BIODIVERSITY ASSESSMENT AS PART OF THE ENVIRONMENTAL IMPACT ASSESSMENT AND AUTHORISATION PROCESS FOR THE PROPOSED MIDVAAL BRICK MANUFACTURING FACILITY, MEYERTON, GAUTENG PROVINCE

Prepared for

SRK Consulting (South Africa) (Pty) LtD

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SAS Environmental Group of Companies

EXECUTIVE SUMMARY

Scientific Terrestrial Services (STS) was appointed to conduct a biodiversity assessment as part of the Environmental Impact and Environmental Authorisation (EA) process for the proposed Midvaal Brick Manufacturing Facility, located in the town of Meyerton, Gauteng Province, henceforth referred to as the "study area". The proposed area identified for development encompasses approximately 6.8 ha

The study area is located within the Vulnerable Soweto Highveld Grassland in the east and within the least concern Carletonville Dolomite Grassland in the west, i.e., the reference vegetation types. During the field assessment, two habitat units were identified within the study area, namely the Degraded Grassland Habitat and Woody Habitat. The study area is encompassed by several urban developments (e.g., housing), a neighbouring mine and roads and as such habitat connectivity has been significantly impacted upon. Within the study area habitats have been exposed to various historic and ongoing disturbances, resulting in largely degraded habitat with generally low floral and faunal diversity and abundance. Much of the study area is dominated by floral species associated with disturbance, including alien and invasive plants (AIPs), whilst the fauna within this area was noted to be commonly occurring and widespread species that have adapted to urban settings. Given the degraded state of the habitat units, the study area is no longer considered representative of the reference vegatation types.

During the field assessment one floral SCC, *Adromischus umbraticola* subsp. *umbraticola*, was potentially observed within the development footprint. Permits will be required from the Gauteng Department of Agriculture and Rural Development (GDARD) for the removal of this species before the commencement of any development proceeds. No faunal SCC were encountered during the field assessment, and it is unlikely that any other faunal SCC will utilise the study area, given the lack of habitat connectivity, resources and overall disturbed nature of the area.

Following the ecological assessment of the biodiversity within the study area, the impacts associated with the proposed development activities were determined. The impacts on the floral and faunal habitat, diversity and SCC are considered to range from medium-low to very low significance impacts prior to the implementation of mitigation measures. With mitigation fully implemented all impacts can be reduced to low to very-low significance impacts. No significant impacts[1] on the biodiversity associated with the study area are anticipated for the proposed development.

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

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).

No.	Requirements	Section in report/Notes
2.1	**Assessment must be undertaken by a suitably qualified SACNASP registered specialist**	**Appendix I**
2.2	**Description of the preferred development site, including the following aspects-**	
2.2.1	*A description of the ecological drivers/processes of the system and how the proposed development will impact these;*	Section 4
2.2.2	*Ecological functioning and ecological processes (e.g. fire, migration, pollination, etc.) that operate within the proposed development site;*	Section 4
2.2.3	*The ecological corridors that the development would impede including migration and movement of flora and fauna;*	Section 4
2.2.4	*The description of any significant landscape features (including rare or important flora/faunal associations, presence of Strategic Water Source Areas (SWSAs) or Freshwater Ecosystem Priority Areas (FEPA) sub catchments;*	Section 4

2.2.5	*A description of terrestrial biodiversity and ecosystems on the proposed development site, including –*
	   a) Main vegetation types;
	   b) Threatened ecosystems, including Listed Ecosystems as well as locally important habitat types identified;
	   c) Ecological connectivity, habitat fragmentation, ecological processes and fine scale habitats; and
	   d) Species, distribution, important habitats (e.g. feeding grounds, nesting sites, etc.) and movement patterns identified.
		Section 3 (desktop analysis)

2.3	**Identify any alternative development footprints within the preferred development site which would be of a "low" sensitivity as identified by the national web based environmental screening tool and verified through the Initial Site Sensitivity Verification.**	Not Applicable
2.4	**The Terrestrial Biodiversity Impact Assessment must be based on the results of a site inspection undertaken on the preferred development site and must identify:**	

2.5	**Terrestrial Critical Biodiversity Areas (CBAs), including:**
	  2.5.1 The reasons why an area has been identified as a CBA;
	  2.5.2 An indication of whether or not the development is consistent with maintaining the CBA in a natural or near natural state or in achieving the goal of rehabilitation;
	  2.5.3 The impact on species composition and structure of vegetation with an indication of the extent of clearing activities;
	  2.5.4 The impact on ecosystem threat status;
	  2.5.5 The impact on explicit subtypes in the vegetation;
	  2.5.6 The impact on overall species and ecosystem diversity of the site; and
	  2.5.7 The impact on populations of species of special concern in the CBA.
		Section 3 (desktop analysis) and 4

2.6	**Terrestrial Ecological Support Areas, including;**
	  2.6.1 The impact on the ecological processes that operate within or across the site;
	  2.6.2 The extent the development will impact on the functionality of the ESA; and
	  2.6.3 Loss of ecological connectivity (on site, and in relation to the broader landscape) due to the degradation and severing of ecological corridor or introducing barriers that impede migration and movement of flora and fauna.	

2.7	**Protected Areas as defined by the National Environmental Management:** Protected Areas Act, 2004 (Act No. 57 of 2004) including an opinion on whether the proposed development aligns with the objectives/purpose of the Protected Area and the zoning as per the Protected Area Management Plan.	Section 3 (desktop analysis)

2.8	**Priority Areas for Protected Area Expansion, including:** The way in which in which the development will compromise or contribute to the expansion of the protected area network.	Section 3 (desktop analysis)
2.9	Strategic Water Source Areas (SWSA) including: 2.9.1 *The impact(s) on the terrestrial habitat of a Strategic Water Source Area; and* 2.9.2 *The impacts of the development on the SWSA water quality and quantity (e.g. describing potential increased runoff leading to increased sediment load in water courses)*	Not Applicable
2.10	Freshwater Ecosystem Priority Area (FEPA) sub catchments, including the impacts of the development on habitat condition and/or species in the FEPA sub catchment.	Not Applicable
2.11	Indigenous Forests, including: 2.11.1 *Impact on the ecological integrity of the forest;* 2.11.2 *Extent of natural or near natural indigenous forest area lost.*	Not Applicable
3.	The report must contain as a minimum the following information:	
3.1	Contact detail of the specialist, their SACNASP registration number, their field of expertise and a curriculum vitae.	Appendix I
3.2	A signed statement of independence by the specialist.	Appendix I
3.3	A statement on the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment.	Section 1.3
3.4	The methodology used to undertake the site inspection and the specialist assessment, including equipment and modelling used, where relevant.	Section 2.1 Appendices B, C & D
3.5	A description of the assumptions made, any uncertainties or gaps in knowledge or data.	Section 1.3
3.6	The location of areas not suitable for development, which are to be avoided during construction and operation, where relevant.	Section 6
3.7	Additional environmental impacts expected from the proposed development based on those already evident on the site and a discussion on the cumulative impacts.	Section 7
3.8	Proposed impact management actions and impact management outcomes for inclusion in the Environmental Management Programme (EMPr).	Section 7
3.9	A motivation must be provided if there were development footprints identified as per paragraph 2.3 in this table were not considered stating reasons why.	Not Applicable
3.10	A reasoned opinion, based on the findings of the specialist assessment, regarding the acceptability or not of the development and if the development should receive approval or not, and any conditions to which the statement is subjected.	Section 6 & 7

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GLOSSARY OF TERMS

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

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

Invasive species	Alien species that sustain self-replacing populations over several life cycles, produce reproductive offspring, often in very large numbers at considerable distances from the parent and/or site of introduction, and have the potential to spread over long distances.
Listed alien species	All alien species that are regulated in South Africa under the National Environmental Management: Biodiversity Act, 2004 (Act 10 of 2004), Alien and Invasive Species (A&IS) Regulations, 2014.
Least Threatened	Least threatened ecosystems are still largely intact.
Native species (syn. indigenous species)	Species that are found within their natural range where they have evolved without human intervention (intentional or accidental). Also includes species that have expanded their range as a result of human modification of the environment that does not directly impact dispersal (e.g. species are still native if they increase their range as a result of watered gardens, but are alien if they increase their range as a result of spread along human-created corridors linking previously separate biogeographic regions).
RDL (Red Data listed) species	According to the Red List of South African plants (http://redlist.sanbi.org/) and the International Union for Conservation of Nature (IUCN), organisms that fall into the Extinct in the Wild (EW), critically endangered (CR), Endangered (EN), Vulnerable (VU) categories of ecological status.
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. **Specifically related to flora**: A list of floral SCC recorded within the QDS 2628CA was obtained from the Gauteng Department of Agriculture and Rural Development (GDARD), comprising SANBI Red Data Listed species. Additional datasets and sources that were also taken into consideration as part of the POC assessment included: - The Botanical Database of Southern Africa (BODATSA) to obtain plant names and floristic details (http://posa.sanbi.org); and - The List of Protected Tree Species (GN 809 of 2014) under the National Forest Act, 1998 (Act No. 84 of 1998). **Specifically related to fauna**: A list of faunal SCC recorded within the QDS 2628CA was obtained from the Gauteng Department of Agriculture and Rural Development (GDARD), comprising SANBI Red Data Listed species. Additional datasets and sources that were also taken into consideration as part of the POC assessment included: - The National Environmental Management: Biodiversity Act (Act No.10 of 2004) (NEMBA) Threatened or Protected Species (TOPS) list (NEMBA, Notice 389 of 2013); - The International Union for Conservation of Nature (IUCN) Red List of Threatened Species; and - The 2015 Eskom Red Data Book of Birds of South Africa, Lesotho and Swaziland; - The Atlas and Red List of the Reptiles of South Africa, Lesotho and Swaziland.

LIST OF ACRONYMS

AIP	Alien Invasive Plant
ARC	Agricultural Research Council
BGIS	Biodiversity Geographic Information Systems
CARA	Conservation of Agricultural Resource Act
CBA	Critical Biodiversity Area
CR	Critically Endangered
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
EN	Endangered
ESA	Ecological Support Area
GDARD	Gauteng Department of Agriculture and Rural Development
GIS	Geographic Information System
GPS	Global Positioning System
Ha	Hectares
IBA	Important Bird Area
IEM	Integrated Environmental Management
IUCN	International Union for the Conservation of Nature
MAP	Mean Annual Precipitation
MAPE	Mean Annual Potential for Evaporation
MASMS	Mean Annual Soil Moisture Stress
MAT	Mean Annual Temperature
MFD	Mean Frost Days
NBA	National Biodiversity Assessment (2011)
NEMA	National Environmental Management Act (Act 107 of 1998)
NEMBA	National Environmental Management: Biodiversity Act (Act 10 of 2004)
NEMPAA	National Environmental Management: Protected Areas Act, 2003 (Act No. 57 of 2003)
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 CC
TSP	Threatened Species Programme
VU	Vulnerable

1. INTRODUCTION

1.1 Background

Scientific Terrestrial Services (STS) was appointed to conduct a biodiversity assessment as part of the Environmental Impact and Environmental Authorisation (EA) process for the proposed Midvaal Brick Manufacturing Facility, located in the town of Meyerton, Gauteng Province, henceforth referred to as the "study area".

The study area is in the Midvaal Local Municipality which is an administrative area within the Sedibeng District Municipality, Gauteng Province. The study area is situated approximately 0.6 km southwest of Witkopdorp, and approximately 2.5 km northeast of Highbury. The study area is located approximately 1 km east of the R59 Provincial Route and 0.8 km southwest of the R557 Regional Route. The study area neighbours the northern section of the Glen Douglas Dolomite Mine. The location and extent are indicated in Figures 1 and 2.

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

1.2 Project Scope

Specific outcomes in terms of this report are outlined below:
- ➢ To define the Present Ecological State (PES) of the biodiversity of the study area;
- ➢ To determine and describe habitats, communities and the ecological state of the study area;
- ➢ To conduct a faunal and floral Species of Conservation Concern (SCC) assessment, including the potential of suitable habitat to occur within the study area for SCC;
- ➢ To identify and consider all sensitive landscapes such as indigenous forests, rocky ridges, wetlands and/ or any other special features such as Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs), if present;
- ➢ To determine the environmental impacts that the construction of the proposed development might have on the biodiversity associated with the study area; and
- ➢ To develop mitigation and management measures for all phases of the development.

Figure 1: Satellite image depicting the location of the study area in relation to surrounding areas.
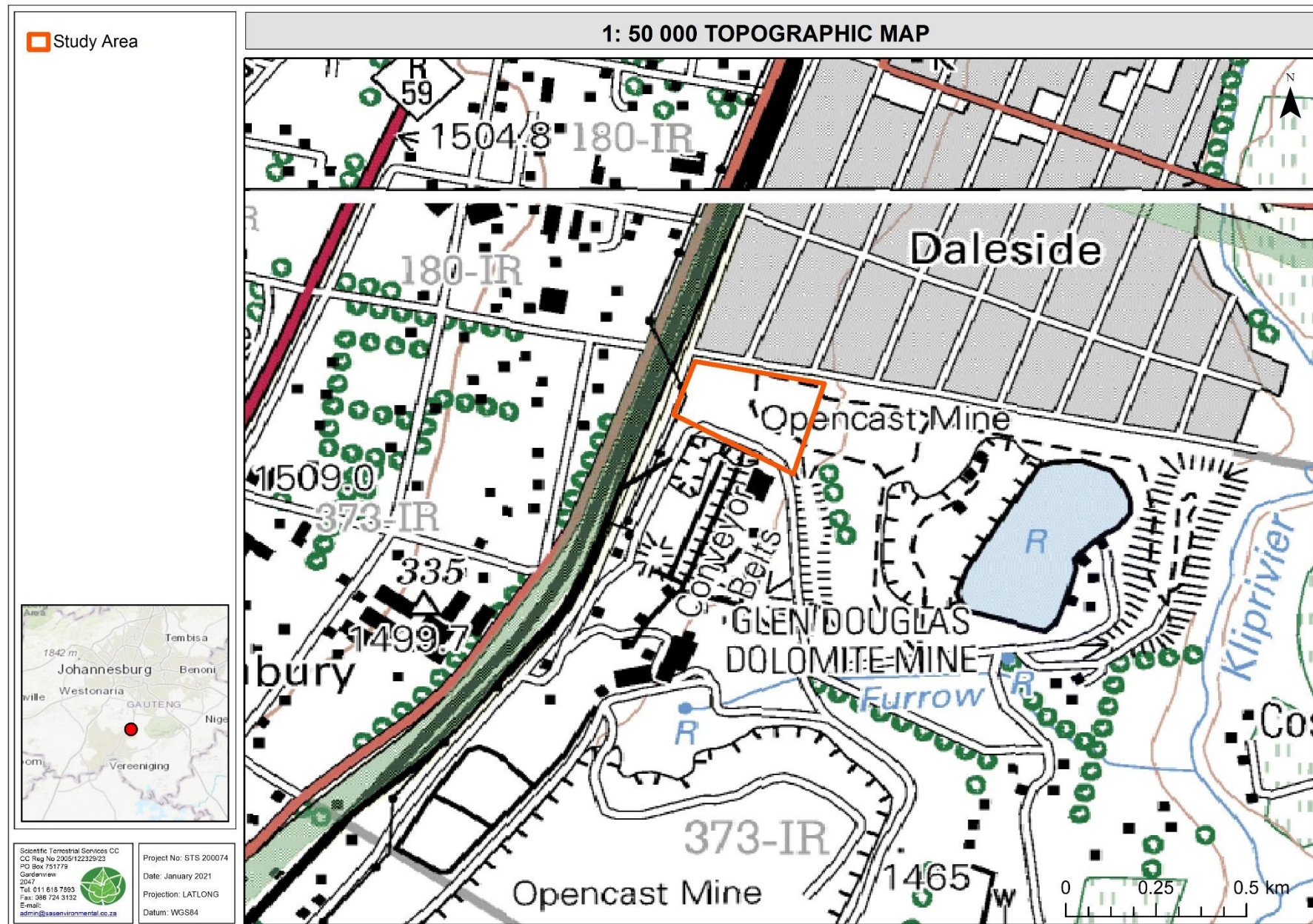
Figure 2: The study area depicted on a 1:50 000 topographical map in relation to the surrounding area.

1.3 Assumptions and Limitations

The following assumptions and limitations apply to this report:

- ➢ The biodiversity assessment was confined to the study area and did not include the neighbouring and adjacent properties. These were 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. The assessment was undertaken on the 11th of December 2020 (summer). A more accurate assessment would require that assessments take place in all seasons of the year. However, on-site data was augmented with all available desktop data. Together with project experience in the area, the findings of this assessment are considered an accurate reflection of the ecological characteristics of the study area.

- ➢ 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. Due to the locality of the study area (peri-urban area), continuous anthropogenic activities, the cyclical nature of many species' life stages, as well as the season of the assessment, very few faunal species were observed. As such, background data (desktop) and literature studies were used to further infer faunal species composition and sensitivities in relation to the available habitat; and

- ➢ Sampling, by its nature, means that not all individuals are assessed and identified. Some species and taxa associated with the study area may have been missed during the assessment.

1.4 Legislative Requirements

The following legislative requirements were considered during the assessment:

- ➢ The Constitution of the Republic of South Africa, 1996[1];
- ➢ 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);

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[1] Since 1996, the Constitution has been amended by seventeen amendments acts. The Co

nstitution 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

> The National Forest Act, 1998 (Act No. 84 of 1998) (NFA);

> Government Notice R598 Alien and Invasive Species Regulations as published in the Government Gazette 37885 dated 1 August 2014[2] as it relates to the National Environmental Management Biodiversity Act, 1998 (Act No. 107 of 1998); and

> The Conservation of Agricultural Resource Act, 1983 (Act No. 43 of 1983) (CARA);

> Government Notice 536 List of Protected Tree Species as published in the Government Gazette 41887 dated 7 September 2018 as it relates to the National Forest Act, 1998 (Act No. 84 of 1998); and

> Gauteng Department of Agriculture and Rural Development (GDARD) Requirements for Biodiversity Assessments Version 3 (GDARD, 2014).

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

2. ASSESSMENT APPROACH

2.1 General Approach

An on-site visual assessment of the study area was conducted on the 11th of December 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 study area. A thorough 'walk through' on foot was undertaken in order to identify the occurrence of the dominant floral and faunal species and faunal and floral habitat diversities.

To accurately determine the PES of the biodiversity significance of the study area and capture comprehensive data with respect to the biodiversity, 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 study area included the South African National Biodiversity Institute (SANBI) Threatened Species Programme (TSP), the Gauteng Conservation Plan Version 3.3 (2011), Mucina and Rutherford (2018), National Biodiversity Assessment (NBA, 2018), Important Bird and Biodiversity

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[2] Government Notice number R.1020: Alien and Invasive Species Regulations, 2020, in Government Gazette 43735 dated 25 September 2020 as it relates to the NEMBA will come into effect on 1 March 2021.

