

Casteel Dam Rehabilitation Project

Ehlanzeni District, Mpumalanga Province

Terrestrial Biodiversity Specialist Assessment and Terrestrial Plant and Animal Species Specialist Assessment Report

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Abbreviations

BES	Biodiversity and Ecosystem Services
BODATSA	Botanical Database of Southern Africa
CBA	Critical Biodiversity Area
BI	Biodiversity Importance
CI	Conservation Importance
CPE	Centre of Plant Endemism
DEFF	Department of Environment, Forestry & Fisheries
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
ECO	Environmental Compliance Officer
ESIA	Environmental and Social Impact Assessment
EST	Environmental Screening Tool
FEPA	Freshwater Ecosystem Priority Area
FI	Functional Integrity
GBIF	Global Biodiversity Information Facility
GKNP	Greater Kruger National Park
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)
PAOI	Project Area of Influence
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 adaptation to survive frost, drought and / or fire.
Modified	Modified ecosystems are no longer natural and contain little or no indigenous flora. Examples include agricultural lands, plantations, urban areas, etc.

1. INTRODUCTION

1.1 Background

The Department of Water and Sanitation (DWS) is applying for authorisation to perform essential rehabilitation work on the Casteel Dam situated on the farm Kasteel 231 KU, Bushbuckridge Local Municipality, Mpumalanga Province, South Africa. This report forms part of the environmental authorisation process and concerns the potential implications of the activities listed above on terrestrial biodiversity. This report is based on a review of available information and a field survey conducted in August 2022. Naledzi Environmental Consultants Pty Ltd appointed Digital Earth Pty Ltd to perform an ecological assessment for terrestrial ecosystems (flora, mammals, birds, reptiles and frogs) for the proposed development area. This report provides baseline data of terrestrial biodiversity and assesses the potential impacts of the proposed development on the terrestrial biodiversity. 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 specialist report comply with the requirements 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). These details are presented in Appendix 4 of this report.

1.2 Study Team

The study team for this report was as follows:

Duncan McKenzie (Director - Digital Earth, Terrestrial Ecologist). Duncan is a terrestrial ecologist with 15 years' experience. 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 6.

Linda McKenzie (Director - Digital Earth, GIS Specialist). Linda is a Geomatics Professional Practitioner 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 (GPr. GISc 0170).

1.3 Report Objectives

The objectives of this report were to:

- provide an objective ecological assessment of the baseline state of the receiving environment;
- assess the ecological importance of all habitats / vegetation communities identified as comprising the receiving environment; and
- assess the significance of potential project-related impacts on the receiving environment.

1.4 Acknowledgements

- Rob Palmer of Nepid Consultants is thanked for providing the wetland delineation as well as for reviewing this report.

1.5 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

26 September 2022



L. McKenzie

26 September 2022

2. SCOPE OF WORK

The Environmental Screening Tool (EST) of the Department of Forestry, Fisheries and the Environment (DEFF) was queried, and the results triggered a required specialist assessment and a set of 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 protocols regarding the recommended 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 are functioning within the PAOI;
 - any ecological corridors that are present in the project 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; and
- 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 on infrastructure layout; and
- Provide a substantiated statement regarding the acceptability / approval or not of the project.

A compliance checklist providing an indication of report compliance to the above protocols has been compiled and is included in Appendix 5.

3. STUDY AREA

The study area is situated on the Remainder of the farm Kasteel 231 KU, approximately 10 km south of Acornhoek in the Ehlanzeni District, Mpumalanga Province, South Africa (Figure 1). According to the Project Information Sheet compiled for this proposed development by Naledzi Environmental Consultants¹, the following is applicable:

“Casteel Dam is a small earth-fill embankment dam with a full supply level (FSL) capacity of approximately 1.18 million m³ with a crest length of 255 m and crest width of 3.5-4 m. The dam wall height is 16.6 m. The dam has a Regional Maximum Flood (RMF) of 430 m³/s and has a 34.9 m wide sharp-crested weir spillway with a capacity of 125 m³/s on its right flank and outlet works. When at FSL the dam has a surface area of approximately 16 hectares. Casteel Dam is classified as a Category II small dam with a significant hazard potential. The dam supplies water for domestic use and irrigation purposes to the rural community. Access to the dam is immediately off the R40 via an existing gravel road routing to the dam embankment.

The recent DSE safety risks identified at the dam include:

- The steep slope on the downstream of the embankment may cause rotational failure.*
- There is an eroded gully further downstream in the spillway channel.*
- The outlet works are non-functional.*
- The dam is currently freely discharging from the spillway to the Thlulandziteka River downstream, and the spillway cannot handle the 430 m³/s RMF rendering the spillway capacity inadequate and requires the dam embankment to be raised by approximately two (2) metres.*

The DWS will undertake rehabilitation activities to address the safety risks within the same location as the original dam. No expansion or construction of a new facility is proposed. The total size of the proposed rehabilitation works is 28 500 m² (2.85 ha) and will consist of the following:

- 10 000 m² works on a spillway section and embankment;*
- 10 000 m² works on main embankment;*
- 500 m² works on pipe trenches;*

¹ Naledzi Environmental Consultants, 2022

- *8000 m² access to wall*”.

Additional information pertaining to the construction work as supplied by Naledzi Environmental Consultants included the following:

1. As part of the outlet works refurbishment, we plan to expand the dimensions of the concrete intake tower to 5 m x 5 m, currently, the dimensions are roughly 1.5 m x 1.5 m.
2. To expand the Intake Tower, we must construct a temporary coffer dam around the Tower to create a safe working space.
3. Environmental Authorization to replace the existing 3 x 250 mm diameter pipes with up to 1 000 mm diameter pipe is required.
4. All the reeds/vegetation on the spillway approach channel must be removed. This promotes the free flow of water and prevents spillway blockages, resulting in the overtopping of the earth-fill embankment.
5. All reed/vegetation along the upstream slopes will be removed during the placement of slope protection material.
6. Slope protection will be provided on both sides of the spillway return channel.
7. A 6 000 mm wide access road (gravel) is required from R40 extending along the toe of the dam. This is for construction vehicles during rehabilitation and operational staff during maintenance of the dam after the rehabilitation.
8. A 300 m long access road (gravel) is required to the western side of the dam.

A map displaying the proposed infrastructure is presented in Figure 2.

The proposed construction sites within the study area formed the direct Project Area Of Influence (PAOI), with a 30 hectare buffer around the study area being considered as the indirect PAOI (Figure 1). This buffer was chosen due to the high levels of transformation present surrounding the study area as well as the small spatial scale of the proposed development.

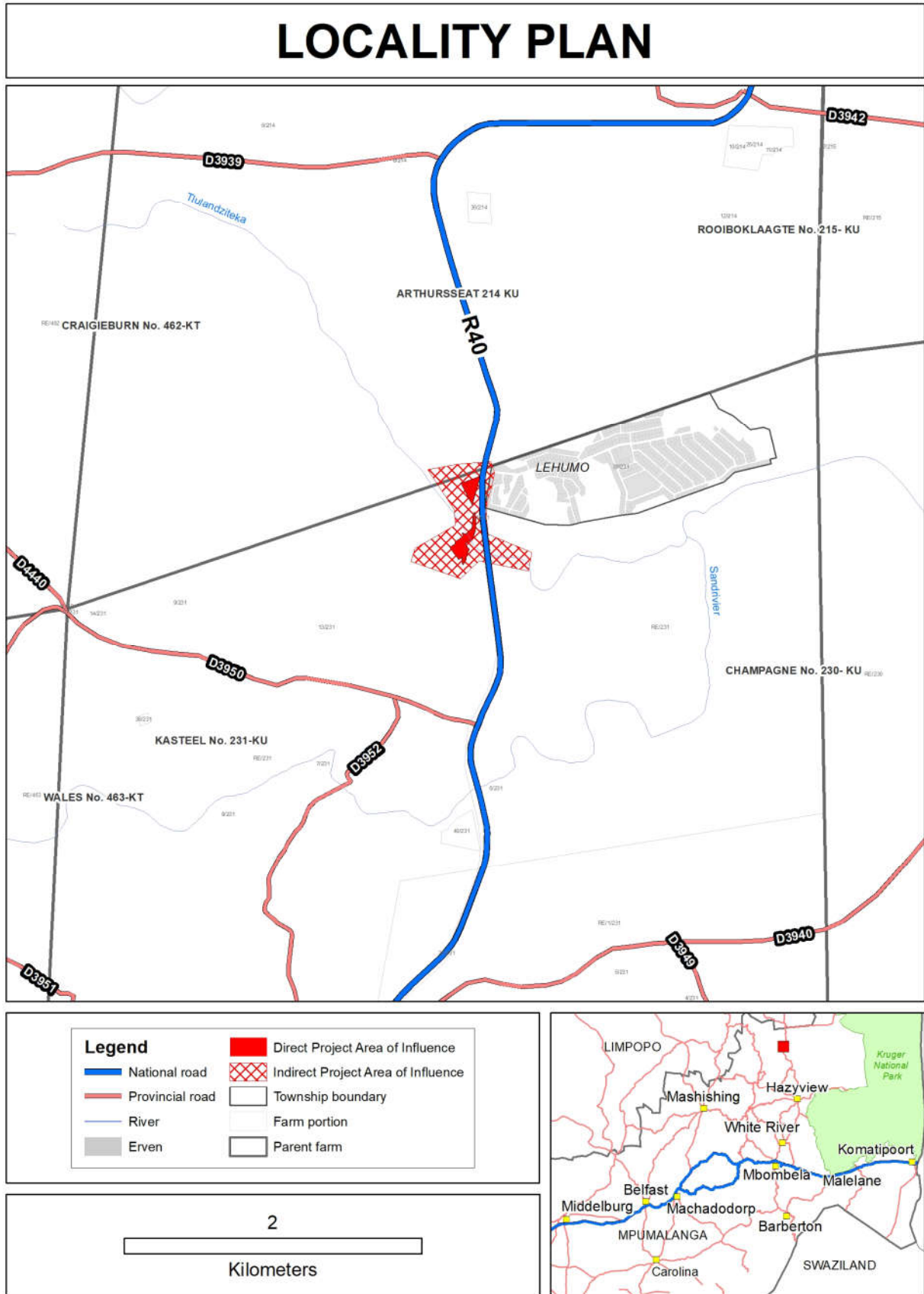


Figure 1. Location of Study Area

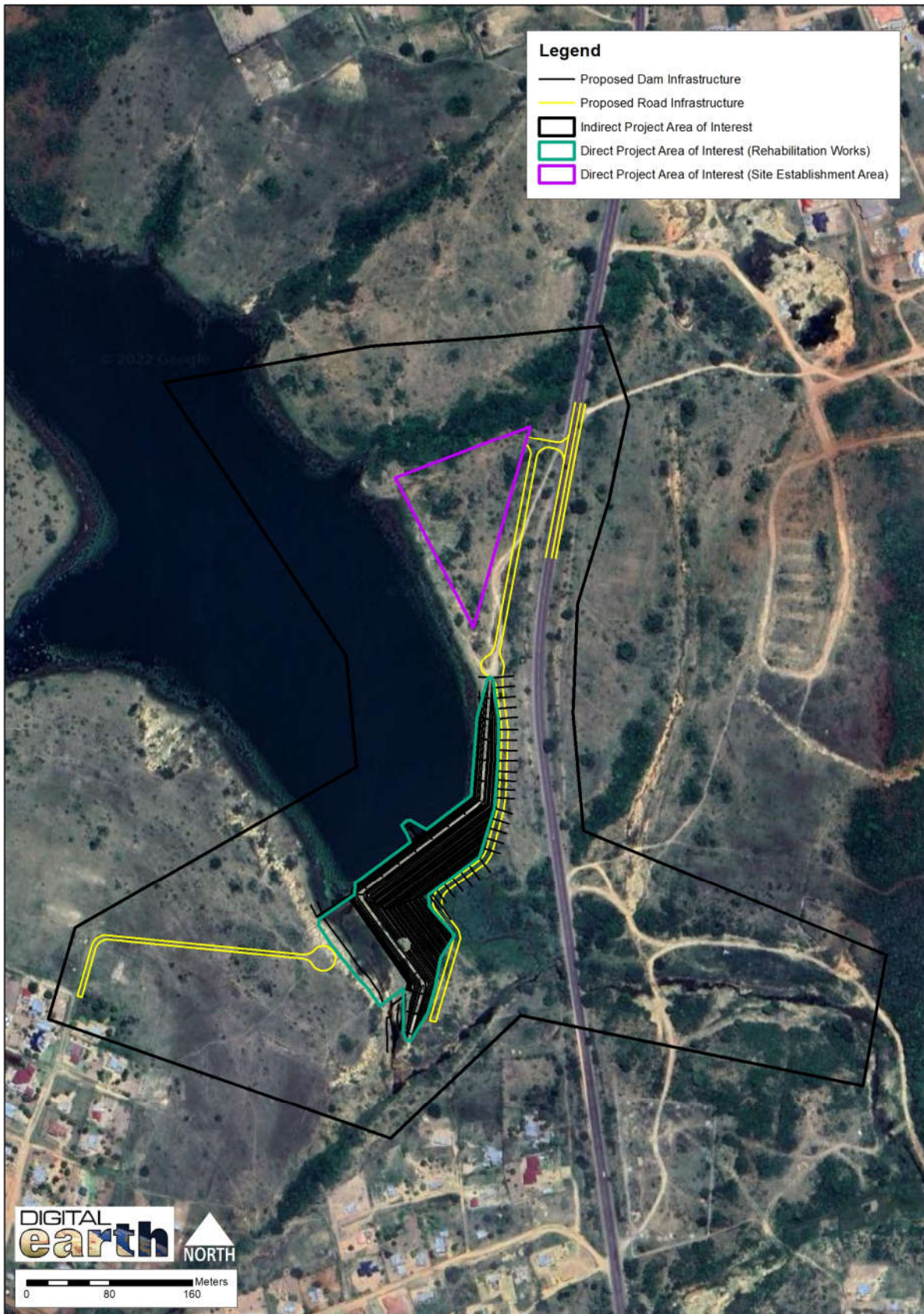


Figure 2. Proposed Casteel Dam Infrastructure (supplied by Naledzi Environmental Consultants)

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 EST of the DEFF. Three Themes were relevant to this study, namely Animal, Plant and Terrestrial Biodiversity. The specific level of site sensitivity for each Theme is as follows:

- Animal Theme is **Medium**
- Plant Theme is **Medium**
- Terrestrial Biodiversity Theme is **Very High**

The specific drivers for each Theme are discussed in Section 5.2.

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 EST. 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 were compiled using Mucina & Rutherford (2006). Various sources then were 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:

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)

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.
3. Data from previous surveys performed by the author within the general area were also referred to for any additional flora SCC. Most specifically, a terrestrial ecology report was produced for the Cunningmoore Pipeline project within the Bushbuckridge Nature Reserve in 2019⁴, as well as the Dwarsloop Residential Development project in 2022⁵.

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., elevation 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 22nd of August 2022. The boundary of the proposed development was supplied by Naledzi

³ <http://newposa.sanbi.org/>

⁴ McKenzie, 2019

⁵ McKenzie, 2022

Environmental Consultants 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 direct PAOI were selected 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. 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). Additionally, the following legislation was referred to pertaining to protected plants:

- 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, if encountered, 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

Faunal observations were made incidentally during the time that the vegetation survey was conducted. Birds seen and heard within the direct and indirect PAOI were identified visually using Vortex Razor 10x42 binoculars as well as audially. 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 SCC⁶. These include species listed under SANBI's Red List of South African Species⁷, as well as the website of the IUCN. Additionally, the following legislation was referred to pertaining to protected fauna species:

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)

⁷ <http://speciesstatus.sanbi.org/>

- 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)

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 9.

