ESKOM HOLDINGS (SOC) LIMITED

ESKOM MAJUBA POWER STATION

PROPOSED GENERAL WASTE DISPOSAL SITE

EIA Specialist Report:
Terrestrial Biodiversity Impact Assessment

Field Survey: 17th March 2022
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Prepared for:

Mmakone Mmola
Savannah Environmental (Pty) Ltd
1st Floor, Block 2
5 Woodlands Drive Office Park
Cnr Woodlands Drive & Western Service Road
WOODMEAD, 2191

Tel: 011 656 3237
Email: Mmakoena@savannah.com

Prepared by:

Duncan McKenzie (SACNASP Reg. No. 122647)
Digital Earth (Pty) Ltd
P.O. Box 19787
The Village
MBOMBELA, 1218
1218

Reviewed by:

Rob Palmer (SACNASP Reg. No. 400108/95)
Nepid Consultants CC
P O Box 4349
WHITE RIVER
1240

Cell: +27(0) 82 574 4486

Email: rob@nepid.co.za
Web: https//:nepid.co.za

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DIGITAL EARTH (Pty) Ltd. P.O. Box 19787 The Village Mbombela 1218
Cell: 079 530 7873 E-mail: duncan@digitalearth.co.za

Abbreviations

BES	Biodiversity and Ecosystem Services
BODATSA	Botanical Database of Southern Africa
CBA	Critical Biodiversity Area
BES	Biodiversity and Ecosystem Services
BI	Biodiversity Importance
CI	Conservation Importance
CPE	Centre of Plant Endemism
DFFE	Department of Forestry, Fisheries and the Environment
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
ESIA	Environmental and Social Impact Assessment
EST	Environmental Screening Tool
FEPA	Freshwater Ecosystem Priority Area
FI	Functional Integrity
GBIF	Global Biodiversity Information Facility
ha	Hectare
IBA	Important Bird & Biodiversity Area
IUCN	International Union for Conservation of Nature
mamsl	Metres above mean sea level
MH	Mitigation Hierarchy
MNCA	Mpumalanga Nature Conservation Act (No. 10 of 1998)
NEMA	National Environmental: Management Act (No. 107 of 1998)
NEMBA ToPS	National Environmental Management: Biodiversity Act Threatened or Protected Species (No. 10 of 2004)
NFA	National Forest Act (No. 30 of 1998)
PRECIS	National Herbarium Pretoria (PRE) Computerised Information System
QDGS	Quarter-Degree Grid Square, for example 2531 AB
RR	Receptor Resilience
SABAP2	Southern African Bird Atlas Project 2
SANBI	South African National Biodiversity Institute
SCC	Species of Conservation Concern
SEI	Site Ecological Importance

Terminology

Alien	Introduced from elsewhere: neither endemic nor indigenous.
Biodiversity	The diversity of living organisms, including the terrestrial and aquatic ecosystems they inhabit; this can be measured at gene, species or ecosystem level.
Disturbed	An ecosystem that is in a sub-climax ecological state, usually through impacts such as low levels of invasion by alien or indigenous pioneer plants, moderate overgrazing, poor burning regimes, etc. These systems still contain a large proportion of indigenous flora.
Degraded	An ecosystem that is in a poor ecological state, usually through impacts such as invasion by alien plants, severe overgrazing, poor burning regimes, etc. These systems contain a low proportion of indigenous flora.
Geophyte	Plants that produce their growth points from organs stored below the ground, an adaption to survive frost, drought and / or fire.
Transformed	Transformed ecosystems are no longer natural and contain little or no indigenous flora. Examples include agricultural lands, plantations, urban areas, etc.
Ungulate	Hoofed animal, such as a cow or antelope.

1. INTRODUCTION

1.1 Background

Eskom Majuba Power Station is proposing the development of a new general waste site and associated infrastructure on a site located ~13 km southwest of Amersfoort and ~40 km north-northwest of Volksrust, within jurisdiction of the Dr Pixley Ka Isaka Seme Local Municipality, which forms part of the Gert Sibande District Municipality, in the Mpumalanga Province. This report forms part of the environmental authorisation process and concerns the potential implications of the activities listed above on terrestrial ecosystems. This report is based on a field survey conducted in March 2022, a review of available information, and that of a field survey conducted by Nepid Consultants CC in March 2018. Nepid Consultants CC contracted Digital Earth (Pty) Ltd. to perform an ecological assessment for terrestrial ecosystems (flora, mammals, birds, reptiles and frogs) for the proposed development. This study will provide a basis for the assessment of the potential impacts of the development on the terrestrial ecology of the study area as well as providing a baseline of surrounding untransformed vegetation. The key deliverables for this study were a report on the potentially impacted terrestrial ecosystems and an integrated ecological importance assessment, including an Impact Assessment on the receiving environment.

The contents of this report comply with the requirements for specialist reports as detailed in Appendix 6 of the National Environmental Management Act (No 107 of 1998; NEMA) Regulations of 2014 (updated in 2017) (GN R. 326 of 2017), as well as the "Guidelines for the implementation of the Terrestrial Fauna and Terrestrial Flora Species Protocols for environmental impact assessments in South Africa" (SANBI, 2020).

1.2 Project Description

A project site, with an extent of ~866 ha, has been identified by Eskom Majuba Power Station as a technically feasible site for the development of a new general waste disposal site. A development footprint of 6 ha has been identified within the project site by the proponent for the development. The 6 ha will accommodate the landfill, together with the associated infrastructure that will be required for the operation of the site. Infrastructure associated with the new general waste disposal site will include the following:

- Fencing with appropriate signage.

- An adequate access road (gravel or surfaced).
- An access control gate.
- A guard house with an ablution facility.
- A conservancy tank connected to the ablution facility.
- Covered parking facilities.
- A designated area for parking and servicing of plant and machinery.
- Sorting and storage facilities for recyclables.
- Adequate water and electricity connection from the existing rising mains.
- Stormwater drainage network and a stormwater evaporation pond for the stormwater entering the site through the waste body.
- A leachate management system and a leachate evaporation pond.

Two alternative sites are being considered for establishment of the general waste disposal site, namely:

- **Alternative A,** located on Portion 6 of the Farm Witkoppies 81HS, immediately east of an existing but decommissioned General Waste Site; and
- **Alternative B,** located on Portions 1 and 2 of the Farm Witkoppies 81HS, immediately south of the decommissioned General Waste Site

(Figure 1-1).

Both sites are contained within Eskom-owned land.

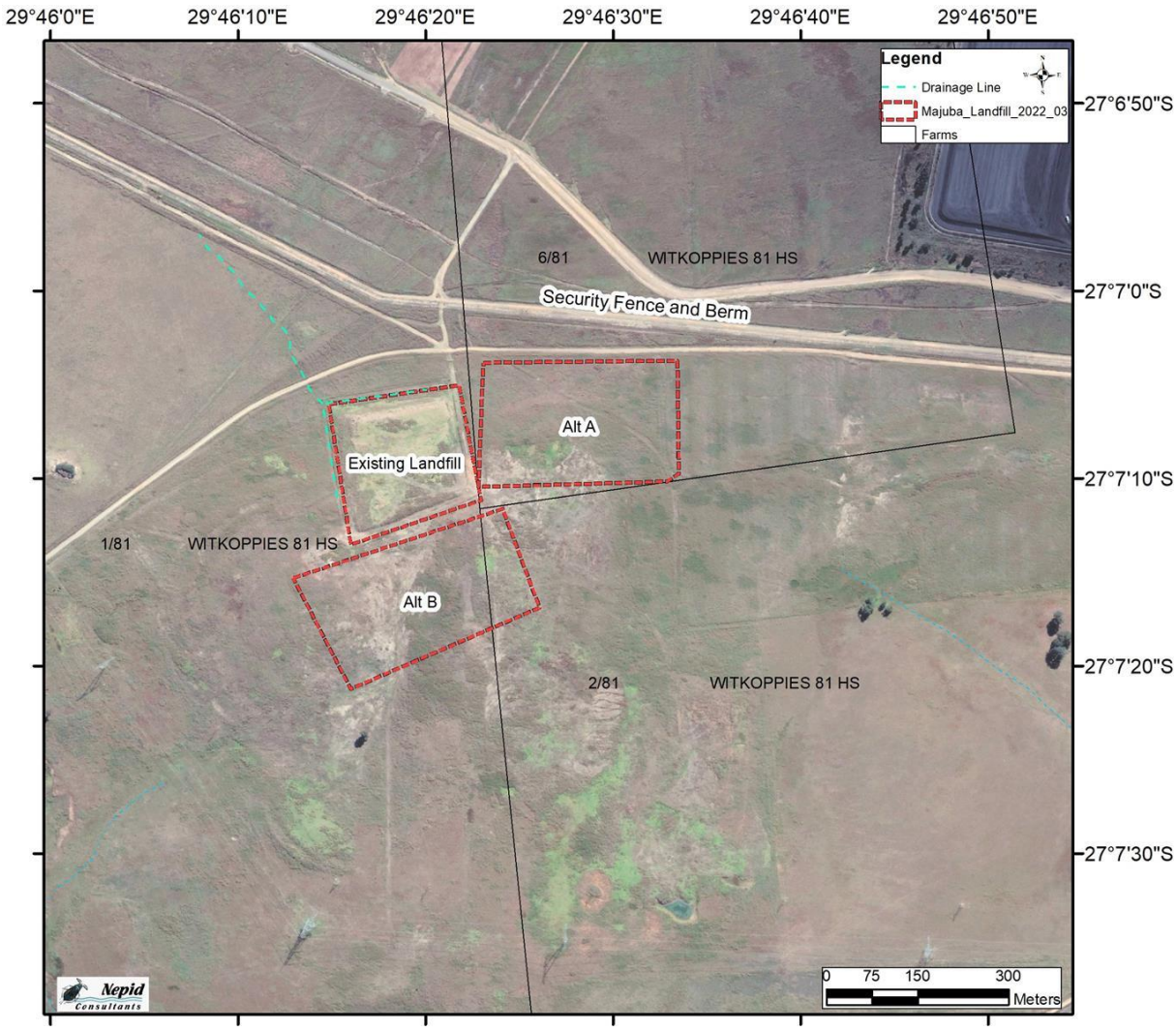

Figure 1-1. Alternatives for Proposed General Waste Disposal Site

[Image Source: Google Earth 2019-05-19].

1.2 Study Team

The study team for this report was as follows:

Duncan McKenzie (Director - Digital Earth, Terrestrial Ecologist). Duncan has been involved in biodiversity assessments for various developments for 15 years. Countries of work experience include Lesotho, Swaziland, Mali, Mozambique, Sierra Leone, Morocco, Guinea, South Africa, Tanzania and the Democratic Republic of the Congo. Duncan previously worked as a Regional Coordinator for the Mondi Wetlands Project and has lectured on many aspects of conservation across South Africa. He is

currently the Mpumalanga Regional Co-ordinator for the South African Bird Atlas Project, the Mpumalanga Regional Reviewer for eBird, formerly served on the KZN Bird Rarities Committee, is lead author of The Birds of Mbombela and is lead author on the Wildflowers of the Kruger National Park and the Roberts Birds of the Kruger National Park projects. Duncan is a Certificated Natural Scientist (SACNASP Reg. No.122647). His CV is presented in Appendix 5.

Linda McKenzie (Director - Digital Earth, GIS Specialist). Linda is a GIS Specialist/GIS Analyst with over 21 years' experience in the industry. She has extensive experience in both the private and public sector and has worked on a wide variety of projects and GIS applications. These include, most recently, vegetation and sensitivity mapping, landcover data capture, municipal roads master planning, hydroelectric scheme and wind farm feasibility mapping as well as town planning, land surveyor and engineering support services. Linda formerly served as Vice Chairperson and Treasurer for GISSA Mpumalanga and is a registered Professional GISc Practitioner (PGP0170).

1.3 Acknowledgements

- Cornel Claassen of Eskom is thanked for providing logistical support for the completion of the fieldwork component of this report.
- Rob Palmer of Nepid Consultants is thanked for reviewing this report.

1.4 Declaration of Independence

We declare that we have been appointed as independent consulting ecologists with no affiliation with or vested financial interests in the proponent, other than for work performed under the 2014 Environmental Impact Assessment Regulations (as amended in 2017). We have no conflicting interests in the undertaking of this activity and have no interests in secondary developments resulting from the authorisation of this project. Remuneration for our services by the proponent is not linked to approval by any decision-making authority responsible for authorising this development.

D.R. McKenzie 30 June 2022

L. McKenzie 30 June 2022

2. SCOPE OF WORK

The results of the specific site query performed by the online Environmental Screening Tool of the Department of Forestry, Fisheries and the Environment (DFFE) determined the Scope of Work of the Terrestrial Ecology Assessment. Three Themes were relevant to this study, namely Animal, Plant and Terrestrial Biodiversity. The specific level of site sensitivity for the Animal Theme is **High**, the Plant Theme is **Medium** and the Terrestrial Biodiversity Theme is **Very High**. The results triggered a required specialist assessment and minimum reporting requirements according to the following Government Notices:

- **Terrestrial Biodiversity Theme** – "Protocol for the specialist assessment and minimum report content requirements for environmental impacts on Terrestrial Biodiversity" (Government Notice No. 320, published in Government Gazette 43110, 20 March 2020)
- **Plant & Animal Themes** – "Protocol for the specialist assessment and minimum report content requirements for environmental impacts on Terrestrial Plant and Animal Species" (Government Notice No. 1150, published in Government Gazette 43855, 30 October 2020)

These requirements provided guidelines for establishing the Objectives and Scope to ensure protocol compliance within the report. Additionally, the 2020 guidelines provided by the South African "Guidelines for the implementation of the Terrestrial Fauna and Terrestrial Flora Species Protocols for environmental impact assessments in South Africa" (SANBI, 2020) provided guidance regarding the method in which specialist studies should be undertaken to meet these minimum requirements.

The Objectives and Scope for this project were therefore as follows:

- Provide a baseline ecological description of the terrestrial ecosystems within the Project Area of Influence (PAOI) that are likely to be impacted by the proposed developments, including of the following:
    - descriptions of the terrestrial ecosystem present, including threatened ecosystems, habitat fragmentation, main vegetation types, presence of indigenous forests, ecological connectivity, Species of Conservation Concern and important habitats;
    - ecological drivers or processes and how these functioning within the PAOI;
    - any ecological corridors that are present in the study area;

  - the presence of any Strategic Water Source Areas or Freshwater Ecosystem Priority Areas;
  - any significant terrestrial landscape features;
  - any potential alternatives of low sensitivity;
  - the presence of and impact on any Critical Biodiversity Area, Ecological Support Areas or Protected Areas, as well as designated Priority Areas for Protected Area Expansion;

- Provide a site-based Ecological Importance Assessment of all habitats or vegetation communities present within the PAOI;
- Assess the significance of direct, indirect and cumulative impacts of the project on terrestrial biodiversity, including:
  - a description of each impact;
  - the significance of each impact; and
  - description of mitigation measures for each impact.
- Provide management measures that should be included in the Environmental Management Program (EMP), including recommendations on infrastructure layout; and
- Provide a substantiated statement regarding the acceptability of the project.

A compliance checklist providing an indication of report compliance to the above protocols has been compiled and is included in Appendix 4.

3. STUDY AREA

The proposed development is situated immediately south of the Majuba Power Station on the farm Witkoppies 81 JS, approximately 30 km north-west of Volksrust, and 15 km south-west of Amersfoort, in the Pixley ka Seme Local Municipality, Mpumalanga Province, South Africa (Figure 2). Two locations were provided by Eskom for the proposed landfill as follows:

- Alternative A: a rectangular portion of land situated on Portion 6 of the Farm Witkoppies 81HS, immediately to the east of the non-operational, closed landfill site and covering an area of 5.8 ha; and

- Alternative B: a rectangular portion of land situated on Portions 1 and 2 of the Farm Witkoppies 81HS, immediately to the south of the non-operational, closed landfill site and also covering an area of 5.8 ha.

The total area surveyed measured 11.6 ha. The study area formed the direct Project Area Of Influence (PAOI), with a 200 m buffer around the two Alternatives being considered as the indirect PAOI. This buffer was chosen due to the high levels of disturbance present surrounding the study area. Most of the area to the north and west of the direct PAOI is industrialised, with remaining natural vegetation occurring to the south and east of the direct PAOI.

The study area is currently used for informal cattle grazing although old rubble piles and old vehicle tracks were observed, indicating that the site was historically settled or heavily utilised.

The study area falls within the summer rainfall, dry winter zone with a mean annual precipitation of between 620 and 830 mm per annum, with incidence of frost being very high[1]. It is situated within the quarter-degree grid square (QDGS) 2729 BB at an elevation of ~1,770 mamsl. The topography of the general area is gently to moderately undulating with scattered dolerite outcrops in places.