Areas (IBA, 2015) in conjunction with the South African Bird Atlas Project (SABAP2), South African Protected and Conservation Areas Databases (SAPAD & SACAD, Quarter 2, 2020), National Protected Areas Expansion Strategy (NPAES, 2011), and International Union for Conservation of Nature (IUCN);

➢ Specific methodologies for the assessment, in terms of the field assessment and data analysis of faunal and floral ecological assemblages, will be presented in Appendices B and C; 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 study area were considered, and sensitive areas were delineated with the use of a Global Positioning System (GPS). A Geographic Information System (GIS) was used to project these features onto satellite imagery.

3. RESULTS OF THE DESKTOP ANALYSIS

3.1 Conservation Characteristics associated with the Study Area

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

Table 1: Summary of the biodiversity conservation characteristics for the study area [QDS 2628CA].

CONSERVATION DETAILS PERTAINING TO THE AREA OF INTEREST (VARIOUS DATABASES)		DETAILS OF THE AREA OF INTEREST IN TERMS OF MUCINA & RUTHERFORD (2006, 2018, 2012)					
NATIONAL BIODIVERSITY ASSESSMENT (NBA): Ecosystem types are categorised as "not protected", "poorly protected", "moderately protected" and "well protected" based on the proportion of each ecosystem type that occurs within a protected area recognised in the National Environmental Management: Protected Areas Act, 2003 (Act No. 57 of 2003) (NEMPAA) and compared with the biodiversity target for that ecosystem type. the ecosystem protection level status is assigned using the following criteria: I. if an ecosystem type has more than 100% of its biodiversity target protected in a formal protected area either a or b, it is classified as well protected, II. when less than 100% of the biodiversity target is met in formal a or b protected areas it is classified it as moderately protected, III. if less than 50% of the biodiversity target is met, it is classified it as poorly protected, and IV. if less than 5% it is hardly protected.		**Biome**	The area of interest is situated within the **Grassland Biome**.				
		Bioregion	The area of interest falls within two bioregions namely the **Mesic Highveld Grassland Bioregion** in the west and the **Dry Highveld Grassland Bioregion** in the east.				
		Vegetation Type	The study area falls within two vegetation units, namely the Vulnerable (VU) **Soweto Highveld Grassland (Gm8)** in the west and the Least Concern (LC) **Carletonville Dolomite Grassland (Gh15)** in the east of the study area.				
		Climate	Soweto Highveld Grassland: Summer-rainfall region. Cool-temperate climate with high extremes between maximum summer and minimum winter temperatures, and frequent occurrence of frost. Carletonville Dolomite Grassland: Warm-temperate, summer-rainfall region. Severe frost often occurs in winter.				
			MAP* (mm)	**MAT* (°C)**	**MFD* (Days)**	**MAPE* (mm)**	**MASMS* (%)**
			Soweto Highveld Grassland				
			662	14.8	41	2060	75
			Carletonville Dolomite Grassland				
			593	16.1	37	2388	78
NBA (2018): 1) **Ecosystem Threat Status** 2) **Ecosystem Protection Level** **FIGURE 3**	NBA 2018 dataset: The study area falls within two vegetation units; the western part of the study area falls within the Soweto Highveld Grassland which is considered a **Vulnerable (VU)** ecosystem and is currently **Not Protected**. The eastern part of the study area falls within the Carletonville Dolomite Grassland which is considered a **Least Concern (LC)** ecosystem and is currently **Poorly Protected**.	**Altitude (m)**	Soweto Highveld Grassland: 1 420–1 760 Carletonville Dolomite Grassland: 1 360–1 620				
		Distribution	Soweto Highveld Grassland: Mpumalanga, Gauteng (and to a very small extent also in neighbouring Free State and North-West) Provinces. Carletonville Dolomite Grassland: North-West (mainly) and Gauteng and marginally into the Free State Province:				
		Conservation	Soweto Highveld Grassland: **Endangered** as per Mucina and Rutherford (2006); however, according to the updated National Biodiversity Assessment (2018) the status has been changed to **Vulnerable**. Target 24%. Only a handful of patches statutorily conserved (Waldrift, Krugersdorp, Leeuwkuil, Suikerbosrand, Rolfe's Pan Nature Reserves) or privately conserved (Johanna Jacobs, Tweefontein, Gert Jacobs, Nikolaas and Avalon Nature Reserves, Heidelberg Natural Heritage Site). Almost half of the area already transformed by cultivation, urban sprawl, mining and building of road infrastructure. Some areas have been flooded by dams (Grootdraai, Leeukuil, Trichardtsfontein, Vaal, Willem Brummer). Erosion is generally very low (93%). Carletonville Dolomite Grassland: **Vulnerable** according to Mucina and Ruther ford (2006) but the status has been updated to Least Concern (NBA, 2018). Target 24%. Small extent conserved in statutory and in at least six private conservation areas. Almost a quarter already transformed for cultivation, by urban sprawl or by mining activity as well				

			as the building of the Boskop and Klerkskraal Dams. Erosion very low (84%) and low (15%).
National Threatened Ecosystems (2011)	The study area falls within ecosystems that are currently considered to be **Vulnerable** (Soweto Highveld Grassland) and **Least concern** (Carletonville Dolomite Grassland). Vulnerable (VU) ecosystems have lost majority of their original extent in good ecological condition but have lost some structure and functioning. Least Concern (LC) ecosystems have not experienced a significant loss of natural habitat or deterioration in condition. For Environmental Impact Assessments (EIAs), the 2011 National list of Threatened Ecosystems remains the trigger for a Basic Assessment in terms of Listing Notice 3 of the EIA Regulations published under the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA).	**Geology & Soils**	Soweto Highveld Grassland: Shale, sandstone or mudstone of the Madzaringwe Formation (Karoo Supergroup) or the intrusive Karoo Suite dolerites which feature prominently in the area. In the south, the Volksrust Formation (Karoo Supergroup) is found and in the west, the rocks of the older Transvaal, Ventersdorp and Witwatersrand Supergroups are most significant. Soils are deep, reddish on flat plains and are typically Ea, Ba and Bb land types. Carletonville Dolomite Grassland: Dolomite and chert of the Malmani Subgroup (Transvaal Supergroup) supporting mostly shallow Mispah and Glenrosa soil forms typical of the Fa land type, dominating the landscapes of this unit. Deeper red to yellow apedal soils (Hutton and Clovelly forms) occur sporadically, representing the Ab land type.
		Vegetation & landscape features	Soweto Highveld Grassland: Gently to moderately undulating landscape on the Highveld plateau supporting short to medium-high, dense, tufted grassland dominated almost entirely by *Themeda triandra* and accompanied by a variety of other grasses such as *Elionurus muticus*, *Eragrostis racemosa*, *Heteropogon contortus* and *Tristachya leucothrix*. In places not disturbed, only scattered small wetlands, narrow stream alluvia, pans and occasional ridges or rocky outcrops interrupt the continuous grassland cover. Carletonville Dolomite Grassland: Slightly undulating plains dissected by prominent rocky chert ridges. Species-rich grasslands forming a complex mosaic pattern dominated by many species.
IBA (2015) FIGURE 4	The study area is situated within a 10 km radius of an Important Bird and Biodiversity Area, namely the **Suikerbosrand Nature Reserve IBA**. The globally threatened species that occur in this IBA are Melodious Lark (*Mirafra cheniana*), Blue Korhaan (*Eupodotis caerulescens*) and Secretarybird (*Sagittarius serpentarius*). Regionally threatened species are African Grass Owl (*Tyto capensis*) and White-bellied Korhaan (*Eupodotis senegalensis*). Kalahari Scrub Robin (*Cercotricha paena*) and White-bellied Sunbird (*Cinnyris talatala*) are the only biome-restricted species in this IBA.		
SAPAD (2020, Q2); SACAD (2020, Q2); NPAES (2009). FIGURE 5	According to SAPAD, the study area is situated within a 10 km radius of both the **Suikerbosrand Nature Reserve** and the **Keyterskloof Private Nature Reserve**. No protected or conservation areas as identified by SACAD or NPAES were located within a 10 km buffer of the study area.		
GAUTENG CONSERVATION PLAN V3.3 (2011)			
Critical Biodiversity Areas (CBA)	The study area was **not** situated within an **Important Critical Biodiversity Areas (CBA),** where Red and Orange Listed Plants and Primary Vegetation is proposed to occur**.** **DEFINITION**: CBAs include natural or near-natural terrestrial and aquatic features that were selected based on an area's biodiversity characteristics, spatial configuration, and requirement for meeting both biodiversity pattern and ecological process targets. CBAs include irreplaceable sites where no other options exist for meeting targets for biodiversity features, as well as best-design sites which represent an efficient configuration of sites to meet targets in an ecologically sustainable way that is least conflicting with other land uses and activities. These areas need be maintained in the appropriate condition for their category. Some CBAs are degraded or irreversibly modified but are still required for achieving specific targets, such as cultivated lands for threatened species.		
Ecological Support Area (ESA)	The study area was **not** situated within an **Ecological Support Area (ESA).**		

	DEFINITION: Natural, near natural, degraded or heavily modified areas required to be maintained in an ecologically functional state to support Critical Biodiversity Areas and/or Protected Areas. ESAs maintain the ecological processes on which Critical Biodiversity Areas and Protected Areas depend. Some ESAs are irreversibly modified but are still required as they still play an important role in supporting ecological processes.
Protected Areas	The study area is situated within 10 kms of two protected areas, namely **Suikerbosrand Nature Reserve** and the **Keyterskloof.** **DEFINITION:** Protected Areas are areas which have legal protection under relevant legislation, or which are managed with a primary conservation objective. Importantly, the Protected Area definition used, and the areas included in Gauteng C-Plan v3.3 deviate from those typically used in other South African conservation plans, as the key criteria used to guide inclusion or exclusion is the type of conservation management applied in an area rather than its legal status.
Wetland and River Buffers	According to the Gauteng C-Plan, the study area is **not** situated within a River Buffer of a non-perennial river or within 10 km of a Wetland Buffer.
Ridges	The study area **does not** fall within any ridge classes. However, the study area is located some distance away from ridges of class 4. Ridge classes as indicated in the Gauteng Conservation Plan v.3 are not necessarily representative of the true condition of the ridge and should be ground-truthed.
NATIONAL WEB BASED ENVIRONMENTAL SCREENING TOOL (2020)	
The screening tool is intended to allow for pre-screening of sensitivities in the landscape to be assessed within the EA process. this assists with implementing the mitigation hierarchy by allowing developers to adjust their proposed development footprint to avoid sensitive areas	
Terrestrial Biodiversity Theme	For the terrestrial biodiversity theme, the study area is considered to have a **very high sensitivity**. The triggered sensitivity features include a **Vulnerable ecosystem** (i.e., the Soweto Highveld Grassland as per the NBA, 2018).
Plant Species Theme	For the plant species theme, the entire study area is considered to have a **medium sensitivity**. Species identified by the EIA screening tool in the study area include: sensitive species 1252, sensitive species 1147, sensitive species 691, sensitive species 1248 and *Delosperma macellum*.
Animal Species Theme	For the animal species theme, the entire study area is considered to have a **medium sensitivity**. Species identified by the EIA Screening tool: Insecta: *Aloeides dentatis* (Roodepoort Copper), *Lepidochrysops procera* (Potchefstroom blue), and *Orachrysops mijburghi* (Mijburgh's blue).

CBA = Critical Biodiversity Area, ESA = Ecological Support Area, IBA = Important Bird and Biodiversity Area, MAP = Mean Annual Precipitation, MAT = Mean Annual Temperature, MFD = Mean Frost Days, MAPE = Mean Annual Potential for Evaporation, MASMS = Mean Annual Soil Moisture Stress, NBA = National Biodiversity Assessment, NPAES = National Protected Areas Expansion Strategy, SACAD = South African Conservation Areas Database, SAPAD = South African Protected Areas Database.
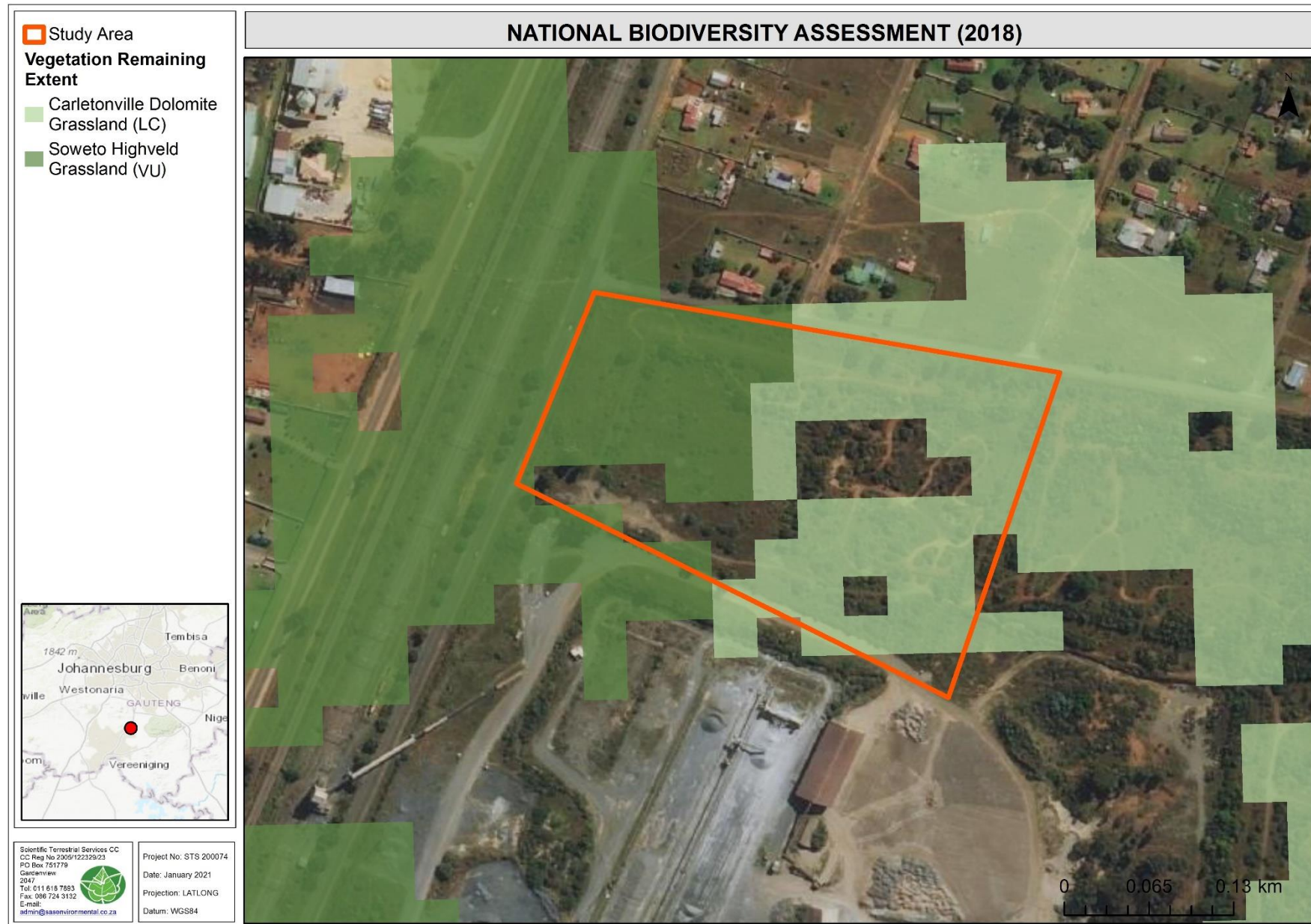
Figure 3: Extent and threat status of vegetation types according to the National Biodiversity Assessment (NBA, 2018).
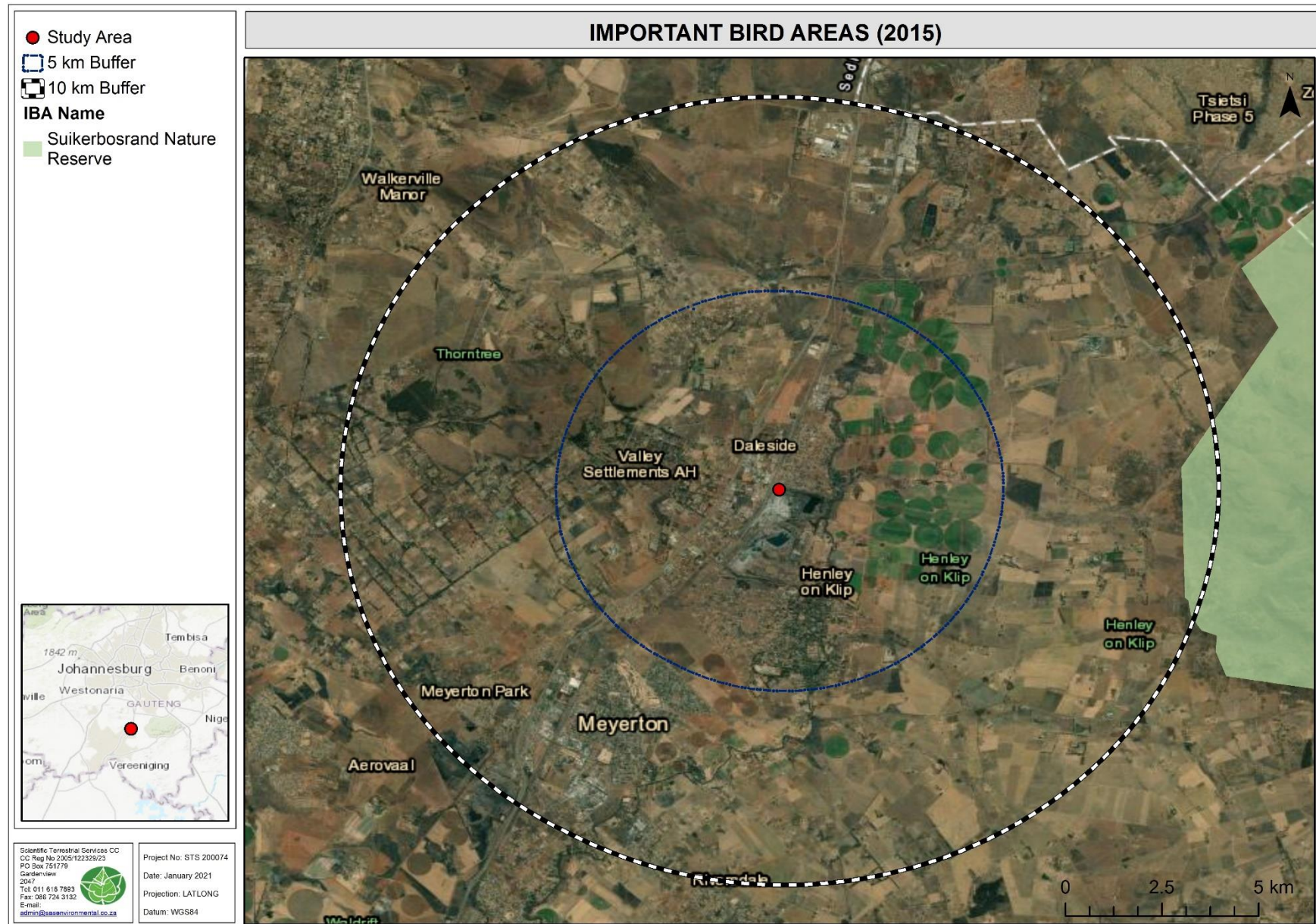
Figure 4: Important Bird Areas (IBAs) within a 10km radius of the study area.
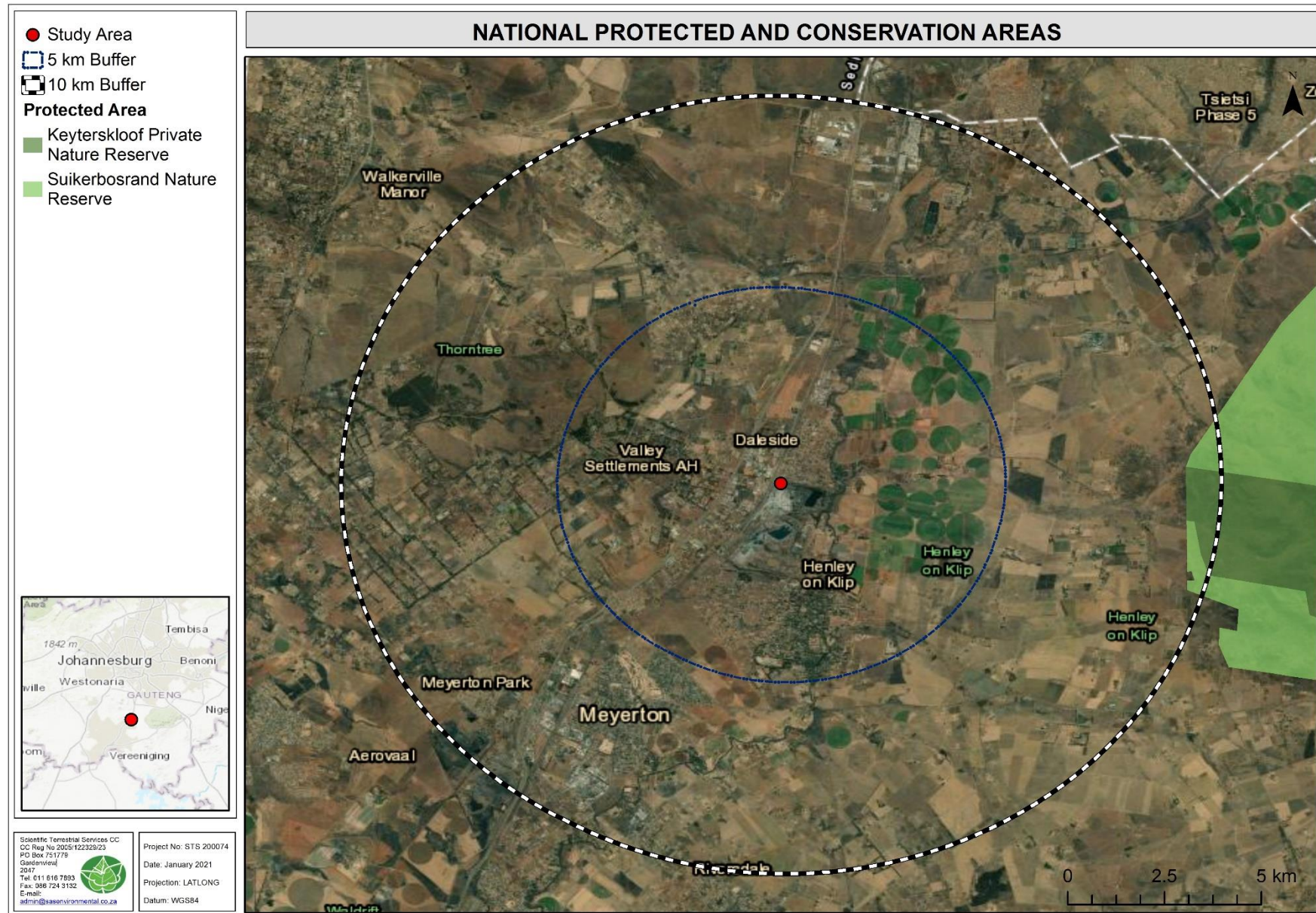
Figure 5: Protected areas within a 10 km radius of the study area, according to SAPAD (Q2, 2020).