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

The first phase of the Impact Assessment is the identification of the various project activities which may impact upon the identified environmental receptors and resources. These receptors and resources allow for an understanding of the impact pathways and assessment of the sensitivity of that receiving environment to change. The significance of the impact is then assessed by rating each variable numerically, according to defined criteria as provided in Table 7. The purpose of the significance rating of the identified impacts is to develop a clear understanding of the influences and processes associated with each impact. The frequency of the activity and the frequency of the impact together comprise the likelihood of the impact and can obtain a maximum value of 10. The severity, spatial scope and duration of the impact together comprise the consequence of the impact; and when summed can obtain a maximum value of 15.

Table 7. Criteria for Assessing the Significance of Impacts

Frequency of Activity	Rating
Duration of aspect	
Annually or less / low	1
6 monthly / temporary	2
Monthly / infrequent	3
Weekly / life of operation / regularly / likely	4
Daily / permanent / high	5
Frequency of Impact	Rating
Almost never / almost impossible	1
Very seldom / highly unlikely	2
Infrequent / unlikely / seldom	3
Often / regularly / likely / possible	4
Daily / highly likely / definitely	5
Severity of Impact	Rating
Insignificant / non-harmful	1
Small / potentially harmful	2
Significant / slightly harmful	3
Great / harmful	4
Disastrous / extremely harmful	5
Spatial Scope of Impact	Rating
Activity specific	1
Area specific	2
Whole project site / local area	3
Regional	4
National/International	5
Duration of Impact	Rating

One day to one month	1
One month to one year	2
One year to ten years	3
Life of operation	4
Post closure / permanent	5

Activity: a distinct process or task undertaken by an organisation for which a responsibility can be assigned.

Environmental aspect: an element of an organisation’s activities, products or services which can interact with the environment.

Environmental impacts: consequences of these aspects on environmental resources or receptors.

Receptors: comprise but are not limited to people or man-made structures.

Resources: include components of the biophysical environment.

Frequency of activity: refers to how often the proposed activity will take place.

Frequency of impact: refers to the frequency with which a stressor will impact on the receptor.

Severity: refers to the degree of change to the receptor status in terms of the reversibility of the impact; sensitivity of receptor to stressor; duration of impact (increasing or decreasing with time); controversy potential and precedent setting; threat to environmental and health standards.

Spatial scope: refers to the geographical scale of the impact.

Duration: refers to the length of time over which the stressor will cause a change in the resource or receptor

The score for each impact, pre and post mitigation, is calculated as follows:

Likelihood	X	Consequence
(Frequency of Activity + Frequency of Impact)		(Severity + Spatial Scope + Duration)

The values for likelihood and consequence of the impact are then read from a significance rating matrix as shown in Table 8.

The Precautionary Principle is applied in instances of uncertainty or lack of information by increasing assigned ratings or adjusting final model outcomes. In certain instances, where a variable or outcome requires rational adjustment due to model limitations the model outcomes are adjusted. Arguments and descriptions for such adjustments, as well as arguments for each specific impact assessments are presented in the text and encapsulated in the assessment summary table linked to each impact

discussion. Included in the discussion under each specific impact is a cumulative assessment of the impact on terrestrial environments represented in the study area.

The Mitigation Hierarchy (MH) as proposed by The Biodiversity Company (2015) is applied to all impacts. The mitigation hierarchy is a tool designed to help decision makers limit, as far as possible, the negative impacts of development projects on Biodiversity and Ecosystem Services (BES). It involves the application of four key actions - ‘avoid’, ‘minimize’, ‘restore’ and ‘offset’—and provides a “best practice approach to aid in the sustainable management of living, natural resources by establishing a mechanism to balance conservation needs with development priorities. While all components of the mitigation hierarchy are important, rigorous efforts to avoid and minimize as far as feasible are likely to achieve significant reductions in potential impacts.”⁸

Table 8. Significance Rating Matrix and Score Classification

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

	Very Low		Medium
	Low		High
	Low-Medium		Very High

⁸ The Biodiversity Company, 2015

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 dry 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 Flora

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.

4.6.3 Overlooked Fauna

Many animals occur at naturally low densities and are cryptic and very difficult to detect, especially predators and animals that are subjected to intensive hunting pressure. This makes it highly unlikely that all species occurring in a region will be detected during a survey as brief as the current study. The current fauna survey provides only an ecological “snapshot” of the communities present and is by no means exhaustive. However, the information presented in this report is considered to be sufficient to be used as a baseline reference and an assessment of the biodiversity value of the habitats represented, and to provide a basis for an impact assessment. Additional fieldwork, including small mammal trapping, nocturnal surveys and the use of camera traps, would result in several additions to the faunal species lists but it is unlikely that this would have produced data that would have changed the ecological importance analysis of this report.

4.6.4 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. REGIONAL CONTEXT

5.1 General

The study area falls within the summer rainfall, dry winter zone with a mean annual precipitation of between 450 and 900 mm per annum and generally frost-free⁹. It is situated within the quarter-degree grid square (QDGS) 2431 CA at an elevation of ~600 mamsl. The general topography of the area is gently to moderately undulating, with shallow to deeply eroded drainage lines. Most of the study area contains natural vegetation, although in a disturbed or degraded state due to overgrazing, firewood gathering, dumping and littering and soil erosion. Modified habitat present includes the dam wall, spillway and reservoir as well as a single access track and the adjacent R40 tarred road. The surrounding area is mostly utilised for cattle grazing, informal fishing and firewood gathering.

5.2 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 DEFF's online EST. The result of the site-specific EST query indicated that the study area, including a 200 m buffer, has **Medium** Sensitivity for the Animal and Plant Theme and **Very High** Sensitivity for the Terrestrial Biodiversity Theme (Figure 3) due to the potential or confirmed occurrence of the following:

5.2.1 Animal Theme (Medium)

- Mammalia – *Lycaon pictus* – EN

African Wild Dog has a very low likelihood of occurring within the study area. Included here solely due to being listed by the EST. A species that is not likely to venture this far from the Kruger National Park into a densely populated area with high hunting pressure, low prey numbers and presence of livestock.

- Mammalia – Listed Sensitive Species No. 5 – VU

This species has a very low likelihood of occurring within the study area. Included here solely due to being listed by the EST. A large carnivore species not likely to venture this far from the Kruger National Park into a densely populated area with high hunting pressure, low prey numbers and presence of livestock.

⁹ Mucina & Rutherford, 2006

- Mammalia – *Crocidura maquassiensis* – VU

Maquassie Musk Shrew has a very low likelihood of occurring within the study area. Included here solely due to being listed by the EST. Unrecorded from far eastern Mpumalanga.

- Mammalia – *Dasymys robertsii* – VU

Robert's Marsh Rat has a low likelihood of occurring within the study area. The study area is at the edge of its distribution range, it is a rare species and requires more pristine and interconnected wetland habitat than what is present.

- Aves – *Terathopius ecaudatus* – EN

Bateleur has a low likelihood of occurrence. Although some suitable foraging habitat is present, the high disturbance levels would deter this shy species. In addition, there are no confirmed records of it in the area.

- Aves – *Aquila rapax* – EN

Tawny Eagle has a low likelihood of occurrence. Although some suitable foraging habitat is present, the high disturbance levels would deter this shy species. In addition, there are no confirmed records of it in the area.

- Aves – *Stephanoaetus coronatus* – VU

Crowned Eagle has a low likelihood of occurrence. No suitable forest habitat is present within or surrounding the study area, there are high disturbance levels present and it is also unrecorded from the area.

- Aves – *Podica senegalensis* – VU

African Finfoot has a low likelihood of occurrence. Although some suitable habitat is present on the reservoir, the high disturbance levels would deter this shy species. In addition, there are no confirmed records of it in the area.

- Aves – *Hydroprogne caspia* – VU

Caspian Tern has a very low likelihood of occurrence. Although superficially suitable habitat is present along the adjacent reservoir, this species requires sandbanks for roosting (which are absent), is

intolerant of high disturbance levels and is very rare in the Lowveld. Included here only due to appearing in the Screening Tool query.

- Reptilia – Listed Sensitive Species No. 5 – VU

This species has a low likelihood of occurrence. Although there are anecdotal records of this species in Casteel Dam, it is no longer present (DWS *pers. comm.*)

5.2.2 Plant Theme (Medium)

- Listed Sensitive Species No. 575 – CR

This plant has a very low likelihood of occurrence. It is very rare in Mpumalanga, and is only known from a few localities further east within the Crocodile Gorge and KNP

- Listed Sensitive Species No. 1252 – VU

This climber has a very low likelihood of occurrence. Only degraded habitats are present, and none were located during fieldwork.

- Woodia singularis – Rare

This herb has a very low likelihood of occurrence. It is a very rare species, only known from two (distant) locations in Mpumalanga / Swaziland. Included here only due to appearing in the Screening Tool query.

5.2.3 Terrestrial Biodiversity Theme (Very High)

- Critical Biodiversity Area 2

The northern portions of the study area are situated in an area classified as Critical Biodiversity Area: Optimal by the Mpumalanga Biodiversity Sector Plan. However, this area is degraded and should be excluded from this macro-scale assessment.

- FEPA Subcatchment

The study area is situated within a Freshwater Ecosystem Priority Area Subcatchment.

- Protected Areas Expansion Strategy

The study area forms part of the Protected Areas Expansion Strategy. However, the closest protected area is situated more than 10 km away, and the surrounding area is densely populated.

- Strategic Water Source Areas

The study area is situated within a Strategic Water Source Area.

- Vulnerable Ecosystem

The area to the north of the study area, outside of the PAOI, is situated within Legogote Sour Bushveld, which is assessed as Vulnerable in the National List of Threatened Ecosystems. However, this Ecosystem is not present within the study area.

5.2.4 Site Sensitivity Verification

The site verification performed during the field assessment indicates that the specific identified sensitivity of the study area, according to the Environmental Screening Tool, is not justified. This is due to the small size of the study area, the lack of Species of Conservation Concern and the high disturbance levels present.

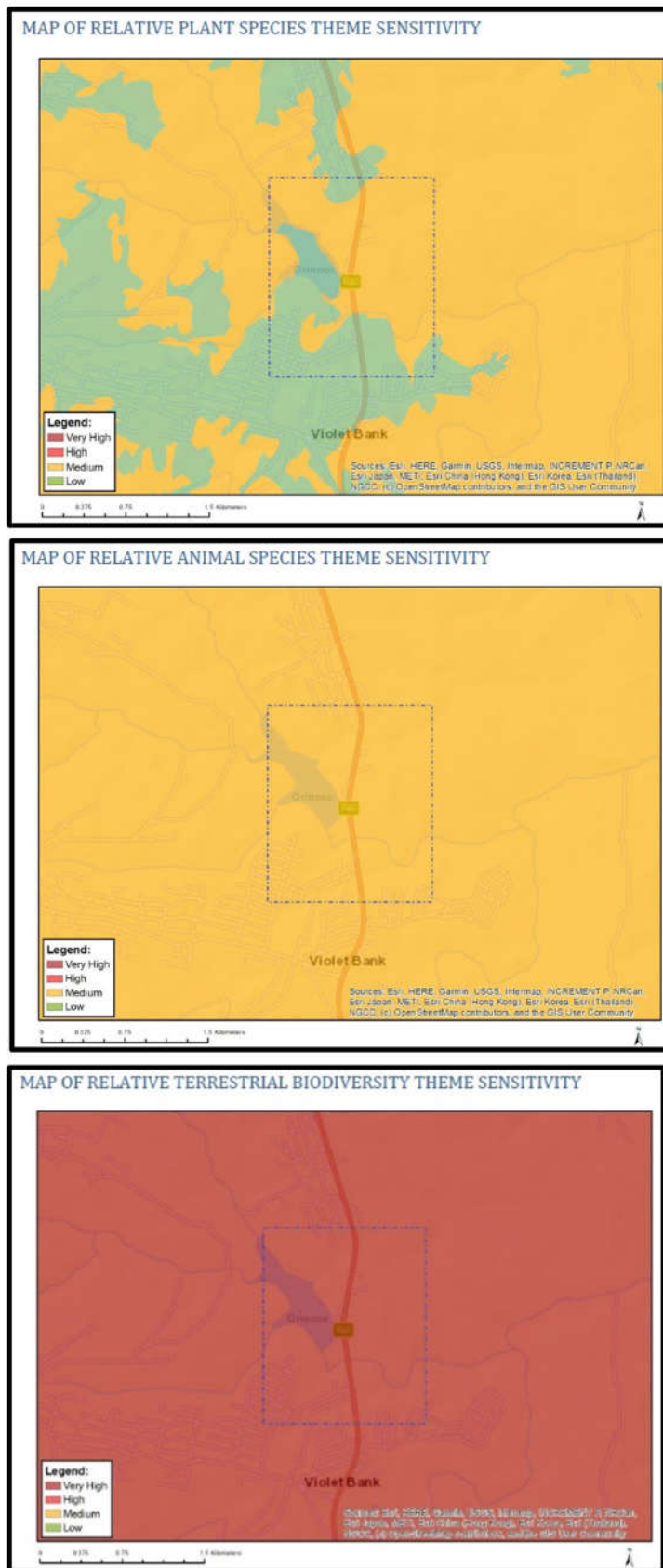


Figure 3. Environmental Screening Tool Themes relevant to Terrestrial Ecology

5.3 Mpumalanga Biodiversity Sector Plan

The northern and north-eastern portions of the study area have been assessed as **Critical Biodiversity Area (CBA) Optimal** by the the MBSP (Figure 4). 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 farming¹⁰. Any development should be carried out under the provisions of the National Environmental Management Act (NEMA, Act 107 of 1998). However, most of these portions of the study area are ecologically compromised by various anthropogenic factors, including historical agricultural lands, overgrazing, firewood gathering and alien plant infestation and should be excluded from the macro-scale CBA assessment. A revision of the MBSP will most likely re-classify many of these areas as **Moderately Modified** and **Other Natural Areas**.

The far south-eastern corner is classified as **Other Natural Areas** by the MBSP. These are areas that have not been identified as a priority in the current systematic biodiversity plan but retain most of their natural character, while performing a range of biodiversity and ecological functions. While not considered priority areas for biodiversity conservation at present, they are still an important part of the natural ecosystem. Other Natural Areas offer much more flexibility in terms of permissible land uses, but the desired management objective should be to minimise habitat and species loss and ensure ecosystem functionality through strategic landscape planning¹¹.

The south-western and western portions of the study area are classified as **Heavily** or **Moderately Modified** by the the MBSP (Lötter *et al.*, 2014). These areas show the greatest flexibility in terms of management objectives and permissible land-uses¹².

