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SITE SENSITIVITY VERIFICATION REPORT (SSVR) FOR THE PROPOSED THARISA BATTERY ENERGY STORAGE SYSTEM (BESS) DEVELOPMENT

MANYABE CONSULTANCY (PTY) LTD PROJECT CODE: 202615

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Date: 26 June 2026

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APPENDICES

BBBEE	Broad Based Black Economic Empowerment
BESS	Battery Energy Storage System
CA	Competent Authority
CV	Curriculum Vitae
CRR	Comments and Responses Report
DAFF	Department of Agriculture, Forestry and Fisheries
DFFE	Department of Forestry, Fisheries and the Environment
DPM	Diesel Particulate Matter
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
EAPASA	Environmental Assessment Practitioners Association of South Africa
EIA	Environmental Impact Assessment
ESA	Ecological Support Areas
EMPr	Environmental Management Programme
EN	Endangered
FeCl ₂	Ferrous chloride
FeCl ₃	Ferric chloride
Fe Cr	Iron Chromium
GDEnv	Gauteng Department of Environment
GN	Government Notice
HCl	Hydrochloric acid
HIA	Heritage Impact Assessment
IBCs	Intermediate Bulk Containers
I&APs	Interested and Affected Parties
km	kilometres
kWh	kilowatt
MC	Manyabe Consultancy (Pty) Ltd
MEC	Member of the Executive Committee
NaOH	Sodium Hydroxide
NEMA	National Environmental Management Act, 1998 (Act No. 107 of 1998)
NHRA	National Heritage Resources Act, 1999 (Act No. 25 of 1999)
NRS	National Rationalised Specifications
NRTA	National Road Traffic Act, 1996 (Act No. 93 of 1996)
NWDARD	North West Department of Agriculture and Rural Development
PAOI	Project Area of Influence
PCD	Pollution Control Dam
PIAs	Palaeontological Impact Assessments
PPM	Parts Per Million
PPP	Public Participation Process
PV	photovoltaic
SACNASP	South African Council for Natural Scientific Professions
SAHRA	South African Heritage Resources Agency
SAHRIS	South African Heritage Resources Information System
SANS	South African National Standards
SCC	Species of Conservation Concern
SEI	Site Ecological Importance
TUT	Tshwane University of Technology
UNISA	University of South Africa
VAC	Visual Absorption Capacity
WBPA	Waterberg Bojanala Priority Area
WRD	Waste Rock Dump

DOCUMENT HISTORY

Revision	Date	Compiled By	Comments
01	23 June 2026	Mpho Manyabe	Initial draft for commenting by the client
02	24 June 2026	Mpho Manyabe	Draft for commenting by I&APs

APPROVAL FOR RELEASE

Name	Title	Signature
Ms. Mpho Manyabe	Manyabe Consultancy: Managing Director and EAP Company	

DECLARATION BY THE ENVIRONMENTAL ASSESSMENT PRACTITIONER

I **Mpho Manyabe**, declare that -

- I act as the independent Environmental Assessment Practitioner (EAP) in this registration process, in support of the Norm for Exclusion for the proposed Tharisa Battery Energy Storage System (BESS) Development, situated in the Rustenburg Local Municipality, Bojanala Platinum District Municipality (BDM), Northwest Province.
- I will perform the work relating to the registration process 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 registration processes, including knowledge of the relevant Acts, Regulations, Norms and any guidelines that have relevance to the proposed activity.
- I will comply with the Norms, Act, Regulations and all other applicable legislation, policies and guidelines.
- 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 registration process by the competent authority; and the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority.
- I will ensure that information containing all relevant facts in respect of the registration process is distributed or made available to the Interested and Affected Parties (I&APs) and the public at large and that participation by I&APs is facilitated in such a manner that all I&APs, state department and the competent authority will be provided with a reasonable opportunity to participate and to provide comments on documents that are produced to support the registration process.
- I will ensure that the comments from all I&APs are considered and recorded in reports that are submitted to the competent authority in respect of the registration process, provided that comments that are made by I&APs in respect of a final report that will be submitted to the competent authority may be attached to the report without further amendment to the report.
- I will keep a register of all I&APs that participated in a Public Participation Process (PPP); and all the particulars furnished by me in this registration form are true and correct.
- I will perform all other obligations as expected from an EAP in terms of the Norms and the Regulations.



Signature of the EAP

Date: 26 June 2026

EAP Company: Manyabe Consultancy (Pty) Ltd

ABOUT THE ENVIRONMENTAL ASSESSMENT PRACTITIONER

Manyabe Consultancy (Pty) Ltd (MC) is a 100% black female owned entity which offers sustainable development solutions to both public and private sectors, including parastatals. The company was founded in 2014 by the Managing Director, Mpho Manyabe. MC seeks to maintain its strategic position in the Environmental Management Services sector by providing service of excellence to its clients. This is achieved by providing: a professional and efficient service; the highest possible level of customer care; the highest ethical and moral principles in our actions, words and thoughts; and the highest possible level of integrity.

The objective of MC is to create an environment in which enthusiastic, highly skilled and motivated professionals seek professional opinions for contribution to the environmental, social and economic development in South Africa. MC currently has a turnover of less than R10 million rand and is a Level 1 contributor with 135% Broad Based Black Economic Empowerment (BBBEE) procurement.

Mpho Manyabe: BSc Honours in Environmental Management, University of South Africa (UNISA), 2016; National Diploma Environmental Sciences, Tshwane University of Technology (TUT), 2008

Mpho Manyabe currently holds a BSc Honours Degree in Environmental Management from UNISA; and National Diploma in Environmental Sciences, from TUT. She has eighteen (18) years of work experience in the field of Environmental Management from different consulting companies.

She was previously nominated to be in the Gauteng Department of Environment (GDEnv) Environmental Impact Assessment (EIA) Environmental Assessment Practitioner (EAP) committee which was launched on 31 March 2015 comprising of EAPs and GDEnv officials to provide quarterly reports to the Executive Authority (Member of the Executive Committee (MEC)) on issues identified as blockages to the improved efficiencies the department seeks to achieve.

She was also a member of the Academic Advisory Committee for the Environmental Science programme in the Department of Environmental, Water and Earth Sciences in the Faculty of Science at the TUT, to serve for a period of three (3) years, where she assisted with preparation and provision of relevant, high quality teaching and learning content for students. She was identified based on her expertise in the field of Environmental Sciences/ Management to make a positive contribution to what TUT was offering students in terms of course content and on how to better run programs to the benefit of students. She is registered with South African Council for Natural Scientific Professions (SACNASP) as a Professional Natural Scientist, and she is also a registered EAP with the Environmental Assessment Practitioners Association of South Africa (EAPASA).

She is the Lead EAP on the project.

Refer to Appendix 1 for the EAP's Curriculum Vitae (CV).

SECTION 1: PROJECT INTRODUCTION AND BACKGROUND

1-1 INTRODUCTION

Tharisa Minerals (Pty) Ltd (hereunder referred to as Tharisa), 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 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 Development 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.

Manyabe Consultancy (Pty) Ltd (MC) has been appointed as an Independent Environmental Assessment Practitioner (EAP), to undertake the registration process on behalf of Tharisa. In terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) as amended (NEMA), and the adopted 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 which allows for the exclusion from the requirement to obtain an Environmental Authorisation (EA) from the competent authority for listed and specified activities identified in Paragraph 3 of the Norm, in terms of Government Notice (GN). 4557, published in Gazette No. 50387, 27 March 2024, Tharisa intends to submit registration for exclusion from the requirement to obtain an EA for the proposed Tharisa BESS Development.

1-2 BACKGROUND

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 (Pty) Ltd (hereunder referred to as 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 RFB 625 BESS, enabling a micro grid 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 Site Description

The proposed BESS Development will be located within the Tharisa Mine which is situated in both the Rustenburg Local Municipality and the Madibeng Local Municipality, forming part of the Bojanala Platinum District Municipality, North West Province. It must however be noted that the BESS Development footprint will be within the Rustenburg Local Municipality.

