat unit is considered to be of moderately high floral significance and includes the Kuruman River, its associated riparian zone, as well as historic rocky slopes southwest of the Kuruman River.
 - The Geology of the Southern Kalahari Mergacha according to Mucina and Rutherford (2012) comprise of Sandy Kalahari sediments within the river channels, with the banks of the dry rivers cutting into duricrust (calcrete or silcretes and in places also ferricretes), with vertical buffs (steep cliffs) of several metres in places. This was evident within the focus area and assisted in defining the boundaries of the Southern Kalahari Mergacha;
 - Due to the varying soil geology, this habitat unit supported a moderately high floral diversity;
 - Degradation of this habitat unit was noted, particularly within the Kuruman River where invasion by *Prosopis glandulosa* (honey mesquite) was noted in areas. Despite the

¹ CBA 1 are irreplaceable or near-irreplaceable (i.e. high selection frequency) for meeting biodiversity targets. There are no or very few other options for meeting biodiversity targets for the features associated with these areas.

² Environmental screening, EIAs and their associated specialist studies should focus on confirming the presence and significance of these biodiversity features, and to provide a site-specific basis on which to apply the mitigation hierarchy to inform regulatory decision making for mining, water use licences, and environmental authorisations. If they are confirmed, the likelihood of a fatal flaw for new mining projects is very high because of the significance of the biodiversity features in these areas and the associated ecosystem services.



- presence of the invasive flora species. the habitat integrity of the Southern Kalahari Mekkacha habitat unit is still considered to be of an intermediate level; and
- This habitat unit can be considered a unique landscape as the Kuruman River, although episodic in nature, is still associated with subsurface flow, which supports a number of tall *Vachellia erioloba* trees, which in turn provide habitat and services for a variety of floral and faunal species (Seymour & Milton, 2003);
- The Kathu Bushveld is also of moderately high floral sensitivity and was associated with deep (>1.2 m) aeolian red sandy soils of Hutton and Clovelly soil forms, which is typical of the Kathu Bushveld.
 - The species composition and vegetation structure were typical of the Kathu Bushveld vegetation type, with a moderately high floral diversity recorded; and
 - Individuals of the Alien Invasive Plant (AIP) *Prosopis glandulosa* was associated with this habitat unit; however the abundance was lost, and the habitat of the Kathu Bushveld is considered largely intact;
 - The Degraded habitat unit is limited in extent and includes an informal farmstead together with vegetable patches and kraals, as well as a recently active quarry. These areas although limited in extent have been significantly altered comprising either no vegetation in the case of the quarry or of limited vegetation dominated by AIP. This habitat unit is considered to be of low floral significance;
 - Due to the increased floral importance and sensitivity attributed to the majority of the focus area, the focus area can be considered a Critical Biodiversity Area (CBA) as identified by the Northern Cape CBA Dataset (2016);
 - During the field assessment, a number of protected floral species were observed, namely *Vachellia erioloba*, *Vachellia haematoxylon*, *Boscia albitrunca*, *Lessertia frutescens* subsp. *frutescens*, *Nerine laticoma*, *Pergularia daemia*, and *Jamesbrittenia burkeana*. Three additional protected species also have an increased likelihood to be associated with the focus area, namely *Harpagophytum procumbens*, *Boophone disticha*, and *Babiana hypogaea*; and
 - Once final layouts of the proposed prospecting activities are available, a summer walkdown will have to be undertaken of the prospecting footprint (including drill sites and access roads) and all protected floral species be marked. Permits will have to be obtained from the Department of Environment, Forestry and Fisheries (DEFF) and the Northern Cape Department of Environment and Nature Conservation (NCDENC) for the removal/ destruction of protected species. It is recommended that herbaceous species be rescued and be relocated to surrounding natural habitat or utilised during the rehabilitation activities, and that as far as is possible all trees >3 m be avoided during the prospecting activities (including clearing activities for access roads).

3) **Faunal Assessment Results:**

- The habitat of the focus area was largely intact, with limited anthropogenic disturbances associated with farming practices observed;
- The focus area is likely to support a moderate diversity of faunal species, with intermediate to moderately high levels of faunal habitat and food resources available within the focus area;
- During the field assessment, signs of two faunal SCC were observed, namely borrows of *Orycteropus afer* (Aardvark), and the exoskeleton of *Opisthophthalmus* sp. (Possibly *O. wahlbergii* (Burrowing scorpion)). The following species have a Probability of Occurrence (POC)³ of 60% or higher of occurring within the focus area:
 - Mammals: *Otocyon megalotis* (Bat-eared fox), *Vulpes chama* (Cape fox), *Mellivora capensis* (Honey Badger), and *Atelerix frontalis* (South African Hedgehog);
 - Avifauna: *Ardeotis kori* (Kori Bustard), *Polemeatus bellicosus* (Martial Eagle), and *Aquila rapax* (Tawny Eagle);
 - Reptiles: *Python natalensis* (African Rock Python); *Chamaeleo dilepis* (Common flap-neck chameleon); and
 - Invertebrates (Arachnids): Genus: *Ceratogyrus*, *Harpactira* and *Pterinochilus* (Baboon Spiders); *Opisthophthalmus ater* (Steinkopf Burrowing Scorpion); and *Opisthophthalmus carinatus* (Burrowing scorpion); and

³ During field assessments, it is not always feasible to identify or observe all species within an area, largely due to the secretive nature of many faunal species, possible low population numbers or varying habits of species. As such, and to specifically assess an area for faunal SCC, a Probability of Occurrence (POC) matrix is used, utilising a number of factors to determine the probability of faunal SCC occurrence within the focus area.



- The proposed prospecting activities will result in the displacement of a few faunal individuals, however, due to the small prospecting footprint area, it is unlikely to significantly impact upon the faunal diversity or the conservation targets for faunal SCC. It is recommended that prior to prospecting and vegetation clearing activities, a thorough walk down of the proposed prospecting footprint (including access roads) be undertaken, to locate such species, and/or their nests/burrows. Where these are located within the prospecting footprint areas, it is recommended that following the receiving of the relevant permits as per the NCNCA (Act 9 of 2009), a rescue and relocation plan be implemented and overseen by a specialist.

BIODIVERSITY IMPACT ASSESSMENT:

The floral sensitivity of the focus area is considered to be moderately high with the exception of the Degraded Habitat. Despite the sensitivity of the receiving environment, the intensity of the impact is considered to be of medium significance, resulting in a moderate alteration of the floral ecology. The reduced intensity of the impact is attributed to the small prospecting footprint. Furthermore, the duration of the prospecting activities is considered to be low. The overall impact significance of the moderately high sensitivity areas is considered to be medium, and low for the low sensitivity areas. With mitigation measures implemented, with particular emphasis on effective rehabilitation and the avoidance of floral and faunal SCC within the prospecting footprint as far as is possible, the impacts can be reduced to low and very low levels.

Based on the impact assessment, it is evident that the proposed prospecting activities (drill sites and access roads) will result in loss of floral habitat and protected species, however due to the small footprint area, it is unlikely that the proposed prospecting activities will result in a significant loss in floral diversity or the functioning of the CBA, nor will it significantly impact on the conservation targets for the province. It is however inevitable that extensive and significant mitigation will have to be implemented in order to restore the disturbed areas, and to allow for the ongoing functioning of the area as a CBA.

Based on the impact assessment of potential impacts on faunal habitat, diversity and SCC associated with the focus area, it is evident that the proposed prospecting activities will result in a medium to low impact on the faunal ecology of the area. With mitigation fully implemented these impacts can be reduced to low and very low significance impacts. Despite the sensitivity of the focus area for faunal species and SCC, the lowered score is largely attributed to the limited development footprint associated with the proposed prospecting activities. It is however highly likely that based on the prospecting activities that an application will be launched for full-scale mining, in which case the impacts on the faunal ecology will be significantly higher.

1) Floral Impact Assessment

Table A: A summary of the impact significance on floral resources.

Habitat Unit	Planning Phase		Prospecting Phase		Decommissioning Phase	
	Unmanaged	Mitigated	Unmanaged	Mitigated	Unmanaged	Mitigated
Impact of faunal Habitat and Diversity						
Southern Kalahari Mekgacha and Kathu Bushveld	Medium	Low	Medium	Low	Medium	Very Low
Degraded Habitat	Low	Very Low	Low	Very Low	Low	Very Low
Impact on Faunal SCC						
Southern Kalahari Mekgacha and Kathu Bushveld	Medium	Low	Medium	Low	Low	Very Low
Degraded Habitat	Low	Very Low	Low	Very Low	Low	Very Low



2) Faunal Impact Assessment

Table B: A summary of the impact significance on faunal resources.

Habitat Unit	Planning Phase		Prospecting Phase		Decommissioning Phase	
	Unmanaged	Mitigated	Unmanaged	Mitigated	Unmanaged	Mitigated
Impact of faunal Habitat and Diversity						
Southern Kalahari Mekgacha and Kathu Bushveld	Low	Very Low	Medium	Low	Medium	Low
Degraded Habitat	Very Low	Very Low	Low	Very Low	Low	Very Low
Impact on Faunal SCC						
Southern Kalahari Mekgacha and Kathu Bushveld	Low	Very Low	Low	Very Low	Low	Very Low
Degraded Habitat	Very Low	Very Low	Very Low	Very Low	Very Low	Very Low

Sensitivity

The section below summarises the findings of the biodiversity sensitivity assessment based on:

- the presence or potential occurrence for floral and faunal SCC,
- habitat integrity and levels of disturbance,
- threat status of the habitat type,
- the presence of unique landscapes, and
- overall levels of diversity.

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

Habitat Unit	Sensitivity	Development Implications
Southern Kalahari Mekgacha and Kathu Bushveld	MODERATELY HIGH <u>Conservation Objective</u> Preserve and enhance the biodiversity of the habitat unit, limit development and disturbance.	<p>These habitat units are of moderately high ecological sensitivity based on the presence of protected floral species, likelihood to support faunal SCC, overall habitat integrity as well as floral and faunal diversity. Both vegetation types are classified as Least Threatened (National Threatened Ecosystems, 2011), however, the focus area has been identified as CBA 1 within the Northern Cape CBA Dataset (2016) and is of Highest Biodiversity Importance (Mining and Biodiversity Guidelines, 2013). The CBA status of the area has been confirmed during the field assessment.</p> <p>As discussed above, the proposed prospecting activities will result in clearance of vegetation, however the footprint area is considered to be minimal, with use of existing access roads used where possible. It is therefore unlikely that the prospecting activities will alter the functioning of the area to the degree that the area can no longer maintain its CBA status. Due to the sensitivity, prospecting within these habitat units should be minimised to what is essential, and care should be taken not to disturb any natural habitat outside of the prospecting footprint. Existing gravel roads should be used for prospecting activities as far as is possible, and where additional roads are required, they should be optimised to serve as many drill sites as possible. Furthermore, it is recommended that where necessary shrubs and trees within access roads be cut as opposed to complete removal to limit habitat fragmentation and the subsequent establishment of AIPs within exposed areas.</p> <p>Once final layouts of the proposed prospecting activities are available, a summer walkdown (January to March) will have to be undertaken of the prospecting footprint (including drill sites and access roads) and all protected floral species be marked. Permits will have to be obtained from the DEFF and the NCDENC for the removal/ destruction of protected species.</p> <p>A rehabilitation and AIP control and Management Plan should also be implemented at the onset of the prospecting activities, to limit spread and further degradation of the surrounding floral habitat.</p>
Degraded	LOW <u>Conservation Objective</u> Optimise development potential.	The Degraded Habitat is of low ecological importance and sensitivity due to the modified floral species composition of these areas comprising predominantly of bare soils or AIP species. Ecological functioning and habitat integrity are significantly compromised, and these areas should be optimised for prospecting. Edge effect impacts on the surrounding natural vegetation should be well managed to limit the spread of AIP species to the surrounding areas.



DOCUMENT GUIDE

The following table indicates the requirements for Specialist Studies as per Appendix 6 of Government Notice 326 as published in Government Notice 40772 of 2017, amendments to the Environmental Impact Assessment (EIA) Regulations, 2014 as it relates to the National Environmental Management Act, 1998 (Act No. 107 of 1998).

NEMA Regulations (2017) - Appendix 6	Relevant section in report
(1) A specialist report prepared in terms of these Regulations must contain -	
(a) details of -	
(i) the specialist who prepared the report; and	Appendix I
(ii) the expertise of that specialist to compile a specialist report, including a curriculum vitae;	Appendix I
(b) a declaration that the specialist is independent in a form as may be specified by the competent authority;	Appendix I
(c) an indication of the scope of, and the purpose for which, the report was prepared;	Section 1.3
(cA) an indication of the quality and age of base data used for the specialist report;	Section 2.1
(cB) a description of existing impacts on site, cumulative impacts of the proposed development and levels of acceptable change;	Section 4-6
(d) the duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment;	Section 2
(e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;	Appendix B, C and D
(f) details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying alternatives;	Section 5
(g) an identification of any areas to be avoided, including buffers;	Section 5
(h) a map superimposing the activity, including the associated structures and infrastructure on the environmental sensitivities of the site, including areas to be avoided, including buffers;	Section 5
(i) a description of any assumptions made and any uncertainties or gaps in knowledge;	Section 1.4
(j) a description of the findings and potential implications of such findings on the impact of the proposed activity, including identified alternatives, on the environment or activities;	Section 6
(k) any mitigation measures for inclusion in the EMPr;	Section 6.4
(l) any conditions for inclusion in the environmental authorisation;	Section 6
(m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;	Section 6
(n) a reasoned opinion -	
(i) as to whether the proposed activity, activities or portions thereof should be authorised;	Section 7
(iA) regarding the acceptability of the proposed activity or activities; and	Section 7
(ii) if the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan;	Section 6
(o) a description of any consultation process that was undertaken during the course of preparing the specialist report	N/A
(p) a summary and copies, if any, comments received during any consultation process and, where applicable all responses thereto; and	N/A
(q) any other information requested by the competent authority.	N/A



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GLOSSARY OF TERMS

Alien and Invasive species	A species that is not an indigenous species; or 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.
Biome	A broad ecological unit representing major life zones of large natural areas – defined mainly by vegetation structure and climate.
CBA (Critical Biodiversity Area)	A CBA is an area considered important for the survival of threatened species and includes valuable ecosystems such as wetlands, untransformed vegetation and ridges.
Endangered	Organisms in danger of extinction if causal factors continue to operate.
Endemic species	Species that are only found within a pre-defined area. There can, therefore, be sub-continental (e.g. southern Africa), national (South Africa), provincial, regional or even within a particular mountain range.
ESA (Ecological Support Area)	An ESA provides connectivity and important ecological processes between CBAs and is therefore important in terms of habitat conservation.
IBA (Important Bird and Biodiversity Area)	The IBA Programme identifies and works to conserve a network of sites critical for the long-term survival of bird species that: are globally threatened, have a restricted range, are restricted to specific biomes/vegetation types or sites that have significant populations.
Indigenous vegetation (as per the definition in (NEMA))	Vegetation occurring naturally within a defined area, regardless of the level of alien infestation and where the topsoil has not been lawfully disturbed during the preceding ten years.
Invasive species	Means any species whose establishment and spread outside of its natural distribution range; they threaten ecosystems, habitats or other species or have demonstrable potential to threaten ecosystems, habitats or other species; and may result in economic or environmental harm or harm to human health
Least Threatened	Least threatened ecosystems are still largely intact.
RDL (Red Data listed) species	Organisms that fall into the Extinct in the Wild (EW), critically endangered (CR), Endangered (EN), Vulnerable (VU) categories of ecological status.
SCC (Species of Conservation Concern)	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.



LIST OF ACRONYMS

AIP	Alien Invasive Plant
BGIS	Biodiversity Geographic Information Systems
CARA	Conservation of Agricultural Resource Act
CBA	Critical Biodiversity Area
CR	Critically Endangered
DEFF	Department of Environment, Forestry and Fisheries
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
EN	Endangered
ESA	Ecological Support Area
GIS	Geographic Information System
GPS	Global Positioning System
IBA	Important Bird Area
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
MPRDA	Mineral and Petroleum Resource Development Act
NBA	National Biodiversity Assessment
NCDENC	Northern Cape Department of Environment and Nature Conservation
NCNCA	Northern Cape Nature Conservation Act
NEMA	National Environmental Management Act
NEMBA	National Environmental Management: Biodiversity Act
NFA	National Forest Act
NPAES	National Protected Areas Expansion Strategy
NT	Near Threatened
PES	Present Ecological State
POC	Probability of Occurrence
QDS	Quarter Degree Square (1:50,000 topographical mapping references)
RDL	Red Data List
SABAP 2	Southern African Bird Atlas 2
SACAD	South Africa Conservation Areas Database
SANBI	South African National Biodiversity Institute
SAPAD	South Africa Protected Area Database
SCC	Species of Conservation Concern
STS	Scientific Terrestrial Services
TOPS	Threatened or Protected Species
TSP	Threatened Species Programme
VU	Vulnerable



1. INTRODUCTION

1.1 Background

Scientific Terrestrial Services (STS) was appointed to conduct a faunal and floral ecological assessment as part of the Basic Assessment (BA) process for the proposed prospecting related activities located in or near the Kuruman River, within Portion 43 of the Farm Eersbegint 703, Northern Cape province. At the time that this field assessment was undertaken, the proposed locations of the prospecting boreholes had not been finalised nor provided to the specialist. Thus, in communication with the client, a 200 m corridor around the delineated riparian zone associated with the Kuruman River was generated in order to guide the field assessment. This 200 m corridor around the riparian zone is henceforth referred to as the “focus area”.

The focus area is situated approximately 7.3 km northwest of Santoy and the Gloria Mine Complex, approximately 20.5 km northwest of the town of Hotazel, and 75 km north of the town of Kathu. The R380 roadway traverses the focus area and farm portion, while the R31 roadway is situated approximately 15.7 km southwest of the focus area (Figures 1 and 2).

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

1.2 Project Description

Khwara Manganese (Pty) Ltd proposes to conduct prospecting activities for Iron Ore and Manganese within Portion 43 of the Farm Eersbegint 703, near Black Rock in the Joe Morolong Local Municipality within the John Taolo Gaetsewe District Municipality, Northern Cape Province. Prospecting activities will include non-invasive and invasive activities. Non-invasive activities will comprise analysing existing core, ground-penetrating radar and handheld ground magnetic mapping. Once the non-invasive activities have been completed, the location of the prospecting boreholes (invasive activities) can be sited. The following facilities and activities are required at each of the prospecting borehole sites (Figure 3 below):

- Temporary ablution facilities for contractors;
- The establishment of a temporary access track;
- Plastic lined sumps;



- Temporary storage of hazardous and non-hazardous waste;
- HDPE sheet lined area and dill rig; and
- The demarcation of the prospecting site.

At this stage it is envisaged that a total of ten prospecting boreholes will be drilled over a period of two years using diamond core drilling methods. For each drill site, once drilling is complete, the site will be decommissioned. Decommissioning will cater for the following:

- Capping and sealing of boreholes;
- Removal of any drilling equipment, chemicals, and waste products;
- Removal and filling of sumps; and
- Ripping of compacted soils (at drill sites and access tracks) to allow for re-vegetation of the site.



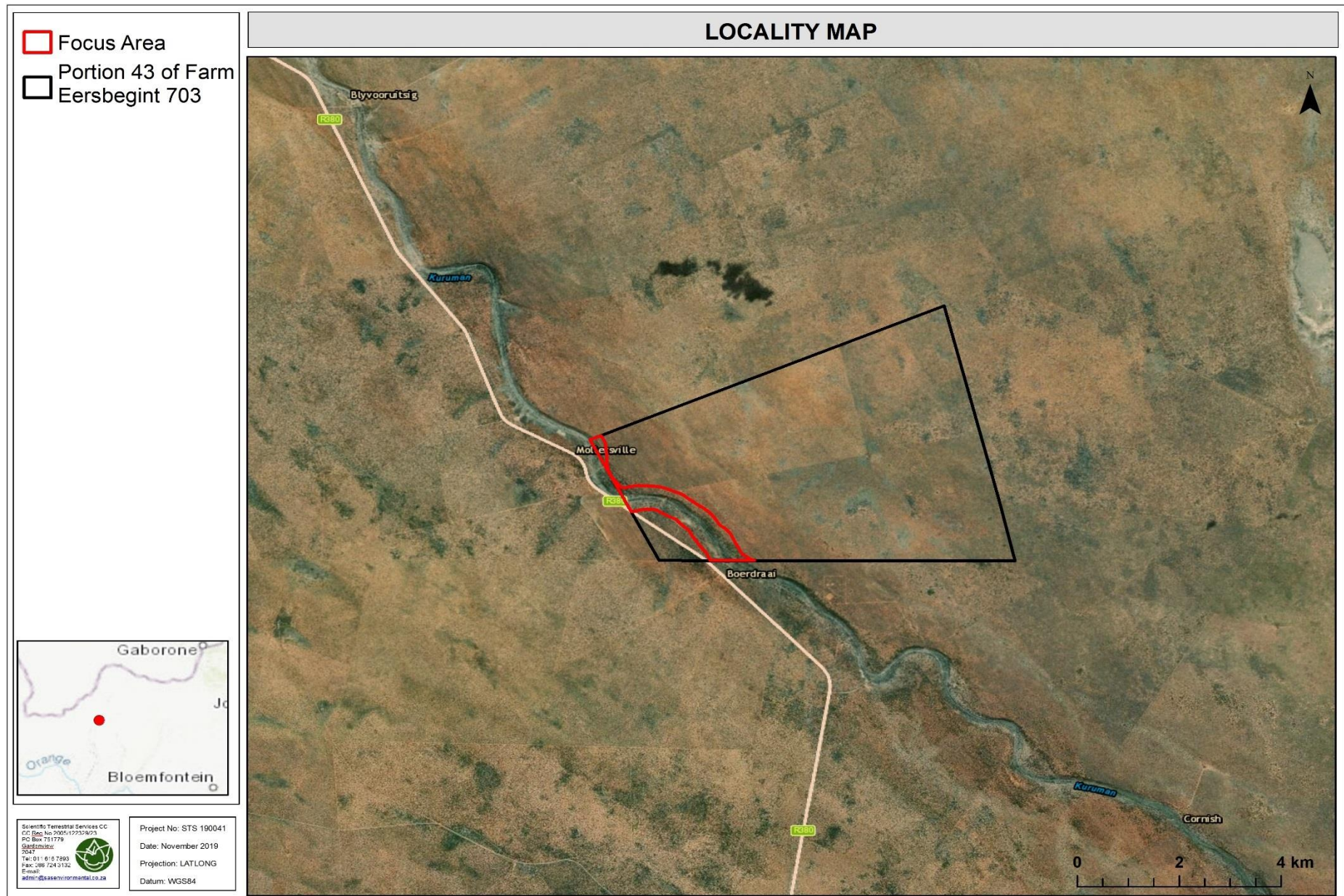


Figure 1: Digital satellite image depicting the location of the focus area and farm portion in relation to surrounding areas.