¹⁰ Lötter *et al.*, 2014

¹¹ Lötter *et al.*, 2014

¹² Lötter *et al.*, 2014

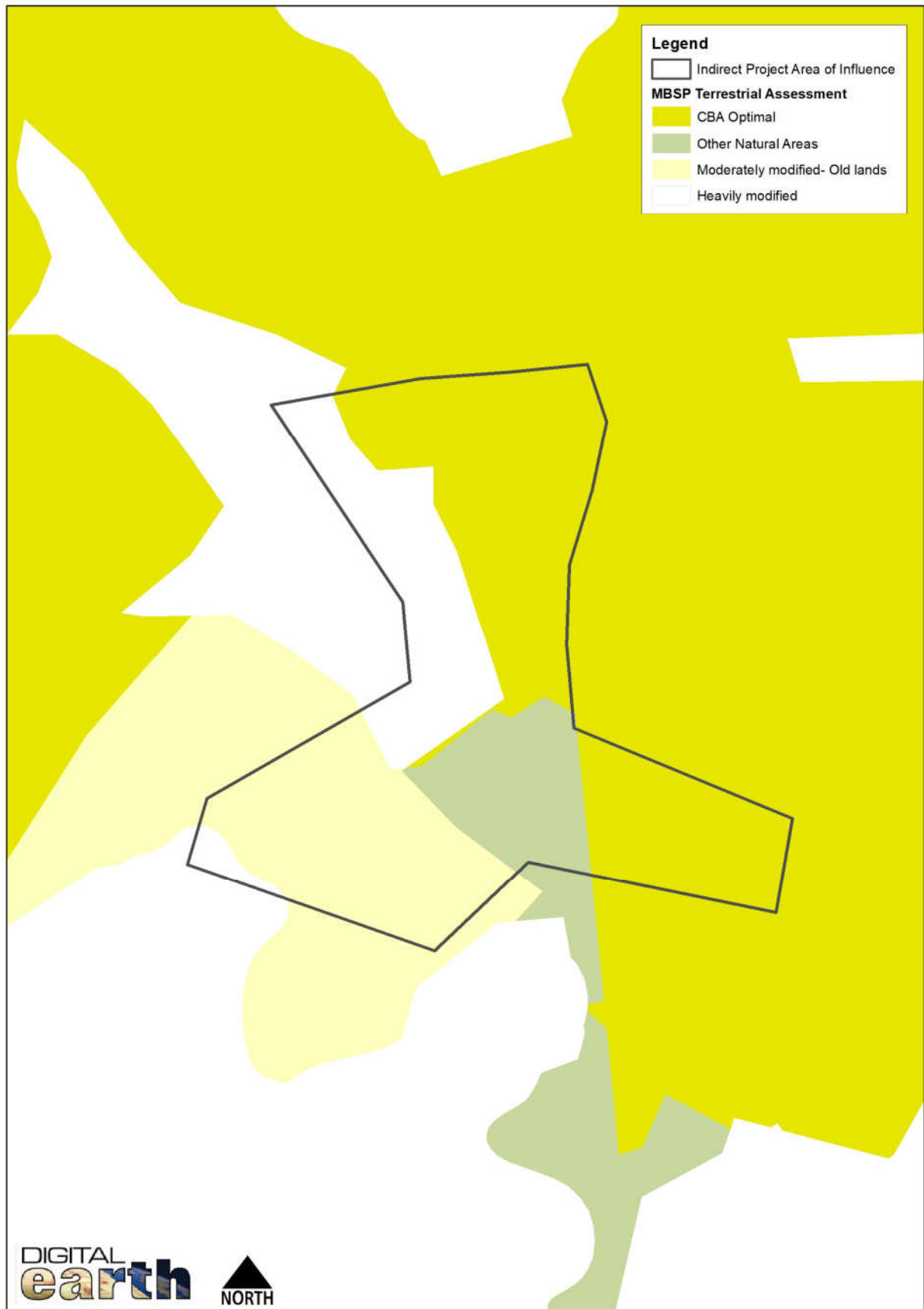


Figure 4. Mpumalanga Biodiversity Sector Plan Assessment of the Study Area

6. BIODIVERSITY BASELINE DESCRIPTION

6.1 Flora

6.1.1 Regional Context

The study area is situated within the Lowveld Bioregion of the Savanna Biome. This is the largest biome in South Africa, occupying 32.8% of the surface area (Mucina & Rutherford, 2006). White (1983) considers the moister eastern savannas of South Africa to fall within the Zambebian Regional Centre of Endemism. This Region stretches from the north-eastern portion of South Africa northwards to Tanzania and westwards to Angola. More specifically, this work categorises the area south of the Limpopo River as South Zambebian Undifferentiated Woodland and Scrub Woodland.

6.1.1.1 National Vegetation Types

According to the current National Vegetation Map (SANBI, 2018), the vegetation type present within the study area is Granite Lowveld. This vegetation type is found in a narrow strip from Phongola in northern KwaZulu-Natal in the south, through central Swaziland, and to Giyani in Limpopo Province in the north. Granite Lowveld originally covered 19 838 km², of which 21% has been transformed, mostly through agriculture and urbanisation. Although Mucina & Rutherford (2006) classified Granite Lowveld as Vulnerable, large tracts of this vegetation type occurs in public and private nature reserves in South Africa, including the Greater Kruger National Park (GKNP), and it is now considered **Well Protected** with a provincial ecosystem status of **Least Concern**¹³.

Typical Granite Lowveld is dominated by tall trees such as *Vachellia nigrescens* and *Sclerocarya birrea*, as well as a variety of smaller trees and shrubs such as *Combretum zeyheri* and *C. apiculatum*, *Terminalia sericea*, *Euclea divinorum* and *Peltophorum africanum*. Common herbaceous plants include *Waltheria indica*, *Aspilia mossambicensis*, *Commelina* species and *Kohautia virgata*. Dominant grasses are *Digitaria eriantha*, *Panicum maximum* and *Pogonarthria squarrosa* (Mucina & Rutherford, 2006).

¹³ Lötter *et al.*, 2014

6.1.1.2 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 does not lie within any of these CPE's, with the closest being the Wolkberg CPE which lies approximately 12 km to the west of the study area.

6.1.1.3 Threatened Ecosystems

Granite Lowveld has not been listed as a Threatened Ecosystem (Notice 1002 of Government Gazette 34809, 9 December 2011).

6.1.2 Local Context – Plant Species Richness and Vegetation Assemblages

The results of a query on SANBI's Botanical Database of Southern Africa (BODATSA) lists 384 plant species from 81 families for a 20 km radius of the project area but below the Escarpment. August 2022 fieldwork yielded 144 plant species from 46 families representing 38% of the BODATSA total. The true plant species diversity of the study area is likely to be slightly higher, with summer flowering herbaceous plants under-represented due to the timing of the survey. 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 Fabaceae and Asteraceae (both with 19 spp.) followed by the Poaceae (17 spp.).

Two vegetation communities are represented within the direct PAOI, based on distinctive vegetation structure (grassland, woodland, thicket, etc.), floristic composition (dominant and diagnostic species) and position in the landscape (mid-slopes, terrace, crest, etc.), in addition to modified areas. Representative photographs of these communities as well as modified habitats are presented in Figure 5, are spatially presented in Figure 6 and are briefly described below. Alien plant species are indicated by an asterisk.

6.1.2.1 *Dichrostachys cinerea* – *Parinari curatellifolia* Degraded Shrubland / Thicket Mosaic

This community occurs over most of the study area. This community is characterised by a moderate variety of woody canopy species and a well-developed ground layer dominated by grasses and forbs. Vegetation structure is mostly High Open to Closed Shrubland, but due to regular firewood harvesting and resultant coppicing of trees, some portions are best described as Low Thicket (Edwards, 1983).

The canopy was dominated by the trees *Dichrostachys cinerea* subsp. *africana* and *Parinari curatellifolia*. Additional canopy species included *Vachellia sieberiana*, *Terminalia sericea*, *Sclerocarya birrea*, *Combretum molle*, *Peltophorum africanum*, *Trichilia emetica*, *Annona senegalensis*, *Gymnosporia senegalensis*, *Antidesma venosum* and *Diospyros mespiliformis*. Rarer species located were *Turraea nilotica* and *Vachellia davyi*. The shrub layer is dominated by *Phyllanthus reticulatus*, * *Lantana camara*, *Carissa bispinosa*, *Ehretia amoena*, *Eriosema psoraleoides*, *Gymnanthemum coloratum*, *Pavetta schumanniana* and * *Psidium guajava*. Grasses dominated the ground layer, with the most frequently encountered species being *Hyperthelia dissoluta*, *Pogonarthria squarrosa*, *Heteropogon contortus*, *Melinis repens*, *Cynodon dactylon*, *Imperata cylindrica*, *Sporobolus africanus* and *S. pyramidalis*. Herbaceous species recorded from this community included *Agathisanthemum bojeri*, *Crystallopolen angustifolium*, *Gazania krebsiana*, *Helichrysum kraussii*, *Indigofera sanguinea* and *Senecio latifolius*. The succulent *Aloe barbertoniae* occurred in large numbers throughout.

A total of 102 species (71% of the entire list) was recorded from the Degraded Shrubland / Thicket Mosaic community, the higher species richness of the two vegetation communities in the study area (Appendix 1).

6.1.2.2 *Phragmites mauritianus* – *Leersia hexandra* Wetland

This community occurred on seasonally to permanently wet soils in the southern portion of the study area, below the dam wall and spillway and, to a limited extent, along the shoreline of the reservoir itself. It was characterised by a well-developed grass layer with scattered trees and shrubs occurring especially in the drier fringes. Vegetation structure was mostly Short to High Closed Grassland (Edwards, 1983).

The reed *Phragmites mauritianus*, the rush *Typha capensis* and the grass *Leersia hexandra* dominated the ground layer, particularly in the heavier soils. Additional graminoids located were *Cyperus polystachyos*, *C. denudatus*, *C. dives*, *C. melanospermus*, *Schoenoplectus corymbosus*, *Imperata cylindrica*, *Cynodon dactylon*, *Hyperthelia dissoluta*, *Eragrostis plana* and *Sporobolus africanus*. Scattered trees, shrubs and dwarf shrubs located included *Ficus sur*, * *Lantana camara*, * *Psidium guajava*, *Antidesma venosum*, *Gymnosporia senegalensis*, *Eriosema psoraleoides* and *Phyllanthus reticulatus*. Facultative wetland herbs occurring in this community included *Centella asiatica*, * *Persicaria lapathifolia*, *Coleus livingstonei*, *Commelina diffusa*, * *Ageratum conyzoides* and *Nidorella podocephala*. Stretches of open water contained the nymphaeid *Nymphaea nouchali*.

A total of 50 species (35% of the entire list) was recorded from the Wetland community, the lower species richness of the two vegetation communities in the study area (Appendix 1).

Modified areas, including roads and open water, make up the remaining portions of the study area.

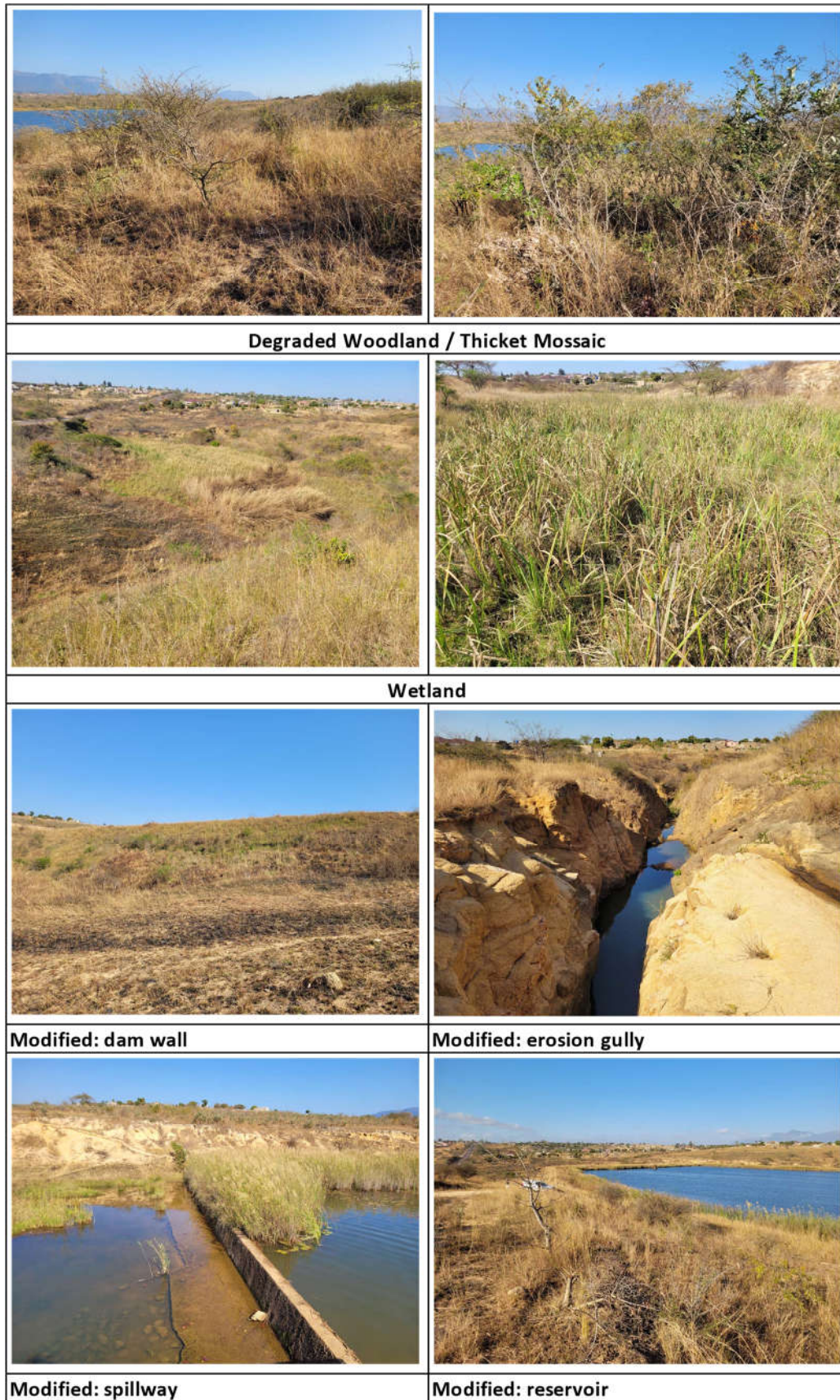


Figure 5. Photographs of Vegetation Communities and Modified Habitats present within the Study Area

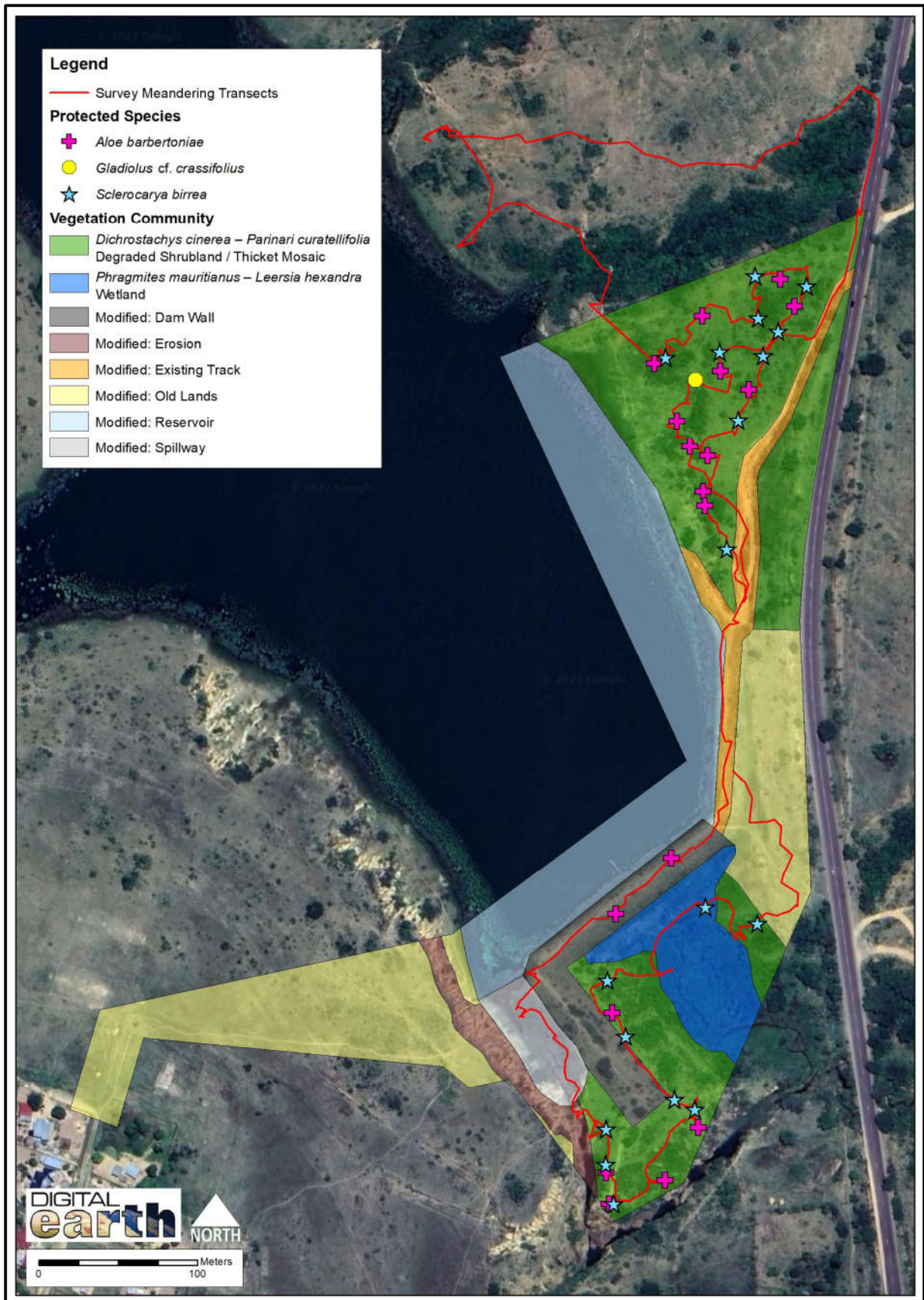


Figure 6. Spatial Presentation of Vegetation Communities Located within the Study Area

6.1.3 Species of Conservation Concern

The study area is situated within a region that has a low to moderate concentration of SCC, with an estimated nine species potentially occurring within a 20 km radius but still within Granite Lowveld (Table 10). A total of 144 species from 46 families were recorded during fieldwork, none of which are listed as threatened or Near Threatened (NT) by SANBI (Appendix 1).