[1] Mucina & Rutherford, 2006

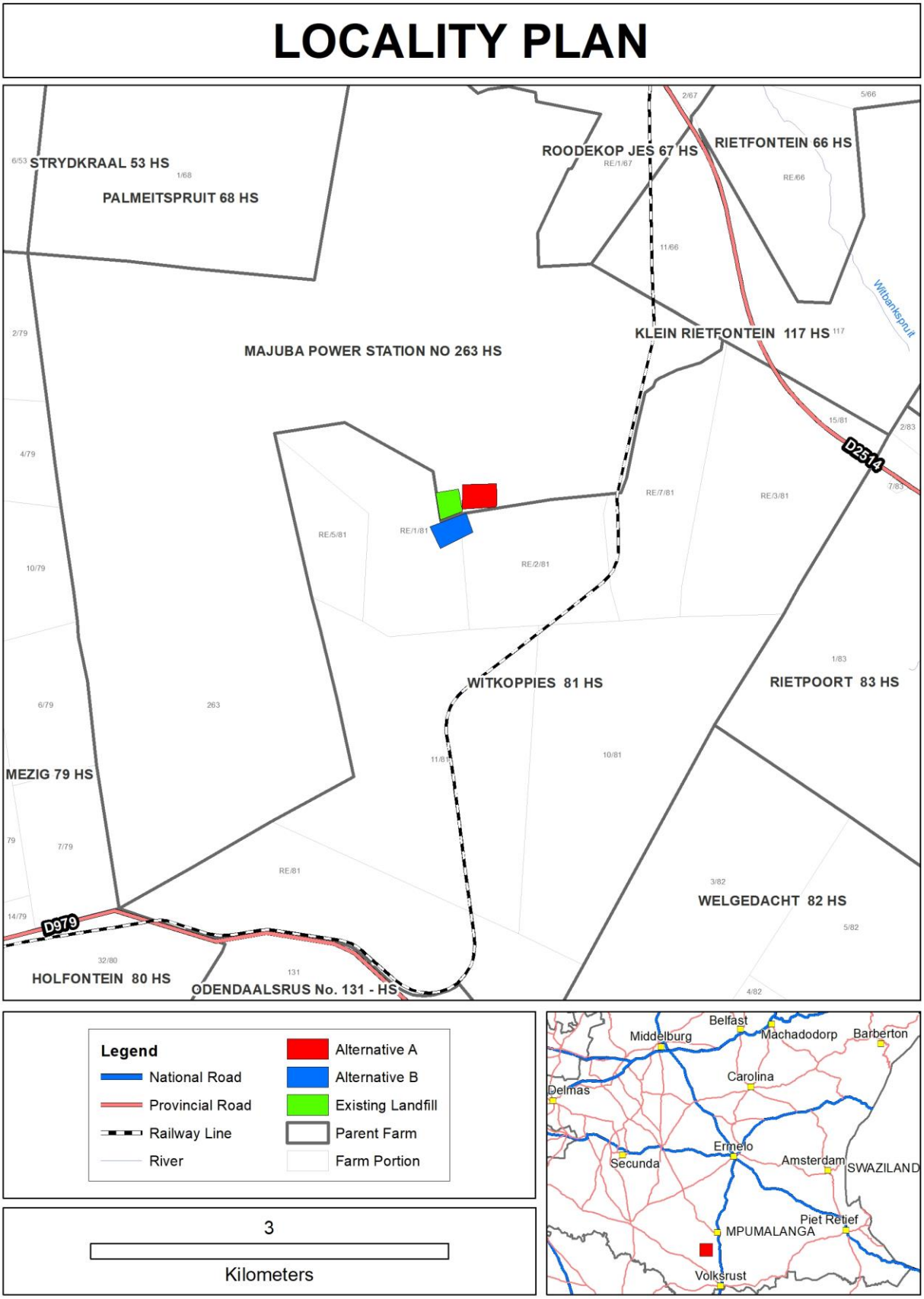

Figure 2. Location of Study Area

4. APPROACH AND METHODOLOGY

The approach and methods applied in this study in both the desktop and fieldwork phases conform with the Species Environmental Assessment Guidelines: Guidelines for the implementation of the Terrestrial Fauna and Terrestrial Flora Species Protocols for environmental impact assessments in South Africa (SANBI, 2020).

4.1 Environmental Screening Tool

An initial screening of the study area was undertaken using the Environmental Screening Tool of the DFFE. Some of the modelled or confirmed species have been identified as sensitive species by the South African National Biodiversity Institute (SANBI) and have been assigned a unique number in the screening report produced by the Environmental Screening Tool. These names have been withheld as the species may be prone to illegal harvesting and must be protected.

4.2 Site-specific Desktop Assessment

4.2.1 Flora

Descriptions of national vegetation types was compiled using Mucina & Rutherford (2006). Various sources were then referenced to obtain a list of plant species potentially occurring within the general area, from which a list of the most likely Species of Conservation Concern (SCC)[2] were searched for during fieldwork:

1. The Botanical Database of Southern Africa (formerly BODATSA, now NEWPOSA)[3], which is curated by the South African National Biodiversity Institute (SANBI), was queried for a list of plant species that have been recorded from a 20 km radius of the study area. The BODATSA contains records from the National Herbarium in Pretoria, the Compton Herbarium in Cape Town and the KwaZulu-Natal Herbarium in Durban.
2. All Research Grade (confirmed) plant records from within a 20 km radius of the study area from the iNaturalist website were investigated for the presence of SCC. This is a peer-reviewed photographic database containing a large dataset of biodiversity records.

[2] Raimondo *et al.* (2009), includes those with a status of Critically Rare, Rare, Near Threatened and Data Deficient as well as threatened species (Vulnerable, Endangered and Critically Endangered)
[3] http://newposa.sanbi.org/

3. Data from previous surveys performed within the general area were also referred to for any additional flora SCC. Most specifically, a terrestrial ecology report was produced by the author for the property Rietpoort 83 HS which is 5 km to the west of Majuba Power Station[4], as well as a Wetland Delineation and Biodiversity Assessment performed for the proposed Majuba Power Station General Waste Landfill[5].

4.2.2 Fauna

Lists of mammal, bird, reptile and frog SCC potentially occurring within the study area were prepared using data from SANBI's Red List of South African Species website, Child *et al*. (2016), the Virtual Museum and Southern African Bird Atlas Project 2 projects of the Fitzpatrick Institute of African Ornithology, Taylor *et al.* (2016), Minter *et al*. (2004), Bates *et al*. (2014), the IUCN Red List of Threatened Species, the iNaturalist website as well as from the previous surveys conducted by the author in the general area.

The above data were captured mostly at a quarter-degree spatial resolution but were refined by excluding species unlikely to occur within the study area due to unsuitable habitat characteristics (e.g., altitude and land-use). Potential occurrence of fauna within the general area around the study area was predicted based on the specialist's knowledge of habitat requirements of local fauna species.

4.3 Fieldwork

The vegetation communities identified in the desktop phase were ground-truthed during a site visit on the 17th of March 2022. This coincided with the end of the wet season and the data quality are acceptable for this report. The boundaries of the proposed development, including both alternatives, was supplied by Nepid and pre-loaded onto a Samsung S21 phone using LocusMap Pro™ software. This area was then surveyed on foot using meandering transects.

4.3.1 Flora

Meandering transects covering as much of the natural habitat within the study area was chosen to sample the flora. All plant species located within each vegetation community encountered were recorded, with cover abundance assessed according to four categories, namely dominant, frequent, uncommon or rare. Specific attention in each locality was given to habitats that potentially host SCC.

[4] ECOREX, 2019. Rietpoort Baseline Terrestrial Ecological Assessment. ECOREX, White River.
[5] Nepid, 2020

These include species listed under SANBI's Red List of South African Plants, as well as the website of the International Union for the Conservation of Nature (IUCN). Within the context of this study, SCC also include range-restricted and endemic species as well as those protected under the following legislation:

- Mpumalanga Nature Conservation Act (No. 10 of 1998) (MNCA)
- National Forests Act (No. 30 of 1998) (NFA)
- National Environmental Management: Biodiversity Act (No. 10 of 2004) Threatened and Protected Species Lists (GG Notice 256, 2015) (NEMBA ToPS)

Photographs of all restricted endemics and SCC were taken as evidence of occurrence and these have been submitted to the online sightings database iNaturalist, which links all research grade observations to the Global Biodiversity Information Facility (GBIF).

4.3.2 Fauna

Birds were identified audially and visually using Nikon 10x42 binoculars. Observations were made incidentally during the time that the vegetation survey was conducted and limited to birds seen and heard within the application site and immediate surrounds. Mammals, reptiles and frogs were recorded incidentally as they were encountered during the survey through direct evidence (sightings) and indirect evidence (spoor, dung etc.). Specific attention was given to habitats that potentially host SCC[6]. These include species listed under SANBI's Red List of South African Species, as well as the website of the IUCN. Within the context of this study, SCC also include range-restricted and endemic species as well as those protected under the following legislation:

- Mpumalanga Nature Conservation Act (No. 10 of 1998) (MNCA)
- National Environmental Management: Biodiversity Act (No. 10 of 2004) Threatened and Protected Species Lists (GG Notice 256, 2015) (NEMBA ToPS)

[6] The same approach as Raimondo *et al*. (2009) has been followed here regarding species of conservation concern (i.e., those with a status of Declining, Near Threatened and Data Deficient) and threatened species (Vulnerable, Endangered and Critically Endangered)

4.4 Method for the determination of Site Ecological Importance (SEI)

A standardised method for assessing site-specific ecological importance in relation to a proposed project (including the project footprint and project activities), providing guidelines for biodiversity specialists in Environmental and Social Impact Assessments (ESIA's), has been followed in this report (SANBI, 2020). This assessment does not replace the output of the National Web-based Environmental Screening Tool but is complementary to it, providing a more site-specific assessment that is linked to the proposed project footprint / activities.

SEI is one of the most important outcomes of a specialist ecological study and provides a basis for assessing the significance of impacts that a project may have on the receiving environment. SEI is a function of the Biodiversity Importance (BI) of the receptor (e.g. the species of conservation concern, vegetation/fauna community or habitat type) and its resilience to impacts (Receptor Resilience) as follows:

SEI = BI + RR

BI in turn is a function of Conservation Importance (CI) and the Functional Integrity (FI) of the receptor as follows:

BI = CI + FI

Conservation Importance is defined as "the importance of a site for supporting biodiversity features of conservation concern present e.g., populations of IUCN Threatened and Near-Threatened species (CR, EN, VU & NT), Rare, Range-restricted species, globally significant populations of congregatory species, and areas of threatened ecosystem types, through predominantly natural processes" (SANBI, 2020). The fulfilling criteria for CI are presented in Table 1.

Table 1. Criteria for Determining Conservation Importance of a Receptor

Conservation Importance	Fulfilling Criteria
VERY HIGH	Confirmed or highly likely occurrence of CR, EN, VU or Extremely Rare or Critically Rare species that have a global EOO of < 10 km^2. Any area of natural habitat of a CR ecosystem type or large area (> 0.1% of the total ecosystem type extent) of natural habitat of EN ecosystem type.

	Globally significant populations of congregatory species (> 10% of global population).
HIGH	Confirmed or highly likely occurrence of CR, EN, VU species that have a global EOO of > 10 km^2. IUCN threatened species (CR, EN, VU) must be listed under any criterion other than A. If listed as threatened only under Criterion A, include if there are less than 10 locations or < 10 000 mature individuals remaining. Small area (> 0.01% but < 0.1% of the total ecosystem type extent) of natural habitat of EN ecosystem type or large area (> 0.1%) of natural habitat of VU ecosystem type. Presence of Rare species. Globally significant populations of congregatory species (> 1% but < 10% of global population).
MEDIUM	Confirmed or highly likely occurrence of populations of NT species, threatened species (CR, EN, VU) listed under Criterion A only and which have more than 10 locations or more than 10 000 mature individuals. Any area of natural habitat of threatened ecosystem type with status of VU. Presence of range-restricted species. > 50% of receptor contains natural habitat with potential to support SCC.
LOW	No confirmed or highly likely populations of SCC. No confirmed or highly likely populations of range-restricted species. < 50% of receptor contains natural habitat with limited potential to support SCC.
VERY LOW	No confirmed and highly unlikely populations of SCC. No confirmed and highly unlikely populations of range-restricted species. No natural habitat remaining.

Functional Integrity (FI) of the receptor (e.g., the vegetation/fauna community or habitat type) is defined here as "a measure of the ecological condition of the impact receptor as determined by its remaining intact and functional area, its connectivity to other natural areas and the degree of current persistent ecological impacts". Fulfilling criteria for determining FI are given in Table 2.

Table 2. Criteria for Determining Functional Integrity of a Receptor

Functional Integrity	**Fulfilling Criteria**
VERY HIGH	Very large (>100 ha) intact area for any conservation status of regional vegetation type or >5 ha for CR regional vegetation types High habitat connectivity serving as functional ecological corridors, limited road network between intact habitat patches No or minimal current ecological impacts with no signs of major past disturbance (e.g. ploughing)
HIGH	Large (>20 ha but <100 ha) intact area for any conservation status of ecosystem type or > 10 ha for EN ecosystem types.

	Good habitat connectivity with potentially functional ecological corridors and a regularly used road network between intact habitat patches Only minor current ecological impacts (e.g. few livestock utilising area) with no signs of major past disturbance (e.g. ploughing) and good rehabilitation potential
MEDIUM	Medium (>5 ha but <20 ha) semi-intact area for any conservation status of ecosystem type or > 20 ha for VU ecosystem types Only narrow corridors of good habitat connectivity or larger areas of poor habitat connectivity and a busy used road network between intact habitat patches Mostly minor current ecological impacts with some major impacts (e.g. established population of alien and invasive flora) and a few signs of minor past disturbance; moderate rehabilitation potential
LOW	Small (>1 ha but <5 ha) area Almost no habitat connectivity but migrations still possible across some transformed or degraded natural habitat; a very busy used road network surrounds the area. Low rehabilitation potential Several minor and major current ecological impacts
VERY LOW	Very small (<1 ha) area No habitat connectivity except for flying species or flora with wind-dispersed seeds. Several major current ecological impacts

BI can be derived from a simple matrix of CI and FI as indicated in Table 3.

Table 3. Biodiversity Importance Two-way Matrix

Biodiversity Importance		**Conservation Importance**				
		Very High	High	Medium	Low	Very Low
Functional Integrity	Very High	Very High	Very High	High	Medium	Low
	High	Very High	High	Medium	Medium	Low
	Medium	High	Medium	Medium	Low	Very Low
	Low	Medium	Medium	Low	Low	Very Low
	Very Low	Medium	Low	Very Low	Very Low	Very Low

Receptor Resilience (RR) is defined as "*the intrinsic capacity of the receptor to resist major damage from disturbance and / or to recover to its original state with limited or no human intervention".* The fulfilling criteria for RR are presented in Table 4.

Table 4. Criteria for Determining Receptor Resilience

Receptor Resilience	Fulfilling Criteria
VERY HIGH	Habitat that can recover rapidly (~ less than 5 years) to restore > 70 % of the original species composition and functionality of the receptor functionality, or species that have a very high likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a very high likelihood of returning to a site once the disturbance or impact has been removed
HIGH	Habitat that can recover relatively quickly (~ 5-10 years) to restore > 70 % of the original species composition and functionality of the receptor functionality, or species that have a high likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a high likelihood of returning to a site once the disturbance or impact has been removed
MEDIUM	Will recover slowly (~more than 10 years) to restore > 70 % of the original species composition and functionality of the receptor functionality, or species that have a moderate likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a moderate likelihood of returning to a site once the disturbance or impact has been removed
LOW	Habitat that is unlikely to be able to recover fully after a relatively long period: > 15 years required to restore ~less than 50 % of the original species composition and functionality of the receptor functionality, or species that have a low likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a low likelihood of returning to a site once the disturbance or impact has been removed
VERY LOW	Habitat that is unable to recover from major impacts, or species that are unlikely to remain at a site even when a disturbance or impact is occurring, or species that are unlikely to return to a site once the disturbance or impact has been removed

Once BI and RR have been calculated using the above two matrices, SEI can be determined using the matrix in Table 5.

Table 5. Site Ecological Importance Two-way Matrix

SEI		Biodiversity Importance				
		Very High	High	Medium	Low	Very Low
Receptor Resilience	Very Low	Very High	Very High	High	Medium	Low
	Low	Very High	Very High	High	Medium	Very Low
	Medium	Very High	High	Medium	Low	Very Low
	High	High	Medium	Low	Very Low	Very Low
	Very High	Medium	Low	Very Low	Very Low	Very Low

Guidelines for how to interpret SEI of a project in terms of impact mitigation are given in Table 6, and SEI values for each vegetation community / proposed development site are indicated spatially in Figure 8.

