



**Agricultural 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**

24 June 2026

**Prepared by:**


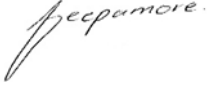

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<b>Report Name</b>	<b>Agricultural Theme Site Sensitivity Verification Report for the proposed Tharisa Minerals (Pty) Ltd Battery Energy Storage System BESS Development Project</b>	
<b>Specialist Theme</b>	Agricultural Theme	
<b>Project Reference</b>	SSVR – Tharisa BESS	
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<b>Declaration</b>	<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

The Biodiversity Company was appointed to undertake a Site Sensitivity Verification Report (SSVR) for the proposed Tharisa Minerals (Pty) Ltd Battery Energy Storage System (BESS) project to inform the environmental authorisation process through the Norm exclusion.

The report described the soil, agricultural resources, and land capability associated with the project area. The approach included a desktop review and a site assessment to verify the agricultural sensitivity and land potential of the site. The area is dominated by soil forms such as Rustenburg, Stilfontein, and Johannesburg, all of which are characterised by high clay content, shallow depth, and significant anthropogenic disturbance, resulting in very restricted or very low land capability. The site is located within an existing mining right boundary on previously disturbed land, with no active crop fields or irrigation infrastructure present. Although the national screening tool initially rated parts of the site as “Medium” to “High” sensitivity, specialist field verification disputed this to “Low” based on field evidence and land capability data.

The overall agricultural theme sensitivity categorised the area as “Low,” which meet requirements for the Norm BESS exclusion for the project area. All anticipated impacts on soil and agricultural resources during construction, operation, and decommissioning are rated as low significance after mitigation, and cumulative impacts remain low due to the already disturbed nature of the area. The report concludes that the project will have a negligible impact on agricultural production potential, provided that recommended mitigation and monitoring measures are implemented and integrated into the Environmental Management Programme (EMPr). No significant risks to agriculture are anticipated.

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## Acronyms and Abbreviations

<b>Abbreviation/Acronym</b>	<b>Full Meaning</b>
<b>BESS</b>	Battery Energy Storage System
<b>SSVR</b>	Site Sensitivity Verification Report
<b>PAOI</b>	Project Area of Influence
<b>MC</b>	Manyabe Consultancy (Pty) Ltd
<b>GN</b>	Government Notice
<b>NEMA</b>	National Environmental Management Act, 1998 (Act No. 107 of 1998)
<b>EIA</b>	Environmental Impact Assessment
<b>EA</b>	Environmental Authorisation
<b>SACNASP</b>	South African Council for Natural Scientific Professions
<b>PV</b>	Photovoltaic
<b>Fe-Cr</b>	Iron Chromium
<b>RFB</b>	Redox Flow Battery
<b>AC</b>	Alternating Current
<b>HCl</b>	Hydrochloric Acid
<b>NaOH</b>	Sodium Hydroxide
<b>IBC</b>	Intermediate Bulk Container
<b>SANS</b>	South African National Standards
<b>NRS</b>	National Rationalised Specifications
<b>MAP</b>	Mean Annual Precipitation
<b>MAPE</b>	Mean Annual Pan Evaporation
<b>DAFF</b>	Department of Agriculture, Forestry and Fisheries
<b>DFFE</b>	Department of Forestry, Fisheries and the Environment
<b>EMPr</b>	Environmental Management Programme
<b>AIP</b>	Alien and Invasive Plant species
<b>CV</b>	Curriculum Vitae

## 1 Introduction

The Biodiversity Company was appointed by Manyabe Consultancy (Pty) Ltd (MC) to compile a Site Sensitivity Verification Report (SSVR) 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 (see Figure 1-1)

From now on, the study area will be referred to as the Project Area of Influence (PAOI). A 50 m buffer was assigned to the project area in accordance with the requirements of GN 320 for the Agricultural Theme assessment. A map illustrating the details of the PAOI is depicted in Figure 1-1 and the proposed layout associated with the project area can be seen in Figure 1-2.



**Figure 1-1** Map illustrating the locality of the project area

### 1.1 Legal Framework

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.

The site sensitivity verification must be undertaken:

- For the footprint on which the proposed activities are proposed to take place;
- 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 soil forms being considered;
- Within the season which would be most relevant to identify the specific soil resources of interest (i.e. not applicable for soil assessments); and
- For a period of time as necessitated by the sensitivity of the proposed site and size of the proposed facility.

In accordance with GN 320 of Government Gazette 43110 (20 March 2020) the minimum reporting requirements for a site sensitivity verification is presented in Table 1-1 below.

**Table 1-1** *Agricultural theme site sensitivity verification information requirements as per the relevant protocol, including the location of the information within this report*

Information to be Included (as per GN 320, 20 March 2020)	Report Section
The site sensitivity verification must be undertaken by an environmental assessment practitioner or a specialist.	7.3
The site sensitivity verification must be undertaken through the use of: (a) a desktop analysis, using satellite imagery; (b) a preliminary on-site inspection; and (c) any other available and relevant information	3
The outcome of the site sensitivity verification must be recorded in the form of a report that: (a) confirms or disputes the current use of the land and the environmental sensitivity as identified by the screening tool, such as new developments or infrastructure, the change in vegetation cover or status etc; and (b) contains a motivation and evidence (e.g. photographs) of either the verified or different use of the land and environmental sensitivity.	3.2 & 3.5.2

## 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





**Figure 1-3** Location of the proposed BESS Facility

#### The Selected Battery System

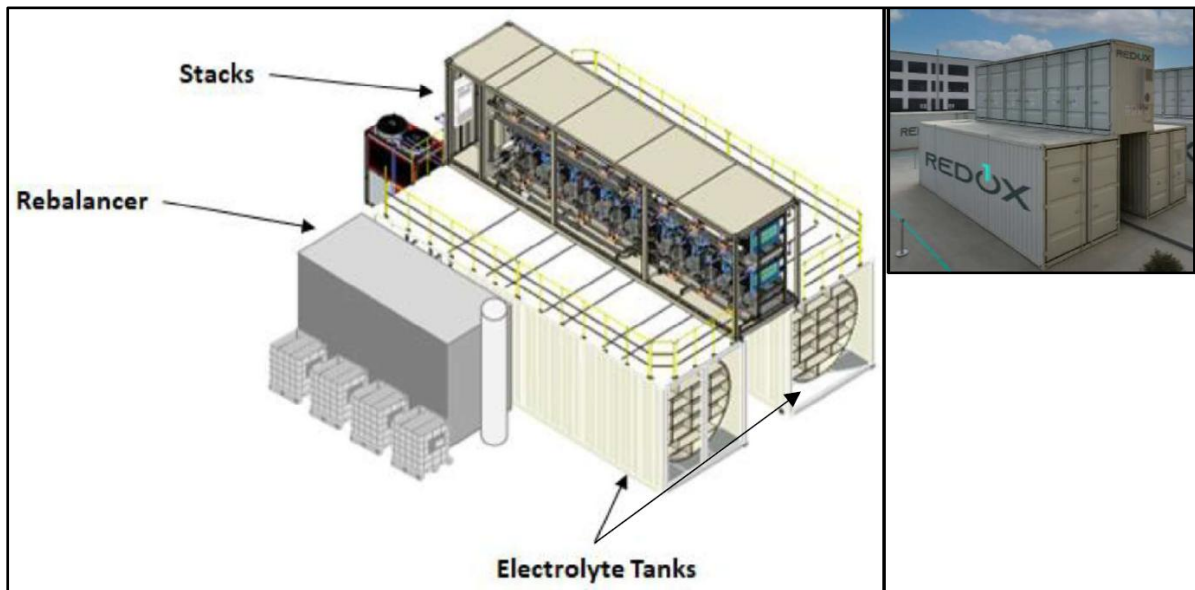
A Redox One RFB 625 Iron Chromium (Fe Cr) flow battery system is proposed for installation, selected for its suitability to the required load profile, its 150 kW power rating, and 500 kWh(AC) storage capacity. The system will be containerised and will include electrolyte storage tanks with a combined capacity of 86 m<sup>3</sup> (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 [FeCl<sub>3</sub>(Aq)] in the positive electrolyte to ferrous chloride [FeCl<sub>2</sub>(Aq)]. The rebalancer requires chemicals with a total volume of 12 m<sup>3</sup>, comprising 5 m<sup>3</sup> hydrochloric acid (HCl), 5 m<sup>3</sup> sodium hydroxide (NaOH, 50%), and 2 m<sup>3</sup> 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 Cl<sub>2</sub>, 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 m<sup>3</sup> 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 m<sup>3</sup> 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.

