

TERRESTRIAL BIODIVERSITY IMPACT ASSESSMENT

DOCUMENT CONTROL

Report Name	MOLEPO, M., & JOSIAH, K. 2022. TERRESTRIAL BIODIVERSITY IMPACT ASSESSMENT FOR THE PROPOSED STOCKPILE ON PORTION OF THE FARM ELANDS SPRUIT NO 5523 WITHIN UTHUKELA DISTRICT MUNICIPALITY IN THE KWAZULU-NATAL PROVINCE.
Reference	GM/TBIA0522
Submitted to	GREENMINED ENVIRONMENTAL
Authors	Mokgatla Molepo <i>Pr. Sci.Nat.</i> : 009509 Kyrone Josiah

BACKGROUND AND EXECUTIVE SUMMARY

MORA Ecological Services (Pty) Ltd was appointed by Greenmined Environmental on to conduct a terrestrial biodiversity impact assessment for the proposed stockpile on portion of the Farm Elands Spruit No 5523 within uThukela District Municipality in the KwaZulu-Natal Province.

The study site was investigated to determine potential impacts on the immediate natural environment. Survey methodology included a comprehensive desktop review, utilising available provincial ecological data, relevant literature, SANBI BGIS databases, topographical maps, and aerial photography. This was then supplemented through a ground-truthing phase, where the site was visited during a field survey in August 2022. This allowed for the assessment of the habitat integrity and status of the vegetation that was identified during the desktop review.

Floral features:

The study site falls within the Grassland biome, and the vegetation type typically found on site is Northern KwaZulu-Natal Moist Grassland. The study site consists mainly open grassland with a few sparsely spaced woody trees and one large patch of woody trees. No species of Conservation Concern were observed on site.

Faunal features:

The birds, mammals and reptiles were surveyed through direct and indirect methods. Although no mammal and reptile species were observed during the survey, observations were made of five bird species which were recorded, and these were generalist species. From the direct survey conducted, no species of Conservation Concern were observed.

Conclusions and Recommendations:

The project area has a medium ecological function due to surrounding developments and current land use. From the survey conducted, there are no evident fatal flaws that would prevent this application from being authorised, nor being conducted in a sustainable manner.

TABLE OF CONTENTS

BACKGROUND AND EXECUTIVE SUMMARY	iii
List of tables	v
List of figures	v
DECLARATION OF INDEPENDENCE	vi
INDEMNITY	vi
1. INTRODUCTION	1
2. TERMS OF REFERENCES	3
2.1. Objectives of this study.....	3
2.2. Assumptions, Limitations, Uncertainties, and Gap analysis	3
3. SURVEY METHODS AND REPORTING	4
Climate	4
Biophysical Environment.....	4
Vegetation of the study site	4
Distribution	4
Vegetation & Landscape Features:	4
Geology & Soils:.....	4
4. LEGAL REQUIREMENTS	6
4.1. RELEVANT LEGISLATION	6
Provincial legislation.....	7
5. METHODOLOGY	10
6. Ecological function	11
Weeds and Invasive Plants.....	11
Sensitivity scale	12
Conservation status of the vegetation	14
7. RESULTS	14
Plants	15
Birds	15
SENSITIVITY ANALYSIS	15
8. CONCLUSION AND RECOMMENDATIONS	18
9. REFERENCES	19

List of tables

Table 1: Red Data Status definitions (SANBI, 2010)..... 10
Table 2: List of plant species recorded at the study site..... 15
Table 3: List of bird species recorded at the study site..... 15

List of figures

Figure 1: Location of the study site. 2
Figure 2: Vegetation of the study site. 5
Figure 3: Conservation plan of the study site. 9
Figure 4: DFFE screening tool outputs for animal species..... 12
Figure 5: DFFE screening tool outputs for plant species..... 13
Figure 6: DFFE screening tool outputs for terrestrial biodiversity. 13
Figure 7: Site sensitivity of the study site. 16

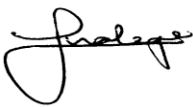
DECLARATION OF INDEPENDENCE

I, Mokgatla Molepo, in my capacity as a lead specialist consultant, hereby declare that I:

- Act/acted as an independent specialist to Greenmined Environmental for this project.
- Do not have any personal, business or financial interest in the project expect for financial remuneration for specialist investigations completed in a professional capacity as specified by the Environmental Impact Assessment Regulations, 2017.
- Will not be affected by the outcome of the environmental process, of which this report forms part of.
- Do not have any influence over the decisions made by the governing authorities.
- Do not object to or endorse the proposed developments but aim to present facts and my best scientific and professional opinion regarding the impacts of the development.
- Undertake to disclose to the relevant authorities any information that has or may have the potential to influence its decision or the objectivity of any report, plan or document required in terms of the Environmental Impact Assessment Regulations, 2017.

INDEMNITY

- This report is based on survey and assessment techniques which are limited by time and budgetary constraints relevant to the type and level of investigation undertaken.
- This report is based on a desktop investigation using available information and data related to the site to be affected, *in situ* fieldwork, surveys and assessments and the specialists best scientific and professional knowledge.
- The Precautionary Principle has been applied throughout this investigation.
- The findings, results, observations, conclusions and recommendations given in this report are based on the specialist's best scientific and professional knowledge as well as information available at the time of study.
- Additional information may become known or available during a later stage of the process for which no allowance could have been made at the time of this report.
- The specialist reserves the right to modify this report, recommendations and conclusions at any stage should additional information become available.
- Information and recommendations in this report cannot be applied to any other area without proper investigation.
- This report, in its entirety or any portion thereof, may not be altered in any manner or form or for any purpose without the specific and written consent of the specialist as specified above.
- Acceptance of this report, in any physical or digital form, serves to confirm acknowledgement of these terms and liabilities.



Mokgatla Molepo *Pr. Nat. Sci* (009509)

20 August 2022

1. INTRODUCTION

Humans alter their environment to suit their needs, to improve their quality of life, and to encourage economic growth. Generally, it is now accepted that development should be planned to make the best possible use of natural resources and to avoid degradation of the environment. Hence the need to pay explicit attention to environmental factors in the decision-making process. This should entail an accurate prediction and assessment of the impact of any development on the environment. It is essential for such assessment procedures to be developed alongside development planning, with the necessary mitigation that could inform development projects to conserve the natural environment.

MORA Ecological Services (Pty) Ltd has been appointed by Greenmined Environmental to undertake terrestrial biodiversity impact assessment for the proposed stockpiling on portion of the Farm Elands Spruit No 5523 within uThukela District Municipality in the KwaZulu-Natal Province. The study site/proposed area lies approximately 26 km North of Ladysmith Town (Fig. 1).

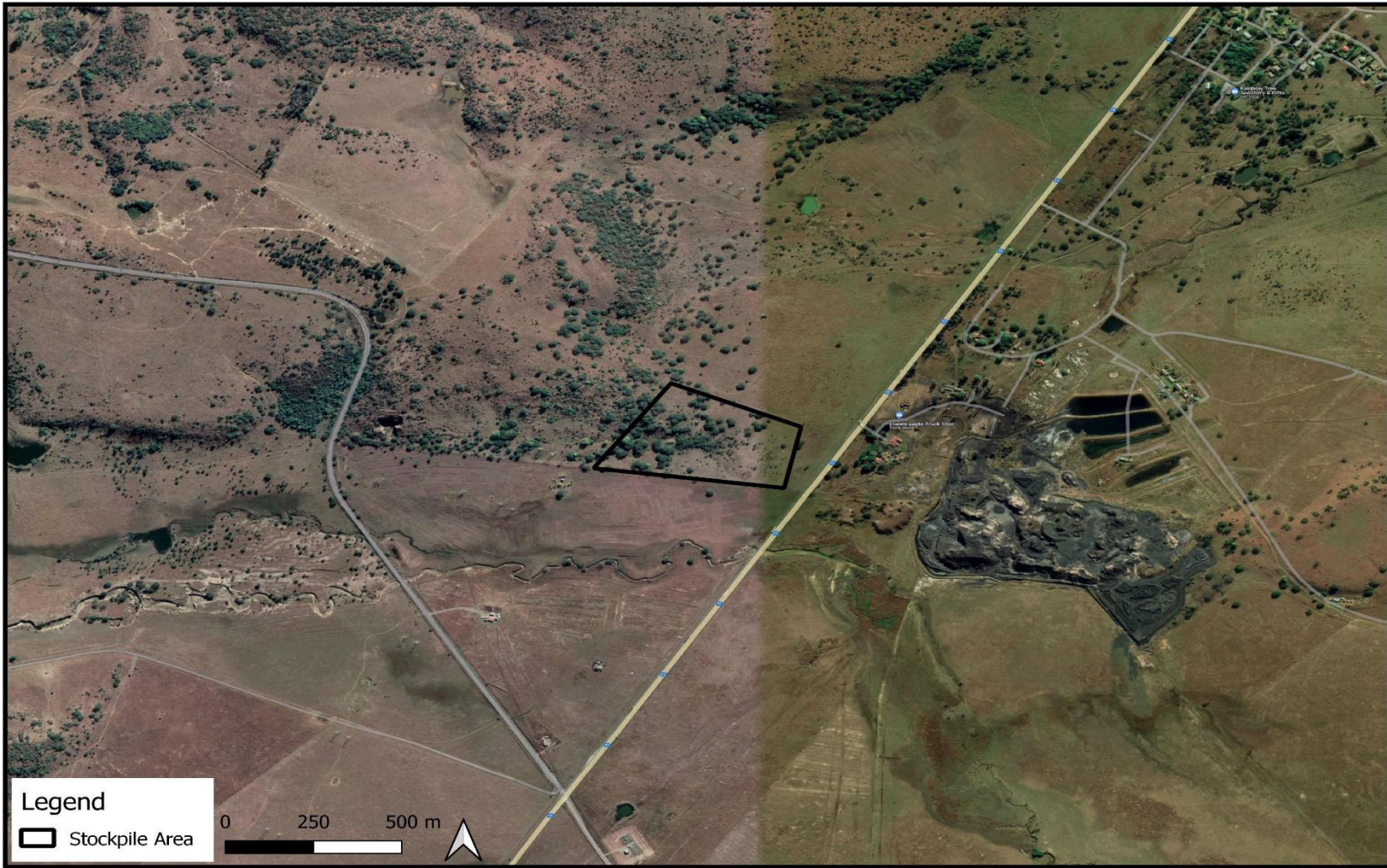


Figure 1: Location of the study site.

2. TERMS OF REFERENCES

- The study included the following activities:
- Provide a broad-scale map of the vegetation of the proposed site.
- A description of the dominant and characteristic species within the broad-scale plant communities.
- Provide a list of red data plant and animal species previously recorded within the study site, and information obtained from the relevant authorities and literature reviews.
- Identification of sensitive habitats and plant communities.
- Preliminary investigation of the impacts of the project and the provision of recommended mitigation measures; and
- Recommend practical mitigation measures to minimize or eliminate negative impacts and or enhance potential project benefits.

