



**Terrestrial Biodiversity, Plant and Animal Theme
Site Sensitivity Verification Report for the
proposed Tharisa Minerals (Pty) Ltd Battery Energy
Storage System (BESS) Development Project**

**Rustenburg Local Municipality, Bojanala Platinum
District Municipality, North West Province,
South Africa**

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Report Name	Terrestrial Biodiversity, Plant and Animal Theme Site Sensitivity Verification Report for the proposed Tharisa Minerals (Pty) Ltd Battery Energy Storage System BESS Development Project	
Specialist Theme	Terrestrial Biodiversity, Plant and Animal Theme	
Project Reference	SSVR - Tharisa BESS	
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Declaration	<p>The Biodiversity Company and its associates operate as independent consultants under the auspice of the South African Council for Natural Scientific Professions (SACNASP). We declare that we have no affiliation with or vested financial interests in the proponent, other than for work performed under the Environmental Impact Assessment (EIA) Regulations, 2014, as amended, promulgated in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended (NEMA). 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. We have no vested interest in the project, other than to provide a professional service within the constraints of the project (timing, time and budget) based on the principals of science.</p>	

Executive Summary

Tharisa Minerals (Pty) Ltd proposes the development of a Battery Energy Storage System (BESS) within Tharisa Mine, located in the Rustenburg Local Municipality, Bojanala Platinum District Municipality, North West Province, South Africa. This terrestrial Site Sensitivity Verification (SSV) was undertaken to confirm or dispute the environmental sensitivity and current land use assigned to the site by the National Web-Based Environmental Screening Tool, and to provide ecological evidence in support of the verified sensitivity of the proposed development footprint.

The terrestrial assessment confirmed that the proposed BESS Development site is located on previously disturbed land within the existing mine footprint and is classified as severely modified, with extensive loss of natural species composition, vegetation structure, and ecological functioning. The site is also isolated from surrounding natural habitat and no longer provides conditions typically associated with intact or semi-natural terrestrial systems. No Species of Conservation Concern (SCCs) or protected species were recorded or expected within the site due to its highly altered condition.

The specialist assessment disputed the screening tool's Very High terrestrial biodiversity sensitivity and Medium animal species sensitivity and confirmed a Low sensitivity rating for the site from a terrestrial and animal perspective. The plant species theme was also confirmed as Low sensitivity. The verified sensitivity outcomes therefore indicate that the proposed development site is of limited terrestrial ecological significance and is unlikely to support important biodiversity features.

From a terrestrial biodiversity perspective, the proposed BESS Development is not expected to result in significant impacts, provided that standard mitigation and environmental management measures are implemented during construction, operation and decommissioning phases. These should include restricting activities to the approved footprint, preventing pollution and spills, managing alien invasive plants, and rehabilitating disturbed areas where required. The project can therefore be supported from a terrestrial biodiversity perspective, subject to compliance with the applicable exclusion norm and other relevant legal requirements.

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Table of Acronyms and Abbreviations

Abbreviation	Full term
AC	Alternating Current
AIP	Alien Invasive Plant
BESS	Battery Energy Storage System
BI	Biodiversity Importance
CBA	Critical Biodiversity Area
CI	Conservation Importance
CR	Critically Endangered
DC	Direct Current
DFFE	Department of Forestry, Fisheries and the Environment
EA	Environmental Authorisation
EMPr	Environmental Management Programme
EN	Endangered
ESA	Ecological Support Area
FI	Functional Integrity
GCC	Grid Connection Corridor
GIS	Geographic Information System
IBC	Intermediate Bulk Container
NEMA	National Environmental Management Act
NT	Near Threatened
PAOI	Project Area of Interest
PCS	Power Conversion System
PV	Photovoltaic
RR	Receptor Resilience
SCC	Species of Conservation Concern
SEI	Site Ecological Importance
SSV	Site Sensitivity Verification
VU	Vulnerable
Abbreviation	Full term
AC	Alternating Current
AIP	Alien Invasive Plant
BESS	Battery Energy Storage System
BI	Biodiversity Importance
CBA	Critical Biodiversity Area
CI	Conservation Importance
CR	Critically Endangered
DC	Direct Current

EA	Environmental Authorisation
EMPr	Environmental Management Programme
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ESA	Ecological Support Area
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GCC	Grid Connection Corridor
GIS	Geographic Information System
IBC	Intermediate Bulk Container
NEMA	National Environmental Management Act
NT	Near Threatened
PAOI	Project Area of Interest
PCS	Power Conversion System
PV	Photovoltaic
RR	Receptor Resilience
SCC	Species of Conservation Concern
SEI	Site Ecological Importance
SSV	Site Sensitivity Verification
VU	Vulnerable

1 Introduction

The Biodiversity Company was appointed by Manyabe Consultancy Pty (Ltd) to compile a Site Sensitivity Verification Report (SSV) in support of the Norm for Exclusion for the proposed Tharisa Battery Energy Storage System (BESS) Development project's registration process. The project is located in Rustenburg Local Municipality, Bojanala Platinum District Municipality, North West Province, South Africa (Figure 1-1).