Table 6. Guidelines for interpreting Site Ecological Importance of Receptors in terms of project impacts

Site Ecological Importance	Interpretation in relation to proposed development activities
Very High	Avoidance mitigation – No destructive development activities should be considered. Offset mitigation not acceptable/not possible (i.e., last remaining populations of species, last remaining good condition patches of ecosystems/unique species assemblages. Destructive impacts for species/ecosystems where <persistence target remains.
High	Avoidance mitigation wherever possible. Minimization mitigation – Changes to project infrastructure design to limit the amount of habitat impacted; limited development activities of low impact acceptable. Offset mitigation may be required for high impact activities.
Medium	Minimization & restoration mitigation – Development activities of medium impact acceptable followed by appropriate restoration activities
Low	Minimization & restoration mitigation – Development activities of medium to high impact acceptable followed by appropriate restoration activities
Very Low	Minimization mitigation – Development activities of medium to high impact acceptable and restoration activities may not be required

4.5 Assessment of Impacts

Impacts were assessed according to a standard method provided by Savannah Environmental (Pty) Ltd. Direct, indirect and cumulative impacts of the issues identified through the scoping study, as well as all other issues identified in the EIA phase are assessed in terms of the following criteria:

- The **nature**, which shall include a description of what causes the effect, what will be affected and how it will be affected.
- The **extent**, wherein it will be indicated whether the impact will be local (limited to the immediate area or site of development) or regional, and a value between 1 and 5 will be assigned as appropriate (with 1 being low and 5 being high):
- The **duration**, wherein it will be indicated whether:
    - the lifetime of the impact will be of a very short duration (0–1 years) – assigned a score of 1;
    - the lifetime of the impact will be of a short duration (2-5 years) – assigned a score of 2;
    - medium-term (5–15 years) – assigned a score of 3;
    - long term (> 15 years) – assigned a score of 4; or
    - permanent – assigned a score of 5;
- The **magnitude**, quantified on a scale from 0-10, where a score is assigned:
    - 0 is small and will have no effect on the environment
    - 2 is minor and will not result in an impact on processes
    - 4 is low and will cause a slight impact on processes
    - 6 is moderate and will result in processes continuing but in a modified way
    - 8 is high (processes are altered to the extent that they temporarily cease)
    - 10 is very high and results in complete destruction of patterns and permanent cessation of processes
- The **probability** *of occurrence*, which shall describe the likelihood of the impact actually occurring. Probability will be estimated on a scale of 1–5, where 1 is very improbable (probably will not happen), 2 is improbable (some possibility, but low likelihood), 3 is probable (distinct possibility), 4 is highly probable (most likely) and 5 is definite (impact will occur regardless of any prevention measures).

- the **significance**, which shall be determined through a synthesis of the characteristics described above and can be assessed as low, medium or high; and
- the **status**, which will be described as either positive, negative or neutral.
- the degree to which the impact can be reversed.
- the degree to which the impact may cause irreplaceable loss of resources.
- the *degree* to which the impact can be *mitigated.*

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

S=(E+D+M)P

S = Significance weighting

E = Extent

D = Duration

M = Magnitude

P = Probability

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

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

Assessment of Cumulative Impacts

The assessment of Cumulative Impacts was performed with the methodology below, as supplied by Savannah Environmental (Pty) Ltd.

"Cumulative Impact", in relation to an activity, means the past, current and reasonably foreseeable future impact of an activity, considered together with the impact of activities associated with that activity, that in itself may not be significant, but may become significant when added to existing and reasonably foreseeable impacts eventuating from similar or diverse activities.

The role of the cumulative assessment is to test if such impacts are relevant to the proposed project in the proposed location (i.e. whether the addition of the proposed project in the area will increase the impact). This section addresses whether the construction of the proposed development will result in:

» Unacceptable risk

» Unacceptable loss

» Complete or whole-scale changes to the environment or sense of place

» Unacceptable increase in impact

4.6 Assumptions, Limitations and Knowledge Gaps

4.6.1 Seasonality

The fieldwork component of this assessment was based on a site visit covering one day in the wet season. It is likely that plants which flower at other times of the year are underrepresented although this is not seen as a limitation that could affect the Record of Decision as the specialist has extensive experience of local flora and has assessed habitat suitability for potentially occurring threatened plant species.

4.6.2 Overlooked Species

Certain plant species, particularly geophytes, will only flower in seasons when conditions are optimal and may thus remain undetected, even over a survey that encompasses several seasons. Other plant species may be overlooked because of very small size and / or extreme rarity. A sampling strategy will always represent merely a subset of the true diversity of the study area. However, the level of sampling effort for this study was appropriate for the objectives of the study.

4.6.2 Chiroptera

Bat species thought to only forage over the study area (i.e., mostly cave-roosting species) were not included in the assessment due to the lack of suitable caves within the study area. However, due to the small size of the study area the level of detail collected and presented is considered appropriate for the purposes of this report.

5. BIODIVERSITY BASELINE DESCRIPTION

5.1 Flora

5.1.1 Regional Context

The study area is situated within the Mesic Highveld Grassland Bioregion in the Grassland Biome. This is the second largest biome in South Africa, occupying 27.9% of the surface area (Mucina & Rutherford 2006). White (1983) considers the interior grasslands of South Africa to fall within the Kalahari – Highveld Regional Transition Zone. This Zone separates the Zambezian and Karoo-Namib Regional Centres of Endemism and runs diagonally across Africa from 13° south in southern Angola to 33° south in the Eastern Cape Province of South Africa.

5.1.1.1 National Vegetation Types

According to Mucina & Rutherford (2006), the vegetation type that occurs within the study area is Amersfoort Highveld Clay Grassland.

Amersfoort Highveld Clay Grassland occurs on vertic soils in a strip from just south of Ermelo in Mpumalanga, through Amersfoort, and to the Memel area in the Free State in the south at an elevation of between 1,580 and 1,860 mamsl. Amersfoort Highveld Clay Grassland originally covered about 280,000 ha, of which 35% has been transformed, mostly through agriculture, mining and urbanisation. Despite it being considered Hardly Protected, it has a provincial ecosystem status of Least Concern[7].

Typical Amersfoort Highveld Clay Grassland is dominated by a wide variety of grasses such as *Andropogon appendiculatus, Brachiaria serrata, Digitaria monodactyla, Elionurus muticus, Eragrostis chloromelas, E. plana* and *Themeda triandra.* Dominant herbs include *Berkheya setifera, Hilliardiella aristata, H. oligocephala, Acalypha peduncularis* and *Crabbea acaulis*. Geophytes include *Boophone disticha* and *Eucomis autumnalis* subsp*. Clavata.* Low shrubs include *Searsia discolor, Anthospermum rigidum* subsp*. Pumilum* and *Polygala uncinata* (Mucina & Rutherford, 2006).

[7] Lötter *et al.,* 2014

5.1.1.2 Centres of Plant Endemism

Three Centres of Plant Endemism (CPE) are present in Mpumalanga, namely the Barberton, Sekukhuneland and Wolkberg CPE's (Van Wyk & Smith, 2001). These centres are areas that have an unusually high number of plants unique to that area. The study area is not situated within or adjacent to any of these CPE's.

5.1.1.3 Threatened Ecosystems

Amersfoort Highveld Clay Grassland is not listed as a Threatened Ecosystem (Notice 1002 of Government Gazette 34809, 9 December 2011).

5.1.2 Local Context – Plant Species Richness and Vegetation Assemblages

SANBI's Botanical Database of Southern Africa (BODATSA) lists 298 plant species from 59 families for a 20 km radius of the project area. This list excludes species recorded from the Escarpment grasslands around Wakkerstroom to the east of the study area, which would not be relevant. Due to the small size and disturbed conditions within the study area, only 86 plant species from 26 families were recorded during the March 2022 fieldwork, representing 29% of the BODATSA total. The true plant species diversity of the study area is likely to be slightly higher, particularly with regard to herbaceous species, which are often more conspicuous early in the wet season. The full list of plant species confirmed to occur in the study area during fieldwork is provided in Appendix 1. The dominant plant families are the Asteraceae (26 spp.) and Poaceae (24 spp.).

Two untransformed vegetation communities were identified within the study area on the basis of distinctive vegetation structure (grassland, woodland, thicket, etc.), floristic composition (dominant and diagnostic species) and position in the landscape (mid-slopes, terrace, crest, etc.). These communities are described in detail below (alien plant species are indicated by an asterisk). Representative photographs of these communities are presented in Figure 3, and they are spatially presented in Figure 4. These communities are described in greater detail below.

5.1.2.1 Aristida congesta – Heteropogon contortus Short Grassland

This vegetation community occurs in scattered pockets throughout the study area, but particularly within Alternative B (Figure 4). *Aristida congesta – Heteropogon contortus* Short Grassland covers approximately 5.5 ha, which represents 47% of the total area surveyed. Vegetation structure can best be described as Low Closed Grassland (Edwards, 1983) (Figure 3). The community contains high

disturbance levels from historical bulk earthworks, overgrazing, alien plant infestation and dumping of rubble.

This community is dominated by grasses, including *Aristida congesta* subsp*. barbicollis, A. adscensionis, Heteropogon contortus, Eragrostis chloromelas, E. plana* and *Sporobolus africanus.* Herbaceous plants are fairly diverse and dominated by *Acalypha angustata, Hermannia transvaalensis, H. depressa, Hilliardiella aristata, H. oligocephala, Helichrysum caespititium, H. pilosellum, Selago densiflora* and *Berkheya radula*. Geophytes include *Hypoxis obtusa* and *Ledebouria ovatifolia,* and the dwarf shrub *Seriphium plumosum* is found singly throughout.

A total of 80 plant species, or 93% of the total species list, was recorded from Short Grassland, the higher of the two communities present. Species fidelity is high, with 55 species (69%) being restricted to this community (Appendix 1).

5.1.2.2 Hyparrhenia hirta Secondary Grassland

This community covers 6.1 ha of the study area, or 53%. It occurs over most of the study area, but particularly in Alternative A (Figure 4). Vegetation structure can best be described as High Closed Grassland (Figure 3) (Edwards, 1983). Historical anthropogenic disturbances such as those associated with historical ploughing, overgrazing and cattle trampling have resulted in a disturbed ecological state in this community.

The robust grass *Hyparrhenia hirta* strongly dominates this community, outcompeting most other plant species and growing in monospecific stands across the study area. Less frequent grasses include *Cynodon dactylon, Sporobolus africanus, S. pyramidalis, Eragrostis curvula, E. plana* and *Aristida congesta* subsp. *barbicollis*. Herbs are mostly represented by pioneer and alien species, such as * *Cirsium vulgare, * Hibiscus trionum, * Plantago lanceolata, * Verbena bonariensis, * Cosmos bipinnatus* and ** Oenothera rosea*.

A total of 31 plant species, or 36% of the total species list, was recorded from Secondary Grassland. Sixteen of these (or 52%) are alien species, highlighting the disturbed nature of this community. Species fidelity is low, with only six species (19%) being restricted to this community (Appendix 1).

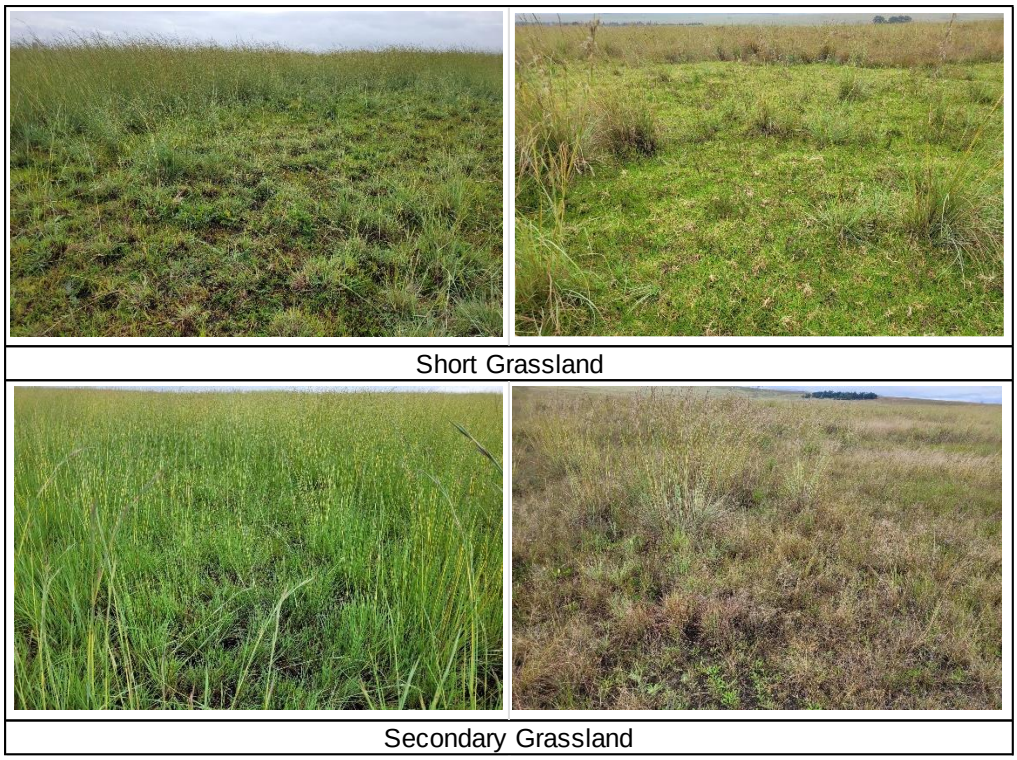

Figure 3. Photographs of Vegetation Communities Present within the Study Area

Figure 4. Spatial Presentation of Vegetation Communities located within the Study Area

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Cell: 079 530 7873 E-mail: duncan@digitalearth.co.za

5.1.3 Species of Conservation Concern

The study area is situated within a region that has a low to moderate concentration of SCC, with an estimated twelve plant species with a threat status of NT or higher having either been recorded from within the QDGS 2729 BB or surrounding grids with similar habitat or are widespread in the Highveld and are likely to occur within the general vicinity of the study area (Table 7). None of these species were confirmed during fieldwork. Due to the disturbed state of the study area, the small size of potentially suitable habitat present, regional scarcity or lack of suitable habitat, no SCC potentially occur within the study area.

5.1.4 Endemic Species

No plant species that are endemic to Mpumalanga were recorded during fieldwork.

5.1.5 Protected Species

No protected plants were recorded during fieldwork.

5.1.6 Alien Species

Twenty-four alien plant species were recorded from within the study area during fieldwork, six of which are listed as being invasive under the National Environmental Management: Biodiversity Act (Act No. 10 of 2004, NEMBA) Alien and Invasive Species Lists, 2016 (Appendix 1). This highlights the severity of infestation within the study area.

Table 7. Potentially occurring Plant Species of Conservation Concern

Species	Red Data Status	Habitat Preference	Optimal Survey Time	Likelihood of Occurrence	Justification
Family Aizoaceae					
Khadia alticola	Rare	Montane grassland in shallow, sandy, humus-rich soil pockets and crevices between rock plates above 2000 m	Throughout the year (even when sterile)	Very Low	Unsuitable habitat and altitude, none located during fieldwork
Family Amaryllidaceae					
Nerine gracilis	VU	Undulating grasslands in damp areas	Nov-April (flowering time)	Low	No suitable habitat present
Nerine platypetala	VU	Montane grassland, margins of permanently moist vleis and levees of riverbanks	Nov-April (flowering time)	Low	No suitable habitat present
Family Apocynaceae					
Aspidoglossum xanthosphaerum	VU	Montane grassland, marshy sites, 1800 m	Nov-April (flowering time)	Low	None located during fieldwork, no suitable habitat present
Pachycarpus suaveolens	VU	Short or annually burnt grasslands, 1400-2000 mamsl	Nov-April (flowering time)	Very Low	Very rare species and only known from eight localities. Habitat present is degraded.
Miraglossum davyi	VU	Escarpment grassland	Nov-April (flowering time)	Low	No suitable habitat present
Family Asphodelaceae					
Kniphofia typhoides	NT	Low lying wetlands and seasonally wet areas in climax *Themeda*	Nov-April (flowering time)	Very Low	No suitable habitat present

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		triandra grasslands on heavy black clay soils			
Family Asteraceae *Cineraria austrotransvaalensis*	NT	Amongst rocks on steep hills and ridges, at the edge of thick bush or under trees on a range of rock types: quartzite, dolomite and shale, 1400-1700 m.	Throughout the year (even when sterile)	Very Low	No suitable habitat present
Family Crassulaceae Sensitive Species 851	VU	Occurs in shallow vleis and marshes in high altitude montane grassland.	Throughout the year (even when sterile)	Very Low	No suitable habitat present
Family Hyacinthaceae *Merwilla plumbea*	NT	Montane Mistbelt and Ngongoni grassland, rocky areas on steep, well drained slopes	Nov-April (flowering time)	Very Low	None located during fieldwork
Family Iridaceae *Gladiolus malvinus*	VU	Dolerite outcrops in grassland, around 2000 m	Nov-April (flowering time)	Low	Unsuitable altitude, no suitable habitat present
Gladiolus robertsoniae	NT	Dolerite outcrops in grassland; also seeps and streambanks	Nov-April (flowering time)	Low	No suitable habitat present

NT - Near Threatened
VU - Vulnerable

5.2 Terrestrial Fauna

5.2.1 Mammals

5.2.1.1 Regional Overview

The Amersfoort area is situated in the grassland biome and therefore has moderate mammal diversity, relatively high numbers of endemics and a relatively high number of Red Data species[8]. The region to the south of the PAOI is mostly used for grazing purposes, while the large Majuba Power Station and associated infrastructure lies to the north and west. The QDGS 2729 BB only contains one protected area, namely Eskom's Majuba Nature Reserve, which is situated approximately 2 km to the north of the study area. Therefore, mammal populations within the general area are mostly confined to smaller, common species and larger herds of ungulates are virtually extirpated. Only nineteen mammal species are confirmed for the QDGS 2729 BB in the Animal Demography Unit's Virtual Museum's database[9], the majority being considered small mammals. The actual number of species present is likely to be higher as many mammals are small, cryptic or nocturnal in habit and therefore difficult to photograph. However, the grid is seldom visited by the public and few records have been submitted. Three of the confirmed Virtual Museum mammals have conservation status, namely Oribi *Ourebia ourebi* which is assessed as Endangered (EN), and Serval *Leptailurus serval* and African Clawless Otter *Aonyx capensis*, both of which are assessed as Near Threatened (NT). Endemism is very low, with none of the confirmed mammals being endemic to South Africa, Lesotho and Eswatini.