2.1. Objectives of this study

- To provide a description of the flora and fauna occurring around the proposed project area.
- To provide description of any threatened species occurring or likely to occur within the study area in terms of the National Red List Status (SANBI, 2012) and Red Data List (IUCN, 2018) specifying species that are either: rare, threatened, endangered, or critically endangered.
- Determine conservation priority areas according to authorised Critical Biodiversity Areas (CBAs).
- To describe the available habitats on the study site including areas of important conservation value.
- Identify and assess the potential impacts associated with a proposed development.

2.2. Assumptions, Limitations, Uncertainties, and Gap analysis

- The findings, results, observations, conclusions, and recommendations provided in this report are based on the author's best scientific and professional knowledge as well as available information regarding the perceived impacts on terrestrial environment.
- A description of vegetation was based on the physical field surveys and site walkthrough and investigations as performed on site.
- Results presented in this report are based on a snapshot investigation of the study site and not on detailed and long-term investigations of all environmental attributes and the varying degrees of biological diversity that may be present in the study site.
- The assessment of impacts and recommendation of mitigation measures were informed by the site-specific ecological issues arising from the field survey and based on the assessor's working knowledge and experience with similar projects.

3. SURVEY METHODS AND REPORTING

Climate

Elands Spruit has a Summer rainfall, with overall mean annual precipitation of 840 mm (710–1 120 mm; Camp 1999a), mainly as summer thunderstorms. Mist occurs frequently on hilltops in spring and early summer, but summer droughts are also frequent. Summers are warm to hot, with maximum temperature recorded in the hottest month of January (Mean Annual Temperature of 27.8°C). Mean Annual Temperature is around 16°C, but some surrounding localities may reach 17°C. Frosts are severe and occur about 20 days per year. Mean annual evaporation recorded at is approximately 1 895 mm.

Biophysical Environment

Vegetation of the study site

Floral diversity was determined by walkthroughs around the project area. The vegetation units of Mucina and Rutherford (2006) were used as references but where necessary communities are named according to the recommendations of a standardised South African Syntaxonomic nomenclature system. By combining the available literature with the survey results, stratification of vegetation communities was possible.

The study site is covered predominantly by open grassland with a patch of woody tree species. This type of vegetation has the potential to support a variety of faunal species including birds, but surrounding human activities seem to be a limiting factor.

The site falls within Grassland Biome and the vegetation type is Northern KwaZulu-Natal Moist Grassland. The vegetation type is explained below.

Distribution

This vegetation type is predominantly found in the northern and north-western regions of the KwaZulu-Natal Province, where it forms a discontinuous rim around the upper Thukela Basin and is situated almost entirely within the catchment of the Thukela River. The most extensive areas are in the vicinity of Winterton, Bergville, Fort Mistake, Dannhauser, Dundee, north of Ladysmith and west of Newcastle. Present at altitudes between 1 040–1 440 m.

Vegetation & Landscape Features:

Hilly and rolling landscapes supporting tall tussock grassland usually dominated by *Themeda triandra* and *Hyparrhenia hirta*. Open *Acacia sieberiana* var. *woodii* savannoid woodlands encroach up the valleys, usually on disturbed (strongly eroded) sites.

Geology & Soils:

Mudstones, sandstones and shales of the Beaufort and Ecca Groups of the Karoo Supergroup predominate and are intruded by dolerites of Jurassic age. Land types Bb, Ac, Fa and Ca.

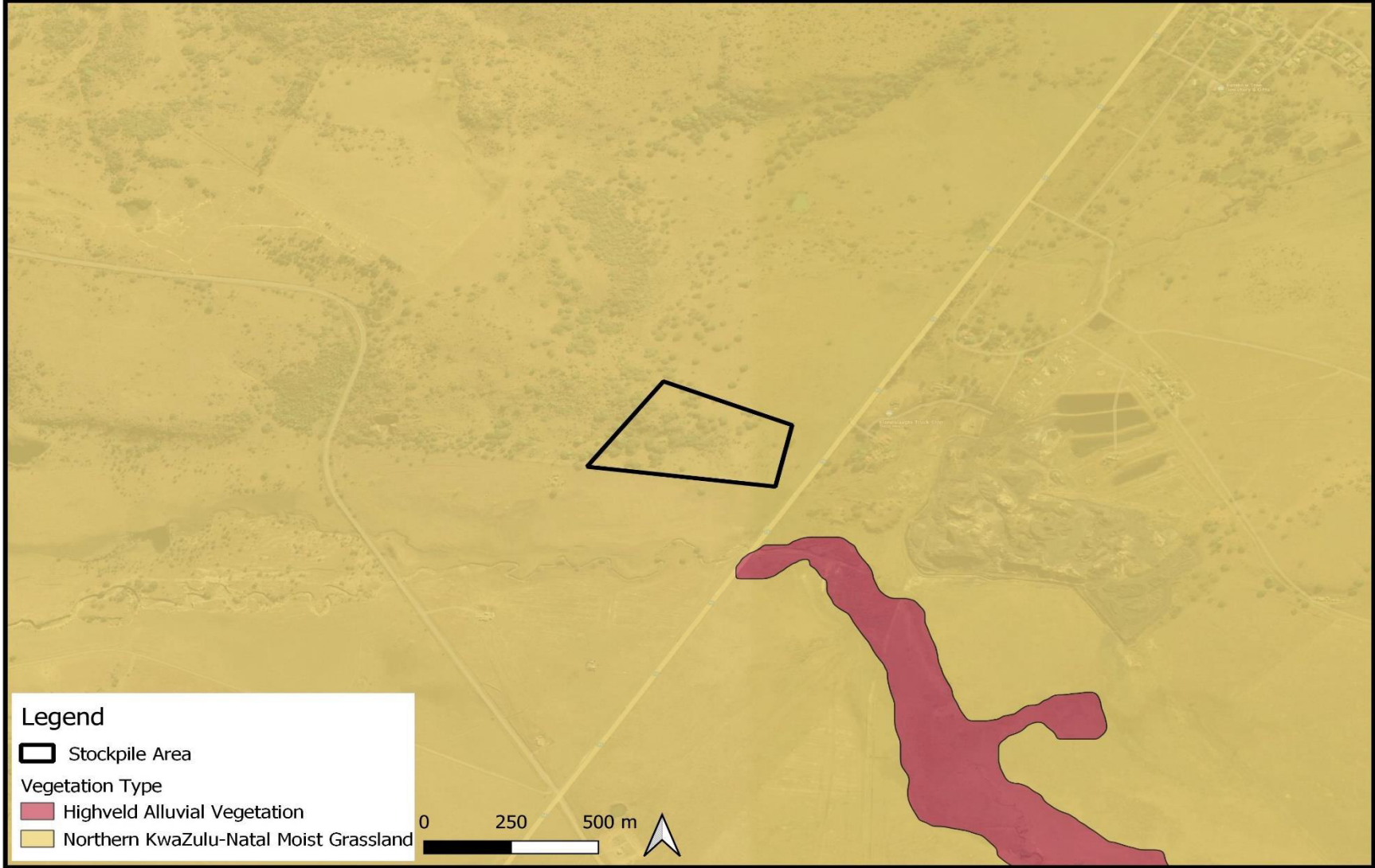


Figure 2: Vegetation of the study site.

4. LEGAL REQUIREMENTS

4.1. RELEVANT LEGISLATION

The Constitution of the Republic of South Africa Act (Act No. 108 of 1996) – Section 24.

The Constitution is South Africa's overarching law. It prescribes minimum standards with which existing and new laws must comply. Chapter 2 of the Constitution contains the Bill of Rights in which basic human rights are enshrined. Government's commitment to give effect to the environmental rights enshrined in the Constitution is evident from the enactment of various pieces of environmental legislation since 1996, including the National Water Act, the National Environmental Management Act, etc.

The Constitution deals with the environment in Section 24 and proclaims the right of everyone—

- (a) To an environment that is not harmful to their health or well-being; and
- (b) To have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that—
 - (i) Prevent pollution and ecological degradation.
 - (ii) Promote conservation; and
 - (iii) Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.

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

NEMA replaces a number of the provisions of the Environment Conservation Act, 1989 (Act No. 73 of 1989). The Act provides for cooperative environmental governance by establishing principles for decision-making on matters affecting the environment, institutions that will promote cooperative governance and procedures for coordinating environmental functions. The principles enshrined in NEMA guide the interpretation, administration and implementation of the Act with regards to the protection and / or management of the environment. These principles serve as a framework within which environmental management must be formulated. Section 2(4) specifies that “sustainable development requires the consideration of all relevant factors including aspects specifically relevant to biodiversity”:

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

NEMBA provides for the management and conservation of biological diversity and components thereof; the use of indigenous biological resources in a sustainable manner; the fair and equitable sharing of benefits rising from bioprospecting of biological resources; and cooperative governance in biodiversity management and conservation within the framework of NEMA.

National Water Act (Act No. 36 of 1998) (NWA).

The National Water Act (NWA) is a legal framework for the effective and sustainable management of water resources in South Africa. Central to the NWA is recognition that water is a scarce resource in the country which belongs to all the people of South Africa and needs to be managed in a sustainable manner to benefit all members of society. The NWA places a strong emphasis on the protection of water resources in South Africa, especially against its exploitation, and the insurance that there is water for social and economic development in the country for present and future generations.

The National Water Act, requires any development to secure Water Use Licences with the following activities:

Section 21 (a), abstractive use of water for construction (if possible and required).

Section 21 (c) and (i) use, i.e., river or wetland crossings, which includes any drainage lines by any infrastructure.

In terms of the definitions provided, activities included under Sections 21(c) and 21(i) are (amongst others) the construction of roads, bridges, pipelines, culverts and structures for slope stabilisation and erosion protection. DWS will however need to be approached to provide guidance on whether approval for Section 21 (c) and (i) water uses would be required.

GENERAL AUTHORISATION IN TERMS OF SECTION 39 OF THE NWA

According to the preamble to Part 6 of the NWA, “This Part established a procedure to enable a responsible authority, after public consultation, to permit the use of water by publishing general authorisations in the Gazette...” “The use of water under a general authorisation does not require a licence until the general authorisation is revoked, in which case licensing will be necessary...”

The General Authorisations for Section 21 (c) and (i) water uses (impeding or diverting flow or changing the bed, banks or characteristics of a watercourse) as defined under the NWA have recently been revised (Government Notice R509 of 2016). Determining if a water use licence is required for these water uses is now associated with the risk of degrading the ecological status of a watercourse. A low risk of impact could be authorised in terms of a General Authorisations (GA).

Provincial legislation

In addition to national legislation such as Protected Areas Act No. 57 of 2003, National Environmental Management: Biodiversity Act No. of 2004 and Conservation of Agricultural Resources Act No. 43 of 1983, some of South Africa's nine provinces have their own provincial biodiversity legislation, as nature conservation is a concurrent function of national and provincial government in terms of the Constitution (Act 108 of 1996).