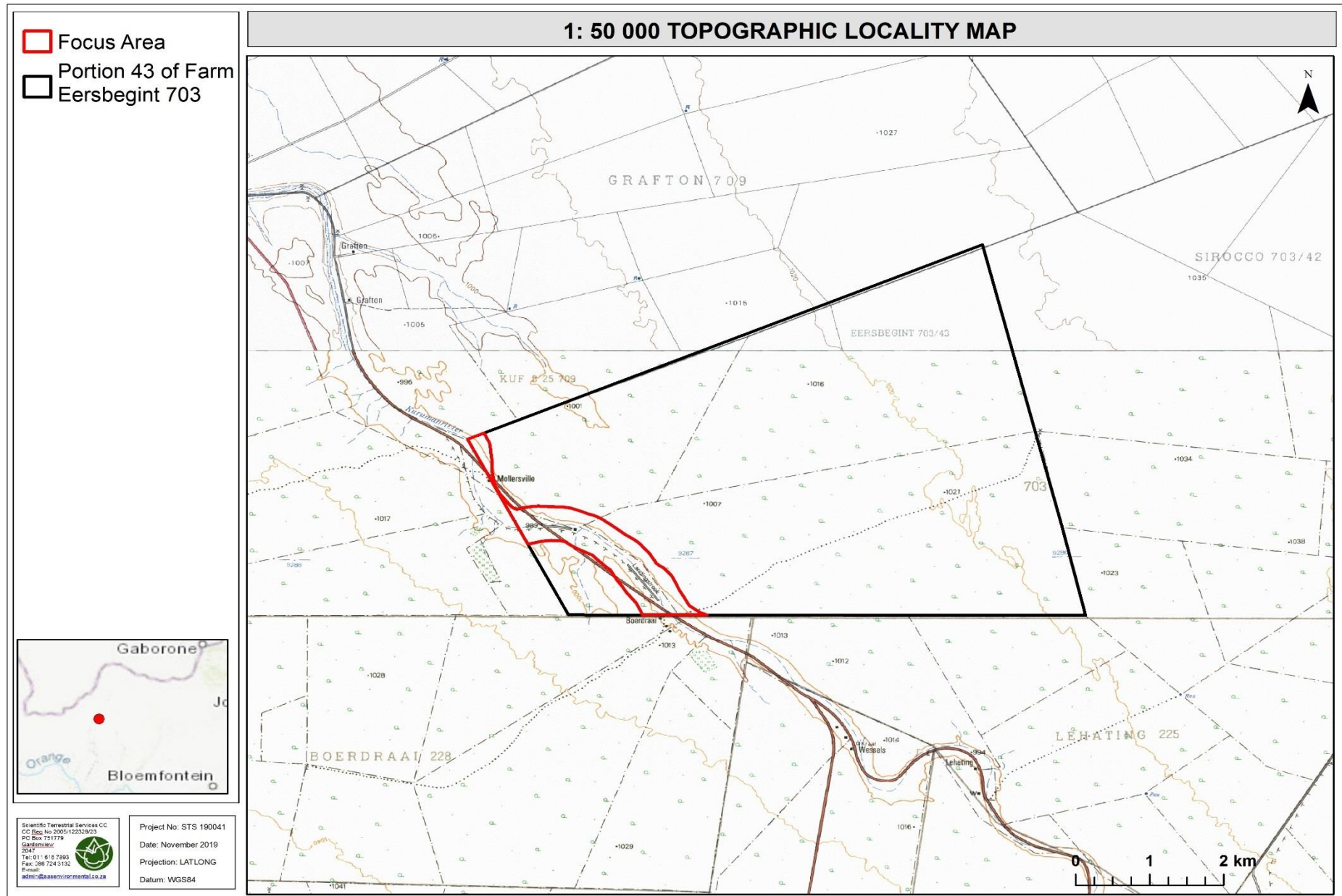


Figure 2: The focus area and farm portion depicted on a 1:50 000 topographical map in relation to the surrounding area.



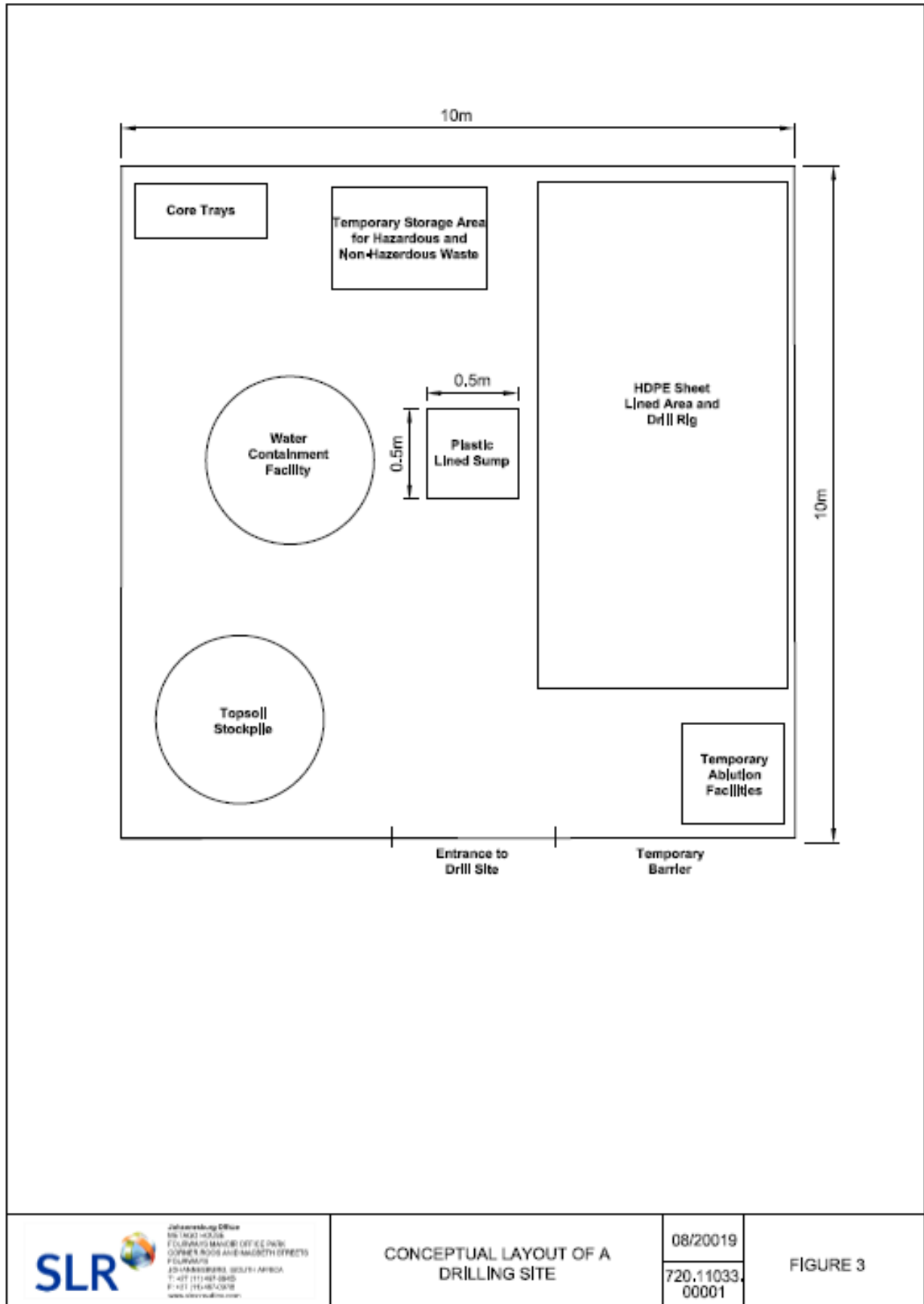


Figure 3: Proposed Conceptual Layout for each Drill Site



1.3 Project Scope

Specific outcomes in terms of this report are outlined below:

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

1.4 Assumptions and Limitations

The following assumptions and limitations apply to this report:

- At the time that this study was conducted, the location of the proposed prospecting sites (including boreholes) and layout of ancillary infrastructure such as access roads, was not provided. Based on the information provided by the EAP, it is the intention of the proponent to focus the prospecting activities within and adjacent to the Kuruman River, and to utilise existing access roads, where feasible. Thus, in line with the precautionary principle, a “worst-case scenario” was assumed when applying the impact assessment, whereby in addition to vegetation clearance for the 10 drill sites, it is envisioned that vegetation clearing for all access roads will also take place;
- The ecological assessment is confined to the focus area (200m on either side of the Kuruman River) and does not include the entire Portion 43 of the Farm Eersbegt 703, nor any of the neighbouring and adjacent properties. The farm portion was however considered as part of the desktop assessment;
- With ecology being dynamic and complex, some aspects (some of which may be important) may have been overlooked. It is, however, expected that most floral and faunal communities had been accurately assessed and considered utilising available desktop information and findings from the field assessment of limited duration;



- Due to the nature and habits of most faunal taxa, it is unlikely that all species would have been observed during a field assessment of limited duration. Therefore, site observations were compared with literature studies where necessary;
- Sampling, by its nature, means that not all individuals are assessed and identified. Some species and taxa associated with the focus area may have been missed during the assessment; and
- The data presented in this report is based on one site visit, undertaken on the 4th and 5th of February 2020 (summer season). A more accurate assessment would require that assessments take place in all seasons of the year. However, on-site data was significantly augmented with all available desktop data. Together with project experience in the area, the findings of this assessment are considered to be an accurate reflection of the ecological characteristics of the focus area.

1.5 Legislative Requirements

The following legislative requirements were considered during the assessment:

- The Constitution of the Republic of South Africa, 1996⁴;
- The National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA);
- The National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEMBA);
- The Minerals and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) (MPRDA);
- The Government Notice 864 Alien and Invasive Species Regulations as published in the Government Gazette 40166 of 2016 as it relates to the National Environmental Management Biodiversity Act, 1998 (Act No.107 of 1998);
- The Conservation of Agricultural Resource Act, 1983 (Act No. 43 of 1983) (CARA);
- The National Forest Act, 1998 (Act No. 84 of 1998)(amended 2001) (NFA); and
- The Northern Cape Nature Conservation Act, 2009 (Act No. 9 of 2009) (NCNCA).

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

⁴ Since 1996, the Constitution has been amended by seventeen amendments acts. The Constitution is formally entitled the 'Constitution of the Republic of South Africa, 1996'. It was previously also numbered as if it were an Act of Parliament – Act No. 108 of 1996 – but since the passage of the Citation of Constitutional Laws Act, neither it nor the acts amending it are allocated act numbers.



2. ASSESSMENT APPROACH

2.1 General Approach

To accurately determine the PES of the terrestrial habitat of the focus area and capture comprehensive data with respect to the terrestrial ecology, the following methodology was used:

- Background data and digital satellite images were consulted prior to the field assessment in order to distinguish broad habitats, vegetation types and potentially sensitive sites. The results of these analyses were then used to focus the fieldwork on specific areas of concern and to identify areas where target specific investigations were required;
- Relevant databases considered during the assessment of the focus area included the South African National Biodiversity Institute (SANBI) Threatened Species Programme (TSP), the Northern Cape Critical Biodiversity Areas (2016), Mucina and Rutherford (2012 and 2018 beta-version), National Biodiversity Assessment (NBA, 2018), Important Bird Areas in conjunction with the South African Bird Atlas Project (SABAP 2), South African Protected and Conservation Areas Databases (SAPAD & SACAD, Quarter 1, 2019), National Protected Areas Expansion Strategy (NPAES, 2011), and International Union for Conservation of Nature (IUCN);
- An on-site assessment of the focus area was conducted on the 4th and 5th of February 2020 in order to confirm the assumptions made during the consultation of the maps and to determine the ecological status of the habitat associated with the focus area. A thorough 'walk through' on foot was undertaken in order to identify the occurrence of the dominant floral species and faunal and floral habitat diversities;
- Specific methodologies for the assessment, in terms of the field assessment and data analysis of faunal and floral ecological assemblages, are presented in Appendix B and C of this report; and
- For the methodologies relating to the impact assessment and development of the mitigation measures, please refer to Appendix D of this report.

2.2 Sensitivity Mapping

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



3. RESULTS OF THE DESKTOP ANALYSIS

3.1 Conservation Characteristics associated with the focus area

The following section contains data accessed as part of the desktop assessment and presented as a “dashboard-style” report below (Tables 1 and 2). The dashboard report aims to present concise summaries of the data on as few pages as possible in order to allow for integration of results by the reader to take place. Where required, further discussion and interpretation are provided.

It is important to note that although all data sources used provide useful and often verifiable, high-quality data, the various databases used do not always provide an entirely accurate indication of the focus area’s actual site characteristics at the scale required to inform the environmental authorisation and/or water use authorisation processes. This information is, however, considered useful as background information to the study. Thus, this data was used as a guideline to inform the assessment and to focus on areas and aspects of increased conservation importance during the site-specific field verification survey.



Table 1: Summary of the conservation characteristics for the farm portion and focus area [Quarter Degree Squares (QDS) 2622DD and 2722BB].

DETAILS OF THE FARM PORTIONS IN TERMS OF MUCINA & RUTHERFORD (2012)				
Biome (Figure 4)	According to Mucina and Rutherford (2012 and 2018 (beta version)) the farm portion falls within two biomes namely the Savanna Biome and the Azonal Vegetation Biome . The focus area falls within the Azonal Vegetation Biome .			
Bioregion (Figure 4)	The majority of the farm portion falls within the Eastern Kalahari Bushveld Bioregion (within the Savanna Biome), with the remaining portions including the entire focus area falling within the Inland Saline Vegetation Bioregion (within the Azonal Vegetation Biome).			
Vegetation Type (Figure 5)	Based on the Mucina and Rutherford database (2012 and 2018 (beta version)), two vegetation types are associated with the farm portion namely the Kathu Bushveld Vegetation Type forming the main vegetation type of the area. The remaining portion of the farm portion and the entire focus area falls within the Southern Kalahari Meksacha Vegetation Type .			
DESCRIPTION OF THE VEGETATION TYPE(S) RELEVANT TO THE FARM PORTIONS (MUCINA & RUTHERFORD 2012, 2018)				
Vegetation Type	Kathu Bushveld (SVk12)		Southern Kalahari Meksacha (AZi3)	
Climate Information	Summer and autumn rainfall with very dry winters.		Subarid region with seasonal, summer-rainfall regime with a slight shift of the major peak towards late summer (February–March).	
	MAP* (mm)	300	MAP* (mm)	239
	MAT* (°C)	18.5	MAT* (°C)	19
	MFD* (Days)	27	MFD* (Days)	21
	MAPE* (mm)	2883	MAPE* (mm)	2945
	MASMS* (%)	85	MASMS* (%)	NA
Altitude (m)	960–1 300		850 – 1100	
Distribution	Northern Cape Province		Northern Cape and North West Provinces	
Geology, Soils & Hydrology	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.		The river channels of this region are embedded within prevalently sandy Kalahari sediments that cover the Precambrian metamorphic crust of the area. The substrate of the dry riverbeds are silty, sandy and rocky, poorly drained and rich in nutrients though the ionic composition of the soils, in particular rivers show considerable differences. The banks of the dry rivers can cut deep into duricrust (calcrete or silcrete and various transitions between these end-members, and in places also ferricretes), sometimes vertical bluffs (steep cliffs) of a few metres high may develop. The mekgacha may stay without any water for a very long time and floods (sometimes of considerable magnitude) occur only in response to dramatic short-term precipitation events. Some of the rivers such as the Kuruman River is likely to experience effective subsurface flow of water judging from the near-continuous belt of trees.	
Conservation	Least threatened. Target 16%. None has been conserved in statutory conservation areas. More than 1% is already transformed, including the iron ore mining locality at Sishen, one of the biggest open-cast mines in the world. Erosion is very low.		Least threatened. Target 24%. Already 18% has been statutorily conserved in the Kgalagadi Transfrontier Park and Molopo Nature Reserve. About 2% has been transformed by road building. The mekgacha are under strong utilisation pressure, both from wildlife (to graze and for salt licks) and domestic animals (grazing, browsing and animal penning). Alien woody <i>Prosopis</i> species occur as invasive plants in places.	
Vegetation & landscape features	Medium-tall tree layer with <i>Acacia erioloba</i> in places, but mostly open and including <i>Boscia albitrunca</i> as the prominent trees. Shrub layer generally most important with, for example, <i>Senegalia mellifera</i> , <i>Diospyros lycioides</i> and <i>Lycium hirsutum</i> . Grass layer is variable in cover.		Sparse, patchy grasslands, sedge-lands and low herblands dominated by C ₄ grasses (<i>Panicum spp.</i> , <i>Eragrostis spp.</i> , <i>Enneapogon spp.</i> , <i>Tragus spp.</i> , <i>Chloris spp.</i> , and <i>Cenchrus spp.</i>) on the bottom of (mostly) dry riverbeds. Low shrublands in places with patches of taller shrubland (with <i>Schotia afra</i>) on the banks of the rivers. Relatively tall <i>Acacia erioloba</i> trees can form a dominant belt along some of the rivers, for example the middle and lower reaches of the Kuruman River. In some other rivers the taller trees are scattered.	

MAP – Mean annual precipitation; MAT – Mean annual temperature; MAPE – Mean annual potential evaporation; MFD = Mean Frost Days; MASMS – Mean annual soil moisture stress (% of days when evaporative demand was more than double the soil moisture supply)



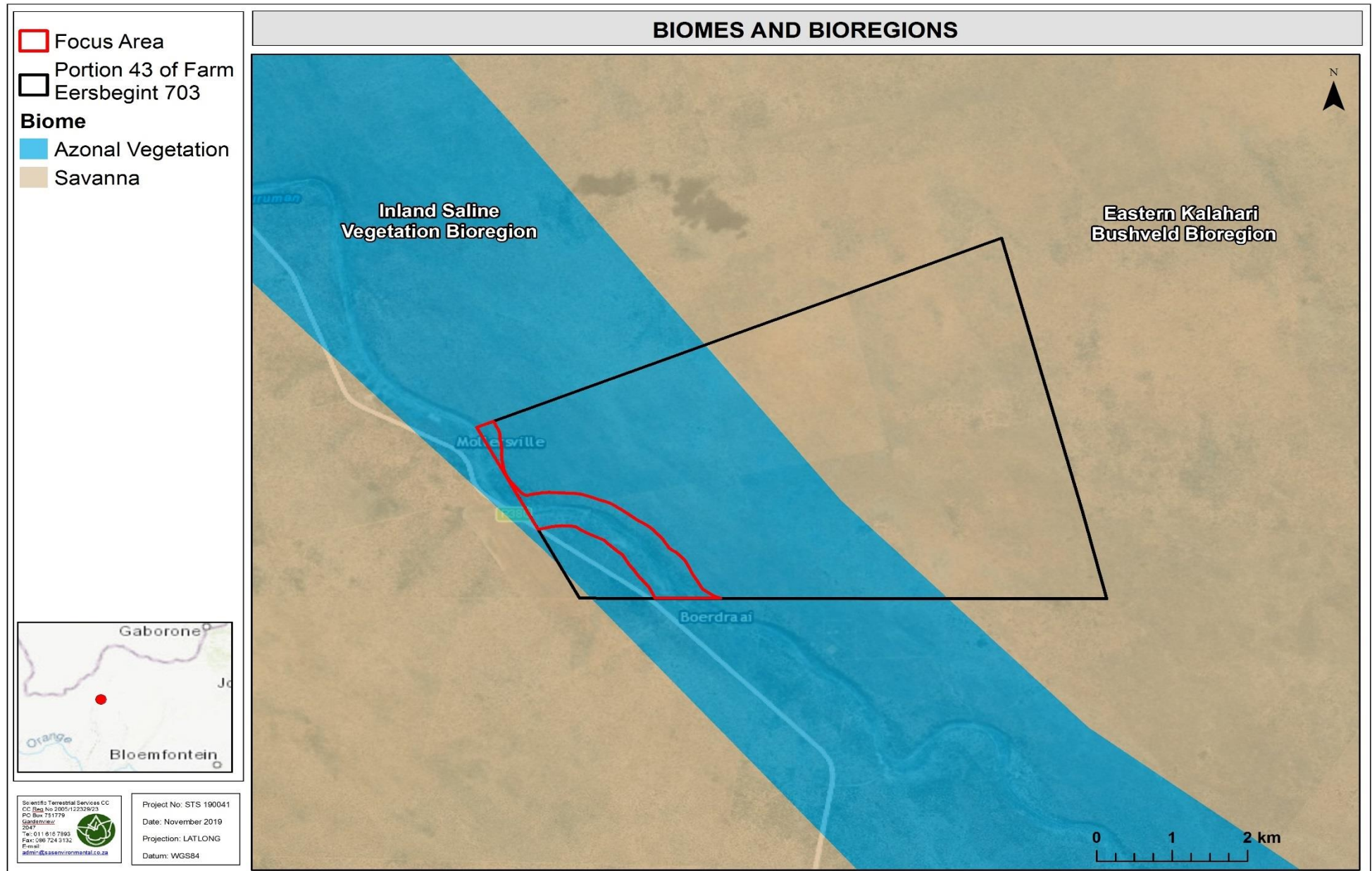


Figure 4: Biomes and bioregions associated with the focus area and farm portion (Mucina and Rutherford, 2012 & 2018 databases).



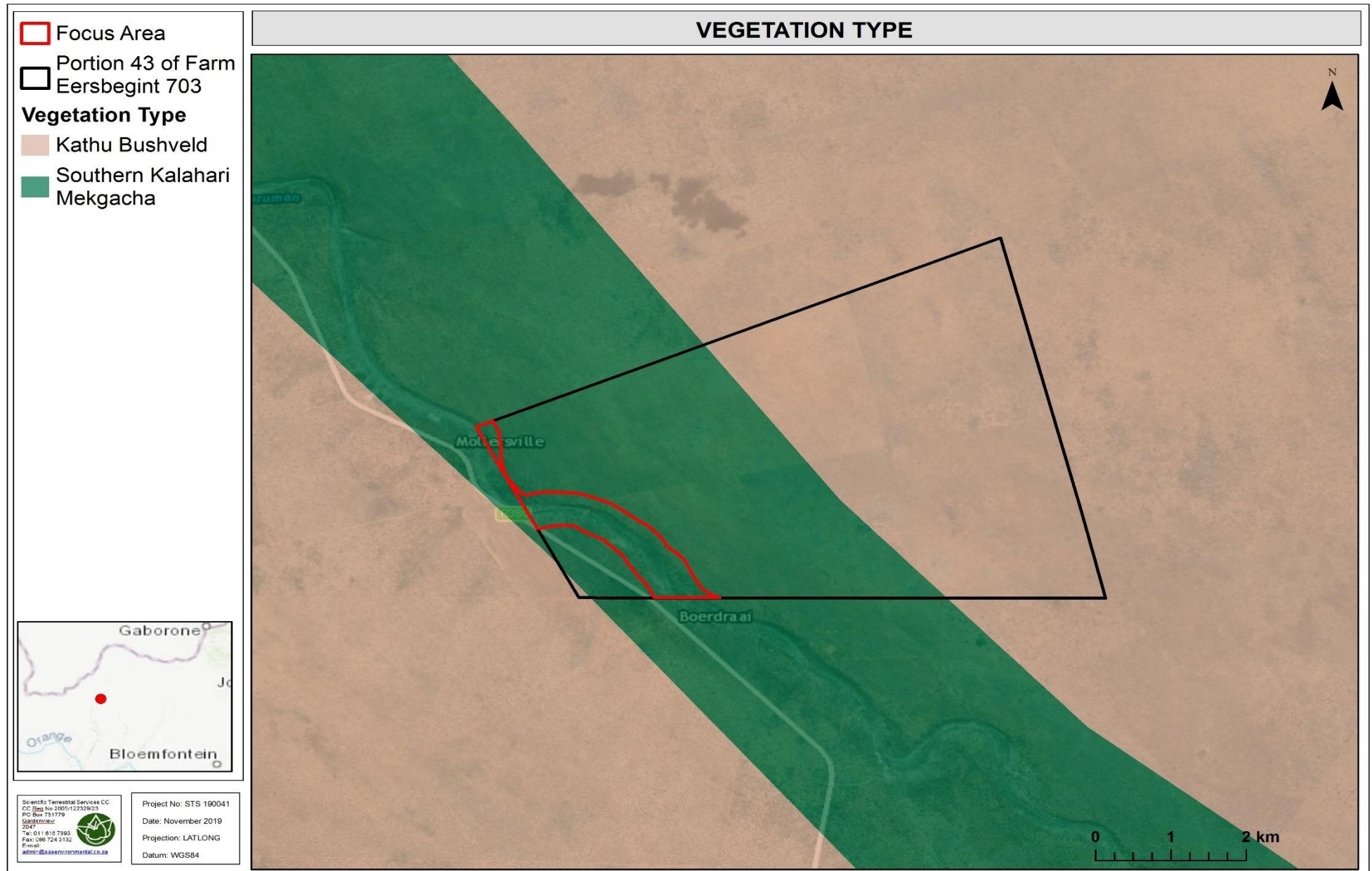


Figure 5: Vegetation types associated with the focus area and farm portion (Mucina and Rutherford, 2012 & 2018 databases).



Table 2: Summary of the terrestrial conservation characteristics for the focus area and farm portion (QDS 2622DD and 2722BB).