4. ASSESSMENT RESULTS

Overall, the habitat within the study area is typical of a peri-urban setting and includes degraded areas that support a high abundance of alien and invasive plant (AIP) species. The biodiversity of the study area can thus be defined under two broad habitat units, namely Degraded Grassland and Woody Habitat. A depiction of these habitat units within the study area is presented in Figure 8 below.

The study area is situated within both the Soweto Highveld Grassland and the Carletonville Dolomite Grassland vegetation types (listed as vulnerable and least concern respectively in Mucina and Rutherford, 2006), i.e., the reference state. Mucina and Rutherford (2006) describe the Soweto Highveld Grassland as having gently to moderately undulating landscape on the Highveld plateau supporting short to medium-high, dense, tufted grassland dominated almost entirely by *Themeda triandra* and accompanied by a variety of other grasses such as *Elionurus muticus*, *Eragrostis racemosa*, *Heteropogon contortus* and *Tristachya leucothrix*. Almost half of this vegetation unit has already been transformed by cultivation, urban sprawl, mining and building of road infrastructure. In contrast, Mucina and Rutherford (2006) describe the Carletonville Dolomite Grassland as having slightly undulating plains with frequent, prominent rocky outcrops. This vegetation unit supports species-rich grassland communities.

The Degraded Grassland Habitat is in the east of the study area. This habitat unit is situated largely within the area identified as supporting the Soweto Grassland Vegetation type (as per Mucina and Rutherford 2006). It is evident that this unit has experienced a large degree of degradation and transformation because of anthropogenic activities; a large degree of waste material has been dumped throughout the habitat unit and the study area. Much of this unit supports a wide array of AIP species such as *Verbena bonariensis, Zinnia peruviana,* and *Tagetes minuta*. The habitat unit is therefore considered to be in a degraded state and no longer representative of the Soweto Highveld Grassland Vegetation type. Despite the overall degraded nature of this habitat unit, a small, localised population of suspected *Adromischus umbraticola* subsp. *umbraticola*, both a provincially important SCC under the Gauteng Department of Agriculture and Rural Development (GDARD), and NT on the Red List was recorded on within the habitat unit.

The Woody Habitat is in the west of the study area, and largely comprises of the Carletonville Dolomite Grassland. This habitat supported several woody species, including *Celtis Africa*, *Searsia pyroides* and *Gymnosporia buxifolia*, in addition to several grass species. It is evident that this habitat unit has also experienced a large degree of degradation and transformation

because of anthropogenic activities. This habitat unit has several 4X4 routes throughout its distribution. This habitat unit supports several AIP species, including *Campuloclinium macrocephalum*, *Conyza bonariensis*, and *Datura stramonium*, and has historically experienced a large degree of dumping as well as woody thickening (Figure 6). As such this habitat unit can no longer be considered as representative of the reference vegetation types.
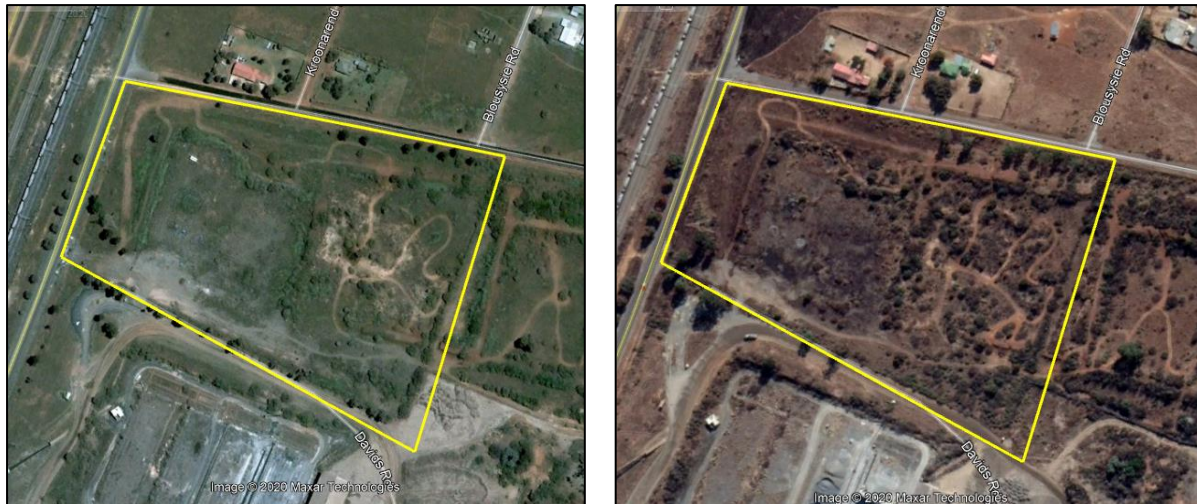
Figure 6: Woody thickening evident within the western section of the study area when comparing satellite imagery from 2016 to 2021. 4X4 routes are also evident within the images.

Existing impacts on the biodiversity associated with the study area include those listed below:

-   Anthropogenic activities (e.g., neighbouring mining activities and infrastructure development) and transformation of surrounding areas to built-up infrastructure;
-   Dumping of waste material throughout the study area (Figure 7);

Figure 7: Dumping of rubble was evident throughout the study area.

-   Modification of the study area through the establishment of 4X4 routes throughout the eastern parts of the study area (see Figure 6);
-   Woody thickening, particularly within the western parts of the study area (see Figure 6);
-   Encroaching alien plant species across the entire study area – an ongoing issue; and
-   Long-term fragmentation of both the habitat units from genetic source pools for ongoing diversification of plant species, including hindering the movement of animal

species. This fragmentation comprises the construction of buildings and major roads around the study area which pre-dates 2003.

Due to impacts/disturbances within the study area, the existing habitats can be categorised as:

➢ **Degraded Grassland Habitat**, i.e. areas historically fragmented with sections where AIPs form a prominent part of the grassland community; and

➢ **Woody Habitat**, i.e. areas where woody thickening and AIP proliferation are evident.

Within both the Degraded Grassland and the Woody Habitat, conditions for fauna and flora are suboptimal due to a lack of suitable habitat and habitat fragmentation. The extensive proliferation of AIPs within both habitats further reduces optimal conditions for the establishment of indigenous species throughout the study area. Ongoing anthropogenic activities within and around this habitat unit have pushed out populations of species that would normally be expected to occur in such an area.

Additional discussions on the faunal and floral biodiversity associated with the study area, including information on SCC, are described in section 4.1 to 4.5.
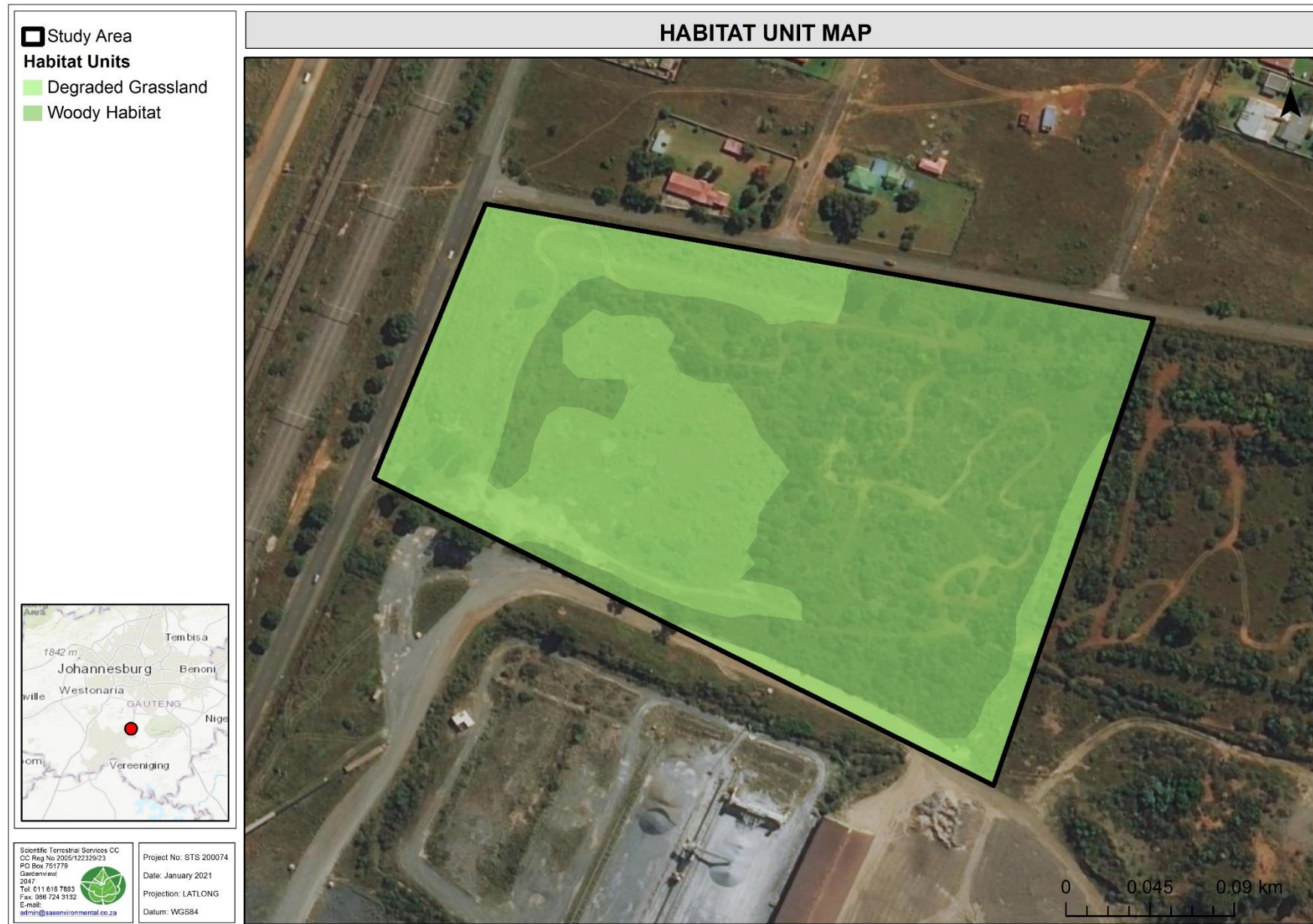
Figure 8: Habitat units associated with the study area.

4.1 Floral Assessment

Degraded Grassland Habitat Sensitivity	Moderately Low	Woody Habitat Sensitivity	Moderately Low

REPRESENTATIVE PHOTOGRAPHS AND SENSITIVITIES OF THE GRASSLAND HABITAT WITHIN THE STUDY AREA

Degraded Grassland	Woody Habitat with dumping evident

Representative photos of floral species within the study area

Left: *Searsia pyroides,* **left middle:** *Zinnia peruviana* (Not Listed)*,* **right middle:** *Elephantorrhiza elephantina,* **right:** *Gazania krebsiana*

SCC Discussion

During the field assessment, several individuals of *Adromischus umbraticola* were recorded within the Degraded Grassland Habitat. According to GDARD, *Adromischus umbraticola* subsp. *umbraticola* (NT) is Orange listed. At the time of assessment, none of the specimens were in flower making positive identification of the individuals as *Adromischus umbraticola* subsp. *umbraticola* difficult. However, given that the other known subspecies does not occur in Gauteng, this specimen is likely A. *umbraticola* subsp. *umbraticola*. Moveover, given the habitat in which the specimens were found (in shallow gravel on top of rocks, in shade of other vegetation), it is likely that the species is the NT subspecies *A. umbraticola* subsp. *umbraticola*. Activities associated with the development of the surrounding infrastructure and long-term fragmentation from surrounding species sources has potentially destroyed suitable habitat for the establishment and persistence of other SCC on the site. The National Web based Environmental Screening Tool indicated that sensitive species 1252, sensitive species 1147, sensitive species 691, sensitive species 1248 and *Delosperma macellum* (EN) have the potential to be located within the study area, however, on-site characteristics do not reflect the habitat required for these species' persistence or permanent existence. The absence of suitable dispersal corridors because of peri-urban development, together with a decrease in many dispersal agents has further reduced the potential of SCC re-establishment and persistence. Habitat for floral species within the anthropogenically modified landscape has been modified to the extent where the likelihood of SCC establishment is low.

The POC assessment indicated that *Hypois hemerocallidea* scored a POC of "high". Although this species is naturally widespread and abundant, it is harvested in extensive volumes during wild harvesting for its medicinal properties.

For Orange-listed species, such as *A. umbraticola* subsp. *umbraticola,* plants will have to be relocated, preferably to the "Green zones" within the development site depending on their numbers or relocated to either registered nurseries or Agricultural Research Council (ARC) or the South African National Biodiversity Institute (SANBI. Permits will only be required if specimens are required to be moved outside of the development site.

It is advised that a walkthrough of the study area is conducted before the commencement of any construction and all SCC that are encountered be relocated and rescued by a suitably qualified specialist and either relocated to suitable habitat (outside the development footprint within the study area or moved to registered nurseries such as the ARC or SANBI. Refer to Section 4.3 for a more complete discussion on SCC associated with the study area.

Ecological Discussion

From a floral perspective, both the Degraded Grassland Habitat and the Woody Habitat Units have been exposed to several historic disturbances resulting in sub-optimal habitat conditions, decreased habitat integrity and a low species diversity. This is evident when comparing the remnants of the Degraded Grassland Habitat and the Woody Habitat Units to the reference vegetation types (namely the Soweto Highveld Grassland and the Carletonville Dolomite Grassland vegetation types), which are expected to support a diversity of forbs and grasses and a lower woody cover.

In particular, the Degraded Grassland Habitat is considered degraded in nature as is evident by the degree of dumping throughout the habitat unit, and fthroughout the study area. Such activities have created habitat suitable for the proliferation of plants that favour disturbed conditions, e.g., alien, and invasive species such as *Verbena bonariensis* (NEMBA Category 1b)*, Datura stramonium*

(NEMBA Category 1b) and *Argemone ochroleuca* (NEMBA Category 1b), as well as native weedy species such as *Gomphocarpus fruticosus.* Common indigenous species found within this habitat unit included *Gazania krebsiana, Helicrysum kraussii, Hypoxis iridifolia* and *Pelargonium luidum*.