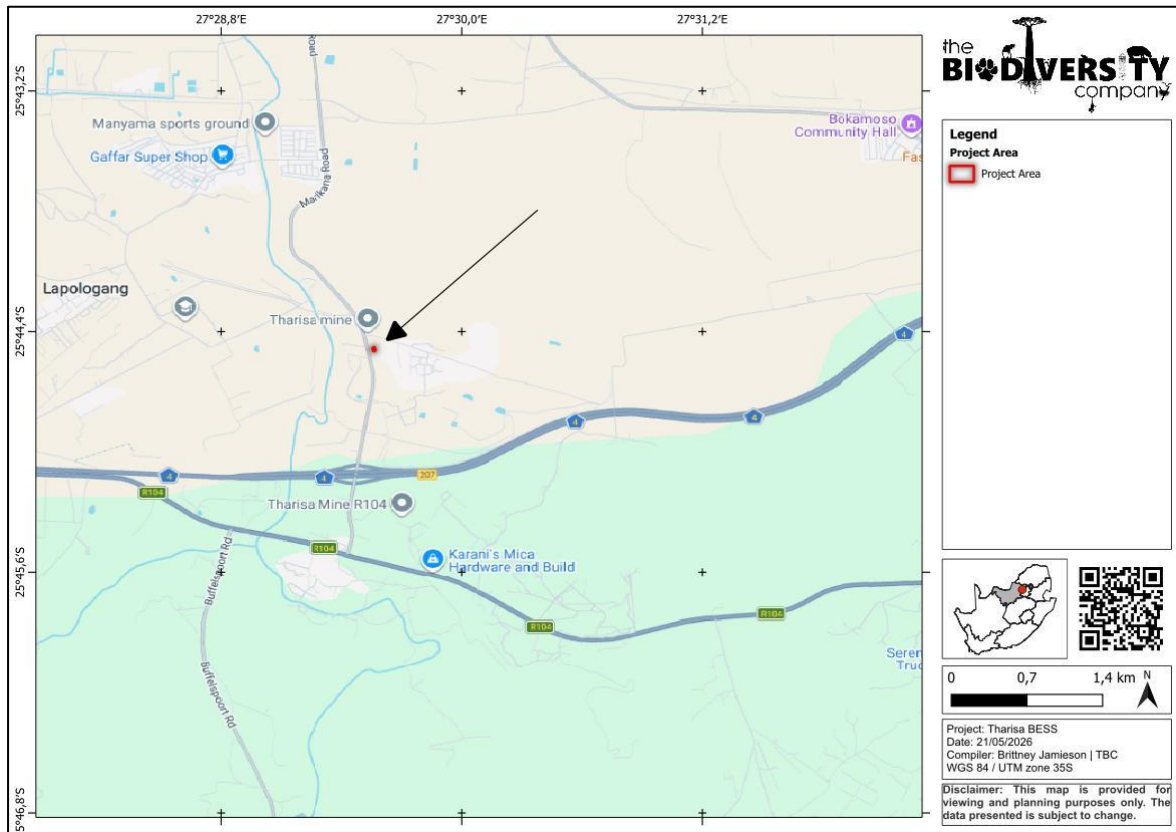


Figure 1-1 Regional locality of the project

1.1 Legal Framework

1.1.1 BESS

This report is compiled in consideration of the Norm for the exclusion of identified activities associated with the development and expansion of battery storage facilities in areas of low or medium environmental sensitivity [Government Notice (GN) 4557, published under the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended (NEMA)], gazetted on 27 March 2024 (hereunder referred to as the “Norm”), from the requirement to obtain an Environmental Authorisation (EA).

This “Norm” has been prepared to provide rules under which activities associated with the development and expansion of battery storage facilities identified in terms of section 24(2)(a) and (b) of the NEMA and contained in the EIA Regulations of 2014, as amended, Listing Notice 1, 2 or 3, promulgated under section 24(5) of the NEMA, are excluded from the requirement to obtain an EA prior to commencement, while meeting the objectives of the NEMA.

1.1.2 Site Sensitivity Verification

The SSV must be undertaken:

- For the footprint on which the proposed activities are proposed to take place and the corridor;
- By specialists, registered in the field for which they are undertaking the site sensitivity verification and where relevant, with demonstrated experience in the taxonomic group of the species being considered;
- Within the season which would be most relevant to identify the specific species or vegetation of interest; and
- For a period of time as necessitated by the sensitivity of the proposed site and size of the proposed facility.

1.2 Project Description

The following information pertaining to the project was provided by Manyabe Consultancy:

Tharisa Minerals, a subsidiary of Tharisa public limited company (Tharisa plc) who operates Tharisa Mine, is pursuing initiatives to reduce the carbon footprint associated with its mining activities in support of Tharisa plc's broader commitments to sustainability and operational decarbonisation.

As part of this strategy, Tharisa Minerals (the Applicant) is implementing a photovoltaic (PV) solar power system to supply clean energy to the Administration and Training Centre facilities at the Tharisa Mine. To maximise the benefits of this renewable energy investment and to ensure reliable power availability during morning and evening peak loads, a Battery Energy Storage System (BESS) capable of storing excess solar generation is required. The BESS is designed to store electricity and provide immediate power when needed. This improves grid stability, supports renewable energy integration, offers ancillary services, helps manage network constraints, and aids in meeting peak demand.

Redox One, a developer and manufacturer of Iron Chromium (Fe-Cr) flow batteries for industrial scale energy storage, is uniquely positioned to support this requirement. Arxo Metals currently manufactures the Fe-Cr electrolyte used in these batteries; utilising materials sourced from the Tharisa Mine. Redox One proposes to implement a demonstration project by installing its RFB625 BESS, enabling a microgrid solution that delivers clean, reliable energy to the Administration and Training Centre facilities, while showcasing the performance of Fe-Cr flow battery technology.

1.2.1 Location of the Proposed Development

The proposed BESS Facility will be located within the Tharisa Mine, situated in both the Rustenburg Local Municipality and the Madibeng Local Municipality, forming part of the Bojanala Platinum District Municipality, North West Province.

The installation site is positioned on Portion 317 of Farm K Kraal 342 JQ, a property owned by Tharisa. The BESS Facility will be deployed behind the Administration and Training Centre facilities, entirely within the existing mine boundary, on previously modified/disturbed land, thereby minimising additional land transformation. The proposed Project Area is indicated in Figure 1-2.



Figure 1-3 Location of the proposed BESS Facility

The Selected Battery System

A Redox One RFB 625 Iron Chromium (Fe Cr) flow battery system is proposed for installation, selected for its suitability to the required load profile, its 150 kW power rating, and 500 kWh(AC) storage capacity. The system will be containerised and will include electrolyte storage tanks with a combined capacity of 86 m³ (Fe Cr/HCl electrolyte). These tanks will be housed within containers, with the electrochemical stacks installed above them, and a dedicated Rebalancer Unit positioned adjacent to the system (refer to Figure 1 4).

The Rebalancer Unit electrochemically maintains the capacity of the battery by reducing built-up ferric chloride [FeCl₃(Aq)] in the positive electrolyte to ferrous chloride [FeCl₂(Aq)]. The rebalancer requires chemicals with a total volume of 12 m³, comprising 5 m³ hydrochloric acid (HCl), 5 m³ sodium hydroxide (NaOH, 50%), and 2 m³ Fe Cr/HCl electrolyte. Intermediate bulk containers (IBCs) located in front of the rebalancer store process liquids will require regular replacement.

During operation, the rebalancer produces chlorine gas, which will be captured using a caustic scrubber, which will be safely vented to the atmosphere after scrubbing. Expected chlorine vent concentrations range from approximately 0.3 3 parts per million (ppm), with annual emissions estimated between 0.5 to 10 kg Cl₂, depending on operating conditions. Electrochemical sensors will be installed to monitor gas releases, with an automated system shutdown triggered if threshold limits are exceeded.

To operate the battery with high efficiency, it is necessary to raise the temperature of the electrolyte. This task is performed by an external unit. The heating and cooling unit is a device designed to bring the battery's electrolyte to a temperature of 45 to 50°C and maintain it at this level, as the system's efficiency is optimal at this temperature.

To store energy in the battery and retrieve it when needed, an external converter is required. This function is performed by a Power Converting System from WindSun. It consists of an inverter equipped with a transformer and a grid connection.