All of the species listed in Table 10 have a low or very low likelihood of occurrence due to either a lack of suitable habitat, being highly conspicuous species that are unlikely to be overlooked during fieldwork, adequate coverage of suitable habitat during fieldwork or because they are regionally rare or very little is known about them.

6.1.4 Endemic Species

No plants located during fieldwork are endemic to Mpumalanga.

6.1.5 Protected Species

One tree recorded during fieldwork is protected under the NFA, namely *Sclerocarya birrea*, which occurred in moderately high numbers throughout the study area. Two additional plants are protected under the MNCA, namely *Aloe barbertoniae*, which occurred in large numbers, and *Gladiolus cf. crassifolius*, which was rarely encountered (Appendix 1, Table 9).

The co-ordinates of the protected plants located within the study area during fieldwork are presented in Appendix 2. These localities represent the larger and main clusters of plants and should not be seen as a complete inventory of all species present as some may have been missed during fieldwork and for others a general point was placed at the centre of a large copse or grove of plants. These localities are meant to guide the developers during the planning and construction phases. These points are spatially presented in Figure 6.

6.1.6 Alien Species

Twenty alien plant species were recorded from within the study area during fieldwork, eight 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 indicates a moderate severity of infestation within the study area.

Table 9. Confirmed Plant Species of Conservation Concern

Taxa	Growth Form	Protected	Degraded Shrubland / Thicket Mosaic	Wetland
Family Anacardiaceae <i>Sclerocarya birrea</i> (A.Rich.) Hochst. subsp. <i>caffra</i> (Sond.) Kokwaro	tree	NFA	f	
Family Asphodelaceae <i>Aloe barbertoniae</i> Pole-Evans	succulent	MNCA	f	
Family Iridaceae <i>Gladiolus cf. crassifolius</i> Baker	geophyte	MNCA	r	
TOTAL	3	3	3	0

NFA - National Forests Act

MNCA - Mpumalanga Nature Conservation Act

f - frequent

r - rare

Table 10. Potentially occurring Plant Species of Conservation Concern

Species	Red Data Status	Habitat Preference	Optimal Survey Time	Likelihood of Occurrence	Justification
Family Apocynaceae <i>Woodia singularis</i>	Rare	Various habitats in bushveld and grasslands	Dec-May (flowering period, deciduous species)	Very Low	Very rare species, only known from two (distant) locations in Mpumalanga
Family Celastraceae <i>Elaeodendron transvaalense</i>	NT	Dry woodland	Throughout the year (even when sterile)	Very Low	Very rare in the general area, prefers heavier soils to the east
Family Dioscoreaceae Listed Sensitive Species No. 1252	VU	Wooded and relatively mesic places, such as the moister bushveld areas, coastal bush and wooded mountain kloofs	Usually throughout the year (even when sterile) although deciduous in dry environments	Very Low	Degraded habitats present, not located during fieldwork
Family Fabaceae <i>Dalbergia melanoxylon</i>	NT‡	Savanna	Throughout the year (even when sterile)	Low	None recorded during fieldwork
Family Hyacinthaceae <i>Bowiea volubilis</i> subsp. <i>volubilis</i>	VU	Scree slopes, rocky thickets	Oct-April (deciduous species)	Very Low	No suitable habitat present
<i>Drimia sanguinea</i>	NT	Open veld and scrubby woodland in a variety of soil types.	Jul-Sep (spring-flowering, deciduous and grass-like species)	Low	Suitable habitat present but none located during fieldwork
<i>Merwillia plumbea</i>	NT	Open grassland, wetlands, rocky ridges	Oct-April (deciduous species)	Very Low	No suitable habitat present, none located during fieldwork
Family Orchidaceae <i>Ansellia africana</i>	VU‡	Riverine forest, tall woodland	Throughout the year (even when sterile)	Low	Suitable habitat present, none located despite intensive searching
Family Zingiberaceae Sensitive Species No. 575	CR	Wide variety of habitat types	Oct-April, deciduous species	Very Low	Very rare in Mpumalanga, only known from a few localities further east within the Crocodile Gorge and KNP

NT - Near Threatened
 VU - Vulnerable
 CR - Critically Endangered
 ‡ - IUCN assessment

6.2 Terrestrial Fauna

6.2.1 Mammals

6.2.1.1 Regional Overview

The study area is situated in the savanna biome in the low, gently undulating hills of the Mpumalanga Lowveld. It is surrounded by high human density, and the arterial R40 to the east. The study area is not inhabited but human and livestock activity probably occurs daily. The untransformed areas surrounding the reservoir are used for grazing and firewood gathering, and several fishermen were observed during fieldwork. Therefore, the study area is not expected to provide refuge for larger mammals.

No protected areas are situated within close proximity to the study area, with the closest being the provincially managed Bushbuckridge Nature Reserve is situated c. 20 km to the south of the study area. This reserve provides refuge for some naturally occurring mammal species such as Southern Bushbuck *Tragelaphus sylvaticus*, Natal Red Duiker *Cephalophus natalensis* and Bushpig *Potamochoerus larvatus*¹⁴. However, none of these are expected within the proposed Casteel development due to high hunting pressure and disturbance levels.

A low total of 50 species of mammals have been recorded in the QDGS 2431 CA in the Animal Demography Unit's Virtual Museum's database¹⁵. However, many of these records are from animals kept in enclosures on private smallholdings in the far northern portion of the QDGS, within the Limpopo Province, and these records should be removed from this database. The study area would support very few larger mammals, and probably only a low to moderate variety of smaller mammals. None of the potentially occurring mammals are endemic to South Africa, Lesotho and Eswatini.

6.2.2.2 Confirmed Species

Two native species of mammals were recorded during fieldwork, namely Slender Mongoose *Herpestes sanguineus* and African Molerat *Cryptomys hottentotus* (Appendix 3) and both from the Open Woodland faunal assemblage (Figure 7). Both species are common and widespread within the savanna biome in South Africa (*pers. obs.*). Additional fieldwork, including small mammal trapping and camera

¹⁴ McKenzie, 2019

¹⁵ http://vmus.adu.org.za/vm_sp_list.php accessed 24/08/2022

traps, would not result in the confirmation of many additional species and it is unlikely that this would have produced data that would have changed the ecological importance analysis of this report.

6.2.2.3 Species of Conservation Concern

An estimated 18 conservation-important mammals potentially occur within the general area (Appendix 4). 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 18 potentially occurring species, 14 are assessed as SCC¹⁶ with nine considered threatened (Appendix 4). None of these were located during fieldwork and none are likely to occur due to a lack of suitable habitat, high disturbance levels or regional scarcity.

6.2.2.4 Protected Species

No protected species were recorded during fieldwork, and very few are expected.

6.2.2.5 Alien Species

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

¹⁶ 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)



Figure 7. Faunal Habitats Present within the Study Area

6.2.2 Avifauna

6.2.2.1 Regional Overview

The savanna biome, within which the study area is situated, supports the highest diversity of bird species within the Southern African sub-region¹⁷. However, the wide-scale modification of natural habitat in the greater Acornhoek / Bushbuckridge area has led to a significant reduction of species diversity, with up to 63% fewer species present than in the adjacent GKNP¹⁸.

The Acornhoek / Bushbuckridge area is avifaunally fairly well sampled but only moderately diverse with a total of 334 species recorded from 169 lists submitted for the nine pentads (mapping units) from the QDGS 2431 CA from Full Protocol cards¹⁹ in the second Southern African Bird Atlas Project (SABAP2)²⁰. At a finer scale, data from SABAP2 indicate that 153 bird species (or 46% of the entire list) from 7 full protocol cards have already been recorded from the pentad in which the study area is situated (2440_3100)²¹. A pentad covers an area of approximately 78 km², which is considerably smaller than a QDGS (approximately 700 km²) and thus a better indication of which species occur in the study area. A map displaying the study area in relation to surrounding pentads is presented in Figure 8.

The study area is situated approximately 9 km east of the Blyde River Canyon Important Bird & Biodiversity Area (IBA) which qualifies as a Global IBA under criteria A1, A2, A3 and A4ii. Eight globally threatened species are resident within the IBA, in addition to an additional eight resident regionally threatened birds. Several migratory and vagrant threatened species also occur²². However, most of the area between Casteel Dam and the Blyde Canyon IBA is either densely populated, cultivated or heavily utilised by stock farmers and none of the threatened species are likely to occur regularly.

The study area is not situated within close proximity to any Wetlands of International Importance (Ramsar Sites)²³.

¹⁷ Taylor *et al.*, 2015

¹⁸ Underhill *et al.*, 2016

¹⁹ Full Protocol lists reflect an observer effort of between two hours and five days of data collection while Ad Hoc lists reflect an effort of less than two hours

²⁰ <http://sabap2.adu.org.za/coverage/qdgc/2431ca> created on 24/08/2022

²¹ Data accessed from https://sabap2.birdmap.africa/coverage/pentad/2440_3100 on 24/08/2022

²² Marnewick *et al.*, 2015

²³ <https://www.ramsar.org/wetland/south-africa>

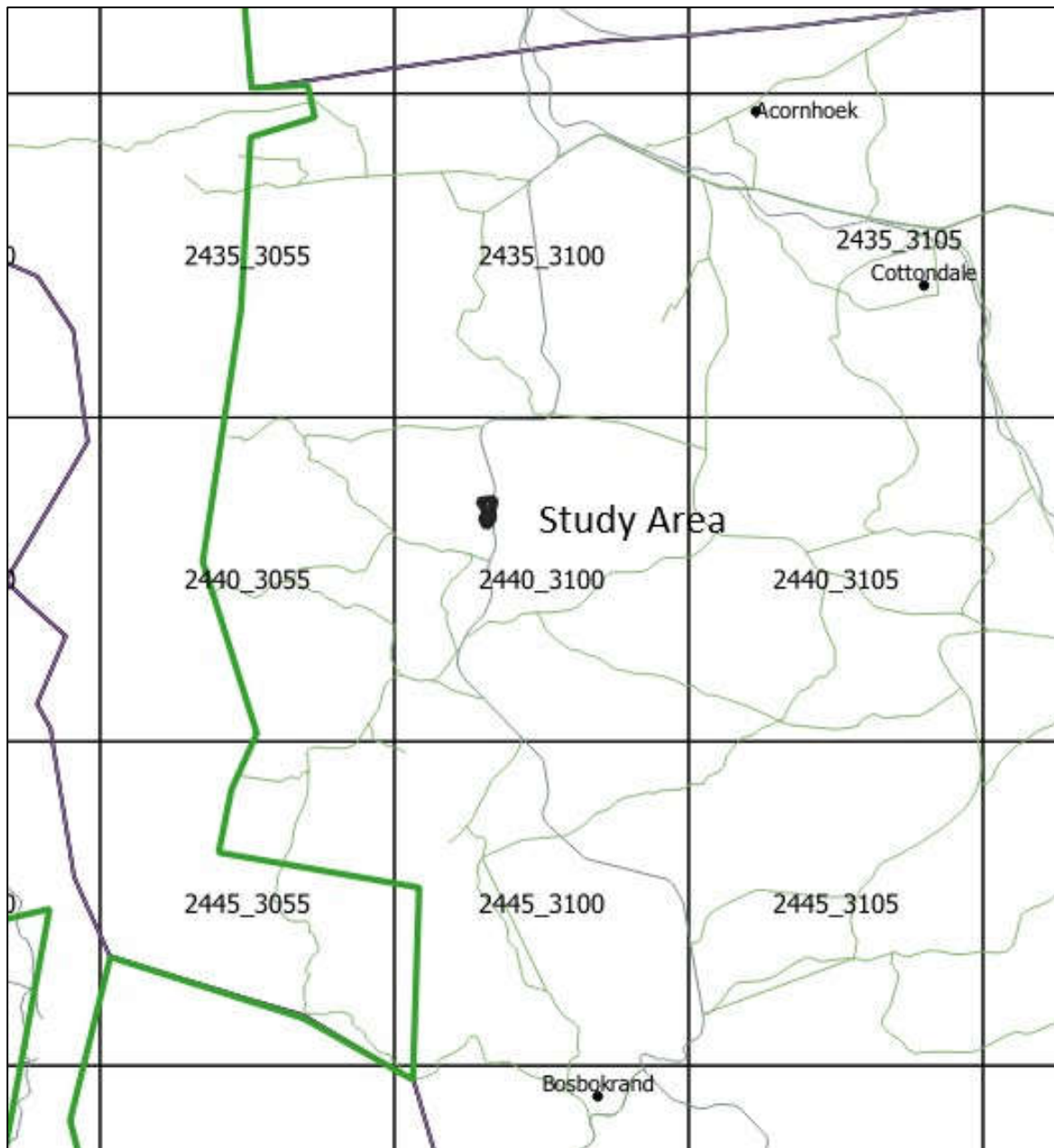


Figure 8. Map of the Pentads Surrounding the Study Area

6.2.2.2 Local Avifaunal Assemblages

A total of 74 species, representing 48% of the pentad list, were confirmed from within or immediately adjacent to the actual habitats represented in the study area during fieldwork and are listed in Appendix 3. Sufficient sampling was undertaken for assessing habitat suitability for potentially occurring threatened species and to describe broad bird assemblages. Four broad assemblages or species-habitat associations were identified, are briefly described below and are spatially presented in Figure 7.