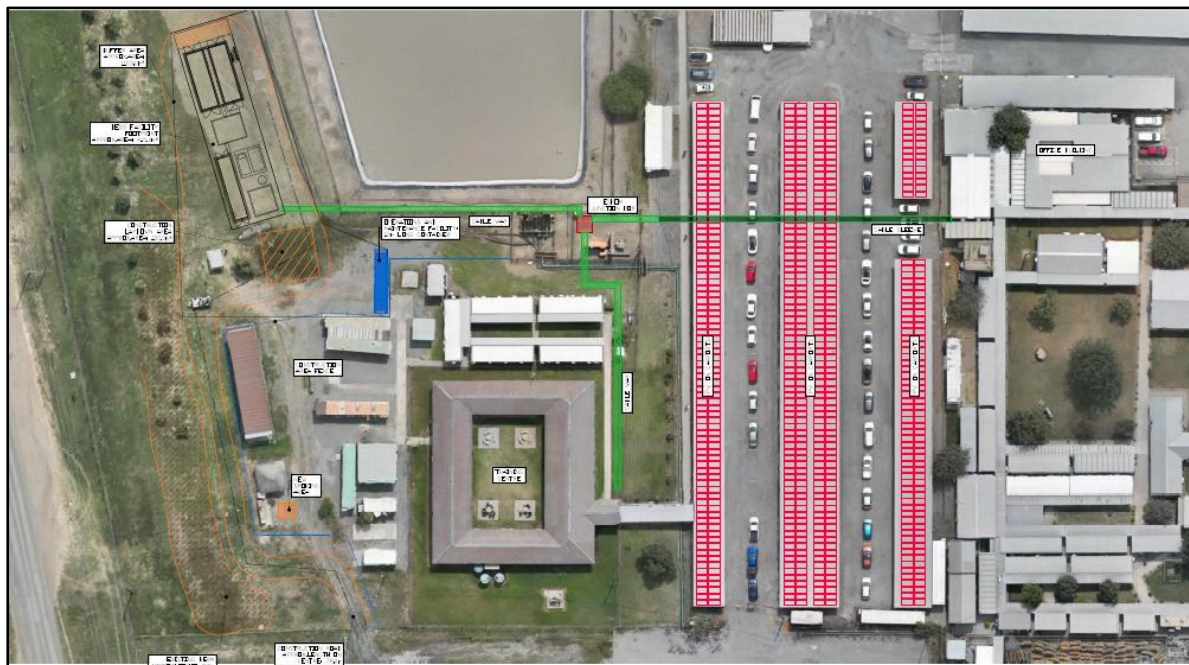
#### BESS Development Overview

The proposed BESS development will be constructed within a footprint of approximately 1 200 m<sup>2</sup> as shown in Figure 1-5. The following components (Table 1-2) are applicable to the proposed project:

**Table 1-2 Technical Specifications associated with the BESS Facility**

Component	Description
<b>BESS Development Footprint</b>	<p>The total development footprint is approximately 1 200 m<sup>2</sup> and comprises the following components:</p> <ul style="list-style-type: none"> <li>• A BESS facility with an approx. footprint of 400 m<sup>2</sup> comprising battery storage tanks &amp; stacks, a PCS unit, heating and cooling unit, a rebalancer unit, a storage area for rebalancer consumables (IBCs) and a leakage sump.</li> <li>• An operations and maintenance facility for safety equipment and routine cleaning equipment storage.</li> <li>• Internal access road.</li> <li>• A construction laydown area.</li> <li>• Stormwater management channel.</li> <li>• Perimeter fencing.</li> </ul>
<b>BESS Technology</b>	<ul style="list-style-type: none"> <li>• Redox One RFB625 Iron Chromium Flow Battery System Electrolyte solution: HCl based Fe-Cr electrolyte.</li> </ul>
<b>Battery Performance</b>	<ul style="list-style-type: none"> <li>• Rated charge/discharged power: 150kW (16 stacks of 9kW each in 2 strings).</li> <li>• DC-voltage Range: 473.6 710.4 V.</li> <li>• Nom. DC Current: 314A.</li> <li>• Response time: 100ms.</li> </ul>
<b>Battery Lifespan</b>	<ul style="list-style-type: none"> <li>• Approximately 25 years.</li> </ul>
<b>Usable energy</b>	<ul style="list-style-type: none"> <li>• 500kWh (AC).</li> </ul>
<b>Solar System</b>	<ul style="list-style-type: none"> <li>• 250 kW generation capacity.</li> <li>• 455 PV panels mounted on existing infrastructure (carports).</li> </ul>
<b>Electrolyte Storage</b>	<ul style="list-style-type: none"> <li>• Combined tank capacity: 86 m<sup>3</sup> (Fe-Cr/HCl electrolyte), housed within containers.</li> </ul>
<b>Rebalancer Unit</b>	<ul style="list-style-type: none"> <li>• Installed adjacent to containers; total chemical volume: 12 m<sup>3</sup>.</li> <li>• Chemical breakdown for rebalancer: 5 m<sup>3</sup> HCl; 5 m<sup>3</sup> NaOH (50%); 2 m<sup>3</sup> Fe-Cr/HCl electrolyte.</li> </ul>
<b>Heating and cooling Unit</b>	<ul style="list-style-type: none"> <li>• Unit for maintaining the electrolyte at temperature.</li> <li>• Euroklima/Sanhe Tongfei Refrigeration Co. Ltd, ECA-50HR-01CSZ3-1237C.</li> <li>• Ancillary consumption: Maximum 120 kW (only during the heating phase).</li> </ul>
<b>PCS</b>	<ul style="list-style-type: none"> <li>• Inverter system for connecting the battery to the power grid.</li> <li>• WindSun FGPCS-440K/0.28.</li> </ul>
<b>Voltage Cabling</b>	<ul style="list-style-type: none"> <li>• 400 V cables will be installed underground, with cable racking used where technically feasible, to connect the BESS to the Eskom junction box.</li> </ul>
<b>Internal Road</b>	<ul style="list-style-type: none"> <li>• An access road will be constructed to the BESS facility for both the construction and operational phases. The road will be approx. 135 m in length and 4 m wide, with a footprint of approx. 540 m<sup>2</sup>.</li> </ul>
<b>Construction Laydown Area</b>	<ul style="list-style-type: none"> <li>• A temporary laydown area of approximately 100 m<sup>2</sup> will be required for construction.</li> </ul>

<b>Operations and Maintenance Facility</b>	<ul style="list-style-type: none"> <li>An operations and maintenance container for the storage of safety equipment and day cleaning equipment will be required, with a footprint of approximately 36 m<sup>2</sup>.</li> </ul>
<b>Fencing</b>	<ul style="list-style-type: none"> <li>Fencing will be installed around the entire BESS facility, including the access road, to restrict unauthorised entry.</li> </ul>



**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 1-3 below:

**Table 1-3 Construction activities**

Activity	Description
<b>Establishment of a construction road</b>	A short internal construction road will be required for the proposed site development. This road will provide access to the BESS facility.
<b>Site preparation and establishment</b>	Site establishment will include vegetation clearing, any required bulk earthworks, and the installation of access control fencing.
<b>Establishment of a laydown area on site</b>	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.
<b>Transport of components and equipment to site</b>	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 (Act No. 93 of 1996). In such cases, the necessary permits will be obtained for the transportation of these loads on public roads.
<b>Installation of battery system and cables</b>	<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 300 mm 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>
<b>Rehabilitation</b>	Once all construction is completed on site and all equipment and machinery has 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 1-3

### **1.3 Scope of Work**

In accordance with GN 320 of 20 March 2020 setting out 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 site sensitivity verification.