Nature Conservation Ordinance No. 15 of 1974

Critical Biodiversity Areas (CBAs)

The KwaZulu-Natal CBA Map identifies biodiversity priority areas, called Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs), which, together with protected areas, are important for the persistence of a viable representative sample of all ecosystem types and species as well as the long-term ecological functioning of the landscape as a whole.

According to the plan, the entire site does not fall within a CBA or ESA(Figure 3). Furthermore, the site also does not fall within the National Protected Areas Expansion Strategy (NPAES) .

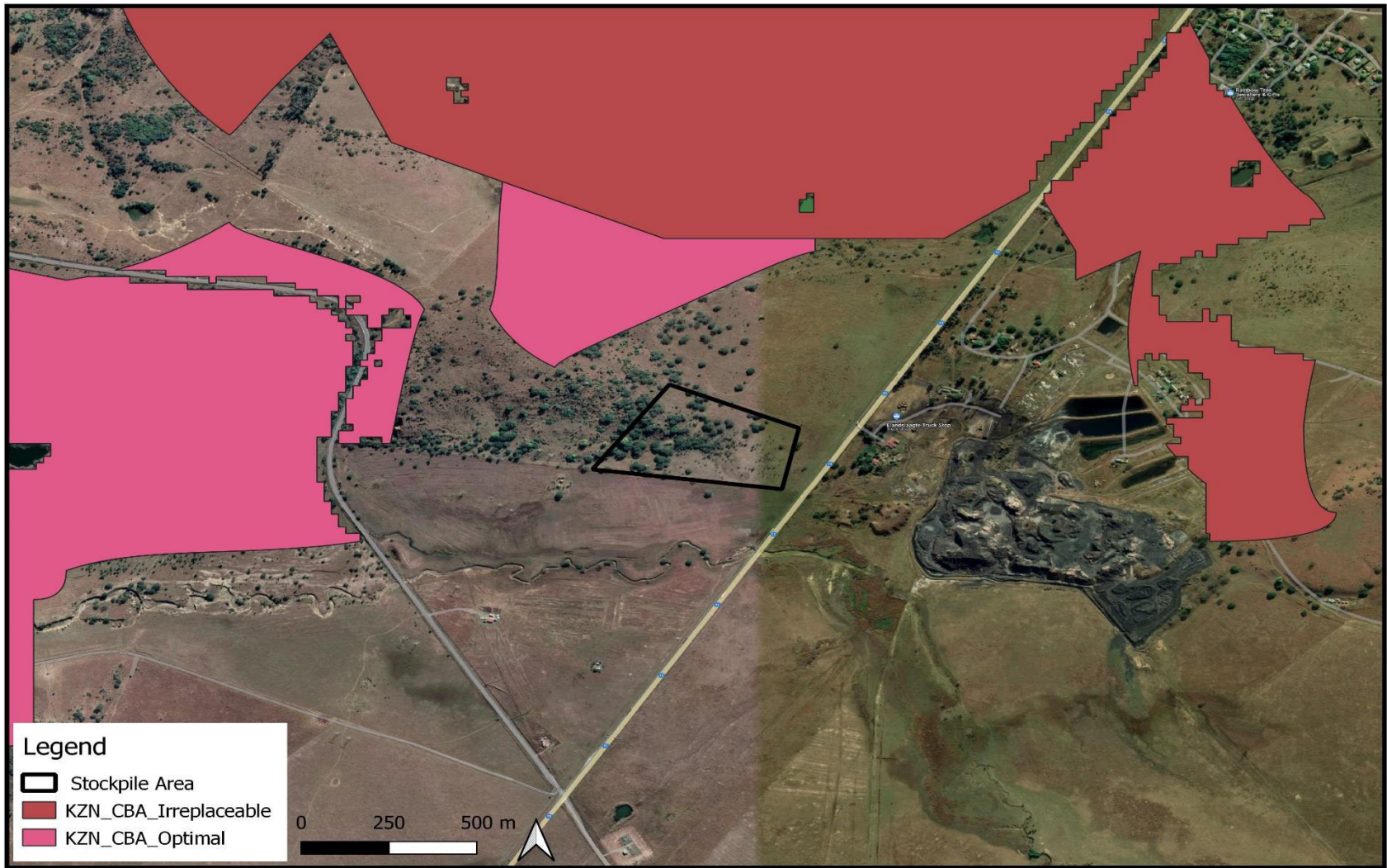


Figure 3: Conservation plan of the study site.

5. METHODOLOGY

Our methodology included both background information search (Desktop) and field survey. Below is the method used in our study for each of the subfields of biodiversity and the limitations encountered:

5.1. Flora Study

Random walkthrough method was used to identify the plants and vegetation structure occurring on the study site. Plants that could not be identified on site were photographed for later identification.

5.2. Fauna Study

Visual observations stand counts and indirect counts method were used to assess the animals occurring on the study site.

Red Data Analysis and Floral Assessment

SANBI NEW POSA was compared to relevant literature detailing Protected and Red Data plant species lists in order to compile a list of Red Data plant species that may potentially occur within the study area. There are no historical floral records around the study area. The status is determined in table 1 below.

Table 1: Red Data Status definitions (SANBI, 2010).

p- protected Species		
M- Medicinal species		
EX	Extinct	A taxon is Extinct when there is no reasonable doubt that the last individual has died. Taxa should be listed as extinct only once exhaustive surveys throughout the historic range have failed to record an individual.
EW	Extinct in the Wild	A taxon is Extinct in the Wild when it is known to survive only in cultivation or as a naturalized population (or populations) well outside the past range.
CR PE	Critically Endangered (Possibly Extinct)	Critically Endangered (Possibly Extinct) taxa are those that are, on the balance of evidence, likely to be extinct, but for which there is a small chance that they may be extant. Hence, they should not be listed as Extinct until adequate surveys have failed to record the taxon.
CR	Critically Endangered	A taxon is Critically Endangered when the best available evidence indicates that it meets any of the five IUCN criteria for Critically Endangered and is therefore facing an extremely high risk of extinction in the wild.
EN	Endangered	A taxon is Endangered when the best available evidence indicates that it meets any of the five IUCN criteria for Endangered and is therefore facing a very high risk of extinction in the wild.
VU	Vulnerable	A taxon is Vulnerable when the best available evidence indicates that it meets any of the five IUCN criteria for Vulnerable and is therefore facing a high risk of extinction in the wild.

NT	Near Threatened	A taxon is Near Threatened when available evidence indicates that it nearly meets any of the five IUCN criteria for Vulnerable and is therefore likely to qualify for a threatened category in the near future.
CRITICALLY RARE		A taxon is Critically Rare when it is known to occur only at a single site but is not exposed to any direct or plausible potential threat and does not qualify for a category of threat according to the five IUCN criteria.
RARE		A taxon is Rare when it meets any of the four South African criteria for rarity but is not exposed to any direct or plausible potential threat and does not qualify for a category of threat according to the five IUCN criteria.
DECLINING		A taxon is Declining when it does not meet any of the five IUCN criteria and does not qualify for the categories Critically Endangered, Endangered, Vulnerable or Near Threatened, but there are threatening processes causing a continuing decline in the population.
DDD	Data Deficient— Insufficient Information	A taxon is DDD when there is inadequate information to make an assessment of its risk of extinction, but the taxon is well defined. Data Deficient is not a category of threat. However, listing of taxa in this category indicates that more information is required, and that future research could show that a threatened classification is appropriate.
LC	Least Concern	A taxon is Least Concern when it has been evaluated against the five IUCN criteria and does not qualify for the categories Critically Endangered, Endangered, Vulnerable or Near Threatened, and it is not rare, and the population is not declining.

6. Ecological function

Ecological function relates to the degree of ecological connectivity between systems within a landscape matrix. Therefore, systems with a high degree of landscape connectivity amongst one another are perceived to be more sensitive and will be those contributing to ecosystem service (for example wetlands for water and food) or overall preservation of biodiversity. Conservation importance relates to species diversity, endemism (unique species or unique processes) and the high occurrence of threatened and protected species or ecosystems protected by legislation.

Weeds and Invasive Plants

Alien invasive species

Few alien invasive species were recorded during the field surveys within the actual study site but there were a more species in the surrounding area. Declared weeds and invaders have the tendency to dominate or replace the herbaceous layer of natural ecosystems, thereby transforming the structure, composition and function of natural ecosystems. Therefore, it is important that all these aliens be eradicated and controlled by means of an eradication and monitoring programme. Invader plants degrade ecosystems through superior competitive capabilities to exclude indigenous plant species. Below is a discussion of the four categories of Invasive Alien Plants as per the National Environmental Management Biodiversity Act (NEMBA).

Category 1a: invasive species that may not be owned, imported into South Africa, grown, moved, sold, given as a gift or dumped in a waterway. These species need to be controlled on your property, and officials from the Department of Environmental Affairs must be allowed access to monitor or assist with control.

Category 1b: invasive species that may not be owned, imported into South Africa, grown, moved, sold, given as a gift or dumped in a waterway. Category 1b species are major invaders that may need government assistance to remove. All Category 1b species must be contained, and in many cases, they already fall under a government sponsored management programme.

Category 2: These are invasive species that can remain in your garden, but only with a permit, which is granted under very few circumstances.

Category 3: These are invasive species that can remain in your garden. However, you cannot propagate or sell these species and must control them in your garden. In riparian zones or wetlands all Category 3 plants become Category 1b plants.

Sensitivity scale

Prior to conducting fieldwork, the DFFE screening tool was consulted in order to get preliminary site sensitivity. Both plant and animal themes yielded medium sensitivity scales (Fig 4 & 5). However, the overall site is highly sensitive in terms of terrestrial biodiversity (Fig. 6). This is due to the area being within Strategic Water Source Areas.

MAP OF RELATIVE ANIMAL SPECIES THEME SENSITIVITY

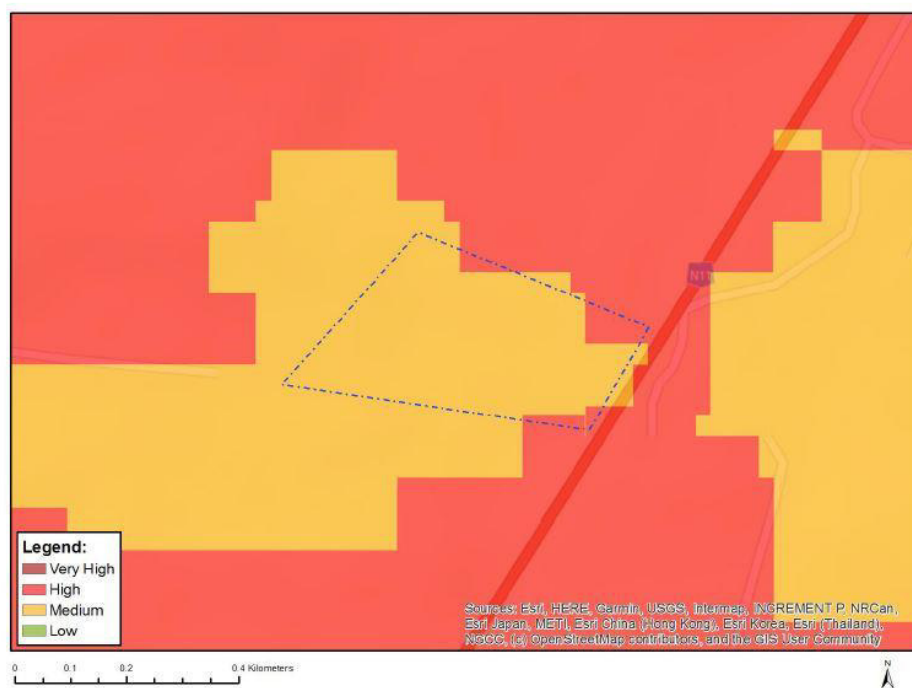


Figure 4: DFFE screening tool outputs for animal species.