The Woody Habitat supported a several indigenous woody species, including *Searsia pyroides, Celtis africana, Gymnosporia buxifolia* and *Asparagus suaveolens.* This habitat unit also supported an array of AIPs, including *Melia azedarach* (NEMBA Category 1b), *Cirsium vulgare* (NEMBA Category 1b) and *Datura stramonium* (NEMBA Category 1b). Both habitat units no longer represent the typical floral aspects that would be expected from the reference vegetation types, (namely the Soweto Highveld Grassland and the Carletonville Dolomite Grassland vegetation types).

The proposed development is likely to significantly impact on a potential SCC species, namely *Adromischus umbraticola* subsp. *umbraticola*, which has declining populations within Gauteng. It is therefore recommended that any and all SCC (as identified in section 4.3) that are present within the footprint area should be rescued and relocated by a suitably qualified specialist and either relocated to suitable habitat (outside the development footprint within the study area or moved to registered nurseries such as the ARC or SANBI.

The major mechanisms that drive the development and maintenance of grasslands are climate, fire and herbivory (SANBI, 2013). These drivers have largely been suppressed across the study rea and the surrounding grassland areas. This has ultimately impacted on the overall functionality of the grassland patches within the study area, resulting in subpar conditions for the establishment and persistence of indigenous floral species. The fragmented nature of the study area and the absence of suitable dispersal corridors will limit the rate at which vegetation re-establishes within the study area. Moreover, AIPs are expected to continue their proliferation within the study area and thus it is recommended that an alien invasive management plan be implemented.

Business Case and Conclusion

The overall sensitivity of both the floral habitat units was moderately low. Anthropogenic activities (e.g. dumping and 4X4 routes) and proliferation of alien plant species have resulted in the degradation of the available habitat and the proposed development is not deemed likely to have significant negative impacts on the species-poor floral assemblages. Although habitat modifications have occurred, it is imperative that the development footprint be restricted to the property boundary. It is recommended that edge effects are strictly managed to limit the impact on the surrounding natural area. The proposed development is unlikely to have any impact on the overall functioning of the system largely because of the small size and fragmented nature of the study area.

Important considerations:

- Many AIPs occur within the study area of which NEMBA category 1b, NEMBA category 2, and NEMBA category 3 are present. The NEMBA regulations do not require that Category 3 species be removed but rather that further planting, propagation, or trade of these species is prohibited. It is still recommended that these species be monitored to ensure they do not spread to adjacent areas where they do not yet occur. Category 2 species include plants used commercially that may be grown in demarcated areas, provided that there is a permit and that steps are taken to prevent their spread; and Category 1b species require compulsory control;
- The proposed development is unlikely to significantly impact SCC species as none were found in the study area, however species may disperse and establish within the study area. It is therefore recommended that if any SCC (as identified in section 4.3) are found within the footprint area they should be rescued and relocated by a suitably qualified specialist and either relocated to suitable habitat (outside the development footprint) within the study area, or moved to registered nurseries such as the ARC or SANBI;
- The western part of the study area, and particularly the Degraded Grassland Habitat, is located within a vulnerable habitat, namely the Soweto Highveld Grassland. However, the Habitat unit is not considered representative of the reference vegetation type and thus does not support the outcome of the Online Screening Tool; and
- According to the Gauteng C-Plan, the study area does not fall within a CBA or ESA. The habitat units have been subjected to various historical disturbances and are severely fragmented limiting their ability to maintain landscape processes and preserve functions within adjacent sensitive areas.

4.2 Faunal Assessment

Degraded Grassland Habitat Sensitivity	Moderately Low	Woody Habitat Sensitivity	Moderately Low

FAUNAL SPECIES OBSERVED DURING THE FIELD ASSESSMENT

Platycorynus dejeani (Milkweed leaf beetle)

Euplectes orix (Southern Red Bishop)

Belenois aurota (Brown-veined White)
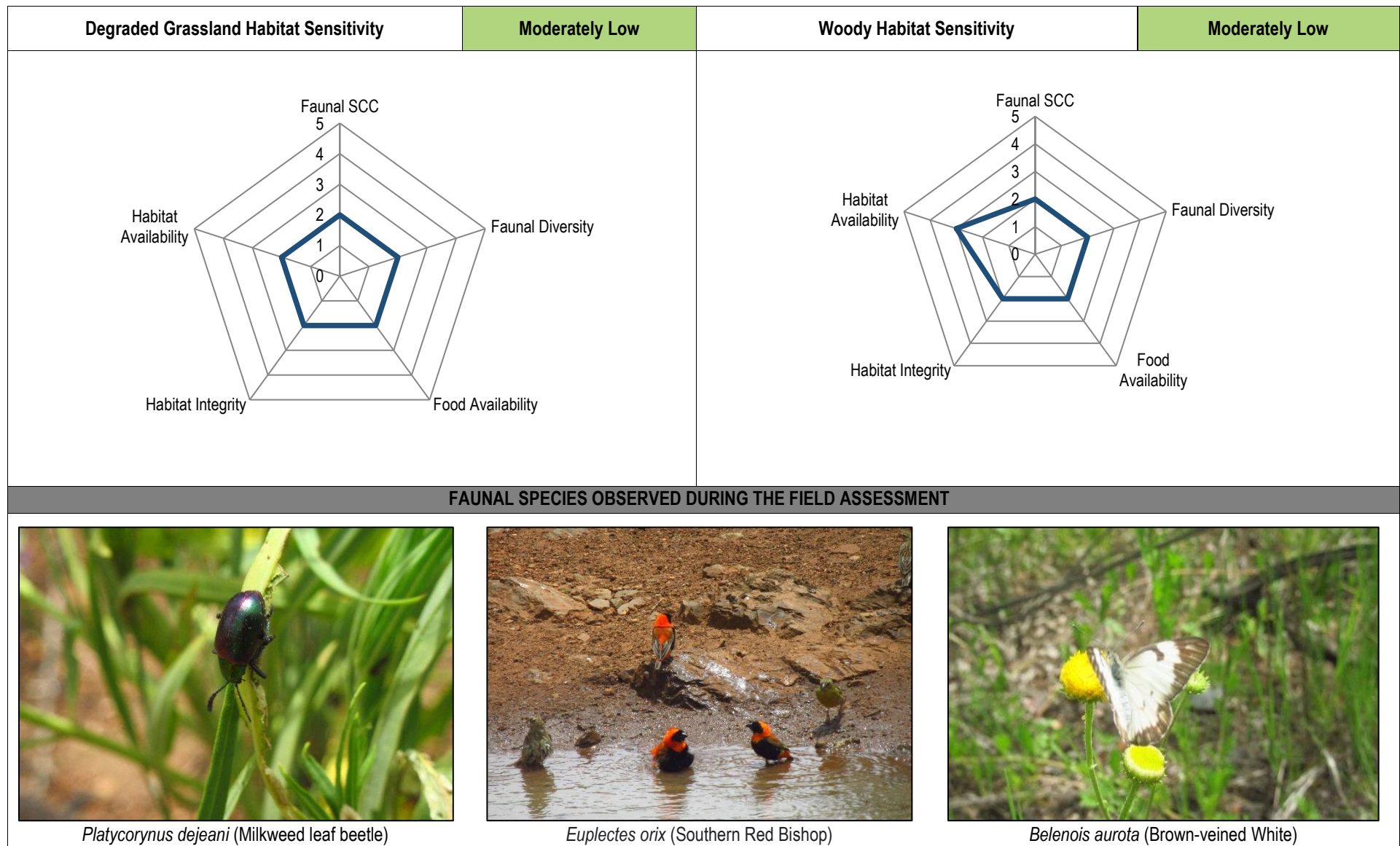
SCC Discussion
No faunal SCC were encountered during the field assessment and due to the impacts currently occurring within the study are it is highly unlikely that any SCC will utilise the study area. The National Web based Environmental Screening Tool indicated that *Aloeides dentatis* (Roodepoort Copper, VU), *Lepidochrysops procera* (Potchefstroom Blue), and *Orachrysops mijburghi* (Mijburgh's Blue, EN) have the potential to be located within the study area, however, on-site characteristics do not reflect the habitat required for these species' permanent existence within the study area. Information obtained from GDARD specialist department noted that no Red Data bird species are likely to present within the study area, especially given the study areas proximity to the Daleside settlement, the neighbouring mine and surrounding transport infrastructure. However, information obtained from the GDARD specialist department indicated that *Atelerix frontalis* (Southern African hedgehog), *Aonyx capensis* (Cape clawless otter) and *Lutra maculicollis* (Spotted necked otter) have been recorded proximate to the study area, however, on site characteristics do not provide the necessary habitat required for their persistence in the study area. The study area does not form part of any important roosting, breeding, foraging or migratory corridors for any SCC.

Ecological Discussion
Faunal species diversity within the study area was moderately low throughout the study area. Very few signs of terrestrial fauna were observed. Limited food resources are available for the small contingent of fauna likely to utilise the area and is thus likely a limiting factor for faunal diversity. Graminoids and various AIP species within the study area provide the main food resource for potential frugivorous and granivorous faunal species. Only mammals (notably small common rodent species) capable of surviving in human modified environments are anticipated to occur within the study area. Avifaunal species observed were largely common species which broad habitat requirements capable of utilising anthropogenically modified landscapes. Observed Avifauna species included, *Vanellus armatus* (Blacksmith Lapwing), *Ploceus velatus* (Southern Masked weaver), *Acridotheres myna* (Common Myna), *Streptopelia semitorquata* (Red-eyed Dove) and *Bostrychia hagadash* (Hadeda). Avifauna are less restricted in terms of barriers to movement (fences, road etc), as such they will readily move between the study area and any adjacent locations. Large predatory owls may utilize the study area to forage while most other raptors are not anticipated to utilize the study area. A moderate diversity of insect species was observed during the field assessment and included *Apis mellifera* (Honeybee) and *Decapotoma lunata* (Lunate Blister Beetle).   The species and signs thereof observed were largely limited to common and widely occurring species known to survive in areas of decreased sensitivity and that have integrated well or adapted into urban settings. Historically the study area would likely have had a much higher diversity of faunal species but following the fragmentation resulting from urbanisation and development of the surrounding areas and the inherent disturbance of the habitat, this has been impacted upon. Overall, the study area is largely isolated from surrounding natural habitat via man-made barriers and development which has significantly impacted upon habitat utilisation by faunal species. The study area is unlikely to function as an important movement corridor for faunal species nor does it function as an important open space area (habitat connectivity) amongst surrounding intact habitats.

Business Case and Conclusion:
The overall sensitivity of the faunal habitat units associated with the study area is moderately low. The faunal habitat has been altered because of historic and ongoing anthropogenic activities associated with an urban setting, most notably dumping of waste material, fragmentation, and edge effects. The impact that the proposed development will have on faunal habitat, diversity, and SCC, is not considered significant.   Several sections within the study area have been compromised by the proliferation of AIPs which has further decreased faunal habitat suitability. To prevent further habitat loss for fauna it is recommended that an alien and invasive control plan be implemented for the study area during construction and operational activities. It is important that cleared alien plants not be dumped within adjacent natural habitat.

4.3 Floral Species of Conservation Concern Assessment

Threatened/protected species are species that are facing a high risk of extinction. Any species classified in the IUCN categories Critically Endangered (CR), Endangered (EN) or Vulnerable (VU) is a threatened species. 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 10 of 2004) (NEMBA).

The SCC assessment not only considers floral SCC recorded on site 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, a list of Red Data Listed (RDL) species previously recorded within the QDS 2628AA was obtained from Gauteng Department of Agriculture and Rural Development (GDARD), comprising SANBI Red Data Listed species.

According to the list provided by GDARD[3], the following Red/Orange List plant taxa have been recorded within 5 km of the study site (where available, common names are presented in brackets):

- *Lithops lesliei* subsp. *lesliei.*

According to the list provided by GDARD[4], the following Red/Orange List plant taxa have been recorded within the quarter degree grid in which the study site is situated. (where available, common names are presented in brackets):

- ➢ *Adromischus umbraticola* subsp. *umbraticola*;
- ➢ *Argyrolobium campicola*;
- ➢ *Bowiea volubilis* subsp. *volubilis* (Climbing Green Lily);
- ➢ *Cineraria longipes*;
- ➢ *Delosperma purpureum*;
- ➢ *Dioscorea sylvatica*;

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[3] Information pertaining to SCC was obtained from GDARD in August 2020
[4] Information pertaining to SCC was obtained from GDARD in August 2020

> ➢ *Eucomis autumnalis* (Pineapple Lily);

> ➢ *Eulophia coddii*;

> ➢ *Habenaria barbertoni*;

> ➢ *Habenaria bicolor*;

> ➢ *Habenaria mossii*;

> ➢ *Holothrix micrantha*;

> ➢ *Holothrix randii*;

> ➢ *Hypoxis hemerocallidea* (Star Flower);

> ➢ *Khadia beswickii*;

> ➢ *Kniphofia typhoides*;

> ➢ *Lithops lesliei* subsp. *lesliei*; and

> ➢ *Stenostelma umbelluliferum*.

Of the species listed above (and tabulated in Table G2: Appendix G), one species (*Adromischus umbraticola* subsp. *umbraticola*) received a POC score of "confirmed''. The individuals recorded on site were not in flower, making positive identification of the species difficult, however, because of the habitat provided within the small area where the specimens were located, it is assumed that the species in question is *Adromischus umbraticola* subsp. *umbraticola.* One species, namely *Hypoxis hemerocallidea,* scored a POC score of "high". The remaining species listed above are unlikely to occur within the study area and received a POC score of "Medium" or "Low". Probability of Occurrence (POC) ratings for each species within the remainder of the QDS 2628AA are indicated in Table G2 (Appendix G).

If any of the above-mentioned floral SCC that are encountered during any phase of the proposed development will require rescuing and relocation to suitable surrounding habitat by a suitably qualified specialist. These species should either be relocated to suitable habitat within the study area outside of the development footprint or moved to registered nurseries such as the ARC or the SANBI. Any other floral SCC encountered during the construction phase of the proposed development should also be relocated by a suitably qualified specialist and, where required, the necessary permits should be applied for.

4.4 Faunal Species of Conservation Concern Assessment

During the field assessment, it is not always feasible to identify or observe all species within the study area, largely due to the secretive nature of many faunal species, possible low population numbers or varying habits of species. As such, to specifically assess an area for faunal SCC, a POC assessment was used to determine the probability of faunal SCC

occurrence within the study area. Species listed in Appendix H, whose known distribution ranges and habitat preferences include the study area, were taken into consideration.

Due to the historic utilisation of the site degradation to habitat has resulted in decreased forage heterogeneity decreasing habitat suitability for SCC. Furthermore, the study area is completely isolated and fragmented from adjacent natural areas where suitable habitat for SCC, which could act as source population, occur. No SCC are anticipated to inhabit the study area or utilise it as a foraging

If in the unlikely event that faunal SCC as listed in Appendix H of this report are encountered during the construction of the proposed development, a biodiversity specialist must be consulted to ascertain the best way forward.

4.5   Alien and Invasive Plant (AIP) Species

South Africa is home to an estimated 759 naturalised or invasive terrestrial plant species (Richardson et al., 2020), with 327 plant species, most of which are invasive, listed in national legislation[5]. Many introduced species are beneficial, e.g., almost all agriculture and forestry production are based on alien species, with alien species also widely used in industries such as horticulture. However, some of these species manage to "escape" from their original locations, spread and become invasive. Although only a small proportion of introduced species become invasive (~0.1–10%), those that do proceed to impact negatively on biodiversity and the services that South Africa's diverse natural ecosystems provide (from ecotourism to harvesting food, cut flowers, and medicinal products) (van Wilgen and Wilson, 2018).

4.5.1   Legal Context

South Africa has released several Acts legislating the control of alien species. Currently, invasive species are controlled by the NEMBA – Alien and invasive Species Regulations, which were gazetted on 1 August 2014 and became law on 1 October 2014[6]. AIPs defined in terms of NEMBA are assigned a category and listed within the NEMBA List of Alien and Invasive Species (2016) in accordance with Section 70(1)(a) of the NEMBA:

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[5] Government Notice 864 Alien Invasive Species List as published in the Government Gazette 40166 of 2016, as it relates to the National Environmental Management Biodiversity Act, 2004 (Act No 10 of 2004).
From 1 March 2021, the new legislation will come into effect: Government Notice number 1003: Alien and Invasive Species Lists, 2020, in Government Gazette 43726 dated 18 September 2020
[6] From 1 March 2021, the new legislation will come into effect: •   Government Notice number R.1020: Alien and Invasive Species Regulations, 2020, in Government Gazette 43735 dated 25 September 2020 as it relates to the NEMBA

- ➤ **Category 1a** species are those targeted for national eradication;
- ➤ **Category 1b** species must be controlled as part of a national management programme, and cannot be traded or otherwise allowed to spread;
- ➤ **Category 2** species are the same as category 1b species, except that permits can be issued for their usage (e.g. invasive tree species can still be used in commercial forestry providing a permit is issued that specifies where they may be grown and that permit holders "*must ensure that the specimens of the species do not spread outside of the land or the area specified in the permit*"); and
- ➤ **Category 3** are listed invasive species that can be kept without permits, although they may not be traded or further propagated, and must be controlled if they occur in protected areas or riparian zones.

Duty of care related to listed invasive species are referred to in NEMBA Section 73[7]. The motivation for this duty of care is both environmentally and economically driven. Management of alien species in South Africa is estimated to cost at least ZAR 2 billion (US$142 million) each year - this being the amount currently spent by the national government's DEFF - i.e. the Working for Water programme (van Wilgen, 2020). Managing AIPs early on will reduce clearing costs in the long run.

4.5.2 Site Results

Of the AIPs recorded during the field assessment, one was listed under NEMBA category 3, three were listed under NEMBA category 2, nine were listed under NEMBA Category 1b and seven were Not listed under NEMBA. The study area had a total of 21 AIPs throughout the study area (Table 3); as such it is suggested that an Alien and Invasive Species Management and Control Plan be implemented during all phases of construction and operation for any potential development.

Alien species located within the study area need to be removed on a regular basis as part of maintenance activities according to Government Notice 1003 Alien and Invasive Species Regulations as published in the Government Gazette 43726 of 2020 as it relates to NEMBA.

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[7] Section 73(2): A person who is the owner of land on which a listed invasive species occurs must-
  a)   notify any relevant competent authority, in writing, of the listed invasive species occurring on that land;
  b)   take steps to control and eradicate the listed invasive species and to prevent it from spreading; and
  c)   take all the required steps to prevent or minimize harm to biodiversity.