The outcome of this site sensitivity verification 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**

A field survey for the area was undertaken on 18 May 2026, to determine the soil resources presence, land capability and land potential of the project area. A CV and specialist declaration are provided in the appendices 7.2 and 7.3, respectively. A verification report has been prepared in accordance with the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Agriculture (GN 320, dated 20 March 2020).

## **2.1 Assumptions and Limitations**

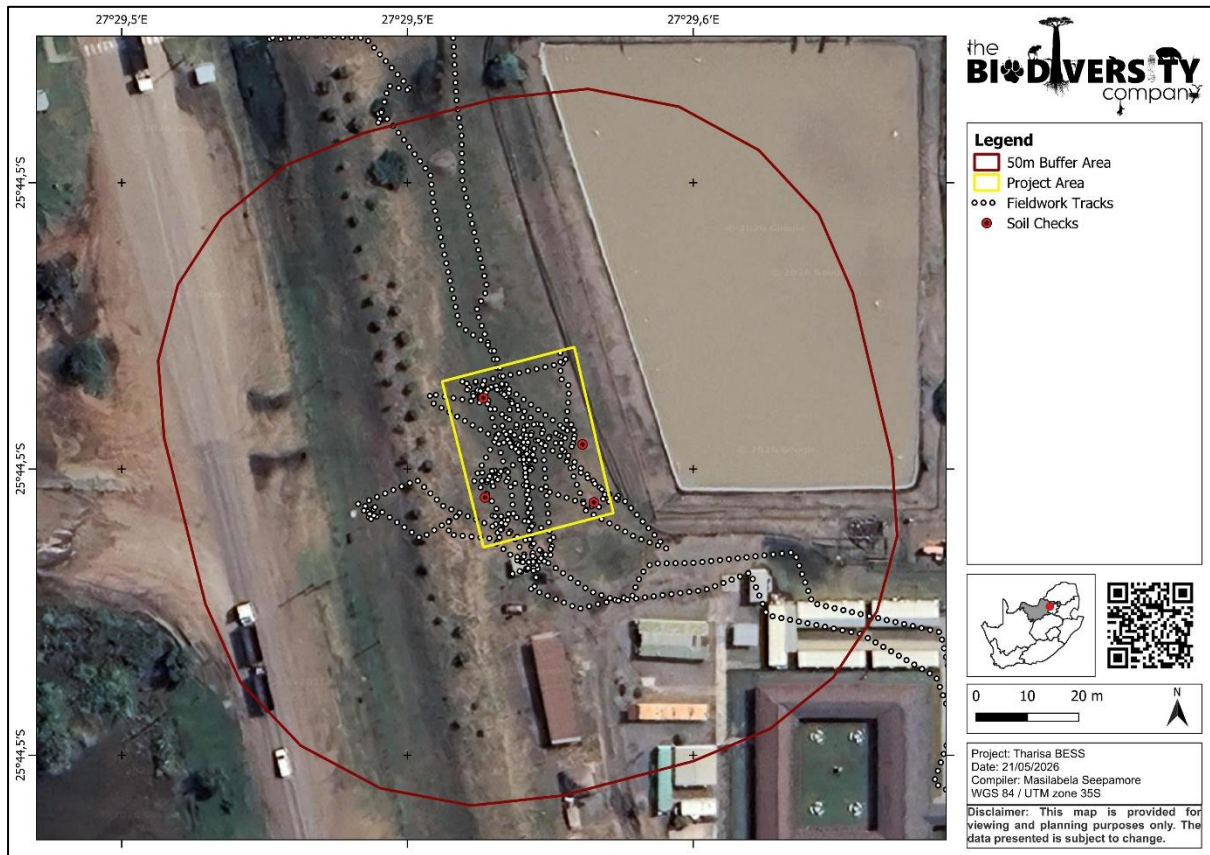
The following is applicable:

- The information contained in this report is based on previously surveyed desktop data and verified observations on site. There may be variations in terms of the delineation of the soil forms across the area; and
- The Global Positioning System (GPS) used for delineations is accurate to within five meters. Therefore, the delineation plotted digitally may be offset by at least five meters to either side.

### 3 Results & Discussion

#### 3.1 Fieldwork

Field work tracks to determine the soil forms and current land uses within the project area are illustrated in Figure 3-1. Seasonality has no bearing on the soil assessment, and the fieldwork is therefore deemed sufficient for the proposed development.





**Figure 3-1** Map illustrating the field work tracks for the proposed project area

### 3.2 Survey Sites

Four spatially represented sites are presented Table 3-1 below.

**Table 3-1** *Four spatially represented survey sites.*

Survey Point	Description	Photographs
Site GPS Reference: Point 1 Date: 18/05/2026 GPS Coordinates: 25°44'28.95"S 27°29'33.48"E	Vertic 40cm, Hard Rock +40cm.	
Site GPS Reference: Point 2 Date: 18/05/2026 GPS Coordinates: 25°44'29.25"S 27°29'34.10"E	Veric 5cm, Hardrock 5cm.	

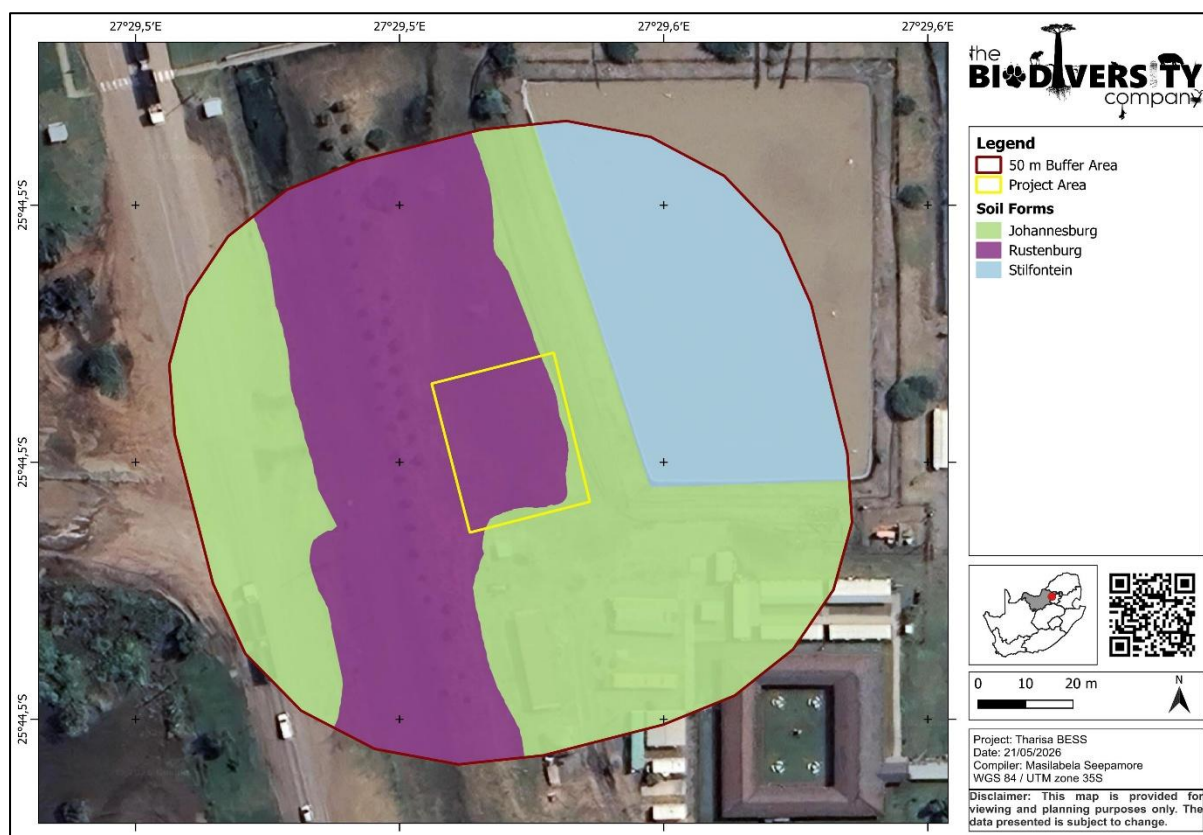
Survey Point	Description	Photographs
Site GPS Reference: Point 3 Date: 18/05/2026 GPS Coordinates: 25°44'29.58"S 27°29'33.49"E	Vertic 60cm, Hard rock +60cm.	
Site GPS Reference: Point 4 Date: 18/05/2026 GPS Coordinates: 25°44'29.61"S 27°29'34.17"E	Johannesburg urban Technosols.	