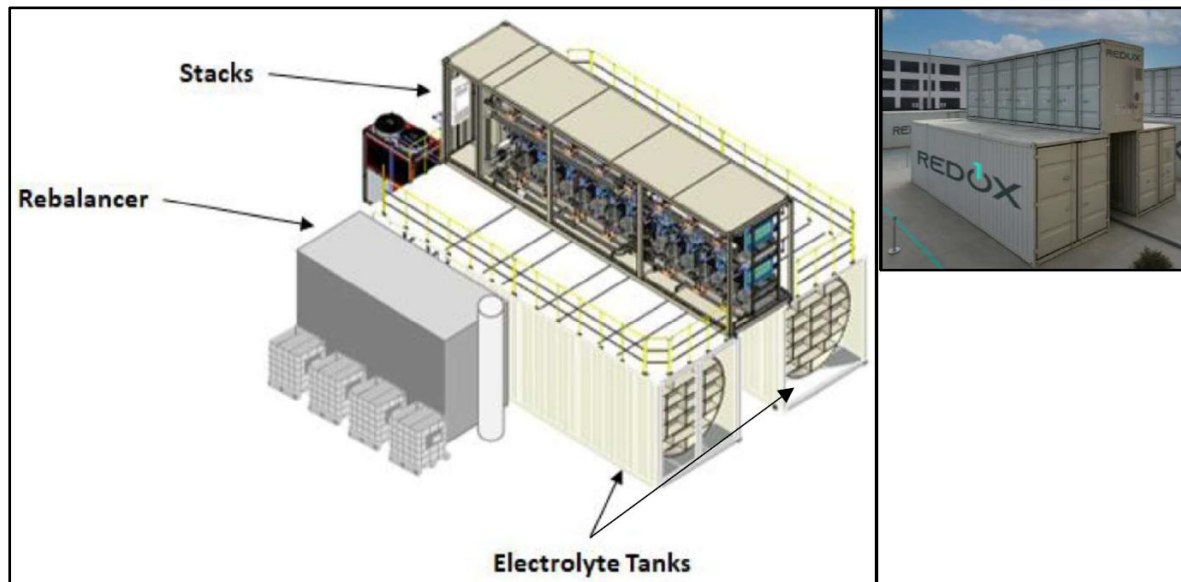


Figure 1-4 Schematic View of the Battery with the Rebalancer within containers

Hazardous Chemicals and Waste Management

The electrolytes and rebalancer chemicals used in the system are classified as hazardous substances. All reagent and electrolyte storage tanks will be housed within a single bunded containment area designed to provide 110% secondary containment capacity, ensuring full compliance with applicable chemical storage and safety requirements.

The primary waste stream will be generated by the rebalancer scrubber system, which produces a mixture of sodium hypochlorite and sodium chloride. A 30 m³ dedicated waste storage tank will be required to accommodate this waste prior to removal and disposal by a licensed waste management contractor.

Additionally, a bunded leakage sump with a volume of approximately 39 m³ will be provided to safely collect and manage any spilled or leaked electrolyte. Small leaks and drips will be appropriately contained and disposed of. Waste collected in the sump will be disposed of at a licensed waste disposal facility. In the unlikely event of a large electrolyte spill, the electrolyte will be recovered and reused where feasible.

Stormwater Management

A stormwater channel will be constructed around the plant to collect runoff and connect it to the existing mine stormwater management system. Any contaminated stormwater within the facility will be directed to the sump for collection and disposal at a licensed waste disposal facility.

BESS Development Overview

The proposed BESS development will be constructed within a footprint of approximately 1 200 m² as shown in Figure 1 5. The following components (Table 1-1) are applicable to the proposed project:

Table 1-1 Summary of Tharisa BESS project Components

Component	Description / Dimensions
BESS Footprint	<p>The total development footprint is approximately 1 200 m² and comprises the following components:</p> <ul style="list-style-type: none"> • A BESS facility with an approximate footprint of 400 m² comprising battery storage tanks & stacks, a PCS unit, heating and cooling unit, a rebalancer unit, a storage area for rebalancer consumables (IBCs) and a leakage sump. • An operations and maintenance facility for safety equipment and routine cleaning equipment storage. • Internal access road. • A construction laydown area. • Stormwater management channel. • Perimeter fencing.
BESS Technology	<ul style="list-style-type: none"> • Redox One RFB625 Iron Chromium (Fe Cr) Flow Battery System Electrolyte solution: HCl based Fe-Cr electrolyte.
Battery Performance	<ul style="list-style-type: none"> • Rated charge/discharged power: 150kW (16 stacks of 9 kW each in 2 strings). • DC-voltage Range: 473.6 710.4 V. • Nom. DC Current: 314A. • Response time: 100ms.
Battery Lifespan	<ul style="list-style-type: none"> • Approximately 25 years.
Usable energy	<ul style="list-style-type: none"> • 500kWh (AC).
Solar System	<ul style="list-style-type: none"> • 250 kW generation capacity. • 455 PV panels mounted on existing infrastructure (carports).
Electrolyte Storage	<ul style="list-style-type: none"> • Combined tank capacity: 86 m³ (Fe-Cr/HCl electrolyte), housed within containers.
Rebalancer Unit	<ul style="list-style-type: none"> • Installed adjacent to containers with a total chemical volume of 12 m³. • Chemical breakdown for rebalancer: 5 m³ HCl; 5 m³ NaOH (50%); 2 m³ Fe-Cr/HCl electrolyte
Heating and cooling Unit	<ul style="list-style-type: none"> • Unit for maintaining the electrolyte at temperature. • Euroklimat/Sanhe Tongfei Refrigeration Co. Ltd, ECA- 50HR-01CSZ3-1237C. • Ancillary consumption: Maximum 120 kW (only during the heating phase).
PCS	<ul style="list-style-type: none"> • Inverter system for connecting the battery to the power grid. • WindSun FGPCS-440K/0.28.
Voltage Cabling	<ul style="list-style-type: none"> • 400 V cables will be installed underground, with cable racking used where technically feasible, to connect the BESS to the Eskom junction box.

Internal Road	<ul style="list-style-type: none"> An access road will be constructed to the BESS Facility for both the construction and operational phases. The road will be approximately 135 m in length and 4 m wide, with a footprint of approximately 540 m².
Construction Laydown Area	<ul style="list-style-type: none"> A temporary laydown area of approximately 100 m² will be required for construction.
Operations and Maintenance Facility	<ul style="list-style-type: none"> An operations and maintenance container for the storage of safety equipment and day cleaning equipment will be required, with a footprint of approximately 36 m².
Fencing	<ul style="list-style-type: none"> Fencing will be installed around the entire BESS Facility, including the access road, to restrict unauthorised entry.