I. Open Woodland Assemblage

The open woodland habitat within the study area supported a moderate diversity of often highly visible species that favour grassy savannas²⁴ such as Cape Starling *Lamprotornis nitens*, Yellow-fronted Canary *Crithagra mozambica*, Scarlet-chested Sunbird *Chalcomitra senegalensis*, Yellow-throated Longclaw *Macronyx croceus*, Little Bee-eater *Merops pusillus*, White-bellied Sunbird *Cinnyris talatala*, Rufous-naped Lark *Mirafraga africana*, African Hoopoe *Upupa africana* and Bronze Mannikin *Spermestes cucullata*. Forty-one species (55% of the entire list) were recorded from the Open Woodland assemblage; the highest of the four assemblages present.

II. Thicket Assemblage

The small pockets of thicket that were embedded within the Open Woodland habitat provided refuge for a moderately low diversity of more specialist species such as Southern Boubou *Laniarius ferrugineus*, Sombre Greenbul *Andropadus importunus*, Terrestrial Brownbul *Phyllastrephus terrestris*, White-throated Robin-Chat *Cossypha humeralis*, Spectacled Weaver *Ploceus ocularis* and African Firefinch *Lagonosticta rubricata*. Twenty species (27% of the entire species recorded during fieldwork) were recorded from the Thicket assemblage, the second highest of the four assemblages.

III. Wetland Assemblage

Wetland areas, dominated by tall reeds, rushes and grasses, supported a relatively diverse assemblage of species. Cryptic insectivores recorded were African Reed Warbler *Acrocephalus baeticatus*, Little Rush Warbler *Bradypterus baboecala*, Tawny-flanked Prinia *Prinia subflava* and Red-faced Cisticola *Cisticola erythrops*. Seedeaters are often highly visible and included Southern Red Bishop *Euplectes orix*, African Golden Weaver *Ploceus xanthops* and Common Waxbill *Estrilda astrild*. Two species more associated with terrestrial wetland habitat included Black Crake *Zapornia flavirostra* and Squacco Heron *Ardeola ralloides*. Eighteen species (24% of the entire species recorded during fieldwork) were recorded from the Wetland assemblage, the third highest of the four assemblages.

IV. Open Water Assemblage

²⁴ Hockey *et al.*, 2005

The Open Water avifaunal assemblage is associated with the Casteel Dam reservoir in the western portion of the study area. Species richness is low, with only 12 species (16%) being recorded during fieldwork. Selected species located included African Jacana *Actophilornis africanus*, Reed Cormorant *Microcarbo africanus*, African Fish Eagle *Haliaeetus vocifer*, Malachite Kingfisher *Corythornis cristata*, Little Grebe *Tachybaptus ruficollis* and Cape Wagtail *Motacilla capensis*. Several hirundines foraged low over the water, including Brown-throated Martin *Riparia paludicola*, White-throated Swallow *Hirundo albigularis* and Wire-tailed Swallow *H. smithii*.

6.2.2.3 Species of Conservation Concern

An estimated 19 bird SCC have been recorded from or potentially occur within the general area around the study area (Appendix 4). Fourteen of these are threatened, with the remaining five species are assessed as NT. No threatened or NT species were recorded during fieldwork, and only two have previously been recorded in the pentad 2440_3100, within which the study area is situated. These two species are described briefly below.

Lanner Falcon *Falco biarmicus*

Southern Africa's largest falcon is assessed as Vulnerable (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 powerlines²⁵. This species reflects a reporting rate of 28,6% within the pentad 2440_3100 and may occasionally forage within the study area. However, no breeding habitat (cliff ledges) is present.

African Pygmy Goose *Nettapus auritus*

Africa's smallest duck is listed as VU due to wetland destruction and invasion of wetland habitat by alien invasive plants²⁶. A single sight record of this species was made on Casteel Dam in December 2020, presumably of vagrant birds, as this species is very rare in the Lowveld²⁷. None were located during the August 2022 survey, despite intensive searching, and it is unlikely to occur regularly.

The remaining potentially occurring SCC have a low or very low likelihood of occurrence 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 4). No raptor nests were located within the study area.

²⁵ Taylor *et al.*, 2015

²⁶ Taylor *et al.*, 2015

²⁷ https://sabap2.birdmap.africa/coverage/pentad/2440_3100

6.2.2.4 Endemic Species

No bird species recorded during fieldwork are endemic to South Africa, Lesotho and Swaziland, and very few are expected.

6.2.2.5 Protected Species

With the exception of most gamebirds, waterfowl and problem birds, most bird species are protected in Mpumalanga under the MNCA. No potentially occurring species are protected under NEMBA ToPS.

6.2.2.6 Alien Species

Three alien bird species were recorded during fieldwork, both from the Open Woodland assemblage (Appendix 3). These are Rock Dove *Columba livia*, House Sparrow *Passer domesticus* and Common Myna *Acridotheres tristis*. It is likely that all three are resident in the general area and flourishing due to the abundant supply of human food waste, with which they are associated²⁸.

²⁸ Hockey *et al.*, 2005

6.2.3 Herpetofauna

6.2.3.1 Regional Overview

The Lowveld and Foothills of eastern Mpumalanga supports a very high diversity of reptile species, with diversity levels ranking in the top 10% of all areas in South Africa²⁹. The two reptile groups showing the highest diversity include the lizards (20-41 species recorded) and snakes (20-44 species recorded) (Bates *et al.*, 2014). Reptile endemism is low with no endemic species recorded in the QDGS 2431 CA. This is to be expected as the area lies in close proximity to Mozambique in the widespread savanna biome (Bates *et al.*, 2014). One hundred and two reptile species have been recorded from the degree grid 2431³⁰ and, at a finer scale, 67 species have been recorded from the QDGS 2431 CA, 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).

The Acornhoek / Bushbuckridge area supports a moderately high diversity of frog species, with levels of 11-20 species per QDGS in the area³¹. However, no potentially occurring frogs are endemic to South Africa (Minter *et al.*, 2004). Forty-one frog species have been recorded from the degree grid 2431³² and, on a finer scale, 27 have been recorded from the QDGS 2431 CA³³, within which the study area is situated.

6.2.3.2 Confirmed Species

Only two species of reptile were recorded during fieldwork, namely Striped Skink *Trachylepis striata* and Rainbow Skink *T. margaritifer*, both from the deep erosion gully embedded within the Open Woodland faunal assemblage (Appendix 3) (Figure 7). Both are common and widespread species in the general area (*pers. obs.*). No frog species were recorded but at least some will be present, mostly within the wetland and open water habitats. Dedicated herpetofaunal surveys in the wet season, including trapping, would no doubt have produced additional species but are unlikely to have produced data that would change the recommendations in this report.

²⁹ Bates *et al.*, 2014

³⁰ http://vmus.adu.org.za/vm_sp_list.php accessed 24/08/2022

³¹ Minter *et al.*, 2004

³² http://vmus.adu.org.za/vm_sp_list.php accessed 24/08/2022

³³ http://vmus.adu.org.za/vm_sp_list.php accessed 24/08/2022

6.2.3.3 *Species of Conservation Concern, Protected and Alien Species*

Two nationally threatened reptiles potentially occur in in the general proximity of the study area, namely Listed Sensitive Species No. 1 and Natal Hinged Tortoise *Kinixys natalensis* (both VU), but both with a Very Low likelihood due to lack of suitable habitat, high disturbance levels or regional rarity. Although there are anecdotal records of Listed Sensitive Species No. 1 in Casteel Dam, it is apparently no longer present (DWS *pers. comm.*). Southern African Python *Python natalensis* is protected under the NEMBA ToPS but is unlikely to regularly occur within the study area (Appendix 4). No potentially occurring frog species are SCC. No alien herpetofauna species were recoded or are expected in the study area.

6.3 Important Ecological Processes / Drivers and Ecological Connectivity

6.3.1 Ecological Drivers

The study area is situated within the savanna biome (Mucina & Rutherford, 2006). Savannas consist of an “open tree layer with a continuous grassy ground layer, typically dominated by shade-intolerant species” (Ratnam *et al.* 2011).

The following major ecological drivers were identified for the savanna biome by Sankaran *et al.* (2005):

- The availability of resources (water, nutrients); and
- Disturbance regimes (fire, herbivory).

The very high levels of development surrounding the study area means that some of the primary ecological drivers may be absent, but others (such as fire and herbivory) are still present. It is assumed that no vegetation management following best-practice guidelines for savanna areas, that includes rotational burning, is being practiced in the study area.

6.3.2 Ecological Functions & Processes

The total amount of nutrients and mean annual precipitation entering the ecosystem has probably not been altered much. The position of the proposed development in the low-altitude savanna means that it is unlikely that any climate-change refugia, which are mostly located in higher-altitude areas, would be impacted by the project.

6.3.3 Ecological Corridors

No important local or landscape corridors have been identified within the study area³⁴. However, the proposed development is situated along the Thlulandziteka River, an area that may provide important biological connectivity to upstream and downstream habitats.

³⁴ Lötter *et al.*, 2014

6.4 Site-specific Ecological Importance Analysis

An integrated Ecological Importance analysis of the four faunal assemblages and two vegetation communities represented in the study area was undertaken using the methodology described in Section 4.4. Prior to calculating Site Ecological Importance (SEI), a comparison was made between the classification of the two vegetation communities and four faunal assemblages to discern how the SEI assessments of each could be integrated. This was performed by merging selected faunal assemblages to match the vegetation communities as indicated in Table 11. SEI was then calculated separately for each of the vegetation communities and faunal assemblages, before integrating these into an overall SEI assessment. Discussion on the SEI of each of these habitats is provided below and the results shown in Table 12 and displayed in Figure 9.

Table 11. Integration of Vegetation Communities and Faunal Assemblages into Habitats for the SEI assessment

Faunal Assemblage	Vegetation Community	Habitat
Open Woodland	Degraded Shrubland / Thicket Mosaic	Degraded Shrubland / Thicket Mosaic
Thicket		
Wetland	Wetland	Wetland
Open Water	No applicable vegetation community	Modified

The Degraded Shrubland / Thicket Mosaic community supports a high density of two and low density of one protected plant species. However, very few potentially occurring SCC are likely. It therefore has Medium Conservation Importance (CI). Due to degradation of this habitat, including firewood harvesting and alien plant infestation, the Functional Integrity (FI) is Medium. The combination of Medium CI and Medium FI leads to a Biodiversity Importance (BI) rating of **Medium**. Receptor Resilience (RR) is **Medium** as Granite Lowveld Will recover slowly (~more than 10 years) to restore > 70% of the original species composition and functionality of the receptor functionality. The integration of Medium BI and Medium RR results in a SEI of **Medium**.

The Wetland vegetation community has a High CI due to the national protection status of wetlands, due to being mostly intact and therefore performing important wetland functions such as water attenuation, water storage and filtering and due to potentially having a local importance as an ecological corridor. FI is High due to the low level of alien invasive plant invasion and disturbance levels. This leads to a BI value of **High**. RR is **Medium** as wetland areas 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 have species that have a moderate likelihood of returning to a site once the disturbance or impact has been removed. When the High BI is combined with a Medium RR the resulting SEI is **High**.

Modified areas have **Low** SEI due to a **Low** BI combined with a **Medium** RR.

According to SANBI’s 2020 guidelines for biodiversity specialists in ESIA’s (Table 6), areas with **High** SEI have the following land use guidelines:

- 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.

Areas with **Medium** SEI have the following land use guidelines:

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

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 12. Ecological Sensitivity of Habitats in the Study Area

Assessment Criteria	Degraded Woodland / Thicket Mosaic	Wetland	Modified
Conservation Importance	Medium	High	Low
Functional Integrity	Medium	High	Low
Biodiversity Importance	Medium	High	Low
Receptor Resilience	Medium	Medium	Medium
SITE ECOLOGICAL IMPORTANCE	Medium	High	Low

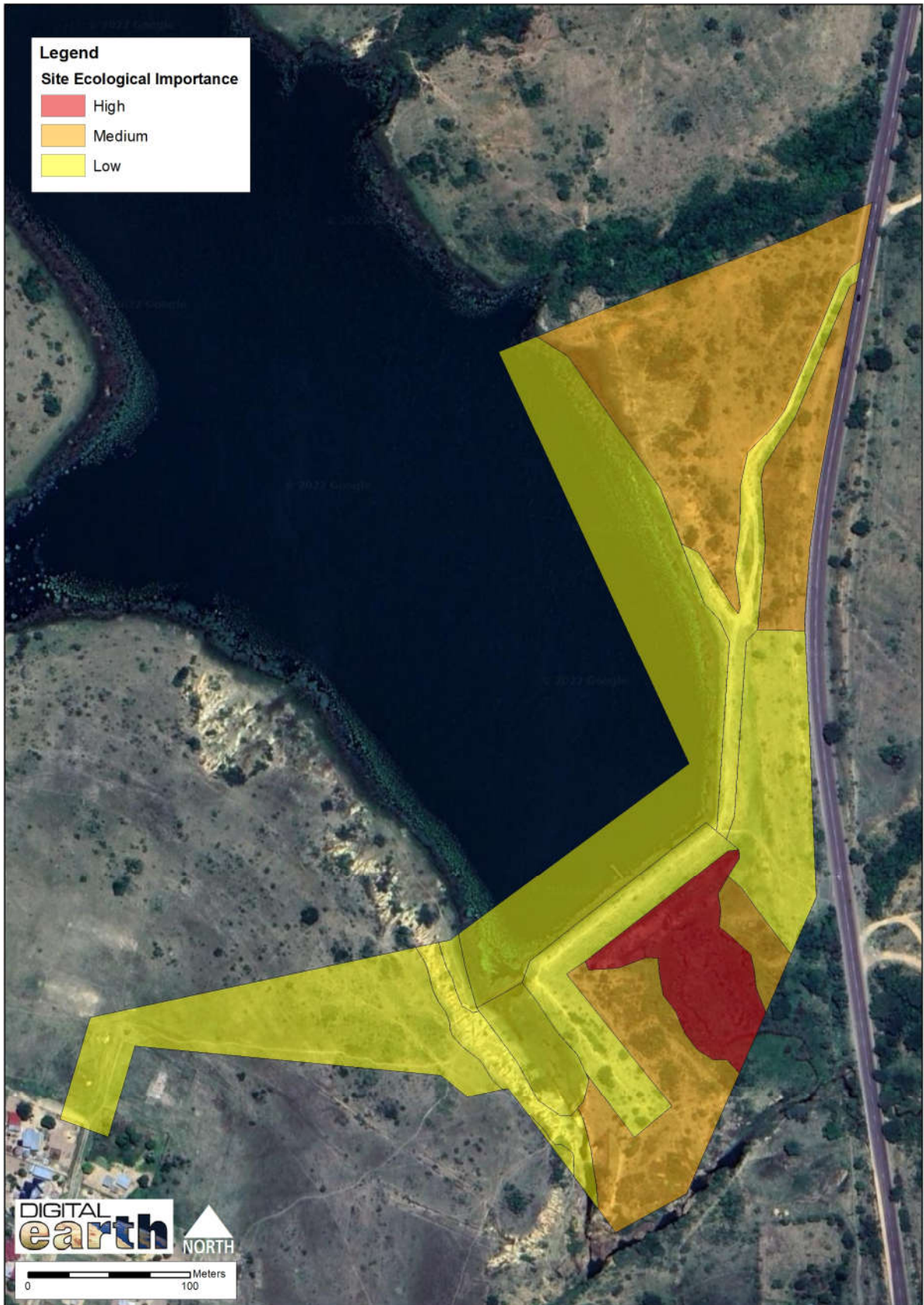


Figure 9. Site Ecological Importance of the Habitats in the Study Area

7. KEY CURRENT AND POTENTIAL IMPACTS

This section details the environmental impacts of the proposed development within the study area on terrestrial ecosystems. Impacts are not arranged in any order of overall significance.