### 3.3 Description of Soil Forms and Soil Families

During the site assessment, various soil forms were identified (see Table 3-2 below). These soil forms are described in accordance to depth, clay percentage, indications of surface crusting, signs of wetness and percentage rock. The soil forms are followed by the soil family, and in brackets, the maximum clay percentage of the topsoil. Soil family characteristics are described in Table 3-2 below. Furthermore, different soil forms identified within the proposed project area and dominant land uses are illustrated in Figure 3-2, and Figure 3-3 respectively.

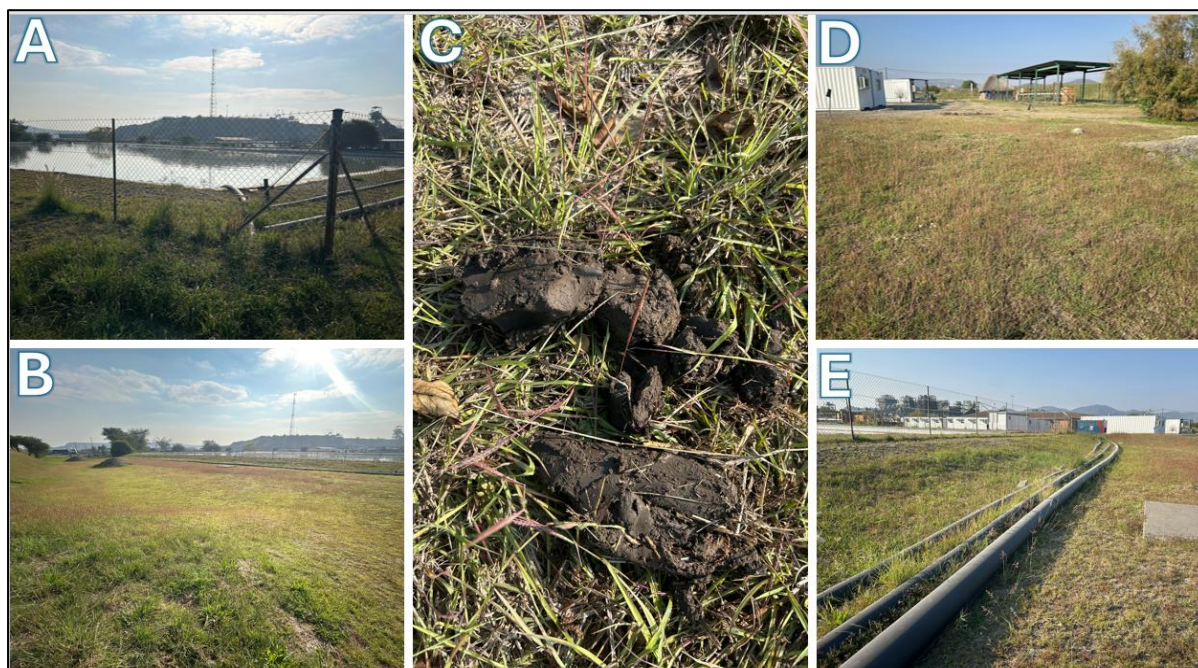
**Table 3-2 Summary of soils identified within the project area**

Diagnostic Horizon	Soil Forms			
		Rustenburg 1220 (35)	Johannesburg 2000 (0-15) <sup>1</sup>	Stilfontein 1200 (0-15)
Topsoil	Depth (mm)	0-600	0-50	+800
	Clay (%)	30-35	-	30-35
	Signs of Wetness	-	-	Mottles, Bleached
	Rock (%)	0	-	-
	Surface crusting	None	Present	-
Subsoil B1	Depth (mm)	+600	+50	+800
	Clay (%)	0-15	-	30-35
	Signs of Wetness	None	-	Mottles, Bleached
	Rock (%)	+50	-	-
Subsoil B2	Depth (mm)	-	-	-
	Clay (%)	-	-	-
	Signs of Wetness	-	-	-
	Rock (%)	-	-	-



**Figure 3-2 Dominant soil forms distribution identified in the project area during the site assessment**

<sup>1</sup> Soil morphological properties of anthrosols or technosols (i.e. Johannesburg or Stilfontein soils are limited in their description due to physical disturbances which alters their natural inherent properties).



**Figure 3-3** *Diagnostic horizon of dominant soils identified within the proposed project area and different land uses; A) Artificial dam; B) Common vegetation; C) Vertic topsoil horizon; D) & F) Infrastructure within the project area.*

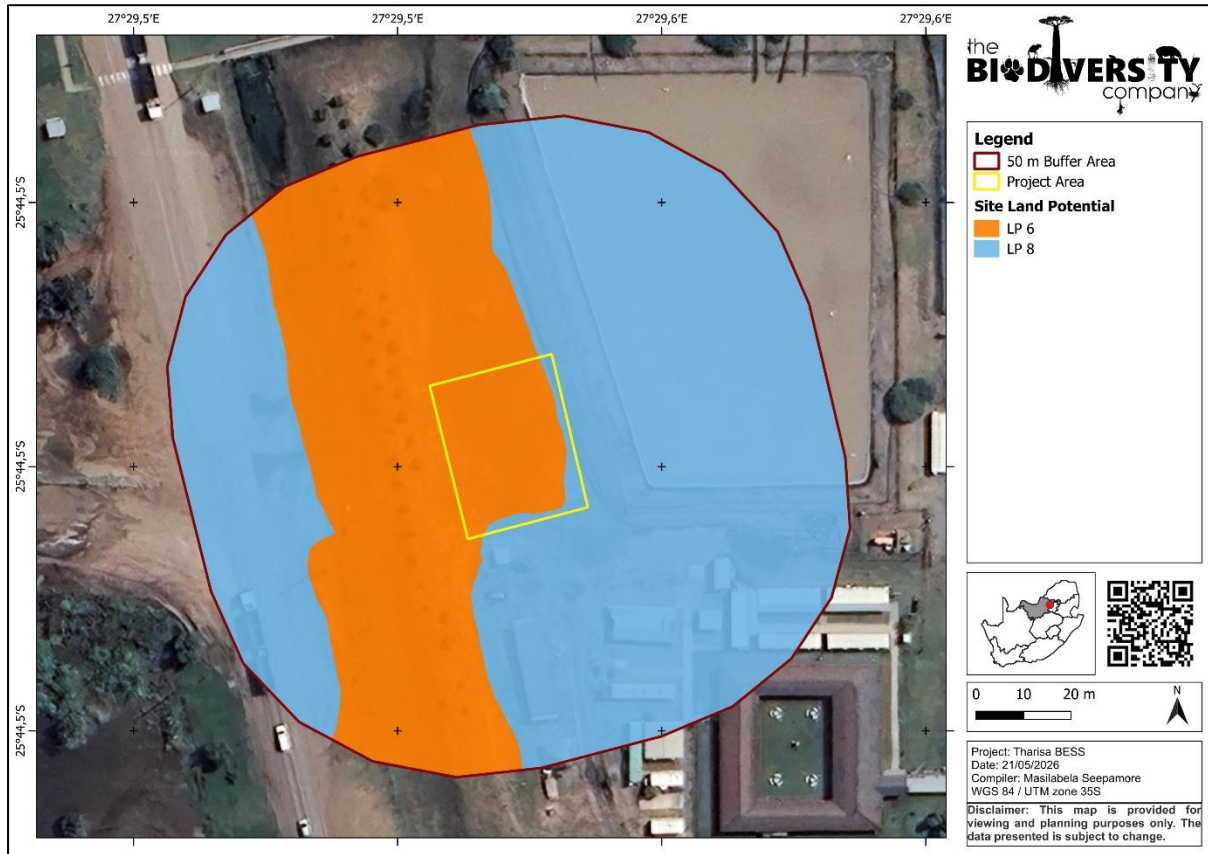
### 3.4 Agricultural Potential

Agricultural potential is determined by a combination of soil, terrain, and climate features. Land capability classes reflect the most intensive long-term use of land under rain-fed conditions.