MAP OF RELATIVE PLANT SPECIES THEME SENSITIVITY

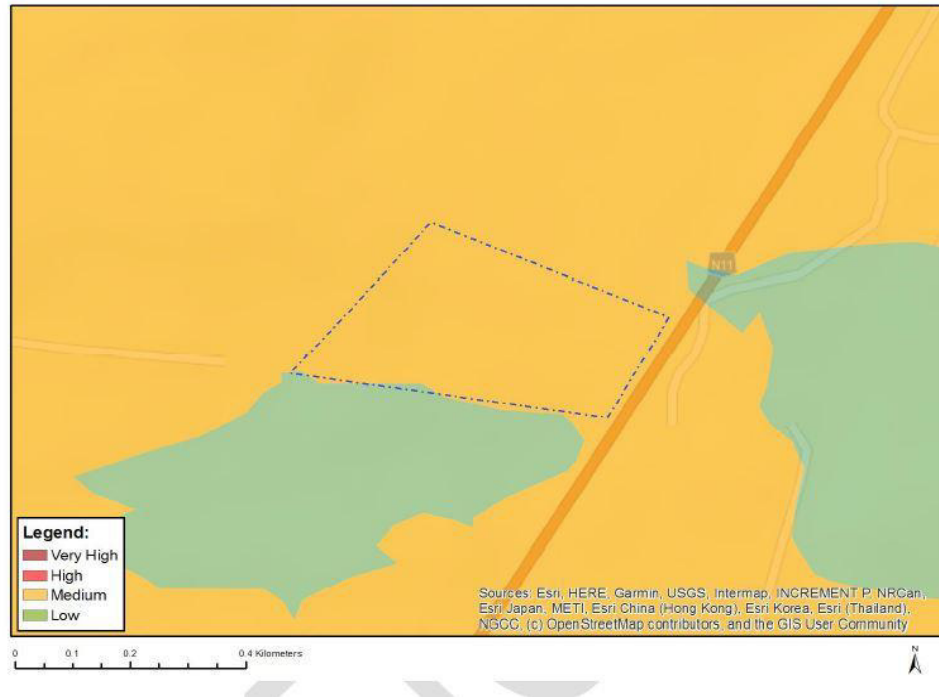


Figure 5: DFFE screening tool outputs for plant species.

MAP OF RELATIVE TERRESTRIAL BIODIVERSITY THEME SENSITIVITY



Figure 6: DFFE screening tool outputs for terrestrial biodiversity.

- **High ecological function:** Sensitive ecosystems with either low inherent resistance or resilience towards disturbance factors or highly dynamic systems considered to be stable and important for the maintenance of ecosystems integrity for example pristine grasslands, pristine wetlands and pristine ridges.

- **Medium ecological function:** Relatively important ecosystems at gradients of intermediate disturbances. An area may be considered of medium ecological function if it is directly adjacent to sensitive/pristine ecosystem.
- **Low ecological function:** Degraded and highly disturbed systems with little or no ecological function.
- **No Go Areas:** Areas that have irreplaceable biodiversity or important ecosystem function values which may be lost permanently if these ecosystems are transformed, with a high potential of also affecting adjacent and/or downstream ecosystems negatively.

Conservation status of the vegetation

- **High conservation importance:** Ecosystems with high species richness which usually provide suitable habitat for several threatened species. Usually termed 'no-go' areas and unsuitable for development and should be conserved.
- **Medium conservation importance:** Ecosystems with intermediate levels of species diversity without any threatened species. Low-density development may be accommodated, provided the current species diversity is conserved.
- **Low conservation importance:** Areas with little or no conservation potential and usually species poor (most species are usually exotic).

Of the four sensitive plant species that were obtained from SANBI, none were observed within the site. Therefore, the site was observed to be of **Medium Ecological Function with Medium Conservation importance** when looking at the sensitivity scale and the conservation status of the vegetation of the area.

7. RESULTS

Biological diversity everywhere is at great risk as a direct result of an ever-expanding human population and its associated needs for energy, water, food and minerals. Landscape transformation that is needed to accommodate these activities inevitably leads to habitat loss and habitat fragmentation, resulting in the mosaical appearance of undisturbed habitat within a matrix of transformed areas. These remaining areas of natural habitat are frequently too small to support the biodiversity that previously occupied the area, and the region loses its ecological integrity (Kamffer 2004). Conservation of the remaining ecosystem is vital and beneficial in the long run. However, the assessment results revealed that the site does not have important plant species that warrant conservation but is relatively in good health. Except for five bird species, no other faunal species were observed on site. Historical records of faunal species previously recorded around the study area is listed in the appendices.

Plants

The vegetation has been exposed to a very low level of disturbance. However, of the species recorded on site, none of them are protected. The conservation status of the species is stated in the table below.

Table 2: List of plant species recorded at the study site.

Species	Common Name	Growth Form	IUCN Conservation Status
<i>Vachellia sieberiana</i>	Paperbark Thorn Tree	Tree	Least Concern
<i>Vachellia karoo</i>	Sweet Thorn Tree	Tree	Least Concern
* <i>Melia azedarach</i>	Syringa	Tree	Least Concern
* <i>Lantana camara</i>	Tick berry	Shrub	Least Concern
* <i>Solanum mauritianum</i>	Bugweed	Shrub	Least Concern
<i>Hyparrhenia hirta</i>	Common Thatching Grass	Grass	Least Concern
<i>Themeda triandra</i>	Red Grass	Grass	Least Concern
<i>Aridistida congesta</i>	Tassel Three Awn Grass	Grass	Least Concern
<i>Cynodon dactylon</i>	Couch Grass	Grass	Least Concern

*Alien invasive plant

Birds

Birds are regarded as one of the most useful bioindicators, and they have been used extensively as models to determine ecosystem function (see review Koskimies 1989; Potts et al. 2014; Bregman et al. 2016). High levels of human disturbance as well as habitat transformation and degradation on adjacent areas would result in the disappearance of the more elusive bird species. Very few birds were recorded around the study site (Table 3).

Table 3: List of bird species recorded at the study site.

Species	Common Name	IUCN Conservation Status
<i>Bostrychia hagedash</i>	Hadeda Ibis	Not Evaluated
<i>Corvus albus</i>	Pied Crow	Not Evaluated
<i>Dicrurus adsimilis</i>	Fork-tailed Drongo	Not Evaluated
<i>Myrmecocichla formicivora</i>	Ant-eating Chat	Not Evaluated
<i>Oenanthe familiaris</i>	Familiar Chat	Not Evaluated

SENSITIVITY ANALYSIS

Vegetation has been used as a common biological indicator to identify the Present Ecological State (PES) or ecological health of ecosystems, given their overall ability to respond rapidly to disturbance. Conservative plant species are the most affected species given their high conservatism status, high sensitivity, narrow distribution ranges and low tolerance to disturbance, these species are the first to be eradicated in disturbed conditions (Rocchio, 2007).

The sensitivity within the study area was predominantly low-medium due to the minimal disturbance within the proposed stockpile area and surroundings.

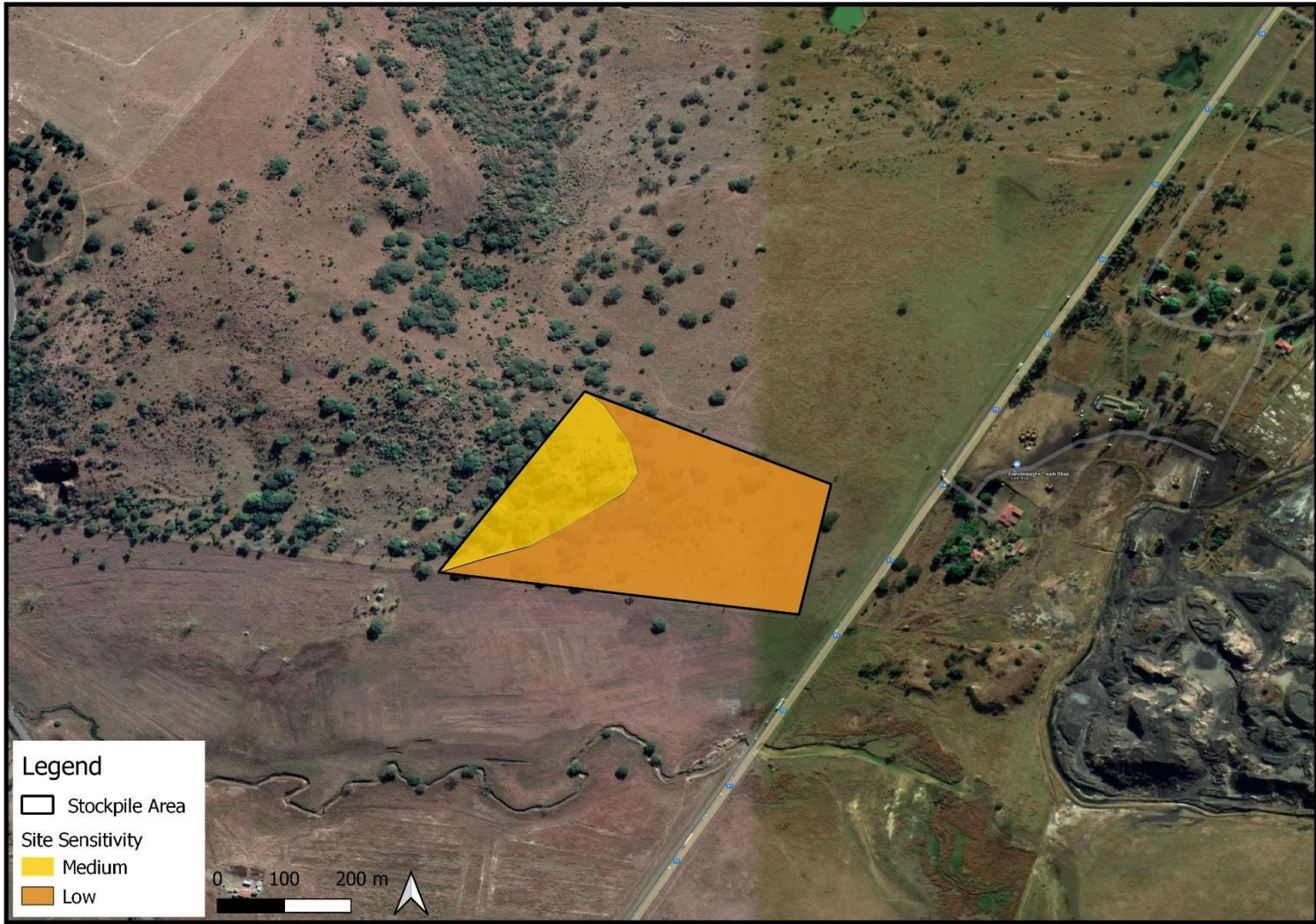


Figure 7: Site sensitivity of the study site.