The site where the installation will be undertaken is positioned on Portion 317 of Farm K/Kraal 342 JQ, which is owned by Tharisa. The BESS Development will be deployed on the north western side of the Administration and Training Centre facilities, entirely within the existing mine boundary, on previously modified/disturbed land, thereby minimising and/or avoiding additional land transformation.

1-2.2 Energy Requirements

The combined daily energy demand for the Administration and Training Centre facilities is 920 kilowatt per hour (kWh) over a 24-hour cycle. The BESS Development is intended to meet this demand by storing excess solar

energy generated from the solar PV panels, during daytime hours, for use during morning and evening peak load periods at the Admin and Training Centre facilities.

1-3 PROJECT LOCALITY

The mining operation is located on the Farms K/Kraal 342 JQ, Rooikoppies 297 JQ and Elandsdrift 467 JQ, approximately 95 kilometres (km) north-west of Johannesburg and 35 km east of Rustenburg, accessible via the R104 regional road just off the N4 toll road. The proposed BESS Development will be located on Portion 317 of Farm K/Kraal 342 JQ (refer to Figure 1 for the Locality Map). The details of the site are as provided in Table 1 below.

Table 1: Details of the Project Site

Farm Name (s)	Portion 317 of Farm K/Kraal 342 JQ (refer to Figure 1 for the Locality Map).
21 digit Surveyor General Code	T0JQ0000000034200317
Application Footprint Area (Ha)	The total development footprint is approximately 1 200 m ²
Farm Owner	Tharisa Minerals (Pty) Ltd
Province	North West
District Municipality	Bojanala Platinum District Municipality
Local Municipality	Rustenburg Local Municipality
Distance and direction from nearest town (s)	Tharisa mine is located approximately 4 km to the south of Marikana Town, in the North West Province
Facility Co-ordinates (approximate centre point)	25°44'29.21"S 27°29'33.78"E

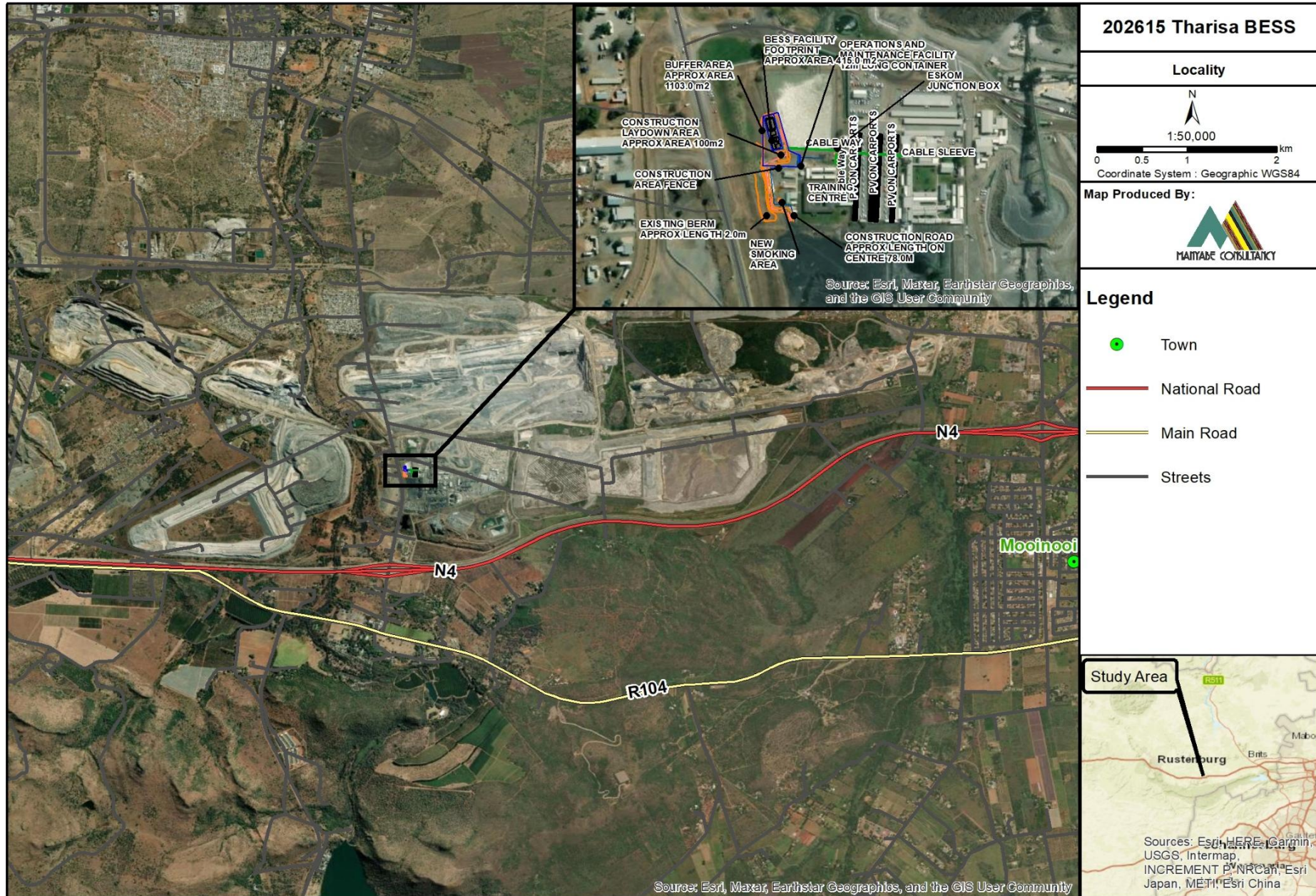


Figure 1: Locality of BESS Development

SECTION 2: PROPOSED SOLAR PHOTOVOLTAIC SYSTEM AND BESS DEVELOPMENT**2-1 SOLAR SYSTEM**

The BESS Development will integrate with a 250 kilowatt (kW) solar PV system, mounted on existing infrastructure (carports) and will connect to the existing Eskom Junction Box at the Mine using cabling. No new power lines will be constructed (Figure 2).



Figure 2: Location of the proposed BESS Development and associated infrastructure

2-2 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 3).

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.

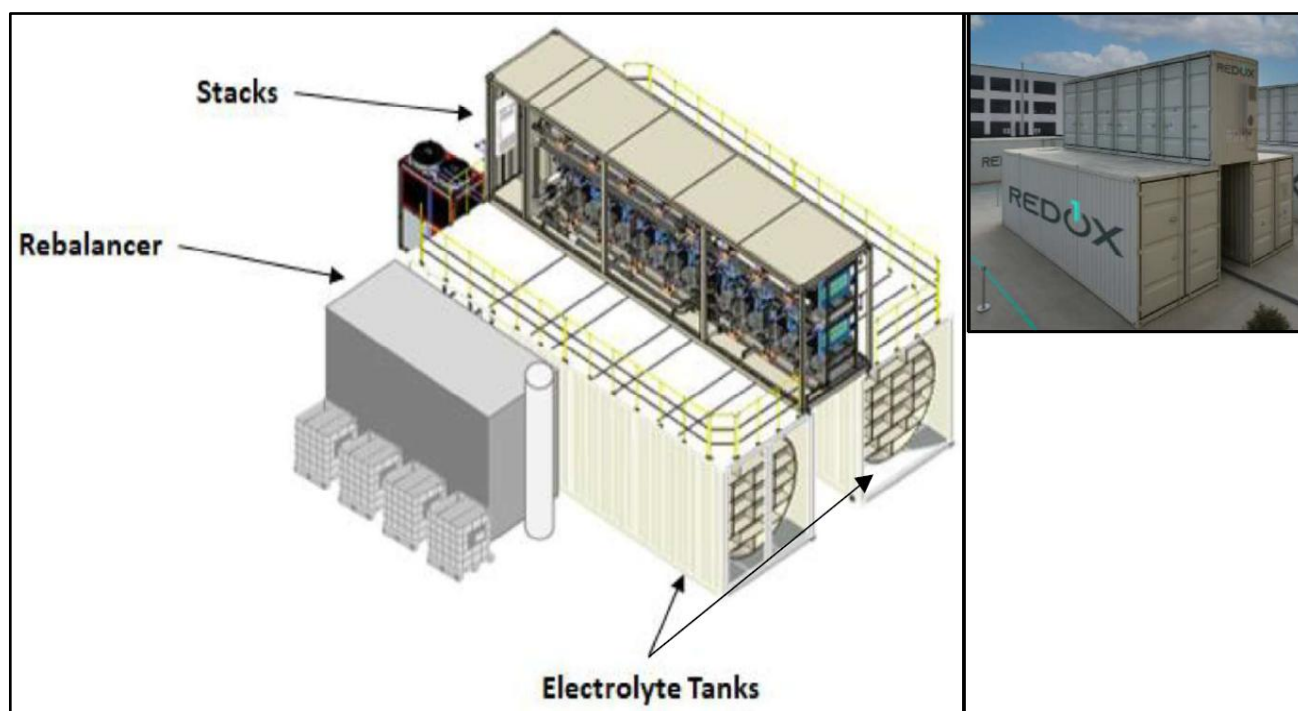


Figure 3: Schematic View of the Battery with the Rebalancer within containers

2-3 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.