CONSERVATION DETAILS PERTAINING TO THE FARM PORTIONS (VARIOUS DATABASES)	
National Threatened Ecosystems (2011)	According to the National Threatened Ecosystems Database, the farm portion and focus area fall within a Least Concerned Ecosystem. For Environmental Impact Assessments (EIAs), the 2011 National list of Threatened Ecosystems remains the trigger for a Basic Assessment in terms of Listing Notice 3 of the EIA Regulations published under the National Environmental Management Act, 1998 (Act No. 107 of 1998). However, the updated 2018 ecosystem threat status have been considered in the assessment of the impact significance within EIAs.
NBA (2018) (Figure 6)	Ecosystem types are categorised as “not protected”, “poorly protected”, “moderately protected” and “well protected” based on the proportion of each ecosystem type that occurs within a protected area recognised in the Protected Areas Act, 2003 (Act No. 57 of 2003), and compared with the biodiversity target for that ecosystem type. The entire focus area and a section of the farm portion falls within the remaining extent of the Least Concerned Southern Kalahari Mergacha terrestrial ecosystem that is currently Moderately Protected (moderately protected meaning that less than 100%, but more than 50% of the biodiversity target is met in formal protected areas within this ecosystem). The majority of the farm portion falls within the Least Concerned Kathu Bushveld terrestrial ecosystem that is currently Poorly Protected . If less than 50% of the biodiversity target is met, it is classified it as Poorly Protected.
SAPAD (2018); SACAD (2018) and NPAES (2009)	According to the South African Conservation Areas Database (SACAD, 2019), South African Protected Areas Database (SAPAD, 2019) and National Protected Areas Expansion Strategy (NPAES, 2009) there are no protected areas situated within a 10km radius of the farm portion or focus area.
IBA (2015)	The focus area and farm portion do not fall within an Important Bird and Biodiversity Area (IBA), nor are there any IBAs situated within 10km of the focus area and farm portion.
NORTHERN CAPE CRITICAL BIODIVERSITY AREAS (2016) (Figure 7)	
Critical Biodiversity Area (CBA) Category 1	CBA 1 are areas that are irreplaceable or near-irreplaceable (i.e. high selection frequency) for meeting biodiversity targets. There are no or very few other options for meeting biodiversity targets for the features associated with these areas. The entire focus area is situated within a Category 1 Critical Biodiversity Area (CBA).
Ecological Support Area (ESA)	ESAs are areas which must retain their ecological processes in order to meet biodiversity targets for ecological processes that have not been met in CBAs or protected areas. Similarly, ESAs are required to meet biodiversity targets for representation of ecosystem types or species of special concern when it's not possible to meet them in CBAs. These areas support ecological functioning of protected areas or CBAs or a combination of these (SANBI, 2017). The majority of the farm portion falls within Ecological Support Areas.
Other Natural Area	ONA consist of all those areas in good or fair ecological condition that fall outside the protected area network and have not been identified as CBAs or ESAs (SANBI, 2017). The remaining portions of the farm portion that are not listed as CBAs anor ESAs fall within an area classified as “Other Natural Areas”.
MINING AND BIODIVERSITY GUIDELINES (2013) (Figure 8)	
Highest Biodiversity Importance	According to the Mining and Biodiversity Guidelines database (2013), the entire focus area falls within an area considered to be of Highest Biodiversity Importance . Risk for mining: Highest risk for mining. Implications for mining: Environmental screening, EIAs and their associated specialist studies should focus on confirming the presence and significance of these biodiversity features, and to provide a site-specific basis on which to apply the mitigation hierarchy to inform regulatory decision making for mining, water use licences, and environmental authorisations. If they are confirmed, the likelihood of a fatal flaw for new mining projects is very high because of the significance of the biodiversity features in these areas and the associated ecosystem services.
Moderate Biodiversity Importance	The majority of the farm portion is situated within an area considered to be of Moderate Biodiversity Importance . Moderate biodiversity important areas include ESA's, vulnerable ecosystems as well as focus areas for protected area expansion. Risk for mining: Moderate risk for mining. Implications for mining: EIAs and associated specialist studies should focus on confirming the presence and significance of these biodiversity features, identifying features (e.g. threatened species) not included in the existing datasets, and on providing site-specific information to guide the application of the mitigation hierarchy. Authorisations may set limits and specify biodiversity offsets that would be written into licence agreements and/or authorisations. The remaining portions of the farm portion is currently not ranked.



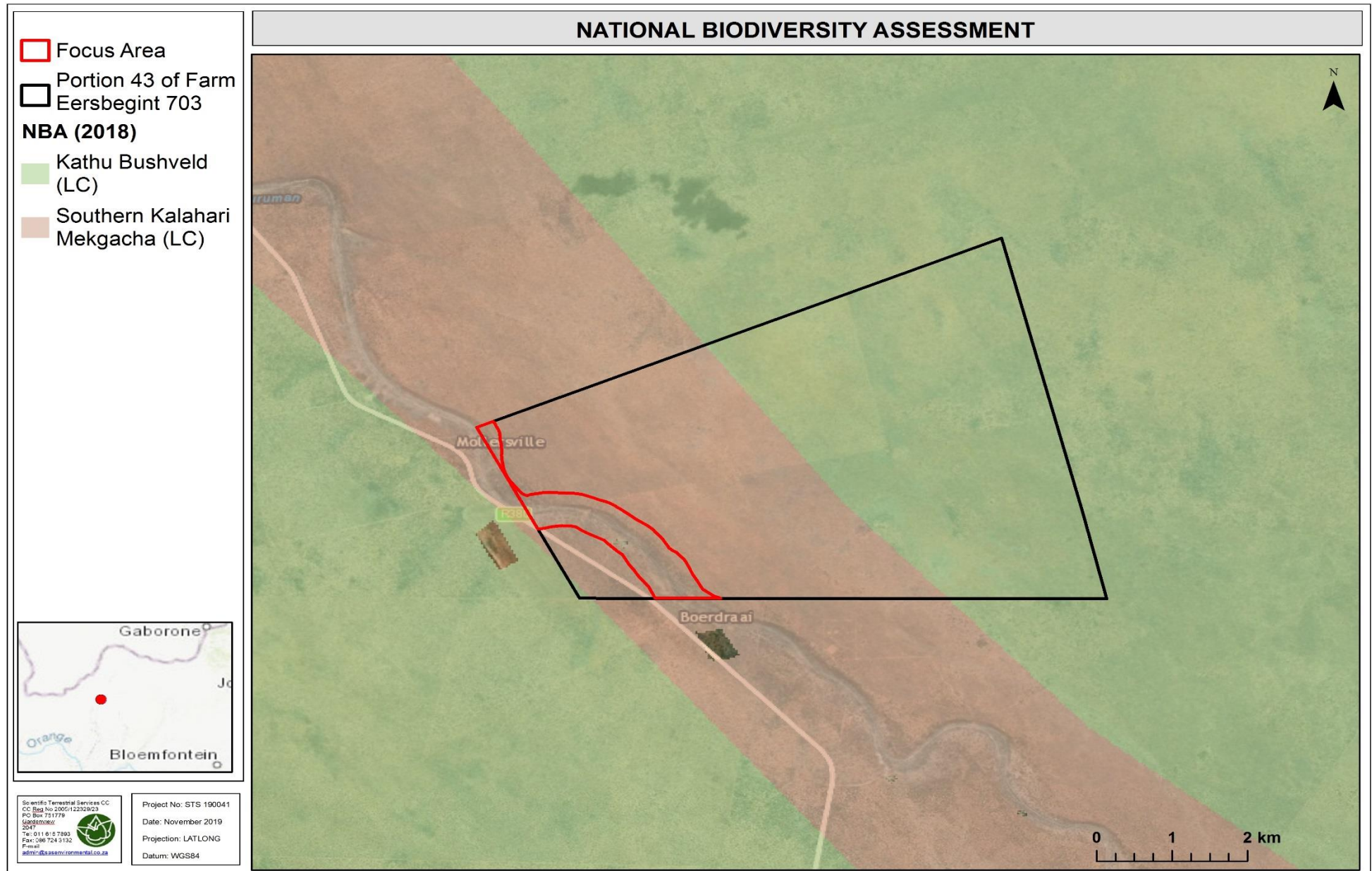


Figure 6: The focus area and farm portion in relation to the remaining sections of the ecosystems (National Biodiversity Assessment, 2018).



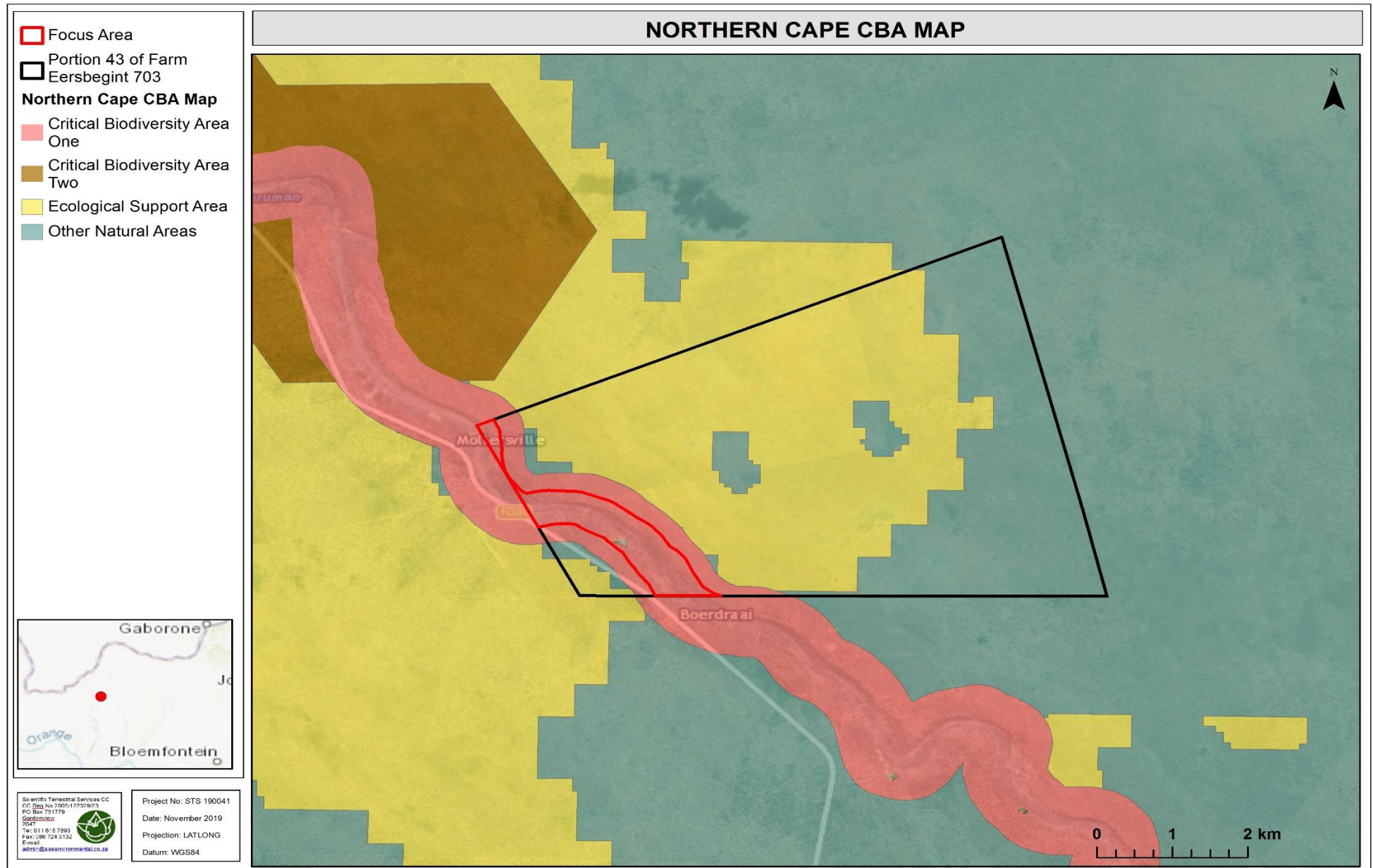


Figure 7: CBAs, ESAs and ONAs associated with the focus area and farm portion according to the Northern Cape CBA Map (2016).



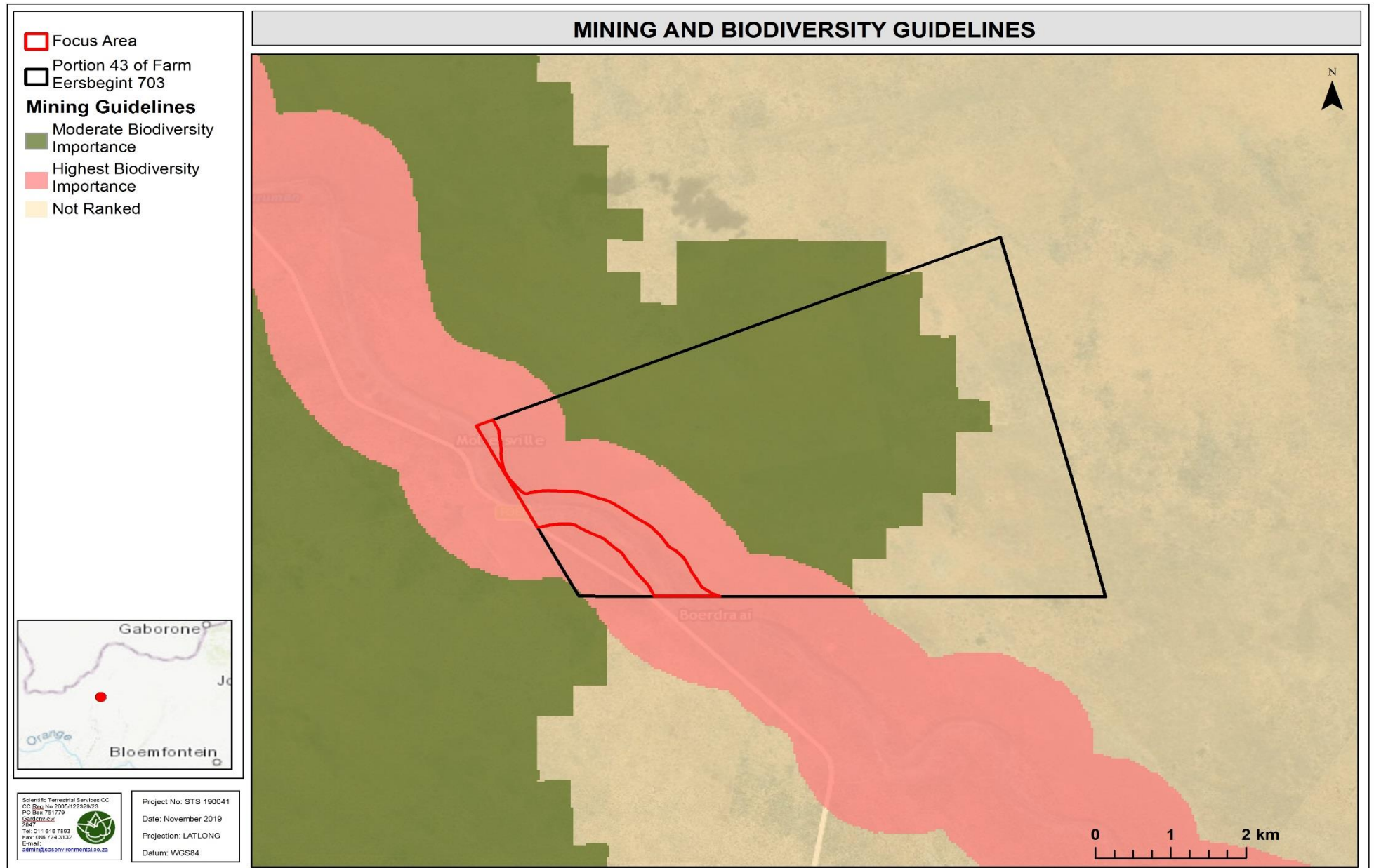


Figure 8: Importance of the focus area and farm portion according to the Mining and Biodiversity Guidelines (2013).



4. BIODIVERSITY ASSESSMENT RESULTS

4.1 Habitat Units

During the field assessment, it was evident that the focus area is subject to some anthropogenic activities, predominantly associated with farming practices such as grazing by livestock. These influences have resulted in habitat disturbance through the establishment and spread of AIP species such as *Prosopis glandulosa* as well as bush encroachment by *Vachellia karroo*. Habitat degradation was considered to be most severe within the riparian zone of the Kuruman River, with the habitat northeast of the Kuruman River considered to be mostly intact.

Mucina and Rutherford (2018) indicate the entire focus area to fall within an Azonal Vegetation type namely Southern Kalahari Mergacha. According to Mucina & Rutherford (2012) 'Mergacha' is of Setswana origin meaning 'Dry (River) Valley', and the Mergacha is considered to be the remains of an ancient extensive riverine system of the 'Kalahari River'. The flow of the Kalahari River was interrupted by the dry periods of the Eocene-Miocene, and was further decimated during the Pliocene-Pleistocene dry periods. During the field assessment the remnant of this ancient River was evident. The entire focus area could, however not be described as Southern Kalahari Mergacha, with the geology and species composition of the portion north of the Kuruman River, as well as portions to the southwest of the River more consistent with Kathu Bushveld. Areas associated with increased anthropogenic activity were also identified to the southwest of the Kuruman River and due to severe habitat degradation, these areas can no longer be described as either Southern Kalahari Mergacha or Kathu Bushveld.

Three habitat units were subsequently identified within the focus area, i.e. the Southern Kalahari Mergacha, Kathu Bushveld and the Degraded Habitat. The sections below provide a description of the habitat units while Figure 10 provides visual representation of these habitats. Table 3 provides a summary of the findings from a floral perspective and Table 4 provides the faunal findings.

Southern Kalahari Mergacha

This habitat unit includes the Kuruman River, its associated riparian zone, as well as historic rocky slopes southwest of the Kuruman River. The geology of the Southern Kalahari Mergacha according to Mucina and Rutherford (2012) comprises Sandy Kalahari sediments within the river channels, with the banks of the dry rivers cutting into duricrust (calcrete or



silcretes and in places also ferricretes), and vertical buffs (steep cliffs) of several metres in places. According to Shaw *et al.*, (1992), the Mekgacha is highly variable in morphology, with the Kuruman Valley between Hotazel and the confluence with the Malopo maintaining a distinctive duricrust-sided valley with the presence of two terraces of 3 m and 8 m above the valley floor. This was evident within the focus area and assisted in defining the boundaries of the Southern Kalahari Mekgacha.

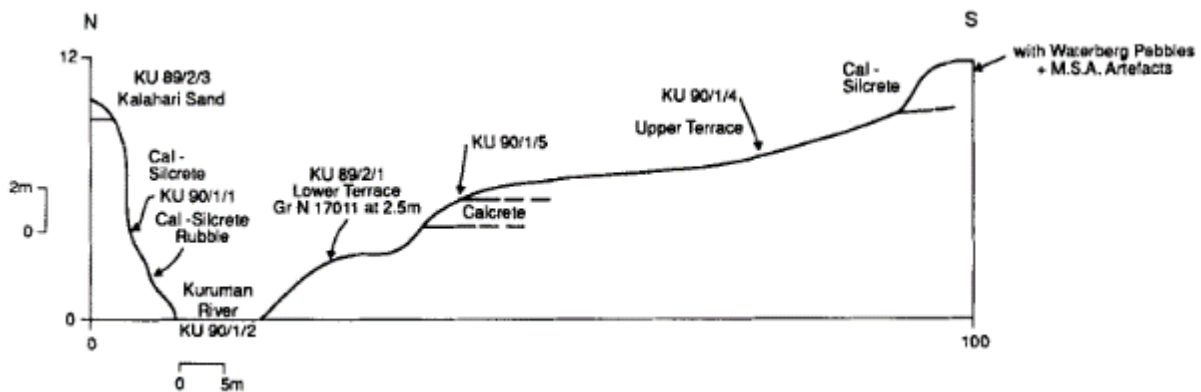


Figure 9: Cross-section of the Kuruman Valley (Southern Kalahari Mekgacha) at Grootdrink approximately 37 km north of Hotazel (Shaw *et al.*, (1992). This diagram was typical of the Southern Kalahari Mekgacha associated with the focus area.

The species composition of this habitat unit was not representative of the species composition listed for the Southern Kalahari Mekgacha within Mucina & Rutherford (2012), however the species recorded are typical of the area and are considered indigenous to the region.

Kathu Bushveld

Mucina & Rutherford describe the geology of the Kathu Bushveld as deep (>1.2 m) aeolian red sandy soils of Hutton and Clovelly soil forms, which was typical of the Kathu Bushveld Habitat unit associated with the focus area. Apart from the geology the species composition and vegetation structure were typical of the Kathu Bushveld vegetation type. Please refer to Table 3 below for further details pertaining to species composition.

Degraded Habitat

The Degraded habitat unit is limited in extent and includes an informal farmstead together with vegetable patches and kraals, as well as a recently active quarry. These areas, although limited in extent, have been significantly altered, comprising either no vegetation in the case of the quarry or of limited vegetation dominated by AIP. At the time of the assessment the subsistence vegetable patches were not associated with crops but were associated with bare soils.



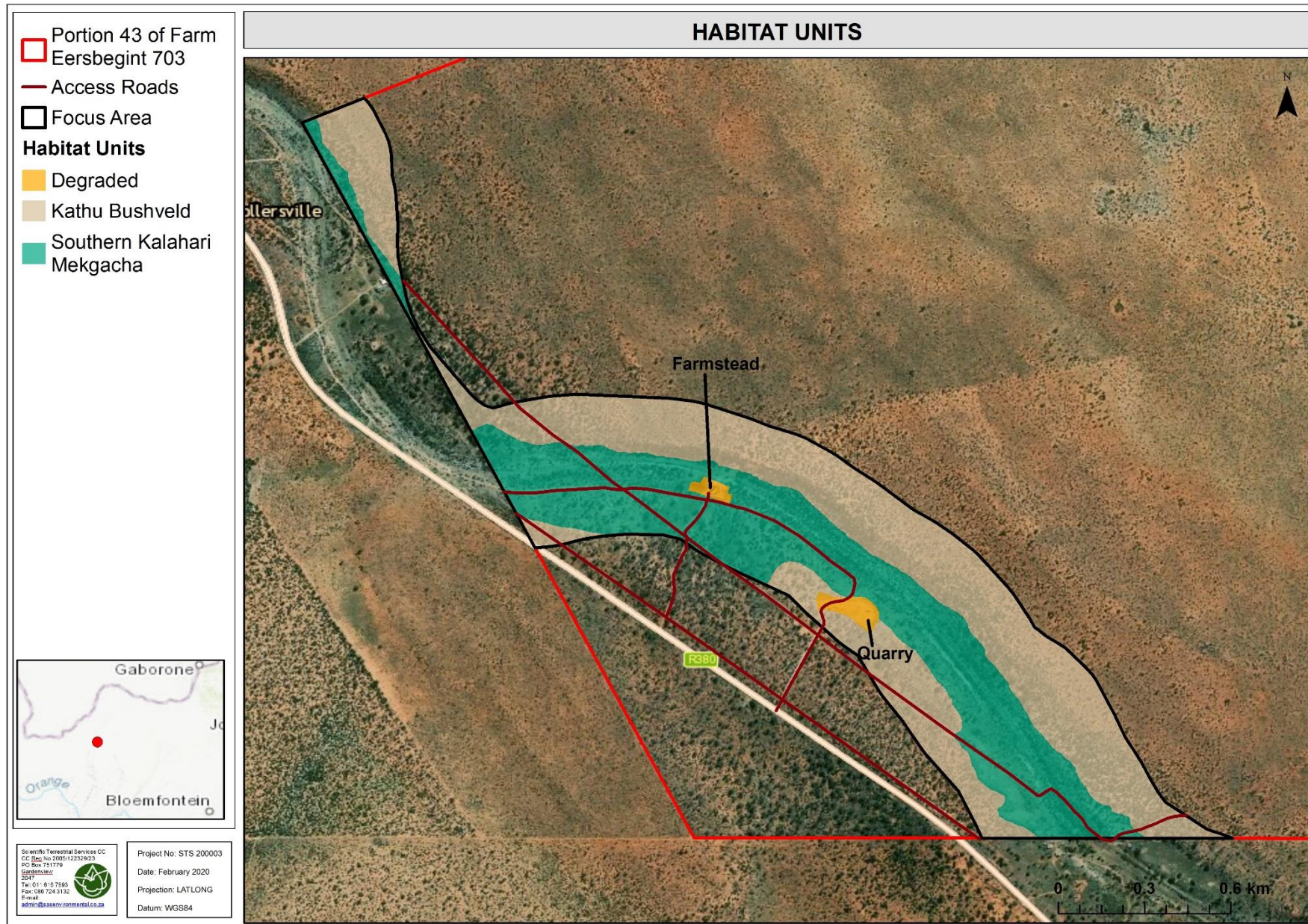
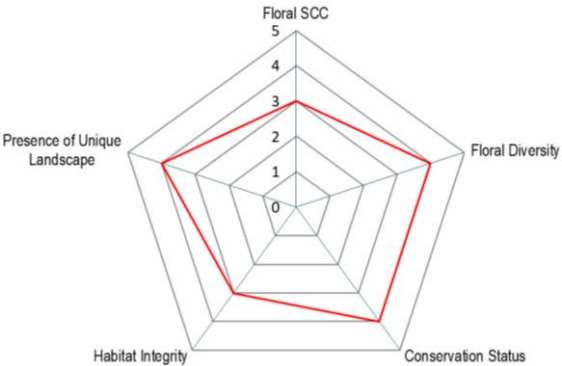
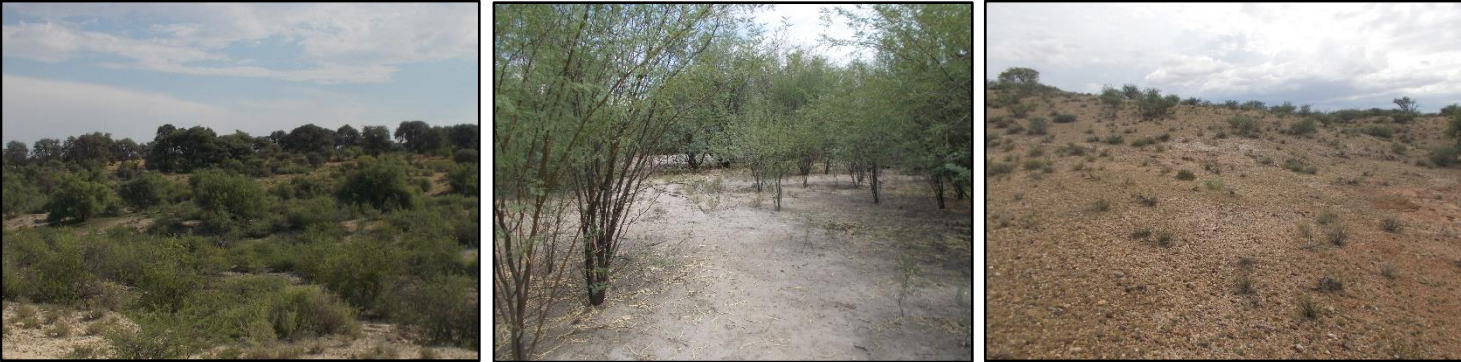
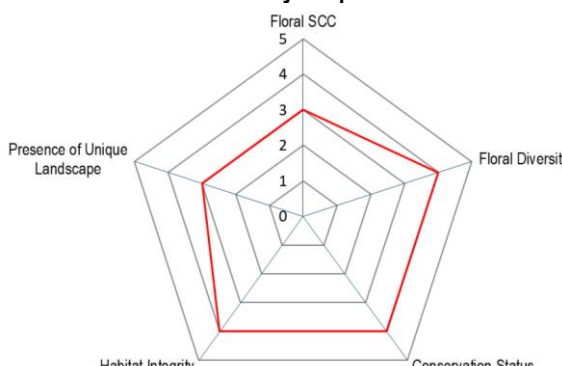



Figure 10: Habitat units associated with the focus area.