THE MAIN IMPACTS

- Permanent loss of vegetation on disturbed sites; and
- Introduction and spread of declared weeds and alien invasive plants: This may occur in disturbed areas and/or where propagules of these plants are readily available.
- Displacement of faunal species.

Impact Phase: Operational							
Potential impact description: Direct and indirect avifauna and faunal Impacts							
	Extent	Duration	Intensity	Status	Significance	Probability	Confidence
Without Mitigation	M	M	M	Negative	M	H	H
With Mitigation	L	L	L	Negative	L	M	H
Can the impact be reversed?	Yes.						
Will impact cause irreplaceable loss or resources?	No						
Can impact be avoided, managed, or mitigated?	Yes						
Mitigation measures: <ul style="list-style-type: none"> • No animal may be hunted, trapped, snared or captured for any purpose whatsoever. • Speed of vehicles should be limited to allow for sufficient safety margins. 							
Impact Phase: Operational							
Potential impact description: Introduction of alien invasive plants Cleared areas which are not rehabilitated are likely to be invaded by aliens and pioneer plants.							
	Extent	Duration	Intensity	Status	Significance	Probability	Confidence
Without Mitigation	H	H	H	Negative	H	H	H
With Mitigation	L	L	M	Negative	M	M	M
Can the impact be reversed?	Yes. This impact can be prevented through appropriate mitigation measures such as alien eradication.						
Will impact cause irreplaceable loss or resources?	No. If this impact is correctly addressed, then no loss of resources will occur.						
Can impact be avoided, managed, or mitigated?	Yes. This impact can be avoided if appropriate mitigation measures are followed.						
Mitigation measures: <ul style="list-style-type: none"> • Any cleared areas that are no longer or not required for drilling activities should be re-seeded with locally sourced seed of suitable species. Bare areas can also be packed with brush removed from other parts of the site to encourage natural vegetation regeneration and limit erosion. • Identify and demarcate areas within which activities are to be undertaken. Ensure that activities are restricted to these areas to ensure unnecessary impacts on surrounding natural vegetation are avoided. 							

Impact Phase: Operational							
Potential impact description: Impacts on vegetation The major impact during this phase will result from vegetation clearance							
	Extent	Duration	Intensity	Status	Significance	Probability	Confidence
Without Mitigation	M	M	M	Negative	M	H	H
With Mitigation	L	L	L	Negative	L	M	M
Can the impact be reversed?	No, once vegetation is cleared, it would not be possible to return it to its previous state.						
Will impact cause irreplaceable loss or resources?	No. the site is of medium ecological integrity.						
Can impact be avoided, managed or mitigated?	Yes, the stockpiling should be restricted to the project boundary.						
Mitigation measures: <ul style="list-style-type: none"> All natural vegetation not required to be removed should be protected against damage. Unnecessary impacts on surrounding natural vegetation must be avoided, e.g. driving around in the veld where there are no existing roads or where there aren't new roads planned. The site should be rehabilitated. 							

MITIGATION MEASURES

All natural vegetation not required to be removed should be protected against damage.

Any cleared areas that are no longer or not required for stockpiling activities should be re-seeded with locally sourced seed of suitable species. Bare areas can also be packed with brush removed from other parts of the site to encourage natural vegetation regeneration and limit erosion.

Maintenance vehicles must not veer from dedicated access roads and activities should be restricted to the previously disturbed footprint.

No animal may be hunted, trapped, snared or captured for any purpose whatsoever.

Speed of vehicles should be limited to allow for sufficient safety margins.

Prohibit vehicular or pedestrian access into natural areas beyond the demarcated boundary of the stockpiling area.

Workers may not remove flora, and neither may anyone collect seed from the plants without permission from the local authority.

8. CONCLUSION AND RECOMMENDATIONS

The proposed stockpile will be located on a previously natural grassland site of good ecosystem health. The site shows medium sensitivity, but disturbance should be limited strictly to the specified activities associated with the proposed stockpile development.

From the survey conducted, there are no evident fatal flaws that would prevent this development from being authorised, nor being conducted in a sustainable manner

9. REFERENCES

- Bregman T. P., Lees, A. C., MacGregor, H. E. A., Darski, B., de Moura, N. G., Aleixo, A., Barlow, J. & Tobias, J. A. 2016 Using avian functional traits to assess the impact of land-cover change on ecosystem processes linked to resilience in tropical forests. *Proceedings of the Royal Society B* 283: 1-10.
- Branch, B. 1998. Field guide to snakes and other reptiles of southern Africa. Struik Nature, Cape Town.
- Gelderblom, C.M. & Bronner, G.N. 1995. Patterns of distribution and protection status of the endemic mammals in South Africa, *South African Journal of Zoology*, 30:3, 127-135.
- Koskimies, P. Birds as a tool in environmental monitoring. *Annales Zoologici Fennici*, 26: 153-166.
- Kottek, M., Grieser, J., Beck, C., Rudolf, B. & Rubel, F. 2006. World Map of Köppe Geiger Climate Classification updated. *Meteorology. Z.* **15**. 259-263.
- Kotze, D.C., Marneweck, G.C., Batchelor, A.L., Lindley, D.S. & Collins, N.B. 2007. Wet EcoServices: A technique for rapidly assessing ecosystem services supplied by wetlands, WRC Report No. TT 339/09, Water Research Commission, Pretoria.
- Manning, J. 2009. Field guide to the wild flowers of South Africa. Struik, Cape Town.
- Mucina, L., Hoare, D.B., Lötter, M.C., Du Preez, P.J., Rutherford, M.C., Scott Shaw, C.R., Bredenkamp, G.J., Powrie, L.W., Scott, L., Camp, K.G.T., Cilliers, S.S. Bezuidenhout, H., Mostert, T.H., Siebert, S.J., Winter, P.J.D., Burrows, J.E., Dobson, L., Ward, R.A., Stalmans, M., Oliver, E.G.H., Siebert, F., Schmidt, E., Kobisi, K., Kose, L. 2006. Grassland Biome. In: Mucina, L. & Rutherford, M.C. (eds.). *Vegetation map of South Africa, Lesotho and Swaziland: an illustrated guide*. Strelitzia 19. South African National Biodiversity Institute, Pretoria.
- Nieto, M., Hortal, J., Martínez-Maza, C., Morales, J., Ortiz-Jaureguizar, E., Pelaez Campomanes, P., Pickford, M., Prado, J.L., Rodríguez, J., Senut, B., Soria, D. & Varela, S. 2005. Historical Determinants of Mammal Diversity in Africa: Evolution of Mammalian Body Mass Distribution in Africa and South America During Neogene and Quaternary Times. *African Biodiversity*.
- Ollis, D., Snaddon, K., Job, N., & Mbona, N. 2013. Classification Systems for Wetlands and other Aquatic Ecosystems in South Africa. User Manual: Inland Systems. SANBI Biodiversity Series 22. Pretoria: South African National Biodiversity Institute.
- Potts, J. R., Mokross, K., Stouffer, P. C. & Lewis, M. A. 2014. Step selection techniques uncover the environmental predictors of space use patterns in flocks of Amazonian birds. *Ecology and Evolution*, 4(24): 4578-4588.
- Raimondo, D., von Staden, L., Foden, W., Victor, J.E., Helme, N.A., Turner, R.C., Kamundi, D.A. and Manyama, P.A. 2009. Red List of South African Plants. Strelitzia 25. South African National Biodiversity Institute, Pretoria

Sinclair, I., Hockey, P., Tarboton, W. & Ryan, R. 2011. Birds of Southern Africa. Struik Nature, Cape Town.

APPENDICES

Appendix 1: Historical Faunal and Floral Records

A, Mammal Records. Animal Demographic Unit.

NO.	Family	Scientific name	Common name	Red list category	Number of records	Last recorded
1	Bovidae	<i>Aepyceros melampus</i>	Impala	Least Concern	3	2018-10-04
2	Bovidae	<i>Alcelaphus buselaphus caama</i>	Red Hartebeest	Least Concern (2008)	1	2015-04-26
3	Bovidae	<i>Connochaetes taurinus</i>	Blue Wildebeest	Least Concern (ver 3.1, 2017)	1	2015-04-26
4	Bovidae	<i>Kobus ellipsiprymnus</i>	Waterbuck	Least Concern (ver 3.1, 2016)	1	2018-10-04
5	Bovidae	<i>Ourebia ourebi</i>	Oribi	Endangered	10	2012-12-31
6	Bovidae	<i>Taurotragus oryx</i>	Common Eland	Least Concern (2016)	2	2015-04-29
7	Bovidae	<i>Tragelaphus angasii</i>	Nyala	Least Concern (2016)	1	2018-10-04
8	Bovidae	<i>Tragelaphus strepsiceros</i>	Greater Kudu	Least Concern (2016)	2	2018-10-04
9	Canidae	<i>Canis mesomelas</i>	Black-backed Jackal	Least Concern (2016)	1	2015-04-27
10	Canidae	<i>Lycaon pictus</i>	African wild dog	Endangered (2016)	2	2006-01-01
11	Elephantidae	<i>Loxodonta africana</i>	African Bush Elephant	Vulnerable A2a (2008)	8	2018-10-04
12	Equidae	<i>Equus quagga</i>	Plains Zebra	Near Threatened (IUCN, 2016)	3	2018-10-04
13	Felidae	<i>Acinonyx jubatus</i>	Cheetah	Vulnerable (2016)	10	2012-12-31
14	Felidae	<i>Caracal caracal</i>	Caracal	Least Concern (2016)	1	
15	Felidae	<i>Felis silvestris</i>	Wildcat	Least Concern (2016)	1	1975-11-28
16	Felidae	<i>Leptailurus serval</i>	Serval	Near Threatened (2016)	1	
17	Felidae	<i>Panthera leo</i>	Lion	Least Concern (2016)	14	2012-12-31
18	Felidae	<i>Panthera pardus</i>	Leopard	Vulnerable (2016)	16	2012-12-31
19	Hippopotamidae	<i>Hippopotamus amphibius</i>	Common Hippopotamus	Least Concern (2016)	16	2015-04-28
20	Leporidae	<i>Lepus saxatilis</i>	Scrub Hare	Least Concern	1	2018-10-04
21	Muridae	<i>Grammomys dolichurus</i>	Common Grammomys	Least Concern (2016)	1	1993-06-15
22	Muridae	<i>Mastomys natalensis</i>	Natal Mastomys	Least Concern (2016)	1	1993-07-29
23	Soricidae	<i>Myosorex sp.</i>	Mouse Shrews		3	1993-06-15

B, Reptile Records. Animal Demographic Unit.