2-4 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.

2-5 PROJECT DEVELOPMENT OVERVIEW

The proposed BESS development will be constructed within a footprint of approximately 1 200 m² as shown in Figure 4. The following components (Table 2) are applicable to the proposed project:

Table 2: Summary of Tharisa BESS Development Project Components

Component	Description / Dimensions
BESS Development 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 Development 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 Development 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 9kW 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 (car ports).
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 Development to the Eskom junction box.
Internal Road	<ul style="list-style-type: none"> • An access road will be constructed to the BESS Development 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 Development, including the access road, to restrict unauthorised entry.



Figure 4: Site Layout for the proposed Tharisa BESS Development

SECTION 3: PROPOSED PROJECT DEVELOPMENT ACTIVITIES

3-1 CONSTRUCTION PHASE

The construction process will follow industry standard methods and techniques. Key activities associated with the construction phase are described in Table 3 below.

Table 3: 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 Development.
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) (NRTA). 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 Development will be installed. 400V cables will be installed underground to connect the BESS Development 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 National Rationalised Specifications (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.

3-2 OPERATIONAL PHASE

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

3-3 DECOMMISSIONING PHASE

The decommissioning phase will include activities similar to those of the construction phase as indicated in Table 3.

SECTION 4: NEEDS AND DESIRABILITY INCLUDING ALTERNATIVES CONSIDERED

4-1 NEEDS AND DESIRABILITY

Tharisa plc has committed to reducing the carbon footprint of its mining operations as part of its broader sustainability and operational decarbonisation strategy. In support of this commitment, Tharisa has developed an energy plan for the Tharisa Mine that prioritises both the security of energy supply and the diversification of energy sources. This approach recognises the growing need for reliable, low-carbon energy solutions in the mining sector to ensure operational resilience while reducing environmental impact.

To advance these objectives, Tharisa Minerals intends to implement a photovoltaic (PV) solar power system to supply clean, renewable energy to the Administration and Training Centre facilities at Tharisa Mine. While solar generation will significantly reduce dependence on conventional energy sources, its intermittent nature creates a need for energy storage to ensure consistent power availability, particularly during morning and evening peak demand periods.

The proposed BESS Development coupled to the Solar PV addresses this need by storing excess solar energy generated during the day and making it available when required. This will enhance energy reliability, improve grid stability, and reduce pressure on existing energy infrastructure. Furthermore, the integration of BESS Development supports the efficient use of renewable energy, helps manage peak demand, and contributes to overall emissions reduction in Tharisa's energy mix.

The selected BESS Development technology, based on Redox Flow Battery (RFB) systems, offers a sustainable and innovative solution aligned with Tharisa's decarbonisation strategy. Having already undergone initial testing, the technology is now ready for deployment on a demonstration scale. The proposed location at the Mine's Administration and Training Centre has been strategically selected to validate this in-house developed solution under operational conditions.

In addition to supporting Tharisa's sustainability goals, the project will contribute to local value creation by demonstrating advanced energy technologies close to the source of critical mineral extraction. This aligns with broader government objectives, as reflected in South Africa's Critical Minerals and Metals Strategy (2025), to promote beneficiation, innovation, and the development of technologies to support the implementation of the South African Renewable Energy Masterplan.

Overall, the project is both necessary and desirable as it strengthens energy security, reduces greenhouse gas emissions, advances technological innovation, and positions Tharisa as a leader in sustainable mining practices, while also promoting local manufacturing of value-added battery materials.

4-2 ALTERNATIVES CONSIDERED

In accordance with environmental assessment requirements, a range of alternatives was considered to identify the most appropriate option that balances environmental protection, technical feasibility, operational requirements, and Tharisa's strategic objectives of deploying the BESS Development facility. These alternatives include location, technology, design, and layout, as well as the no-go option.

4-3 LOCATION ALTERNATIVES

As part of a phased approach to implementation, Tharisa elected to first demonstrate the BESS Development technology at a smaller scale. Various potential locations within and surrounding the Mine were assessed, including the Administration and Training Centre located on the Mine site as well as the Conference Centre facilities located approximately 4 km from the Mine. Following this assessment, the Administration and Training Centre site was selected as the preferred location due to its suitability for controlled testing and demonstration,

as well as the need for additional power that could be run independently from the main supply to the Mine. This is particularly essential during scheduled maintenance.

4-3.1 Validation of In-House Developed Technology

The selected site supports the validation of in-house developed BESS technology, in line with Tharisa's decarbonisation strategy. The objective is to test and demonstrate the technology under operational conditions before potential wider deployment.

4-3.2 Land Use and Environmental Considerations

From a land use and environmental perspective, the preferred site offers several advantages. The area has been previously disturbed, thereby minimising the need for further land transformation and reducing potential environmental impact associated with construction activities. Although one feasible alternative site was identified, it did not provide the same environmental and operational advantages.

4-3.3 Proximity to Existing Electrical Infrastructure

The preferred site is also strategically positioned in close proximity to the Eskom junction box and existing electrical infrastructure. This enables efficient integration with the current power network without requiring additional connection infrastructure. As a result, the system can seamlessly utilise solar energy when available and draw from the grid when required, ensuring a reliable power supply.

4-3.4 Operational Compatibility

Furthermore, the location minimises potential interference with ongoing mining operations, thereby reducing operational risks and ensuring that core mining activities are not disrupted.

4-4 TECHNOLOGY ALTERNATIVES

4-4.1 Identification of suitable Energy Storage Technology

As part of its expansion into the energy sector, Tharisa, through Arxo Metals, investigated opportunities to utilise chromite, one of its core products, in energy storage applications. This investigation led to the identification of RFB technology, specifically Iron-Chromium (Fe-Cr) systems, as a viable solution for large-scale energy storage.

Redox One, a developer and manufacturer of Fe-Cr flow batteries, has partnered with Arxo Metals, which produces the Fe-Cr electrolyte using materials sourced from the Tharisa Mine. This collaboration has enabled the development of an innovative, locally derived battery technology that supports value addition within the mining value chain.

Alternative battery technologies, such as lithium-ion batteries, were considered as part of the assessment. While these technologies are widely available and commonly used for energy storage, these were not selected as they do not align with the primary objective of the project. The focus of this project is to establish proof of concept and demonstrate the technical and commercial viability of this novel innovative system.

A key advantage for the selection of RFB technology is its ability to provide long-duration energy storage. While solar PV systems can generate significant amounts of energy, there is often limited capability to store this energy for extended periods. The Fe-Cr RFB is well suited to this requirement, as it provides reliable, long-duration storage that can support mining operations, particularly during periods when solar generation is unavailable.

Technology will be tested under operational conditions to assess its long-term performance and reliability, ensuring that it can support mining processes without risk of failure.

4-4.2 Safety Considerations

The Fe-Cr RFB technology offers safety advantages compared to conventional lithium-ion batteries. In particular, it presents a lower fire risk, making it more suitable for deployment in industrial and mining environments where safety is a priority.