Table 2: Dominant alien floral species identified during the field assessment with their invasive status as per NEMBA: Alien and Invasive Species Lists, GN R1003 of 2020.

Species Name	Common Name	NEMBA Category	Degraded Grassland Habitat	Woody Habitat
Trees				
Acacia mearnsii	Black wattle	2	x	x
Eucalyptus grandis	Saligna gum	NL	x	
Melia azedarach	Saringa	3		x
Pinus sp.	Pine		x	
Tecoma stans	Yellow bells	1b	x	x
Shrubs and forbs				
Argemone ochlroleuca	Yellow pricky poppy	2	x	
Bidens pilosa	Common blackjack	NL	x	x
Campuloclinium macrocephalum	Pompom weed	1b	x	x
Conyza bonariensis	Flax-leaved horseweed	NL	x	x
Datura Ferox	Large-thorn apple	1b	x	x
Lantana camara	West Indian lantana	1b		x
Ricinus communis	Castor oil plant	2	x	
Solanum mauritianum	Bugweed	1b	x	x
Solanum pseudocapsicum	Jerusalem cherry	1b	x	
Solanum sisymbrifolium	Sticky nightshade	1b	x	x
Sonchus oleraceus	Common sowthistle	NL	x	
Tagetes minuta	Wild Marigold	NL	x	x
Verbena bonariensis	Wild Verbena	1b	x	x
Verbena tenuisecta	Fine-leaved Verbena	NL	x	x
Zinnia peruviana	Peruvian Zinnia	NL	x	
Graminoids				
Cortaderia jubata	Pampas grass	1b	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 if there is a permit and that steps are taken to prevent their spread.
3: Category 3 – Ornamentally used plants that may no longer be planted; existing plants may remain, except within the flood line of watercourses and wetlands, as long as all reasonable steps are taken to prevent their spread (Bromilow, 2001).
NL – Not listed.

5. SENSITIVITY MAPPING

The below (Figure 9) conceptually illustrates the areas of ecological sensitivity – depicting a combined fauna-flora sensitivity. The areas are depicted according to their sensitivity in terms of the presence or potential for SCC, habitat integrity and levels of disturbance, threat status of the habitat type, the presence of unique landscapes and overall levels of diversity.

Table 3 below presents the sensitivity of each identified habitat unit for fauna and flora along with an associated conservation objective and implications for development.

Table 3: A summary of the sensitivity of each habitat unit and implications for development.

| Habitat Unit	Overall Sensitivity	Conservation Objective	Development Implications
Degraded Grassland Habitat & Woody Habitat	Moderately Low	Optimise development potential while improving biodiversity integrity of surrounding natural habitat and managing edge effects.	It is evident that over the years both the Degraded Grassland Habitat and the Woody Habitat units have been notably impacted upon and disturbed. Both habitat units support several AIP species. A large degree of dumping, largely building material, is present throughout the study area. The net result has been a loss of floristic and faunal diversity across the study area and thus in both habitat units. Mitigations proposed in the operational and rehabilitation phase should be incorporated to minimise the potential future impacts on the surrounding area. Developments within these habitat units are unlikely to impact significantly on either the floral or faunal species diversity or any associated conservation efforts. The National Web based Environmental Screening Tool indicated the site as medium sensitivity for both the Animal and Plant species themes due to the possible presence of a SCC. A floral SCC, namely *Adromischus umbraticola* subsp. *umbraticola,* was potentially recorded within the Degraded Grassland Habitat. For Orange-listed species, such as *A. umbraticola* subsp. *umbraticola,* plants will have to be relocated, preferably to the "Green zones" within the development site depending on their numbers or relocated to either registered nurseries or Agricultural Research Council (ARC) or the South African National Biodiversity Institute (SANBI). Permits will only be required if specimens are required to be moved outside of the development site. It is thus recommended that a floral walkdown of the study area be conducted prior to the commencement of construction activities No faunal SCC were encountered during the field assessment, and it is unlikely that any other faunal SCC will utilise the study area, given the lack of habitat connectivity, resources and overall disturbed nature of the area.
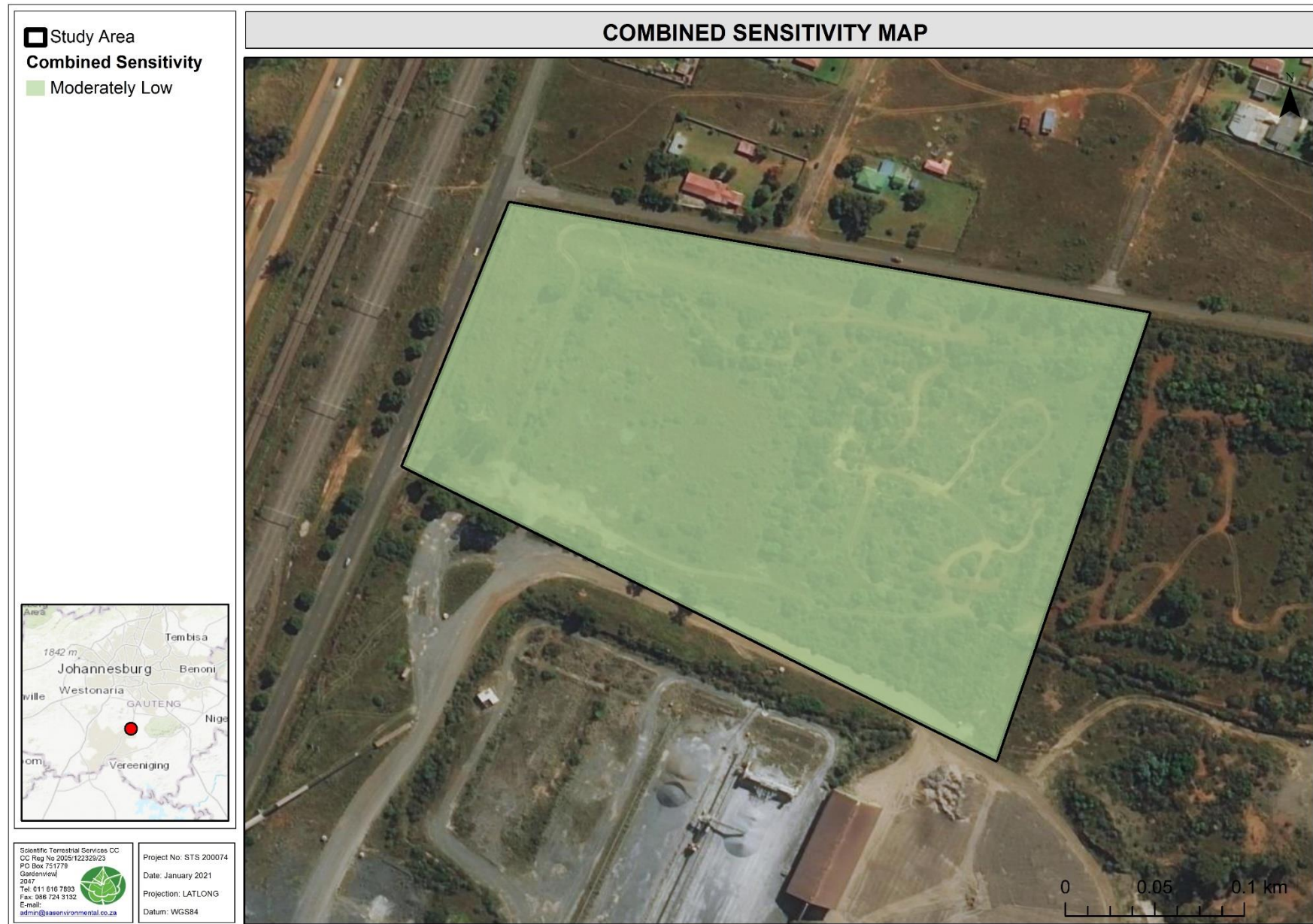
Figure 9: Combined floral and faunal sensitivity map for the study area.

6. IMPACT ASSESSMENT

The proposed area identified for development encompasses approximately 6.8 ha.

The sections below provide the significance of perceived impacts on the floral and faunal ecology of the study area. An impact discussion and assessment of all potential pre-construction, construction, operational and maintenance phase impacts are provided in Section 6.1 (flora) and Section 6.2 (fauna). All mitigatory measures required to minimise the perceived impacts are presented in Section 6.3.

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

Table 4: Activities and Aspects likely to impact on the faunal and floral resources of the study area.

ACTIVITIES AND ASPECTS REGISTER
Pre-Construction Phase
- Potential failure to relocate floral or faunal SCC to suitable habitat outside the development footprint.   - **Impact**: Loss of faunal or floral SCC within the development footprint areas in the study area.
- Inconsiderate planning, infrastructure placement and design, leading to the loss of potential sensitive floral and faunal species and/or habitat for such species, as well as unnecessary edge effect impacts on areas outside of the proposed development footprint.   - **Impact:** Degradation and modification of the receiving environment, loss of faunal and floral habitat.
- Potential failure to design and implement an Alien and Invasive Plant (AIP) Management/Control plan before the commencement of construction activities, resulting in the spread of AIPs from the development footprint to surrounding natural habitat.   - **Impact:** Spreads of AIPs, leading to potential loss of floral species diversity from surrounding natural habitat.
Construction Phase
- Site clearing and the removal of vegetation.   - **Impact:** Loss of faunal and floral habitat, diversity, and the possible loss of floral SCC.
- Potential failure to monitor the success of relocated floral SCC.   - **Impact:** Loss of SCC individuals.
- Proliferation of AIP species that colonise in areas of increased disturbances and that outcompete native species, including the further transformation of adjacent natural habitat.   - **Impact:** Loss of favourable faunal and floral habitat outside of the direct development footprint, including a decrease in species diversity and a potential loss of faunal and floral SCC.
- Dumping of construction material within areas where no construction is planned thereby leading to further habitat disturbance - allowing the establishment and spread of AIPs and further alteration of faunal habitat.   - **Impact:** Loss of preferred faunal and floral habitat, diversity and SCC as AIPs outcome and replace these species.
- Potential overexploitation through the trapping and/or hunting of faunal species, beyond the direct footprint area.   - **Impact:** Local loss of faunal abundance and diversity.

- Potentially poorly managed edge effects:
   • Ineffective rehabilitation of compacted areas, bare soils, or eroded areas leading to continual proliferation of AIP species in disturbed areas and subsequent spread to surrounding natural areas altering the floral habitat; and
   • Compaction of soils outside of the study area due to indiscriminate driving of construction vehicles through natural vegetation.
 - **Impact:** Loss of floral and faunal habitat, diversity, and SCC within the direct footprint of the proposed development. Loss of surrounding floral and faunal diversity and floral SCC through the displacement of indigenous flora by AIP species - especially in response to disturbance in natural areas.

- Possible increased fire frequency during construction.   - **Impact:** Loss or alteration of floral and faunal habitat and species diversity.

ACTIVITIES AND ASPECTS REGISTER
-     Dust generated during construction and operational activities accumulating on the surrounding floral individuals, altering the photosynthetic ability of plants[8] and potentially further decreasing optimal growing/re-establishing conditions.
-     **Impact:** Declines in plant functioning leading to loss of floral species and habitat for optimal growth.
Operational and Maintenance Phases
-     Potential failure to monitor the success of relocated floral SCC.
-     **Impact:** Loss of SCC individuals.
-     Increased introduction and proliferation of alien plant species due to a lack of maintenance activities, or poorly implemented and monitored AIP Management programme, leading to ongoing displacement of natural vegetation outside of the footprint area.
-     **Impact:** Ongoing or permanent loss of faunal and floral habitat, diversity, and potential SCC.
-     Increased human presence in the area once operational, potentially leading to Illegal harvesting/ collection of medicinal plants, the persecution of fauna in the adjacent natural habitat, or an increased risk of fire frequency impacting on floral and faunal communities outside of the development footprint.
-     **Impact:** Loss of faunal and floral habitat, medicinal flora, and SCC, as well as overall species diversity within the local area.

6.1 Floral Impact Assessment

6.1.1   Floral Impact Assessment Results

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

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

Table 5: Impact on the floral habitat, diversity, and SCC from the proposed development activities per habitat.

Habitat Unit	UNMANAGED							Significance	MANAGED							Significance
	Probability of Impact	Sensitivity of receiving environment	Severity	Spatial Scale	Duration of Impact	Likelihood	Consequence		Probability of Impact	Sensitivity of receiving environment	Severity	Spatial Scale	Duration of Impact	Likelihood	Consequence	
PRE-CONSTRUCTION PHASE																
Impact on floral Habitat and Diversity																
Degraded Grassland Habitat	5	2	2	2	2	7	6	42 / Low	4	2	1	1	2	6	4	24 / Very low
Woody Habitat	5	2	2	2	2	7	6	42 / Low	4	2	1	1	2	6	4	24 / Low
Impact on Floral SCC																
Degraded Grassland Habitat	3	2	2	2	2	5	6	30 / Low	2	1	1	1	2	3	4	12 / Very low
Woody Habitat	2	1	2	2	2	3	6	18 / Very low	1	1	1	1	2	2	4	8 / Very low
CONSTRUCTION PHASE																
Impact on floral Habitat and Diversity																
Degraded Grassland Habitat	5	2	3	2	3	7	8	56 / Medium-low	4	2	2	2	2	6	6	36 / Low
Woody Habitat	5	2	3	2	3	7	8	56 / Medium-low	4	2	2	2	2	6	6	36 / Low
Impact on Floral SCC																
Degraded Grassland Habitat	4	3	2	2	3	7	7	49 / Low	2	1	1	2	2	3	5	15 / Very low
Woody Habitat	2	1	2	2	3	3	7	21 / Very low	1	1	1	2	2	2	5	10 / Very low
OPERATIONAL AND MAINTENANCE PHASE																
Impact on floral Habitat and Diversity																
Degraded Grassland Habitat	5	2	2	2	3	7	7	49 / Low	4	2	1	2	3	6	6	36 / Low
Woody Habitat	5	2	2	2	3	7	7	49 / Low	4	2	1	2	3	6	6	36 / Low
Impact on Floral SCC																
Degraded Grassland Habitat	3	2	2	2	4	5	8	40 / Low	2	1	1	2	4	3	7	21 / Very low
Woody Habitat	2	1	2	2	4	3	8	24 / Very low	1	1	1	2	4	2	7	14 / Very low

6.1.2   Impact Discussion

The direct impact of the proposed development on the floral ecology of the study area is not anticipated to be detrimental, with impact significance varying between medium-low and low for the Degraded Grassland Habitat and between medium-low and very low for the Woody Habitat units prior to the implementation of mitigation measures. If mitigation measures are implemented, the impact significance for the study area is anticipated to vary between low and very low.

Due to the study area being surrounded by man-made built-up areas (e.g., neighbouring Glen Douglas Dolerite Mine), roads, housing and other developments, the surrounding natural vegetation within the local region is unlikely to be impacted by the proposed development. As part of the rehabilitation actions, disturbed areas not within the development footprint must be rehabilitated appropriately and AIP establishment controlled within such areas.

6.1.2.1   Impact on Floral Habitat and Diversity

The historic and current disturbances within the study area, i.e., the transformation of vegetation communities during development of the surrounding infrastructure (including housing, neighbouring mining activities, and road construction) and fragmentation from the surrounding natural vegetation communities has resulted in a decreased habitat integrity and floral communities that are indicative of disturbance events. The remaining habitat within the study area is no longer representative of the reference vegetation types, i.e., the Soweto Highveld Grassland and the Carletonville Dolomite Grassland. AIP proliferation within the both the Degraded Grassland and the Woody Habitat is moderate to moderately high, leading to an ongoing decline in preferred habitat for native floral species. The proposed development will result in the loss of indigenous species, but the impact will be localised within the footprint area and no regional impacts on floral communities are anticipated. The study area is located within part of the vulnerable vegetation unit, namely the Soweto Highveld Grassland, however, neither of the habitat units identified on site are considered representative of the reference vegetation type. Moreover, the study area is not located within a CBA, which is important for "Red" Listed plant habitat and for primary vegetation, or within an ESA, which is important for ecological functioning.

6.1.2.2   Impacts on Floral SCC

During the field assessment, one SCC, *Adromischus umbraticola* subsp. *umbraticola*, was potentially observed. Furthermore, *Hypoxis hemerocallidea*, scored a POC of "high" and thus has the potential to be located on site. The impact of the development on floral SCC is likely to be significant. However, provided that strict mitigation measures are implemented, and that

the identified SCC species are appropriately rescued, the impact on floral communities associated with all habitat units can remain localised.

It is recommended that before any construction commences, a walkthrough of the study area is performed, particularly during the flowering season of the potential SSC (i.e., September to January for *A. umbraticola* subsp. *umbraticola* and during September to March for H. *hemerocallidea*). All SCC species identified be rescued and relocated by a qualified specialist to suitable habitat surrounding the disturbance footprint.

6.1.2.3 Probable Residual Impacts

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

➢ Loss of floral habitat outside of the footprint area;
➢ Permanent loss of and altered floral species diversity outside of the footprint area, including loss of favourable habitat for SCC; and
➢ Continued AIP proliferation to adjacent natural vegetation communities.

6.1.2.4 Cumulative Impacts

The greatest threat to the floral ecology within the study area is the continued proliferation of AIP species, and ongoing/expanding urban settlements in the surrounding areas resulting in the overall loss of native floral communities within the local area. The proposed development will also increase the movement of humans within the area and could lead to increased harvesting of floral SCC (if they establish within the area) and / or the degradation of floral habitat due to continued exposure to anthropogenic disturbances.

6.2 Faunal Impact Assessment

6.2.1 Faunal Impact Assessment Results

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

Table 6: Impact on the faunal habitat, diversity and SCC arising from the proposed development activities.