NO.	Family	Scientific name	Common name	Red list category	Number of records	Last recorded
1	Agamidae	<i>Acanthocercus atricollis</i>	Southern Tree Agama	Least Concern (SARCA 2014)	1	2018-10-04
2	Elapidae	<i>Elapsoidea sundevallii sundevallii</i>	Sundevall's Garter Snake		1	1900-06-15
3	Elapidae	<i>Hemachatus haemachatus</i>	Rinkhals	Least Concern (SARCA 2014)	2	1900-06-15
4	Gekkonidae	<i>Pachydactylus vansonii</i>	Van Son's Gecko	Least Concern (SARCA 2014)	1	1919-11-20
5	Lacertidae	<i>Pedioplanis burchelli</i>	Burchell's Sand Lizard	Least Concern (SARCA 2014)	2	1973-04-16
6	Lamprophiidae	<i>Psammophis brevirostris</i>	Short-snouted Grass Snake	Least Concern (SARCA 2014)	1	1900-06-15
7	Pelomedusidae	<i>Pelomedusa galeata</i>	South African Marsh Terrapin	Not evaluated	1	1900-06-15
8	Viperidae	<i>Bitis arietans arietans</i>	Puff Adder	Least Concern (SARCA 2014)	1	1900-06-15

C, Frog Records, Animal Demographic Unit.

NO,	Family	Scientific name	Common name	Red list category	Number of records	Last recorded
1	Bufoidea	<i>Sclerophrys capensis</i>	Raucous Toad	Least Concern	1	2001-01-20
2	Bufoidea	<i>Sclerophrys gutturalis</i>	Guttural Toad	Least Concern (IUCN, 2016)	2	2001-01-20
3	Hyperoliidae	<i>Hyperolius marmoratus</i>	Painted Reed Frog	Least Concern (IUCN ver 3.1, 2013)	2	2011-08-11
4	Hyperoliidae	<i>Kassina senegalensis</i>	Bubbling Kassina	Least Concern	2	2001-01-20
5	Phrynobatrachidae	<i>Phrynobatrachus natalensis</i>	Snoring Puddle Frog	Least Concern (IUCN, 2013)	1	2000-12-11
6	Ptychadenidae	<i>Ptychadena oxyrhynchus</i>	Sharpnosed Grass Frog	Least Concern	1	
7	Pyxicephalidae	<i>Amietia sp.</i>		Not Evaluated	1	2014-04-02
8	Pyxicephalidae	<i>Amietia delalandii</i>	Delalande's River Frog	Least Concern (2017)	2	2001-01-20
9	Pyxicephalidae	<i>Amietia fuscigula</i>	Cape River Frog	Least Concern (2017)	1	2001-01-20
10	Pyxicephalidae	<i>Cacosternum boettgeri</i>	Common Caco	Least Concern (2013)	1	2000-12-11

11	Pyxicephalidae	<i>Tomopterna cryptotis</i>	Tremelo Sand Frog	Least Concern	1	2001-01-20
12	Pyxicephalidae	<i>Tomopterna krugerensis</i>	Knocking Sand Frog	Least Concern	1	
13	Pyxicephalidae	<i>Tomopterna natalensis</i>	Natal Sand Frog	Least Concern	2	2001-01-20

D, Scorpion Records. Animal Demographic Unit

NO,	Family	Scientific name	Common name	Red list category	Number of records	Last recorded
1	Hormuridae	<i>Hadogenes trichiurus</i>	Southern Rock Scorpion	Not Evaluated	1	2016-06-19

E, Lepidoptera Records. Animal Demographic Unit

NO,	Family	Scientific name	Common name	Red list category	Number of records	Last recorded
1	Geometridae	<i>Rhodometra sacraria</i>		Not Threatened	1	2019-04-20
2	Hesperiidae	<i>Kedestes wallengrenii wallengrenii</i>	White-streaked ranger	Least Concern (SABCA 2013)	1	2014-04-02
3	Lycaenidae	<i>Anthene amarah amarah</i>	Black-striped ciliate blue	Least Concern (SABCA 2013)	1	2019-04-20
4	Lycaenidae	<i>Azanus natalensis</i>	Natal babul blue	Least Concern (SABCA 2013)	1	2019-04-20
5	Lycaenidae	<i>Cacyreus marshalli</i>	Common geranium bronze	Least Concern (SABCA 2013)	1	2014-04-02
6	Lycaenidae	<i>Myrina silenus ficedula</i>	Common fig tree blue	Least Concern (SABCA 2013)	1	2019-04-20
7	Lycaenidae	<i>Zizula hylax</i>	Tiny grass blue	Least Concern (SABCA 2013)	1	2019-04-20
8	Nymphalidae	<i>Acraea neobule neobule</i>	Wandering donkey acraea	Least Concern (SABCA 2013)	1	2019-04-20
9	Nymphalidae	<i>Acraea oncaea</i>	Window acraea	Least Concern (SABCA 2013)	1	2019-04-20
10	Nymphalidae	<i>Charaxes varanes varanes</i>	Pearl charaxes	Least Concern (SABCA 2013)	1	2019-04-20
11	Nymphalidae	<i>Junonia hierta cebrene</i>	Yellow pansy	Least Concern (SABCA 2013)	1	2019-04-20
12	Nymphalidae	<i>Junonia orithya madagascariensis</i>	African blue pansy	Least Concern (SABCA 2013)	1	2019-04-20
13	Nymphalidae	<i>Vanessa cardui</i>	Painted lady	Least Concern (SABCA 2013)	1	2014-04-02
14	Papilionidae	<i>Papilio nireus lyaeus</i>	Narrow green-banded swallowtai	Least Concern (SABCA 2013)	1	2019-04-20

F, Avifaunal Records. SABAP2, Animal Demographic Unit.

NO.	Common group	Common species	Genus	Species	Red list category (Global)
1		Bokmakierie	<i>Telophorus</i>	<i>zeylonus</i>	Not Evaluated
2		Brubru	<i>Nilaus</i>	<i>afer</i>	Not Evaluated
3		Hamerkop	<i>Scopus</i>	<i>umbretta</i>	Not Evaluated
4		Neddicky	<i>Cisticola</i>	<i>fulvicapilla</i>	Not Evaluated
5		African Quail-finch	<i>Ortygospiza</i>	<i>atricollis</i>	Not Evaluated
6		Secretarybird	<i>Sagittarius</i>	<i>serpentarius</i>	Endangered
7	Babbler	Arrow-marked	<i>Turdoides</i>	<i>jardineii</i>	Not Evaluated
8	Barbet	Acacia Pied	<i>Tricholaema</i>	<i>leucomelas</i>	Not Evaluated
9	Barbet	Black-collared	<i>Lybius</i>	<i>torquatus</i>	Not Evaluated
10	Barbet	Crested	<i>Trachyphonus</i>	<i>vaillantii</i>	Not Evaluated
11	Batis	Chinspot	<i>Batis</i>	<i>molitor</i>	Not Evaluated
12	Bee-eater	Little	<i>Merops</i>	<i>pusillus</i>	Not Evaluated
13	Bishop	Southern Red	<i>Euplectes</i>	<i>orix</i>	Not Evaluated
14	Bishop	Yellow-crowned	<i>Euplectes</i>	<i>afer</i>	Not Evaluated
15	Boubou	Southern	<i>Laniarius</i>	<i>ferrugineus</i>	Not Evaluated
16	Bulbul	Dark-capped	<i>Pycnonotus</i>	<i>tricolor</i>	Not Evaluated
17	Bustard	Denham's	<i>Neotis</i>	<i>denhami</i>	Near Threatened
18	Buzzard	Common	<i>Buteo</i>	<i>buteo</i>	Not Evaluated
19	Buzzard	Jackal	<i>Buteo</i>	<i>rufofuscus</i>	Not Evaluated
20	Canary	Black-throated	<i>Crithagra</i>	<i>atrogularis</i>	Not Evaluated
21	Canary	Yellow-fronted	<i>Crithagra</i>	<i>mozambica</i>	Not Evaluated
22	Chat	Ant-eating	<i>Myrmecocichla</i>	<i>formicivora</i>	Not Evaluated
23	Chat	Buff-streaked	<i>Campicoides</i>	<i>bifasciatus</i>	Not Evaluated
24	Chat	Familiar	<i>Oenanthe</i>	<i>familiaris</i>	Not Evaluated
25	Cisticola	Cloud	<i>Cisticola</i>	<i>textrix</i>	Not Evaluated
26	Cisticola	Levaillant's	<i>Cisticola</i>	<i>tinniens</i>	Not Evaluated
27	Cisticola	Wing-snapping	<i>Cisticola</i>	<i>ayresii</i>	Not Evaluated
28	Cisticola	Zitting	<i>Cisticola</i>	<i>juncidis</i>	Not Evaluated
29	Coot	Red-knobbed	<i>Fulica</i>	<i>cristata</i>	Not Evaluated
30	Cormorant	Reed	<i>Microcarbo</i>	<i>africanus</i>	Not Evaluated
31	Crane	Blue	<i>Grus</i>	<i>paradisea</i>	Vulnerable
32	Crane	Grey Crowned	<i>Balearica</i>	<i>regulorum</i>	Endangered
33	Crow	Cape	<i>Corvus</i>	<i>capensis</i>	Not Evaluated
34	Crow	Pied	<i>Corvus</i>	<i>albus</i>	Not Evaluated
35	Cuckoo	Black	<i>Cuculus</i>	<i>clamosus</i>	Not Evaluated
36	Cuckoo	Diederik	<i>Chrysococcyx</i>	<i>caprius</i>	Not Evaluated
37	Cuckoo	Klaas's	<i>Chrysococcyx</i>	<i>klaas</i>	Not Evaluated
38	Cuckoo	Red-chested	<i>Cuculus</i>	<i>solitarius</i>	Not Evaluated
39	Cuckooshrike	Black	<i>Campephaga</i>	<i>flava</i>	Not Evaluated
40	Dove	Cape Turtle	<i>Streptopelia</i>	<i>capicola</i>	Not Evaluated
41	Dove	Emerald-spotted Wood	<i>Turtur</i>	<i>chalcospilos</i>	Not Evaluated
42	Dove	Laughing	<i>Spilopelia</i>	<i>senegalensis</i>	Not Evaluated
43	Dove	Red-eyed	<i>Streptopelia</i>	<i>semitorquata</i>	Not Evaluated
44	Drongo	Fork-tailed	<i>Dicrurus</i>	<i>adsimilis</i>	Not Evaluated
45	Duck	African Black	<i>Anas</i>	<i>sparsa</i>	Not Evaluated
46	Duck	White-faced Whistling	<i>Dendrocygna</i>	<i>viduata</i>	Not Evaluated
47	Duck	Yellow-billed	<i>Anas</i>	<i>undulata</i>	Not Evaluated
48	Eagle	African Fish	<i>Haliaeetus</i>	<i>vocifer</i>	Not Evaluated
49	Eagle	Crowned	<i>Stephanoaetus</i>	<i>coronatus</i>	Near Threatened
50	Eagle-Owl	Spotted	<i>Bubo</i>	<i>africanus</i>	Not Evaluated
51	Egret	Great	<i>Ardea</i>	<i>alba</i>	Not Evaluated