7.1 Loss of Habitat with a Very High Terrestrial Biodiversity Theme (EST), and Vegetation Community with High SEI

The study area is situated within an area assessed as having Very High Terrestrial Biodiversity Theme within the Environmental Screening Tool of the DEFF. The primary drivers for this assessment are the location of the study area within a Strategic Water Source Area, a FEPA and CBA2. While the Degraded Shrubland / Thicket Mosaic community has a Medium SEI, the Wetland community contains a functioning wetland that would contribute to the drivers and has a High SEI. However, the portion of wetland that may be affected by rehabilitation works is spatially limited to less than 0.5 ha. An additional 0.5 ha may be Frequency of activity is rated 4 (life of project) and impact rated 5/5 as these impacts are highly likely. The severity and spatial scope are rated 3/5. Duration of impact is rated 4/5 (life of project). Destruction of the wetland will therefore result in a **Medium** significance pre-mitigation, but with mitigation, this can be lowered to **Low-Medium**, which would require no further application of the Mitigation Hierarchy.

Likelihood		Consequence			Significance Rating
Frequency of Activity	Frequency of Impact	Severity	Spatial Scope	Duration	
Significance Pre-Mitigation					
4	5	3	3	4	90
Significance Post-Mitigation					
4	5	1	2	4	63

7.2 Invasion of Natural Habitat by Alien Plants

Twenty alien plant species were located within the study area during fieldwork, eight of which are declared alien invasives. Additional invasion is likely as construction activities could introduce seeds which may thrive in bare soil resulting from construction activities. However, infestation levels are only low to moderate. Frequency of activity and impact are both rated 4/5 as these impacts could occur regularly. The severity is only rated 3/5 due to the moderately low density of aliens already established within the study area. Spatial scope is rated 3/5 due to the potential widespread

infestation. Duration of impact is rated 4/5 (life of project). The pre-mitigation significance of this impact is therefore **Medium**. Implementation of suitable mitigation measures is likely to reduce the impact significance to **Low-Medium**, which would require no further application of the Mitigation Hierarchy.

Likelihood		Consequence			Significance Rating
Frequency of Activity	Frequency of Impact	Severity	Spatial Scope	Duration	
Significance Pre-Mitigation					
4	4	3	3	4	80
Significance Post-Mitigation					
4	4	1	2	4	56

7.3 Potential of Soil Erosion and Sedimentation of Wetlands

Rain and sediment runoff from loose and bare soil around the cleared areas and hard surfaces are likely to result in some erosion and sedimentation of the downstream wetland and river systems. The frequency and impact is rated 4/5, the severity and spatial scope is rated 3/5 due to the small spatial scale of the possible construction works, and the duration is rated 3/5 as the vegetation covering the earthworks will require some time to establish. Although the pre-mitigation impact of this is **Low-Medium**, consideration must be given to the timing of clearing activities. Clearing during the dry season and the careful and correct implementation of a soil erosion plan will reduce this impact to **Low**.

Likelihood		Consequence			Significance Rating
Frequency of Activity	Frequency of Impact	Severity	Spatial Scope	Duration	
Significance Pre-Mitigation					
4	4	3	2	3	64
Significance Post-Mitigation					
4	4	1	1	3	40

7.4 Increase in Poaching Activities

Unsupervised construction workers may participate in small-scale poaching through netting of fish in the reservoir or adjacent downstream section of the Thlulandziteka River. Medicinal plants may also

be harvested for local retail to markets. The frequency of activity is rated 2/5 as this impact may only be temporary, while the frequency of impact is rated 4/5 as the impact is likely. Severity is rated 3/5 as the impact may only be slightly harmful, particularly considering the fishing activities that are already taking place and the low number of threatened species present in the general area. Spatial scope is rated 3/5 as only the local area may be affected. Duration is rated 1/5 as construction workers may only be on site for a few months. The pre-mitigation impact is assessed as **Low**, which remains **Low** even post-mitigation as implementation of mitigation measures will be very difficult due to the lack of access controls.

Likelihood		Consequence			Significance Rating
Frequency of Activity	Frequency of Impact	Severity	Spatial Scope	Duration	
Significance Pre-Mitigation					
2	4	3	3	2	48
Significance Post-Mitigation					
2	4	2	2	2	36

7.5 Destruction of Protected Plants

Three protected plant species were confirmed in the study area. One species (*Sclerocarya birrea*) is nationally protected and occurs in moderately high density, while the remaining two species, namely *Aloe barbertoniae* and *Gladiolus cf. crassifolius*, are provincially protected. The *Aloe* occurs in high density while the *Gladiolus* in low density. The frequency of the activity is rated 2/5 as it is temporary. The frequency of impact is rated 5/5 as it highly likely. Severity is 3/5 due to the moderate to high density of only three protected species. Spatial scope is rated 3/5 as heavy machinery will likely traverse the entire site. Duration is rated 5/5 as the consequence will be permanent. The overall significance of this impact pre-mitigation is **Medium** but could be reduced to **Low-Medium** with the implementation of mitigation measures. This would require no further application of the Mitigation Hierarchy.

Likelihood		Consequence			Significance Rating
Frequency of Activity	Frequency of Impact	Severity	Spatial Scope	Duration	
Significance Pre-Mitigation					
2	5	3	3	5	77
Significance Post-Mitigation					
2	5	1	2	5	56

7.6 Destruction of Habitat for Faunal SCC

Although no bird or mammal SCC were recorded during fieldwork, two mammals, two reptiles and 74 bird species were confirmed to occur. A low number of SCC potentially occur, but only as foraging species. Construction activities may displace these animals through noise and human presence, and the construction work may reduce habitat / natural vegetation by up to c. 3 ha. The frequency of activity and impact area rated 4/5 (likely). However, due to the limited spatial scale of the proposed development and few SCC likely to ever be present, the severity is rated 2/5 (small). The spatial scope is 2/5 (area specific). Duration is likely to be for the life of operation (4/5). The overall significance of this impact pre-mitigation is **Low-Medium**. Implementation mitigation measures will reduce the overall severity of the impact to **Low**, which would not require further application of the Mitigation Hierarchy.

Likelihood		Consequence			Significance Rating
Frequency of Activity	Frequency of Impact	Severity	Spatial Scope	Duration	
Significance Pre-Mitigation					
4	4	2	2	4	64
Significance Post-Mitigation					
4	4	1	1	4	48

7.7 Cumulative Impacts

Cumulative impacts of the proposed development on terrestrial biodiversity are likely to arise from:

- Loss of habitat for fauna and flora, which has a **Medium** cumulative impact due to the small size of the proposed development, medium to high sensitivity and low number of potential SCC.
- Loss of habitat from invasion from alien plant species may result in a Medium regional cumulative impact and should therefore be regarded as having **Medium** significance.
- Destruction of protected plants would have a **Medium** cumulative impact due to the moderate to high density of at least two species within the study area.

Application of the mitigation measures listed under the next section are likely to reduce the significance of cumulative impacts within the study area to **Low-Medium**, which would require no further application of the Mitigation Hierarchy.

Likelihood		Consequence			
<i>Frequency of Activity</i>	<i>Frequency of Impact</i>	<i>Severity</i>	<i>Spatial Scope</i>	<i>Duration</i>	<i>Significance Rating</i>
Significance Pre-Mitigation					
4	4	3	3	4	80
Significance Post-Mitigation					
4	4	2	2	3	56

8. RECOMMENDATIONS

8.1 Authorisation

There is no objection to the proposed development in terms of the terrestrial ecosystems of the study area 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). 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 on untransformed habitat, including wetlands, and the presence of protected plant species.

8.2 Mitigation Measures / Recommendations

The following mitigation measures are proposed to avoid or minimise potential impacts on terrestrial biodiversity:

- An independent Environmental Compliance Office (ECO) should be appointed prior to any construction activities. The ECO will be responsible for compliance with the Environmental Management Plan by the developer during the construction phase;
- 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. Suitable drains and other stormwater infrastructure should be constructed in areas where run-off is likely.
- During the construction phase, the surrounding area should be deemed out of bounds to restrict movement of workers and disturbance of the surrounding habitat;
- All diesel and other harmful chemicals should be stored in environmentally safe areas away from the reservoir and river;
- All building rubble should be removed from the site and not remain within the development area;
- All declared alien plants within a 100 m buffer around the proposed development must be eliminated according to the DEA's published guidelines (DEA, 2015). These are species that have been listed under the National Environmental Management: Biodiversity Act (Act No. 10 OF 2004);

- It is important that weed control, if involving herbicides, be managed correctly to reduce the impact on the adjacent natural vegetation;
- The ECO should perform regular inspections around the construction site to search for evidence of poaching;
- All specimens of *Aloe barbertoniae* within the proposed development footprints should be carefully dug up with their roots intact and transplanted into either adjacent habitat or used in landscaping / re-vegetation around the construction site;
- No additional construction activities or tracks should be placed within any wetland or riparian areas.
- Every effort should be made to avoid unnecessary erosion of soil and sedimentation of downstream areas around the construction works. This may include, but not be restricted to, the installation of drains along the access road and sediment traps below construction areas;
- Destruction permits from the relevant authorities may have to be applied for, particularly with regard to the destruction of the tree *Sclerocarya birrea*.
- The large areas of active sheet erosion on the western side of the dam wall and spillway should be rehabilitated to prevent further sedimentation of downstream wetland and riparian areas.
- It is recommended that the integrity of the dam wall be verified by qualified engineers due to the presence of termites which may undermine the wall and result in wall failure.

8.3 Monitoring

Other than the recommended, scheduled tasks to be performed by the ECO, no monitoring actions for terrestrial ecosystems are suggested for this development due to the generally low ecological sensitivity of the area and lack of species of conservation concern.

9. CONSULTATION PROCESS

Naledzi Environmental Consultants, as the EAP, is assumed to have initiated the stakeholder engagement process with the I&AP's including with the 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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11. APPENDICES

Appendix 1. Checklist of Flora Recorded During Fieldwork

Taxa	Growth Form	Protected	NEMBA Alien Invasive Species Category	Degraded Shrubland / Thicket Mosaic	Wetland
Family Amaranthaceae * <i>Achyranthes aspera</i> L. var. <i>aspera</i> * <i>Amaranthus hybridus</i> L. subsp. <i>hybridus</i> * <i>Gomphrena celosioides</i> Mart.	herb herb herb			r r	r
Family Anacardiaceae <i>Lannea edulis</i> (Sond.) Engl. var. <i>edulis</i> <i>Sclerocarya birrea</i> (A.Rich.) Hochst. subsp. <i>caffra</i> (Sond.) Kokwaro <i>Searsia transvaalensis</i> (Engl.) Moffett	dwarf shrub tree tree	NFA		r f u	
Family Annonaceae <i>Annona senegalensis</i> Pers. subsp. <i>senegalensis</i>	tree			r	
Family Apiaceae <i>Centella asiatica</i> (L.) Urb.	herb				u
Family Apocynaceae <i>Carissa bispinosa</i> (L.) Desf. ex Brenan <i>Carissa spinarum</i> L. <i>Gomphocarpus physocarpus</i> E.Mey. <i>Gomphocarpus tomentosus</i> Burch.	shrub climber herb herb			u r r r	r
Family Araliaceae <i>Cussonia spicata</i> Thunb.	tree			r	
Family Asphodelaceae <i>Aloe barbertoniae</i> Pole-Evans	succulent	MNCA		f	
Family Asteraceae					

* <i>Ageratum conyzoides</i> L.	herb		1b		u
<i>Berkheya zeyheri</i> var. <i>rehmannii</i> (Thell.) Roessler	herb			r	
* <i>Bidens pilosa</i> L.	herb			r	
* <i>Chromolaena odorata</i> (L.) R.M.King & H.Rob.	shrub		1b		r
<i>Crystallopollen angustifolium</i> Steetz	herb			f	
* <i>Erigeron sumatrensis</i> Retz.	herb			r	r
<i>Gazania krebsiana</i> Less.	herb			f	
<i>Geigeria ornativa</i> O.Hoffm. subsp. <i>ornativa</i>	dwarf shrub			r	
<i>Gymnanthemum coloratum</i> (Willd.) H.Rob. & B.Kahn	dwarf shrub			f	r
<i>Helichrysum kraussii</i> Sch.Bip.	shrub			f	
<i>Helichrysum nudifolium</i> (L.) Less. var. <i>pilosellum</i> (L.f.) Beentje	herb			u	
<i>Hilliardiella oligocephala</i> (DC.) H.Rob.	herb				
<i>Laggera crispata</i> (Vahl) Hepper & J.R.I.Wood	herb			r	
<i>Linzia glabra</i> Steetz	herb				r
<i>Macledium zeyheri</i> (Sond.) S.Ortiz	herb			r	
<i>Nidorella podocephala</i> (DC.) J.C.Manning & Goldblatt	herb				r
<i>Senecio latifolius</i> DC.	herb			u	
<i>Senecio madagascariensis</i> Poir.	herb			r	
* <i>Tagetes minuta</i> L.	herb			r	
* <i>Tridax procumbens</i> (L.) L.	herb			r	
Family Bignoniaceae					
<i>Tecomaria capensis</i> (Thunb.) Spach	shrub			r	
* <i>Tecoma stans</i> (L.) Juss. ex Kunth var. <i>stans</i>	shrub		1b	r	
Family Boraginaceae					
<i>Ehretia amoena</i> Klotzsch	tree			u	
<i>Heliotropium ovalifolium</i> Forssk.	herb				r
Family Celastraceae					
<i>Gymnosporia buxifolia</i> (L.) Szyszyl.	tree			r	
<i>Gymnosporia senegalensis</i> (Lam.) Loes.	shrub			f	r
Family Chrysobalanaceae					
<i>Parinari curatellifolia</i> Planch. ex Benth.	tree			d	
Family Combretaceae					
<i>Combretum molle</i> R.Br. ex G.Don	tree			f	

<i>Terminalia sericea</i> Burch. ex DC.	tree			f	r
Family Commelinaceae					
<i>Commelina diffusa</i> Burm.f. subsp. <i>scandens</i> (Welw. ex C.B.Clarke) Oberm.	herb				r
Family Convolvulaceae					
* <i>Cuscuta</i> sp.	climber			r	
<i>Ipomoea obscura</i> (L.) Ker Gawl. var. <i>obscura</i>	climber			r	
Family Cyperaceae					
<i>Bulbostylis hispidula</i> (Vahl) R.W.Haines subsp. <i>pyriformis</i> (Lye) R.W.Haines	sedge				r
<i>Cyperus denudatus</i> L.f.	sedge				r
<i>Cyperus dives</i> Delile	sedge				f
<i>Cyperus melanospermus</i> (Nees) Valck.Sur.	sedge				u
<i>Cyperus mundii</i> (Nees) Kunth	sedge				r
<i>Cyperus polystachyos</i> Rottb.	sedge				r
<i>Schoenoplectus corymbosus</i> (Roth ex Roem. & Schult.) J.Raynal	sedge				u
Family Dennstaedtiaceae					
<i>Pteridium aquilinum</i> (L.) Kuhn subsp. <i>capense</i> (Thunb.) C.Chr.	fern			u	u
Family Ebenaceae					
<i>Diospyros lycioides</i> Desf. subsp. <i>sericea</i> (Bernh.) De Winter	shrub			u	
<i>Diospyros mespiliformis</i> Hochst. ex A.DC.	tree			r	
Family Euphorbiaceae					
<i>Acalypha villicaulis</i> Hochst.	herb			r	
Family Fabaceae					
<i>Bauhinia galpinii</i> N.E.Br.	climber			r	
<i>Cassia abbreviata</i> Oliv.	tree			r	
<i>Chamaecrista mimosoides</i> (L.) Greene	herb			r	
<i>Crotalaria</i> sp.	herb				r
<i>Dichrostachys cinerea</i> (L.) Wight & Arn. subsp. <i>africana</i> Brenan & Brummitt	tree			d	r
<i>Dicliptera clinopodia</i> Nees	herb			r	
<i>Eriosema psoraleoides</i> (Lam.) G.Don	dwarf shrub			f	r
<i>Erythrina lysistemon</i> Hutch.	tree			r	
<i>Flemingia grahamiana</i> Wight & Arn.	dwarf shrub			r	
<i>Indigofera sanguinea</i> N.E.Br.	herb			u	