Habitat Unit	UNMANAGED								MANAGED							
	Probability of Impact	Sensitivity of receiving environment	Severity	Spatial Scale	Duration of Impact	Likelihood	Consequence	Significance	Probability of Impact	Sensitivity of receiving environment	Severity	Spatial Scale	Duration of Impact	Likelihood	Consequence	Significance
PRE-CONSTRUCTION PHASE																
Impact on faunal Habitat and Diversity																
Degraded Grassland Habitat	5	2	2	2	2	7	6	42 / Low	4	2	1	1	2	6	4	24 / Very low
Woody Habitat	5	2	2	2	2	7	6	42 / Low	4	2	1	1	2	6	4	24 / Low
Impact on faunal SCC																
Degraded Grassland Habitat	2	1	2	2	2	3	6	18 / Very low	1	1	1	1	2	2	4	8 / Very low
Woody Habitat	2	1	2	2	2	3	6	18 / Very low	1	1	1	1	2	2	4	8 / Very low
CONSTRUCTION PHASE																
Impact on faunal Habitat and Diversity																
Degraded Grassland Habitat	5	2	3	2	3	7	8	56 / Medium-low	4	2	2	2	2	6	6	36 / Low
Woody Habitat	5	2	3	2	3	7	8	56 / Medium-low	4	2	2	2	2	6	6	36 / Low
Impact on faunal SCC																
Degraded Grassland Habitat	2	1	2	2	3	3	7	21 / Very low	1	1	1	2	2	2	5	10 / Very low
Woody Habitat	2	1	2	2	3	3	7	21 / Very low	1	1	1	2	2	2	5	10 / Very low
OPERATIONAL AND MAINTENANCE PHASE																
Impact on faunal Habitat and Diversity																
Degraded Grassland Habitat	5	2	2	2	3	7	7	49 / Low	4	2	1	2	3	6	6	36 / Low
Woody Habitat	5	2	2	2	3	7	7	49 / Low	4	2	1	2	3	6	6	36 / Low
Impact on faunal SCC																
Degraded Grassland Habitat	2	1	2	2	4	3	8	24 / Very low	1	1	1	2	4	2	7	14 / Very low
Woody Habitat	2	1	2	2	4	3	8	24 / Very low	1	1	1	2	4	2	7	14 / Very low

6.2.2   Impact Discussion

The proposed development footprint is approximately 6.8 ha anticipated to have a limited impact on faunal communities. The habitat integrity the study area has largely been degraded and most of the faunal species that were observed in the study area are common and widely spread throughout the region. With mitigation measures implemented, the impacts on the faunal ecology can be reduced to very-low levels.

The study area is somewhat surrounded and thus fragmented by man-made barriers such as roads, fencing, housing, and commercial infrastructure which limit faunal movement within the area. As part of the rehabilitation actions an AIP control plan implemented.

6.2.2.1 Loss of Faunal Habitat and Ecological Structure

The proposed development will result in a loss of faunal habitat from the area; however, the study area is associated with a moderately low diversity of fauna and thus the proposed development is unlikely to have any significant negative impact on faunal communities. Many of the faunal species observed, or that may occur within the study area are urban adaptors and capable of utilising urban environments to sustain their resource requirements. It is highly recommended that an AIP control plan be undertaken.

6.2.2.2   Impact on Important Faunal Species of Conservation Concern

No faunal SCC were observed within the study area. It is also highly unlikely that any SCC will utilise the area for foraging and less likely that SCC will breed within the study area. Thus, the impacts can only be very low.

6.2.2.3 Probable Residual Impacts

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

  ➢ Continued loss of faunal habitat; and
  ➢ Continued loss of and altered faunal species diversity.

6.2.2.4 Possible cumulative Impacts

The region in which the study area is located has already been subjected to extensive anthropogenic activities, historically dumping of waste material and more recently urban development. As such, this has already led to notable habitat loss, habitat degradation, loss of species diversity and the alteration and limiting of faunal species movement / migration.

The study area itself has been isolated from natural open spaces with local faunal assemblages because of surrounding anthropogenic activities, including activities within the neighbouring Glen Douglas Dolerite Mine, roads, and the development of surrounding infrastructure. Edge effects and improper environmental management during the construction of the surrounding areas has led to the degradation of the study area itself as dumping and the proliferation of AIP species was noted. Development within the study area will further add to local loss of habitat, yet species diversity is unlikely to be affected.

6.3 Integrated Impact Mitigation

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

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

Table 7: A summary of the mitigatory requirements for the biodiversity associated with the study area.

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

Floral and Faunal Habitat and Diversity
• Minimise loss of natural vegetation where possible through planning and where necessary by incorporating the sensitivity of the biodiversity report as well as any other specialist studies;
• Prior to the commencement of construction activities, an AIP Management/Control Plan should be compiled for implementation:
  - Removal of alien invasive species should preferably commence during the pre-construction phase and continue throughout the construction and operational phases. AIPs should be cleared within the study area before any vegetation clearing activities commence, thereby ensuring that no AIP propagules are spread, or soils contaminated with AIP seeds during the construction phase; and
  - An AIP Management/Control Plan should be implemented by a qualified professional. No uncertified chemicals may be used for chemical control of AIPs. Only trained professionals must be allowed to administer chemical control.	

Floral SCC • All potential floral SCC, if identified during the pre-construction phase, that may be affected by the construction activities, must be marked and where possible, relocated to suitable habitat surrounding the disturbance footprint. Consultation with GDARD will be required to determine whether a permit process needs to be followed.	
Project phase	Construction Phase
Impact Summary	Loss of floral and faunal habitat, species and SCC
Proposed mitigation and management measures:	

Development footprint

- The construction footprint must be kept as small as possible to minimise impact on the surrounding environment (edge effect management);
- Removal of vegetation must be restricted to what is absolutely necessary and should remain within the approved development footprint. Where possible/ feasible, any remaining natural areas should be utilised as part of the landscaping of the proposed development;
- Clearing of vegetation should take place in a phased manner. This will allow for faunal species within the study area to flee and avoid harm;
- Smaller species that are not as readily able to move out of an area ahead of ground clearing activities such as scorpions and reptiles will be less mobile during rainfall events and cold days (winter). As such should any be observed in the construction site during clearing and construction activities, they are to be carefully and safely moved to an area of similar habitat outside of the disturbance footprint should they not self relocate. Construction personnel are to be educated about these species and instructed not to kill them. Smaller scorpion species and harmless reptiles should be carefully relocated by a suitably nominated construction person. For larger venomous snakes, a suitably trained specialist, or on-site personnel, should be contacted to carry out the relocation of the species, should it not move off on its own;
- Vehicles should be restricted to travelling only on designated roadways to limit the ecological footprint of the construction activities. Additional road construction should be limited to what is absolutely necessary, and the footprint thereof kept to a minimal;
- No collection of floral SCC must be allowed by construction personnel;
- No hunting or trapping of faunal species is to be allowed by construction personnel;
- Informal fires by construction personnel should be prohibited, and no uncontrolled fires whatsoever should be allowed;
- Care should be taken during the construction and operation of the proposed development to limit edge effects to surrounding natural habitat. This can be achieved by:
  - Demarcating all footprint areas during construction activities;
  - No construction rubble or cleared alien invasive species are to be disposed of outside of demarcated areas, and should be taken to a registered waste disposal facility;
  - All soils compacted as a result of construction activities should be ripped and profiled and reseeded;
  - Manage the spread of AIP species, which may affect remaining natural habitat within surrounding areas. Specific mention in this regard is made to Category 1b and Category 2 species identified within the development footprint areas (refer to Appendix F of this report); and
- Appropriate sanitary facilities must be provided during the construction of the development and must be removed to an appropriate waste disposal site;
- No dumping of litter, rubble or cleared vegetation on site should be allowed. Infrastructure and rubble removed because of the construction activities should be disposed of at an appropriate registered dump site away from the development footprint. No temporary dump sites should be allowed in areas with natural vegetation. It is advised that waste disposal containers and bins be provided during the construction phase for all construction rubble and general waste. Vegetation cuttings must be carefully collected and disposed of at a separate waste facility;
- If any spills occur, they should be immediately cleaned up to avoid soil contamination that can hinder floral rehabilitation later down the line. Spill kits should be kept on-site within workshops. In the event of a breakdown, maintenance of vehicles must take place with care, and the recollection of spillage should be practised, preventing the ingress of hydrocarbons into the topsoil; and
- Upon completion of construction activities, it must be ensured that no bare areas remain, and that indigenous species be used to revegetate the disturbed area.

Alien Vegetation

- Edge effects arising from the proposed development, such as erosion and alien plant species proliferation, which may affect adjacent natural areas, need to be strictly managed. Specific mention in this regard is made of Category 1b AIP species (as listed in the NEMBA Alien species lists, 2020), in line with the NEMBA Alien and Invasive Species Regulations (2014) (Appendix F of this report);
- Ongoing alien and invasive plant monitoring and clearing/control should take place throughout the construction and operational phase of the development, and a buffer surrounding the study area (i.e. along the fence line) should be regularly checked for AIP proliferation and to prevent spread into surrounding natural areas; and
- Alien vegetation that is removed must not be allowed to lay on unprotected ground as seeds might disperse upon it. All cleared plant material to be disposed of at a licensed waste facility which complies with legal standards.

Floral and Faunal SCC

- The relocation success of floral SCC should be monitored during the construction phase to ensure immediate actions can be taken if it becomes evident that relocation is not successful;
- No collection of floral SCC or medicinal floral species must be allowed by construction personnel;
- Edge effect control needs to be implemented to prevent further degradation and potential loss of floral and faunal habitat for SCC outside of the proposed development footprint area;
- It is recommended that the perimeter fence allows for movement of small mammals, such as palisade fencing, as opposed to solid constructions such as walls. Should the perimeter be walled in, it is recommended that small opening be left to allow for continuous movement of small mammal species. Such openings must be continuously monitored and cleared of debris to ensure continued movement is possible; and
- Should the presence of any faunal SCC be noted, or their breeding sites be located, within the development footprint a suitably qualified specialist should be consulted on the best way to proceed.

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

Development footprint
- No dumping of litter or garden refuse must be allowed on-site. As such it is advised that vegetation cuttings from landscaped areas be carefully collected and disposed of at a separate waste facility.

Alien Vegetation
- Edge effects arising from the proposed development, such as erosion and alien plant species proliferation, which may affect adjacent natural areas, need to be strictly managed. Specific mention in this regard is made of Category 1b and Category 2 AIP species (as listed in the NEMBA Alien species lists, 2016 and 2020 from March 2021), in line with the NEMBA Alien and Invasive Species Regulations (2014) (Appendix F of this report). For any activities taking place after 1 March 2021, the Alien and Invasive Species Regulations of 2020 apply;
- Ongoing alien and invasive plant monitoring and clearing/control should take place throughout the operational phase, and the project perimeters should be regularly checked for AIP establishment to prevent spread into surrounding natural areas; and
- Alien vegetation that is removed must not be allowed to lay on unprotected ground as seeds might disperse upon it. All cleared plant material to be disposed of at a licensed waste facility, which complies with legal standards.

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

7.   CONCLUSION

The Degraded Grassland Habitat and the Woody Habitat units were identified as having a moderately low floral and faunal sensitivity. The moderately low sensitivity of the study area can be attributed to the extent of fragmentation (e.g. due to the location of the study area within a peri-urban setting, neighbouring an active mine) and degradation (e.g. dumping of waste material) experienced throughout the study area. Development activities within the study area will likely not have a significant impact[9] on the floral and faunal communities found within the study area or beyond, provided that development activities are restricted to the area identified for development.

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

During the field assessment, one potential floral SCC, namely *Adromischus umbraticola* subsp. *umbraticola*, was potentially recorded on site. It is therefore recommended that all SCC (as identified in section 4.3) that are present or potentially within the footprint area should be rescued and relocated by a suitably qualified specialist and either relocated to suitable habitat outside of the development footprint or moved to registered nurseries such as the ARC or the SANBI. No faunal SCC were encountered during the field assessment and due to the impacts currently occurring within the study are it is highly unlikely that any SCC will permanently utilise the study area due its location within a peri-urban setting and the limited habitat, food resources and movement corridors necessary to support SCC.

Following the ecological assessment of the biodiversity within the study area, the impacts associated with the proposed development activities were determined. The impacts on the floral and faunal habitat, diversity and SCC are considered to range from medium-low to very low significance impacts prior to the implementation of mitigation measures. With mitigation fully implemented all impacts can be reduced to low to very-low significance impacts. No significant impacts[10] on the biodiversity associated with the study area are anticipated for the proposed development.

The objective of this study was to provide sufficient information on the biodiversity significance 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 the opinion of the ecologists that this study provides the relevant information required to implement Integrated Environmental Management (IEM) and to ensure that the best long-term use of the ecological resources in the study area will be made in support of the principle of sustainable development.

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

8.   REFERENCES

Bromilow, C. (2010). Revised Edition, First Impression. *Problem Plants of South Africa.* Briza Publications, Pretoria, RSA.

Chittendan, H. (2007). Roberts Bird Guide. A comprehensive field guide to over 950 bird species in southern Africa*.* John Voeckler Bird Book Fund. Cape Town.

Evans, R.A., and R.M. Love. 1957. The step-point method of sampling: A practical tool in range research. Journal of Range Management 10:208-212.

Gauteng Department of Agriculture and Rural Development (GDARD). Gauteng C-Plan 3.3 Terrestrial CBAs and EASs 2011 [vector geospatial dataset] 2011. Available from the SANBI Biodiversity GIS website.

GDARD (2014): Technical Report for the Gauteng Conservation Plan (Gauteng C-Plan v3.3). Gauteng Department of Agriculture and Rural Development: Nature Conservation Directorate. 60 pages.

Hui C, Richardson DM (2017) Invasion dynamics. Oxford University Press, Oxford. https://doi.org/10.1093/acprof:oso/9780198745334.001.0001

IBA: Marnewick MD, Retief EF, Theron NT, Wright DR, Anderson TA. 2015. Important Bird and Biodiversity Areas of South Africa. Johannesburg: BirdLife South Africa. Online available: http://bgis.sanbi.org/IBA/project.asp

IUCN (2019-2). http://www.iucnredlist.org/.

Child MF, Roxburgh L, Do Linh San E, Raimondo D, Davies-Mostert HT, editors. The Red List of Mammals of South Africa,Swaziland and Lesotho. South African National Biodiversity Institute and Endangered Wildlife Trust, South Africa.

Mucina, L. & Rutherford, M.C. (Eds). (2012). *The Vegetation of South Africa, Lesotho and Swaziland*. Strelitzia 19. South African National Biodiversity Institute, Pretoria, RSA.

NPAES: DEA and SANBI. 2009. National Protected Areas Expansion Strategy Resource Document. Online available: http://bgis.sanbi.org/protectedareas/NPAESinfo.asp

Picker. M., Griffiths. C. & Weaving. A. (2004). New Edition. Field Guide to Insects of South Africa*.* Struik Publishers (Pty) Ltd, Cape Town, RSA.

Raimondo, D., von Staden, L., Foden., W., Victor, JE., Helme, NA., Turner, RC., Kamundi, DA., Manyama, PA. (eds) (2009). *Red List of South African Plants* Strelitzia 25. South African National Biodiversity Institute, Pretoria.

Richardson DM, Pyšek P, Carlton JT (2011) A compendium of essential concepts and terminology in invasion ecology. In: Richardson DM (ed) Fifty years of invasion ecology. The legacy of Charles Elton. Wiley-Blackwell, Oxford, pp 409–420. https://doi.org/10.1002/9781444329988. ch30

SACAD: Department of Environmental Affairs. 2020. South Africa Protected Areas Database (SACAD_OR_2020_Q2). Online available: [http://egis.environment.gov.za]

SAPAD: Department of Environmental Affairs. 2020. South Africa Protected Areas Database (SAPAD_OR_2020_Q2). Online available: [http://egis.environment.gov.za]

Skinner JD, Chimimba CT. 2005. The Mammals of the Southern African Subregion. Third edition. Cambridge University Press, Cambridge, UK.

Smithers, R. H. N. 2000. Third Edition. Edited by Peter Apps. The Mammals of the Southern African. A Field Guide. Struik Publishers, Cape Town, RSA.

South African National Biodiversity Institute (2006-2018). The Vegetation Map of South Africa, Lesotho and Swaziland, Mucina, L., Rutherford, M.C. and Powrie, L.W. (Editors), Online, http://bgis.sanbi.org/Projects/Detail/186, Version 2018

Southern African Bird Atlas Project (SABAP) 2. 2007 -2019. Online available: http://sabap2.adu.org.za/.

The South African National Biodiversity Institute - Biodiversity GIS (BGIS) [online]. URL: http://bgis.sanbi.org as retrieved in 2019

Threatened Ecosystems: National Environmental Management Biodiversity Act: National list of ecosystems that are threatened and in need of protection (G 34809, GoN 1002). 2011. Department of Environmental Affairs. Online available: http://bgis.sanbi.org/ecosystems/project.asp

Threatened Species Programme (2017). Red Data List of South African Plant Species. Available online: http://www.redlist.org.

Van Oudtshoorn, F. (2004). Second Edition, Third Print. Guide to Grasses of South Africa. Briza Publications, Pretoria, RSA.

Van Wyk, B. and Malan, S. (1998) Field Guide to the Wild Flowers of the Highveld. Struik Publishers, Cape Town.

Van Wyk, B. and van Wyk, P. 1997. Field guide to Trees of Southern Africa. Struik Nature. Cape Town, RSA

Wilson JRU, Gaertner M, Richardson DM et al (2017) Contributions to the national status report on biological invasions in South Africa. Bothalia 47:a2207. https://doi.org/10.4102/abc.v47i2.2207

Woodhall, S. (2005). Field Guide to Butterflies of South Africa. Struik Publishers (Pty) Ltd, Cape Town, RSA

APPENDIX A - Legislative Requirements and Indemnity

The Constitution of the Republic of South Africa, 1996

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

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

The National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) and the associated Environmental Impact Assessment (EIA) Regulations (GN R326 as amended in 2017 and well as listing notices 1, 2 and 3 (GN R327, R325 and R324 of 2017), state that prior to any development taking place which triggers any activity as listed within the abovementioned regulations, an environmental authorisation process needs to be followed. This could follow either the Basic Assessment process or the Environmental Impact Assessment process depending on the nature of the activity and scale of the impact.

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

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

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

Furthermore, a person may not carry out a restricted activity involving either:
a) A specimen of a listed threatened or protected species;
b) Specimens of an alien species; or
c) A specimen of a listed invasive species without a permit.

Government Notice 598 Alien and Invasive Species Regulations (2014), including the Government Notice 1003 Alien Invasive Species List as published in the Government Gazette 43726 of 2020, as it relates to the National Environmental Management Biodiversity Act, 2004 (Act No. 10 of 2004)

NEMBA is administered by the Department of Environmental Affairs and aims to provide for the management and conservation of South Africa's biodiversity within the framework of the NEMA. 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.

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

The biodiversity assessment must comply with the minimum requirements as stipulated by GDARD Version 3 of 2014 and must contain the following information:
   > A location and description of the application site and proposed activities;
   > Photographic record and description of the site characteristics and inventories of the faunal and floral species observed on site, with special mention to Red Listed species;
   > Sensitivity map displaying all sensitive areas and associated buffers as listed in the Sensitivity Mapping Rules for Biodiversity Assessments section of GDARD V3 (2014); and
   > A list of recommendations and mitigation measures to reduce the potential environmental impacts that the proposed development might have on the terrestrial ecology associated with the site.