The land capability is determined by the physical features of the landscape including the soils present. The land potential or agricultural potential is determined by combining the land capability results and the climate capability for the region (Appendix A – Methodology). Following the identified soil forms, climate class (C8) and land capability (“III” and “VIII”), the project area is characterised by LP 6, and LP 8.

**Table 3-3** *Land potential for the soils within the project area (Guy and Smith, 1998)*

Soil Form	Land Potential	Description of Land Potential Class	Sensitivity
Rustenburg	6	<b>Very Restricted potential.</b> Regular and/or severe limitations due to soil, slope, temperature, or rainfall. Non-arable.	Low
Stilfontein and Johannesburg	8	<b>Very low potential.</b> Very severe limitations due to soil, slope, temperature, or rainfall. Non-arable.	Low



**Figure 3-4** Land Potential within the 50 m Buffer area

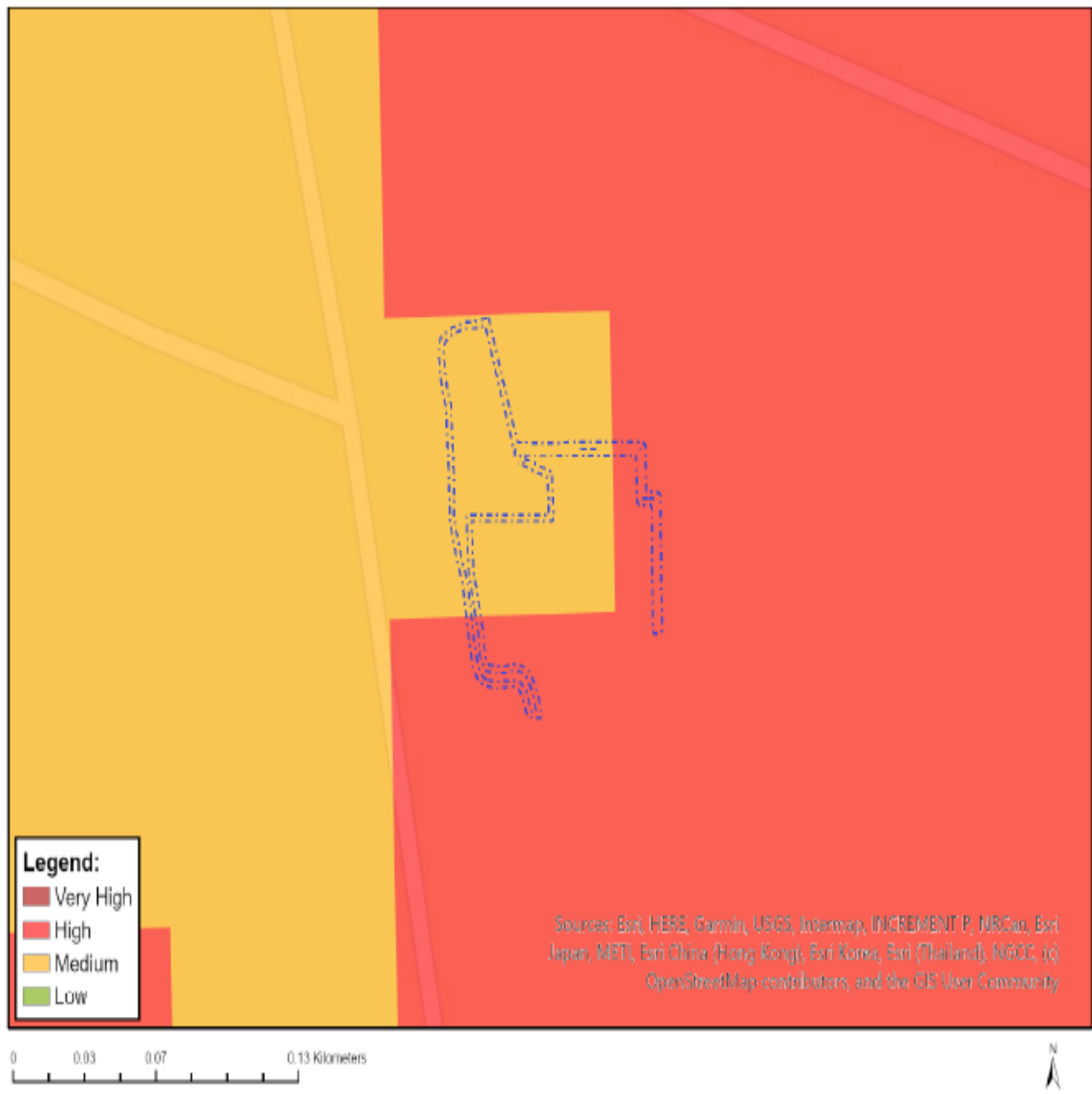
### 3.5 Desktop Agricultural Sensitivity

#### 3.5.1 Screening Report

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

- Agriculture Theme Sensitivity indicates that the 50 m buffer of the proposed project area falls within the “Medium” to “High” agricultural sensitivity (Figure 3-5).

### MAP OF RELATIVE AGRICULTURE THEME SENSITIVITY



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
	X		

**Sensitivity Features:**

Sensitivity	Feature(s)
High	08. Moderate
Medium	07. Low-Moderate

**Figure 3-5 Agricultural Theme Sensitivity**

Fifteen land capabilities have been digitised by (DAFF, 2017) across South Africa, of which two (2) potential land capability classes are located within the assessment area, including;

- Land Capability 7 to 8 (Low-Moderate Sensitivity);

The land capability dataset (DAFF, 2017) indicates that the proposed project area falls predominately within the “Low Moderate” sensitivity with marginal areas with “Moderate” sensitivity (see Figure 3-5). No highly sensitive field crop boundaries were identified within the 50 m buffer area of the proposed project area and associated infrastructure for the project using the agricultural theme tool (DFFE, 2026). Therefore, there is no segregation of high cropping areas within the proposed project.

The baseline soil findings, current land uses, and the calculated land potential disputes the agricultural theme tool, in all areas demarcated with “Low Moderate to Moderate” land capability sensitivities to “Low” sensitivity. These areas are marginalised for cropping practices; they are suitable for grazing purposes. No irrigation infrastructure was found in the project area for cropping practices such as centre pivot, drip irrigation or canals for flood irrigation. Areas, which used to have cropping practices are now historical under mining infrastructure uses and some marginal grazing practices.