5.2.2.2 Confirmed Species

Only two native mammals were confirmed during fieldwork, namely Scrub Hare *Lepus saxatilis* and Cape Porcupine *Hystrix africaeaustralis* (Appendix 2). The partial skeleton of either a Serval or subadult Caracal *Caracal caracal* was also located, but too few teeth were present for a specific identification. Additional fieldwork, including small mammal trapping and camera traps, would result in a low number of additions but it is unlikely that this would have produced data that would have changed the ecological importance analysis of this report.

[8] Child *et al*., 2016
[9] http://vmus.adu.org.za/vm_sp_list.php accessed 23/03/2022

5.2.2.3 Species of Conservation Concern

An estimated 22 conservation-important mammals potentially occur in the general area surrounding the study area (Appendix 3). Several cave-roosting bat species of conservation concern are likely to occur overhead, but these species are only likely to feed over the site because of the shortage of suitable roosting sites and have been excluded from this assessment. Of the 22 potentially occurring species, 19 are considered to be SCC[10] with ten considered threatened (Appendix 3). None were located during fieldwork despite intensive searching. Only two NT mammal species potentially occur within the study area and are discussed below.

Serval *Leptailurus serval*

This medium-sized cat species is fairly common in suitable grassland habitat in Mpumalanga (*pers. obs.*). Although not located during fieldwork, a partial skeleton possibly belonging to this species was found within tall grassland habitat within the study area. This species was also confirmed from the nearby farm Rietpoort 83 HS during a previous ecological survey, and it probably occasionally utilises the study area for foraging but would not be resident due to the small size. However, it would probably be resident in the large tract of natural grassland to the south of the study area. It is listed as NT due to habitat loss and fragmentation, as well as demand for their coats[11].

Southern African Hedgehog *Atelerix frontalis*

This small, spine-covered mammal is fairly widespread on the Highveld but is relatively poorly known and seldom seen as it is nocturnal and secretive. It is listed as NT due to a continuous decline in numbers due to collection for the pet and traditional muthi trade and habitat loss[12]. It potentially regularly forages within the study area although is unlikely to be resident due to the small size of the area.

5.2.2.4 Protected Species

Several potentially occurring species are protected under either the MNCA or the NEMBA ToPS (Appendix 3). However, none of these were confirmed during fieldwork.

[10] The same approach as Raimondo *et al*. (2009) has been followed here regarding species of conservation concern (i.e. those with a status of Declining, Near Threatened and Data Deficient) and threatened species (Vulnerable, Endangered and Critically Endangered)
[11] Child *et al*., 2016
[12] Child *et al.,* 2016

5.2.2.5 Alien Species

No naturalised alien mammal species were located during fieldwork, and very few are expected.

5.2.2 Avifauna

5.2.2.1 Regional Overview

The Amersfoort area is situated within the grassland biome, within the Mesic Highveld Grassland Bioregion. Species diversity is comparatively low, but numbers of endemic and Red Data species are comparatively high[13]. Data from the Southern African Bird Atlas Project (SABAP2), which is currently in progress, indicate that 164 bird species from 82 full protocol cards[14] have been recorded from the QDGS 2729 BB[15]. At a finer scale, data from SABAP2 indicate that 100 species from eight cards have been recorded from the pentad (mapping unit) in which the study area is situated within (2705_2945)[16]. A pentad covers a relatively small area of approximately 77 km^2, which is considerably smaller than a QDGS, and thus a better indication of which species occur in the study area. Although the total of 100 is probably not an entirely accurate reflection of true diversity of the general area, it far exceeds the total that the degraded habitats within the study area will regularly support.

The study area is situated between two Important Bird & Biodiversity Areas (IBA's), namely the Grasslands IBA to the south and the Amersfoort – Bethal – Carolina District IBA to the north. Both are Global IBA's under Criteria A1, A2, A3, A4i, ii, iii. These two IBA's support globally important populations of threatened birds such as Rudd's Lark *Heteromirafra ruddi*, Botha's Lark *Spizocorys fringillaris*, Yellow-breasted Pipit *Anthus chloris*, Southern Bald Ibis *Geronticus calvus*, African Grass Owl *Tyto alba* and White-winged Flufftail *Sarothrura ayresi*[17].

The study area is not situated within close proximity to any Wetlands of International Importance (Ramsar Sites)[18], with the closest being Seekoeivlei in the Free State Province lying *c.* 55km due south.

[13] Taylor *et al*., 2015
[14] Full protocol lists require at least two hours of coverage per list
[15] https://sabap2.birdmap.africa/coverage/group/459_Mjb accessed 24/03/2022
[16] http://sabap2.adu.org.za/coverage/pentad/2705_2950 accessed 24/03/2022
[17] Marnewick *et al*., 2015
[18] https://www.ramsar.org/wetland/south-africa

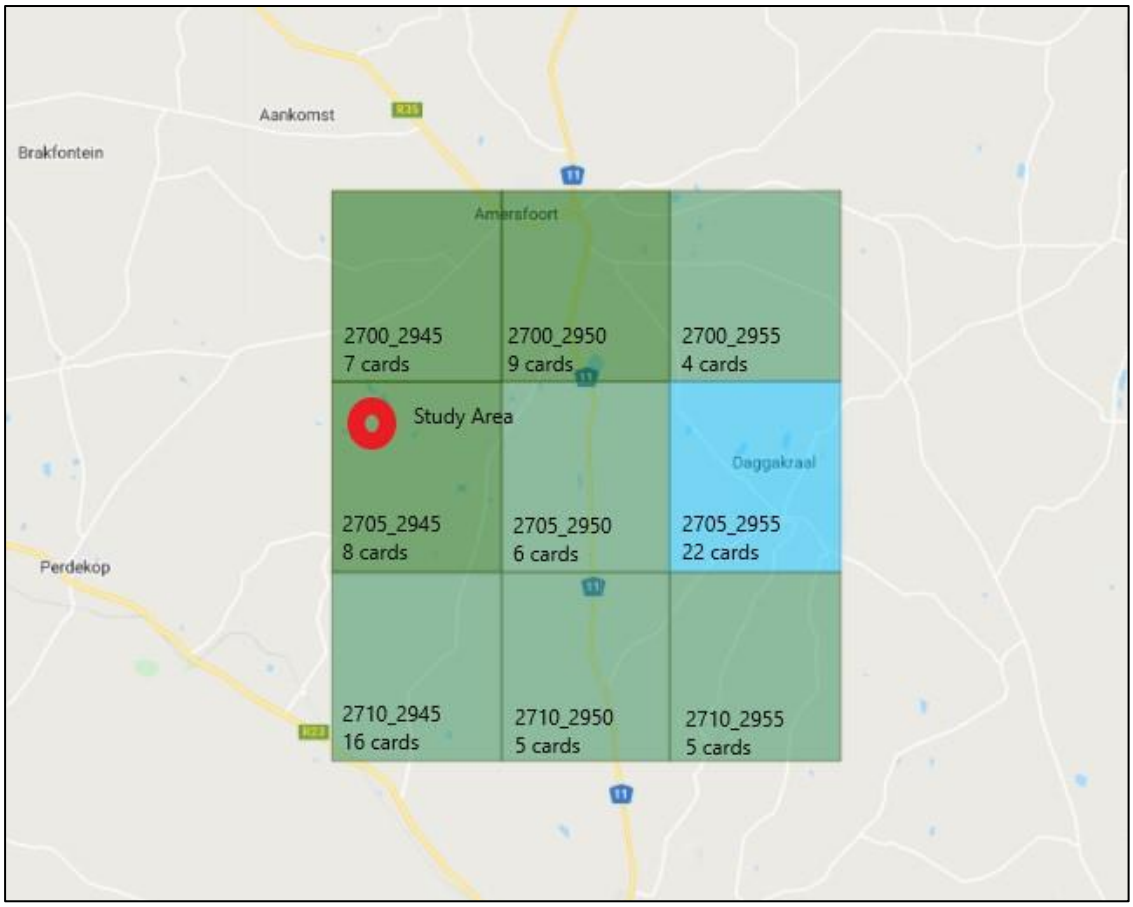

Figure 5. Map of the Pentads in the QDGS 2729 BB, including Pentad Codes and Numbers of Cards Submitted

5.2.2.2 Local Avifaunal Assemblages

A total of 35 bird species, or 35% of the pentad list, was confirmed from within or immediately adjacent to the actual habitats represented in the study area during fieldwork and are listed in Appendix 2. Sufficient sampling was undertaken for assessing habitat suitability for potentially occurring threatened species and to describe broad bird assemblages. Two broad assemblages or species-habitat associations were identified, and are briefly described below (alien species indicated by an asterisk):

I. Short Grassland Assemblage

Short Grassland occurs only in small, scattered pockets throughout the study area which eliminates short-grass specialists such as Denham's Bustard *Neotis denhami* and Botha's Lark *Spizocorys fringillaris* which require far more extensive tracts. This assemblage supports moderate avifaunal

diversity, especially the more terrestrial species that forage on the ground such as African Pipit *Anthus cinnamomeus*, Cape Longclaw *Macronyx capensis,* Helmeted Guineafowl *Numida meleagris,* Swainson's Spurfowl *Pternistis swainsonii,* Quailfinch *Ortygospiza atricollis* and Pied Starling *Lamprotornis bicolor*. Twenty-five species (71% of the total list) were recorded from this assemblage, the higher of the two assemblages present (Appendix 2).

II. Tall Grassland Assemblage

The near-pure stands of thatching grass *Hyparrhenia hirta* that dominate the study area have low avifaunal diversity. Larger birds such as cranes and bustards avoid these very tall grasslands due to low visibility and cover for predators and most birds recorded forage within the tall grass itself as opposed to the ground level (*pers. obs*.). These include a variety of seedeaters which nest in tall-grass habitat, such as Long-tailed Widowbird *Euplectes progne*, Fan-tailed Widowbird *Euplectes axillaris*, Southern Red Bishop *Euplectes orix* and Orange-breasted Waxbill *Amandava subflavus*. Eighteen species (51% of the entire species list) were recorded from the Tall Grassland assemblage, the lower of the two assemblages present (Appendix 2).

5.2.2.3 Species of Conservation Concern

The grasslands of far south-western Mpumalanga support a high number of bird SCC, with 22 species potentially occurring within the general area around the study area (Appendix 3). Thirteen of these are threatened, with the remaining assessed as NT. No threatened or NT species were recorded during fieldwork, and only two of the potentially occurring SCC potentially occurs within the study area on a regular basis. These species are described below.

Southern Bald Ibis *Geronticus calvus*

This grassland species has its world population centred on the Highveld and Escarpment grasslands of South Africa, Lesotho and eSwatini[19]. It has suffered a significant decline in global population size, mostly because of habitat loss, and is currently assessed as Vulnerable (VU)[20]. Southern Bald Ibis will forage in disturbed or secondary grasslands, especially after a burn (*pers. obs*.), and could therefore forage within the study area, although only irregularly due to the small size. Suitable breeding habitat (high cliffs, often near waterfalls) is absent from the study area.

[19] Hockey *et al*., 2005
[20] Taylor *et al*., 2015

Lanner Falcon *Falco biarmicus*

Southern Africa's largest falcon is assessed as VU due to large-scale habitat destruction of especially grasslands, as well as poisoning by agrochemicals, persecution by racing pigeon fanciers and domestic fowl owners and collisions with powerlines[21]. No breeding habitat (cliff ledges) is present, but this species may occasionally forage over the grassland habitat present within the study area.

The remaining potentially occurring SCC all have a low or very low likelihood of regularly occurring within the study area, primarily due to very high disturbance levels, a lack of suitable habitat, regional rarity or shortage of suitable nesting sites such as tall trees or cliffs (Appendix 3).

No raptor nests were located within the study area.

5.2.2.4 Endemic Species

One bird species recorded during fieldwork is endemic to South Africa, Lesotho and Swaziland, namely Pied Starling *Lamprotornis bicolor* (Appendix 2). This is a common and conspicuous species in the Amersfoort area (*pers. obs*.).

5.2.2.5 Protected Species

With the exception of most gamebirds, waterfowl and problem birds, most bird species are protected in Mpumalanga under the MNCA. One potentially occurring species is protected under NEMBA ToPS, namely Southern Bald Ibis.

5.2.2.5 Alien Species

No alien bird species were recorded during fieldwork (Appendix 2). However, it is likely that at least some are present within the adjacent transformed / degraded habitat found around Majuba Power Station.

[21] Taylor *et. al*., 2015

5.2.3 Herpetofauna

5.2.3.1 Regional Overview

The Highveld and Escarpment of southern Mpumalanga supports a moderate diversity of reptile species with 51 species already recorded from the degree grid square 2729[22]. However, many of these species are only found in the higher Escarpment grasslands and forest pockets in the southern portion of the degree square; habitats that are absent from the Amersfoort area. Only 17 species of reptiles have been recorded from the QDGS 2729 BB, in which the study area is situated, as listed on the Reptile Atlas of Southern Africa website (http://vmus.adu.org.za/) and in Bates *et al*. (2014), indicating that reptile diversity in the area is probably somewhat under-sampled. Bates *et al*. (2014) classifies the grid in which the study area is located as having moderate reptile diversity (15 to 18 taxa). Reptile endemicity is also moderate, with four potentially occurring taxa occurring only within South Africa, Lesotho and eSwatini (Bates *et al.*, 2014).

The Amersfoort area, situated within the Highveld of southern Mpumalanga, supports a moderately diverse frog population (Minter *et al*. 2004). Twenty-seven species of frogs have been recorded in the degree grid square 2729, and 11 within the QDGS 2729 BB, as listed on the Frogs of Southern Africa website (http://vmus.adu.org.za/). However, frog endemicity is low with only three potentially occurring endemic species present in the area (Minter *et al.,* 2004).

5.2.3.2 Confirmed Species

No reptiles were recorded during fieldwork. Cold and wet conditions were encountered during the survey which are not conducive to locating reptiles. However, this is not seen as a limiting factor as the only potentially occurring threatened reptile excavates fairly large burrows which are easily located. Dedicated herpetofaunal surveys, including trapping, would no doubt have produced a few species but are unlikely to have produced data that would change the recommendations in this report. No frogs were recorded during fieldwork, and very few are expected to occur due to the lack of surface water within the study area. Dedicated frog surveys, including trapping, would have produced at least a few species but are unlikely to have produced data that would change the recommendations in this report.

[22] http://vmus.adu.org.za/vm_sp_list.php accessed 24/03/2022

5.2.3.3 Species of Conservation Concern, Protected and Alien Species

Of the potentially occurring species, only one reptile SCC potentially occurs within the study area, namely Giant Girdled Lizard *Smaug giganteus* (Appendix 3). Although this species is confirmed from the QDGS 2729 BB and occurs within the Majuba Nature Reserve and from the nearby farm Rietpoort 83 HS[23], none were located within the study area despite intensive searching. This large species excavates distinctive burrows which were searched for during fieldwork, but none were located. The likelihood of it being present in the study area is therefore Low (Appendix 3).

One potentially occurring frog species is assessed as VU, namely Spotted Shovel-nosed Frog *Hemisus guttatus* (Appendix 3). The likelihood of occurrence is Low, as it prefers Escarpment habitats that are found further to the south around Volksrust and Wakkerstroom. No alien herpetofauna species were recoded or are expected in the study area.

[23] ECOREX, 2019

5.3 Important Ecological Processes / Drivers and Ecological Connectivity

The focus on threatened species and ecosystems are often the primary approach taken with conservation actions (for example, biodiversity assessments). While this is still important, the protection of biodiversity assets will not be effective unless the ecological processes or drivers that sustain them are maintained (Bennett *et al*., 2009).

Ecological processes are those processes which maintain the structure and species composition of habitats and allow these to evolve over time (Driver *et al.* 2003). Many kinds of ecological processes sustain biodiversity, including the following:

- climatic processes;
- primary productivity;
- hydrological processes;
- formation of biophysical habitats;
- interactions between species;
- movements of organisms; and
- natural disturbance regimes[24].

The study area is situated within the grassland biome (Mucina & Rutherford, 2006). Grasslands can be defined as follows.