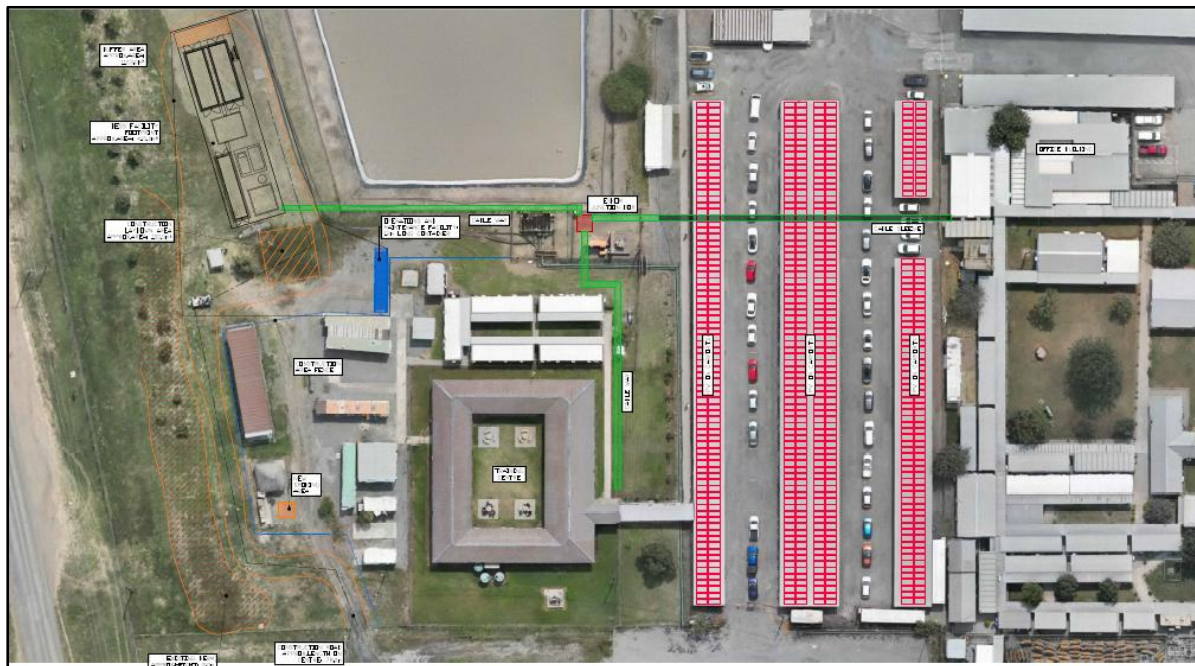


Figure 1-5 Site Layout for the proposed Tharisa BESS

1.2.3 Proposed Project Development Activities

Construction Phase

The construction process will follow industry standard methods and techniques. Key activities associated with the construction phase are described in Table 1-2 below:

Table 1-2 Construction Activities

Activity	Description
Establishment of a construction access road	A short internal construction access road will be required for the proposed site development. This road will provide access to the BESS facility.
Site preparation and establishment	Site establishment will include vegetation clearing, any required bulk earthworks, and the installation of access control fencing.

Establishment of a laydown area on site	Construction materials, machinery, and equipment will be stored in designated laydown and/or storage areas. The use of a centralised laydown area will reduce potential environmental impacts during the construction phase by confining activities to a single, controlled location.
Transport of components and equipment to site	All construction materials, machinery, and equipment (e.g. graders, excavators, trucks, cement mixers) will be transported to the site using the national, regional, and local road network. Larger components may be classified as abnormal loads in terms of the National Road Traffic Act, 1996 (Act No. 93 of 1996). In such cases, the necessary permits will be obtained for the transportation of these loads on public roads.
Installation of battery system and cables	<p>Foundations will be constructed, and the BESS Facility will be installed. 400 V cables will be installed underground to connect the BESS to the Eskom junction box, with cable racking utilised where feasible. Trenching depths will range from 600 mm in pedestrian areas to 1,000 mm at road crossings, with a minimum trench width of 450 mm. Trenches will be prepared with a level, debris-free base and a 75 mm layer of sand bedding.</p> <p>Cables will be laid without tension on the prepared bedding, ensuring appropriate spacing and identification. Protective measures will include sand cover, mechanical protection barriers, and warning tape installed 250 to 300mm below ground level. Backfilling will be carried out using suitable material, compacted in layers. Road crossings will be constructed using ducts or concrete encasement. Minimum separation distances between services will be maintained, and markers will be installed at regular intervals and at key points.</p> <p>All installations will be tested and commissioned in accordance with relevant South African National Standards (SANS) and NRS standards, and appropriate safety controls will be implemented throughout.</p>
Rehabilitation	Once all construction is completed on site and all equipment and machinery have been removed from the site, the site will be rehabilitated.

Operational Phase

During the operational phase, key activities will include routine inspection and maintenance.

Decommissioning Phase

The decommissioning phase will include activities similar to that of the construction phase as indicated in Table 1-2.

1.3 Scope of Work

In accordance with the procedures for the assessment and minimum criteria for reporting on identified environmental themes in terms of Sections 24(5)(a) and (h) and 44 of the NEMA, 1998, when applying for EA the current use of the land and the environmental sensitivity of the site under consideration as identified by the National Web-Based Environmental Screening Tool, must be confirmed by undertaking a SSV.

The outcome of this SSV is to:

- Confirm or dispute the current use of the land and the environmental sensitivity as identified by the screening tool; and
- Motivate and provide evidence of either the verified or different use of the land and environmental sensitivity of the site.

2 Approach

One early dry season field survey was undertaken for the project on the 18th of May 2026 to confirm the presence of SCC, as well as any sensitive habitat features. Effort was made to cover all the different habitat types within the limits of time and access. During the survey, notes were made regarding current impacts, recording of dominant vegetation species and any sensitive or important features

2.1 Assumptions and Limitations

The following limitations should be noted for the assessment:

- The results from the desktop evaluation and field survey considered the entire Project Area;
- A single survey was undertaken on 18th of May 2026 and hence there is a high probability that not all species of flora were recorded, especially since the Project Area falls within a summer rainfall region. However, the site assessment is considered sufficient for the project;
- The assessment area was based on the area provided by the client and any alterations to the route and/or missing GIS information pertaining to the assessment area would have affected the area surveyed.
- The Global Positioning System (GPS) used in the assessment has an accuracy of 5 m and consequently any spatial features may be offset by 5 m; and
- A single survey was undertaken in May (autumn; early dry season). This assessment has therefore not assessed any temporal trends for the project.

3 Results & Discussion

3.1 Desktop Ecological Baseline

The following is deduced from the National Web-based Environmental Screening Tool Regulation 16(1)(v) of the Environmental Impact Assessment Regulations 2014, as amended):

- Terrestrial Biodiversity Theme sensitivity is Very High for the Project Area, due to the Project Area overlapping with an Ecological Support Area (ESA 1) and an Endangered (EN) Ecosystem, Marikana Thornveld (Figure 3-1).
- Plant Species Theme sensitivity is Low for the Project Area (Figure 3-2), and
- Animal Species Theme sensitivity is Medium for the Project Area, due to the possible presence of two (2) medium sensitivity mammal species (Figure 3-3).

MAP OF RELATIVE PLANT SPECIES THEME SENSITIVITY



Where only a sensitive plant unique number or sensitive animal unique number is provided in the screening report and an assessment is required, the environmental assessment practitioner (EAP) or specialist is required to email SANBI at eiadatarequests@sanbi.org.za listing all sensitive species with their unique identifiers for which information is required. The name has been withheld as the species may be prone to illegal harvesting and must be protected. SANBI will release the actual species name after the details of the EAP or specialist have been documented.