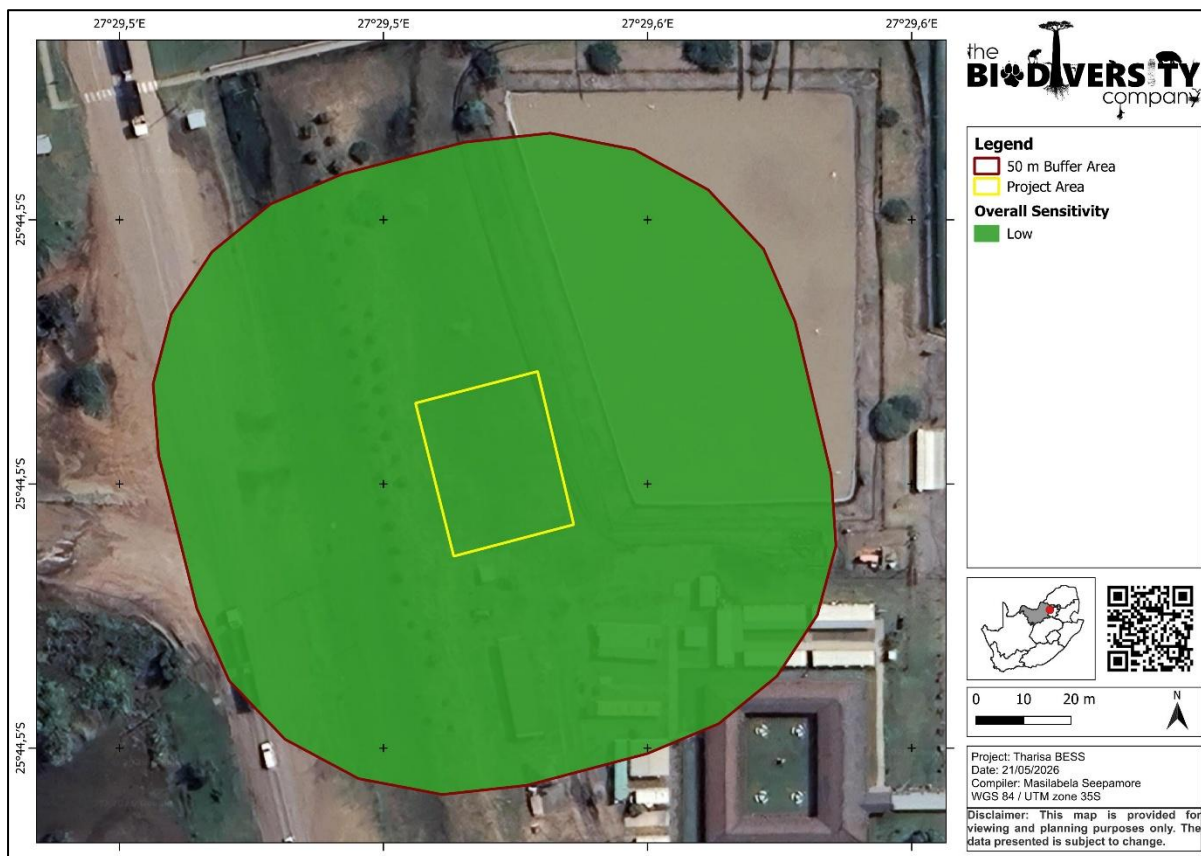
The current project area and associated activities to the proposed project, will have acceptable expected changes to soil resources. As a result, based on the verified baseline findings, the proposed development will have a minimal impact on the soil resources.

### 3.5.2 Screening Tool Comparison

The allocated sensitivities for each of the relevant theme are either disputed or validated for the assessed areas in Table 3-4 below. A summative explanation for each result is provided as relevant. The specialist-assigned sensitivity ratings are based largely on the agricultural land capability and potential of land resources followed in the previous section 3.4, and consideration is given to any observed active agricultural practices (see Figure 3-6).

**Table 3-4 Summary of the screening tool vs specialist assigned sensitivities**

Screening Tool Theme	Feature	Screening Tool	Specialist Finding	Tool Validated or Disputed by Specialist - Reasoning
Agriculture Theme	Moderate (LC 8)	High	Low	Disputed – Land Capability = Very Low to Low. The presence of low potential soil with high clay content which may impede drainage, aeration and root penetration such as Rustenburg soil form. Moreover, the presence of anthropogenic soil materials with very severe limitations to crop production such as Stilfontein and Johannesburg.
	Low-Moderate (LC 7)	Medium	Low	Disputed – Land Capability = Very Low to Low. The presence of low potential soil with high clay content which may impede drainage, aeration and root penetration such as Rustenburg soil form. Moreover, the presence of anthropogenic soil materials with very severe limitations to crop production such as Stilfontein and Johannesburg.



**Figure 3-6 Overall sensitivity of the project area**

## 4 Impact & Management Measures

### 4.1 Alternatives

No alternative sites were considered for the proposed BESS project construction.

### 4.2 Anticipated Impact Framework

An impact framework was considered for the impact assessment. The following list provides a framework for the identified major impacts associated with the project (Table 4-1).

**Table 4-1 Anticipated impacts for the proposed infrastructures within the project on agricultural resources**

Main Impact	Project activities that can cause loss/impacts to Soils	Secondary impacts anticipated
<b>Loss of land capability</b>	<ul style="list-style-type: none"> <li>• Construction, operation and decommissioning of BESS infrastructure, voltage cabling, internal roads, stormwater management and operation and maintenance facility, fencing;</li> <li>• Construction, operation and decommissioning of construction temporal camps and layout areas;</li> <li>• Potential leaks or spillage (i.e. hydrocarbons);</li> <li>• Mixing of soil;</li> <li>• Soil dust precipitation in bare surface or gravel access roads;</li> <li>• Dust precipitation; and</li> <li>• Removal of vegetation for the proposed support infrastructure</li> </ul>	<ul style="list-style-type: none"> <li>• Erosion;</li> <li>• Soil degradation;</li> <li>• Compaction;</li> <li>• Increase in salinity;</li> <li>• Land contamination; and</li> <li>• Loss of soil via aeolian processes.</li> </ul>

### 4.3 Impact Assessment

The following list provides the identified impacts which contributed to the loss of land capability:

- Soil erosion: Bare soil surfaces within the proposed project area and along the distributed areas contributed to increased susceptibility to wind and water erosion, leading to loss of topsoil;
- Soil compaction from increased vehicle traffic: The movement and operation of vehicles within the project footprint will result in increased soil compaction, which negatively affected soil structure and permeability;
- Soil contamination: Surface flow from dirty water channels, potential hydrocarbon spillages from the BESS or construction vehicle will lead to soil contamination, impacting soil health and productivity, and
- Soil compaction and degradation from the existing disturbance: The presence of existing stockpiles or excavated areas can cause further soil compaction and land degradation, disturbing soil structure and reducing overall soil quality.

Impacts were in terms of the construction phase, operational phase, and decommission phase. Mitigation measures were only applied to impacts deemed relevant. Mitigations are given as the pre-mitigation significance rating for construction, operation and decommissioning phases has been scored as post- mitigation significance rating being scored as “Low – Negative.” The following table provides the framework for the project impacts, albeit limited, for the proposed project (Table 4-2).

**Table 4-2 Summative results of the Impact Assessment conducted for the proposed project**

Nature of the Impact	Phase	Stage	Status		Extent	Probability	Reversibility	Irreplaceability	Duration	Cumulative Effect	Magnitude	Impact Significance	Can impact be mitigated?	Is the impact acceptable ?
Loss of land capability, soil erosion, soil compaction, Land degradation, fertility and Soil contamination	Construction	Pri	Negative	2	3	2	2	3	2	2	28	Low (6-28)	Yes	Yes
		Post	Negative	2	2	1	2	2	1	2	20	Low (6-28)		
	Operation	Pri	Negative	2	2	2	2	3	2	2	26	Low (6-28)		
		Post	Negative	1	2	2	1	2	2	1	10	Low (6-28)		
	Decommission and closure	Pri	Negative	2	3	2	2	2	2	2	26	Low (6-28)		
		Post	Negative	1	2	2	2	2	2	2	22	Low (6-28)		

#### 4.4 Management Measures

The assessment of impact significance considers pre-mitigation as well as implemented post-mitigation scenarios. Two phases were considered for the impact assessment, with the infrastructure assumed to be permanent (> 20 years) and decommissioning phase:

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

The aim of the management outcomes is to present the mitigation measures in such a way that can be incorporated into the Environmental Management Programme (EMPr) for the project, allowing for more successful implementation and auditing of the mitigations and monitoring guidelines. Table 4-3 presents the prescribed mitigation measures for construction phase for the assessment. On the other hand, Table 4-4 presents the prescribed mitigation measures for operational to decommissioning phase for the assessment.