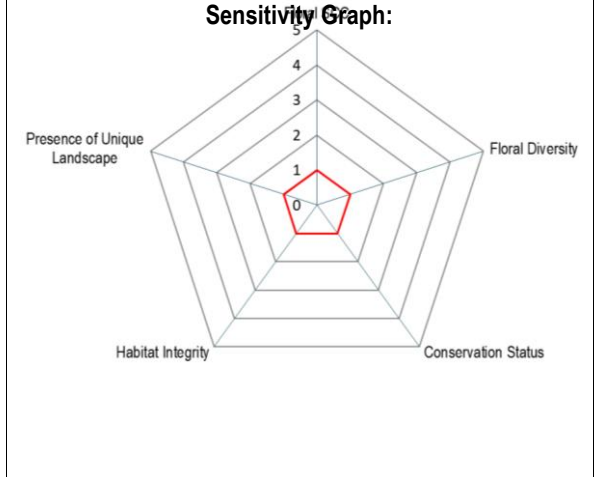
4.2 Floral Assessment Results

Table 3: Floral field assessment results associated with the focus area.

Habitat Unit	Southern Kalahari Mekgacha	Habitat Sensitivity:	Moderately High
<p>Sensitivity Graph:</p> 	<p>Representative Photographs</p>  <p>Notes on photographs: Left: Representative photographs of the Southern Kalahari Mekgacha. The Kuruman River can be seen in the valley, with tall <i>Vachellia erioloba</i> trees forming a prominent belt in places along the riverbank. Middle: Portions of the Kuruman River are encroached by the AIP species <i>Prosopis glandulosa</i> and the indigenous species <i>Vachellia karroo</i>. Right: Duricrust sided terrace associated with the Southern Kalahari Mekgacha.</p>		
Habitat Unit	Kathu Bushveld	Habitat Sensitivity:	Moderately High
<p>Sensitivity Graph:</p> 	<p>Representative Photographs</p>  <p>Notes on photographs: Representative photographs of the Kathu Bushveld. The red aeolian sands associated with this vegetation type is evident. Also evident is the variable grass layer, the prominent shrub layer and scattered tall <i>Vachellia erioloba</i> trees typical of the Kathu Bushveld.</p>		



Habitat Unit	Degraded Habitat	Habitat Sensitivity:	Low
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Representative Photographs



Notes on photographs: **Left:** Degraded habitat associated with the informal farmstead. A vegetable patch is visible in the central portion of the photograph, with a chicken coop situated to the left of the photograph. **Middle:** Housing associated with the farmstead, comprising predominantly bare soils, and the AIP *Melia azedarach* situated to the right of the photograph. **Right:** Bare soils associated with the quarry.

Floral SCC Discussion

During the field assessment, no threatened floral species were observed within the focus area. A number of national and provincial protected species were, however noted:

- National Forest Act, 1998, (Act No. 84 of 1998), as amended in September 2011 (NFA):
 - *Vachellia erioloba*, *V. haematoxylon*, and *Boscia albitrunca*;
- Northern Cape Nature Conservation Act, 2009 (Act No. 9 of 2009) (NCNCA):
 - Schedule 1: *Lessertia frutescens subsp. frutescens*; and
 - Schedule 2: *Boscia albitrunca*, *Nerine laticoma*, *Pergularia daemia*, and *Jamesbrittenia burkeana*

The majority of NFA protected individuals, as well as the NCNCA Schedule 1 protected species were observed within the Kathu Bushveld, with the majority of NCNCA Schedule 2 species and individuals recorded within the Southern Kalahari Mekgacha. None of the protected species recorded are considered to be threatened according to the Red List of South African Plants (2017).

A number of other protected floral species have an increased probability to occur within the focus area. Refer to Section 3.5 below for a detailed discussion.

Once final layouts of the proposed prospecting activities are available, a summer walkdown (January to March) will have to be undertaken of the prospecting footprint (including drill sites and access roads) and all protected floral species be marked. Prior to any ground clearing activities, permits will have to be obtained from the Department of Environment, Forestry and Fisheries (DEFF) and the Northern Cape Department of Environment and Nature Conservation (NCDENC) for the removal/ destruction of any protected species.

Floral Diversity

The floral diversity for the Southern Kalahari Mekgacha and Kathu Bushveld is considered to be moderately high, while the floral diversity of the Degraded habitat considered to be low.

The increased diversity associated with the Southern Kalahari Mekgacha can be attributed to the varying soil geology associated with this habitat unit ranging from deep sandy soils within the Kuruman River and associated riparian zone, which provide habitat for a number of taller trees, as well as the calcrete duricrust associated with the terraces within the Kuruman Valley, which support a number of dwarf shrubs and herbs. The species composition associated with this habitat unit is not considered well represented of the species listed for the Southern Kalahari Mekgacha (Mucina & Rutherford, 2012), however the species are predominantly indigenous and typical of dry river beds or calcrete outcrops within a semi-desert landscape. Species representative of the Southern Kalahari Mekgacha include: *Vachellia erioloba* (protected), *Dicoma capensis*, *Tribulus terrestris*, *Stachys spathulate*, and *Calobota linearifolia*. Species typical of a semi-desert landscape include: *Lycium cinereum*, *Rhigozum trichotomum*, *Aptosimum albomarginatum*, *Barleria rigida*, *Monechma genistifolium subsp. austral*, *Eragrostis truncate*, *Fingerhuthia africana*, and *Limeum argute-carinatum*.



The species composition of the Kathu Bushveld can be described as a medium tall tree layer with *Vachellia erioloba* in places, but mostly open with a prominent shrub layer dominated by *Senegalia mellifera* and *Grewia flava*. A number of species indigenous to the Kathu Bushveld have been recorded during the site assessment and include amongst others: *Diospyros lycioides*, *Rhigozum brevispinosum*, *Terminalia sericea*, *Aristida meridionalis*, *Eragrostis lehmanniana*, *Schmidtia kalahariensis*, *Stipagrostis ciliate*, *Hermbsstaedtia fleckii*, *Nolletia arenosa* (*chrysocomoides*), and *Senna italica* subsp. *arachoides*.

The low diversity of the degraded habitat can be attributed to vegetation clearing that has historically taken place within this habitat unit.

Refer to Appendix F for a list of all species observed within the different habitat units during the field assessment.

Conservation Importance

Both the Southern Kalahari Mekgacha and the Kathu Bushveld vegetation types are considered to be Least Threatened (National Threatened Ecosystems, 2011; and Mucina & Rutherford). Despite the least threatened status of these vegetation types, the National Biodiversity Assessment (2018) indicate the focus area to form part of the remaining extent of the Southern Kalahari Mekgacha. Based on the field assessment results, the vegetation within the focus area, with the exception of the degraded habitat can be considered as the remaining extent of both the Southern Kalahari Mekgacha and the Kathu Bushveld. The Northern Cape CBA Dataset (2016) indicate the focus area as a CBA 1, meaning that it has been selected as an irreplaceable area to reach conservation targets within the province. With the moderately high sensitivity attributed to the Southern Kalahari Mekgacha and Kathu Bushveld habitat units within this assessment, the CBA status of the focus area is confirmed. This area is further classified to be of Highest Biodiversity Importance within the Mining and Biodiversity Guidelines (2013) dataset. The conservation importance of the focus area with the exception of the degraded habitat is considered to be moderately high.

During the field assessment a notice board approximately 1.5 km southeast of the focus area was observed by the specialist indicating that the area has been set aside as a biodiversity offset area by Tshipi Borwa Mine. The extent of this offset area has been requested by the specialist from the Tshipi Contact person, but no indication have been obtained at the time of the submission of this report. The extent of the offset area should be obtained, and it should be ensured that the proposed prospecting activities do not fall within this offset area.

Habitat integrity / Alien and Invasive species

The focus area has been subject to livestock grazing and anthropogenic activities typically associated with a farming community such as the establishment of farmsteads, informal roads, and installation of fences for grazing camps. These activities have resulted in the establishment of AIP species in places, with the most significant impact from AIPs noted within the southern portion of the Kuruman River, where proliferation by *Prosopis glandulosa* was considered significant. Portions of the Kuruman River was further associated with bush encroachment by the indigenous species *Vachellia Karroo*. Despite severe habitat degradation in portions of the Kuruman River, the Southern Kalahari Mekgacha still supports a number of species typically associated with white sandy soils and calcrete outcrops in a semi-desert environment. The habitat integrity of the Southern Kalahari Mekgacha is considered to be of an intermediate level.

Establishment of the AIP *Prosopis glandulosa* was noted within the Kathu Bushveld, however infestation was not significant. Bush encroachment by *Senegalia mellifera* was also noted in small portions of the Kathu Bushveld, but again the impact is not considered extensive nor typical of Kathu Bushveld associated with high levels of anthropogenic activities. The habitat integrity of the Kathu Bushveld habitat unit is considered to be moderately high.

Severe habitat degradation has taken place within portions of the focus area as this discussed. The degraded habitat can no longer be considered representative of either the Southern Kalahari Mekgacha or the Kathu Bushveld, and the habitat integrity of this habitat unit is low.

Presence of Unique Landscape

Despite the habitat degradation of the Southern Kalahari Mekgacha, the habitat unit can still be considered a unique landscape, as it is associated with the Kuruman River. Despite the portion of the Kuruman River associated with the focus area being considered as an episodic system, the river is still associated with subsurface flow, which supports a number of tall trees, particularly *Vachellia erioloba*, which in turn provide habitat and services for a variety of floral and faunal species (Seymour & Milton, 2003) (refer to Table 4 below). The calcrete duricrust side valleys further support species adapted to shallow soils.

The Kathu Bushveld habitat is considered a least threatened vegetation type and is well represented throughout the larger region. Only 1% of this vegetation type is, however conserved, with large portions severely grazed by domestic livestock, which has altered the habitat integrity over large parts of the vegetation type. The Kathu Bushveld within the focus area is considered largely intact and can be considered somewhat unique.

The Degraded Habitat Unit can no longer be considered unique due to the altered habitat integrity of this habitat unit.



Business Case and Conclusion:

The majority of the focus area is considered to be of moderately high importance from a floral perspective due to the ability of the area to support protected floral species, conservation importance attributed to the focus area, and the floral diversity, and habitat integrity associated with the focus area.

The proposed prospecting activities will include 10 drill site of 10 m x 10 m for which vegetation will have to be cleared. The proponent proposes to use as much of the existing roads as possible to access the drill sites. As no layout have been provided at the time of the assessment, it is not possible to accurately determine where these roads will be and it is considered highly likely that additional roads will have to be created, which in turn will result in habitat fragmentation. Current habitat degradation is considered higher within the area south west of the Kuruman River, with access roads already running along the river. It is subsequently recommended that prospecting activities largely be undertaken to the southwest of the Kuruman River, as this will likely limit the number of additional roads that will have to be created for the prospecting activities, and overall limit the impact on floral habitat fragmentation and the continuation of the area to function as a CBA. It is further considered imperative that all areas cleared for prospecting be rehabilitated using indigenous species, and continually be monitored for the establishment of AIP species until natural processes have taken over.

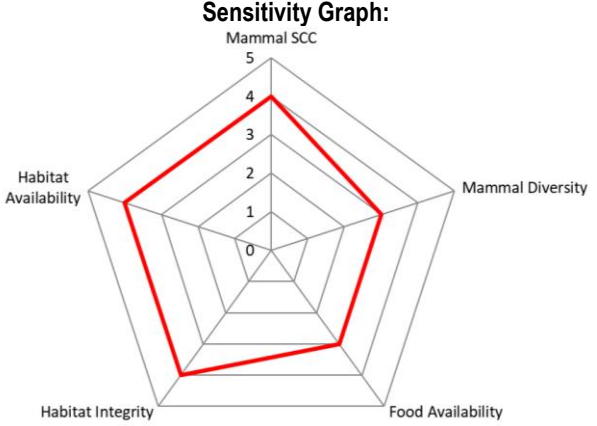

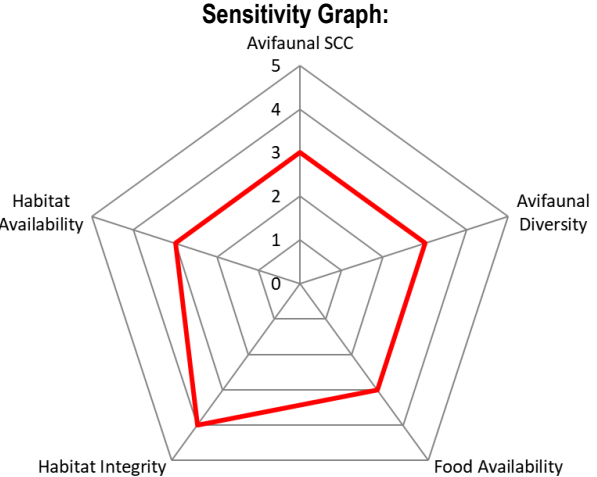

Once final layouts of the proposed prospecting activities are available, a summer walkdown (January to March) will have to be undertaken of the prospecting footprint (including drill sites and access roads) and all protected floral species be marked. Permits will have to be obtained from the Department of Environment Forestry and Fisheries (DEFF) and the Northern Cape Department of Environment and Nature Conservation (NCDENC) for the removal/ destruction of protected species. It is recommended that herbaceous species be rescued and be relocated to adjacent areas or be utilised during the rehabilitation activities. It is recommended that as far as is possible all trees >3 m be avoided during the prospecting activities as these individuals provide habitat for a number of floral and faunal species under canopies. The fact that an area to the east has been set aside as a biodiversity offset area by Tshipi Borwa Mine must be considered as part of the prospecting layouts to ensure there is no conflict of interest.

It is recommended that concurrent rehabilitation be implemented, and that all drill sites and access roads be rehabilitated as soon as prospecting activities are moved to the next drill site. This will limit the establishment and subsequent spread of AIP species. This is of importance where prospecting takes place within the Kuruman River, and where severe infestation by *Prosopis glandulosa* have been noted within portions of the river.



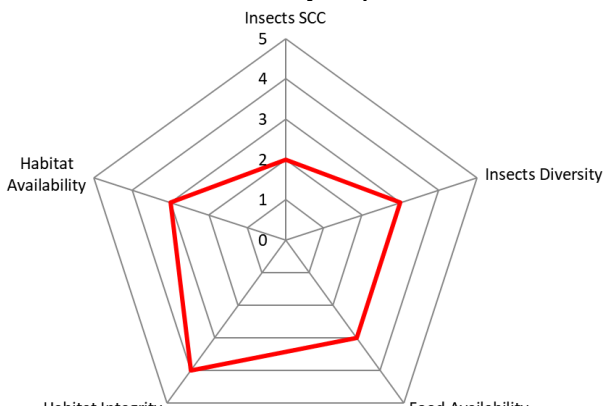



4.3 Faunal Assessment Results

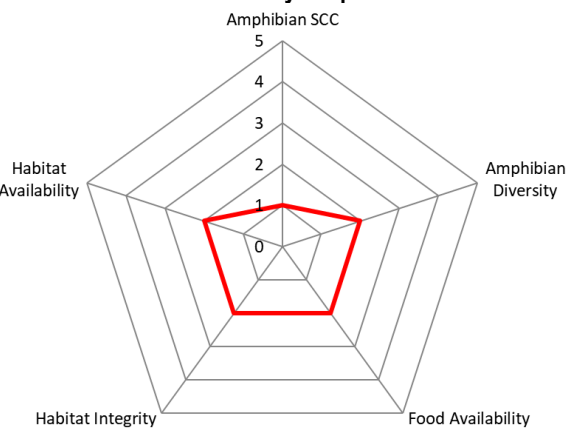
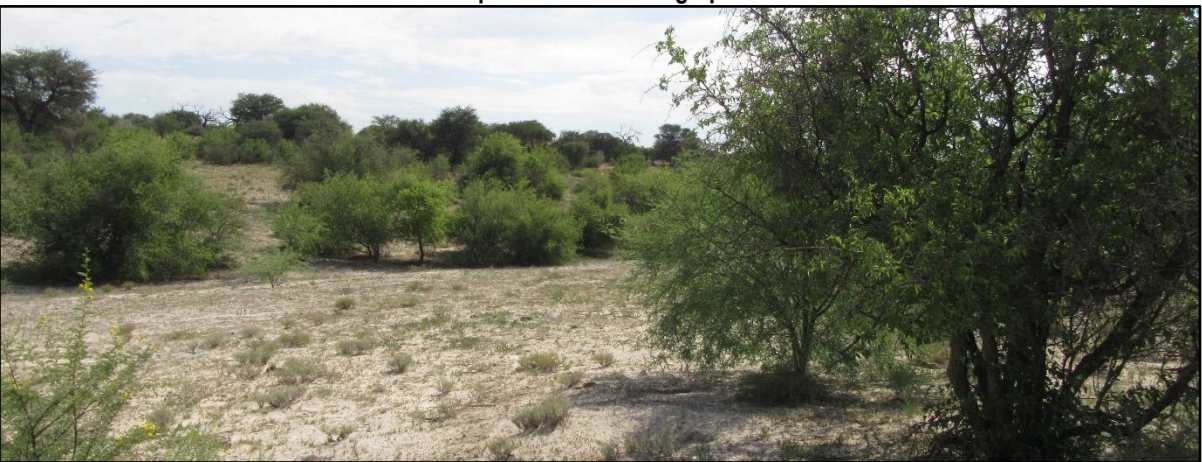
Table 4: Faunal field assessment results associated with the Focus Area.

Faunal Taxa	Mammals	Habitat Sensitivity:	Moderately High
<p>Sensitivity Graph:</p>  <p>Mammal SCC</p> <p>Mammal Diversity</p> <p>Food Availability</p> <p>Habitat Integrity</p> <p>Habitat Availability</p>			<p>Representative Photographs</p>  <p>Notes on photographs: Left: Skull of <i>Phacochoerus africanus</i> (Common Warthog). Middle: <i>Xerus inaeus</i> (Ground Squirrel). Right: Scat of <i>Lepus saxatilis</i> (Scrub Hare).</p>
Faunal Taxa	Avifauna	Habitat Sensitivity:	Intermediate
<p>Sensitivity Graph:</p>  <p>Avifaunal SCC</p> <p>Avifaunal Diversity</p> <p>Food Availability</p> <p>Habitat Integrity</p> <p>Habitat Availability</p>			<p>Representative Photographs</p>  <p>Notes on photographs: Left: <i>Prinia flavicans</i> (Black-chested Prinia); Right: <i>Uraeginthus granatinus</i> (Violet-eared Waxbill)</p>



Faunal Taxa	Reptiles	Habitat Sensitivity:	Intermediate
	<p>Sensitivity Graph:</p>  <p>The graph shows scores for Reptiles across five categories: Reptile SCC (5), Reptile Diversity (2), Food Availability (2), Habitat Integrity (2), and Habitat Availability (2). The red line indicates a score of 2 for all categories.</p>		<p>Representative Photographs</p>  <p>Notes on photographs: Left: <i>Stigmochelys pardalis</i> (Leopard Tortoise) Middle: <i>Trachylepis spilogaster</i> (Kalahari Tree Skink). Right: <i>Pedioplanus namaquensis</i> (Namaqua Sand Lizard)</p>
Faunal Taxa	Invertebrates	Habitat Sensitivity:	Intermediate
	<p>Sensitivity Graph:</p>  <p>The graph shows scores for Invertebrates across five categories: Insects SCC (2), Insects Diversity (2), Food Availability (2), Habitat Integrity (2), and Habitat Availability (2). The red line indicates a score of 2 for all categories.</p>		<p>Representative Photographs</p>  <p>Notes on photographs: Left. Exoskeleton of <i>Opisthophthalmus</i> sp; Middle: <i>Tarucus sybaris</i> (Dotted Blue); Right: <i>Zonocerus elegans</i> (Elegant Grasshopper)</p>



Faunal Taxa	Amphibians	Habitat Sensitivity:	Moderately Low
<p>Sensitivity Graph:</p> 		<p>Representative Photographs</p>  <p>Notes on photographs: Suitable habitat for amphibian species not dependant on permanent water on the banks of the Kuruman River</p>	

Mammal Discussion

The habitat integrity of the focus area was largely intact as discussed in Section 4.2 above, with anthropogenic activities limited to grazing by domestic livestock. Habitat availability for mammals is considered moderately high, despite proliferation by the AIP *Prosopis glandulosa* noted within portions of the Kuruman River. The Southern Kalahari Mekkacha and Kathu Bushveld habitat units are capable of providing habitat to a number of small, medium and large mammal species. Food availability within the focus area is also considered moderately high, however food sources can become limited particularly during the winter months, due to competition for grazing resources with domestic livestock. Mammal diversity is considered to be of intermediate levels, mainly due to the homogenous landscape limiting habitat diversity and reducing specialised niche environments which would increase mammal diversity. The focus area is further likely to support a number of mammal SCC, with active borrows of *Orycteropus afer* (Aardvark), a Threatened Or Protected Species (TOPS) according to the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (Threatened Or Protected Species Regulations, 2015), noted at the time of the assessment. Other mammal SCC likely to utilise the focus area include *Atelerix frontalis* (South African Hedgehog), *Otocyon megalotis* (Bat-eared fox), and *Vulpes chama* (Cape fox).

Avifaunal Discussion

Habitat availability for avifaunal species is considered to be moderately high, particularly within the areas adjacent to the Kuruman River, where tall *Vachellia erioloba* trees were present. A number of avifaunal species were observed nesting within these trees. Large predatory birds are likely to utilise the focus area for foraging. Tall *Acacia erioloba* trees were noted within the focus area, which would be suitable for breeding, however no nests were observed at the time of the assessment. The avifaunal diversity associated with the focus area was intermediate and comprised mainly of common avifaunal species that have become accustomed to areas with increased anthropogenic activities. Food resources in the focus area will be cyclical, tracking in-line with seasons. During the summer months with increased rainfall and plant growth, there will be sufficient plant material (seeds, flower and new shoots) to feed on, whilst the subsequent increase in insect abundance during this period will provide food resources for insectivorous species. Although no avifaunal SCC were observed during the time of the assessment, the following species might utilise the area on a temporary basis, *Ardeotis kori* (Kori Bustard), *Polemeatus bellicosus* (Martial Eagle), and *Aquila rapax* (Tawny Eagle)

Reptile Discussion

A low reptile diversity was observed during the field assessment however, this is likely due to the secretive nature of many reptile species. It is likely that the focus area will have an intermediate reptile diversity. Food resources are considered moderately high, as insects and herbaceous plant material, the primary food resource for small reptiles, are readily available. Predatory snakes will likely be less abundant in the focus area as their food resources (small mammals and some instance nestlings) will be less abundant in this arid environment. The entire focus area provides moderately high habitat availability for reptile species with the Kathu Bushveld likely favoured by a diverse assemblage of reptiles as the overall habitat structure and deep sands provide ideal areas for refuge and burrow construction. No faunal SCC were observed during the field assessment, however two SCC, namely: *Chamaeleo dilepis* (Common flap-neck chameleon) and the *Python sebae* (African rock python) may occur on the site within the Kathu Bushveld. African Rock pythons often utilise burrows dug by Aardvark to breed in and escape to when disturbed.