4-4.3 Innovation and Strategic Value

The development and deployment of this technology represent a first-of-its-kind, innovative solution within Tharisa's operations. It supports the company's broader objectives of decarbonisation, technological advancement, and beneficiation by demonstrating the value of mineral-based energy storage solutions derived from its own resources.

4-5 DESIGN AND LAYOUT ALTERNATIVES

The design of the BESS Development has been developed in accordance with applicable local and international standards. Emphasis has been placed on safety, including the minimisation of fire risks and ensuring safe operation within an industrial and mining environment.

Two alternative layout designs (Alternatives 1 and 2) were initially assessed. These options incorporated a new rebalancer system, which increased the overall footprint of the battery installation. As a result, these layout designs presented several challenges in terms of constructability, maintainability, and operational accessibility. In addition, the larger footprint, together with the existing on-site berm, introduced further spatial constraints and reduced overall layout efficiency (refer to Figure 5 and Figure 6).

The preferred layout (Alternative 3) was developed to address the shortcomings identified in the initial alternatives. This layout offers improved constructability, easier maintenance and better operational access. The optimised design also enhances overall functionality while maintaining compliance with applicable safety and engineering requirements (refer to Figure 7). A buffer of approximately 1 103 m² has been applied to the layout to accommodate potential future layout changes.