**Table 4-3 The project management measures for the soils and agricultural resources during the construction phase**

Environmental Theme: Agriculture						
Impact Management Outcome: Protection of soil resources						
Phase: Construction						
Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
<b>Cleared areas must be rehabilitated and stabilised to avoid impacts to adjacent areas.</b>	Contractor/ Environmental Officer	Implement a rehabilitation plan	Construction Phase	Environmental Officer	Throughout the phase	Rehabilitation implemented
<b>Restrict the disturbance footprint and the clearing of vegetation for the authorised area only.</b>	Engineer/Contractor/ Environmental Officer	Design engineer to consider this for final layout	Construction Phase	Environmental Officer	Throughout the phase	Disturbance minimised
<b>Make use of existing access routes as much as possible before new routes are considered.</b>	Contractor	Design engineer to consider this for final layout	Construction Phase	Environmental Officer	Throughout the phase	All routes authorised
<b>Promptly remove all alien and invasive plant species (AIPs) that may emerge during construction (i.e., weedy annuals and other alien forbs) must be removed.</b>	Environmental Officer	Implement an alien vegetation management plan	Construction Phase	Environmental Officer	Throughout the phases	Implement alien vegetation management plan
<b>Limit soil disturbance outside the project development footprint and its associated infrastructure.</b>	Contractor/ Environmental Officer	Clear/disturb soil on a need basis only	Construction Phase	Environmental Officer	Throughout the phase	Soil disturbance is reduced
<b>Keep excavation and soil heaps neat and tidy.</b>	Contractor	Separate topsoil and sub-soil	Construction Phase	Environmental Officer	Throughout the phase	Soil heaps are managed
<b>Lightly till any disturbed soil around the development footprint to avoid compaction.</b>	Contractor/ Environmental Officer	Implement a rehabilitation plan	Construction Phase	Environmental Officer	Throughout the phase	Plan is implemented
<b>Ensure soil stockpiles sand are sufficiently safeguarded against rain wash.</b>	Contractor/ Environmental Officer	Implement soil management plan	Construction Phase	Environmental Officer	Throughout the phase	Plan is implemented
<b>Minimise unnecessary clearing of vegetation beyond the development footprints,</b>	Contractor/ Environmental Officer	Visibly demarcate authorised working areas	Construction Phase	Environmental Officer	Throughout the phase	Clearance is minimised

<b>The use of herbicides is not recommended (opt for mechanical removal).</b>	Contractor/ Environmental Officer	Demarcate buffer area	Construction Phase	Environmental Officer	Throughout the phase	Avoided buffer area
<b>Make sure all excess consumables or waste material are removed from site and deposited at an appropriate waste facility.</b>	Contractor/ Environmental Officer	Restrict to designated working/storage/service areas	Construction Phase	Environmental Officer	Throughout the phase	Restricted to demarcated area
<b>Appropriately contain any generator diesel storage tanks, machinery spills (e.g., accidental spills of hydrocarbons oils, diesel etc.) or construction materials on site (e.g., concrete) in such a way as to prevent them leaking.</b>	Contractor/ Environmental Officer	Restrict to designated working/storage/service areas	Construction Phase	Environmental Officer	Throughout the phase	Restricted to demarcated area
<b>Provide appropriate sanitation facilities for workers during construction and service them regularly.</b>	Contractor	Provide service ablution for contractors/labour	Construction Phase	Environmental Officer	Throughout the phase	Ablution facilities provided and serviced
<b>The Contractor should supply sealable and properly marked domestic waste collection bins and all solid waste collected must be disposed of at a licensed disposal facility.</b>	Contractor	Implement waste management plan	Construction Phase	Environmental Officer	Throughout the phase	Plan is implemented
<b>The Contractor must be in possession of an emergency spill kit that must be complete and available at all times on site.</b>	Contractor	Implement spill response plan	Construction Phase	Environmental Officer	Throughout the phase	Plan is implemented
<b>Any possible contamination of topsoil by hydrocarbons must be avoided. Any contaminated soil must be treated in situ or be placed in containers and removed from the site for disposal in a licensed facility.</b>	Contractor	Implement spill response plan	Construction Phase	Environmental Officer	Throughout the phase	Plan is implemented

**Table 4-4 The project management measures for the soils and agricultural resources during the operational phase**

Environmental Theme: Agriculture						
Impact Management Outcome: Protection of soil resources						
Phase: Operational						
Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
Monitor signs of erosion and chemical spills on site.	Environmental Officer	Implement an alien vegetation management plan	Operational Phase	Environmental Officer	Throughout the phases	Implement soil management plan

**Table 4-5 The project management measures for the soils and agricultural resources during the operational phase**

Environmental Theme: Agriculture						
Impact Management Outcome: Protection of soil resources						
Phase: Operational						
Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
Maintain erosion and sediment controls until vegetation is re-established	Environmental Officer	Implement an alien vegetation management plan	Operational Phase	Environmental Officer	Throughout the phases	Implement soil management plan
Decompact soils in areas affected by heavy machinery (use subsoiling or deep ripping).	Contractor/ Environmental Officer	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
Ensure successful rehabilitation of areas disturbed during construction to operation and these areas are stabilised to avoid impacts to adjacent areas.	Contractor/ Environmental Officer	Implement spill rehabilitation plan	Operational Phase	Environmental Officer	Quarterly during first two years of operation.	Plan is implemented
Remove all construction debris and waste from the site.	Environmental Officer	Implement an alien vegetation management plan	Operational Phase	Environmental Officer	Throughout the phases	Implement soil management plan

#### 4.5 Cumulative Impacts

The “Norm” requires the consideration of cumulative effects for each theme as well as the acceptability of the cumulative effect.

The term "Cumulative Effect" has for the purpose of this report, been defined as: the summation of effects over time which can be attributed to the operation of the project itself, and the overall effects on the ecosystem of the site that can be attributed to the project and other existing and planned future projects.

The geographic area of evaluation is the spatial boundary in which the cumulative effects analysis was undertaken. The spatial boundary evaluated in these cumulative effects analysis generally includes the area within a 30 km radius surrounding the proposed development. Refer to Figure 4-1.

A temporal boundary is the timeframe during which the cumulative effects are reasonably expected to occur. The temporal parameters for these cumulative effects analysis is the anticipated lifespan of the proposed project, beginning in 2026 and extending out at least 20 years, which is the minimum expected project life of the proposed project. Where appropriate, particular focus is on near-term cumulative impacts of overlapping construction schedules for proposed projects in the area of evaluation.

The quantitative impact of the proposed project in isolation on soil resources, land capability and agriculture use is anticipated to be “Low” due to the absence of highly sensitive areas (Table 4-6). The cumulative impact of the proposed project within a 30 km radius considering other similar renewable projects is anticipated to be “Medium” pre-mitigation and “Low” post-mitigation. The project area has undergone historic and current modifications due to human activities.

After implementation of the mitigation measures as stipulated above, the agricultural productivity of the area is not expected to deteriorate further because of the proposed development, and no irreplaceable loss of resources is anticipated.