"A biome dominated, at least visually, by different species of grasses, and characterised by a lack of tall shrubs and woody plants. Grasslands are also home to a rich variety of herbaceous forbs (small, non-woody plants) and bulbous plants. In South Africa, grassland covers much of the central and eastern parts of the country, in regions dominated by summer rainfall."[25]

Grasslands cover almost one third of South Africa's land surface across seven provinces, spanning a diverse and complex array of socio-economic situations and land use contexts[26]. From a local perspective, grassland plant diversity is second only to that of the Fynbos Biome and is home to a many of South Africa's threatened and endemic animal species (SANBI, 2013).

[24] Bennett *et al*., (2009)
[25] SANBI, 2013
[26] SANBI, 2013

Fire and grazing are two of the most important ecological drivers in grassland. According to SANBI (2013), any land-use change that results in reduced ability to manage fire or grazing in grasslands will have significant implications for grassland biodiversity. Soil erosion and invasive alien species are two of the most serious management issues affecting all grassland ecosystems and are key indicators that the limits of acceptable change have been exceeded.

No important local or landscape corridors have been identified within the study area[27]. However, some intact portions of grassland to the south and east of the study area have been classified by the MBSP as Ecological Support Areas: Local Corridor. These are areas that maintain ecological functionality in support of biodiversity connectivity buy retaining the existing natural vegetation cover in a healthy ecological state and restore "critical linkages" where necessary (Lötter *et al*., 2014).

The high levels of disturbance associated with the adjacent Majuba Power Station, as well as high grazing pressure and human movement through the study means that many of the primary ecological drivers deviate from natural processes. Grazing pressure is probably constant and without rest periods and burning is likely to be an annual occurrence.

The total amount of nutrients and mean annual precipitation entering the ecosystem has probably not been altered much despite the presence of the industrialised state to the north of the study area. Despite the location of the proposed development in the high-altitude grassland of the far south-western corner of Mpumalanga, the high degree of disturbance means that it is unlikely that any climate-change refugia would be impacted by the project.

The degraded state of the two vegetation communities within the study area and proximity to a large power-generating complex makes it unlikely that this site provides important connectivity to other surrounding grassland habitats. However, the rocky hills and grassy wetlands to the south and east of the study area are still intact and are linked to other similar habitat and most likely provide important ecological connectivity.

[27] Lötter *et al*., 2014

5.4 Environmental Screening Tool

According to regulation 16(1)(b)(v) of the EIA Regulations (2014), applicants requiring Environmental Authorisation must comply with the protocols within the report generated by the DEA's online EST. The result of the site-specific EST query indicated that the study area, including a 1km buffer, has **High** Sensitivity for the Animal Theme, **Medium** Sensitivity for the Plant Theme and **Very High** Sensitivity for the Terrestrial Biodiversity Theme (Figure 5) due to the potential or confirmed occurrence of the following:

Animal Theme (High)

- Mammalia - *Ourebia ourebi* - EN

The study area does not support undisturbed grasslands, habitat of Oribi.

- Mammalia – *Chrysospalax villosus* – VU

Rough-haired Golden Mole occurs in sandy soils and at wetland edges, habitats absent from the study area.

- Mammalia – *Hydrictis maculicollis* – VU

No aquatic habitat is present within the study area for Spotted-necked Otter.

- Aves – *Sagittarius serpentarius – VU*

The dominance of tall grassland within the study area, as well as high disturbance levels, creates unfavourable conditions for Secretarybird.

- Aves – *Geronticus calvus* – VU

Southern Bald Ibis has a Moderate likelihood of occasionally foraging within the study area, particularly after a burn. However, no nesting sites (cliffs) are present.

- Aves – *Tyto capensis* – VU

Some suitable habitat is present for African Grass Owl, but there are no recent records from the Amersfoort area and the site has high disturbance levels.

- Reptilia – *Smaug giganteus* – VU

Some marginally suitable habitat is present for Giant Girdled Lizard, but none were located, and neither were any indications that that occur in the study area due to the absence of their characteristic burrows. Disturbance levels are high enough to possibly prevent colonisation.

Plant Theme (Medium)

- Listed Sensitive Species No. 851 – CR

This small, succulent plant has a very low likelihood of occurrence due to regional rarity and lack of suitable wetland habitat.

Terrestrial Biodiversity Theme (Very High)

- Critical Biodiveristy Area 1 (CBA Irreplaceable)
- FEPA Subcatchment
- Protected Areas Expansion Strategy

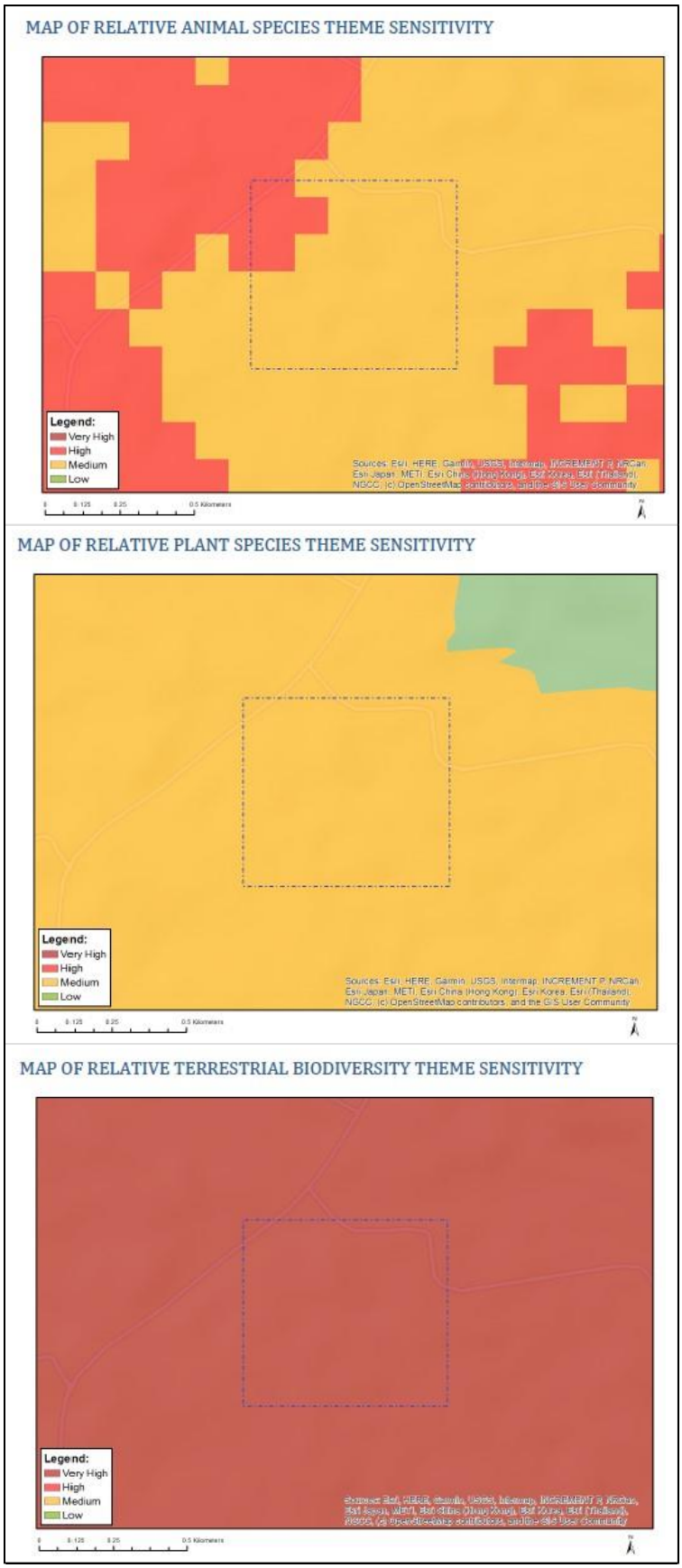

Figure 6. Environmental Screening Tool Themes relevant to Terrestrial Ecology

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5.5 Mpumalanga Biodiversity Sector Plan Assessment

Alternative A is situated within an area classified as **Heavily** or **Moderately Modified** and **Critical Biodiversity Area (CBA) Irreplaceable** by the MBSP (Lötter *et al.*, 2014) (Figure 6). These areas show the greatest flexibility in terms of management objectives and permissible land-uses[28].

Alternative B is mostly situated within an area classified as **Critical Biodiversity Area (CBA) Irreplaceable** by the MBSP, with the eastern section of the site being situated within an area classified as **Heavily** or **Moderately Modified** (Lötter *et al.*, 2014, Figure 6). These are areas that are the most important in Mpumalanga for meeting biodiversity targets outside of formally protected areas and for conserving critical biodiversity ecosystems. CBA areas should be maintained in a natural state with no further loss of natural habitat. The desired management objective in these areas is conservation management which includes, for example, low-intensity livestock or game farming[29]. Any development should be carried out under the provisions of the National Environmental Management Act (NEMA, Act 107 of 1998). However, this area is ecologically compromised by various anthropogenic factors, including historical dumping of rubble, overgrazing and invasion by alien plants, and should be excluded from the macro-scale CBA assessment.

[28] Lötter *et al.*, 2014
[29] Lötter *et al.*, 2014

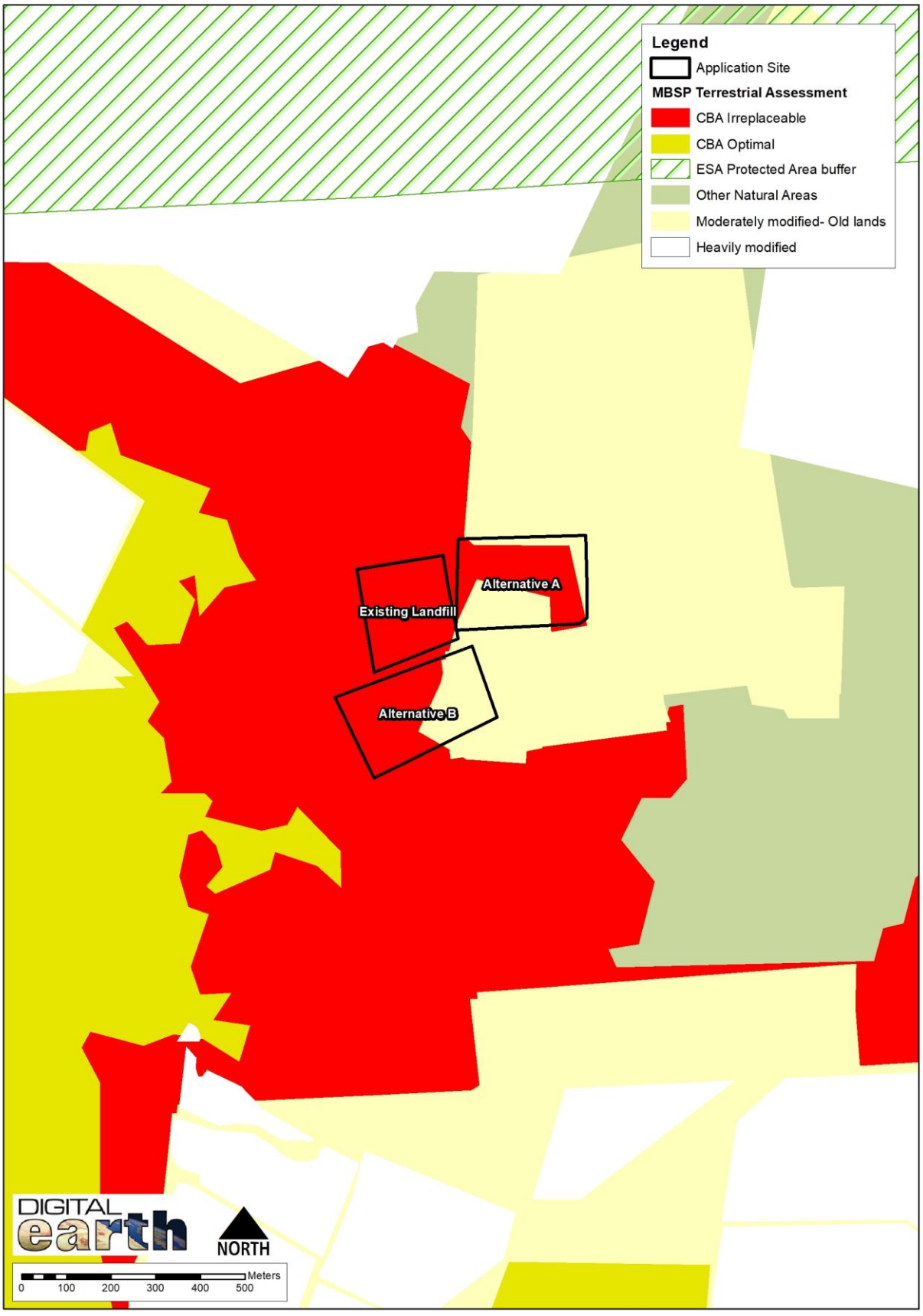

Figure 7. Mpumalanga Biodiversity Sector Plan Assessment of the Study Area

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5.6 Site-specific Ecological Importance Analysis

An Ecological Importance analysis of the two vegetation communities represented in the study area was undertaken using the methodology described in Section 4.4. Table 8 presents the calculation of Ecological Importance of the study area, which is displayed in Figure 7 below.

The Short Grassland vegetation community has Medium Conservation Importance (CI) as a result of the predicted occurrence of a limited number of faunal SCC, as well as mostly being situated within a CBA. The Functional Integrity (FI) is only Medium as the area is relatively disturbed through alien plant infestation and overgrazing. The integration of Medium CV and Medium FI results in a Biodiversity Importance (BI) of **Medium**. Receptor Resilience (RR) is **Medium** as the area to be impacted is limited in spatial extent, is already ecologically compromised, and is situated adjacent to a historical landfill site. When integrated with the Medium BI the Site Ecological Importance (SEI) of the vegetation community is assessed as **Medium**.

The Secondary Grassland community has Medium CI due to the potential occurrence of a limited number of SCC. However, the FI is Low as this area has been exposed to significant historical degradation through the adjacent landfill site, over grazing and colonisation of tall thatching grass. When integrated with a Medium CI, it results in a BI of **Low**. RR of this vegetation community is assessed as **Medium**, as it will recover slowly to restore > 70 % of the original species composition and functionality of the receptor functionality. The combination of a Low BI and Medium RS results in an SEI assessment of **Low**.

According to SANBI's 2020 guidelines for biodiversity specialists in ESIAs (Table 6), areas with Medium SEI have the following land use guidelines:

- Minimization & restoration mitigation - Development activities of medium impact acceptable followed by appropriate restoration activities.

Whereas areas with Low SEI have the following land use guidelines:

- Minimization & restoration mitigation - Development activities of medium to high impact acceptable followed by appropriate restoration activities.

Table 8. Ecological Sensitivity of Vegetation Communities in the Study Area

Assessment Criteria	Short Grassland	Tall Grassland
Conservation Importance	Medium	Medium
Functional Integrity	Medium	Low
Biodiversity Importance	Medium	Low
Receptor Resilience	Medium	Medium
SITE ECOLOGICAL IMPORTANCE	**Medium**	**Low**

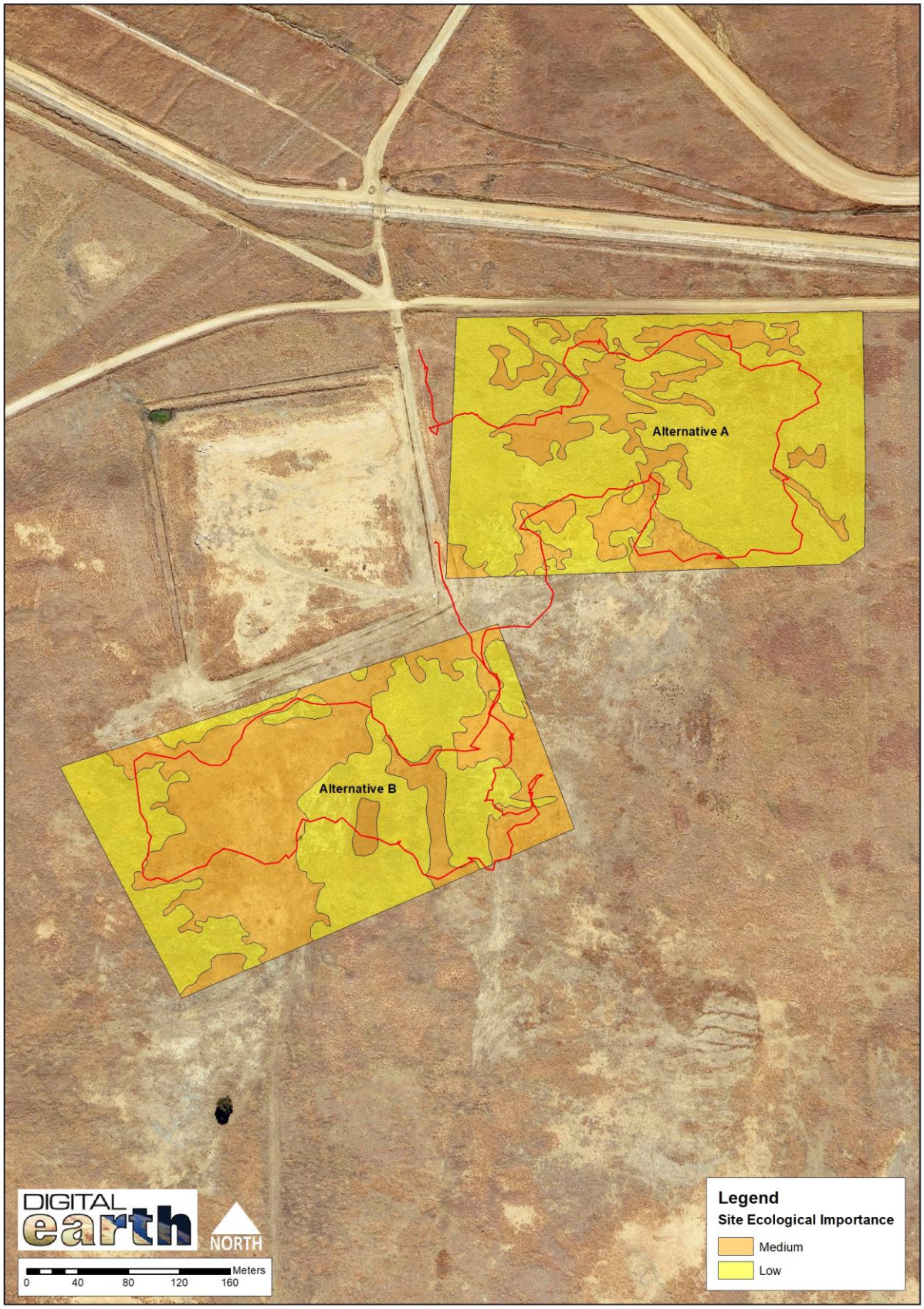

Figure 8. Site Ecological Importance of the Vegetation Communities in the Study Area

6. IMPACTS AND MITIGATION

This section details the environmental impacts of the proposed development on Witkoppies 81 JS on terrestrial ecosystems. Impacts are not arranged in any order of overall significance.