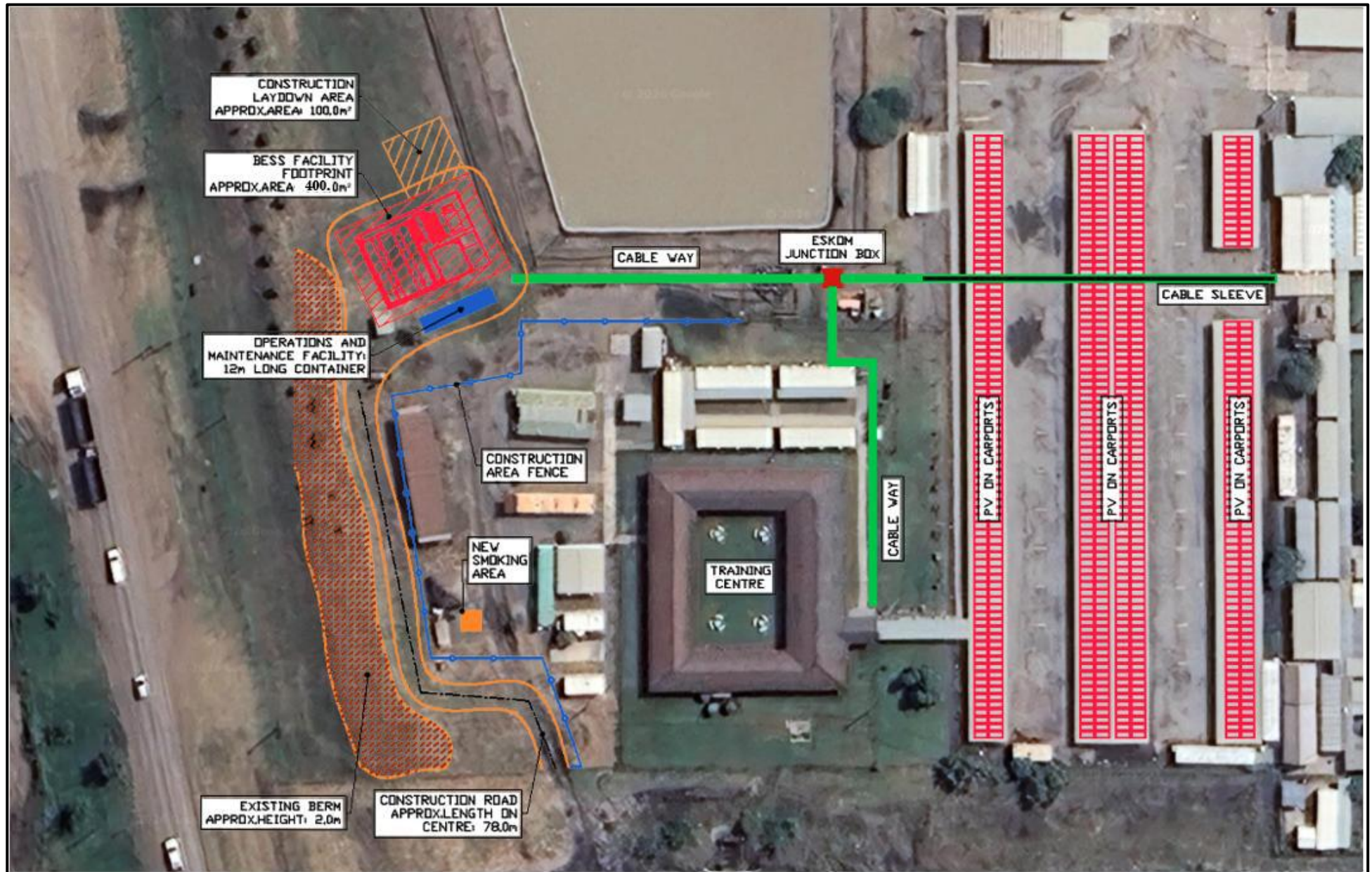


Figure 5: Site Layout for the proposed Tharisa BESS Development – Alternative 1

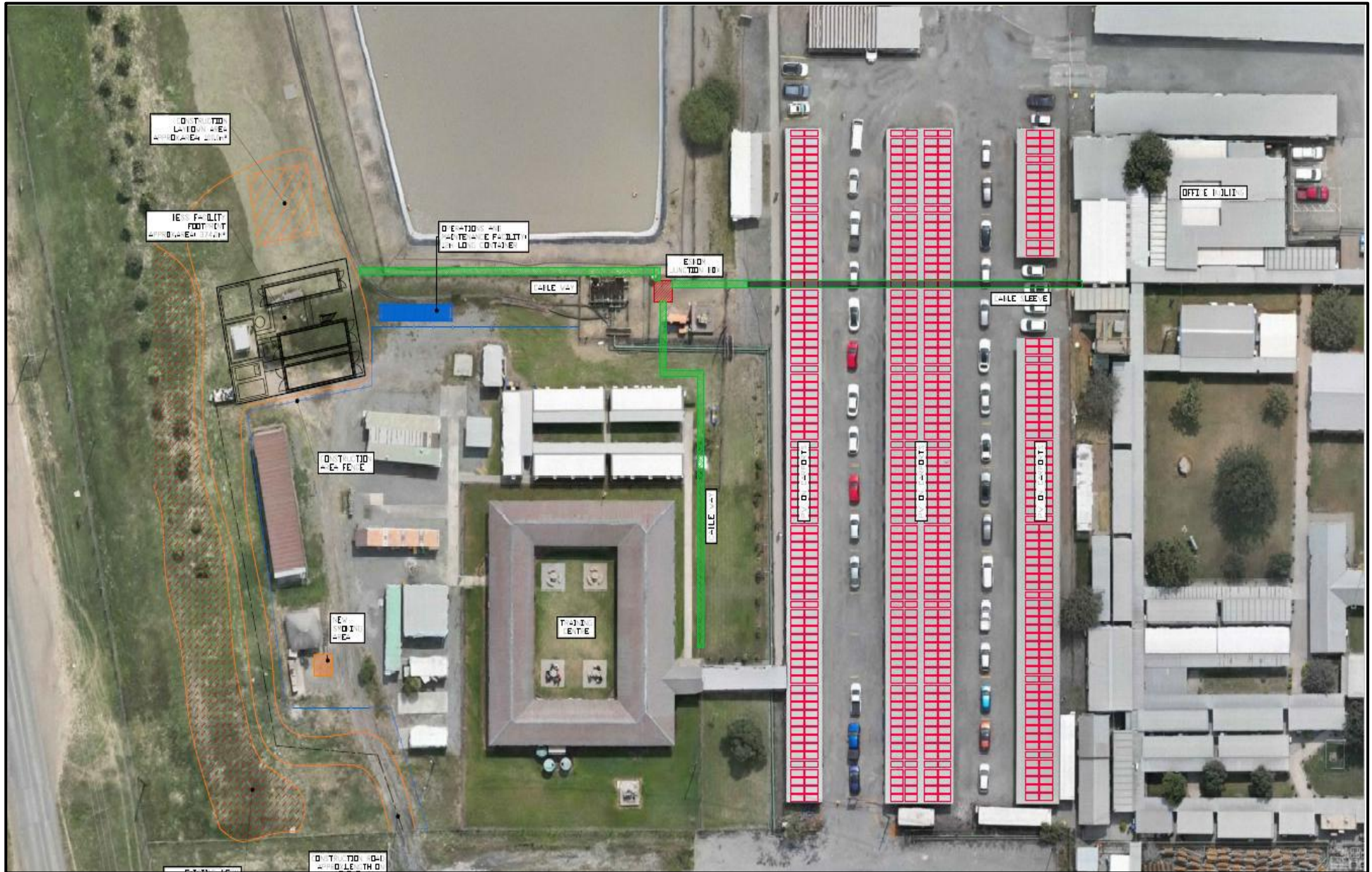


Figure 6: Site Layout for the proposed Tharisa BESS Development – Alternative 2

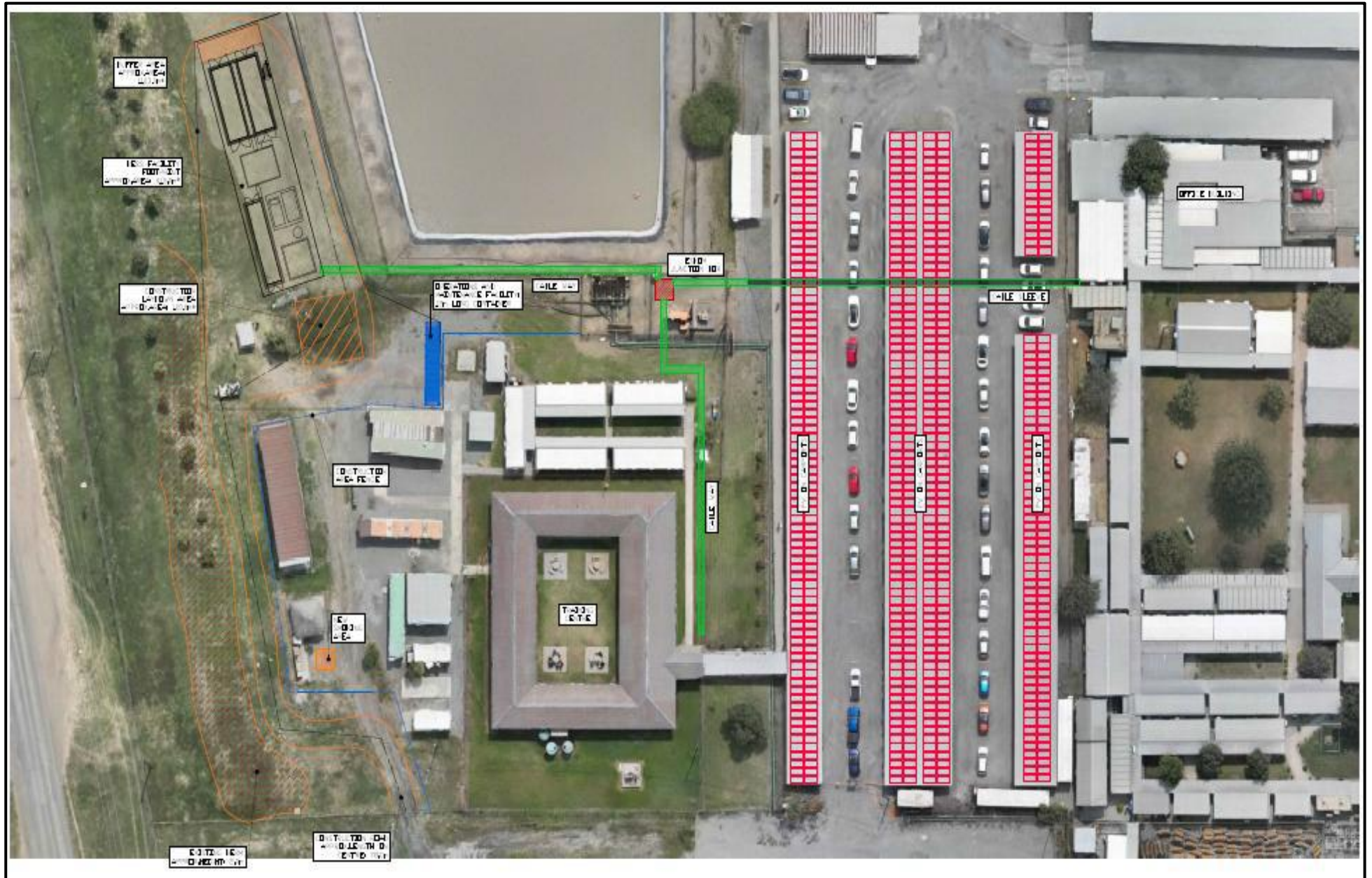


Figure 7: Site Layout for the proposed Tharisa BESS Development – Alternative 3 (Preferred Alternative)

4-6 NO-GO ALTERNATIVES

The no-go alternative involves not proceeding with the proposed BESS Development project.

If the project is not implemented, Tharisa would continue to rely primarily on conventional energy sources including grid electricity, which may be associated with higher carbon emissions and potential energy supply constraints. This would limit the company's ability to meet its decarbonisation targets and reduce its overall environmental footprint.

The no-go option would also result in the loss of an opportunity to demonstrate and validate an innovative Fe Cr RFB technology, which has the potential for deployment in the energy sector in South Africa and the rest of the continent. This could delay the development and adoption of locally developed energy storage solutions and reduce opportunities for mineral beneficiation and value addition.

From a strategic perspective, not proceeding with the project would limit potential long-term benefits including improved energy security, reduced operational costs, and enhanced sustainability performance.

SECTION 5: AIM OF THE SITE SENSITIVITY VERIFICATION REPORT

Prior to commencing with a specialist assessment, the current use of the land and the environmental sensitivity of the site under consideration identified by the screening tool must be confirmed by the undertaking a site sensitivity verification. The site sensitivity verification is to confirm the actual use of land on the ground versus that which has been identified by the screening tool. The site sensitivity verification will confirm or refute the need to employ the various specialists as identified in the Screening Tool Report. The site sensitivity report does not form part of the specialist report.

The site sensitivity verification must be undertaken by an EAP or a specialist. The site sensitivity verification must be undertaken using:

- Desktop analysis, using satellite imagery;
- Preliminary site inspection; and
- Any other available and relevant information.

The outcome of the site sensitivity verification must be recorded in the form of a report that:

- 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.;
- Contains a motivation and evidence (e.g. photographs) of either the verified or different use of the land and environmental sensitivity; and
- Is submitted together with the relevant assessment report prepared in accordance with the requirements of the EIA Regulations of 2014, as amended.

SECTION 6: SCREENING TOOL RESULTS

The Screening Tool Report generated from the national web based environmental screening tool is attached in Appendix 2. The following section discusses the on-site verification of the findings of the screening tool by MC.

6-1 RELEVANT DEVELOPMENT INCENTIVES, RESTRICTIONS, EXCLUSIONS OR PROHIBITIONS

The study area falls within the following development zones:

- Air Quality: Waterberg Bojanala Priority Area (WBPA);
- Strategic Gas Pipeline Corridor-Phase 3: Richard's Bay to Gauteng;
- Main Electricity Distribution Substation;
- South African Conservation Areas.

In terms of the NEMA, and the adopted 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 which allows for the exclusion from the requirement to obtain an EA from the competent authority for listed and specified activities identified in Paragraph 3 of the Norm, in terms of GN. 4557, published in Gazette No. 50387, 27 March 2024, registration is being sought from the North West Department of Agriculture and Rural Development (NWDARD) for exclusion from the requirements of obtaining an EA in terms of NEMA EIA Regulations, 2014, as amended, Listing Notice No.1: Activity, 14.