Invertebrate Discussion

During the field assessment a high abundance of invertebrates were noted, particularly amongst the Lepidoptera and Orthoptera families, although the overall diversity of these families was limited. Floral habitat associated with the focus area is considered to be largely intact especially the Kathu Bushveld, offering suitable habitat and food sources for a variety of invertebrates. The availability of food resources and subsequently diversity and abundance of invertebrate species will be subjected to seasonal cycles, with higher species abundances being observed within the summer rainfall months in comparison to the drier winter months. Subsequently, the peak and fall of invertebrate abundance will also drive and impact upon other species population numbers as invertebrates form a base food resource for a large number of other faunal species. Grazing by domestic livestock has resulted in a slight reduction in standing vegetation within the focus area, which may limit food availability to invertebrate species, however this will be highly dependent on the overall stocking rates of domestic livestock. Grazing was, however not extensive at the time of the assessment, pointing to lower stocking rates and subsequently food availability is of intermediate abundance. During the field assessment the exoskeleton of a single invertebrate SCC was observed, namely an individual of the Genus *Opisththalmus* (likely *O. wahlbergii* (Kalahari Burrower)). This species is listed in Schedule 2 of the NCNCA (2009). The only other potential SCC to utilise the focus area is *Opisththalmus carinatus* (Robust Burrowing Scorpion) also listed in Schedule 2 of the NCNCA. Scorpion species are notoriously difficult to detect during field surveys of limited duration. However, given that the proposed prospecting activities will not result in large scale habitat loss, the threat to these species is considered limited.

Amphibian Discussion

No amphibians were observed within the focus area during the field assessment. The arid nature of the locality and the absence of any permanent water which normally provides suitable locations for breeding and maintaining a moist epidermis required for amphibian respiration are absent within the focus area. The Kuruman River does however, provide suitable habitat for amphibian species not dependant on permanent water. Due to the limited habitat for amphibian species, the diversity is expected to be moderately low. No amphibian species or SCC were observed during the field assessment. The regionally NT *Pyxicephalus adspersus* (Giant Bullfrog) is unlikely to occur due to the lack of suitable aquatic habitat for this species on site.

Business Case and Conclusion:

Habitat within the focus area is considered to be largely intact, with the highest disturbance observed within the Kuruman River where the AIP *Prosopis glandulosa* has become proliferate in areas. The focus area nonetheless supports an abundance of faunal species, with evidence of two faunal SCC observed, namely *Orycteropus afer* (Aardvark) and *Opisththalmus* sp. Due to the homogenous nature of the larger landscape, with limited habitat available for species utilising niche habitat, the focus area is considered to support an intermediate diversity of faunal species.

The impact footprint arising from the proposed prospecting activities is considered to be minimal, as only 10 drill sites are planned, which are limited in extent. Subsequently, the impact on faunal species is considered to be low, and although a few individuals might be displaced due to temporary prospecting activities, sufficient habitat will remain within the focus area and surrounding area to support individuals that have been displaced.

In order to minimise the impact on faunal species it is, however recommended that use be made of existing gravel roads as far as possible. Where additional access roads are to be created, it is recommended that these roads be optimised to serve as many drill sites as possible. It is further pertinent that rehabilitation of all drill sites and access roads take place post prospecting to limit the residual impact and permanent habitat fragmentation and ensure control of AIPs. It is also recommended that a walkdown of the final prospecting footprint be undertaken during the breeding season, and all faunal SCC nests and burrows be marked. Any SCC observed within the prospecting footprint should be rescued and relocated by a suitably qualified specialist once the relevant permits have been obtained from the relevant departments.



4.4 Floral Species of Conservation Concern Assessment

Threatened/protected species are species that are facing a high risk of extinction. Any species classified in the International Union for the Conservation of Nature (IUCN) categories Critically Endangered (CR), Endangered (EN) or Vulnerable (VU) is a threatened species. Furthermore, SCC are species that have a high conservation importance in terms of preserving South Africa's high floristic diversity and include not only threatened species, but also those classified in the categories Extinct in the Wild (EW), Regionally Extinct (RE), Near Threatened (NT), Critically Rare, Rare and Declining. A person may not carry out a restricted activity involving a specimen of a listed threatened or protected species without a permit issued in terms of Chapter 7 of the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEMBA).

The SCC assessment not only considers floral SCC recorded within the focus area during the field assessment but also includes a Potential of Occurrence (POC) assessment where the assessment takes suitable habitat to support any such species into consideration. Thus, for the POC assessment, the following protected species lists were utilised:

- The Northern Cape Nature Conservation Act, 2009 (Act No. 9 of 2009),
- Government Notice 256 Threatened or Protected Species (TOPS) as published in the Government Gazette 38600 of 2015 as it relates to the National Environmental Management Biodiversity Act, 2004 (Act No. 10 of 2004); and
- Government Notice 908 List of Protected Tree Species as published in the Government Gazette 38215 as it relates to the National Forest Act, 1998, (Act No. 84 of 1998, amended in September 2011).

The following SCC/ protected species were recorded during the field assessment or obtained a POC of 60% or more (please refer to Appendix B for the methodology used to determine the POC):

Table 5: SCC/ Protected species observed within the focusarea at the time of assessment or with an increased likelihood to utilise the focus area.

Species	Threat Status	Habitat Unit	POC
NFA			
<i>Vachellia erioloba</i>	LC	Recorded within the Kathu Bushveld and Southern Kalahari Mekgacha	100%
<i>Vechellia haematoxylon</i>	LC	Recorded within the Kathu Bushveld	100%
<i>Boscia albitrunca</i>	LC	Recorded within the Kathu Bushveld	100%
NCNCA			
Schedule 1			
<i>Harpagophytum procumbens</i>	LC	Suitable habitat within the Kathu Bushveld	80%
<i>Lessertia frutescens</i> subsp. <i>frutescens</i>	LC	Recorded within the Kathu Bushveld	100%



Schedule 2			
<i>Boophone disticha</i>	LC	Suitable habitat within the Kathu Bushveld and Southern Kalahari Mekgacha	60%
<i>Babiana hypogaea</i>	LC	Suitable habitat within the Kathu Bushveld and Southern Kalahari Mekgacha	80%
<i>Boscia albitrunca</i>	LC	Recorded within the Kathu Bushveld	100%
<i>Nerine laticoma</i>	LC	Recorded within the Southern Kalahari Mekgacha	100%
<i>Pergularia daemia</i>	LC	Recorded within the Southern Kalahari Mekgacha	100%
<i>Jamesbrittenia burkeana</i>	LC	Recorded within the Southern Kalahari Mekgacha	100%
TOPS			
<i>Harpagophytum procumbens</i>	LC	Suitable habitat within the Kathu Bushveld	80%

From the table above it is evident that a number of protected floral species have been recorded within the focus area or have a high probability of utilising the focus area. During the time of the assessment no layout plan for the proposed prospecting activities have been available, and subsequently marking of protected floral species did not form part of the scope of works. Removal/ destruction to any of the above-listed species would require a permit from the various provincial and national departments. Prior to finalisation of the prospecting sites and any on-site activities related to the proposed prospecting activities, a walkdown will have to be undertaken of the proposed drill sites as well as the access roads to and from the various prospecting drill sites, and all protected floral species marked. The assessment should take place during the summer season (preferably January to March) when the majority of species will be in flower. Where feasible, all protected herbaceous species should be rescued and relocated to suitable habitat outside of the prospecting footprint. The rescue and relocation of such species should be overseen by a suitably qualified contractor and/or botanist.

Rescue and relocation of tall trees is not considered feasible, and it is therefore recommended that the prospecting drill sites be designed in such a way to avoid all tall protected tree species (>3 m). This is of particular importance for large *Vachellia erioloba* trees, as these trees are often the only tree of significant size within the landscape. These trees increase the heterogeneity of the landscape by increasing species richness as it provides habitat and services for a variety of floral and faunal species (Seymour & Milton, 2003). The life cycles of many faunal species are often closely associated with this tree species. The use of these trees by birds (for roosting and nesting) and antelope (for shade and browsing), result in a concentration of nutrients under the canopy, leading to the development of distinctive plant communities (Barnes *et al.*, 1997). As such the loss of this species from the area has a detrimental effect on the entire ecosystem of the region.

Where any protected species are to be removed/ damaged, permits should be obtained from the relevant authorities for the removal/ destruction of all protected species prior to commencement of any works.





Figure 11: Protected species encountered within the study: Top (Left to right): *Pergularia daemia*, *Nerine laticoma* and *Lesertia frutescens* subsp. *frutescens*. Middle (Left to right): *Jamesbrittenia burkeana*, and *Vachellia haematoxylon*; and Below (Left to Right): *Boscia albitrunca* and *Vachellia erioloba*.



4.5 Faunal Species of Conservation Concern Assessment

During field assessments, it is not always feasible to identify or observe all species within an area, largely due to the secretive nature of many faunal species, possible low population numbers or varying habits of species. As such, and to specifically assess an area for faunal SCC, a POC matrix is used, utilising a number of factors to determine the probability of faunal SCC occurrence within the focus area. Species listed in Appendix H whose known distribution ranges and habitat preferences include the focus area were taken into consideration.

The species listed below are considered to have an increased probability of occurring (POC) within the focus area (please refer to Appendix C for the methodology used to determine the POC):

Table 6: Faunal SCC considered likely to occur or temporarily utilise in the focus area.

Scientific Name	Common Name	POC %
MAMMALS		
<i>Otocyon megalotis</i>	Bat-eared fox	70%
<i>Vulpes chama</i>	Cape fox	60%
<i>Mellivora capensis</i>	Honey Badger	70%
<i>Atelerix frontalis</i>	South African Hedgehog	70%
<i>Orycteropus afer</i>	Aardvark	100%
AVIFAUNA		
<i>Ardeotis kori</i>	Kori Bustard	70%
<i>Polemeatus bellicosus</i>	Martial Eagle	60%
<i>Aquila rapax</i>	Tawny Eagle	60%
REPTILES		
<i>Python natalensis</i>	African Rock Python	60%
<i>Chamaeleo dilepis</i>	Common flap-neck chameleon	65%
INVERTEBRATES (PARTICULARLY ARACHNIDS)		
Genus: <i>Ceratogyrus</i> , <i>Harpactira</i> and <i>Pterinochilus</i>	Baboon Spiders	80%
<i>Opisththalmus ater</i>	Steinkopf Burrowing Scorpion	60%
<i>Opisththalmus carinatus</i>	Burrowing scorpion	80%
<i>Opisththalmus wahlbergii</i>	Burrowing scorpion	90%

During the field assessment, no direct observations of faunal SCC themselves were made. Active borrows of the TOPS protected species *Orycteropus afer* (Aardvark) were however observed, particularly within the Kathu Bushveld habitat unit. The exoskeleton of an *Opisththalmus* sp. (possibly *O. wahlbergii*) was observed during the field assessment. Although none of the remaining faunal species were observed within the focus area, they are known to occur within the region. The focus area provides suitable breeding and foraging resources for these species, and as such the loss of habitat within the focus area may result in a disruption of breeding activities with the net result being a possible decrease in population



numbers. The prospecting footprints are, however considered limited in extent, and with similar suitable habitat in the areas surrounding the focus area, it is considered unlikely that these activities will significantly impact on the conservation of these species at this point in time. Should the prospecting activities yield favourable results, it is likely that full scale mining will be proposed which will have a significantly higher impact on faunal SCC. It is recommended that prior to prospecting and vegetation clearing activities, a thorough walk down of the proposed prospecting footprint (including access roads) be undertaken, to locate such species (specifically smaller, less mobile and cryptic spp such as arachnids), and/or their nests/burrows. Where these are located within the prospecting footprint areas, it is recommended the relevant permits as per the Northern Cape Nature Conservation Act (Act No. 9 of 2009) (NCNCA) be obtained followed by a rescue and relocation plan that must be implemented and overseen by a suitably qualified faunal specialist.

5. SENSITIVITY MAPPING

Figure 12 below conceptually illustrate the areas of varying ecological sensitivity. The areas are depicted according to their sensitivity in terms of the presence or potential for floral and faunal SCC, habitat integrity and levels of disturbance, threat status of the habitat type, the presence of unique landscapes and overall levels of floral and faunal diversity. The table below presents the sensitivity of each identified habitat unit along with an associated conservation objective and implications for development.



Table 7: A summary of the sensitivity of each habitat unit and implications associated with the focus area.

Habitat Unit	Sensitivity	Development Implications
<p>Southern Kalahari Mekgacha and Kathu Bushveld</p>	<p style="text-align: center;">MODERATELY HIGH</p> <p><u>Conservation Objective</u></p> <p>Preserve and enhance the biodiversity of the habitat unit, limit development and disturbance.</p>	<p>These habitat units are of moderately high ecological sensitivity based on the presence of protected floral species, likelihood to support faunal SCC, overall habitat integrity as well as floral and faunal diversity. Both vegetation types are classified as Least Threatened (National Threatened Ecosystems, 2011), however, the focus area has been identified as CBA 1 within the Northern Cape CBA Dataset (2016) and is of Highest Biodiversity Importance (Mining and Biodiversity Guidelines, 2013). The CBA status of the area has been confirmed during the field assessment.</p> <p>As discussed above, the proposed prospecting activities will result in clearance of vegetation, however the footprint area is considered to be limited in extent, with use of existing access roads used where possible. It is therefore unlikely that the prospecting activities will alter the functioning of the area to the degree that the area can no longer maintain its CBA status. It must, however, be considered that should prospecting yield favourable, the area may be mined which will affect the area's ability to maintain a CBA status.</p> <p>Due to the sensitivity, prospecting within these habitat units should be minimised to what is essential, and care should be taken not to disturb any natural habitat outside of the prospecting footprint. Existing gravel roads should be used for prospecting activities as far as is possible, and where additional roads are required, they should be optimised to serve as many drill sites as possible. Furthermore, it is recommended that where necessary shrubs and trees within access roads be cut as opposed to complete removal to limit habitat fragmentation and the subsequent establishment of AIPs within exposed areas.</p> <p>Once final layouts of the proposed prospecting activities are available, a summer walkdown (January to March) will have to be undertaken of the prospecting footprint (including drill sites and access roads) and all protected floral species be marked and a search and rescue be undertaken for potential faunal SCC. Permits will have to be obtained from the Department of Environment, Forestry and Fisheries (DEFF) and the Northern Cape Department of Environment and Nature Conservation (NCDENC) for the removal/ destruction of protected species (both floral and faunal).</p> <p>A rehabilitation and AIP control and Management Plan should also be implemented at the onset of the prospecting activities, to limit spread and further degradation of the surrounding floral habitat.</p>
<p>Degraded</p>	<p style="text-align: center;">LOW</p> <p><u>Conservation Objective</u></p> <p>Optimise development potential.</p>	<p>The Degraded Habitat is of low ecological importance and sensitivity due to the modified floral species composition of these areas comprising predominantly of bare soils or AIP species. Ecological functioning and habitat integrity are significantly compromised, and these areas should be optimised for prospecting. This area does not provide suitable habitat for faunal SCC. Edge effect impacts on the surrounding natural vegetation should be well managed to limit the spread of AIP species to the surrounding areas.</p>



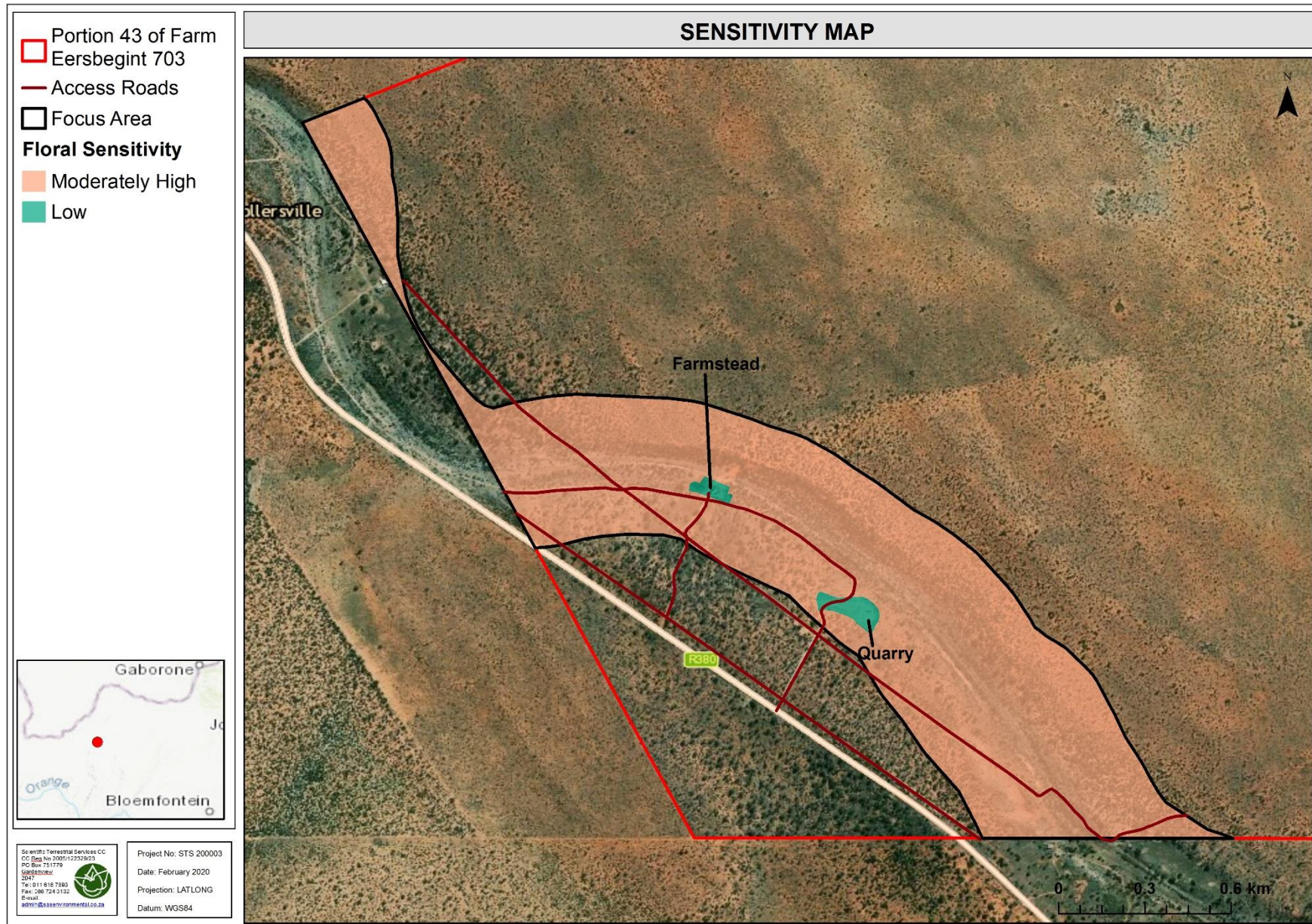


Figure 12: Terrestrial habitat sensitivity map for the focus area.



6. IMPACT ASSESSMENT

The section below provides the significance of perceived impacts on the biodiversity of the focus area. An impact discussion and assessment of all potential prospecting and decommissioning phase impacts are provided in Sections 6.2 and 6.3 that follows. All mitigatory measures required to minimise the perceived impacts are presented in Section 6.4 below.

At the time of the assessment a detailed layout of the proposed prospecting activities was not available to the specialist. The impact assessment was subsequently based on the information provided and assessed on a worst-case scenario, where ground clearing activities will be included for the access road together with the drill site.

Ten drill sites are proposed for the Eersbegint property and will be drilled over a period of 2 years. Decommissioning of each drill site will take place following drilling activities. For each drill site a 10 x 10 m square area will be cleared for the prospecting drill site and associated infrastructure. The following facilities and activities are required at each of the prospecting borehole sites:

- Temporary ablution facilities for contractors;
- The establishment of a temporary access track;
- Plastic lined sumps;
- Temporary storage of hazardous and non-hazardous waste;
- HDPE sheet lined area and dill rig; and
- The demarcation of the prospecting site.

For each drill site, once drilling is complete, the site will be decommissioned. Decommissioning will cater for the following:

- Capping and sealing of boreholes;
- Removal of any drilling equipment, Chemicals, and Waste;
- Removal and filling of sumps; and
- Ripping of compacted soils (at drill sites and access tracks) to allow for re-vegetation of the site.

6.1 *Activities and Aspect Register*

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



Table 8: Activities and aspects likely to impact on the floral resources within the focus area. Blocks in red were regarded as having a higher impact significance and were rated higher in the impact assessment.

ACTIVITIES AND ASPECTS REGISTER	
Planning Phase	
-	Potential failure to obtain the necessary permits for removal of protected floral species, and potential failure to implement a rescue and relocation of protected forb species and faunal SCC.
-	Impact: Permanent loss of protected floral and faunal species from the focus area.
-	Failure to take the biodiversity sensitivity into consideration when planning prospecting drill sites, leading to additional access roads cleared for drilling.
-	Impact: Permanent loss of floral and faunal habitat.
-	Potential failure to have a Rehabilitation Plan developed and ready for implementation before the commencement of prospecting activities.
-	Impact: Without a developed rehabilitation plan it could lead to the exposure of areas of bare soil, which aren't immediately rehabilitated, leading to habitat fragmentation and establishment of AIP species.
-	Potential failure to implement an Alien and Invasive Plant (AIP) Management/Control Plan before prospecting activities commence.
-	Impact: Continued displacement of indigenous species by AIPs, subsequently leading to a loss in floral diversity, as well as displacement/ mortality of protected floral species and faunal species.
-	Potential failure to implement an Erosion Control Plan for sloped areas leading to sedimentation of lower-lying habitat and degradation of soil structure. This is of particular importance for the dune area northeast of the Kuruman River
	Impact: Loss of favourable floral habitat and consequently declines in floral diversity.
-	Potential inadequate design of drill sites leading to pollution of soils as a result of, e.g., seepage/leaks from infrastructure failure.
-	Impact: Contaminated soils lead to a loss of viable growing conditions for plants and results in a decrease of floral and faunal habitat, diversity, SCC and medicinal plant species – rehabilitation effort will also be increased as a result.
Prospecting Phase	
-	Site clearing and the removal of vegetation.
-	Impact: Loss of floral and faunal habitat and loss of potential protected floral species.
-	Potential trapping and Hunting of Faunal Species
-	Impact: Loss of faunal species abundance and faunal SCC.
-	Proliferation of AIP species that colonise in drill sites and access roads and that outcompete native species, including the further transformation of adjacent or nearby natural areas. This is particularly important within the Kuruman River where AIP proliferation was notably the most severe.
-	Impact: Loss of favourable floral and faunal habitat outside of the direct development footprint, including a decrease in floral and faunal diversity, potential loss of floral and faunal SCC.
-	Failure to concurrently rehabilitate bare areas associated with drill sites and access roads as soon as they become available, potentially resulting in establishment of IAPs and subsequent spread to surrounding natural areas.
-	Impact: Long-term loss of favourable habitat for the establishment of floral species. Loss of floral and faunal habitat and diversity.
-	Habitat fragmentation resulting from the prospecting activities and poorly rehabilitated areas.
-	Impact: Long-term changes in floral structure, altered genetic fitness due to a smaller genetic pool and potential loss of SCC and faunal habitat.
-	Overexploitation through the removal and/or collection of important or sensitive medicinal and floral SCC beyond the direct prospecting footprint area.
-	Impact: Local loss of floral SCC abundance and diversity.
-	Risk of contamination from prospecting facilities may pollute the receiving environment.
-	Impact: Leading to altered floral and faunal habitat.
-	Erosion as a result of prospecting activities or movement of prospecting vehicles on the dune northeast of the Kuruman River.
-	Impact: Leading to a loss of floral and faunal habitat.



ACTIVITIES AND ASPECTS REGISTER	
-	Dust generated during construction and operational activities accumulating on the surrounding floral individuals, altering the photosynthetic ability of plants ⁵ and potentially further decreasing optimal growing/re-establishing conditions, indirectly impacting n food resources for faunal species.
-	Impact: Declines in plant functioning leading to loss of floral species and habitat for optimal growth.
Decommissioning & Closure Phase	
-	Potentially poorly managed edge effects: <ul style="list-style-type: none"> • Ineffective rehabilitation of disturbed areas, bare soils, or eroded areas leading to a continual proliferation of AIP species in disturbed areas and subsequent spread to surrounding natural areas altering the floral and faunal habitat; and • Potential erosion stemming from soil left bare leading to sedimentation of downslope floral and faunal habitat.
-	Impact: Loss of floral and faunal habitat, diversity and SCC within the direct prospecting footprint. 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.
-	Potential poor management and failure to monitor rehabilitation efforts, leading to: <ul style="list-style-type: none"> • Landscapes left fragmented, resulting in reduced dispersal capabilities of floral species and a decrease in floral and faunal diversity; • Increased risk of erosion in areas left disturbed, particularly on the dune.
-	Impact: Long-term (or permanent) loss of floral habitat, diversity and SCC.
-	Potentially poorly implemented and monitored AIP management programme leading to the reintroduction and proliferation of AIP species.
-	Impact: Permanent loss of surrounding natural floral and faunal habitat, diversity and SCC.
-	Rehabilitation of currently degraded habitat and AIP clearance of already proliferated areas, particularly within the Kuruman River.
-	Impact (positive): Some ecological functioning will be restored that has been lost due to AIP proliferation and habitat transformation.