52	Egret	Western Cattle	<i>Bubulcus</i>	<i>ibis</i>	Not Evaluated
53	Falcon	Amur	<i>Falco</i>	<i>amurensis</i>	Not Evaluated
54	Falcon	Lanner	<i>Falco</i>	<i>biarmicus</i>	Least Concern
55	Firefinch	African	<i>Lagonosticta</i>	<i>rubricata</i>	Not Evaluated
56	Fiscal	Southern	<i>Lanius</i>	<i>collaris</i>	Not Evaluated
57	Flycatcher	African Paradise	<i>Terpsiphone</i>	<i>viridis</i>	Not Evaluated
58	Flycatcher	Fiscal	<i>Melaenornis</i>	<i>silens</i>	Not Evaluated
59	Flycatcher	Spotted	<i>Muscicapa</i>	<i>striata</i>	Not Evaluated
60	Francolin	Shelley's	<i>Scleroptila</i>	<i>shelleyi</i>	Not Evaluated
61	Goose	Egyptian	<i>Alopochen</i>	<i>aegyptiaca</i>	Not Evaluated
62	Goose	Spur-winged	<i>Plectropterus</i>	<i>gambensis</i>	Not Evaluated
63	Grassbird	Cape	<i>Sphenoeacus</i>	<i>afer</i>	Not Evaluated
64	Grebe	Little	<i>Tachybaptus</i>	<i>ruficollis</i>	Not Evaluated
65	Guineafowl	Helmeted	<i>Numida</i>	<i>meleagris</i>	Not Evaluated
66	Heron	Black-headed	<i>Ardea</i>	<i>melanocephala</i>	Not Evaluated
67	Heron	Grey	<i>Ardea</i>	<i>cinerea</i>	Not Evaluated
68	Hoopoe	African	<i>Upupa</i>	<i>africana</i>	Not Evaluated
69	Ibis	African Sacred	<i>Threskiornis</i>	<i>aethiopicus</i>	Not Evaluated
70	Ibis	Hadada	<i>Bostrychia</i>	<i>hagedash</i>	Not Evaluated
71	Ibis	Southern Bald	<i>Geronticus</i>	<i>calvus</i>	Vulnerable
72	Kestrel	Lesser	<i>Falco</i>	<i>naumanni</i>	Not Evaluated
73	Kingfisher	Brown-hooded	<i>Halcyon</i>	<i>albiventris</i>	Not Evaluated
74	Kingfisher	Malachite	<i>Corythornis</i>	<i>cristatus</i>	Not Evaluated
75	Kite	Black-winged	<i>Elanus</i>	<i>caeruleus</i>	Not Evaluated
76	Kite	Yellow-billed	<i>Milvus</i>	<i>aegyptius</i>	Not Evaluated
77	Korhaan	Red-crested	<i>Lophotis</i>	<i>ruficrista</i>	Not Evaluated
78	Koorhan	White-bellied	<i>Eupodotis</i>	<i>senegalensis</i>	Least Concern
79	Lapwing	African Wattled	<i>Vanellus</i>	<i>senegallus</i>	Not Evaluated
80	Lapwing	Blacksmith	<i>Vanellus</i>	<i>armatus</i>	Not Evaluated
81	Lapwing	Crowned	<i>Vanellus</i>	<i>coronatus</i>	Not Evaluated
82	Lark	Eastern Long-billed	<i>Certhilauda</i>	<i>semitorquata</i>	Not Evaluated
83	Lark	Melodious	<i>Mirafra</i>	<i>cheniana</i>	Not Evaluated
84	Lark	Rufous-naped	<i>Mirafra</i>	<i>africana</i>	Not Evaluated
85	Lark	Spike-heeled	<i>Chersomanes</i>	<i>albofasciata</i>	Not Evaluated
86	Longclaw	Cape	<i>Macronyx</i>	<i>capensis</i>	Not Evaluated
87	Martin	Banded	<i>Riparia</i>	<i>cincta</i>	Not Evaluated
88	Martin	Rock	<i>Ptyonoprogne</i>	<i>fuligula</i>	Not Evaluated
89	Moorhen	Common	<i>Gallinula</i>	<i>chloropus</i>	Not Evaluated
90	Mousebird	Red-faced	<i>Urocolius</i>	<i>indicus</i>	Not Evaluated
91	Mousebird	Speckled	<i>Colius</i>	<i>striatus</i>	Not Evaluated
92	Myna	Common	<i>Acridotheres</i>	<i>tristis</i>	Not Evaluated
93	Oriole	Black-headed	<i>Oriolus</i>	<i>larvatus</i>	Not Evaluated
94	Oxpecker	Red-billed	<i>Buphagus</i>	<i>erythrorhynchus</i>	Not Evaluated
95	Pigeon	Speckled	<i>Columba</i>	<i>guinea</i>	Not Evaluated
96	Pipit	African	<i>Anthus</i>	<i>cinnamomeus</i>	Least Concern
97	Plover	Three-banded	<i>Charadrius</i>	<i>tricoloris</i>	Not Evaluated
98	Quelea	Red-billed	<i>Quelea</i>	<i>quelea</i>	Not Evaluated
99	Robin-Chat	Cape	<i>Cossypha</i>	<i>caffra</i>	Not Evaluated
100	Sandpiper	Wood	<i>Tringa</i>	<i>glareola</i>	Not Evaluated
101	Saw-wing	Black (Southern Africa)	<i>Psalidoprocne</i>	<i>pristoptera holomelas</i>	Not Evaluated
102	Seedeater	Streaky-headed	<i>Crithagra</i>	<i>gularis</i>	Not Evaluated
103	Shelduck	South African	<i>Tadorna</i>	<i>cana</i>	Not Evaluated
104	Snipe	African	<i>Gallinago</i>	<i>nigripennis</i>	Not Evaluated
105	Sparrow	Cape	<i>Passer</i>	<i>melanurus</i>	Not Evaluated
106	Sparrow	House	<i>Passer</i>	<i>domesticus</i>	Not Evaluated
107	Sparrow	Southern Grey-headed	<i>Passer</i>	<i>diffusus</i>	Not Evaluated
108	Sparrowhawk	Black	<i>Accipiter</i>	<i>melanoleucus</i>	Not Evaluated
109	Spoonbill	African	<i>Platalea</i>	<i>alba</i>	Not Evaluated

110	Spurfowl	Swainson's	<i>Pternistis</i>	<i>swainsonii</i>	Not Evaluated
111	Starling	Cape	<i>Lamprotornis</i>	<i>nitens</i>	Not Evaluated
112	Starling	Pied	<i>Lamprotornis</i>	<i>bicolor</i>	Not Evaluated
113	Starling	Red-winged	<i>Onychognathus</i>	<i>morio</i>	Not Evaluated
114	Stonechat	African	<i>Saxicola</i>	<i>torquatus</i>	Not Evaluated
115	Stork	White	<i>Ciconia</i>	<i>ciconia</i>	Not Evaluated
116	Sunbird	Amethyst	<i>Chalcomitra</i>	<i>amethystina</i>	Not Evaluated
117	Sunbird	Greater Double-collared	<i>Cinnyris</i>	<i>afer</i>	Not Evaluated
118	Sunbird	White-bellied	<i>Cinnyris</i>	<i>talatala</i>	Not Evaluated
119	Swallow	Barn	<i>Hirundo</i>	<i>rustica</i>	Not Evaluated
120	Swallow	Greater Striped	<i>Cecropis</i>	<i>cucullata</i>	Not Evaluated
121	Swallow	Lesser Striped	<i>Cecropis</i>	<i>abyssinica</i>	Not Evaluated
122	Swallow	South African Cliff	<i>Petrochelidon</i>	<i>spilodera</i>	Not Evaluated
123	Swallow	White-throated	<i>Hirundo</i>	<i>albigularis</i>	Not Evaluated
124	Swift	African Palm	<i>Cypsiurus</i>	<i>parvus</i>	Not Evaluated
125	Swift	White-rumped	<i>Apus</i>	<i>caffer</i>	Not Evaluated
126	Teal	Red-billed	<i>Anas</i>	<i>erythrorhyncha</i>	Not Evaluated
127	Thick-knee	Spotted	<i>Burhinus</i>	<i>capensis</i>	Not Evaluated
128	Thrush	Karoo	<i>Turdus</i>	<i>smithi</i>	Not Evaluated
129	Tinkerbird	Red-fronted	<i>Pogoniulus</i>	<i>pusillus</i>	Not Evaluated
130	Vulture	Cape	<i>Gyps</i>	<i>coprotheres</i>	Vulnerable
131	Vulture	White-backed	<i>Gyps</i>	<i>africanus</i>	Critically endangered
132	Wagtail	Cape	<i>Motacilla</i>	<i>capensis</i>	Not Evaluated
133	Warbler	Lesser Swamp	<i>Acrocephalus</i>	<i>gracilirostris</i>	Not Evaluated
134	Waxbill	Blue	<i>Uraeginthus</i>	<i>angolensis</i>	Not Evaluated
135	Waxbill	Common	<i>Estrilda</i>	<i>astrild</i>	Not Evaluated
136	Weaver	Cape	<i>Ploceus</i>	<i>capensis</i>	Not Evaluated
137	Weaver	Southern Masked	<i>Ploceus</i>	<i>velatus</i>	Not Evaluated
138	Weaver	Spectacled	<i>Ploceus</i>	<i>ocularis</i>	Not Evaluated
139	Weaver	Thick-billed	<i>Amblyospiza</i>	<i>albifrons</i>	Not Evaluated
140	Weaver	Village	<i>Ploceus</i>	<i>cucullatus</i>	Not Evaluated
141	White-eye	Cape	<i>Zosterops</i>	<i>virens</i>	Not Evaluated
142	Whydah	Pin-tailed	<i>Vidua</i>	<i>macroura</i>	Not Evaluated
143	Widowbird	Fan-tailed	<i>Euplectes</i>	<i>axillaris</i>	Not Evaluated
144	Widowbird	Long-tailed	<i>Euplectes</i>	<i>progne</i>	Not Evaluated
145	Widowbird	Red-collared	<i>Euplectes</i>	<i>ardens</i>	Not Evaluated
146	Wood-hoopoe	Green	<i>Phoeniculus</i>	<i>purpureus</i>	Not Evaluated
147	Woodpecker	Cardinal	<i>Dendropicos</i>	<i>fuscescens</i>	Not Evaluated

REPORT COMPILED BY:

MORA Ecological Services (Pty) Ltd

Email:

mokgatla@moraecological.co.za

Contact:

(+27) 76 559 7692





MOLEPO MOKGATLA JERRY

CURRICULUM VITAE

EDUCATION:

- MSc Zoology, Nelson Mandela University (Percy FitzPatrick Institute of African Ornithology Centre of Excellence)

Research Project Topic: Foraging behaviour and thermal physiology in Cape Sugarbirds: sex-specific responses to temperature.