<i>Mucuna coriacea</i> Baker subsp. <i>irritans</i> (Burt Davy) Verdc.	climber			u	r
<i>Peltophorum africanum</i> Sond.	tree			u	
<i>Senegalia ataxacantha</i> (DC.) Kyal. & Boatwr.	climber			r	
<i>Senna petersiana</i> (Bolle) Lock	tree			r	
* <i>Sesbania bispinosa</i> (Jacq.) W.Wight var. <i>bispinosa</i>	shrub				r
* <i>Senna didymobotrya</i> (Fresen.) H.S.Irwin & Barneby	shrub		1b		r
<i>Stylosanthes fruticosa</i> (Retz.) Alston	herb			r	
<i>Vachellia davyi</i> (N.E.Br.) Kyal. & Boatwr.	tree			r	
<i>Vachellia sieberiana</i> (DC.) Kyal. & Boatwr. var. <i>woodii</i> (Burt Davy) Kyal. & Boatwr.	tree			u	
<i>Vachellia swazica</i> (Burt Davy) Kyal. & Boatwr.	shrub			r	
<i>Zornia capensis</i> Pers. subsp. <i>capensis</i>	herb			r	
Family Hyacinthaceae					
<i>Ledebouria revoluta</i> (L.f.) Jessop	bulb			r	
Family Hypoxidaceae					
<i>Hypoxis iridifolia</i> Baker	geophyte			r	
Family Iridaceae					
<i>Gladiolus</i> cf. <i>crassifolius</i> Baker	geophyte	MNCA		r	
Family Lamiaceae					
<i>Coleus livingstonei</i> A.J.Paton	herb				r
<i>Hoslundia opposita</i> Vahl	herb			r	
<i>Leonotis nepetifolia</i> (L.) R.Br.	herb			r	
<i>Leucas glabrata</i> (Vahl) Sm. var. <i>glabrata</i>	herb			r	
<i>Ocimum americanum</i> L. var. <i>americanum</i>	herb			r	
<i>Rothea myricoides</i> (Hochst.) Steane & Mabb.	shrub			r	
Family Malvaceae					
<i>Dombeya rotundifolia</i> (Hochst.) Planch. var. <i>rotundifolia</i>	tree			r	
<i>Gossypium herbaceum</i> L.	dwarf shrub			r	
<i>Grewia occidentalis</i> L. var. <i>occidentalis</i>	shrub			r	
<i>Hermannia boraginiflora</i> Hook.	herb			r	
<i>Hibiscus vitifolius</i> L. subsp. <i>vulgaris</i> Brenan & Exell	dwarf shrub				r
<i>Sida dregei</i> Burt Davy	dwarf shrub			r	
<i>Waltheria indica</i> L.	dwarf shrub			r	
Family Meliaceae					

<i>Trichilia emetica</i> Vahl subsp. <i>emetica</i>	tree			u	
<i>Turraea nilotica</i> Kotschy & Peyr.	shrub			r	
Family Menispermaceae					
<i>Cocculus hirsutus</i> (L.) Diels	climber			r	
Family Moraceae					
<i>Ficus sur</i> Forssk.	tree				r
Family Myrtaceae					
<i>Heteropyxis natalensis</i> Harv.	tree			r	
* <i>Psidium guajava</i> L.	shrub		2/3	u	r
Family Nymphaeaceae					
<i>Nymphaea nouchali</i> Burm.f. var. <i>caerulea</i> (Savigny) Verdc.	herb				r
Family Onagraceae					
<i>Ludwigia adscendens</i> subsp. <i>diffusa</i> (Forssk.) P.H.Raven	herb				r
Family Phyllanthaceae					
<i>Antidesma venosum</i> E.Mey. ex Tul.	tree			f	r
<i>Flueggea virosa</i> (Roxb. ex Willd.) Voigt subsp. <i>virosa</i>	shrub			r	
<i>Phyllanthus reticulatus</i> Poir. var. <i>reticulatus</i>	shrub			d	r
Family Poaceae					
<i>Cynodon dactylon</i> (L.) Pers.	grass			u	u
<i>Digitaria eriantha</i> Steud.	grass			r	
<i>Eragrostis curvula</i> (Schrud.) Nees	grass			r	
<i>Eragrostis nindensis</i> Ficalho & Hiern	grass			r	
<i>Eragrostis plana</i> Nees	grass				u
<i>Heteropogon contortus</i> (L.) Roem. & Schult.	grass			f	
<i>Hyperthelia dissoluta</i> (Nees ex Steud.) Clayton	grass			d	r
<i>Imperata cylindrica</i> (L.) Raeusch.	grass			f	f
<i>Leersia hexandra</i> Sw.	grass				f
<i>Melinis repens</i> (Willd.) Zizka subsp. <i>repens</i>	grass			f	
<i>Panicum maximum</i> Jacq.	grass			r	
<i>Phragmites mauritianus</i> Kunth	reed				d
<i>Pogonarthria squarrosa</i> (Roem. & Schult.) Pilg.	grass			f	
<i>Setaria sphacelata</i> (Schumach.) Stapf & C.E.Hubb. ex M.B.Moss var. <i>sphacelata</i>	grass			r	

<i>Sporobolus africanus</i> (Poir.) Robyns & Tournay	grass				u	r
<i>Sporobolus pyramidalis</i> P.Beauv.	grass				r	
<i>Urochloa mosambicensis</i> (Hack.) Dandy	grass					r
Family Polygonaceae						
<i>Persicaria decipiens</i> (R.Br.) K.L.Wilson	herb					r
* <i>Persicaria lapathifolia</i> (L.) Delarbre	herb					r
Family Potamogetonaceae						
<i>Potamogeton crispus</i> L.	herb					r
Family Pteridaceae						
<i>Pityrogramma calomelanos</i> (L.) Link	fern				r	
Family Ranunculaceae						
* <i>Ranunculus multifidus</i> Pursh	herb					r
Family Rhamnaceae						
<i>Ziziphus mucronata</i> Willd. subsp. <i>mucronata</i>	tree				r	
Family Rubiaceae						
<i>Agathisanthemum bojeri</i> Klotzsch subsp. <i>bojeri</i>	herb				f	
<i>Pavetta schumanniana</i> F.Hoffm. ex K.Schum.	shrub				r	
<i>Pentanisia angustifolia</i> (Hochst.) Hochst.	herb				r	
* <i>Richardia brasiliensis</i> Gomes	herb				r	
<i>Spermacoce senensis</i> (Klotzsch) Hiern	herb				r	
<i>Vangueria infausta</i> Burch. subsp. <i>infausta</i>	tree				r	
Family Sinopteridaceae						
<i>Cheilanthes viridis</i> (Forssk.) Sw. var. <i>viridis</i>	fern				r	
Family Smilacaceae						
<i>Smilax anceps</i> Willd.	climber				r	
Family Solanaceae						
* <i>Solanum mauritianum</i> Scop.	shrub			1b	r	
Family Thelypteridaceae						
<i>Christella dentata</i> (Forssk.) Brownsey & Jermy	fern					r
<i>Thelypteris confluens</i> (Thunb.) C.V.Morton	fern					u
Family Typhaceae						
<i>Typha capensis</i> (Rohrb.) N.E.Br.	rush					f

Family Verbenaceae					
* <i>Lantana camara</i> L.	dwarf shrub		1b	u	r
<i>Lippia javanica</i> (Burm.f.) Spreng.	dwarf shrub			f	
* <i>Verbena bonariensis</i> L.	herb		1b		r
Family Vitaceae					
<i>Rhoicissus tridentata</i> (L.f.) Wild & R.B.Drumm. subsp. <i>tridentata</i>	climber			r	
TOTAL		144	3	8	108 52

NFA - National Forests Act	d - dominant
MNCA - Mpumalanga Nature Conservation Act	f - frequent
* - alien species	u - uncommon
	r - rare

Appendix 2. Co-ordinates of Protected Plants Recorded in the Study Area

Species	Protected Status	No. of Plants	GPS Co-ordinates	
			Lat	Long
<i>Aloe barbertoniae</i>	MNCA	10	-24.692936	31.026263
<i>Aloe barbertoniae</i>	MNCA	6	-24.693588	31.026797
<i>Aloe barbertoniae</i>	MNCA	15	-24.693887	31.026590
<i>Aloe barbertoniae</i>	MNCA	2	-24.694022	31.026242
<i>Aloe barbertoniae</i>	MNCA	3	-24.693845	31.026222
<i>Aloe barbertoniae</i>	MNCA	20	-24.692372	31.026285
<i>Aloe barbertoniae</i>	MNCA	4	-24.692053	31.026629
<i>Aloe barbertoniae</i>	MNCA	6	-24.689565	31.026664
<i>Aloe barbertoniae</i>	MNCA	20	-24.689279	31.026936
<i>Aloe barbertoniae</i>	MNCA	3	-24.689236	31.026522
<i>Aloe barbertoniae</i>	MNCA	5	-24.688966	31.026821
<i>Aloe barbertoniae</i>	MNCA	12	-24.688757	31.027308
<i>Aloe barbertoniae</i>	MNCA	3	-24.688912	31.027397
<i>Aloe barbertoniae</i>	MNCA	15	-24.689385	31.027112
<i>Aloe barbertoniae</i>	MNCA	6	-24.689710	31.026743
<i>Aloe barbertoniae</i>	MNCA	5	-24.689763	31.026856
<i>Aloe barbertoniae</i>	MNCA	5	-24.689968	31.026827
<i>Aloe barbertoniae</i>	MNCA	1	-24.690048	31.026837
<i>Gladiolus cf. crassifolius</i>	MNCA	1	-24.689329	31.026783
<i>Sclerocarya birrea</i>	NFA	1	-24.692426	31.027167
<i>Sclerocarya birrea</i>	NFA	2	-24.692333	31.026844
<i>Sclerocarya birrea</i>	NFA	1	-24.692749	31.026234
<i>Sclerocarya birrea</i>	NFA	2	-24.693067	31.026346
<i>Sclerocarya birrea</i>	NFA	2	-24.693431	31.026650
<i>Sclerocarya birrea</i>	NFA	1	-24.693485	31.026778
<i>Sclerocarya birrea</i>	NFA	1	-24.694017	31.026272
<i>Sclerocarya birrea</i>	NFA	1	-24.693797	31.026223

<i>Sclerocarya birrea</i>	NFA	1	-24.693596	31.026226
<i>Sclerocarya birrea</i>	NFA	1	-24.689168	31.026931
<i>Sclerocarya birrea</i>	NFA	1	-24.689202	31.026596
<i>Sclerocarya birrea</i>	NFA	1	-24.688977	31.027172
<i>Sclerocarya birrea</i>	NFA	2	-24.688736	31.027152
<i>Sclerocarya birrea</i>	NFA	2	-24.688794	31.027472
<i>Sclerocarya birrea</i>	NFA	1	-24.689053	31.027297
<i>Sclerocarya birrea</i>	NFA	2	-24.689192	31.027202
<i>Sclerocarya birrea</i>	NFA	1	-24.689556	31.027048
<i>Sclerocarya birrea</i>	NFA	1	-24.690294	31.026977

<p>NFA - National Forests Act MNCA - Mpumalanga Nature Conservation Act</p>
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Appendix 3. Checklist of Fauna Recorded in the Study Area

Species	Family	Assemblages			
		Open Woodland	Thicket	Wetland	Open Water
Mammals					
ORDER: RODENTIA Family Bathyergidae (mole-rats) Common Mole-rat	<i>Cryptomys hottentotus</i>	x			
ORDER: CARNIVORA Family Herpestidae (mongooses) Slender Mongoose	<i>Herpestes sanguineus</i>	x			
Subtotal	1	2		0	0
Birds					
ORDER: PODICIPEDIFORMES Family Podicipedidae (grebes) Little Grebe	<i>Tachybaptus ruficollis</i>				x
ORDER: PELECANIFORMES Family Ardeidae (herons and bitterns) Squacco Heron Western Cattle Egret	<i>Ardeola ralloides</i> <i>Bubulcus ibis</i>			x	
Family Scopidae (Hamerkop) Hamerkop	<i>Scopus umbretta</i>				x
ORDER: SULIFORMES Family Phalacrocoracidae (cormorants and shags) Reed Cormorant	<i>Microcarbo africanus</i>				x
ORDER: ACCIPITRIFORMES					

Family Accipitridae (kites, hawks and eagles) African Harrier-Hawk African Fish Eagle	<i>Polyboroides typus</i> <i>Haliaeetus vocifer</i>	x			x
ORDER: GRUIFORMES Family Rallidae (rails, crakes and coots) Black Crake Common Moorhen	<i>Zapornia flavirostra</i> <i>Gallinula chloropus</i>			x	x
ORDER: CHARADRIIFORMES Family Charadriidae (plovers) African Wattled Lapwing Family Jacanidae (jacanas) African Jacana	<i>Vanellus senegallus</i> <i>Actophilornis africanus</i>			x	x
ORDER: COLUMBIFORMES Family Columbidae (pigeons and doves) * Rock Dove Red-eyed Dove Ring-necked Dove Laughing Dove Emerald-spotted Wood Dove	<i>Columba livia</i> <i>Streptopelia semitorquata</i> <i>Streptopelia capicola</i> <i>Spilopelia senegalensis</i> <i>Turtur chalcospilos</i>	x x x x		x	
ORDER: APODIFORMES Family Apodidae (swifts) African Palm Swift	<i>Cypsiurus parvus</i>	over	over	over	over
ORDER: COLIIFORMES Family Coliidae (mousebirds) Speckled Mousebird	<i>Colius striatus</i>		x		
ORDER: CORACIIFORMES Family Alcedinidae (kingfishers) Malachite Kingfisher Family Meropidae (bee-eaters) White-fronted Bee-eater Little Bee-eater	<i>Corythornis cristata</i> <i>Merops bullockoides</i> <i>Merops pusillus</i>				x
ORDER: PICIFORMES Family Lybiidae (African barbets) Yellow-fronted Tinkerbird	<i>Pogoniulus chrysoconus</i>	x			