6.1 Loss of Habitat with a Very High Terrestrial Biodiversity Theme (EST), CBA: Irreplaceable Conservation Status and Medium SEI

Nature: The study area is situated within an area assessed as having Very High Terrestrial Biodiversity Theme within the Environmental Screening Tool of the DFFE. Additionally, portions of the study area are situated within an area assessed as CBA: Irreplaceable in the MBSP, most of which is mapped within Alternative B. The Short Grassland community has also been assessed as having Medium Site Ecological Importance. According to SANBI's 2020 guidelines, impacts in these areas should be minimised. The total area spatial extent of this community in Alternative A is 1.5 ha and is 3 ha in Alternative B.

	Alternative A		**Alternative B**	
	Without mitigation	**With mitigation**	**Without mitigation**	**With mitigation**
Extent	Local (2)	Site (1)	Local (2)	Site (1)
Duration	Permanent (5)	Very short (1)	Permanent (5)	Permanent (5)
Magnitude	Moderate (6)	Low (4)	Moderate (6)	Moderate (6)
Probability	Highly Probable (4)	Improbable (2)	Highly Probable (4)	Probable (3)
Significance	**Medium (52)**	**Low (12)**	**Medium (52)**	**Medium (36)**
Status	Negative	Negative	Negative	Negative
Reversibility	Low	Medium	Low	Medium
Irreplaceable loss of resources?	Yes	Yes	Yes	Yes
Can impacts be mitigated?	Yes	-	Yes	-
Mitigation/Enhancement Measures:				

• It is suggested that Alternative A be selected for development and Alternative B be left undeveloped. Application of this measure is likely to reduce the impact significance to Low; • To improve the ecological integrity of Alternative B and offset the destruction of vegetation in Alternative A, an integrated management plan should be compiled for this area. This will include alien plant control and adequate grazing / burning principles; • An independent Environmental Compliance Officer (ECO) must be appointed by the developer to monitor compliance with the Environmental Authorisation during construction. The ECO must be appointed prior to commencement of construction and be involved in all aspects of project planning that can influence environmental conditions on the site. Where possible, the ECO must attend relevant project meetings, conduct inspections to assess compliance with the Environmental Authorisation and relevant Health and Safety regulations, and be responsible for providing feedback on potential environmental problems associated with construction; • Bulk clearing of vegetation should be restricted to the dry months between April and September; and • The landfill site must be adequately fenced off to prevent access to surrounding untransformed vegetation.
Residual Risks:
The residual risk of site preparation on destruction of sensitive habitats is rated with high confidence as **Low.**

6.2 Invasion of Natural Habitat by Alien Plants

Nature: A total of 24 alien plant species were located within the study area during fieldwork, six of which are declared alien invasives. Additional invasion is highly likely as construction activities could introduce seeds which may thrive in bare soil resulting from construction activities. The significance of this impact is therefore Medium but, with the implementation of appropriate mitigation, the significance could be reduced to Low.

	Alternative A		**Alternative B**	
	Without mitigation	**With mitigation**	**Without mitigation**	**With mitigation**
Extent	Local (2)	Site (1)	Local (2)	Site (1)
Duration	Long-term (4)	Short-term (2)	Long-term (4)	Short-term (2)
Magnitude	Moderate (6)	Low (4)	Moderate (6)	Low (4)
Probability	High Probable (4)	Improbable (2)	High Probable (4)	Improbable (2)
Significance	**Medium (48)**	**Low (14)**	**Medium (48)**	**Medium (14)**
Status	Negative	Negative	Negative	Negative
Reversibility	Low	High	Low	High

Irreplaceable loss of resources?	No	No	No	No
Can impacts be mitigated?	Yes	-	Yes	-

Mitigation/Enhancement Measures:

• To comply with the National Environmental Management: Biodiversity Act (Act No. 10 of 2004), all listed invasive exotic plants as indicated in Appendix 1 should be targeted and controlled. This is especially relevant to the many alien invasive tree and shrub species present, and may require the compilation of an alien plant control plan;

• It is recommended that all woody alien plants within a 200 m radius of the site be immediately destroyed using appropriate techniques;

• An independent ECO must be appointed by the developer to monitor compliance with the Environmental Authorisation during construction. The ECO must be appointed prior to commencement of construction and be involved in all aspects of project planning that can influence environmental conditions on the site. Where possible, the ECO must attend relevant project meetings, conduct inspections to assess compliance with the Environmental Authorisation and relevant Health and Safety regulations, and be responsible for providing feedback on potential environmental problems associated with construction;

• It is important that weed control, if involving herbicides, be managed correctly to reduce the impact on the adjacent natural vegetation. Regular inspections should be made to determine if any additional alien plants have established; and

• Bulk clearing of vegetation should be restricted to the dry months between April and September.

Residual Risks:

The residual risk of invasion from alien plants is rated with high confidence as **Low.**

6.3 Potential of Soil Erosion

Nature: Rain and sediment runoff from loose and bare soil around the construction site is likely to result in some erosion and downstream sedimentation. Although the pre-mitigation impact of this is Low, consideration must be given to the timing of clearing activities. Clearing during the dry season and the careful and correct implementation of a re-vegetation and soil erosion plan will reduce the significance of this impact.

	Alternative A		**Alternative B**	
	Without mitigation	**With mitigation**	**Without mitigation**	**With mitigation**
Extent	Local (2)	Site (1)	Local (2)	Site (1)
Duration	Medium-term (3)	Short-term (2)	Medium-term (3)	Short-term (2)

Magnitude	Minor (2)	Small (0)	Minor (2)	Small (0)
Probability	Probable (3)	Improbable (2)	Probable (3)	Improbable (2)
Significance	**Low (21)**	**Low (6)**	**Low (21)**	**Low (6)**
Status	Negative	Negative	Negative	Negative
Reversibility	High	High	High	High
Irreplaceable loss of resources?	No	No	No	No
Can impacts be mitigated?	Yes	-	Yes	-

Mitigation/Enhancement Measures:

• It is recommended that clearing be conducted in the dry months between April and September, prior to the onset of the rains. The seasonal arrival of the rain season subsequent to construction will then allow for the natural re-vegetation of bare areas, from the seedbank within the soil;

• All existing and proposed roads should contain adequate stormwater drainage and erosion control measures; and

• An independent ECO must be appointed by the developer to monitor compliance with the Environmental Authorisation during construction. The ECO must be appointed prior to commencement of construction and be involved in all aspects of project planning that can influence environmental conditions on the site. Where possible, the ECO must attend relevant project meetings, conduct inspections to assess compliance with the Environmental Authorisation and relevant Health and Safety regulations, and be responsible for providing feedback on potential environmental problems associated with construction.

Residual Risks:

The residual risk of erosion is rated with high confidence as **Low.**

6.4 Potential Release of Pollutants and Dispersal of Waste

Nature: Due to the presence of vertic soils within the study area, the risk of leaching of rainwater through the landfill into the surrounding soil is low. However, gusts of wind may lift light plastics into the air to be deposited some distances away, and birds and mammals may scavenge in the site, exposing them to potentially harmful waste and sharp objects. The pre-mitigation impact of this is Medium. However, the impact can be reduced to Low with the implementation of suitable mitigation measures.

	Alternative A		**Alternative B**	
	Without mitigation	**With mitigation**	**Without mitigation**	**With mitigation**
Extent	Regional (3)	Site (1)	Regional (3)	Site (1)
Duration	Long (4)	Short (2)	Long (4)	Short (2)
Magnitude	High (8)	Minor (2)	High (8)	Minor (2)

Probability	High Probable (4)	Improbable (2)	High Probable (4)	Improbable (2)
Significance	**Medium (60)**	**Low (10)**	**Medium (60)**	**Low (6)**
Status	Negative	Negative	Negative	Negative
Reversibility	High	High	High	High
Irreplaceable loss of resources?	No	No	No	No
Can impacts be mitigated?	Yes	-	Yes	-

Mitigation/Enhancement Measures:

• A sturdy, mammal-proof fence of at least 3 m in height should be constructed around the perimeter of the site to prevent unwanted access from small mammals, cattle and people as well as prevent plastics from being blown out;

• This fence must be regularly inspected for damage or forced entry;

• Waste should periodically be covered with layers of soil obtained from an authorised borrow pit to allow for physical and chemical stability of the waste and create a sustainable future land use or ecological function; and

• An independent ECO must be appointed by the developer to monitor compliance with the Environmental Authorisation during construction. The ECO must be appointed prior to commencement of construction and be involved in all aspects of project planning that can influence environmental conditions on the site. Where possible, the ECO must attend relevant project meetings, conduct inspections to assess compliance with the Environmental Authorisation and relevant Health and Safety regulations, and be responsible for providing feedback on potential environmental problems associated with construction.

Residual Risks:

The residual risk of dispersal of waste is rated with high confidence as **Low.**

6.5 Increase in Poaching Activities

Nature: Unsupervised construction workers may participate in small-scale poaching through setting snares or traps for bushmeat. Medicinal plants may also be harvested for muthi. Due to the relative lack of target species and no access controls, mitigation measures are redundant. However, due to the paucity of fauna, the impact is likely to be Low.

	Alternative A		**Alternative B**	
	Without mitigation	**With mitigation**	**Without mitigation**	**With mitigation**
Extent	Local (2)	Local (2)	Local (2)	Local (2)
Duration	Long (4)	Long (4)	Long (4)	Long (4)
Magnitude	Minor (2)	Minor (2)	Minor (2)	Small (0)
Probability	Probable (3)	Probable (3)	Probable (3)	Probable (3)

Significance	**Low (24)**	**Low (24)**	**Low (24)**	**Low (24)**
Status	Negative	Negative	Negative	Negative
Reversibility	Moderate	Moderate	Moderate	Moderate
Irreplaceable loss of resources?	No	No	No	No
Can impacts be mitigated?	No	-	No	-
Mitigation/Enhancement Measures:				
• Due to the area surrounding the proposed landfill site appearing to be accessible to the general public, no appropriate mitigation measures can be made. The pre and post mitigation ratings remain Low.				
Residual Risks:				
The residual risk of poaching is rated with high confidence as **Low.**				

6.6 Cumulative Impacts

Nature: According to Savannah (2015), there are proposed plans for the expansion of the Eskom Majuba Power Station, as well as development of a solar energy facility. Cumulative impacts of the proposed landfill and the proposed future developments on terrestrial biodiversity are likely to arise
from:

• destruction of vegetation assessed as having Medium Ecological Importance, being situated within a CBA and in an area assessed as having Very High Terrestrial Biodiversity Importance; and
• increased alien plant infestation, erosion and poaching associated with construction at the proposed development.

	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Site (1)	Local (2)
Duration	Medium (3)	Long (4)
Magnitude	Minor (2)	Low (4)
Probability	Improbable (2)	Improbable (2)
Significance	**Low (12)**	**Low (20)**
Status (positive or negative)	Negative	Negative
Reversibility	Medium	Low
Irreplaceable loss of resources?	No	Yes
Can impacts be mitigated?	Yes	Yes
Confidence in findings: Low		
Mitigation:		

- Select Alternative A for development;
- Contain waste to the landfill site and exclude cattle and people from the site
- Implement alien plant and erosion control measures

7. CONCLUSION AND RECOMMENDATIONS

The summary of the preferred Alternative is presented in Table 9 below:

Table 9. Ecological Sensitivity of Vegetation Communities in the Study Area

GENERAL WASTE DISPOSAL SITE AT THE ESKOM MAJUBA POWER STATION		
Alternative	**Preference**	**Reasons**
Alternative A	Preferred	The Site Ecological Importance of the Short Grassland vegetation community, which dominates Alternative B, is Medium, while that of Secondary Grassland, which dominates Alternative A, is Low.
Alternative B	Acceptable	As above

The terrestrial ecology of a portion of land was surveyed for a proposed landfill site immediately south of the Majuba Power Station, 15 km south-west of Amersfoort, in the Gert Sibande District Municipality, Mpumalanga Province, South Africa. Clearing for construction of the landfill will result in the destruction of 5.5 ha of historically disturbed natural vegetation. Two Alternatives of equal size were surveyed, both adjacent to an existing, closed landfill site.

The Environmental Screening Tool of the DFFE indicates that the study area has a High Animal Theme, Medium Plant Theme and Very High Terrestrial Biodiversity Theme. The main drivers of these assessments are several potentially occurring threatened and NT plant and animal species as well as the area being assessed as CBA: Irreplaceable in the MBSP. However, due to the high disturbance levels and degraded habitats very few are likely to occur. The macro-scale assessment of the conservation importance of natural vegetation in Mpumalanga does not allow for small discrepancies where vegetation is disturbed or degraded, such as is present within the study area. A re-assessment, using a finer scale, may well result in a revision of the CBA assessment. However, Alternative A falls outside this classification and within Heavily or Moderately Modified areas and is the more ecologically compromised site of the two.

Two vegetation communities were identified within the study area The SEI of the Short Grassland, which dominates Alternative B, is Medium, while that of Secondary Grassland, which dominates Alternative A, is Low. No threatened or NT plant or animals were confirmed during fieldwork, and very few are likely to occur due to the very high disturbance levels present. No raptor nesting sites were located.

The cumulative impact of the proposed development will not result in a significant loss of biodiversity. Construction will result in the destruction of 5.5 ha of natural vegetation, much of which is already ecologically compromised.

The existing, closed landfill site was not surveyed but during the visual assessment appeared to be well vegetated. It is recommended that this area be regularly monitored for alien invasive plant species and is burnt on a rotational basis every two to three years to prevent invasive plant species from encroaching into the area where the new landfill site is proposed.

Table 10 presents the Alien Invasive Plant mitigation measures for inclusion into the EMPr.

Table 10. Mitigation Measures for inclusion in the EMPr

OBJECTIVE: Implement an efficient and regular alien plant control plan within and around the proposed landfill site	
Project component/s	» Fencing with appropriate signage. » An adequate access road (gravel or surfaced). » An access control gate. » A guard house with an ablution facility. » A conservancy tank connected to the ablution facility. » Covered parking facilities. » A designated area for parking and servicing of plant and machinery. » Sorting and storage facilities for recyclables. » Adequate water and electricity connection from the existing rising mains. » Stormwater drainage network and a stormwater evaporation pond for the stormwater entering the site through the waste body. » A leachate management system and a leachate evaporation pond.
Potential Impact	Alien plants potentially degrade or transform natural vegetation through invasion and compete with indigenous species for natural resources
Activity/risk source	The existing presence of many alien species is likely to incur additional invasion as construction activities could introduce seeds which may thrive in bare soil resulting from construction activities.