6-2 PROPOSED DEVELOPMENT AREA ENVIRONMENTAL SENSITIVITY AND SPECIALIST ASSESSMENT IDENTIFIED

Table 4 highlights the relevant environmental themes and their associated environmental sensitivity for the area to be disturbed.

Table 4: Environmental Sensitivities as per the Department of Forestry, Fisheries and the Environment Screening Tool Report

Theme	Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
Agriculture Theme		X		
Animal Species Theme			X	
Aquatic Biodiversity Theme				X
Archaeological and Cultural Heritage Theme				X
Civil Aviation Theme		X		
Defence Theme				X
Paleontology Theme			X	
Plant Species Theme				X
Terrestrial Biodiversity Theme	X			

Based on the generated Screening Tool Report (Appendix 2), the selected classification, and the known impacts associated with the proposed project, the following list of specialist assessments have been identified for inclusion in the assessment report:

- Landscape/ Visual Impact Assessment;
- Archaeological and Cultural Heritage Impact Assessment;
- Palaeontology Impact Assessment;
- Terrestrial Biodiversity Assessment;
- Aquatic Biodiversity Assessment;
- Socio-Economic Assessment;
- Plant Species Assessment; and
- Animal Species Assessment.

From the site sensitivity verification; Table 4 [environmental sensitivities as per the Department of Forestry, Fisheries and the Environment (DFFE) Screening Tool Report]; and the above list of specialist assessments identified for inclusion in the assessment report, the following conclusions have been made which confirm or refute the need to employ the mentioned imperative specialist studies as identified in the Screening Tool Report.

6-2.1 Landscape/ Visual Impact Assessment

The Landscape/ Visual Impact Assessment is mentioned to be imperative in the Screening Tool Report, and there is no specific environmental theme protocol that has been prescribed.

As can be seen from Table 11, the proposed BESS Development has minimal visual intrusions. The site generally slopes northwards. The land's inherent visual absorption capacity (VAC) enhances the project's ability to minimise visual impacts substantially.

The proposed BESS Development will be installed entirely within the existing mine boundary on land that has already been modified and disturbed by ongoing mining activities as shown in Figure 8. The site is located within an established industrial mining landscape characterised by existing mining infrastructure, buildings, access roads, and operational areas, rather than within an undisturbed natural setting. Consequently, the development will not result in significant additional land transformation or materially alter the existing landscape character of the area.

From a visual perspective, the BESS Development will be situated within a landscape that is already influenced by mining-related activities and infrastructure. The facility will therefore be viewed in the context of the existing mine operations, reducing its visual prominence and limiting any additional visual intrusion. The development is not expected to introduce a significant new visual element into the surrounding environment, as it will be consistent with the scale, form, and industrial character of the existing mining infrastructure.

By utilising previously disturbed land within the established mine footprint, the project avoids encroachment into natural or sensitive areas, minimises impacts on landscape and visual resources, and promotes the efficient use of existing developed areas. As such, the anticipated landscape and visual impacts associated with the proposed BESS Development are expected to be low and largely confined to the operational mining area.



Figure 8: Location of potentially sensitive visual receptors in relation to the project

It is therefore the EAP's opinion that a Landscape/ Visual Impact Assessment is not required for the proposed BESS Development.

6-2.2 Archaeological and Cultural Heritage Impact Assessment

The Archaeological and Cultural Heritage Impact Assessment is mentioned to be imperative in the Screening Tool Report, and there is a specific environmental theme protocol that has been prescribed. The sensitivities identified on the archaeology and cultural heritage theme layer represents a limited number of known heritage resources. Heritage resources are widely dispersed and can occur on any development site in South Africa. Therefore, a **Heritage Impact Assessment (HIA) must be undertaken for all developments, irrespective of the sensitivity shown on the archaeological and cultural heritage theme layer.**

The HIA must:

- Meet the requirements of section 38(3) of the National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA).
- Must be undertaken by a qualified heritage specialist;
- Be undertaken in line with Appendix 6 of the EIA Regulations; and
- For HIAs submitted to the South African Heritage Resources Agency (SAHRA), the report must also comply with the requirements of the "2007 Minimum Standards: Archaeological and Palaeontological Components of Impact Assessment Reports", accessible at <https://sahra.org.za/legislation/>.

A Heritage Screener has been compiled for the following reasons, and findings have been described below:

As indicated in Figure 9 and Figure 10, the area proposed for development has been subject to several heritage impact assessments in the past. In the assessment completed by Pistorius (2009) for the Tharisa Mine, he notes the following heritage resources found within the mine area:

- Stonewalled settlements which date from the Late Iron Age;
- Historical structures such as farmhouses with outbuildings, agricultural infrastructure and the Van Rensburg School (now called the Retief Primary School);
- At least six graveyards as well as objects with heritage significance such as outdated and discarded agricultural implements.

Pistorius conducted an additional field assessment in 2014 for the proposed north-eastern Waste Rock Dump (WRD) area which identified no heritage resources of significance. A subsequent heritage field assessment was conducted by Pelser (2018) for the proposed north-eastern WRD, which included the Lapologang Village. Pelser (2018) identified a number of sites and structures, with only 2 [cemeteries, South African Heritage Resources Information System (SAHRIS) Inventory Numbers 2527CB176 and 2527CB177] of any significance recorded (Figure 11). The others were the remains/ruins of fairly recent buildings and not deemed of any significance. Neither of the cemeteries identified by Pelser (2018) will be impacted by the proposed BESS Development process water Pollution Control Dam (PCD) (Figure 12).

In June 2025, CTS Heritage visited the mine in person to conduct an HIA for another development related to Tharisa Mine and passed by the area intended for the BESS Development. The location of the proposed BESS Development is on a completely transformed area next to a mine dam.

There are currently no known sites within 500m of the proposed BESS Development. As the area is already significantly disturbed, it is unlikely that the proposed development of BESS Development infrastructure will have an impact on significant heritage resources, and no further assessment is recommended.