6.2 Impact Discussion

6.2.1 Impact on Floral Habitat and Diversity

The majority of the focus area is considered to be of moderately high floral sensitivity, due to the conservation importance attributed to the focus area (CBA 1), as well as the floral diversity, unique landscape and habitat integrity attributed to the two major habitat units, Southern Kalahari Mekgacha and Kathu Bushveld. Clearance of vegetation for prospecting activities is considered inevitable, however the extent of clearance is considered limited in extent due to small prospecting drill site footprint (10 m x 10 m) and limited number of drill sites (10). It is, however considered likely that vegetation will also have to be cleared for access roads, particularly northeast of the Kuruman River, where existing roads were minimal.

Despite the sensitivity of the receiving environment, the intensity of the impact is considered to be of medium significance, resulting in a moderate alteration of the floral ecology. The reduced intensity is attributed to the limited prospecting footprint. Furthermore, the duration of the prospecting activities is considered to be low. The overall impact significance of the moderately high sensitivity areas is considered to be medium, and low for the low sensitivity

⁵ Sett, R. (2017). Responses in plants exposed to dust pollution. Horticulture International Journal, 1(2), 00010.).



areas. Medium significance impacts based on the impact criteria should have influence on the decision, and mitigation will be required. With mitigation measures implemented, with particular emphasis on effective rehabilitation during decommissioning the impacts can be reduced to low and very low levels.

Based on the impact assessment, it is evident that the proposed prospecting activities will result in loss of floral habitat, however due to the limited footprint area, it is unlikely that the proposed prospecting activities will result in a significant loss in floral diversity, or the functioning of the CBA, nor will it significantly impact on the conservation targets for the province on condition that extensive and significant mitigation be implemented in order to restore the disturbed areas, and to allow for the continuation of the area as a CBA. The fact that the site is a CBA must be considered in light of the prospecting yielding favourable results and therefore the potential for the site to be mined in the near future. Mining of the area will impact on the required conservation targets, and a biodiversity offset investigation will likely be required should a Mining Right License application be launched. The offset area associated with the Tshipi Borwa Mine should also be considered, and the potential impacts for utilisation of this area for biodiversity offset must be thoroughly investigated to ensure no future conflict of interest.

6.2.2 Impact on Faunal Habitat and Diversity

The focus area supports a moderate diversity of faunal species, with a moderate to moderately high habitat and food resources available for various faunal taxa. The proposed prospecting footprint is, however considered to be limited in extent, and although the activities will result in the loss of faunal habitat, the extent is not considered significant to displace a large abundance of faunal species, and the impact on faunal diversity is thus considered low to medium. With mitigation fully implemented the impacts can be reduced to low and very low significant impacts.

6.2.3 Impacts on Floral SCC

During the field assessment a number of NFA and NCNCA protected floral species were observed within the focus area, and include *Vachellia erioloba*, *V. haematoxylon*, and *Boscia albitrunca*, *Lessertia frutescens subsp. frutescens*, *Nerine laticoma*, *Pergularia daemia*, and *Jamesbrittenia burkeana*. Removal/ destruction of any of these will require permits from DEFF and NCDENC. Marking of protected species did not form part of the scope of work of this assessment, and thus a summer walkdown (January to March) of all final development footprint areas will have to be undertaken and all protected individuals marked. Failure to



initiate a summer walkdown, and subsequent rescue and relocation will result in the permanent loss of these protected floral species. Loss of individuals should be minimised by implementing a rescue and relocation plan for herbaceous species. It is, however recommended that tall *Vachellia erioloba* (3 m) trees not be removed, as these trees provide habitat for a variety of floral and faunal species, and are significant for maintaining the CBA status of the area.

6.2.4 Impacts on Faunal SCC

Signs of two faunal SCC *Orycteropus afer* (Aardvark) and *Opisthophthalmus* sp. (Possibly *O. wahlbergii*) were observed within the focus area during the faunal assessment. A further thirteen SCC may inhabit different regions of the focus area or surrounding region (Refer to Section 4.5 above).

Due to the limited development footprint associated with the prospecting activities, the impact associated with the loss of habitat for the above-mentioned species is of low and very low significance during the various phases associated with the prospecting activities. With the implementation of mitigation measures, the impact significance of the loss of important species may be further reduced, as mitigation measures will ensure that habitat loss for these species will be minimised.

6.2.5 Probable Residual Impacts

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

- Continued loss of floral and faunal habitat of increased sensitivity, i.e. Southern Kalahari Mkgacha and Kathu Bushveld;
- Continued loss of and altered floral species diversity;
- Alien and invasive plant proliferation, particularly in sensitive habitat where bare soils are left exposed; and
- Permanent loss of protected floral species and suitable habitat for floral and faunal SCC.

6.2.6 Cumulative Impacts

According to the proposed prospecting method (including access roads), vegetation clearance will be limited have a small footprint with limited duration with the overall contribution to cumulative impacts to the receiving environment likely being small, provided that all mitigation measures are implemented. The perceived low-level cumulative contribution to impacts associated with prospecting activities however could lead to full scale mining activities, which



if such occurs post prospecting, will have a significantly higher contribution to cumulative impacts on the biodiversity resources.

6.3 Impact Assessment Results

The following tables indicate the perceived risks to the floral and faunal ecology associated with all phases of the proposed prospecting activities. 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 Section 6.4 of 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.

As no layout have been provided for the drill sites or access roads, the impact assessment was undertaken for the various habitat units based on the habitat sensitivity. Subsequently the impact on the Southern Kalahari Mkgacha and Kathu Bushveld is considered similar, and the impact on these habitat units have been assessed together. As the degraded Bushveld have been subject to historic ground clearing activities, the impact is considered to be lower, and was assessed separately.

Table 9: Impact on the floral habitat, diversity and SCC arising from the proposed development activities.

Expansion Activity	UNMANAGED						MANAGED					
	Intensity	Duration	Extent	Consequence	Probability	Significance	Intensity	Duration	Extent	Consequence	Probability	Significance
Pre-Construction (Planning) Phase												
Impact of Floral Habitat and Diversity												
Southern Kalahari Mkgacha and Kathu Bushveld	H	L	VL	M	VH	Medium	M	VL	VL	L	H	Low
Degraded Habitat	L	L	VL	L	VH	Low	VL	VL	VL	VL	H	Very Low
Impact on Floral SCC												
Southern Kalahari Mkgacha and Kathu Bushveld	H	L	VL	M	VH	Medium	M	VL	VL	L	H	Low
Degraded Habitat	L	L	VL	L	VH	Low	VL	VL	VL	VL	H	Very Low
Construction and Operational Phase												
Impact of floral Habitat and Diversity												
Southern Kalahari Mkgacha and Kathu Bushveld	H	M	L	M	VH	Medium	M	L	VL	L	VH	Low



Expansion Activity	UNMANAGED						MANAGED					
	Intensity	Duration	Extent	Consequence	Probability	Significance	Intensity	Duration	Extent	Consequence	Probability	Significance
Degraded Habitat	L	L	VL	L	VH	Low	VL	VL	VL	VL	H	Very Low
Impact on Floral SCC												
Southern Kalahari Mekgacha and Kathu Bushveld	H	M	L	M	VH	Medium	M	L	VL	L	VH	Low
Degraded Habitat	L	L	VL	L	VH	Low	VL	VL	VL	VL	H	Very Low
Decommissioning and Closure Phase												
Impact of floral Habitat and Diversity												
Southern Kalahari Mekgacha and Kathu Bushveld	M	VH	L	H	M	Medium	L	M	VL	L	M	Very Low
Degraded Habitat	L	L	VL	L	VH	Low	VL	VL	VL	VL	M	Very Low
Impact on Floral SCC												
Southern Kalahari Mekgacha and Kathu Bushveld	M	M	L	M	M	Low	L	L	VL	L	M	Very Low
Degraded Habitat	L	L	VL	L	VH	Low	VL	VL	VL	VL	M	Very Low

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

Expansion Activity	UNMANAGED						MANAGED					
	Intensity	Duration	Extent	Consequence	Probability	Significance	Intensity	Duration	Extent	Consequence	Probability	Significance
Pre-Construction (Planning) Phase												
Impact of Faunal Habitat and Diversity												
Southern Kalahari Mekgacha and Kathu Bushveld	L	L	VL	L	H	Low	L	VL	VL	VL	M	Very Low
Degraded Habitat	VL	L	VL	VL	H	Very Low	VL	VL	VL	VL	M	Very Low
Impact on Faunal SCC												
Southern Kalahari Mekgacha and Kathu Bushveld	L	L	VL	L	H	Low	L	VL	VL	VL	M	Very Low
Degraded Habitat	VL	L	VL	VL	H	Very Low	VL	VL	VL	VL	M	Very Low
Construction and Operational Phase												
Impact of Faunal Habitat and Diversity												
Southern Kalahari Mekgacha and Kathu Bushveld	M	L	L	M	VH	Medium	L	VL	VL	VL	H	Low



Expansion Activity	UNMANAGED						MANAGED						
	Intensity	Duration	Extent	Consequence	Probability	Significance	Intensity	Duration	Extent	Consequence	Probability	Significance	
Degraded Habitat	L	L	L	L	VH	Low		VL	VL	VL	VL	H	Very Low
Impact on Faunal SCC													
Southern Kalahari Mekkacha and Kathu Bushveld	L	L	L	L	H	Low		L	VL	VL	VL	M	Very Low
Degraded Habitat	VL	L	VL	VL	H	Very Low		VL	VL	VL	VL	M	Very Low
Decommissioning and Closure Phase													
Impact of Faunal Habitat and Diversity													
Southern Kalahari Mekkacha and Kathu Bushveld	M	L	L	M	VH	Medium		L	VL	VL	VL	H	Low
Degraded Habitat	L	L	L	L	VH	Low		VL	VL	VL	VL	H	Very Low
Impact on Faunal SCC													
Southern Kalahari Mekkacha and Kathu Bushveld	L	L	VL	L	H	Low		L	VL	VL	VL	M	Very Low
Degraded Habitat	VL	L	VL	VL	H	Very Low		VL	VL	VL	VL	M	Very Low

6.4 Integrated Impact Mitigation

Table 11 below highlights the key, general integrated mitigation measures that are applicable to the proposed prospecting activities in order to suitably manage and mitigate the ecological impacts that are associated with all phases of the proposed prospecting activities.

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



Table 11: A summary of the mitigatory requirements for floral and faunal resources.

Project phase	<i>Planning Phase</i>
Impact Summary	<i>Loss of floral habitat, species and floral SCC</i>
Management Measures	Proposed mitigation and management measures:
	Floral Habitat and Diversity
	<ul style="list-style-type: none"> - Minimise loss of indigenous vegetation and faunal habitat where possible through effective planning and limiting the prospecting footprint to what is essential. This is of significance with regards to access roads to the prospecting drill holes. The designs must further adhere to all legislation and all possible precautions taken to prevent potential spills and /or leaks. - Current habitat degradation is considered higher within the area south west of the Kuruman River, with access roads already running along the River. It is recommended if feasible, that prospecting activities be planned to largely be undertaken within the portion southwest of the Kuruman River utilising the Degraded Habitat first, as this will likely limit the number of additional roads that will have to be created for the prospecting activities. - It is recommended that prior to the commencement of a prospecting drill site, that the prospecting footprint area be demarcated through the use of shade-net fencing, to prevent habitat creep into surrounding natural areas.
	Floral SCC
<ul style="list-style-type: none"> - Once prospecting drill sites and access roads have been identified, a detailed walkdown of the footprint areas must be undertaken and all protected floral species marked (on the ground and with GPS locations). Once the locations of floral SCC and protected species have been determined, the footprint of the prospecting activities can be finalised. - It is recommended that the walkdown ideally be undertaken during the summer season (January - March) when most herbaceous floral species will be in flower, and accurate identification will be easier. - It is recommended that were colonies of floral SCC are recorded, prospecting drill sites and access roads be refined to exclude these areas from prospecting, to limit the impact on these individuals. - It is not recommended that any trees taller than 3 m be removed, but that access roads and drill sites be located in such a way to prevent the removal of large indigenous or protected trees. - The necessary permits need to be obtained from DEFF and NCDENC prior to the implementation of rescue and relocation activities. - Once all floral SCC and NCNCA protected floral species within the development footprint has been identified, a rescue and relocation plan should be designed for herbaceous species – this plan must give guidance on a species level with regards to their relocation potential and requirements. Rescue activities need to take place prior to the commencement of any prospecting activities. Once a drill site has been decommissioned, the rescued species (if they have been kept at a suitable nursery) should be used as part of rehabilitation efforts. Rescue and transplanting of floral species should be overseen by a contractor/ mine employee with assistance from a suitably qualified botanist. The success of rehabilitation actions needs to be monitored quarterly for a minimum period of a year post-relocation. 	
Faunal SCC	
<ul style="list-style-type: none"> - Once prospecting drill sites and access roads have been identified, a detailed walkdown of the footprint areas will have to be undertaken and all protected faunal species or their nests/ burrows be marked. Once the locations of faunal SCC and protected species have been determined, the footprint of the prospecting activities can be finalised. - The walkdown should be undertaken during the breeding season of the various faunal species in order more readily identify active nests. - Where faunal SCC are identified within the prospecting footprint, and where it is deemed unfeasible to alter the prospecting footprint to exclude these individuals, they should be rescued and relocated to suitable similar habitat outside of the prospecting footprint once the relevant permits have been obtained. - The rescue and relocation of faunal SCC should be overseen by a suitably qualified faunal specialist. 	
	AIP Control and Ongoing Rehabilitation



	<ul style="list-style-type: none"> - Prior to the commencement of prospecting activities, an AIP Management/Control Plan should be compiled for implementation: <ul style="list-style-type: none"> • Where AIP species are removed as part of prospecting activities, it is recommended that the plant material be immediately removed to a registered waste facility. AIP material should not be allowed to remain on site from where it can readily spread to surrounding natural areas. • Of particular importance is the control of <i>Prosopis glandulosa</i>, which comprise of a deep-rooted taproot as well as an extensive lateral root system. This species subsequently not only compete with the indigenous <i>V. erioloba</i> for deep groundwater but also take-up sparse precipitation within the soil profile. This species also has a high transpiration rate, which further result in a rapid decline of the water table (Schachtschneider and February, 2013). The proliferation of these species have the potential to result in significant long-term negative impacts on the surrounding landscape, particularly the NFA protected species <i>V. erioloba</i> and <i>V. haematoxylon</i>, which play a vital role in the ecosystem by providing habitat for a number of floral and faunal species (Seymour &Milton, 2003).
Project phase	<i>Prospecting Phase</i>
Impact Summary	<i>Loss of floral habitat, species and floral SCC</i>
Management Measures	Proposed mitigation and management measures:
	<p>Development footprint</p> <ul style="list-style-type: none"> - Ensure the prospecting footprint area is kept as small as possible in order to minimise loss of floral and faunal habitat and to limit impacts on all floral and faunal species. - It is recommended that existing gravel roads be used for prospecting as far as is possible and sites be planned in consideration of the existing road network available. Where additional roads are required it is recommended that shrubs and trees be cut as oppose to complete removal, and prospecting vehicles drive over herbaceous species, in order to limit disturbance to the area. This will further limit habitat fragmentation within the landscape or limit additional bare soils along which AIPs can spread. Any temporary roads should be rehabilitated as soon as they are no longer in use to prevent effects of habitat fragmentation. - Vehicles should be restricted to travelling only on designated access roads, and no discriminate driving through surrounding natural habitat should be allowed to limit the ecological footprint of the prospecting activities. - No dumping of waste on site should take place. As such it is advised that waste disposal containers and bins be provided during the prospecting phase for all prospecting rubble and general waste. - Cut vegetation from site clearing to be removed immediately and not allowed to accumulate within surrounding natural habitat. - If any spills occur, they should be immediately cleaned up to avoid soil contamination that can hinder floral rehabilitation later down the line. Spill kits should be kept on site within workshops. In the event of a breakdown, maintenance of vehicles must take place with care, and the recollection of spillage should be practised preventing the ingress of hydrocarbons into the topsoil. - Natural habitat outside of the direct prospecting footprint areas must be avoided, and no prospecting vehicles, personnel, or any other prospecting-related activities are to encroach upon these areas. - The footprint of daily operational activities must be strictly monitored to ensure that edge effects from the prospecting facilities do not affect the surrounding floral and faunal habitat. The topsoil stockpile should also be weekly inspected for establishment of AIP species. Where seedlings are visible, they should be immediately pulled and be disposed of in waste bin and be left on site from where it spread to surrounding areas. <p>Alien Vegetation</p> <ul style="list-style-type: none"> - Edge effects of all prospecting activities, such as erosion and alien plant species proliferation, which may affect adjacent Southern Kalahari Mkgacha and Kathu Bushveld Habitat, need to be strictly managed adjacent to the prospecting project footprint areas. Specific mention in this regard is made of <i>Prosopis glandulosa</i> and all Category 1b AIP species, in line with the NEMBA Alien and Invasive Species Regulations (2016). - AIP management for construction-phase activities should be focused on limiting their spread, e.g. roadsides (gravel and tarred roads) should be monitored, as they serve as common corridors along which AIP species are introduced and



	<p>dispersed, and disturbed areas should regularly be monitored for AIP recruitment until successfully rehabilitated.</p> <ul style="list-style-type: none"> - Alien vegetation that is removed must not be allowed to lay on unprotected ground as seeds might disperse upon it. All cleared plant material to be disposed of within a waste disposal containers, and be removed to a licensed waste facility which complies with legal standards. <p>Floral SCC</p> <ul style="list-style-type: none"> - No collection of floral SCC or medicinal floral species within the focus area or larger region must be allowed by prospecting personnel. - Edge effect control needs to be implemented to prevent further degradation and potential loss of floral SCC and protected floral species outside of the proposed expansion footprint area. <p>Fauna</p> <ul style="list-style-type: none"> - As far as possible attempts must be made to flush faunal species from the prospecting sites and access routes prior to driving and setting up the drill vehicle. In this instance each site and access route must be thoroughly inspected for small fauna, notably tortoises, snakes and baboon spiders that may be hiding under vegetation which may be crushed/injured by the vehicle. - Prohibit trapping or hunting of fauna. <p>Fire</p> <ul style="list-style-type: none"> - No illicit fires must be allowed during the construction and operational phases of the proposed prospecting activities.
Project phase	<i>Decommissioning Phase</i>
Impact Summary	<i>Loss of floral habitat, species and SCC</i>
	<p>Rehabilitation</p> <ul style="list-style-type: none"> - All prospecting footprints and access roads should be rehabilitated in accordance with a rehabilitation plan compiled by a suitable specialist. - All rehabilitated areas should be rehabilitated to a point where natural processes will allow the ecological functioning and biodiversity of the area to be re-instated as per the post-closure objective. - Rehabilitation efforts must be implemented for a period of at least one year after decommissioning. <p>Alien Vegetation</p> <ul style="list-style-type: none"> - Edge effects of decommissioning activities, such as erosion and alien plant species proliferation, which may affect adjacent sensitive habitat, need to be strictly managed adjacent to the prospecting footprint. - Ongoing alien and invasive vegetation monitoring and eradication should take place for all decommissioned areas throughout the prospecting phase for alien vegetation proliferation to prevent spread into surrounding natural area. - An Alien and Invasive Plant Management and Control Plan must be designed and implemented in order to monitor and control alien floral recruitment in disturbed areas. The alien floral control plan must be implemented for a period of at least 1 year after decommissioning and closure.



8. CONCERN RAISED BY INTERESTED AND AFFECTED PARTIES (AIP)

Comments regarding the biodiversity associated with the project were received and are outlined in the below table, including the responses to each.

Table 12: Responses to issues and risks highlighted by Interested and Affected Parties from a biodiversity perspective.

Interested and affected party	Date comment received	Issues raised	Response provided
Jacoline Mans (DAFF)	17 January 2020	The proposed invasive prospecting activities consisting of ten exploration boreholes may impact on protected tree species such as <i>Vachellia erioloba</i> and <i>Vachellia haematoxylon</i> , known to occur in the vicinity of the study site. Number 4.1 of the report, table 5 refers to the applicable legislation. The NFA and Northern Cape Nature Conservation Act, Act 9 of 2009 (NCNCA) was not mentioned. Both Acts may be applicable, due to the potential impacts on protected trees and plants known to occur in the region.	During the site assessment, the presence of both trees has been confirmed within the focus area. The NFA and NCNCA and all protected species identified during the site assessment or likely to occur within the focus area have listed in section 4.4 of this report. The potential impact on these species have been assessed in Section 6.3, with specific mitigation measures proposed in Section 6.4. Both the NFA and NCNCA have been mentioned in Section 1.5 and Appendix A.
Jacoline Mans (DAFF)	17 January 2020	A Flora Permit may be required under the NCNCA for removal of common indigenous, provincially protected and specially protected plant species, such as <i>Harpagophytum procumbens</i> , which was mentioned in the report. In addition, a Fauna Permit may be required for felling of trees with active bird nests.	Section 4.4 and 4.5 of the biodiversity report stipulate that permits will have to be obtained for all protected floral and faunal species. It has been recommended within Section 4.5 that a walkdown be undertaken for for all floral and faunal SCC (including nests and burrows) once the prospecting footprint (including access roads) have been finalised, and the necessary permits be obtained for the rescue and relocation of such species. Khwara is committed to obtain a floral and faunal permit in terms of the NCNCA if necessary, for the removal of any protected floral and faunal species as well as a faunal Permit for felling of trees with active bird nests, if required.
Jacoline Mans (DAFF)	17 January 2020	The developer must try to avoid impacts on protected trees, especially for placement of temporary infrastructure. Where it is not possible to avoid protected trees, a Forest Act License and/or Flora Permit must be applied for an obtained prior to destroying or damaging any protected species.	It has been recommended within Section 4.2 and 4.4 that a summer walkdown (January to March) of the final prospecting footprint (including access roads) be undertaken and all protected trees be marked., and that all tall trees > 3 m be avoided as far as possible. Khwara is committed to obtaining tree removal permits, prior to destroying or damaging any protected species.
Jacoline Mans (DAFF)	17 January 2020	The study site is adjacent to the Kuruman River. The area is of the Highest Biodiversity Importance according to the Mining and Biodiversity Guidelines. Biodiversity sensitivity information was sources from previous EIA's (for the adjacent still to be constructed Khwara Mine) and has not been	This report specifically assesses the impact relating to prospecting activities on the CBA 1 (Section 6.2 and 6.3). It has also been indicated that the impact on the functioning of thie CBA 1 will be significantly higher should prospecting activities yield positive results, and an application into full scale



Interested and affected party	Date comment received	Issues raised	Response provided
		ground-truthed with specialist input. The south-western portion of the site falls in a Critical Biodiversity Area 1 (CBA 1), with the rest in an Ecological Support Area (ESA) and Other Natural Areas. Kindly note that developments in CBA 1 and CBA 2 may require an offset investigation report as part of the Forest Act License and Flora Permit application processes, should prospecting proceeds to full-scale mining in future.	mining commence. The need for a biodiversity offset has been noted by Khwara as a requirement that may be needed should a mining right application be applied for.

9. CONCLUSION

STS was appointed to conduct a biodiversity assessment as part of the Basic Assessment process for the proposed prospecting related activities located in or near the Kuruman River, within Portion 43 of the Farm Eersbegint 703. The focus of the proposed prospecting activities is within and surrounding the Kuruman River. At the time that this field assessment was undertaken, the proposed locations of the prospecting boreholes have not been finalised nor provided to the specialist. Thus, a 200 m corridor around the delineated riparian zone associated with the Kuruman River was generated in order to guide the field assessment.

Three broad habitat units were identified within the focus area at the time of the assessment. The Southern Kalahari Mekkacha and Kathu Bushveld habitat units are considered to be of moderately high biodiversity importance. The increased sensitivity of these habitat units is attributable to the habitat being considered largely intact, the conservation significance of these habitat units (classified as a CBA 1), as well as the ability to support floral and faunal SCC. The Degraded Habitat unit has been associated with increased anthropogenic activities and can no longer be considered representative of either the Southern Kalahari Mekkacha or the Kathu Bushveld vegetation types. The Degraded Habitat is associated with an altered floral species composition, provide limited habitat for faunal species and is of low ecological importance.