- BSc Honours in Zoology, University of Limpopo

Research Project Topic: Morphometrics and plumage variation in the South African Fiscal flycatcher *Sigelus silens* Shaw 1809.

- BSc Botany & Zoology, University of Venda
- Grade 12, Marobathota High School

CERTIFICATES:

- SASS5 Aquatic Biomonitoring, GroundTruth
- Hydropedology and Wetland Functioning, Terra Soil Science & Water Business Academy
- Section 21 (c) & (i) Water Use Authorisation Training, Department of Water and Sanitation
- Basic Project Management, Hudisa Business School

PROFESSIONAL MEMBERSHIP:

- South African Council for Natural Scientific Professions (SACNASP) – Professionally registered as Professional Natural Scientist. **Registration number:** 009509
- British Ecological Society (BES). **Membership number:** 1010709
- Zoological Society of Southern Africa (ZSSA). **Membership number:** 691

WORK EXPERIENCE:

- MORA Ecological Services (Pty) Ltd: April 2018 – Current, I am an Environmental Specialist, and my duties include; (i) Conducting Biodiversity, Aquatic Impact Assessments, Rehabilitation (ii) Compilation of specialist reports.
- Arcus Consulting: May - November 2017, I was a subcontracted avifaunal surveyor for the proposed Highlands Wind Energy Farm, Somerset East, Eastern Cape.



- Centre for African Conservation Ecology (ACE), Nelson Mandela University: 2015 - 2016, I was a field guide/ environmental educator. Responsibilities: taking school learners on trail walks inside the Nelson Mandela University Nature Reserve.
- South African National Biodiversity Institute (SANBI): May – December 2014, I was a Zoological Systematics Technician. Responsibilities: (i) Insect identification and curation, and (ii) compiling the animal checklist of South Africa, (iii) Sourcing wildlife crime reports on endangered animals and plants for Barcode of Wildlife Project, (iv) Monitoring the bird population in the Botanical Garden.
- Department of Zoology, University of Venda: 2009 – 2013, I was a Research Assistant under Dr. T.C Munyai who was conducting a long-term research project which monitored the effects of climate change on biota and processes influencing ecosystem functioning and species diversity patterns.
- Percy FitzPatrick Institute of African Ornithology: March – April 2014, I was a Research Assistant under Dr. Rita Covas' Sociable Weaver Research Project. This is a long-term study which looks at the reproductive success of Sociable weavers at Benfontein Nature Reserve in Kimberley.

KEY EXPERIENCE IN SPECIALIST PROJECTS:

Year	Project	Location:	Role(s)
2022	Avifaunal Impact Assessment for the proposed 132kV for Musina-Makhado Special Economic Zone North Site	Musina, Limpopo	Avifaunal Specialist/Ornithologist
2022	Avifaunal Impact Assessment for the proposed Khauta PV Solar including 44kV and 132kV Powerline	Welkom, Free State	Avifaunal Specialist/Ornithologist
2022	Avifaunal Impact Assessment for the proposed NAOS PV Solar including 132kV Powerline	Free State	Avifaunal Specialist/Ornithologist
2022	Preconstruction Avifaunal Assessment for the proposed Lichtenburg PV Solar including 132kV Powerline	Lichtenburg, North West	Avifaunal Specialist/Ornithologist
2022	Preconstruction Botanical Assessment for the proposed Lichtenburg PV Solar including 132kV Powerline	Lichtenburg, North West	Ecologist
2022	Biodiversity Assessment, Land Capability and Veld Condition Assessment for PPC Cement SA Slurry	Slurry, North West	Ecologist
2021	Avifaunal Impact Assessment for the proposed Upington-Aries 2x 400kV	Upington, Northern Cape	Avifaunal Specialist/Ornithologist
2021	Habitat Assessment Post Rehabilitation for PPC Cement SA Dwaalboom Factory	Dwaalboom, Limpopo	Ecologist
2021	Habitat Assessment Post Rehabilitation for Gibson Bay Wind Energy Farm	Humansdorp, Eastern Cape	Ecologist
2021	Wetland Rehabilitation for the sewer pipeline construction in Daveyton	Ekurhuleni East College Campus, Daveyton, Gauteng	Wetland Ecologist
2021	12 Months Wetland Rehabilitation Supervision for Ekangala Ext F Waterborne Sanitation Project	City of Tshwane Metropolitan Municipality, Ekangala, Gauteng	Aquatic Ecologist



2021	Bi-annual Aquatic Biomonitoring for Ekangala Ext F Waterborne Sanitation Project	City of Tshwane Metropolitan Municipality, Ekangala, Gauteng	Aquatic Ecologist
2021	12 Months Surface water and Groundwater monitoring for Ekangala Ext F Waterborne Sanitation Project	City of Tshwane Metropolitan Municipality, Ekangala, Gauteng	Aquatic Ecologist
2021	Estuarine Impact Assessments for the Proposed Mkhambathi and Mbotyi Beach Developments, Ingquza Hill Municipality, Eastern Cape	Ingquza Hill Municipality, Eastern Cape	Ecologist
2021	Botanical Search and Rescue Monitoring Report for A 140 Megawatt Roggeveld Wind Farm and Associated Infrastructure.	Karoo Hoogland Local Municipality, Northern Cape & Laingsburg Local Municipality, Western Cape Provinces	Ecologist
2021	Ecological walkthrough for the proposed National Route 3 (N3) between Cato Ridge and Camperdown in KwaZulu-Natal.	Cato Ridge, KwaZulu-Natal	Ecologist
2021	Avifaunal Impact Assessment for the proposed Musina-Makhado Special Economic Zone South Site	Musina-Makhado, Limpopo	Avifaunal Specialist/Ornithologist
2021	Ecological Impact Assessment for the proposed prospecting on Farm In Die Kom 345 JQ	North West	Ecologist
2021	Rehabilitation Plan for Roggeveld Wind Energy Facility and associated Substation and 33kV and 132kV transmission powerlines.	Karoo Hoogland Local Municipality, Northern Cape & Laingsburg Local Municipality, Western Cape Provinces	Rehabilitation Specialist
2021	Rehabilitation Plan of the sewage effluent in Bethal.	Bethal, Mpumalanga	Rehabilitation Specialist
2021	Invasive Alien Plants Species Eradication and Control Program for Castle Gate Shopping Centre.	Pretoria, Gauteng	Ecologist
2020	Avifaunal Impact Assessment for the proposed 33kV overhead powerlines on Roggeveld Wind Energy Farm.	Karoo Hoogland Local Municipality, Northern Cape & Laingsburg Local Municipality, Western Cape Provinces	Avifaunal Specialist/Ornithologist
2020	Avifaunal & Ecological Impact Assessment for the proposed solar farm on Vaalkloof Nature Reserve.	Brede Valley Municipality, Western Cape	Ecologist
2020	Wetland assessment for the proposed water pipeline upgrade.	Daveyton, Gauteng	Ecologist
2020	Biodiversity Impact Assessment (BIA) for the proposed township establishment in Pretoria North.	Pretoria, Gauteng	Ecologist
2020	Freshwater impact assessment for the proposed water Kagiso Regional Park.	Kagiso, Gauteng	Ecologist
2019	Basic Assessment Report and EMPr for the proposed borehole drilling to supplement water supply for broiler in Delmas, Mpumalanga Province.	Delmas, Mpumalanga	Environmental Assessment Practitioner
2019	Wetland and Ecological Assessment for the proposed upgrading of bulk sewer pipeline in Amsterdam.	Amsterdam, Mkhondo Local Municipality	Ecologist



2019	Ecological assessment for the proposed mine on Farm Palmietfontein 189 IP situated within JB Marks Local Municipality, North West Province.	Ventersdorp, North West	Ecologist
2019	Biodiversity Management Plans for Evander Gold Mine.	Evander, Mpumalanga	Ecologist
2019	Avifaunal assessment for the proposed granite mine outside Mokopane.	Mogalakwena Local Municipality, Limpopo	Avifaunal Specialist/ Ornithologist
2019	Wetland assessment for the proposed grey water pipeline for irrigation.	Makhado Municipality, Limpopo	Ecologist
2019	Ecological assessment for the proposed for Nandoni mixed development.	Nandoni, Thulamela Local Municipality, Limpopo	Ecologist
2019	Ecological assessment for the proposed cultural village on farm Mphaphuli 278MT.	Mukomaasinandu, Thulamela Local Municipality, Limpopo	Ecologist
2019	Ecological assessment for the proposed Musina mixed development.	Musina, Limpopo	Ecologist
2019	Preliminary Ecological assessment for the prospecting on Kroomdrai farm, Mokopane.	Mokopane, Mogalakwena Local Municipality, Limpopo	Ecologist
2018	Invasive Alien Plants Species Eradication and Control Program Plan for Kwazenzele Ext. 1 Phase 2.	Lesedi Local Municipality, Gauteng province	Ecologist
2018	Updating of Wetland Assessment Report for the Magalies Lapatrie to Moruleng Pipeline.	Moses Kotana Local Municipality, North West province	Ecologist
2018	Avifaunal impact assessment for the proposed construction of two double storey on Mooifontein farm no 14IR, Portion 22 in Norkem, Kempton Park.	City of Ekurhuleni, Gauteng province	Avifaunal Specialist/ Ornithologist
2018	Ecological assessment for the proposed shopping centre and filling station in Madombidzha.	Madombidzha, Makhado Municipality, Limpopo province	Ecologist
2018	Biodiversity Assessment & Management Plan for Cullinan Diamond Mine.	Cullinan, Gauteng province	Ecologist (Faunal Specialist)
2017	Preconstruction Avifaunal Assessment for the Proposed Highlands Wind Energy Farm.	Somerset East, Eastern Cape province.	Ornithologist



REFERENCES:

Clients:

Name: Thembi Nkosi

Position & Company: Site Controller – Project Management, Nordex Energy South Africa

Contact: +27 83 379 1775

E-mail: TNkosi@nordex-online.com

Name: Reuben Maroga

Position & Company: Permitting Specialist, SOLA Group

Contact: +27 10 597 3538

E-mail: reuben@solagroup.co.za

Name: Ndivhuwo Ratshikhopha

Position & Company: Director, Nkhophele Holdings

Contact: 012 643 1247

E-mail: ndivhuwo@nkhopheleh.co.za

Academic:

Name: Dr. Ben Smit

Position: Senior lecturer/ Masters supervisor (Rhodes University) Department of Zoology

Contact no: 082 200 8155

E-mail: smitbe@gmail.com

Name: Dr. T.C Munyai

Position: Researcher (University of KwaZulu Natal)

Contact: 072 409 0380, Tel: 033 260 6086

E-mail: munyaic2@ukzn.ac.za