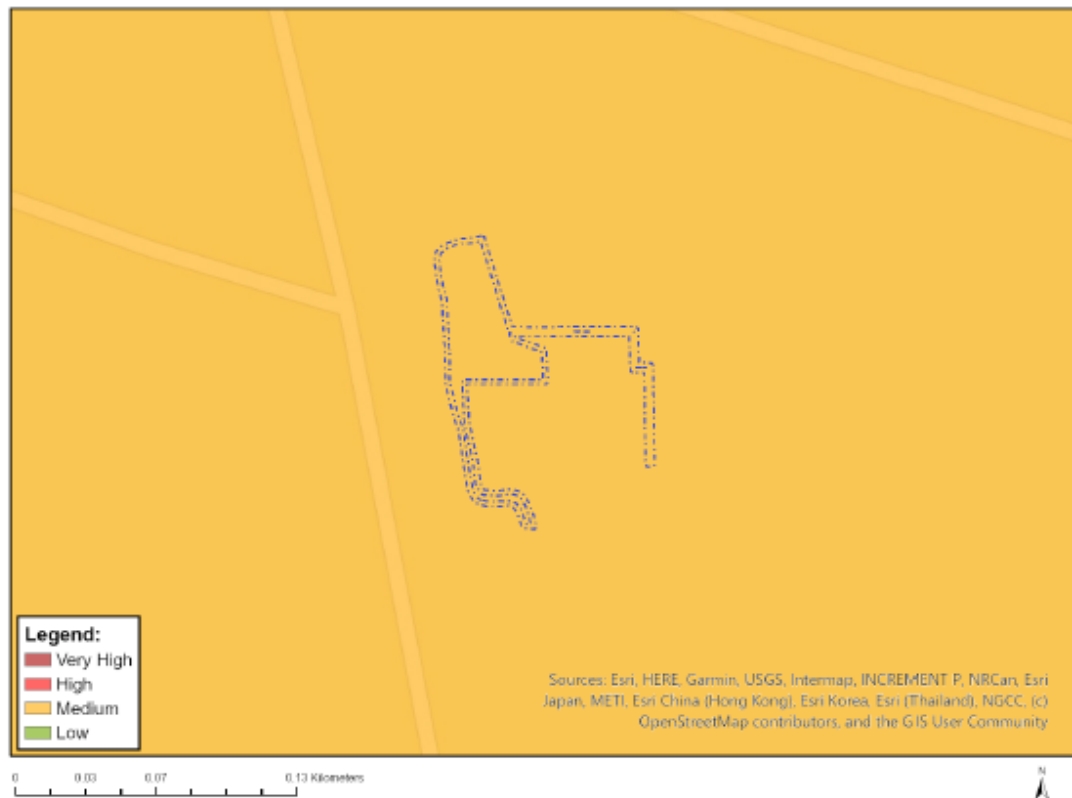
Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
			X

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low Sensitivity

Figure 3-2 Plant Species Theme Sensitivity

MAP OF RELATIVE ANIMAL SPECIES THEME SENSITIVITY



Where only a sensitive plant unique number or sensitive animal unique number is provided in the screening report and an assessment is required, the environmental assessment practitioner (EAP) or specialist is required to email SANBI at eiadatarequests@sanbi.org.za listing all sensitive species with their unique identifiers for which information is required. The name has been withheld as the species may be prone to illegal harvesting and must be protected. SANBI will release the actual species name after the details of the EAP or specialist have been documented.

Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
		X	

Sensitivity Features:

Sensitivity	Feature(s)
Medium	Mammalia-Crocidura maquassiensis
Medium	Mammalia-Dasymys robertsii

Figure 3-3 Animal Species Theme Sensitivity

3.2 Field Survey Results

The following sections discuss the results from the field surveys that was conducted for the proposed project on the 18th of May 2026 (Figure 3-4). One (1) terrestrial habitat (*viz.* Severely Modified) was identified within the Project Area. The field observations and habitats observed are discussed below (Table 3-1).

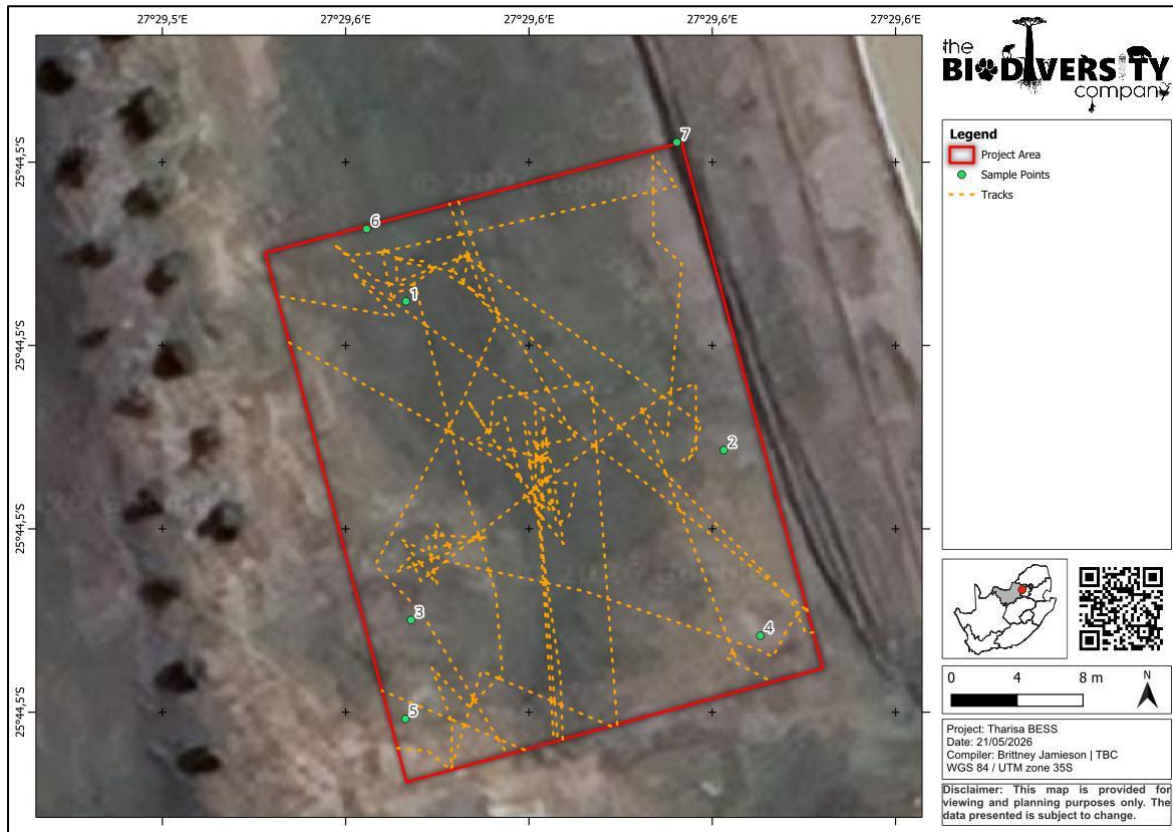


Figure 3-4 Map illustrating the field tracks of the field survey of the Project Area.

Table 3-1 Field Survey Results

Habitat	Area description and condition
Severely Modified	The habitat is classified as severely modified, with extensive loss of natural species composition, vegetation structure, and ecological functioning. The entire Project Area consists of this habitat. The area is not connected to any surrounding natural habitats due to the surrounding existing mine and associated infrastructure and has been transformed (e.g. vegetation mowed down) to the extent that it no longer presents habitat conditions typically associated with intact or semi-natural systems. No SCCs were recorded during the assessment, and none are expected given the highly altered nature of the habitat.