Indemnity and Terms of use of this Report

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

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APPENDIX B - Floral Method of Assessment

Floral Species of Conservational Concern Assessment

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

The National Web-Based Environmental Screening Tool

The Screening Tool was accessed to obtain a list of potentially occurring species of conservation concern for the focus area. Each of the themes in the Screening Tool consists of theme-specific spatial datasets which have been assigned a sensitivity level namely, "*low*", "*medium*", "*high*" and "*very high*" sensitivity. The four levels of sensitivity are derived and identified in different ways, e.g. for **confirmed** areas of occupied habitat for SCC a Very High and High Sensitivity is assigned and for areas of suitable habitat where SCC may occur based on spatial models only, a Medium Sensitivity is assigned. The different sensitivity ratings pertaining to the Plant [and Animal] Protocols are described below[11]:

- ➢ **Very High**: Habitat for species that are endemic to South Africa, where all the known occurrences of that species are within an area of 10 km^2 are considered Critical Habitat, as all remaining habitat is irreplaceable. Typically, these include species that qualify under Critically Endangered (CR), Endangered (EN), or Vulnerable (VU) D criteria of the IUCN or species listed as Critically/ Extremely Rare under South Africa's National Red List Criteria. For each species reliant on a Critical Habitat, all remaining suitable habitat has been manually mapped at a fine scale.
- ➢ **High**: Recent occurrence records for all threatened (CR, EN, VU) and/or rare endemic species are included in the high sensitivity level. Spatial polygons of suitable habitat have been produced for each species by intersecting recently collected occurrence records (those collected since the year 2000) that have a spatial confidence level of less than 250 m with segments of remaining natural habitat.
- ➢ **Medium**: Model-derived suitable habitat areas for threatened and/or rare species are included in the medium sensitivity level. Two types of spatial models have been included. The first is a simple rule-based habitat suitability model where habitat attributes such as vegetation type and altitude are selected for all areas where a species has been recorded to occur. The second is a species distribution model which uses species occurrence records combined with multiple environmental variables to quantify and predict areas of suitable habitat. The models provide a probability-based distribution indicating a continuous range of habitat suitability across areas that have not been previously surveyed. A probability threshold of 75% for suitable habitat has been used to convert the modelled probability surface and reduce it into a single spatial area which defines areas that fall within the medium sensitivity level.
- ➢ **Low**: Areas where no SCC are known or expected to occur.

BRAHMS Online Website

The Botanical Database of Southern Africa (BODATSA) is accessed to obtain plant names and floristic details (http://posa.sanbi.org/) for species of conservation concern within a selected boundary;
- ➢ This website provides access to South African plant names (taxa), specimens (herbarium sheets) and observations of plants made in the field (botanical records). Data is obtained from

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

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

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

GDARD Species of Conservation Concern

A list of all Orange and Red-listed species, as defined from GDARD, was obtained for the relevant QDS.

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

The Probability of Occurrence (POC) for each floral SCC is described:
➢ "**Confirmed'**: if observed during the survey;
➢ "**High**": if within the species' known distribution range and suitable habitat is available;
➢ "**Medium**": if either within the known distribution range of the species or if suitable habitat is present; or
➢ "**Low**": if the habitat is not suitable and falls outside the distribution range of the species.
The accuracy of the POC is based on the available knowledge about the species in question, with many of the species lacking in-depth habitat research.

Vegetation Surveys

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

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

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

Floral Habitat Sensitivity

The floral habitat sensitivity of each habitat unit was determined by calculating the mean of five different parameters which influence floral communities and provide an indication of the overall floristic ecological integrity, importance, and sensitivity of the habitat unit. Each of the following parameters are subjectively rated on a scale of 1 to 5 (1 = lowest and 5 = highest):
➢ **Floral SCC:** The confirmed presence or potential for floral SCC or any other significant species, such as endemics, to occur within the habitat unit;
➢ **Unique Landscapes:** The presence of unique landscapes or the presence of an ecologically intact habitat unit in a transformed region;
➢ **Conservation Status:** The conservation status of the ecosystem or vegetation type in which the habitat unit is situated based on local, regional, and national databases. Whether the habitat is representative of a Critical Biodiversity Area or forms part of an Ecological Support Area is also taken into consideration;

> ➢ **Floral Diversity:** The recorded floral diversity compared to a suitable reference condition such as surrounding natural areas or available floristic databases; and
> ➢ **Habitat Integrity:** The degree to which the habitat unit is transformed based on observed disturbances which may affect habitat integrity.

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

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

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

APPENDIX C - Faunal Method of Assessment

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

Mammals

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

Avifauna

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

Reptiles

During the field assessment, suitable applicable habitat areas (rocky outcrops and fallen dead trees) were inspected for the presence of reptiles, and any individuals encountered were identified. The data gathered during the assessment along with the habitat analysis provided an accurate indication of which reptile species are likely to occur on the study 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 study 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 study area, all insect species visually observed were identified, and where possible photographs taken.

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

Arachnids

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

Faunal Species of Conservational Concern Assessment

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

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

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

Faunal Habitat Sensitivity

The sensitivity of the study 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 study 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 study area for each faunal class;
- ➤ **Faunal Diversity:** The recorded faunal diversity compared to a suitable reference condition such as surrounding natural areas or available faunal databases; and
- ➤ **Habitat Integrity:** The degree to which the habitat is transformed based on observed disturbances which may affect habitat integrity.

Each of these values contributes equally to the mean score, which determines the suitability and sensitivity of the study 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 study 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

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

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

> ➢ An **activity** is a distinct process or task undertaken by an organisation for which a responsibility can be assigned. Activities also include facilities or infrastructure that is possessed by an organisation.
> ➢ An **environmental aspect** is an 'element of an organizations activities, products and services which can interact with the environment'[12]. The interaction of an aspect with the environment may result in an impact.
> ➢ **Environmental risks/impacts** are the consequences of these aspects on environmental resources or receptors of particular value or sensitivity, for example, disturbance due to noise and health effects due to poorer air quality. In the case where the impact is on human health or wellbeing, this should be stated. Similarly, where the receptor is not anthropogenic, then it should, where possible, be stipulated what the receptor is.
> ➢ **Receptors** can comprise, but are not limited to, people or human-made systems, such as local residents, communities and social infrastructure, as well as components of the biophysical environment such as wetlands, flora and riverine systems.
> ➢ **Resources** include components of the biophysical environment.
> ➢ **Frequency of activity** refers to how often the proposed activity will take place.
> ➢ **Frequency of impact** refers to the frequency with which a stressor (aspect) will impact on the receptor.
> ➢ **Severity** refers to the degree of change to the receptor status in terms of the reversibility of the impact; sensitivity of receptor to stressor; duration of impact (increasing or decreasing with time); controversy potential and precedent setting; threat to environmental and health standards.
> ➢ **Spatial extent** refers to the geographical scale of the impact.
> ➢ **Duration** refers to the length of time over which the stressor will cause a change in the resource or receptor.

The significance of the impact is then assessed by rating each variable numerically according to the defined criteria. Refer to Table 3. The purpose of the rating is to develop a clear understanding of influences and processes associated with each impact. The severity, spatial scope and duration of the impact together comprise the consequence of the impact and when summed can obtain a maximum value of 15. The frequency of the activity and the frequency of the impact together comprise the likelihood of the impact occurring and can obtain a maximum value of 10. The values for likelihood and consequence of the impact are then read off a significance-rating matrix and are used to determine whether mitigation is necessary[13].

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

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

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[12] The definition has been aligned with that used in the ISO 14001 Standard.
[13] Some risks/impacts that have low significance will however still require mitigation.

information, by increasing assigned ratings or adjusting final model outcomes. In certain instances where a variable or outcome requires rational adjustment due to model limitations, the model outcomes have been adjusted.

Table D1: Criteria for assessing significance of impacts

LIKELIHOOD DESCRIPTORS

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

CONSEQUENCE DESCRIPTORS

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

Table D2: Significance Rating Matrix.

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

Table D3: Positive/Negative Mitigation Ratings.

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

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

Mitigation measure development

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

> ➢ *Mitigation* and *performance improvement measures* and actions that address the risks and impacts[14] are identified and described in as much detail as possible.
> ➢ Measures and actions to address negative impacts will favour avoidance and prevention over minimisation, mitigation, or compensation.
> ➢ Desired outcomes are defined, and have been developed in such a way as to be *measurable events with performance indicators, targets and acceptable criteria* that can be tracked over *defined periods*, with estimates of the *resources* (including human resource and training requirements) *and responsibilities for implementation.*

Recommendations

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

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

APPENDIX E - Vegetation Types
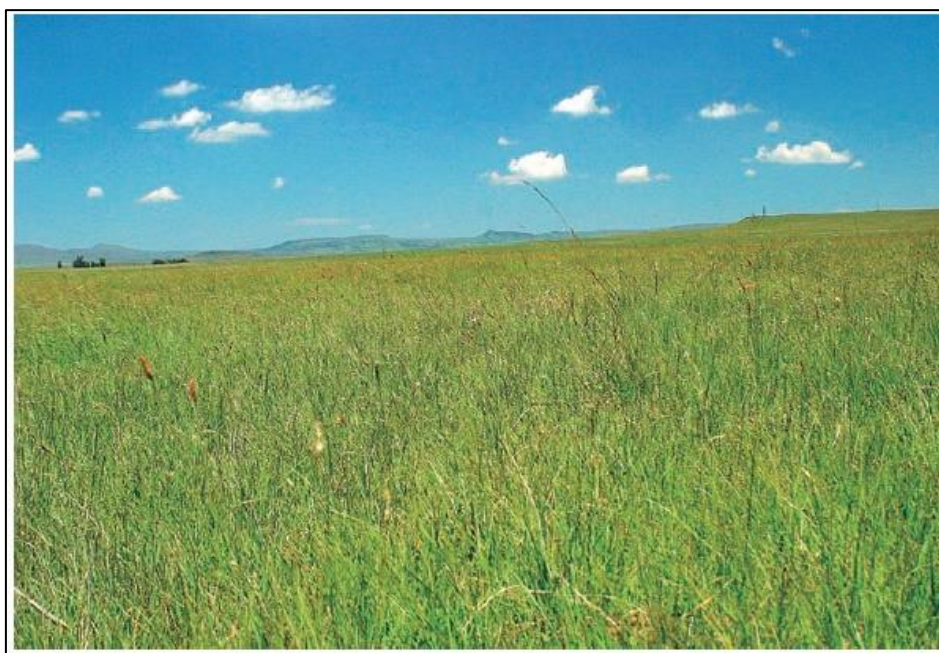
Soweto Highveld Grassland (Gm 8)

Figure E1: Gm 8 Soweto Highveld Grassland: Typical mesic highveld grassland with *Themeda triandra* and several *Egrostis* species still found in some parts of southern Gauteng in natural condition. Image by D.B. Hoare.

Table E1: Floristic species of the *Soweto Highveld Grassland* (Mucina & Rutherford, 2012).

Plant Community	Species
Dominant and typical floristic species (*d – dominant)	
Woody Layer	
Low Shrubs	*Anthospermum hispidulum, A. rigidum* subsp. *pumilum, Berkheya annectens, Felicia muricata, Ziziphus zeyheriana.*
Forb layer	
Herbs	*Hermannia depressa* (d), *Acalypha angustata, Berkheya setifera, Dicoma anomala, Euryops gilfillanii, Geigeria aspera* var. *aspera, Graderia subintegra, Haplocarpha scaposa, Helichrysum miconiifolium, H. nudifolium* var. *nudifolium, H. rugulosum, Hibiscus pusillus, Justicia anagalloides, Lippia scaberrima, Rhynchosia effusa, Schistostephium crataegifolium, Selago densiflora, Senecio coronatus, Hilliardiella elaeagnoides, Wahlenbergia undulata*
Geophytic Herbs	*Haemanthus humilis* subsp. *hirsutus, H. montanus*
Herbaceous climber	*Rhynchosia totta*
Graminoid layer	
Graminoids	*Andropogon appendiculatus* (d), *Brachiaria serrata* (d), *Cymbopogon pospischilii* (d), *Cynodon dactylon* (d), *Elionurus muticus* (d), *Eragrostis capensis* (d), *E. chloromelas* (d), *E. curvula* (d), *E. plana* (d), *E. planiculmis* (d), *E. racemosa* (d), *Heteropogon contortus* (d), *Hyparrhenia hirta* (d), *Setaria nigrirostris* (d), *S. sphacelata* (d), *Themeda triandra* (d), *Tristachya leucothrix* (d), *Andropogon schirensis, Aristida adscensionis, A. bipartita, A. congesta, A. junciformis* subsp. *galpinii, Cymbopogon caesius, Digitaria diagonalis, Diheteropogon amplectens, Eragrostis micrantha, E. superba, Harpochloa falx, Microchloa caffra, Paspalum dilatatum*

Carletonville Dolomite Grassland (Gh15)

Figure E2: Gh 15 Carletonville Dolomite Grassland: Grassy rocky outcrop at Vlakplaats, west of Valhalla near Centurion (Gauteng) with prominent grasses such as *Loudetia simplex*, *Hyparrhenia hirta*, *Brachiaria serrata* and *Heteropogon contortus* and scattered shrubs including *Euclea undulata*, *Rhus agalismontanum*, *Zanthoxylum capense* and *Diospyros lycioides*. Image by D.B. Hoare.

Table E2: Floristic species of *the Carletonville Dolomite Grassland* (Mucina & Rutherford, 2012).

Plant Community	Species
Dominant and typical floristic species (*d – dominant)	
Woody Layer	
Low Shrubs	*Anthospermum rigidum* subsp. *pumilum*, *Indigofera comosa*, *Pygmaeothamnus zeyheri* var. *rogersii*, *Searsia magalismontana*, *Tylosema esculentum*, *Ziziphus zeyheriana*.
Forb layer	
Herbs	*Acalypha angustata*, *Barleria macrostegia*, *Chamaecrista mimosoides*, *Chamaesyce inaequilatera*, *Crabbea angustifolia*, *Dianthus mooiensis*, *Dicoma anomala*, *Helichrysum caespititium*, *H. miconiifolium*, *H. nudifolium* var. *nudifolium*, *Ipomoea ommaneyi*, *Justicia anagalloides*, *Kohautia amatymbica*, *Kyphocarpa angustifolia*, *Ophrestia oblongifolia*, *Pollichia campestris*, *Senecio coronatus*, *Hilliardiella elaeagnoides*.
Geophytic Herbs	*Boophone disticha*, *Habenaria mossii*.
Geoxylic Suffrutices	*Elephantorrhiza elephantina*, *Parinari capensis* subsp. *capensis*.
Gramminoid layer	
Graminoids	*Aristida congesta* (d), *Brachiaria serrata* (d), *Cynodon dactylon* (d), *Digitaria tricholaenoides* (d), *Diheteropogon amplectens* (d), *Eragrostis chloromelas* (d), *E. racemosa* (d), *Heteropogon contortus* (d), *Loudetia simplex* (d), *Schizachyrium sanguineum* (d), *Setaria sphacelata* (d), *Themeda triandra* (d), *Alloteropsis semialata* subsp. *eckloniana*, *Andropogon schirensis*, *Aristida canescens*, *A. diffusa*, *Bewsia biflora*, *Bulbostylis burchellii*, *Cymbopogon caesius*, *C. pospischilii*, *Elionurus muticus*, *Eragrostis curvula*, *E. gummiflua*, *E. plana*, *Eustachys paspaloides*, *Hyparrhenia hirta*, *Melinis nerviglumis*, *M. repens* subsp. *repens*, *Monocymbium ceresiiforme*, *Panicum coloratum*, *Pogonarthria squarrosa*, *Trichoneura grandiglumis*, *Triraphis andropogonoides*, *Tristachya leucothrix*, *T. rehmannii*.

APPENDIX F - Species Lists

Floral Species List

Table F1: Dominant floral species encountered during the field assessment. Alien species are indicated with an asterisk (*). Also indicated are species falling within an alien invasive category as per the National Environmental Management: Biodiversity Act (Act 10 of 2004): Alien and Invasive Species Regulations, 2014.

Species Name	Degraded Grassland Habitat	Woody Habitat
*Acacia mearnsii (NEMBA Category 2)	x	x
*Eucalyptus grandis (NL)	x	
*Melia azedarach (NEMBA Category 3)		x
*Pinus sp.	x	
*Tecoma stans (NEMBA Category 1b)	x	x
Celtis africana		x
Euclea crispa		x
Gymnosporia buxifolia		x
Searsia pyroides	x	x
Seasrisa lancea		x
Ziziphus mucronata		x
Shrubs and forbs		
*Argemone ochlroleuca (NEMBA Category 1b)	x	
*Bidens pilosa (NL)	x	x
*Campuloclinium macrocephalum (NEMBA Category 1b)	x	x
*Conyza bonariensis (NL)	x	x
*Datura stramonium (NEMBA Category 1b)	x	x
*Lantana camara (NEMBA Category 1b)		x
*Ricinus communis (NEMBA Category 2)	x	
*Solanum mauritianum (NEMBA Category 1b)	x	x
*Solanum pseudocapsicum (NEMBA Category 1b)	x	
*Solanum sisymbrifolium (NEMBA Category 1b)	x	x
*Sonchus oleraceus (NL)	x	
*Tagetes minuta (NL)	x	x
*Verbena bonariensis (NEMBA Category 1b)	x	x
*Verbena tenuisecta (NL)	x	x
*Zinnia peruviana (NL)	x	
Adromischus umbraticola subsp. *umbraticola*	x	
Acalypha angustata	x	x
Acrotome hispida	x	
Berkheya setifera	x	x
Felicia muricata	x	x
Gazania krebsiana	x	
Gomphocarpus fruticosus	x	x
Gomphrena celosioides	x	x
Helichrysum miconiifolium	x	
Helicrysum krausii	x	x
Hilliardiella oligocephala	x	

Species Name	Degraded Grassland Habitat	Woody Habitat
Hypoxis iridifolia	x	
Ipomoea ommanneyi	x	
Ledebouria ovatifolia	x	
Ledebouria sp.	x	x
Nemesia fruticans	x	
Pelargonium luidum	x	
Plantago lanceolata	x	x
Scabiosa columbaria	x	
Senecio coronatus	x	
Tragopogon dubis	x	x
Wahlenbergia undulata	x	x
Ziziiphus zeyheriana	x	
Graminoids		
Cortaderia jubata (NEMBA Category 1b)	x	
Andropogon appendiculatus	x	
Cynodon dactylon	x	x
Digitaria diagonalis	x	
Eragrostis capensis	x	
Eragrostis racemosa	x	
Heteropogon contortus	x	x
Hyparrhenia hirta	x	
Setaria nigrirostris	x	
Themeda triandra	x	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).

NL: Not Listed

Faunal Species List

At the time of the assessment, a limited number of faunal species were observed, most likely due to prevalent rainy conditions. Faunal species is however considered to be limited to common species adapted to increased levels of anthropogenic activities.

Table F2: Mammal species or signs thereof observed with the study area.