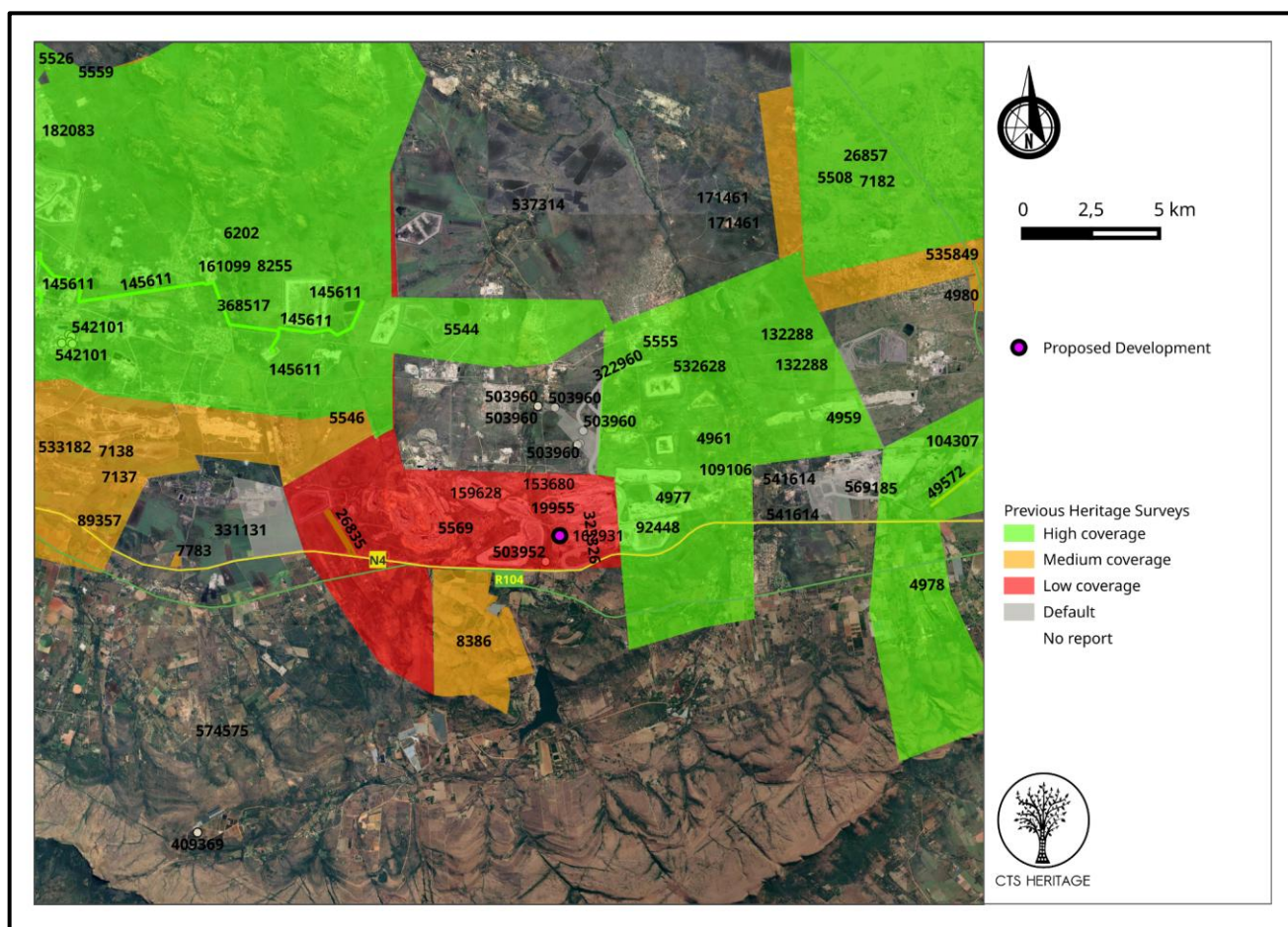


Figure 9: Map of previous Heritage Impact Assessments surrounding the proposed development area, with SAHRIS NIDs indicated.