Figure 3-5 Map illustrating different habitat types within the project area

3.3 Site Ecological Importance

Based on the criteria provided in Appendix C: Terrestrial Site Ecological Importance of this report, all habitats within the Project Area were assigned a sensitivity category, i.e., a SEI category. The one (1) terrestrial habitat was assigned a 'Very Low' SEI (Table 3-2).

The SEI of the Project Area can be seen in Figure 3-6.

Table 3-2 Summary of habitat types delineated within Project Area.

Habitat	Conservation Importance (CI)	Functional Integrity (FI)	Biodiversity Importance (BI)	Receptor Resilience (RR)	Site Ecological Importance (SEI) Guidelines for interpreting SEI in the context of the proposed development activities
Severely Modified	Very Low No confirmed or highly unlikely populations of SCC. No natural Habitat remaining.	Very Low Very small (< 1 ha) area. Several major current negative ecological impacts.	Very Low	Very High Habitat that can recover rapidly (~ less than 5 years) to restore > 75% of the original species composition and functionality of the receptor	Very Low Minimisation mitigation – development activities of medium to high impact acceptable and restoration activities may not be required.



Figure 3-6 Site Ecological Importance of the Project Area

3.4 Screening Tool Comparison

The allocated sensitivities for each of the relevant themes are either disputed or validated for the assessed areas in Table 3-3 below. A summative explanation for each result is provided as relevant. The specialist-assigned sensitivity ratings are based largely on the SEI process followed in the previous section, and consideration is given to any observed or likely presence of SCC.

Table 3-3 Summary of the screening tool vs specialist assigned sensitivities.

Screening Tool Theme	Screening Tool	Specialist	Tool Validated or Disputed by Specialist - Reasoning
Animal Theme	Medium	Low	Disputed – The Project Area is modified due to anthropogenic ingress and activities. No fauna SCC or suitable habitat for fauna SCC was observed. No fauna SCC are expected.
Plant Theme	Low	Low	Validated – The Project Area is modified due to anthropogenic ingress and activities. No natural habitat remains, so no suitable habitat for flora SCC was observed. No flora SCC are expected.
Terrestrial Biodiversity Theme	Very High	Low	Disputed - The Project Area has been severely modified and as such has lost the ecological functionality. The Project Area is no longer representative of the EN Marikana Thornveld. Moreover, the ecological functionality of the Project Area is severely limited, impairing the function as an ESA1.

4 Impact Management

4.1 Impact management

Mitigation measures have been developed for inclusion in the Environmental Management Programme (EMPr) for the proposed development. Two project phases were considered in the formulation of these measures, namely the Construction Phase and the Operational Phase, with the infrastructure assumed to be permanent (> 20 years) and no decommissioning phase anticipated. The purpose of these management measures is to avoid, minimise and manage potential impacts associated with the proposed activity, while also improving the conservation value of the property. The recommended mitigation measures for incorporation into the EMPr are provided in the tables below

- Construction Phase;
- Operational Phase; and
- Decommissioning Phase.

The purpose of the management measures is to inform on the mitigations required to lower the risk of the impacts associated with the proposed activity, provide measures for improving the conservation value of the property and to be able to be inserted into the Environmental Management Programme (EMPr). The mitigation actions required to reduce the significance of the impacts associated with the development are provided in the table below (Table 4-1).

Table 4-1 The project management measures for the terrestrial biodiversity during the construction, operational and decommissioning phases

Management outcome: Vegetation and Habitats				
Impact Management Actions	Implementation		Monitoring	
	Phase	Responsible Party	Aspect	Frequency
All activities must be restricted to the approved project footprint to avoid unnecessary disturbance to adjacent areas within the existing mine property. No disturbance must occur outside demarcated work areas.	Life of operation	Contractor / Site Manager / Environmental Officer	Footprint disturbance	Ongoing
The construction footprint must be clearly demarcated prior to the commencement of works, and all personnel must be made aware of the site limits during induction.	Construction and Decommissioning	Contractor / Environmental Officer	Site demarcation and habitat disturbance	Once prior to construction, with ongoing compliance monitoring
A hydrocarbon spill management plan must be put in place to ensure that any chemical spill out or over does not run into the surrounding areas. The Contractor shall be in possession of an emergency spill kit that must always be complete and available on site. Drip trays or any form of oil absorbent material must be placed underneath vehicles/machinery and equipment when not in use. No servicing of equipment on site unless necessary. All contaminated soil / yard stone shall be treated in situ or removed and be placed in containers.	Life of operation	Environmental Officer & Contractor	Spill events, Vehicles dripping.	Ongoing
Leaking equipment and vehicles must be repaired immediately or be removed from Project Area to facilitate repair.	Life of operation	Environmental Officer & Contractor	Leaks and spills	Ongoing
All disturbed areas (the project footprint) must be cleared of rubble, waste, and redundant infrastructure and left in a stable condition consistent with the surrounding environment.	Decommissioning	Contractor / Site Manager / Environmental Officer	Site reinstatement	As required

Denuded areas must be revegetated in-line with the rehabilitation plan.

Management outcome: Fauna				
Impact Management Actions	Implementation		Monitoring	
	Phase	Responsible Party	Aspect	Frequency
All construction and maintenance motor vehicle operators should undergo an environmental induction that includes instruction on the need to comply with speed limits, to respect all forms of wildlife. Speed limits must still be enforced to ensure that road killings and erosion is limited.	Life of operation	Health and Safety Officer	Compliance to the training.	Ongoing
No hunting, trapping, killing, harming or deliberate disturbance of fauna by site personnel may be permitted.	Life of operation	Contractor / Site Manager	Protection of fauna	Ongoing
Speed limits must be maintained during decommissioning and open excavations or trenches must not be left open for longer than necessary to reduce fauna mortality and entrapment.	Decommissioning	Contractor / Site Manager	Faunal collisions and entrapment	Ongoing

Management outcome: Alien Vegetation				
Impact Management Actions	Implementation		Monitoring	
	Phase	Responsible Party	Aspect	Frequency
An Alien Invasive Plant (AIP) Management Plan must be compiled and implemented. This should regularly be updated to reflect the annual change in AIP composition.	Life of operation	Project manager, Environmental Officer & Contractor	Manage and assess presence and encroachment of alien vegetation	Twice a year
Any alien or weedy plant species establishing within newly disturbed areas associated with the project must be identified and controlled in accordance with existing mine procedures.	Construction and Operation	Mine Environmental Officer / Contractor	Alien plant establishment in disturbed areas	As required during routine inspections
Any alien or weedy species establishing in areas disturbed during decommissioning must be identified and controlled in accordance with existing mine procedures.	Decommissioning	Mine Environmental Officer / Contractor	Alien plant establishment in disturbed areas	As required during routine inspections

4.2 Cumulative Impacts

The quantitative impact of the proposed project in isolation on terrestrial biodiversity is anticipated to be "Low" due to the expected adherence to mitigation and the Severely Modified condition of the habitat. The cumulative impact of the proposed project on habitats, plants and animals is anticipated to be "low". The Project Area has undergone historic and current disturbance, similar to the disturbances that the local area has undergone.