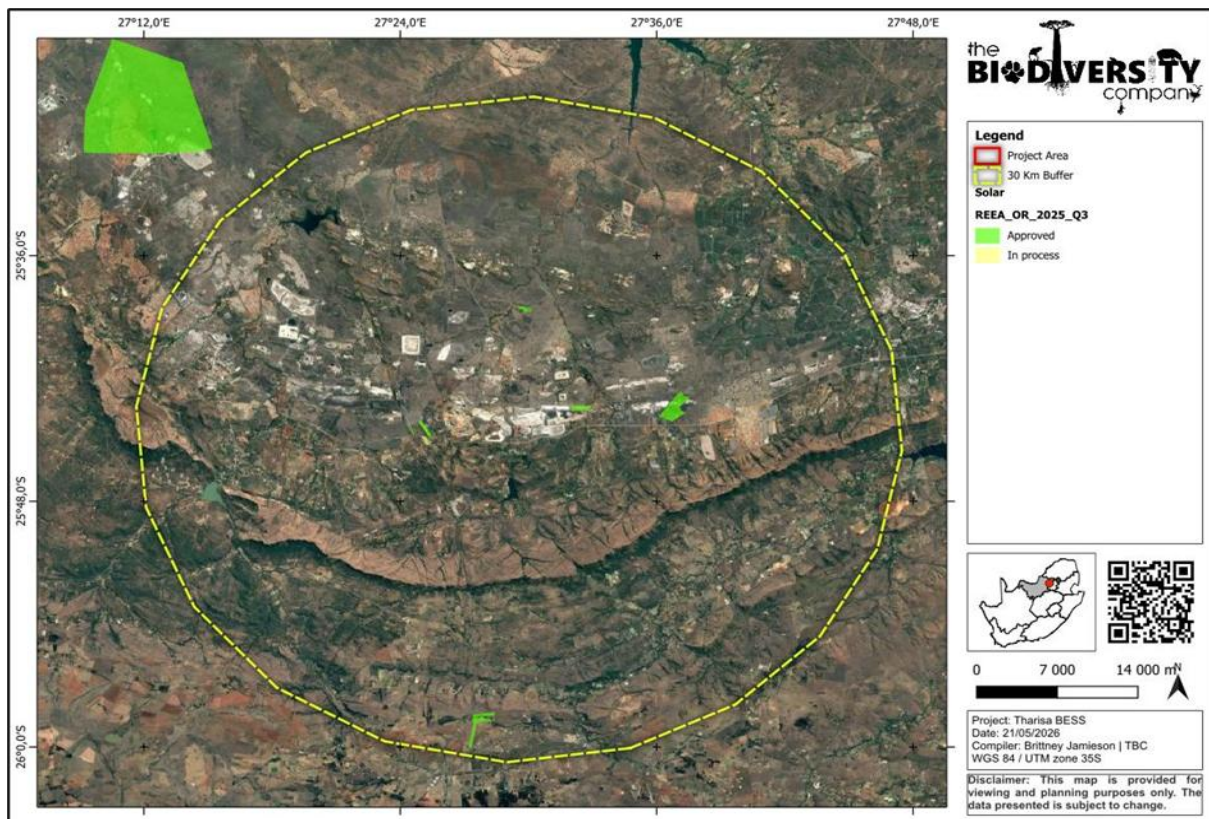


Figure 4-1 Cumulative impacts

**Table 4-6 Cumulative Impacts associated with the proposed project**

	Status		Extent	Probability	Reversibility	Irreplaceability	Duration	Cumulative Effect	Magnitude	Impact Significance	Impact Rating	Is the impact acceptable?
<b>Pre-mitigation</b>	Impact in isolation	Negative	2	2	2	2	2	2	2	24	Low (6-28)	Yes
<b>Post mitigation</b>	Impact in isolation	Negative	1	2	1	2	2	1	1	9	Low (6-28)	
<b>Pre-mitigation</b>	Cumulative impact	Negative	2	3	3	3	2	3	3	48	Medium (29-50)	
<b>Post mitigation</b>	Cumulative impact	Negative	2	2	2	2	3	1	2	26	Low (6-28)	

## 5 Conclusion

The results indicate a predominantly “Low” land capability sensitivity in areas dominated with Rustenburg, Stilfontein and Johannesburg soil forms within the proposed BESS Development area. The project has a predominantly “Low” agricultural sensitivity. Furthermore, there are no active crop fields and the presence of irrigation infrastructure within the proposed BESS Development area. The project area has natural veld areas, including area associated to mining activities infrastructure and roads.

The verified baseline findings, current land uses, and the calculated land capability disputes all areas which were identified as “Medium to High” with the agricultural theme to “Low” sensitivity. The proposed BESS project coincides with areas with low land capability.

It is the specialist’s opinion that the proposed Tharisa BESS project, and the associated infrastructure will have an overall low residual impact on the agricultural production ability of the land. The proposed project and associate infrastructure may be favourably considered for development through the Norms exclusion, provided mitigation measures are implemented.

### 5.1 Developable Areas

The project area can be developed overall for the proposed project layout. The sensitivities of these identified soils are predominately Low which will have acceptable impacts on soil resources (Figure 5-1). Therefore, it is the opinion of the specialist that the proposed project can be favourably considered for Norms exclusion authorization.



**Figure 5-1**      *Developable areas for the project.*

## 6 References

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## 7 Appendix Items

### 7.1 Appendix A – Methodology

#### 7.1.1 Climate

The climatic capability has been determined by means of the Smith (2006) methodology, of which the first step includes determining the climate capability of the region by means of the Mean Annual Precipitation (MAP) and annual Class A pan (potential evaporation). The climatic capability (i.e. Gold Reef Mountain Bushveld and Moot Plains Bushveld, MAP 666 and 636mm and MAPE of 2267 and 23732 mm with a pan Class of 0.29 and 0.28, respectively) has been determined to be “C8” for the project area.

#### 7.1.2 Land Capability

The land capability was determined by using the guidelines described in “The farming handbook” (Smith, 2006). Accordingly, the identified soil forms associated with the project area are restricted to land capability “III” and “VIII” classes.

**Table 7-1 Land capability for the soils within the project area**

Land Capability Class	Definition of Class	Conservation Need	Use-Suitability	Land Capability Group	Sensitivity
III	Moderate limitations with some erosion hazard.	Special conservation practice and tillage methods	Rotation of crops and ley (50%)	Arable	Medium
VIII	Extremely severe limitations. Not suitable for grazing or afforestation	Total protection from agriculture	Wildlife	Non-Arable	Low

#### 7.1.3 Land Potential

The methodology in regard to the calculations of the relevant land potential levels are illustrated in Table 7-2. From the two land capability classes, the land potential levels have been determined by means of the Guy and Smith (1998) methodology. Land capability class “III” has been reduced to land potential 6, and Land Capability class “VIII” to land potential 8, due to climatic limitations (see Table 7-2).

**Table 7-2 Land potential from climate capability vs land capability (Guy and Smith, 1998)**

Land Capability Class	Climatic Capability Class							
	C1	C2	C3	C4	C5	C6	C7	C8
LC1	L1	L1	L2	L2	L3	L3	L4	L4
LC2	L1	L2	L2	L3	L3	L4	L4	L5
LC3	L2	L2	L2	L2	L4	L4	L5	L6*
LC4	L2	L3	L3	L4	L4	L5	L5	L6
LC5	Vlei	Vlei	Vlei	Vlei	Vlei	Vlei	Vlei	Vlei
LC6	L4	L4	L5	L5	L5	L6	L6	L7
LC7	L5	L5	L6	L6	L7	L7	L7	L8
LC8	L6	L6	L7	L7	L8	L8	L8	L8*

\*Land potential level applicable to climatic and land capability

## 7.2 Appendix B – Specialist Declaration of Independence

I, Masilabela Seepamore, 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 48 and is punishable in terms of Section 24F of the Act.



Masilabela Seepamore

Soil and Agricultural Scientist


The Biodiversity Company

May 2026

### 7.3 Appendix C – Specialist CV

# Masilabela Seepamore

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#### PROFILE SUMMARY

Soil and Agricultural specialist with ~ 3 years' consulting experience. Specialist experience in project exploration, mining, engineering, hydropower, renewable energy, and private sector developments. Project management of national I multi-disciplinary projects. Provides specialist guidance, technical support, and facilitation 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: 08 June 1988

#### EXPERIENCE


Environmental Impact Assessment (EIA)  
Environmental Management Programmes (EMP)  
Rehabilitation Plans  
Agricultural potential assessments  
Soil taxonomy classification (SA form)

#### SKILLS

- ✓ Soil Classification
- ✓ Project Management
- ✓ Soil & Crop Management
- ✓ Monitoring & Management Plans

#### LANGUAGES

English – Proficient  
Afrikaans & IsiZulu – Conversational  
Tswana, Sesotho, Sepedi - Proficient



Signed: Masilabela Seepamore

#### ACADEMIC QUALIFICATIONS

**FERTALIZER ASSOCIATION OF SOUTHERN AFRICA (FERTASA) (2021)** – Fertilizer Advisory Certificate & Training Scheme (FACTS)

**University of the Free State (2019):** MAGISTER SCIENTIAE (MSc) *Cum Laude* – Soil Science:  
**Title:** *Impact of long-term production management practices on wheat grain yield under a semi-arid climate.*

**University of the Free State (2015):** BACCALAUREUS SCIENTIAE AGRICULTURAE Honores (Hons) – Soil Science.

**University of the Free State (2013):** BACCALAUREUS SCIENTIAE AGRICULTURAE. Majors: Agronomy & Soil Science.

#### PROFESSIONAL EXPERIENCE

Sep 2023 – Present	<b>The Biodiversity Company</b> Soil Ecologist
Nov 2022 – Aug 2023	<b>ARC-NRE</b> Intern
Mar 2021 – Sep 2021	<b>Central University of Technology</b> Lecturer (Part-Time)
July 2016 – Dec 2018	<b>University of the Free State</b> Research Assistant

#### INTERNATIONAL EXPERIENCE

South Africa