Black-collared Barbet	<i>Lybius torquatus</i>	x	x		
ORDER: BUCEROTIFORMES					
Family Upupidae (hoopoes)					
African Hoopoe	<i>Upupa africana</i>	x			
ORDER: PASSERIFORMES					
Family Platysteiridae (wattle-eyes and batises)					
Chin-spot Batis	<i>Batis molitor</i>	x			
Family Malaconotidae (bushshrikes)					
Black-crowned Tchagra	<i>Tchagra senegalus</i>	x			
Southern Boubou	<i>Laniarius ferrugineus</i>		x		
Gorgeous Bushshrike	<i>Telophorus viridis</i>		x		
Family Laniidae (shrikes)					
Southern Fiscal	<i>Lanius collaris</i>	x			
Family Corvidae (crows and jays)					
Pied Crow	<i>Corvus albus</i>	x			
Family Alaudidae (larks)					
Rufous-naped Lark	<i>Mirafra africana</i>	x			
Family Pycnonotidae (bulbuls)					
Sombre Greenbul	<i>Andropadus importunus</i>		x		
Dark-capped Bulbul	<i>Pycnonotus tricolor</i>	x	x		
Terrestrial Brownbul	<i>Phyllastrephus terrestris</i>		x		
Family Hirundinidae (swallows & martins)					
Brown-throated Martin	<i>Riparia paludicola</i>	over	over	over	over
Grey-rumped Swallow	<i>Pseudhirundo griseopyga</i>	over		over	
White-throated Swallow	<i>Hirundo albigularis</i>	over	over	over	over
Wire-tailed Swallow	<i>Hirundo smithii</i>	over		over	
Lesser Striped Swallow	<i>Cecropis abyssinica</i>	over	over	over	over
Family Macrosphenidae (crombecs & African warblers)					
Long-billed Crombec	<i>Sylvietta rufescens</i>	x			
Family Acrocephalidae (reed warblers and allies)					
Lesser Swamp Warbler	<i>Acrocephalus gracilirostris</i>			x	
African Reed Warbler	<i>Acrocephalus baeticatus</i>			x	
Family Locustellidae (grassbirds and allies)					
Little Rush Warbler	<i>Bradypterus baboecala</i>			x	

Family Cisticolidae (cisticolas & allies)				
Red-faced Cisticola	<i>Cisticola erythrops</i>			x
Neddicky	<i>Cisticola fulvicapilla</i>	x		
Zitting Cisticola	<i>Cisticola juncidis</i>	x		
Lazy Cisticola	<i>Cisticola aberrans</i>	x		
Yellow-breasted Apalis	<i>Apalis flavida</i>		x	
Green-backed Camaroptera	<i>Camaroptera brachyura</i>		x	
Tawny-flanked Prinia	<i>Prinia subflava</i>	x		x
Family Muscicapidae (chats & Old World flycatchers)				
White-browed Scrub Robin	<i>Cercotrichas leucophrys</i>		x	
White-browed Robin-Chat	<i>Cossypha heuglini</i>		x	
White-throated Robin-Chat	<i>Cossypha humeralis</i>		x	
Family Sturnidae (starlings)				
* Common Myna	<i>Acridotheres tristis</i>	x		
Cape Starling	<i>Lamprotornis nitens</i>	x		
Family Nectariniidae (sunbirds)				
White-bellied Sunbird	<i>Cinnyris talatala</i>	x	x	
Amethyst Sunbird	<i>Chalcomitra amethystina</i>	x		
Scarlet-chested Sunbird	<i>Chalcomitra senegalensis</i>	x		
Family Passeridae				
Southern Grey-headed Sparrow	<i>Passer diffusus</i>	x		
* House Sparrow	<i>Passer domesticus</i>	x		
Family Ploceidae (weavers & widowbirds)				
Village Weaver	<i>Ploceus cucullatus</i>	x		
Spectacled Weaver	<i>Ploceus ocularis</i>		x	
Cape Weaver	<i>Ploceus capensis</i>			x
Holub's Golden Weaver	<i>Ploceus xanthops</i>			x
Southern Masked Weaver	<i>Ploceus velatus</i>	x		
Red-collared Widowbird	<i>Euplectes ardens</i>	x		
Southern Red Bishop	<i>Euplectes orix</i>			x
Family Estrildidae (waxbills, mannikins)				
Common Waxbill	<i>Estrilda astrild</i>			x
African Firefinch	<i>Lagonosticta rubricata</i>		x	
Bronze Mannikin	<i>Spermestes cucullata</i>	x		

Family Motacillidae (wagtails and pipits)					
Yellow-throated Longclaw	<i>Macronyx croceus</i>	x			
Cape Wagtail	<i>Motacilla capensis</i>				x
Family Fringillidae (finches, canaries & allies)					
Yellow-fronted Canary	<i>Crithagra mozambica</i>	x			
Streaky-headed Seedeater	<i>Crithagra gularis</i>	x			
Subtotal	74	41	20	18	12
Reptiles					
ORDER: SQUAMATA					
Family Scincidae (skinks)					
Rainbow Skink	<i>Trachylepis margaritifer</i>	x			
Striped Skink	<i>Trachylepis striata</i>	x			
Subtotal	2	2	0	0	0
TOTAL	77	43	20	18	12

* - alien species

Appendix 4. Potentially Occurring Fauna of Conservation Concern

Common Name	Scientific Name	Red Data	Protected	Habitat	SABAP2 Reporting Rate for 2440_3100	Likelihood	Justification
Mammals							
Sensitive Species No. 5		VU	NEMBA (VU)	Savanna, semi desert		Very Low	Included here solely due to being listed by the EST. A large carnivore species not likely to venture this far from the KNP into a densely populated area with high hunting pressure, low prey numbers and presence of livestock
African Clawless Otter	<i>Aonyx capensis</i>	NT	MNCA	Rivers and streams		High	Suitable habitat present although no evidence found of its presence
Natal Red Duiker	<i>Cephalophus natalensis</i>	NT	MNCA	Forest and thicket		Very Low	Very high disturbance levels and hunting pressure present
Samango Monkey	<i>Cercopithecus albogularis schwarzi</i>	EN	NEMBA (VU)	Afromontane forest		Low	No suitable habitat present

Maquassie Musk Shrew	<i>Crocidura maquassiensis</i>	VU		Grassland and rocky grassland		Very Low	Included here solely due to being listed by the EST. Unrecorded from far E Mpumalanga
Swamp Musk Shrew	<i>Crocidura mariquensis</i>	NT		Wetlands in savanna		Moderate	Suitable habitat present
Robert's Marsh Rat	<i>Dasymys robertsii</i>	VU		Marshes, wetlands		Low	Edge of range, rare species, requires more pristine habitat than what is present within the study area
Hippopotamus	<i>Hippopotamus amphibius</i>	VU‡	MNCA	Wetlands		Very Low	Although suitable habitat is present within the study area, there are very high disturbance levels present
Serval	<i>Leptailurus serval</i>	NT	NEMBA (PR)	Grassland, wetlands		Low	Suitable habitat present but high hunting pressure from adjacent urban area
African Wild Dog	<i>Lycaon pictus</i>	EN	NEMBA (EN)	Wide variety of habitats		Very Low	Included here solely due to being listed by the EST. A species not likely to venture this far from the KNP into a densely populated area with high hunting pressure, low prey numbers and presence of livestock

Honey Badger	<i>Mellivora capensis</i>		MNCA	Wide variety of habitats		Low	Suitable habitat present but high hunting pressure from adjacent urban area
Aardvark	<i>Orycteropus afer</i>		NEMBA (PR)	Wide variety of habitats		Very Low	Very rare in the area, high disturbance levels present
Thick-tailed Greater Galago	<i>Otolemur crassicaudatus</i>		MNCA	Moist woodland and forest		Low	Limited suitable habitat present
Oribi	<i>Ourebia ourebi</i>	EN	MNCA	Upland plains grassland		Very Low	No suitable habitat present
Leopard	<i>Panthera pardus</i>	VU	NEMBA (PR)	Wide variety of habitats		Very Low	Very rare in the area, high disturbance and hunting levels present
African Weasel	<i>Poecilogale albinucha</i>	NT		Wide variety of habitats		Very Low	Very rare in Eastern Mpumalanga
Aardwolf	<i>Proteles cristatus</i>		MNCA	Wide variety of habitats		Very Low	Very rare in the area, high disturbance and hunting levels present
Steenbok	<i>Raphicerus campestris</i>		MNCA	Wide variety of habitats		Low	Very rare in the area, high disturbance and hunting levels present
Mountain Reedbuck	<i>Redunca fulvorufula</i>	EN	MNCA	Hilly grassland and open woodland		Very Low	No suitable habitat present, occurs in the higher, grassy mountains to the west of the study area
Subtotal	18	14	15				
Birds							

Half-collared Kingfisher	<i>Alcedo semitorquata</i>	NT		Streams with overhanging vegetation	-	Moderate	Some suitable habitat present in the upper reaches of the dam
Tawny Eagle	<i>Aquila rapax</i>	EN	NEMBA (EN)	Savanna	-	Very Low	Although some suitable foraging habitat is present, the high disturbance levels would deter this shy species. In addition, there are no confirmed records of it in the area
Curlew Sandpiper	<i>Calidris ferruginea</i>	NT‡		Mudflats, tidal wetlands	-	Low	Limited suitable habitat present, rare in the Lowveld
Abdim's Stork	<i>Ciconia abdimi</i>	NT		Short-grass savanna and semi desert	-	Very Low	No suitable habitat present, very rare in the area
Black Stork	<i>Ciconia nigra</i>	VU		Rivers, pans, breed on cliffs	-	Low	May very occasionally forage along the shoreline, but disturbance levels are high
African Marsh Harrier	<i>Circus ranivorus</i>	EN		Moist grassland and wetland	-	Very Low	Limited suitable habitat present, unrecorded from the area
European Roller	<i>Coracias garrulus</i>	NT		Open, grassy savanna	-	Low	Some suitable habitat present but unrecorded from the area

Lanner Falcon	<i>Falco biarmicus</i>	VU		Wide variety of habitats but nests on cliffs	28,6%	Confirmed	Two previous records for the pentad. Suitable foraging habitat present but no cliff-nesting sites present
White-backed Night-Heron	<i>Gorsachius leuconotus</i>	VU		Streams with overhanging vegetation	-	Low	May very occasionally forage along the shoreline, but disturbance levels are high and suitable overhanging trees are rare
White-backed Vulture	<i>Gyps africanus</i>	CR	NEMBA (EN)	Savanna	-	Low	May very occasionally forage on a livestock carcass within study area
Cape Vulture	<i>Gyps coprotheres</i>	EN	NEMBA (EN)	Wide variety of habitats	-	Low	May very occasionally forage on a livestock carcass within study area
Caspian Tern	<i>Hydroprogne caspia</i>	VU		Large waterbodies	-	Very Low	Although superficially suitable habitat is present, this species requires sandbanks (which are absent), is intolerant of high disturbance levels and is very rare in the Lowveld. Included here only due to appearing in the Screening Tool query
Bat Hawk	<i>Macheiramphus alcinus</i>	EN		Tall woodland along rivers	-	Very Low	Limited suitable habitat present, high disturbance levels present, unrecorded from the area

African Pygmy Goose	<i>Nettapus auritus</i>	VU		Tropical wetlands with floating vegetation	14,3%	Confirmed	Single sight record in Dec 2020, presumably of vagrant birds as this species is very rare in the general area. Not located during the August 2022 survey, despite intensive searching
African Finfoot	<i>Podica senegalensis</i>	VU		Rivers and streams with overhanging vegetation	-	Low	Although some suitable habitat is present, the high disturbance levels would deter this shy species. In addition, there are no confirmed records of it in the area
Martial Eagle	<i>Polemaetus bellicosus</i>	EN	NEMBA (EN)	Wide variety of habitats	-	Low	Although some suitable foraging habitat is present, the high disturbance levels would deter this shy species. In addition, there are no confirmed records of it in the area
Greater Painted-snipe	<i>Rostratula benghalensis</i>	NT		Wetlands	-	Low	Some suitable habitat present but unrecorded from the area
Crowned Eagle	<i>Stephanoaetus coronatus</i>	VU		Forest	-	Low	No suitable habitat present, high disturbance levels, unrecorded from the area

Bateleur	<i>Terathopius ecaudatus</i>	EN	NEMBA (EN)	Savanna		Low	Although some suitable foraging habitat is present, the high disturbance levels would deter this shy species. In addition, there are no confirmed records of it in the area
<i>Subtotal</i>	19	19	5				
Reptiles							
Listed Sensitive Species No. 1		VU	NEMBA (VU)	Wide variety of wetlands in warmer areas		Low	Although there are anecdotal records of this species in Casteel Dam, it is no longer present (DWS <i>pers. comm.</i>)
Natal Hinged Tortoise	<i>Kinixys natalensis</i>	VU		Dry rocky habitat in thornveld, valley bushveld, dry thicket or bushveld savanna		Low	Limited suitable habitat present, very rare in the area
Southern African Python	<i>Python natalensis</i>		NEMBA (PR)	Wide variety of habitats, but usually near water or rocky outcrops		Low	Suitable habitat present but disturbance levels are very high
<i>Subtotal</i>	3	2	2				
TOTAL	40	35	22				

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

Appendix 5. 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	2
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, 6
The Duration, Date and Season of the site investigation and the relevance of the season to the outcome of the assessment	4.3, 4.6
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	6.4
An identification of any areas to be avoided including buffers	8
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 2, Fig 6
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	8.2
Any Conditions for inclusion in the Environmental Authorisation	8.1
Any Monitoring Requirements for inclusion in the EMPr or Environmental Authorisation	8.3
Reasoned Opinion	
As to whether the proposed activity/ activities or portions thereof should be authorised	8.1
Regarding the acceptability of the proposed activity or activities	8.1
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	8.1

A Description of any Consultation Process that was undertaken during the course of preparing the specialist report	9
A Summary and copies of any comments received during any consultation process and where applicable all responses thereto	N/A
Any other Information requested by the CA	App 4

Appendix 6. 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	3
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 Chinhanganine 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 Cupriferos 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.

PAPERS

- 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 Observations* 7.68: 1–56.
- McKenzie, D. & McKenzie, L. 2019. The Avifaunal Importance of the Barberton-Makhonjwa World Heritage Site. *BirdLife Lowveld, Mbombela*.
- Sieben, E., Nyambeni, T., Mtshali, H., Corry, F.T.J., Venter, C.E., McKenzie, D.R., Matela, T.E., Pretorius, L. & Kotze, D. 2016. The herbaceous vegetation of subtropical freshwater wetlands in South Africa: Classification, description and explanatory environmental factors. *South African Journal of Botany*. 104. 158-166. 10.1016/j.sajb.2015.11.005.

RED-LIST ASSESSMENTS

- McKenzie, D., von Staden, L. & Mtshali, H. 2018. *Aloe simii* Pole-Evans. National Assessment: Red List of South African Plants version 2020.1.
- 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.



SIGNATURE

DATE 26 September 2022

Appendix 7. 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 field(s) of practice (Schedule 1 of the Act)
Biological Science (Professional Natural Scientist)


Effective **25 October 1995**

Expires **31 March 2023**






Chairperson



Chief Executive Officer



To verify this certificate scan this code



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 field(s) of practice (Schedule 1 of the Act)

Ecological Science (Certificated Natural Scientist)

Effective **5 May 2021**

Expires **31 March 2023**



Botha

Chairperson

R. J. ...

Chief Executive Officer



To verify this certificate scan this code

THE SOUTH AFRICAN COUNCIL FOR
PROFESSIONAL AND
TECHNICAL SURVEYORS



DIE SUID AFRIKAANSE RAAD VIR
PROFESIONELE EN
TEGNIESE OPMETERS

CERTIFICATE OF REGISTRATION
SERTIFIKAAT VAN REGISTRASIE

This is to certify that

Hiermee word gesertifiseer dat

Linda M Kenzie

was registered as a

geregistreer is as 'n

PROFESSIONAL GISc PRACTITIONER

on the 13th day of March 2012

op die 13^{de} dag van Maart 2012

in accordance with the provisions of the Professional and Technical Surveyors' Act, 1984 (Act No 40 of 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.



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

Registration Number
Registrasienommer **PGP 0170**

[Signature]
President

[Signature]
Registrar
Registrateur

Gedrukte Pres

Appendix 8. 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

26/09/2022

Date