Mitigation: Target/Objective	Elimination of the six alien invasive species, as listed in the National Environmental Management: Biodiversity Act (Act No. 10 of 2004), as well as any additional species within a 200 m radius of the proposed landfill site to prevent infestation from these point sources. These six species are: ** Cirsium vulgare, * Cuscuta campestris, * Pennisetum clandestinum, * Datura stramonium, * Solanum elaeagnifolium and * Verbena bonariensis.*

Mitigation: Action/control	Responsibility	Timeframe
Hand-pull herbaceous species after rain and before seeding	Land / unit manager	Construction and Operation
Cut stump and apply herbicide containing a dye to any woody species located within 200 m of the proposed landfill site	Land / unit manager	Construction and Operation

Performance Indicator	Annual elimination of all six listed invasives, permanent elimination of woody invasives within a 200 m radius
Monitoring	Bi-annual visual inspection of the landfill site, as well as adjacent natural vegetation, to assess the success of control measures

Provided the recommendations suggested in this report are followed, and the developer complies with all relevant legislation pertaining to the development activities (such as the NEMA and NEMBA), there is no objection to the proposed development in terms of the terrestrial ecosystems of the study area. However, if the development were to proceed without the implementation of the recommendations given above then we would object to the development application, due to the potential negative impact of the landfill on terrestrial ecology of the area.

8. CONSULTATION PROCESS

Savanna Environmental, as the EAP, is assumed to have initiated the stakeholder engagement process with the I&AP's, including presenting information contained in this report and the formal Issues and Comments Register contained in the EIA documentation, fully documenting the responses to all terrestrial ecology related issues and concerns.

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10. APPENDICES

Appendix 1. Checklist of Flora Recorded During Fieldwork

Taxa	Growth Form	NEMBA Invasive Species Category	Vegetation Communities	
			Short Grassland	Tall Grassland
Family Acanthaceae				
Crabbea acaulis N.E.Br.	herb		r	
Family Amaranthaceae				
* *Amaranthus hybridus* L.	herb		r	r
* *Alternanthera pungens* Kunth	herb		r	
Family Apiaceae				
Centella asiatica (L.) Urb.	herb		r	
Family Apocynaceae				
Gomphocarpus fruticosus (L.) W.T.Aiton	herb		r	
Family Asteraceae				
Berkheya pinnatifida (Thunb.) Thell. subsp. *ingrata* (Bolus) Roessler	herb		u	r
Berkheya radula (Harv.) De Wild.	herb		r	
* *Bidens pilosa* L.	herb		r	r
* *Cirsium vulgare* (Savi) Ten.	herb	1b	r	r
Conyza sp.	herb			r
* *Cosmos bipinnatus* Cav.	herb		r	u
* *Crepis hypochaeridea* (DC.) Thell.	herb		r	
* *Erigeron sumatrensis* Retz.	herb		u	r
Gerbera ambigua (Cass.) Sch.Bip.	herb		r	

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Haplocarpha scaposa Harv.	herb		r	
Helichrysum aureonitens Sch.Bip.	herb		r	
Helichrysum caespititium (DC.) Harv.	herb		u	
Helichrysum pilosellum (L.f.) Less.	herb		f	
Helichrysum rugulosum Less.	herb		u	r
Helichrysum sp.	herb		r	
Hilliardiella aristata (DC.) H.Rob.	herb		f	
Hilliardiella oligocephala (DC.) H.Rob.	herb		r	
Nidorella aegyptiaca (L.) J.C.Manning & Goldblatt	herb		r	
Nidorella podocephala (DC.) J.C.Manning & Goldblatt	herb		r	
* *Schkuhria pinnata* (Lam.) Kuntze ex Thell.	herb		u	r
Senecio latifolius DC.	herb		r	r
Senecio sp.	herb		r	
Senecio madagascariensis Poir.	herb		r	r
Seriphium plumosum L.	dwarf shrub		u	
* *Sonchus oleraceus* L.	herb			r
* *Tagetes minuta* L.	herb		r	r
Family Commelinaceae				
Commelina africana L. var. *africana*	herb		r	
Family Convolvulaceae				
* *Cuscuta campestris* Yunck.	climber	1b	r	
Family Cyperaceae				
Cyperus esculentus L. var. *esculentus*	sedge		r	
Cyperus sp.1	sedge		r	
Family Dipsacaceae				
Scabiosa columbaria L.	herb		r	
Family Euphorbiaceae				
Acalypha peduncularis E.Mey. ex Meisn.	herb		r	
* *Euphorbia prostrata* Aiton	herb		r	
Family Fabaceae				
Crotalaria sp. (no flowers)	herb		u	

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Indigofera sp. (no flowers)	herb		r	
* *Melilotus albus* Medik.	herb		r	
Family Gentianaceae				
Sebaea leiostyla Gilg	herb		r	
Family Geraniaceae				
Pelargonium luridum (Andrews) Sweet	herb		r	
Family Hyacinthaceae				
Ledebouria ovalifolia (Schrad.) Jessop	geophyte		r	
Family Hypoxidaceae				
Hypoxis rigidula Baker	geophyte		r	
Hypoxis obtusa Burch. ex Ker Gawl.	geophyte		u	
Family Lobeliaceae				
Lobelia flaccida (C.Presl) A.DC.	herb		r	
Family Malvaceae				
Hermannia depressa N.E. Br.	herb		u	r
Hermannia transvaalensis Schinz	herb		f	
Hibiscus pusillus Thunb.	herb		r	
* *Hibiscus trionum* L.	herb			r
Family Onagraceae				
* *Oenothera rosea* L'Hér. ex Aiton	herb		u	r
Family Oxalidaceae				
* *Oxalis corniculata* L.	herb			r
Family Plantaginaceae				
* *Plantago lanceolata L.*	herb		u	r
Family Poaceae				
Aristida adscensionis L.	grass		f	
Aristida congesta subsp. *barbicollis* (Trin. & Rupr.) De Winter	grass		d	r
* *Cymbopogon pospischilii* (K.Schum.) C.E.Hubb.	grass		r	
Cynodon dactylon (L.) Pers.	grass		u	
Elionurus muticus (Spreng.) Kunth	grass		r	
Eragrostis chloromelas Steud.	grass		u	r

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Eragrostis curvula (Schrad.) Nees	grass		u	r
Eragrostis plana Nees	grass		f	r
Eragrostis racemosa (Thunb.) Steud.	grass		u	
Eragrostis sp.	grass		r	
Heteropogon contortus (L.) Roem. & Schult.	grass		d	
Hyparrhenia hirta (L.) Stapf	grass		u	d
Hyparrhenia tamba (Hochst. ex Steud.) Andersson ex Stapf	grass		r	
Melinis repens (Willd.)	grass		r	
Microchloa caffra Nees	grass		u	
Paspalum dilatatum Poir.	grass		r	
* *Pennisetum clandestinum* Hochst. ex Chiov.	grass	1b#	u	
Poaceae sp.1	grass		r	
Poaceae sp.2	grass		r	r
Schizachyrium sanguineum (Retz.) Alston	grass		u	
Sporobolus africanus (Poir.) Robyns & Tournay	grass		f	r
Sporobolus pyramidalis P.Beauv.	grass			r
Themeda triandra Forssk.	grass		r	
Trachypogon spicatus (L.f.) Kuntze	grass		r	
Family Rubiaceae				
Anthospermum rigidum Eckl. & Zeyh. subsp. *rigidum*	dwarf shrub		u	
* *Richardia brasiliensis* Gomes	herb		r	r
Family Scrophulariaceae				
Selago densiflora Rolfe	herb		u	r
Family Solanaceae				
* *Datura stramonium* L.	herb	1b		r
* *Physalis angulata* L.	herb		u	r
* *Solanum elaeagnifolium* Cav.	herb	1b	r	
Family Verbenaceae				
* *Verbena bonariensis* L.	herb	1b	u	r
Family Zygophyllaceae				
Tribulus terrestris L.	herb		r	

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Total	**86**	**6**	**80**	**31**

d = dominant
f = frequent
u = uncommon
r = rare
# - only in protected areas and wetlands in which it does not already occur

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Appendix 2. Checklist of Fauna Recorded in the Study Area

Common Name	Scientific Name	Endemic	Assemblages	
			Short Grassland	Tall Grassland
Mammals				
ORDER: RODENTIA				
Family Hystricidae (porcupines)				
Common Porcupine	*Hystrix africaeaustralis*		X	X
ORDER: LAGOMORPHA				
Family Leporidae (hares)				
Scrub Hare	*Lepus saxatilis*		X	
ORDER: CARNIVORA				
Family Felidae (cats)				
Felid sp.	*Leptailurus / Caracal*			X
Subtotal	**3**		**2**	**2**
Birds				
ORDER: GALLIFORMES				
Family Numididae (guineafowl)				
Helmeted Guineafowl	*Numida meleagris*		X	
Family Phasianidae (pheasants, fowl and allies)				
Swainson's Spurfowl	*Pternistis swainsonii*		X	
ORDER: PELECANIFORMES				
Family Ardeidae (herons and bitterns)				
Western Cattle Egret	*Bubulcus ibis*		X	
ORDER: ACCIPITRIFORMES				
Family Accipitridae (kites, hawks and eagles)				
Black-winged Kite	*Elanus caeruleus*		X	
ORDER: COLUMBIFORMES				
Family Columbidae (pigeons and doves)				
Speckled Pigeon	*Columba guinea*		X	
Laughing Dove	*Spilopelia senegalensis*		X	
Ring-necked Dove	*Streptopelia capicola*		X	
Red-eyed Dove	*Streptopelia semitorquata*		X	
ORDER: APODIFORMES				
Family Apodidae (swifts)				
Little Swift	*Apus affinis*		over	over
White-rumped Swift	*Apus caffer*		over	over
ORDER: FALCONIFORMES				
Family Falconidae (caracaras and falcons)				
Amur Falcon	*Falco amurensis*		X	
ORDER: PASSERIFORMES				
Family Laniidae (shrikes)				
Southern Fiscal	*Lanius collaris*		X	
Family Corvidae (crows and jays)				
Pied Crow	*Corvus albus*		X	
Family Hirundinidae (swallows and martins)				
White-throated Swallow	*Hirundo albigularis*		over	over
Barn Swallow	*Hirundo rustica*		over	over

Brown-throated Martin	*Riparia paludicola*		over	over
Family Cisticolidae (cisticolas and allies)				
Zitting Cisticola	*Cisticola juncidis*			X
Levaillant's Cisticola	*Cisticola tinniens*			X
Black-chested Prinia	*Prinia flavicans*			X
Family Sturnidae (starlings)				
Pied Starling	*Lamprotornis bicolor*	SLS	X	
Family Muscicapidae (chats and Old-World flycatchers)				
African Stonechat	*Muscicapa aquatica*		X	X
Family Passeridae (Old World sparrows)				
Cape Sparrow	*Passer melanurus*		X	
Family Ploceidae (weavers and widowbirds)				
Southern Red Bishop	*Euplectes orix*			X
Fan-tailed Widowbird	*Euplectes axillaris*			X
Long-tailed Widowbird	*Euplectes progne*			X
Southern Masked Weaver	*Ploceus velatus*		X	X
Family Estrildidae (waxbills, munias and allies)				
Orange-breasted Waxbill	*Amandava subflavus*			X
Common Waxbill	*Estrilda astrild*			X
Quailfinch	*Ortygospiza atricollis*		X	
Family Viduidae (indigobirds and whydahs)				
Pin-tailed Whydah	*Vidua macroura*			X
Family Motacillidae (wagtails and pipits)				
African Pipit	*Anthus cinnamomeus*		X	
Cape Longclaw	*Macronyx capensis*		X	
Family Fringillidae (finches and canaries)				
Black-throated Canary	*Crithagra atrogularis*		X	
Yellow Canary	*Crithagra flaviventris*		X	X
Cape Canary	*Serinus canicollis*			X
Subtotal	**35**	**1**	**25**	**18**
TOTAL	**38**	**1**	**27**	**20**

SLS = South Africa, Lesotho and eSwatini

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Appendix 3. Potentially Occurring Fauna of Conservation Concern

Common Name	Scientific Name	Red Data	Protected	Habitat Preference	VMUS Record for 2729 BB	SABAP2 Reporting Rate for 2729 BB	Likelihood of Occurrence	Reason
MAMMALS								
Highveld Golden Mole	*Amblysomus septentrionalis*	NT		Meadows and edges of marshes in high-altitude grasslands			Low	Suitable habitat present only on adjacent properties
African Clawless Otter	*Aonyx capensis*	NT	MNCA	Rivers and streams	X		Very Low	No suitable aquatic habitat present
Southern African Hedgehog	*Atelerix frontalis*	NT	MNCA	Arid grassland and woodland			Moderate	Some suitable habitat present
Rough-haired Golden Mole	*Chrysospalax villosus*	VU		Sandy soils in grassland, wetland edge			Low	Suitable habitat present only on adjacent properties
Maquassie Musk Shrew	*Crocidura maquassiensis*	VU		Rocky grassland			Low	Poorly known species, no recent records in the Amersfoort area
Swamp Musk Shrew	*Crocidura mariquensis*	NT		Reedbeds, wetlands and the thick grass along riverbanks			Very Low	Suitable habitat present only on adjacent properties
Rough-haired Golden Mole	*Chrysospalax villosus*	VU		Sandy soils in grasslands, meadows and along edges of marshes in Savannah and Grassland			Very Low	No suitable sandy soils present, no records from Amersfoort area

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African Marsh Rat	*Dasymys incomtus*	VU		Reed beds and among semi-aquatic grasses in wetlands or swampy areas or along rivers and streams, as well as in grassy areas close to water			Low	Poorly known species, no records in the Amersfoort area
Black-footed Cat	*Felis nigripes*	VU	NEMBA (PR)	Arid grassland, semi-desert, arid savanna			Very Low	Limited suitable habitat present, human disturbance, no recent records
Cape Mole-rat (Mpumalanga Subpopulation)	*Georychus capensis*	DD		Deep, sandy soils in Highveld grassland			Low	No suitable sandy soils present
Spotted-necked Otter	*Hydrictis maculicollis*	VU	MNCA	High-altitude rivers, streams, dams and lakes			Very Low	Suitable habitat present only on adjacent properties
Serval	*Leptailurus serval*	NT	NEMBA (PR)	Wide variety of open grassland and woodland habitats	X		High	Suitable habitat present, recorded from the area during a previous ecological survey
White-tailed Rat	*Mystromys albicaudatus*	EN		Calcrete soils in grasslands			Low	No suitable habitat present, rare and poorly known species
Vlei Rat	*Otomys auratus*	NT		Mesic grasslands and wetlands within alpine, montane and sub-montane regions			Low	Suitable habitat present only on adjacent properties
Oribi	*Ourebia ourebi*	EN	NEMBA (EN)	Open savanna grassland, floodplains and other grassland types	X		Very Low	Limited habitat present, human disturbance

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Aardvark	*Orycteropus afer*		NEMBA (PR)	Wide variety of habitats			Low	Some suitable habitat present but rare in the general area
Leopard	*Panthera pardus*	VU	NEMBA (PR)	Wide variety of habitats			Very Low	High disturbance, regional rarity
Brown Hyaena	*Parahyaena brunnea*	NT	NEMBA (PR)	Wide variety of arid habitats			Low	No recent records, high disturbance levels
Grey Rhebok	*Pelea capreolus*	NT	MNCA	High altitude grasslands			Low	No recent records, high disturbance levels
African Weasel	*Poecilogale albinucha*	NT		Wide variety of habitats			Low	Very rare in Mpumalanga
Aardwolf	*Proteles cristatus*		MNCA	Wide variety of habitats			Low	Some suitable habitat present but rare in the general area
Steenbok	*Raphicerus campestris*		MNCA	Wide variety of habitats			Moderate	Some suitable habitat present
Southern Mountain Reedbuck	*Redunca fulvorufula*	EN	MNCA	Mountainous high altitude grasslands			Low	No recent records, high disturbance levels
Subtotal	**22**	**19**	**13**					
BIRDS								
Yellow-breasted Pipit	*Anthus chloris*	VU		Escarpment grassland above 2000 mamsl		-	Very Low	No suitable habitat present, found further east and south on Escarpment grasslands
Grey Crowned Crane	*Balearica regulorum*	EN	NEMBA (EN)	Wetland and grassland		2,9%	Very Low	No suitable habitat present
Curlew Sandpiper	*Calidris ferruginea*	NT‡		Mudflats, tidal wetlands		-	Very Low	No suitable habitat present
Black Stork	*Ciconia nigra*	VU		Forages in wetlands and breeds on cliffs		1,4%	Very Low	No suitable habitat present

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Pallid Harrier	*Circus macrourus*	NT		Open grassland and semi-desert		-	Low	Suitable foraging habitat present on the adjacent properties only but no recent records for the area
Black Harrier	*Circus maurus*	EN		Fynbos, highveld grassland		-	Low	Limited suitable habitat present, unrecorded from the area
African Marsh Harrier	*Circus ranivorus*	EN		Undisturbed wetland and grassland		1,4%	Low	No recent records for the area, limited suitable habitat present
European Roller	*Coracias garrulus*	NT		Open woodland, tropical and subtropical grasslands		1,4%	Very Low	Vagrant to the Amersfoort area
White-bellied Korhaan	*Eupodotis senegalensis*	VU		Open woodland and grassland		-	Low	Some suitable habitat present but unrecorded from the area
Lanner Falcon	*Falco biarmicus*	VU		Wide variety of habitats		7,1%	Moderate	Some suitable foraging habitat present only
Red-footed Falcon	*Falco vespertinus*	NT		Arid grassland and open woodland		-	Low	Limited suitable habitat present, unrecorded from the area
Southern Bald Ibis	*Geronticus calvus*	VU	NEMBA (VU)	Montane grassland, ploughed lands		21,4%	Moderate	Some suitable foraging habitat present only
Black-winged Pratincole	*Glareola nordmanni*	NT		Short Highveld grassland, wetland		1,4%	Low	Limited suitable foraging habitat present, very rare in the Amersfoort area
Blue Crane	*Grus paradiseus*	NT	NEMBA (PR)	Undisturbed grassland in Mpumalanga		5,7%	Low	High disturbance levels present, avoids very tall grassland

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Rudd's Lark	*Heteromirafra ruddi*	EN		Escarpment grasslands between 1700 and 2200 mamsl		_	Very Low	No suitable habitat present, found further east and south on Escarpment grasslands
Denham's Bustard	*Neotis denhami*	VU	NEMBA (VU)	Undisturbed open grassland		-	Very Low	High disturbance levels present, avoids very tall grassland
Maccoa Duck	*Oxyura maccoa*	NT		Pans, dams, wetlands		1,4%	Very Low	No suitable habitat present
Greater Flamingo	*Phoenicopterus roseus*	NT		Saline pans		-	Very Low	No suitable habitat present
Lesser Flamingo	*Phoeniconaias minor*	NT		Saline pans		-	Very Low	No suitable habitat present
Secretarybird	*Sagittarius serpentarius*	VU		Open savanna and grassland		14,3%	Low	Although a pair was observed on a nearby property during a previous survey, disturbance levels are very high and this species avoids very tall grassland
Botha's Lark	*Spizocorys fringillaris*	EN		Heavily grazed grasslands between 1500 and 1900 mamsl		12,9%	Low	Although recorded from 2705_2955, it avoids very tall grassland as is present within the study area. The remaining short grassland is disturbed and unsuitable for this species. Some suitable habitat is present on the adjacent property.