During the field assessment a number of protected floral species were observed, namely *Vachellia erioloba* (Camel Thorn), *Vachellia haematoxylon* (Grey Camel Thorn), *Boscia albitrunca* (Shephard's Tree), *Lessertia frutescens* subsp. *frutescens* (Cancer Bush), *Nerine laticoma* (Gifbol), *Pergularia daemia* (Trellis vine), and *Jamesbrittenia burkeana* (Bruinblommetjie). Three additional protected species also have an increased likelihood to be associated with the focus area, namely *Harpagophytum procumbens* (Devils's Claw), *Boophone disticha* (Poison Bulb), and *Babiana hypogaea* (Bobbejaankalkoentjie).

The focus area is further capable of supporting a number of faunal SCC, namely Mammals: *Otocyon megalotis* (Bat-eared fox), *Vulpes chama* (Cape fox), *Mellivora capensis* (Honey



Badger), *Atelerix frontalis* (South African Hedgehog); and *Orycteropus afer* (Aardvark); Avifauna: *Ardeotis kori* (Kori Bustard), *Polemeatus bellicosus* (Martial Eagle), and *Aquila rapax* (Tawny Eagle); Reptiles: *Python natalensis* (African Rock Python); *Chamaeleo dilepis* (Common flap-neck chameleon); and Invertebrates (Arachnids): Genus: *Ceratogyrus*, *Harpactira* and *Pterinochilus* (Baboon Spiders); *Opisthophthalmus ater* (Steinkopf Burrowing Scorpion); *Opisthophthalmus carinatus* (Burrowing scorpion); and *Opisthophthalmus wahlbergii* (Burrowing scorpion). Signs for two of these SCC were observed at the time of the assessment, namely *Orycteropus afer* (Aardvark) and *Opisthophthalmus* sp. (likely *O. wahlbergii* (Burrowing scorpion)).

Based on the field assessment results the CBA status attributed to the focus area have been confirmed by the specialist. Due to the limited development footprint associated with the proposed prospecting activities (10 drill sites of 10m x 10m each), it is considered unlikely that the proposed prospecting activities will significantly impact on the ongoing functioning of the CBA. Based on the impact assessment, the proposed prospecting activities will result in medium to low significance impacts on the floral and faunal ecology prior to the implementation of mitigation measures. With mitigation fully implemented, with particular emphasis on relocation of herbaceous protected floral species occurring within the prospecting footprint, rehabilitation of the prospecting footprint and AIP control, all impacts can be reduced to low and very low significant impacts. The perceived low-level impacts associated with prospecting activities however, could lead to full scale mining, which if it occurs post prospecting will have a significantly higher impact on biodiversity resources, and the functioning of the CBA.

The objective of this study was to provide sufficient information on the floral and faunal ecology of the area, together with other studies on the physical and socio-cultural environment for the EAP and the relevant authorities to apply the principles of Integrated Environmental Management (IEM) and the concept of sustainable development. The need for conservation as well as the risks to other spheres of the physical and socio-cultural environment need to be compared and considered along with the need to ensure sustainable economic development of the country.

It is recommended that, from an ecological perspective, the proposed development be considered acceptable, provided that the recommended mitigation measures for the identified impacts (as outlined in Section 6.4) are adhered to.

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



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APPENDIX A - LEGISLATIVE REQUIREMENTS AND INDEMNITY

The Constitution of the Republic of South Africa, 1996 (Act No. 108 of 1996)

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

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

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

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

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

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

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

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

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



The Minerals and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) (MPRDA)

The obtaining of a New Order Mining Right (NOMR) is governed by the MPRDA. The MPRDA requires the applicant to apply to the DMR for a NOMR which triggers a process of compliance with the various applicable sections of the MPRDA. The NOMR process requires environmental authorisation in terms of the MPRDA Regulations and specifically requires the preparation of a Scoping Report, an Environmental Impact Assessment (EIA) and Environmental Management Programme (EMP), and a Public Participation Process (PPP).

The Government Notice 864 Alien and Invasive Species Regulations as published in the Government Gazette 40166 of 2016 as it relates to the National Environmental Management Biodiversity Act, 1998 (Act No. 107 of 1998)

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

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

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

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

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

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

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

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

The National Forest Act, 1998 (Act No. 84 of 1998), as amended in September 2011 (NFA).

Principles to guide decisions affecting forestry resources applicable to land development management are contained in the following principle:

Principle 3

3) The principles are that—

- (a) natural forests must not be destroyed save in exceptional circumstances where, in the opinion of the Minister, a proposed new land use is preferable in terms of its economic, social or environmental benefits;
- (b) a minimum area of each woodland type should be conserved, and forests must be developed and managed to -
 - (i) conserve biological diversity, ecosystems and habitats;
 - (ii) sustain the potential yield of their economic, social and environmental benefits.



This section of the Act alludes to the fact that the conservation status of all vegetation types needs to be considered when any development is taking place to ensure that the adequate conservation of all vegetation types is ensured.

Principle 6

- (6) Criteria and indicators may include but are not limited to, those for determining— the level of maintenance and development of—
- (i) forest resources;
 - (ii) biological diversity in forests;
 - (iii) the health and vitality of forests;
 - (iv) the productive functions of forests;
 - (v) the protective and environmental functions of forests; and
 - (vi) the social functions of forests.

Applicable sections

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.

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

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 seasonality, time and budgetary constraints relevant to the type and level of investigation undertaken as well as the project program and STS CC and its staff, at their sole discretion, 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 – Floral Method of Assessment

Floral Species of Conservation Concern Assessment

Prior to the field visit, a record of all potential floral SCC and their habitat requirements was acquired making use of relevant national and provincial list published in:

- the Northern Cape Nature Conservation Act, 2009 (Act No. 9 of 2009),
- Government Notice 256 Threatened or Protected Species (TOPS) as published in the Government Gazette 38600 of 2015 as it relates to the National Environmental Management Biodiversity Act, 2004 (Act No. 10 of 2004); and
- Government Notice 908 List of Protected Tree Species as published in the Government Gazette 38215 as it relates to the National Forest Act, 1998, (Act No. 84 of 1998), amended in September 2011.

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

The Probability of Occurrence (POC) for floral SCC was determined using the following calculations wherein the distribution range for the species, specific habitat requirements and level of habitat disturbance were considered. The accuracy of the calculation is based on the available knowledge about the species in question, with many of the species lacking in-depth habitat research.

Each factor contributes an equal value to the calculation.

Distribution						
	Outside of known distribution range					Inside known distribution range
Site score						
EVC 1 score	0	1	2	3	4	5
Habitat availability						
	No habitat available					Habitat available
Site score						
EVC 1 score	0	1	2	3	4	5
Habitat disturbance						
	0	Very low	Low	Moderate	High	Very high
Site score						
EVC 1 score	5	4	3	2	1	0

$[\text{Distribution} + \text{Habitat availability} + \text{Habitat disturbance}] / 15 \times 100 = \text{POC}\%$

Vegetation Surveys

Vegetation surveys were undertaken by first identifying different habitat units and then analysing the floral species composition that was recorded during detailed floral assessments using the step point vegetation assessment methodology. Different transect lines were chosen throughout the entire focus area within areas that were perceived to best represent the various plant communities. Floral species were recorded, and a species list was compiled for each habitat unit. These species lists were also compared with the vegetation expected to be found within the relevant vegetation types as described in Appendix E, which serves to provide an accurate indication of the ecological integrity and conservation value of each habitat unit (Evans & Love, 1957; Owensby, 1973).

Floral Habitat Sensitivity

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



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

Each of these values contributes equally to the mean score, which determines the floral habitat sensitivity class in which each habitat unit falls. A conservation and land-use objective is also assigned to each sensitivity class which aims to guide the responsible and sustainable utilisation of the habitat unit in question. In order to present the results use is made of spider diagrams to depict the significance of each aspect of floral ecology for each vegetation type. The different classes and land-use objectives are presented in the table below:

Table B1: Floral habitat sensitivity rankings and associated land-use objectives.

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



APPENDIX C – Faunal Method of Assessment

It is important to note that due to the nature and habits of fauna, varied stages of life cycles, seasonal and temporal fluctuations along with other external factors, it is unlikely that all faunal species will have been recorded during the site assessment. The presence of human habitation in the area surrounding the focus area and the associated anthropogenic activities may have an impact on faunal behaviour and in turn the rate of observations. In order to increase overall observation time within the focus area, as well as increasing the likelihood of observing shy and hesitant species, camera traps were strategically placed within the focus area.

Mammals

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

Avifauna

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

Reptiles

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

Amphibians

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

Invertebrates

Whilst conducting transects through the focus area, all insect species visually observed were identified, and where possible photographs taken. Due to the terrain, and shallow/ rocky soil structure pitfall traps were not utilised during the site assessment.

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



Arachnids

Suitable applicable habitat areas (rocky outcrops, sandy areas and fallen dead trees) where spiders and scorpions are likely to reside were searched. Rocks were overturned and inspected for signs of these species. Specific attention was paid to searching for Mygalomorphae arachnids (Trapdoor and Baboon spiders) as well as potential SCC scorpions within the Focus Area.

Faunal Species of Conservational Concern Assessment

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

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

The accuracy of the calculation is based on the available knowledge about the species in question. Therefore, it is important that the literature available is also considered during the calculation. Each factor contributes an equal value to the calculation.

Scoring Guideline				
Habitat availability				
No Habitat	Very low	Low	Moderate	High
1	2	3	4	5
Food availability				
No food available	Very low	Low	Moderate	High
1	2	3	4	5
Habitat disturbance				
Very High	High	Moderate	Low	Very Low
1	2	3	4	5
Distribution/Range				
Not Recorded		Historically Recorded		Recently Recorded
1		3		5

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

Faunal Habitat Sensitivity

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

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



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

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

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



APPENDIX D – Impact Assessment Methodology

The method to be used for assessing risks/impacts is outlined in the sections below.

PART A: DEFINITIONS AND CRITERIA*		
Definition of SIGNIFICANCE	Significance = consequence x probability	
Definition of CONSEQUENCE	Consequence is a function of intensity, spatial extent and duration	
Criteria for ranking of the INTENSITY of environmental impacts	VH	Severe change, disturbance or degradation. Associated with severe consequences. May result in severe illness, injury or death. Targets, limits and thresholds of concern continually exceeded. Substantial intervention will be required. Vigorous/widespread community mobilisation against the project can be expected. May result in legal action if impact occurs.
	H	Prominent change, disturbance or degradation. Associated with real and substantial consequences. May result in illness or injury. Targets, limits and thresholds of concern regularly exceeded. Will definitely require intervention. Threats of community action. Regular complaints can be expected when the impact takes place.
	M	Moderate change, disturbance or discomfort. Associated with real but not substantial consequences. Targets, limits and thresholds of concern may occasionally be exceeded. Likely to require some intervention. Occasional complaints can be expected.
	L	Minor (Slight) change, disturbance or nuisance. Associated with minor consequences or deterioration. Targets, limits and thresholds of concern rarely exceeded. Require only minor interventions or clean-up actions. Sporadic complaints could be expected.
	VL	Negligible change, disturbance or nuisance. Associated with very minor consequences or deterioration. Targets, limits and thresholds of concern never exceeded. No interventions or clean-up actions required. No complaints anticipated.
	VL+	Negligible change or improvement. Almost no benefits. Change not measurable/will remain in the current range.
	L+	Minor change or improvement. Minor benefits. Change not measurable/will remain in the current range. Few people will experience benefits.
	M+	Moderate change or improvement. Real but not substantial benefits. Will be within or marginally better than the current conditions. A small number of people will experience benefits.
	H+	Prominent change or improvement. Real and substantial benefits. Will be better than current conditions. Many people will experience benefits. General community support.
	VH+	Substantial, large-scale change or improvement. Considerable and widespread benefit. Will be much better than the current conditions. Favourable publicity and/or widespread support expected.
Criteria for ranking the DURATION of impacts	VL	Very short, always less than a year. Quickly reversible
	L	Short-term, occurs for more than 1 but less than 5 years. Reversible over time.
	M	Medium-term, 5 to 10 years.
	H	Long term, between 10 and 20 years. (Likely to cease at the end of the operational life of the activity)
	VH	Very long, permanent, +20 years (Irreversible. Beyond closure)
Criteria for ranking the EXTENT of impacts	VL	A part of the site/property.
	L	Whole site.
	M	Beyond the site boundary, affecting immediate neighbours
	H	Local area, extending far beyond site boundary.
	VH	Regional/National



PART B: DETERMINING CONSEQUENCE							
INTENSITY = VL							
DURATION	Very long	VH	Low	Low	Medium	Medium	High
	Long term	H	Low	Low	Low	Medium	Medium
	Medium term	M	Very Low	Low	Low	Low	Medium
	Short term	L	Very low	Very Low	Low	Low	Low
	Very short	VL	Very low	Very Low	Very Low	Low	Low
INTENSITY = L							
DURATION	Very long	VH	Medium	Medium	Medium	High	High
	Long term	H	Low	Medium	Medium	Medium	High
	Medium term	M	Low	Low	Medium	Medium	Medium
	Short term	L	Low	Low	Low	Medium	Medium
	Very short	VL	Very low	Low	Low	Low	Medium
INTENSITY = M							
DURATION	Very long	VH	Medium	High	High	High	Very High
	Long term	H	Medium	Medium	Medium	High	High
	Medium term	M	Medium	Medium	Medium	High	High
	Short term	L	Low	Medium	Medium	Medium	High
	Very short	VL	Low	Low	Low	Medium	Medium
INTENSITY = H							
DURATION	Very long	VH	High	High	High	Very High	Very High
	Long term	H	Medium	High	High	High	Very High
	Medium term	M	Medium	Medium	High	High	High
	Short term	L	Medium	Medium	Medium	High	High
	Very short	VL	Low	Medium	Medium	Medium	High
INTENSITY = VH							
DURATION	Very long	VH	High	High	Very High	Very High	Very High
	Long term	H	High	High	High	Very High	Very High
	Medium term	M	Medium	High	High	High	Very High
	Short term	L	Medium	Medium	High	High	High
	Very short	VL	Low	Medium	Medium	High	High
			VL	L	M	H	VH
			A part of the site/ property	Whole site	Beyond the site, affecting neighbours	Extending far beyond site but localised	Regional/ National
EXTENT							

PART C: DETERMINING SIGNIFICANCE							
PROBABILITY (of exposure to impacts)	Definite/ Continuous	VH	Very Low	Low	Medium	High	Very High
	Probable	H	Very Low	Low	Medium	High	Very High
	Possible/ frequent	M	Very Low	Very Low	Low	Medium	High
	Conceivable	L	Insignificant	Very Low	Low	Medium	High
	Unlikely/ improbable	VL	Insignificant	Insignificant	Very Low	Low	Medium
			VL	L	M	H	VVH
CONSEQUENCE							



PART D: INTERPRETATION OF SIGNIFICANCE	
Significance	Decision guideline
Very High	Potential fatal flaw unless mitigated to lower significance.
High	It must have an influence on the decision. Substantial mitigation will be required.
Medium	It should have an influence on the decision. Mitigation will be required.
Low	Unlikely that it will have a real influence on the decision. Limited mitigation is likely required.
Very Low	It will not have an influence on the decision. Does not require any mitigation
Insignificant	Inconsequential, not requiring any consideration.

*VH = very high, H = high, M= medium, L= low and VL= very low and + denotes a positive impact.

Mitigation measure development

According to the DEA *et al.*, (2013) “Rich biodiversity underpins the diverse ecosystems that deliver ecosystem services that are of benefit to people, including the provision of basic services and goods such as clean air, water, food, medicine and fibre; as well as more complex services that regulate and mitigate our climate, protect people and other life forms from natural disaster and provide people with a rich heritage of nature-based cultural traditions. Intact ecological infrastructure contributes significant savings through, for example, the regulation of natural hazards such as storm surges and flooding by which is attenuated by wetlands”.

According to the DEA *et al.*, (2013) Ecosystem services can be divided into 4 main categories:

- Provisioning services are the harvestable goods or products obtained from ecosystems such as food, timber, fibre, medicine, and fresh water;
- Cultural services are the non-material benefits such as heritage landscapes and seascapes, recreation, ecotourism, spiritual values and aesthetic enjoyment;
- Regulating services are the benefits obtained from an ecosystem’s control of natural processes, such as climate, disease, erosion, water flows, and pollination, as well as protection from natural hazards; and
- Supporting services are the natural processes such as nutrient cycling, soil formation and primary production that maintain the other services.

Loss of biodiversity puts aspects of the economy, wellbeing and quality of life at risk, and reduces socio-economic options for future generations. This is of particular concern for the poor in rural areas who have limited assets and are more dependent on common property resources for their livelihoods. The importance of maintaining biodiversity and intact ecosystems for ensuring on-going provision of ecosystem services, and the consequences of ecosystem change for human well-being, were detailed in a global assessment entitled the Millennium Ecosystem Assessment (MEA, 2005), which established a scientific basis for the need for action to enhance management and conservation of biodiversity.

Sustainable development is enshrined in South Africa’s Constitution and laws. The need to sustain biodiversity is directly or indirectly referred to in a number of Acts, not least the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (hereafter referred to as the Biodiversity Act), and is fundamental to the notion of sustainable development. In addition, International guidelines and commitments as well as national policies and strategies are important in creating a shared vision for sustainable development in South Africa (DEA *et al.*, 2013).

The primary environmental objective of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) (MPRDA) is to give effect to the environmental right contained in the South African Constitution. Furthermore, Section 37(2) of the MPRDA states that “any prospecting or mining operation must be conducted in accordance with generally accepted principles of sustainable development by integrating social, economic and environmental factors into the planning and implementation of prospecting and mining projects in order to ensure that exploitation of mineral resources serves present and future generations”.

Pressures on biodiversity are numerous and increasing. According to the DEA *et al.*, (2013) Loss of natural habitat is the single biggest cause of biodiversity loss in South Africa and much of the world. The most severe transformation of habitat arises from the direct conversion of natural habitat for human requirements, including:

- Cultivation and grazing activities;
- Rural and urban development;



- Industrial and mining activities, and
- Infrastructure development.

Impacts on biodiversity can largely take place in four ways (DEA *et al.*, 2013):

- **Direct impacts:** are impacts directly related to the project including project aspects such as site clearing, water abstraction and discharge of water from riverine resources;
- **Indirect impacts:** are impacts associated with a project that may occur within the zone of influence in a project such as surrounding terrestrial areas and downstream areas on water courses;
- **Induced impacts:** are impacts directly attributable to the project but are expected to occur due to the activities of the project. Factors included here are urban sprawl and the development of associated industries; and
- **Cumulative impacts:** can be defined as the sum of the impact of a project as well as the impacts from past, existing and reasonably foreseeable future projects that would affect the same biodiversity resources. Examples include numerous mining operations within the same drainage catchment or numerous residential developments within the same habitat for faunal or floral species.

Given the limited resources available for biodiversity management and conservation, as well as the need for development, efforts to conserve biodiversity need to be strategic, focused and supportive of sustainable development. This is a fundamental principle underpinning South Africa's approach to the management and conservation of its biodiversity and has resulted the definition of a clear mitigation strategy for biodiversity impacts.

'Mitigation' is a broad term that covers all components of the 'mitigation hierarchy' defined hereunder. It involves selecting and implementing measures – amongst others – to conserve biodiversity and to protect, the users of biodiversity and other affected stakeholders from potentially adverse impacts as a result of mining or any other land use. The aim is to prevent adverse impacts from occurring or, where this is unavoidable, to limit their significance to an acceptable level. Offsetting of impacts is considered to be the last option in the mitigation hierarchy for any project.

The mitigation hierarchy in general consists of the following in order of which impacts should be mitigated (DEA *et al.*, 2013):

- **Avoid/prevent impact:** can be done through utilising alternative sites, technology and scale of projects to prevent impacts. In some cases, if impacts are expected to be too high the "no project" option should also be considered, especially where it is expected that the lower levels of mitigation will not be adequate to limit environmental damage and eco-service provision to suitable levels;
- **Minimise impact:** can be done through utilisation of alternatives that will ensure that impacts on biodiversity and ecoservices provision are reduced. Impact minimisation is considered an essential part of any development project;
- **Rehabilitate impact:** is applicable to areas where impact avoidance and minimisation are unavoidable where an attempt to re-instate impacted areas and return them to conditions which are ecologically similar to the pre-project condition or an agreed post project land use, for example arable land. Rehabilitation can however not be considered as the primary mitigation tool as even with significant resources and effort rehabilitation that usually does not lead to adequate replication of the diversity and complexity of the natural system. Rehabilitation often only restores ecological function to some degree to avoid ongoing negative impacts and to minimise aesthetic damage to the setting of a project. Practical rehabilitation should consist of the following phases in best practice:
 - **Structural rehabilitation** which includes physical rehabilitation of areas by means of earthworks, potential stabilisation of areas as well as any other activities required to develop a long terms sustainable ecological structure;
 - **Functional rehabilitation** which focuses on ensuring that the ecological functionality of the ecological resources on the focus area supports the intended post closure land use. In this regard special mention is made of the need to ensure the continued functioning and integrity of wetland and riverine areas throughout and after the rehabilitation phase;
 - **Biodiversity reinstatement** which focuses on ensuring that a reasonable level of biodiversity is re-instated to a level that supports the local post closure land uses. In this regard special mention is made of re-instating vegetation to levels which will allow the



- natural climax vegetation community of community suitable for supporting the intended post closure land use; and
- **Species reinstatement** which focuses on the re-introduction of any ecologically important species which may be important for socio-cultural reasons, ecosystem functioning reasons and for conservation reasons. Species re-instatement need only occur if deemed necessary.
 - **Offset impact:** refers to compensating for latent or unavoidable negative impacts on biodiversity. Offsetting should take place to address any impacts deemed to be unacceptable which cannot be mitigated through the other mechanisms in the mitigation hierarchy. The objective of biodiversity offsets should be to ensure no net loss of biodiversity. Biodiversity offsets can be considered to be a last resort to compensate for residual negative impacts on biodiversity.

The significance of residual impacts should be identified on a regional as well as national scale when considering biodiversity conservation initiatives. If the residual impacts lead to irreversible loss or irreplaceable biodiversity the residual impacts should be considered to be of very high significance and when residual impacts are considered to be of very high significance, offset initiatives are not considered an appropriate way to deal with the magnitude and/or significance of the biodiversity loss. In the case of residual impacts determined to have medium to high significance, an offset initiative may be investigated. If the residual biodiversity impacts are considered of low significance no biodiversity offset is required.

In light of the above discussion 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 impacts⁶ 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 wherever possible.

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 focus area as a whole. Mitigation measures have been developed to address issues in all phases throughout the life of the operation from planning, through to construction and operation.