After implementation of the mitigation measures as stipulated above the integrity and functionality of the natural habitat is not expected to deteriorate further as a result of the proposed development and no irreplaceable loss of terrestrial biodiversity is anticipated.

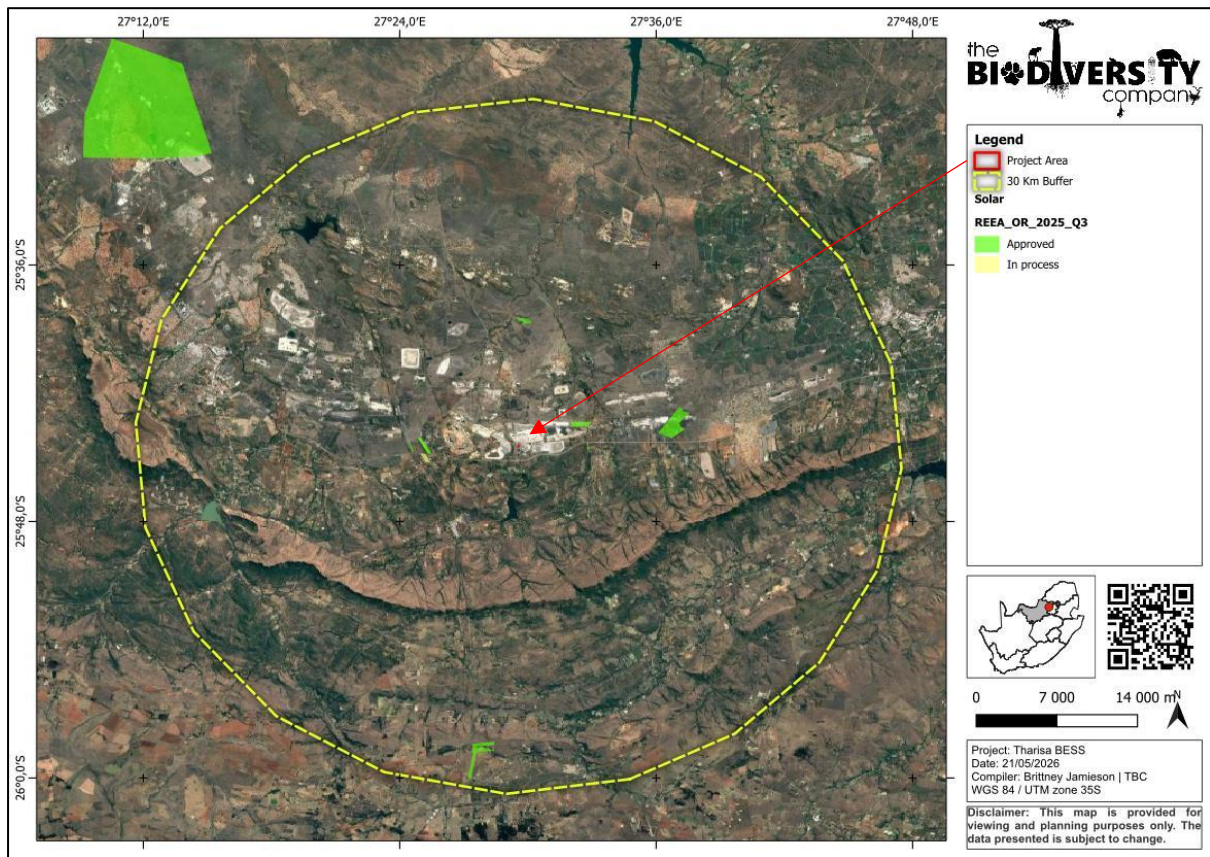


Table 4-2 Cumulative Impacts associated with the proposed project.

5 Conclusion

According to the Department of Forestry, Fisheries and the Environment (DFFE) Screening Tool, the Project Area overlaps with Ecological Support Area (ESA) 1 and the Endangered Marikana Thornveld vegetation type. However, the site survey confirmed that the Project Area comprises a single Severely Modified terrestrial habitat with an assigned Very Low SEI. The site is located within the existing operational mine footprint and is associated with established mine land uses and infrastructure, including previously disturbed ground and related transformed areas. The habitat is characterised by extensive loss of natural species composition, vegetation structure, and ecological functioning, and is not connected to surrounding natural habitats. As a result, the site is no longer representative of Endangered Marikana Thornveld, does not provide suitable habitat for flora or fauna SCCs, and has severely limited functionality as an ESA 1.

No flora or fauna SCCs were recorded during the assessment, and none are expected given the highly transformed nature of the site. The Very High terrestrial biodiversity sensitivity assigned by the Screening Tool is therefore disputed and revised to Low. The Animal Species Theme, assigned Medium sensitivity by the Screening Tool, is also disputed and revised to Low, while the Low sensitivity assigned to the Plant Species Theme is validated.

Given that the proposed development is confined to an already transformed area within the active mine footprint, and within a landscape characterised by existing infrastructure and operational land use, the project is unlikely to result in significant additional terrestrial biodiversity loss. The anticipated cumulative impact on habitats, plants, and animals is considered low, and no irreplaceable biodiversity loss is expected, provided that standard mitigation and management measures are implemented.

6 References

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7 Appendix Items

7.1 Appendix A – Specialist Declaration of Independence

I, Brittney Jamieson, declare that:

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing any decision to be taken with respect to the application by the competent authority; and the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of Regulation 71 and is punishable in terms of Section 24F of the Act.



Brittney Jamieson

Ecologist

The Biodiversity Company

June 2026

I, Andine de Villiers, declare that:

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing any decision to be taken with respect to the application by the competent authority; and the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of Regulation 71 and is punishable in terms of Section 24F of the Act.



Andine de Villiers

Ecologist

The Biodiversity Company

June 2026

7.2 Appendix B – Specialist CV

Brittney-Aidan Jamieson

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✉
brittney@thebiodiversitycompany.com



PROFILE SUMMARY

Master's graduate in Microbiology with hands-on experience in environmental monitoring, field sampling, and pathogen detection across diverse ecosystems. Skilled in experimental design, data collection and analysis, with strong foundation in Microbiology, Genetics, and Plant Pathology. Experienced in combining laboratory and field-based research to address real-world environmental and agricultural challenges. Demonstrated leadership and mentoring abilities through roles as class representative and honors student mentor, reflecting strong teamwork, communication, and organizational skills. Passionate about contributing to sustainable land and resource management by applying scientific rigor and evidence based thinking within multidisciplinary teams.

PERSONAL INFO

Nationality: South African
Date of birth: 27 May 1999

EXPERIENCE

Field work
Sample processing
Report writing
Conference Presentations

SKILLS

- ✓ Research & Problem-Solving
- ✓ Data Analysis & Interpretation
- ✓ Scientific Writing & Communication
- ✓ Fieldwork & Practical Experience
- ✓ Collaboration & Leadership

LANGUAGES

English – Proficient
Afrikaans – Conversational
Spanish - Basic



Signed: Brittney-Aidan Jamieson

ACADEMIC QUALIFICATIONS

University of Pretoria (2024 - 2025): MAGISTER SCIENTIAE (MSc) - Microbiology:

Title: *Screening South African Commercial Eucalyptus Provenances for Resistance to Quambalaria eucalypti.*

University of Pretoria (2023): BACCALAUREUS SCIENTIAE HONORIBUS (Hons) – Microbiology

University of Pretoria (2019 - 2022): BACCAUREUS SCIENTIAE IN NATURAL AND ENVIRONMENTAL SCIENCES. Majors: Genetics and Microbiology.