Scientific Name	Common Name	IUCN
Cryptomys hottentotus	Common Molerat	LC
Lepus saxatilis	Scrub HRE	NYBA
Rattus	Black Rat	LC
Sylvicapra grimmia	Common Duiker	LC

LC = Least Concern

Table F3: Avifaunal species observed within the study area.

Scientific Name	Common Name	IUCN
Acridotheres tristis	Indian Myna	NEMBA Category 3 alien species
Bostrychia hagedash	Hadada Ibis	LC
Corvus albus	Pied Crow	LC
Corythaixoides concolor	Grey Go-Away-Bird	LC
Columba livia	Rock dove	LC
Euplectes orix	Southern Red Bishop	LC
Turdus smithi	Karoo Thrush	LC
Passer melanurus	Cape Sparrow	LC
Ploceus velatus	Southern Masked Weaver	LC
Pycnonotus barbatus	Common Bulbul	LC
Streptopelia capicola	Cape Turtle Dove	LC
Streptopelia senegalensis	Laughing Dove	LC
Vanellus coronatus	Crowned Lapwing	LC
Colius striatus	Speckled Mousebird	LC
Threskiornis aethiopicus	Sacred Ibis	LC
Cossypha caffra	Cape Robin-chat	LC

LC = Least Concern

Table F4: Insect species observed with the study area

Scientific Name	Common Name	IUCN
Decapotoma lunata	Lunate Blister Beetle	NYBA
Lagria vulnerata	Hairy Darkling Beetle	NYBA
Lycus ampliatus	Tail Net-winged Beetle	NYBA
Apis mellifera	Honey bee	DD
Danaus chrysippus	African Monarch	LC
Eurema brigitta ssp. brigitta	African Broad-bordered Grass Yellow	NTBA
Junonia orithya ssp. madagascariensis	Eyed pansy	NTBA
Belenois aurota	Brown-veined White	NTBA
Platycorynus dejeani	Milkweed Leaf Beetle	NTBA

LC = Least concerned, NYBA = Not yet been assessed by the IUCN, DD = Data deficient

Table F5: Arachnid species observed within the study area.

Scientific Name	Common Name	IUCN
Ageledidae sp	Funnel-web Spider	NYBA
Olurunia ocellata	Grass funnel-web spider	NYBA

NYBA = Not yet been assessed by the IUCN

APPENDIX G - Floral SCC

South Africa uses the internationally endorsed IUCN Red List Categories and Criteria in the Red List of South African plants. This scientific system is designed to measure species' risk of extinction. The purpose of this system is to highlight those species that are most urgently in need of conservation action. Due to its strong focus on determining risk of extinction, the IUCN system does not highlight species that are at low risk of extinction but may nonetheless be of high conservation importance. Because the Red List of South African plants is used widely in South African conservation practices such as systematic conservation planning or protected area expansion, we use an amended system of categories designed to highlight those species that are at low risk of extinction but of conservation concern.

Definitions of the national Red List categories

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

- **Extinct (EX)** A species is Extinct when there is no reasonable doubt that the last individual has died. Species should be classified as Extinct only once exhaustive surveys throughout the species' known range have failed to record an individual.
- **Extinct in the Wild (EW)** A species is Extinct in the Wild when it is known to survive only in cultivation or as a naturalized population (or populations) well outside the past range.
- **Regionally Extinct (RE)** A species is Regionally Extinct when it is extinct within the region assessed (in this case South Africa), but wild populations can still be found in areas outside the region.
- **Critically Endangered, Possibly Extinct (CR PE)** Possibly Extinct is a special tag associated with the category Critically Endangered, indicating species that are highly likely to be extinct, but the exhaustive surveys required for classifying the species as Extinct has not yet been completed. A small chance remains that such species may still be rediscovered.
- **Critically Endangered (CR)** A species is Critically Endangered when the best available evidence indicates that it meets at least one of the five IUCN criteria for Critically Endangered, indicating that the species is facing an extremely high risk of extinction.
- **Endangered (EN)** A species is Endangered when the best available evidence indicates that it meets at least one of the five IUCN criteria for Endangered, indicating that the species is facing a very high risk of extinction.
- **Vulnerable (VU)** A species is Vulnerable when the best available evidence indicates that it meets at least one of the five IUCN criteria for Vulnerable, indicating that the species is facing a high risk of extinction.
- **Near Threatened (NT)** A species is Near Threatened when available evidence indicates that it nearly meets any of the IUCN criteria for Vulnerable and is therefore likely to become at risk of extinction in the near future.
- [N]**Critically Rare** A species is Critically Rare when it is known to occur at a single site but is not exposed to any direct or plausible potential threat and does not otherwise qualify for a category of threat according to one of the five IUCN criteria.
- [N]**Rare** A species is Rare when it meets at least one of four South African criteria for rarity but is not exposed to any direct or plausible potential threat and does not qualify for a category of threat according to one of the five IUCN criteria. The four criteria are as follows:
  - Restricted range: Extent of Occurrence (EOO) <500 km^2, OR
  - Habitat specialist: Species is restricted to a specialized microhabitat so that it has a very small Area of Occupancy (AOO), typically smaller than 20 km^2, OR
  - Low densities of individuals: Species always occurs as single individuals or very small subpopulations (typically fewer than 50 mature individuals) scattered over a wide area, OR
  - Small global population: Less than 10 000 mature individuals.
- **Least Concern** A species is Least Concern when it has been evaluated against the IUCN criteria and does not qualify for any of the above categories. Species classified as Least Concern are considered at low risk of extinction. Widespread and abundant species are typically classified in this category.

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

Floral Species of Conservation Concern (SCC) that were assessed for the study area are listed within the table below:

Table G1: Floral SCC expected to occur within the QDS 2628CA in which the study area is located as obtained from GDARD. Additional information on species threat status as defined in The Red List of South African Plants (http://redlist.sanbi.org/index.php) is presented. A full list of POC ratings is presented in Appendix B.

Family	Species	National status	Habitat	POC
CRASSULACEAE	*Adromischus umbraticola subsp. umbraticola*	NT	**Range**: Potchefstroom and Zeerust to Cullinan **Major habitats**: Savanna **Description**: South-facing rock crevices on ridges, restricted to Gold Reef Mountain Bushveld in the northern parts of its range, and Andesite Mountain Bushveld in the south **Population trend**: Decreasing	**Potentially Confirmed**
FABACEAE	*Argyrolobium campicola*	NT	**Range**: Pretoria to Dundee **Major habitats**: Grassland **Description**: Highveld Grassland **Population trend**: Decreasing	**Medium**
HYACINTHACEAE	*Bowiea volubilis subsp. Volubilis*	VU	**Range**: Eastern Cape to Limpopo Province. Widespread elsewhere in southern and eastern Africa. **Major habitats**: Drakensberg Foothill Moist Grassland, Fish Valley Thicket, Sundays Valley Thicket, Pondoland-Ugu Sandstone Coastal Sourveld, Southern Afrotemperate Forest, Northern Afrotemperate Forest, Southern Mistbelt Forest, Northern Mistbelt Forest, Scarp Forest, Amathole Montane Grassland, Carletonville Dolomite Grassland, Zastron Moist Grassland, Egoli Granite Grassland, Baviaans Valley Thicket, Tsakane Clay Grassland, Eastern Valley Bushveld, East Griqualand Grassland, Queenstown Thornveld, KwaZulu-Natal Highland Thornveld, Midlands Mistbelt Grassland, Gauteng Shale Mountain Bushveld, Andesite Mountain Bushveld, Loskop Mountain Bushveld, Soutpansberg Mountain Bushveld, Mamabolo Mountain	**Low**

Family	Species	National status	Habitat	POC
			Bushveld, Marikana Thornveld, Gold Reef Mountain Bushveld, Malelane Mountain Bushveld, Soutpansberg Summit Sourveld. **Description**: Low and medium altitudes, usually along mountain ranges and in thickly vegetated river valleys, often under bush clumps and in boulder screes, sometimes found scrambling at the margins of karroid, succulent bush in the Eastern Cape. Occurs in bushy kloofs at the coast and inland in KwaZulu-Natal. In Gauteng, Mpumalanga, and North West Province it is often found in open woodland or on steep rocky hills usually in well-shaded situations. Tolerates wet and dry conditions, growing predominantly in summer rainfall areas with an annual rainfall of 200-800 mm. **Population trend**: Decreasing	
ASTERACEAE	*Cineraria longipes*	VU	**Range**: Klipriviersberg and Suikerbosrand. **Major habitats**: Gold Reef Mountain Bushveld, Andesite Mountain Bushveld, Soweto Highveld Grassland **Description**: Grassland, amongst rocks and along seepage lines, exclusively on basalt koppies on south-facing slopes **Population trend**: Stable	**Medium**
AIZOACEAE	*Delosperma purpureum*	EN	**Range**: Witwatersrand **Major habitats**: Gold Reef Mountain Bushveld, Andesite Mountain Bushveld **Description**: South-facing slopes, in shallow soils among crystalline or conglomerate quartzitic rocks, in sun or in partial shade, rarely in shade, in grassland with some trees. **Population trend:** Decreasing.	**Medium**
HYACINTHACEAE	*Eucomis autumnalis*	LC	**Range**: South Africa, Swaziland, Lesotho, Botswana, Zimbabwe and Malawi. **Major habitats**: Grassland. **Description**: Damp, open grassland and sheltered places from the coast to 2450 m. **Population trend**: Decreasing.	**Medium**
ORCHIDACEAE	*Eulophia coddii*	VU	**Range**: Heidelberg, Magaliesberg and Waterberg. **Major habitats**: Gold Reef Mountain Bushveld, Waterberg Mountain Bushveld, Waterberg-Magaliesberg Summit Sourveld **Description**: Steep slopes, growing on sandstone-derived soils in grassland or bushveld. **Population trend**: Decreasing.	**Low**
ORCHIDACEAE	*Habenaria barbertoni*	NT	**Range**: Gauteng and Mpumalanga **Major habitats**: Savanna **Description**: Rocky hillsides, in bushveld in association with acacias, 1000-1500 m **Population trend**: Decreasing	**Low**

Family	Species	National status	Habitat	POC
ORCHIDACEAE	*Habenaria bicolor*	NT	**Range**: Gauteng and near Middelburg in Mpumalanga. Also known from two records from Zimbabwe. **Major habitats**: Grassland **Description**: Well-drained grasslands at around 1600 m in South Africa. **Population trend**: Decreasing	**Low**
ORCHIDACEAE	*Habenaria mossii*	EN	**Range**: Johannesburg, Pretoria, and Krugersdorp. **Major habitats**: Carletonville Dolomite Grassland, Andesite Mountain Bushveld. **Description**: Open grassland on dolomite or in black, sandy soil. **Population trend**: Decreasing.	**Low**
ORCHIDACEAE	*Holothrix micrantha*	CR (PE)	**Range**: Gauteng, Johannesburg to Heidelberg. **Major habitats**: Gold Reef Mountain Bushveld, Egoli Granite Grassland **Description**: Grassy cliffs, 1500-1800 m **Population trend**: Decreasing.	**Low**
ORCHIDACEAE	*Holothrix randii*	NT	**Range**: Gauteng and Limpopo Province, Zimbabwe, Tanzania and Kenya. **Major habitats**: Grassland. **Description:** Grassy slopes and rock ledges, usually southern aspects. **Population trend**: Decreasing.	**Low**
HYPOXIDACEAE	*Hypoxis hemerocallidea*	LC	**Range**: This species is widespread across northern and eastern South Africa, extending to Botswana, eSwatini (Swaziland) and Mozambique. **Major habitats**: Albany Thicket, Grassland, Indian Ocean Coastal Belt, Savanna **Description**: It occurs in a wide range of habitats, including sandy hills on the margins of dune forests, open, rocky grassland, dry, stony, grassy slopes, mountain slopes and plateaus. It appears to be drought and fire tolerant. **Population trend**: Decreasing	**High**
AIZOACEAE	*Khadia beswickii*	VU	**Range**: Gauteng, Mpumalanga, North West. **Major habitats**: Andesite Mountain Bushveld, Gauteng Shale Mountain Bushveld, Tsakane Clay Grassland, Soweto Highveld Grassland, Carletonville Dolomite Grassland **Description**: Open shallow soil over rocks in grassland. **Population trend**: Decreasing	**Medium**
ASPHODELACEAE	*Kniphofia typhoides*	NT	**Range**: Parys to Lydenburg to Paulpietersburg to Newcastle. **Major Habitats:** Grassland **Description**: Low lying wetlands and seasonally wet areas in climax *Themeda triandra* grasslands on heavy black clay soils, tends to disappear from degraded grasslands. **Population trend**: Decreasing	**Low**

Family	Species	National status	Habitat	POC
AIZOACEAE	*Lithops lesliei* subsp. *lesliei*	NT	**Range**: Douglas in the Northern Cape Province to central Limpopo Province and south-eastern Botswana. **Major habitats**: Grassland, Savanna **Description**: Primarily in arid grasslands, usually in rocky places, growing under the protection of forbs and grasses. **Population trend**: Decreasing	**High**
APOCYNACEAE	*Stenostelma umbelluliferum*	NT	**Range**: Pretoria North and adjacent areas in North West Province. **Major habitats**: Savanna **Description**: Deep black turf in open woodland mainly in the vicinity of drainage lines. **Population trend**: Decreasing	**Low**

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

APPENDIX H - Faunal SCC

Table H1: RDL Mammal Species for the Gauteng Province (GDARD 2014).

Scientific Name	Common name	IUCN Status	GDARD Status	POC
Aonyx capensis	African Clawless Otter	NT	-	Low
Atelerix frontalis	Southern African Hedgehog	LC	NT	Low
Lutra maculicollis	Spotted-necked Otter	NT	NT	Low
Mystromys albicaudatus	White-tailed Mouse	EN	EN	Low
Neamblysomus julianae	Juliana's Golden Mole	EN	VU	Low
BATS				
Miniopterus schreibersii	Scheiber's Long-Fingered Bat	NT	NT	Low
Myotis tricolor	Temminck's Hairy Bat	LC	NT	Low
Rhinolophus blasii	Blasius's/Peak-Saddle Horseshoe Bat	LC	VU	Low
Rhinolophus clivosus	Horseshoe Bat	LC	NT	Low
Rhinolophus darlingi	Darling's Horseshoe Bat	LC	NT	Low
Rhinolophus hildebrandtii	Hildebrandt's Horseshoe Bat	LC	NT	Low

VU = Vulnerable, EN = Endangered, NT = Near Threatened, LC= Least Concern

Table H2: RDL Avifaunal Species for the Gauteng Province (GDARD 2014).

Scientific Name	Common name	IUCN Status	GDARD Status	POC
Alcedo semitorquata	Half-Collared Kingfisher	LC	NT	Low
Anthropoides paradiseus	Blue Crane	VU	VU	Low
Circus ranivorus	African Marsh-Harrier	LC	VU	Low
Eupodotis caerulescens	Blue Korhaan	NT	NT	Low
Eupodotis senegalensis	White-bellied Korhaan	LC	VU	Low
Gorsachius leuconotus	White-backed Night-Heron	LC	VU	Low
Gyps coprotheres	Cape Vulture	EN	VU	Low
Mirafra cheniana	Melodious Lark	LC	NT	Medium
Oxyura maccoa	Maccoa Duck	VU	VU	Low
Podica senegalensis	African Finfoot	LC	VU	Low
Sagittarius serpentarius	Secretarybird	VU	NT	Low
Tyto capensis	African Grass-Owl	LC	VU	Low

VU = Vulnerable, NT = Near Threatened, LC = Least Concern, EN = Endangered, Ad mon = Additional Monitoring, End and N-end = Endemic and Near endemic

Table H3: RDL Invertebrates Species for the Gauteng Province (GDARD 2014). Additional information on the status of the species in South Africa obtained from SANBI (http://speciesstatus.sanbi.org/**).**

Scientific Name	Common name	IUCN Status	GDARD Status	POC
Aloeides dentatis dentatis	Roodepoort Copper Butterfly	VU	VU	Low
Chrysoritis aureus	Heidelberg Copper	NYBA	VU	Low
Ichnestoma stobbiai	Stobbia's Fruit Chafer Beetle	NYBA	VU	Low
Lepidochrysops praeterita	Highveld Blue Butterfly	NYBA	VU	Low

EN = Endangered, VU = Vulnerable, NYBA = Not yet been assessed.

Table H4: RDL Reptile Species for the Gauteng Province (GDARD 2014)

Scientific Name	Common name	IUCN Status	GDARD Status	POC
Homoroselaps dorsalis	Striped Harlequin Snake	LC	NT	

NT = Neat Threatened

South African Bird Atlas Project 2 list for quadrant QDS 2628CA

Table H5: Avifaunal Species for the pentad 2630_2800 within the QDS 2628CA

Pentads	Link to pentad summary on the South African Bird Atlas Project 2 web page
2630_2800	http://sabap2.adu.org.za/coverage/pentad/2630_2800

APPENDIX I - Specialist information

DETAILS, EXPERTISE AND CURRICULUM VITAE OF SPECIALISTS

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

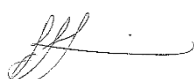|	
Samantha-Leigh Daniels	PhD Candidate (Plant Science) (University of Pretoria)
Chris Hooton	BTech Nature Conservation (Tshwane University of Technology)
Nelanie Cloete	MSc (Environmental Management) (University of Johannesburg)

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

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

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

I, Samantha-Leigh Daniels, declare that -

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

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Signature of the Specialist

I, Chris Hooton, declare that -

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

----
Signature of the Specialist

I, Nelanie Cloete, declare that -

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

----
Signature of the Specialist

SAS ENVIRONMENTAL GROUP OF COMPANIES –
SPECIALIST CONSULTANT INFORMATION
CURRICULUM VITAE OF SAMANTHA-LEIGH DANIELS

PERSONAL DETAILS

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

EDUCATION

Qualifications

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

AREAS OF WORK EXPERIENCE

South Africa – Gauteng, Mpumalanga, KwaZulu-Natal

KEY SPECIALIST DISCIPLINES

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

Training
- Plant species identification
- Herbarium usage and protocols

**SAS ENVIRONMENTAL GROUP OF COMPANIES –
SPECIALIST CONSULTANT INFORMATION
CURRICULUM VITAE OF CHRISTOPHER HOOTON**

PERSONAL DETAILS

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

EDUCATION

Qualifications

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

Short Courses

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

AREAS OF WORK EXPERIENCE

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

KEY SPECIALIST DISCIPLINES

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

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

**SAS ENVIRONMENTAL GROUP OF COMPANIES –
SPECIALIST CONSULTANT INFORMATION
CURRICULUM VITAE OF NELANIE CLOETE**

PERSONAL DETAILS

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

MEMBERSHIP IN PROFESSIONAL SOCIETIES

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

EDUCATION

Qualifications

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

Short Courses

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

AREAS OF WORK EXPERIENCE

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

KEY SPECIALIST DISCIPLINES

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

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

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