⁶ Mitigation measures should address both positive and negative impacts



APPENDIX E - VEGETATION TYPE

Kathu Bushveld (SVk12)

Table E1: Dominant & typical floristic species of Kathu Bushveld (Mucina & Rutherford, 2012)

	Species
Tall Tree	<i>Vachellia erioloba</i> (d)
Small Trees	<i>Senegalia mellifera</i> subsp. <i>detinens</i> (d), <i>Vachellia leudertzii</i> var. <i>leudertzii</i> (k), <i>Boscia albitrunca</i> (d), <i>Terminalia sericea</i> ,
Tall Shrubs	<i>Diospyros lycioides</i> subsp. <i>lycioides</i> (d), <i>Dichrostachys cinerea</i> , <i>Grewia flava</i> , <i>Gymnosporia buxifolia</i> , <i>Rhigozum brevispinosum</i>
Low Shrubs	<i>Aptosimum decumbens</i> , <i>Grewia retinervis</i> , <i>Nolletia arenosa</i> , <i>Sida cordifolia</i> , <i>Tragia dioica</i> ,
Graminoids	<i>Aristida meridionalis</i> (d), <i>Brachiaria nigropedata</i> (d), <i>Centropedia glauca</i> (d), <i>Eragrostis lehmanniana</i> (d), <i>Schmidtia pappophoroides</i> (d), <i>Stipagrostis ciliata</i> , <i>Aristida congesta</i> , <i>Eragrostis biflora</i> , <i>E. chloromelas</i> , <i>E. heteromera</i> , <i>E. pallens</i> , <i>Melinis repens</i> , <i>Schmidtia kalahariensis</i> , <i>Stipagrostis uniplumis</i> , <i>Tragus berteronianus</i> , <i>Antheophora argentea</i> (k), <i>Megaloprotachne albescens</i> (k), <i>Panicum kalaharensense</i> (k)
Herbs	<i>Acrotome inflata</i> , <i>Erlangea misera</i> , <i>Gisekia africana</i> , <i>Heliotropium cillatum</i> , <i>Hermbsstaedtia fleckii</i> , <i>H. odorata</i> , <i>Limeum fenestratum</i> , <i>L. viscosum</i> , <i>Lotononis platycarpa</i> , <i>Senna italic</i> subsp. <i>arachoides</i> , <i>Tribulus terrestris</i> , <i>Neuradopsis bechuanensis</i> (k)

D = Dominant, K = Kalahari Endemic

Southern Kalahari Mekkacha (AZi3)

Table E2: Dominant & typical floristic species of Southern Kalahari Mekkacha (Mucina & Rutherford, 2012)

	Species
Dry River Bottoms	
Tall Shrubs	<i>Lebeckia linearifolia</i> (d), <i>Sisyndite spartea</i> (d), <i>Deverra denudata</i> subsp. <i>aphylla</i>
Graminoids	<i>Cenchrus ciliaris</i> (d), <i>Chloris virgata</i> (d), <i>Enneapogon desvauxii</i> (d), <i>Eragrostis annulata</i> (d), <i>E. bicolor</i> (d), <i>Odyssea paucinervis</i> (d), <i>Panicum coloratum</i> (d), <i>Eragrostis porosa</i> , <i>Panicum impeditum</i> , <i>Sporobolus nervosus</i> .
Herbs	<i>Amaranthus dinteri</i> subsp. <i>dinteri</i> , <i>A. praetermissus</i> , <i>A. schinzianus</i> , <i>Boerhavia repens</i> , <i>Chamaesyce inaequilatera</i> , <i>Cucumis africanus</i> , <i>Geigeria ornativa</i> , <i>G. pectidea</i> , <i>Heliotropium lineare</i> , <i>Indigofera alternans</i> , <i>I. argyroides</i> , <i>Kohautia cynanchica</i> , <i>Lotononis platycarpa</i> , <i>Osteospermum muricatum</i> , <i>Platycarpha carlinoides</i> , <i>Radyera urens</i> , <i>Stachys spathulata</i> , <i>Tribulus terrestris</i> .
Succulent Herb	<i>Zygophyllum simplex</i> (d).
Rocky Slopes of River Canal	
Tall Tree	<i>Vachellia erioloba</i> (d)
Low Shrubs	<i>Aptosimum lineare</i> , <i>Pechuel-Loeschea leubnitziae</i> .
Graminoids	<i>Setaria verticillata</i> (d), <i>Enneapogon scaber</i> , <i>Oropetium capense</i> , <i>Stipagrostis uniplumis</i> , <i>Tragus racemosus</i> .
Herb	<i>Dicoma capensis</i>



APPENDIX F - SPECIES LISTS

Table F1: Dominant floral species encountered within the focus area. Alien species are indicated with an asterisk (*). Protected species as indicated in Bold.

Species	Habitat Unit		
	Mekgacha	Kathu Bushveld	Degraded
Trees and Tall Shrubs			
<i>*Melia azedarach</i> 1b			X
<i>*Prosopis glandulosa</i> 3	X	X	
Boscia albitrunca		X	
<i>Calobota linearifolia</i>	X		
<i>Dicrostachys cinerea</i>		X	
<i>Diospyros lycioides</i>		X	
<i>Ehretia rigida</i>		X	
<i>Grewia flava</i>	X	X	
<i>Gymnosporia buxifolia</i>		X	
<i>Lycium cinereum</i>	X	X	
<i>Lycium hirsutum</i>			
<i>Rhigozum brevispinosum</i>		X	
<i>Rhigozum trichotomum</i>	X	X	
<i>Senegalia hebeclada</i>		X	
<i>Senegalia mellifera</i>	X		
<i>Terminalia sericea</i>		X	
Vachellia erioloba	X	X	
Vachellia haematoxylon		X	
<i>Vachellia karroo</i>	X		
<i>Vachellia leuderitzii</i> var. <i>leuderitzii</i>		X	
<i>Ziziphus mucronata</i>	X	X	
Dwarf Shrubs			
<i>Aptosimum albomarginatum</i>	X		
<i>Asparagus cooperi</i>		X	
<i>Barleria rigida</i>	X		
<i>Cadaba aphylla</i>	X		
<i>Elephanthorrhiza elephantina</i>		X	
<i>Eriocephalus ambiguus</i> (<i>aspalathoides</i>)	X		
Jamesbrittenia burkeana	X		
<i>Lasiosiphon polycephalus</i>		X	
<i>Melhania rehmanii</i>	X		
<i>Monechma genistifolium</i> subsp. <i>australe</i>	X		
<i>Roepera</i> (<i>Zygophyllum</i>) <i>pubescens</i>	X		
Grasses			
<i>Aristida congesta</i> subsp. <i>congesta</i>		X	
<i>Aristida meriodinalis</i>		X	
<i>Cyperus margaritaceus</i> var. <i>margaritaceus</i>		X	
<i>Eragrostis lehmanniana</i>		X	
<i>Eragrostis truncata</i>	X		
<i>Fingerhuthia africana</i>	X		



<i>Schmidtia kalihariensis</i>		X	
<i>Schmidtia pappophoroides</i>	X	X	
<i>Stipagrostis ciliata</i>		X	
Herbs			
* <i>Verbesina encelioides</i>	X		
<i>Amellus tridactylus</i> subsp. <i>arenarius</i>	X		
<i>Chamaesyce (Euphorbia) inaeguilatera</i>	X		
<i>Citrullus lanatus</i>		X	
<i>Convolvulus sagittatus</i>	X		
<i>Dicoma capensis</i>	X	X	
<i>Dimorphotheca polyptera</i>		X	
<i>Gisekia africana</i> var. <i>africana</i>		X	
<i>Hermannia depressa</i>	X		
<i>Hermbstaedtia fleckii</i>		X	
<i>Hibiscus engleri</i>		X	
<i>Indigofera alternans</i>	X		
<i>Indigofera flavicans</i>		X	
<i>Ipomoea hackeliana</i>	X		
<i>Kyphocarpa angustifolia</i>	X		
<i>Lessertia frutescens</i> subsp. <i>frutescens</i>		X	
<i>Limeum argute-carinatum</i>	X		
<i>Limeum viscosum</i> subsp <i>viscosum</i>		X	
<i>Nerine laticoma</i>	X		
<i>Nolletia arenosa (chrysocomoides)</i>		X	
<i>Peliostomum leucorrhizum</i>	X		
<i>Pentzia calcarea</i>	X	X	
<i>Phyllanthus angolensis (loandensis)</i>		X	
<i>Pollichia campestris</i>	X		
<i>Polygala hottentotta</i>	X		
<i>Requienia sphaerosperma</i>		X	
<i>Sansevieria aethiopica</i>	X		
<i>Senna italica</i> subsp. <i>arachoides</i>	X	X	
<i>Sesamum triphyllum</i>	X	X	
<i>Stachys spathulata</i>	X		
<i>Trianthema parvifolia</i> var. <i>parvifolia</i>	X		
<i>Tribulus terrestris</i>	X	X	
<i>Xenostegia tridentata</i>	X	X	
Climbers			
<i>Pergularia daemia</i>	x		
<i>Vites</i> sp.			X

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

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

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

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



Table F2: Mammal species recorded during the field assessment.

Scientific Name	Common Name	IUCN Status
<i>Canis mesomelas</i>	Black-backed Jackal	LC
<i>Lepus saxatilis</i>	Scrub hare	LC
<i>Raphicerus campestris</i>	Steenbok	LC
<i>Xerus rutilus</i>	Ground Squirrel	LC
<i>Phacochoerus africanus</i>	Warthog	LC
<i>Pedetes capensis</i>	Springhare	LC
<i>Hystrix africaeaustralis</i>	Porcupine	LC

Highlighted species are protected species

Table F3: Avifaunal species recorded during the field assessment.

Scientific name	English name	National Conservation Status (Taylor et al. 2015)	IUCN Status
<i>Plocepasser mahali</i>	White browed Sparrow Weaver		LC
<i>Trachyphonus vaillantii</i>	Crested Barbet		LC
<i>Ploceus velatus</i>	Southern Masked Weaver		LC
<i>Dicrurus adsimilis</i>	Fork-tailed Drongo		LC
<i>Prinia flavicans</i>	Black Chested Prinia		LC
<i>Uraeginthus granatinus</i>	Violet eared waxbill		LC
<i>Vanellus coronatus</i>	Crowned Lapwing		LC
<i>Tockus leucomelas</i>	Southern Yellow-billed Hornbill		LC
<i>Merops apiaster</i>	European Bee-eater		LC
<i>Passer melanurus</i>	Cape Sparrow		LC
<i>Passer diffusus</i>	Southern Grey-headed Sparrow		LC
<i>Bubalornis niger</i>	Red-billed Buffalo Weaver		LC
<i>Erythropgia paena</i>	Kalahari Scrub Robin		LC
	Glossy Starling		LC
<i>Colius</i>	White-backed Mousebird		LC
	African Hoopoe		LC
<i>Lanius collaris</i>	Fiscal Shrike		LC
<i>Lophoceros nasutus</i>	Grey Hornbill		LC

LC = Least Concern, N-End Near-endemic

Table F4: Reptile species recorded during the field assessment.

Scientific name	Common Name	IUCN 2016 Status
<i>Stigmochelys pardalis</i>	Leopard tortoise	LC
<i>Trachylepis spilogaster</i>	Kalahari Tree Skink	NYBA
<i>Pedioplanis namaquensis</i>	Namaqua Sand Lizard)	NYBA

LC = Least Concern, NYBA = Not Yet Been Assessed



Table F5: Invertebrate recorded during the field assessment.

Scientific Name	Common Name	IUCN 2016 Status
<i>Tarucus sybaris</i>	Dotted Blue	NYBA
<i>Zonocerus elegans</i>	Elegant Grasshopper	NYBA
<i>Catopsilia florella</i>	Common vagrant	NA
Cicadidae	Cicada	NYBA
<i>Anoplolepis custodiens</i>	Pugnacious Ant	NYBA
<i>Lamarckian</i> sp.	Rain Locust	NYBA
<i>Hippobosca</i> sp.	Louse fly	NYBA
<i>Psammodes virago</i>	Giant Toktokkie	NYBA
<i>Decapotoma transvaalica</i>	Blister Beetle	NYBA
<i>Graphipterus atrimediis</i>	Velvet Ground Beetle	NYBA
<i>Dichesta rufa</i>	Savanna Fruit Chafer	NYBA
<i>Opisthophthalmus</i> sp (possible <i>O. wahlbergii</i>)	Burrowing Scorpion	NYBA

NYBA = Not yet been assessed by the IUCN; NA = Not Applicable



APPENDIX G - FLORAL SCC

The species listed below and protected within the various legislature have an increased probability of occurring within the focus area.

Table G1: NFA (1998) plant list for the tree species expected to occur within the focus area.

Family	Scientific Name	Habitat	National Status	POC (%)
Fabaceae	<i>Vachellia erioloba</i>	Savanna, semi-desert and desert areas with deep, sandy soils and along drainage lines in very arid areas, sometimes in rocky outcrops	LC	100
Fabaceae	<i>Vachellia haematoxylon</i>	Bushveld, usually on deep Kalahari sand between dunes and dry watercourses.	LC	100
Capparaceae	<i>Boscia albitrunca</i>	This species is found in the drier parts of southern Africa, in areas of low rainfall.	LC	100

LC = Least Concern

Table G2: NCNCA (2009) plant list for the floral species likely to occur within the focus area.

Family	Scientific Name	Habitat	Schedule	National Status	POC (%)
Apocynaceae	<i>Hoodia gordonii</i>	Occurs in a wide variety of arid habitats from coastal to mountainous, also on gentle to steep shale ridges, found from dry, rocky places to sandy spots in riverbeds.	Schedule 1	DDD	40
Fabaceae	<i>Lessertia frutescens</i> subsp. <i>frutescens</i>	Occurs naturally throughout the dry parts of southern Africa.	Schedule 1	LC	100
Pedaliaceae	<i>Harpagophytum procumbens</i>	Well drained sandy habitats in open savanna and woodlands.	Schedule 1	LC	80
Apocynaceae	<i>Orbea lutea</i> subsp. <i>lutea</i>	The plants grow in scrub, savanna (Acacia and mopane veld) and grassland at altitudes of 500-1500 m in full sun or semi-shade	Schedule 2	LC	27
Capparaceae	<i>Boscia albitrunca</i>	This species is found in the drier parts of southern Africa, in areas of low rainfall.	Schedule 2	LC	100
Asphodelaceae	<i>Aloe grandidentata</i>	Nama karoo shrubland, occurs on ironstone ridges, but in the eastern part of the range it is also found on calcrete.	Schedule 2	LC	20
Amaryllidaceae	<i>Boophane disticha</i>	Wide distribution in sandy soils throughout the central and eastern parts of southern Africa. Occurs infrequently in the Kalahari dune veld.	Schedule 2	LC	60
Amaryllidaceae	<i>Nerine laticoma</i>	<i>Nerine laticoma</i> occurs in a broad band stretching from the dry inland parts of Namibia eastwards and southwards through southern Botswana, Limpopo, Gauteng, the North-West, Northern Cape, Free State and Lesotho. It usually occurs in large colonies on deep, red, sandy soils.	Schedule 2	LC	100
Iridaceae	<i>Babiana hypogaea</i>	Red sand plains. Usually in Kalahari sand or stony laterite in open woodland or grassland	Schedule 2	LC	80

DDD = Data Deficient – Insufficient Information; LC = Least Concern



Table G3: TOPS plant list for the floral species expected to occur within the Northern Cape.

Family	Scientific Name	Habitat	Growth Form	National Status	Tops Status	POC (%)
Aizoaceae	<i>Cheiridopsis peculiaris</i>	Gravels and shale derived from metamorphic rocks of the Namaqualand Complex	Succulent	CR	CR	0
Aizoaceae	<i>Conophytum herreanthus</i> subsp. <i>Herreanthus</i>	Quartz patches. Umdaus Mountains Succulent Shrubland. Richtersveld, near Umdaus north of Steinkopf	Succulent	EW	CR	0
Asphodelaceae	<i>Aloidendron pillansii</i>	Succulent Karoo shrubland on dry, rocky dolomite and gneiss hillsides. Richtersveld and southern Namibia	Succulent, Tree	EN	EN	0
Amaryllidaceae	<i>Haemanthus graniticus</i>	Namaqualand Klipkoppe Shrubland or Namaqualand Granite Renosterveld. Springbok to Kamiesberg	Geophyte	EN	EN	0
Aizoaceae	<i>Lithops dorotheae</i>	Fine-grained, sheared, feldspathic quartzite. Pella to Pofadder.	Succulent	EN	EN	0
Asphodelaceae	<i>Aloidendron dichotomum</i>	On north-facing rocky slopes (particularly dolomite) in the south of its range. Any slopes and sandy flats in the central and northern parts of range. From Nieuwoudtville east to Olifantsfontein and northwards to the Brandberg in Namibia.	Succulent, Tree	VU	VU	0
Amaryllidaceae	<i>Brunsvigia herrei</i>	Succulent Karoo Shrubland, granitic soils on flats and sometimes in deposits of fairly large stones. Southern Namibia to Springbok	Geophyte	VU	VU	0
Aizoaceae	<i>Conophytum bachelorum</i>	Quartz outcrops, ridges and cliffs in Namaqualand Heuweltjieveld. Southern Richtersveld between Steinkopf and Port Nolloth.	Succulent	VU	VU	0
Aizoaceae	<i>Conophytum ratum</i>	Spongy quartz soil. Bushmanland Inselbergs near Aggeneys.	Succulent	CR	VU	0
Amaryllidaceae	<i>Gethyllis grandiflora</i>	Sandy and or stony soils in arid karroid shrubland. Richtersveld Mountains to Komaggas.	Geophyte	LC	VU	0
Amaryllidaceae	<i>Gethyllis namaquensis</i>	Coastal dunes and gravelly mountain slopes in succulent karoo shrubland. Richtersveld and southern Namibia.	Geophyte	LC	VU	0
Amaryllidaceae	<i>Brunsvigia josephinae</i>	Heavy clay soils. Nieuwoudtville to Baviaanskloof.	Geophyte	VU	VU	0
Asphodelaceae	<i>Aloe krapohlana</i>	Occurs in the extremely arid northern regions of the Succulent Karoo, on clay, stony (mostly quartzitic) and sandy soils on flats and slopes. Namaqualand, from Vanrhynsdorp to the Orange River.	Herb, Succulent	DDD	P	0
Amaryllidaceae	<i>Cyrtanthus herrei</i>	Deeply shaded rock ledges on south-facing rocky slopes. Central mountains of the Richtersveld and southern Namibia.	Bulb	NT	P	0
Aizoaceae	<i>Sceletium tortuosum</i>	Quartz patches and is usually found growing under shrubs in partial shade.	Succulent	LC	P	20
Pedaliaceae	<i>Harpagophytum procumbens</i>	Well drained sandy habitats in open savanna and woodlands.	Herb		P	80

EW = Extinct in the Wild; DDD = Data Deficient – Insufficient Information; CR= Critically Endangered, EN= Endangered, VU= Vulnerable, P= Protected; LC = Least Concern



APPENDIX H - FAUNAL SCC

Table H1: TOPS list of faunal species (2015) expected to occur within the Northern Cape.

Scientific Name	Common Name	Threat Status	POC
<i>Homopus signatus</i>	Speckled tortoise	VU	0
<i>Pachydactylus goodi</i>	Good's Gecko	VU	0
<i>Cordylus macropholis</i>	Large-scaled Lizard	P	0
<i>Cordylus imkeae</i>	Rooiberg Girdled Lizard	P	0
<i>Opisththalmus ater</i>	Steinkopf Burrowing Scorpion	CR	60
<i>Acinonyx jubatus</i>	Cheetah	VU	0
<i>Manis temminckii</i>	Pangolin	VU	25
<i>Ceratotherium simum</i>	Southern White Rhinoceros	P	0
<i>Crocuta crocuta</i>	Spotted Hyaena	P	0
<i>Felis nigripes</i>	Black-footed Cat	P	10
<i>Hyaena brunnea</i>	Brown Hyaena	NT	30
<i>Neophron percnopterus</i>	Egyptian Vulture	CR	3
<i>Aquila rapax</i>	Tawny Eagle	EN	10
<i>Torgos tracheliotos</i>	Lappet-faced Vulture	EN	50
<i>Gyps africanus</i>	White-backed Vulture	CR	50
<i>Gyps coprotheres</i>	Cape Vulture	EN	5
<i>Neotis ludwigii</i>	Ludwig's Bustard	EN	3
<i>Polemaetus bellicosus</i>	Martial Eagle	EN	4
<i>Terathopius ecaudatus</i>	Bateleur	EN	0
<i>Anthropoides paradiseus</i>	Blue Crane	P	0
<i>Ardeotis kori</i>	Kori Bustard	P	16
<i>Orycteropus afer</i>	Aardvark	P	100

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



Table H2:Threatened species not yet listed above that may occur in the focus area.

Common Name	Species	NCCA 2009 Status	IUCN 2015 Status	POC (%)
Honey badger	<i>Mellivora capensis</i>	Specially Protected	LC	20
African wild cat	<i>Felis silvestris</i>	Specially protected	LC	15
Striped polecat	<i>Ictonyx striatus</i>	Specially protected	LC	15
African striped weasel	<i>Poecilogale albinucha</i>	Specially protected	LC	5
Aardwolf	<i>Proteles cristata</i>	Specially protected	LC	20
Cape fox	<i>Vulpes chama</i>	Specially protected	LC	60
Southern African hedgehog	<i>Atelerix frontalis</i>	Specially protected	LC	70
Leopard	<i>Panthera pardus</i>	Specially protected	VU	10
Black eagle	<i>Aquila verreauxii</i>	Specially Protected	VU	20
White-backed Vulture	<i>Gyps africanus</i>	Specially Protected	CR	10
Ludwig's Bustard	<i>Neotis ludwigii</i>	Specially protected	EN	10
Martial Eagle	<i>Polemeatus bellicosus</i>	Specially Protected	EN	60
Tawny Eagle	<i>Aquila rapax</i>	Specially Protected	EN	60
Cape Vulture	<i>Gyps coprotheres</i>	Specially Protected	EN	7
Lappet-faced Vulture	<i>Torgos tracheliotos</i>	Specially Protected	EN	5
Burchell's courses	<i>Cursorius rufus</i>	Protected	VU	15
Lanner Falcon	<i>Falco biarmicus</i>	Specially Protected	VU	8
Secretarybird	<i>Sagittarius serpentarius</i>	Specially Protected	VU	5
Kori Bustard	<i>Ardeotis kori</i>	NA	NT	60
African Rock Pipit	<i>Anthus crenatus</i>	Protected	NT	10
Burrowing scorpion	<i>Opisththalmus carinatus</i>	Specially Protected	NYBA	80
Burrowing scorpion	<i>Opisththalmus wahlbergii</i>	Specially Protected	NYBA	90
Common flap-neck chameleon	<i>Chamaeleo dilepis</i>	Specially Protected	LC	65
African rock python	<i>Python sebae</i>	Specially Protected		65

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

South African Bird Atlas Project 2 list for quadrant 2722BB and 2622DD

Avifaunal Species for the following pentads within the QDS 2722BB and 2622DD

http://sabap2.adu.org.za/coverage/pentad/2655_2250

http://sabap2.adu.org.za/coverage/pentad/2700_2250

http://sabap2.adu.org.za/coverage/pentad/2700_2245



APPENDIX I – SPECIALIST INFORMATION

DETAILS, EXPERTISE AND CURRICULUM VITAE OF SPECIALISTS

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

M. Meintjies	MSC (Medicinal Plant Science) (University of Pretoria)
N. Cloete	MSc (Environmental Management) (University of Johannesburg)
Kim Marais	BSc (Hons) Zoology (Herpetology) (University of the Witwatersrand)
Chris Hooton	BTech Nature Conservation (Tshwane University of Technology)

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

Company of Specialist:	Scientific Terrestrial Services		
Name / Contact person:	Nelanie Cloete		
Postal address:	29 Arterial Road West, Oriel, Bedfordview		
Postal code:	2007	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) Member of the Botanical Society of South Africa (BotSoc)		



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

I, Marelle Meintjies, 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

Mantjies

Signature of the Specialist

I, Nelanie Cloete, declare that -

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

Cloete

Signature of the Specialist



I, Kim Marais, declare that -

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



Signature of the Specialist

I, Chris 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





**SAS ENVIRONMENTAL GROUP OF COMPANIES –
SPECIALIST CONSULTANT INFORMATION**

CURRICULUM VITAE OF NELANIE CLOETE

PERSONAL DETAILS

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

MEMBERSHIP IN PROFESSIONAL SOCIETIES

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

EDUCATION

Qualifications

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

Short Courses

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

AREAS OF WORK EXPERIENCE

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



KEY SPECIALIST DISCIPLINES

Biodiversity Assessments

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

Freshwater Assessments

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

Legislative Requirements, Processes and Assessments

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





SAS ENVIRONMENTAL GROUP OF COMPANIES – SPECIALIST CONSULTANT INFORMATION

CURRICULUM VITAE OF KIM MARAIS

PERSONAL DETAILS

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

MEMBERSHIP IN PROFESSIONAL SOCIETIES

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

EDUCATION

Qualifications

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

Short Courses

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

AREAS OF WORK EXPERIENCE

South Africa – Gauteng, Mpumalanga, KwaZulu-Natal, Northern Cape, Eastern Cape,
Africa - Uganda

KEY SPECIALIST DISCIPLINES

Biodiversity Assessments

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

Freshwater Assessments

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



Aquatic Ecological Assessment and Water Quality Studies

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

Legislative Requirements, Processes and Assessments

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





**SAS ENVIRONMENTAL GROUP OF COMPANIES –
SPECIALIST CONSULTANT INFORMATION**

CURRICULUM VITAE OF 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
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 MARELIE MEINTJIES

PERSONAL DETAILS

Position in Company	Plant Ecologist and GIS Specialist
Joined SAS Environmental Group of Companies	2015

EDUCATION

Qualifications

MSc Medicinal Plant Science (University of Pretoria)	2014
BSc (Hons) Medicinal Plant Science (University of Pretoria)	2012
BSc Biotechnology (University of Pretoria)	2011

Short Courses

ESRI MOOC ARCGIS Cartography	2018
Global Mapper Lidar Training	2017

AREAS OF WORK EXPERIENCE

South Africa – All Provinces

KEY SPECIALIST DISCIPLINES

Biodiversity Assessments

- Floral Assessments
- Alien and Invasive Control Plan (AICP)
- Ecological Scan
- Protected Tree and Floral Marking and Reporting
- Biodiversity Offset Plan

Freshwater Assessments

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

Visual Impact Assessment

- Visual Baseline and Impact Assessments
- Visual Impact Peer Review Assessments
- View Shed Analyses
- Visual Modelling