PROFESSIONAL EXPERIENCE

January 2026	The Biodiversity Company Terrestrial Intern
December 2025	Digby Wells Environmental Shadow Experience
June 2023 – November 2025	University of Pretoria Lab Demonstrator and Tutor

Andine DE VILLIERS

Pr Sci Nat 164894

+27 64 417 6320

✉ andine@thebiodiversitycompany.com



PROFILE SUMMARY

Environmental and ecological specialist with more than two years of consulting experience within South Africa and internationally. Specialist expertise as a terrestrial ecologist and project manager in various sectors including mining, engineering, renewable energy, and private sector developments. Experienced in delivering field surveys, technical reports and specialist guidance for compliance with in-country legislative requirements and international lender standards. Registered Pr Sci Nat with the South African Council for Natural Scientific Professions.

PERSONAL INFO

Nationality: South African

Date of birth: 8 April 1995

EXPERIENCE

Environmental Impact Assessments (EIA)

Environmental Management Programmes (EMP)

Project Management

Mammal Assessments

SKILLS

- ✓ Terrestrial Biodiversity, Fauna and Flora (Ecology) Assessments
- ✓ GIS
- ✓ Golden Mole and Riverine Rabbit Assessment
- ✓ Rehabilitation
- ✓ Monitoring & Management Plans

LANGUAGES

English – Proficient

Afrikaans – Proficient



Signed: Andine de Villiers

ACADEMIC QUALIFICATIONS

University of Pretoria (2020): MAGISTER SCIENTIAE (MSc) – Zoology with distinction:

Thesis title: *Playing with rats: The effect of a social companion, environmental enrichment and human interactions on the plasma oxytocin and faecal corticosterone metabolite concentration of Sprague Dawley rats.*

University of Pretoria (2018): BACCALAREUS SCIENTIAE CUM HONORIBUS (BSc Hons) – Zoology:

Research project title: Research project: Locomotor activity of individual Damaraland mole-rats (*Fukomys damarensis*) in intact colonies.

University of Pretoria (2017): BACCALAREUS SCIENTIAE (BSc) – Zoology:

Majors: Zoology

PROFESSIONAL EXPERIENCE

June 2023 – **The Biodiversity Company**
Present Terrestrial Ecologist

INTERNATIONAL EXPERIENCE

South Africa, Mauritius, Zambia

7.3 Appendix C: Terrestrial Site Ecological Importance

The different habitat types within the project area were delineated and identified based on observations made during the field survey, and information from available satellite imagery. These habitat types were assigned Ecological Importance (EI) categories based on their ecological integrity, conservation value, the presence of SCC and their ecosystem processes.

Site Ecological Importance (SEI) is a function of the Biodiversity Importance (BI) of the receptor (e.g., SCC, the vegetation/fauna community or habitat type present in the project area) and Receptor Resilience (RR) (its resilience to impacts).

BI is a function of Conservation Importance (CI) and the Functional Integrity (FI) of the receptor. The criteria for the CI and FI ratings are provided in Table 7-1 and Table 7-3 respectively.

Table 7-1 Summary of Conservation Importance (CI) criteria

Conservation Importance	Fulfilling Criteria
Very High	Confirmed or highly likely occurrence of Critically Endangered (CR), Endangered (EN), Vulnerable (VU) or Extremely Rare or CR species that have a global extent of occurrence (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 an 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 Near Threatened (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.

Table 7-2 Summary of Functional Integrity (FI) criteria

Functional Integrity	Fulfilling Criteria
Very High	Very large (> 100 ha) intact area for any conservation status of ecosystem type or > 5 ha for CR ecosystem types. High habitat connectivity serving as functional ecological corridors, limited road network between intact habitat patches. No or minimal current negative ecological impacts, with no signs of major past disturbance.
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 negative ecological impacts, with no signs of major past disturbance 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 negative ecological impacts, with some major impacts 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 modified or degraded natural habitat and a very busy used road network surrounds the area. Low rehabilitation potential. Several minor and major current negative 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 negative ecological impacts.

BI can be derived from a simple matrix of CI and FI as provided in Table 7-3.

Table 7-3 Matrix used to derive Biodiversity Importance (BI) from Functional Integrity (FI) and Conservation Importance (CI)

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

The fulfilling criteria to evaluate RR are based on the estimated recovery time required to restore an appreciable portion of functionality to the receptor, as summarised in Table 7-4.

Table 7-4 Summary of Receptor Resilience (RR) criteria

Resilience	Fulfilling Criteria
Very High	Habitat that can recover rapidly (~ less than 5 years) to restore > 75% of the original species composition and functionality of the receptor functionality, or species that have a very high likelihood of: (i) remaining at a site even when a disturbance or impact is occurring, or (ii) returning to a site once the disturbance or impact has been removed.
High	Habitat that can recover relatively quickly (~ 5–10 years) to restore > 75% of the original species composition and functionality of the receptor functionality, or species that have a high likelihood of: (i) remaining at a site even when a disturbance or impact is occurring, or (ii) returning to a site once the disturbance or impact has been removed.
Medium	Will recover slowly (~ more than 10 years) to restore > 75% of the original species composition and functionality of the receptor functionality, or species that have a moderate likelihood of: (i) remaining at a site even when a disturbance or impact is occurring, or (ii) 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: (i) remaining at a site even when a disturbance or impact is occurring, or (ii) 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: (i) remain at a site even when a disturbance or impact is occurring, or (ii) return to a site once the disturbance or impact has been removed.

After the determination of BI and RR, the SEI can be ascertained using the matrix as provided in Table 7-5.

Table 7-5 Matrix used to derive Site Ecological Importance from Receptor Resilience (RR) and Biodiversity Importance (BI)

Site Ecological Importance		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

Interpretation of the SEI in the context of the proposed project is provided in Table 7-6.

Table 7-6 *Guideline for interpreting Site Ecological Importance in the context of proposed activities*

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. Minimisation 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	Minimisation and restoration mitigation – development activities of medium impact acceptable followed by appropriate restoration activities.
Low	Minimisation and restoration mitigation – development activities of medium to high impact acceptable followed by appropriate restoration activities.
Very Low	Minimisation mitigation – development activities of medium to high impact acceptable and restoration activities may not be required.

The SEI evaluated for each taxon can be combined into a single multi-taxon evaluation of SEI for the assessment area. Either a combination of the maximum SEI for each receptor should be applied, or the SEI may be evaluated only once per receptor but for all necessary taxa simultaneously. For the latter, justification of the SEI for each receptor is based on the criteria that conforms to the highest CI and FI, and the lowest RR across all taxa.