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African Grass Owl	*Tyto capensis*	VU		Grassland		-	Low	Some suitable habitat present but unrecorded from the area. Disturbance levels are also high. An increasingly rare species
Subtotal	**22**	**22**	**4**					
HERPETOFAUNA								
Giant Girdled Lizard	*Smaug giganteus*	VU		Undisturbed dry Highveld grassland	X		Low	Confirmed from 2729 BB but very limited habitat present within the study area. No burrows located despite intensive searching
Spotted Shovel-nosed Frog	*Hemisus guttatus*	NT		Escarpment grasslands, coastal forest and woodland			Low	No suitable habitat present, only found on the Escarpment further to the south
Subtotal	**2**	**19**	**4**					
TOTAL	**46**	**60**	**21**					

EN - Endangered
VU - Vulnerable
NT - Near Threatened
DD - Data Deficient
MNCA - Mpumalanga Nature Conservation Act
NEMBA - National Environmental Management: Biodiversity Act
‡ - IUCN assessment

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Appendix 4. Specialist Report Checklist and Information Requested by the Competent Authorities

A Specialist Report Checklist Table has been compiled in accordance with the Appendix 6 of the EIA Regulations (GNR 982 of 04 December 2014). The section which relays the specific information required as per the guideline is given in the second column of the Table.

Any additional information requested by the Competent Authorities will be included in this section.

Specialist Report Guideline: Appendix 6 GNR 982 EIA Regulations 4 December 2014 as amended	
Details to be Included in the Report	**Section in Report**
Details of	
Specialist who prepared the report	1
Expertise of the specialist	1
CV of the specialist	Appendix 5
Declaration that the Specialist is Independent in a form as may be specified by the CA	Appendix 7
An indication of the Scope of and the Purpose for which the report was prepared	3
An indication of the Quality and Age of base data used for the specialist report	4.3
A Description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change	5
The Duration, Date and Season of the site investigation and the relevance of the season to the outcome of the assessment	4.3
A Description of the Methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used	4.2, 4.3, 4.4, 4.5
Details of an Assessment of the specific identified Sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives	5.6
An identification of any areas to be avoided including buffers	7
A Map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided including buffers	Fig 7
A Description of any Assumptions made and any Uncertainties or Gaps in Knowledge	4.6
A Description of the Findings and Potential implications of such findings on the Impact of the proposed activity, including identified Alternatives on the environment, or activities	5
Any Mitigation Measures for inclusion in the EMPr	6, 7
Any Conditions for inclusion in the Environmental Authorisation	6, 7
Any Monitoring Requirements for inclusion in the EMPr or Environmental Authorisation	6, 7
Reasoned Opinion	

As to whether the proposed activity/ activities or portions thereof should be authorised	7
Regarding the acceptability of the proposed activity or activities	7
If the opinion is that the proposed activity or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr and where applicable the closure plan	7
A Description of any Consultation Process that was undertaken during the course of preparing the specialist report	8
A Summary and copies of any comments received during any consultation process and where applicable all responses thereto	App 4
Any other Information requested by the CA	App 4

Appendix 5. Curriculum Vitae of Duncan McKenzie

Profession	Terrestrial Ecologist
Date of Birth	9 November 1977
Name of Firm	Digital Earth (Pty) Ltd.
Position in Firm	Director / Ecologist
Years with firm	4
Nationality	South African

Qualifications

- National Diploma: Nature Conservation (UNISA, 2007)
- National Certificate: Nature Guiding (Drumbeat Academy, 2004)

Membership in Professional Societies

- BirdLife South Africa
- South African Council for Natural Scientific Professions (Reg.No.122647)

Language Proficiency

- English (home language) - excellent
- Afrikaans - good
- isiZulu / isiSwati – fair to good

Countries of Work Experience

Botswana, Democratic Republic of the Congo, Lesotho, Mali, Morocco, Mozambique, Namibia, Republic of Guinea, Sierra Leone, South Africa, Swaziland, Tanzania, Zimbabwe.

EXPERIENCE & ACHIEVEMENTS

- 15 years' experience in specialist species identification, conducting baseline surveys, data analysis and report writing in various biomes in southern Africa, particularly savanna, forest and grassland biomes.
- 2 years' experience game reserve management (KwaZulu-Natal).
- 5 years' experience (part time) of wetland delineation and management.
- 2 years' experience of plant propagation and use for rehabilitation.
- Co-author of the new Guidelines for the implementation of the Terrestrial Flora (3c) & Terrestrial Fauna (3d) Species Protocols for environmental impact assessments in South Africa (SANBI, 2020).
- Lead-author of the Birds of Mbombela book, published in 2019 by BirdLife Lowveld.
- 2017 recipient of BirdLife South Africa's Owl Award.

- SABAP2 Regional Co-ordinator for Mpumalanga.
- eBird Regional Reviewer for Mpumalanga.
- Scientific Advisor for BirdLife Lowveld.

EMPLOYMENT RECORD

2007 - present	ECOREX Consulting Ecologists CC / Digital Earth	Ecologist / Director
2005 - 2006	Iglu (London, UK)	Specialist Travel Agent
1997 - 2005	Duncan McKenzie Bird Tours	Owner, Specialist Guide
2001	KZN Wildlife	District Conservation Officer, Reserve Manager
1999 - 2001	Institute of Natural Resources	Part-time Horticulturalist and Rehabilitation Officer
1997-2001	Mondi Wetlands Project	Part-time Field Assistant and Regional Co-ordinator
1996-1997	Natal Parks Board	Ranger

RELEVANT PROJECTS & EXPERIENCE

COUNTRY	YEAR	PROJECT	CONTACT
Mozambique			
Mozambique	2018 - 2019	Mozambique LNG Crab Plover Population Study	ERM - Jessica Hughes (jessica.hughes@erm.com)
	2015	Biodiversity Baseline Study for a SASOL Gas Pipeline, Inhassoro	ERM - Jessica Hughes (jessica.hughes@erm.com)
	2014	Terrestrial Fauna Survey of the Quirimbas Palma-Pemba Coastal Road	ERM - Jessica Hughes (jessica.hughes@erm.com)
	2013	Biodiversity Baseline Study and Impact Assessment for Benga Coal Mine, Tete	Nepid Consultants - Dr Rob Palmer rob@nepid.co.za)
	2008	Terrestrial Ecology Study for Chinhanguanine Sugar Expansion Project, Maputo Province	ACER (Africa) Environmental Management Consultants
Tanzania			
Tanzania	2011	Biodiversity Baseline Study and Impact Assessment for Mkuju River Uranium Project, Selous Game Reserve, Songea	Epoch Resources - Fanie Coetzee (fanie@epochresources.co.za)
	2020	Terrestrial Ecology Survey of Kakono Hydropower Scheme, Kagera Region	SLR - Jessica Hughes (jessica.hughes@slrconsulting.com)
Southern and South-central Africa			
Democratic Republic of Congo	2016	Survey Of The Cupriferous Plant Translocation Programme For Kinsevere Mine, Katanga Province, DRC	Knight Piesold - Amelia Briel (abriel@knightpiesold.com)
	2014	Biodiversity Baseline Study and Impact Assessment for Pumpi Copper Mine, Kolwezi	Epoch Resources - Fanie Coetzee (fanie@epochresources.co.za)

	2011	Biodiversity Baseline Study and Impact Assessment for Kinsevere Copper Mine, Lubumbashi	Knight Piesold - Amelia Briel (abriel@knightpiesold.com)
South Africa	2021	Biodiversity Baseline Study and Impact Assessment for the Instream Construction on Little Gowrie	Henwood Environmental Services - Steven Henwood (shenwood@mweb.co.za)
	2019	Baseline Terrestrial Ecology Study & Biodiversity Value Assessment for the proposed Ilima Coal Mine	Epoch Resources - Fanie Coetzee (fanie@epochresources.co.za)
	2018	Baseline Terrestrial Ecology Study & Biodiversity Value Assessment for the proposed Olienhout Dam	Enpact Environmental Consultants CC - Heinrich Kammeyer (heinrich@enpact.co.za)
	2018	Baseline Terrestrial Ecology Study & Biodiversity Value Assessment for the proposed Strathmore Dam	Henwood Environmental Services - Steven Henwood (shenwood@mweb.co.za)
	2017	Baseline Terrestrial Ecology Study & Biodiversity Value Assessment for the proposed Croc River Sub-station and Powerline Routes	Enpact Environmental Consultants CC - Heinrich Kammeyer (heinrich@enpact.co.za)
	2016	Baseline Terrestrial Ecology Study And Biodiversity Sensitivity Assessment of the proposed developments on Lapalala Wilderness	NuLeaf - Peter Velcich (peter@nuleafsa.co.za)
	2014	Botanical Survey for the Kumba Mine Powerline Re-Routing	Synergistics - Chiara Kotze (ckotze@slrconsulting.com)
	2007	Terrestrial Ecology Study for the Groot Letaba Water Resource Development Scheme, Tzaneen	Iliso Consulting - Terry Baker (terry@iliso.com)
Swaziland	2017	Strengthening National Protected Areas Systems in Swaziland (SNPAS)	Linda Loffler (lindad@realnet.co.sz)
	2009	Biodiversity Baseline Study for Siphofaneni Road Developments	Aurecon Nelspruit (mbombela@aurecongroup.com)

BOOKS

- McKenzie, D. & Lawson, P. 2019. *Birds of Mbombela A Comparative Study*. Birdlife Lowveld, Nelspruit.
- Scientific Advisor on van den Berg, P. *Game Drive Birds of Southern Africa*. HPH, Cascades.
- Contributor on Chittenden, H. & Whyte, I. 2008. *Roberts Bird Guide Kruger National Park and Adjacent Lowveld*. John Voelcker Bird Book Fund, Cape Town.
- Contributor on Tarbotan, W. & Ryan, P. 2016. *Guide to Birds of the Kruger National Park*. Struik Nature, Cape Town.

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- McKenzie, D.R., Underhill, L.G., López Gómez, M. and Brooks, M. Bird distribution dynamics - Pale-crowned Cisticola *Cisticola cinnamomeus* in South Africa. Biodiversity Observations 2017 8.15:1-9.
- McKenzie, D.R. Reporting rate comparisons for birds in the Nelspruit area – SABAP1 vs SABAP2. Biodiversity Observations, 2 (), 22 – 31.

- Guest editor on Underhill, L.G., Lawson, P. R. da Cruz, P. and Glasson, A. The impact of political history on birds: A case study in north-eastern Mpumalanga, South Africa. Biodiversity Observations7.68: 1–56.
- McKenzie, D. & McKenzie, L. 2019. The Avifaunal Importance of the Barberton-Makhonjwa World Heritage Site. BirdLife Lowveld, Mbombela.
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- von Staden, L. & McKenzie, D. 2019. *Aloe komatiensis* Reynolds. National Assessment: Red List of South African Plants version 2020.1.
- von Staden, L., Lötter, M. & McKenzie, D. 2019. *Aloe modesta* Reynolds. National Assessment: Red List of South African Plants version 2020.1.

DECLARATION

I declare that the particulars above are accurate and true to the best of my knowledge and belief.

DECLARATION

I declare that the particulars above are accurate and true to the best of my knowledge and belief.

SIGNATURE **DATE 14 April 2022**

Appendix 6. Professions Certificates of the Study and Review Team

SACNASP
South African Council for Natural Scientific Professions

herewith certifies that

Robert William Palmer

Registration Number: 400108/95

is a registered scientist

in terms of section 20(3) of the Natural Scientific Professions Act, 2003
(Act 27 of 2003)
in the following fields(s) of practice (Schedule 1 of the Act)

Biological Science (Professional Natural Scientist)

Effective **25 October 1995** Expires **31 March 2023**

Botha
Chairperson

Chief Executive Officer

To verify this certificate scan this code

SACNASP
South African Council for Natural Scientific Professions

herewith certifies that

Duncan McKenzie

Registration Number: 122647

is a registered scientist

in terms of section 20(3) of the Natural Scientific Professions Act, 2003
(Act 27 of 2003)
in the following fields(s) of practice (Schedule 1 of the Act)

Ecological Science (Certificated Natural Scientist)

Effective **5 May 2021** Expires **31 March 2023**

Chairperson

Chief Executive Officer

To verify this certificate scan this code

THE SOUTH AFRICAN COUNCIL FOR
PROFESSIONAL AND
TECHNICAL SURVEYORS

DIE SUID AFRIKAANSE RAAD VIR
PROFESSIONELE EN
TEGNIESE OPMETERS

CERTIFICATE OF REGISTRATION
SERTIFIKAAT VAN REGISTRASIE

This is to certify that — Hiermee word gesertifiseer dat

Linda Mc Kenzie

was registered as a — geregistreer is as 'n

PROFESSIONAL GISc PRACTITIONER

on the 13th day of March 2012 — op die 13de dag van Maart 2012

in accordance with the provisions of the Professional and Technical Surveyors' Act, 1984 (Act No 40 0f 1984) and is entitled to carry on his/her profession or calling in any part of the Republic of South Africa in terms of the said Act and rules framed thereunder.

ingevolge die bepalings van die Wet op Professionele en Tegniese Opmeters, 1984 (Wet nr 40 van 1984) en geregtig is om sy/haar beroep of nering in enige deel van die Republiek van Suid-Afrika te beoefen ingevolge die genoemde Wet en reëls daarvolgens uitgevaardig.

President

Issued under the Seal of the Council
Uitgereik onder die Seël van die Raad

Registration Number
Registrasienommer PGP 0170

Registrar
Registrateur

Goldfields Press

Appendix 7. Specialists Declaration

10.4 The Specialist

Note: Duplicate this section where there is more than one specialist.

10.4 The Specialist

Note: Duplicate this section where there is more than one specialist.

I …Duncan McKenzie…, as the appointed specialist hereby declare/affirm the correctness of the information provided as part of the application, and that I:

- in terms of the general requirement to be independent (tick which is applicable):

X	other than fair remuneration for work performed/to be performed in terms of this application, have no business, financial, personal or other interest in the activity or application and that there are no circumstances that may compromise my objectivity; or

	am not independent, but another EAP that is independent and meets the general requirements set out in Regulation 13 has been appointed to review my work (Note: a declaration by the review specialist must be submitted);

- have expertise in conducting specialist work as required, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity;
- will ensure compliance with the EIA Regulations 2014 (as amended in 2017);
- 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 application;
- will take into account, to the extent possible, the matters listed in regulation **18** of the regulations when preparing the application and any report, plan or document relating to the application;
- will disclose to the proponent or applicant, registered interested and affected parties 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 or the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority (unless access to that information is protected by law, in which case I will indicate that such protected information exists and is only provided to the competent authority);
- declare that all the particulars furnished by me in this form are true and correct;
- am aware that it is an offence in terms of Regulation 48 to provide incorrect or misleading information and that a person convicted of such an offence is liable to the penalties as contemplated in section 49B(2) of the National Environmental Management Act, 1998 (Act 107 of 1998).

Signature of the specialist

Digital Earth (Pty) Ltd.

Name of company

30/06/2022

Date