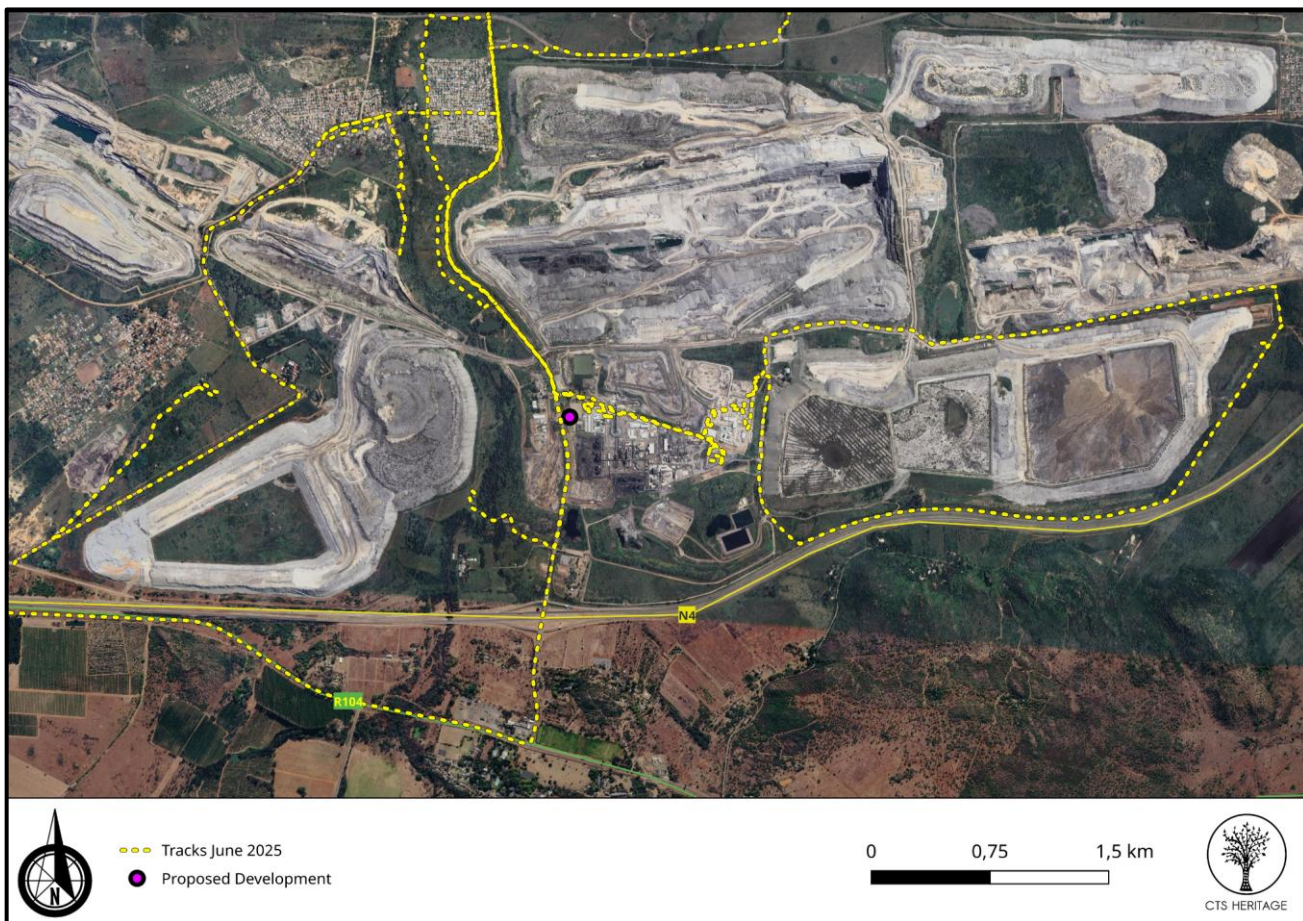


Figure 10: Map of previous CTS Heritage Tracks

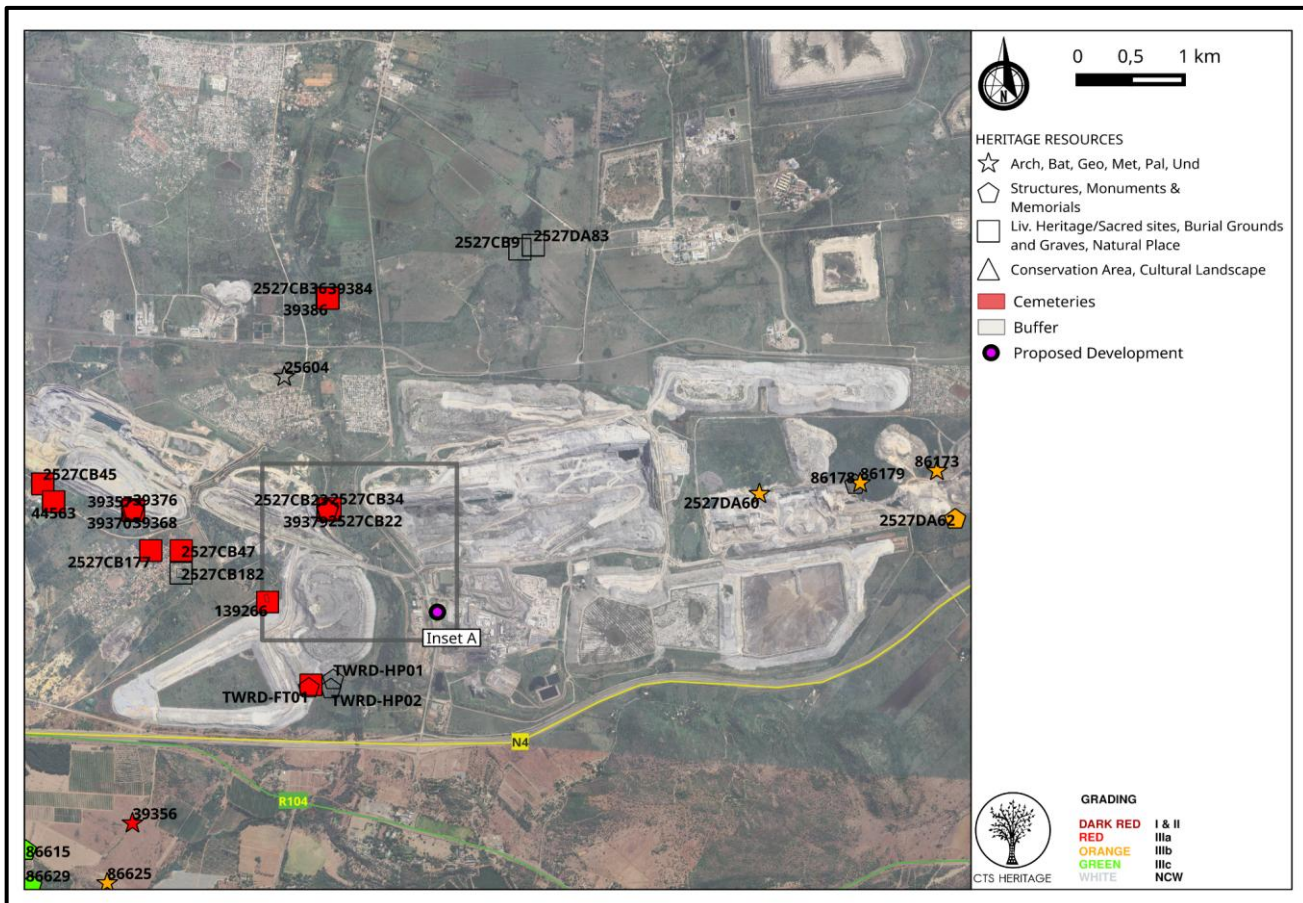


Figure 11: Map of Heritage Resources previously identified in and near the study area, with SAHRIS InvNos indicated.



Figure 12: Map of Heritage Resources previously identified in and near the study area, with SAHRIS InvNos indicated.

6-2.3 Palaeontology Impact Assessment

The Palaeontology Impact Assessment is mentioned to be imperative in the Screening Tool Report, and there is a specific environmental theme protocol that has been prescribed. The sensitivities identified on the Palaeontology theme layer represents a limited number of known palaeontology resources. Palaeontology resources are widely dispersed and can occur on any development site in South Africa. Therefore, **Palaeontological Impact Assessments (PIAs) must be undertaken for all developments as per the PalaeoSensitivity Map** provided on SAHRIS, irrespective of the sensitivity shown on the palaeontology theme layer. The PIA must:

- Meet the requirements of section 38(3) of the NHRA or section 41(1) of the KwaZulu-Natal Amafa and Research Institute Act, 2018 should the development be in KwaZulu Natal;
- Must be undertaken by a qualified palaeontological specialist;
- Be undertaken in line with Appendix 6 of the EIA Regulations; and
- For PIAs submitted to SAHRA, the report must comply with the requirements of the “2012 Minimum Standards: Palaeontological Components of HIAs”, accessible at <https://sahra.org.za/legislation/>.

A PIA screener has been undertaken. and findings have been described below:

- According to the SAHRIS Palaeosensitivity Map (Figure 13), the area proposed for development is underlain with sediments zero fossil sensitivity underlying most of the study area, According to the extract from the Council of GeoScience Map 2526 for Rustenburg (Figure 14), the geology of the area consists of VI: Tweelaagte Bronzite, Groenfontein Harzburgite including norite all from the Rustenburg Layered Suite, in the Bushveld Complex. Bamford (2022) in a desktop Palaeontological Impact Assessment (PIA) for the same area as the proposed mine noted that “The northern part of the mine property is on the Mathlagame Norite (Vcm) and the southern part on the Kolobeng Norite (Vn), both of the Rustenburg

Layered Suite, Bushveld Igneous Complex (Fig. 2; Cawthorn et al., 2006). These are intrusive volcanic rocks (igneous) so do not preserve any fossils at all. “

- As such, it is very unlikely that the proposed establishment of a BESS will impact on significant palaeontological heritage and no further assessment of impacts to palaeontological heritage is recommended.

Paleontological (or palaeontological) means "relating to palaeontology," the scientific study of past life on Earth, primarily through the analysis of fossils to understand ancient organisms, ecosystems, and geological history.

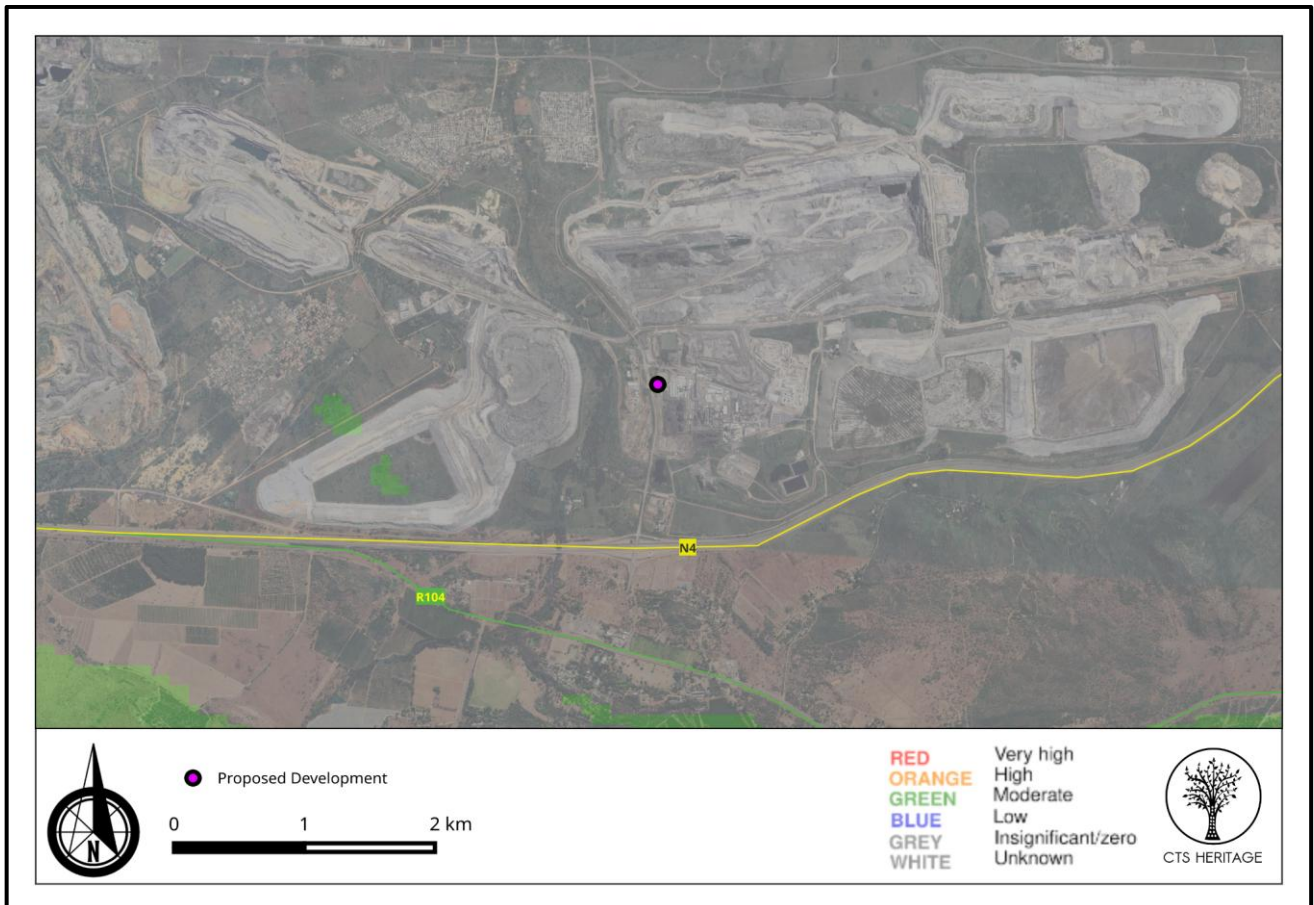


Figure 13: SAHRIS Palaeosensitivity Map indicating insignificant fossil sensitivity underlying the study area.

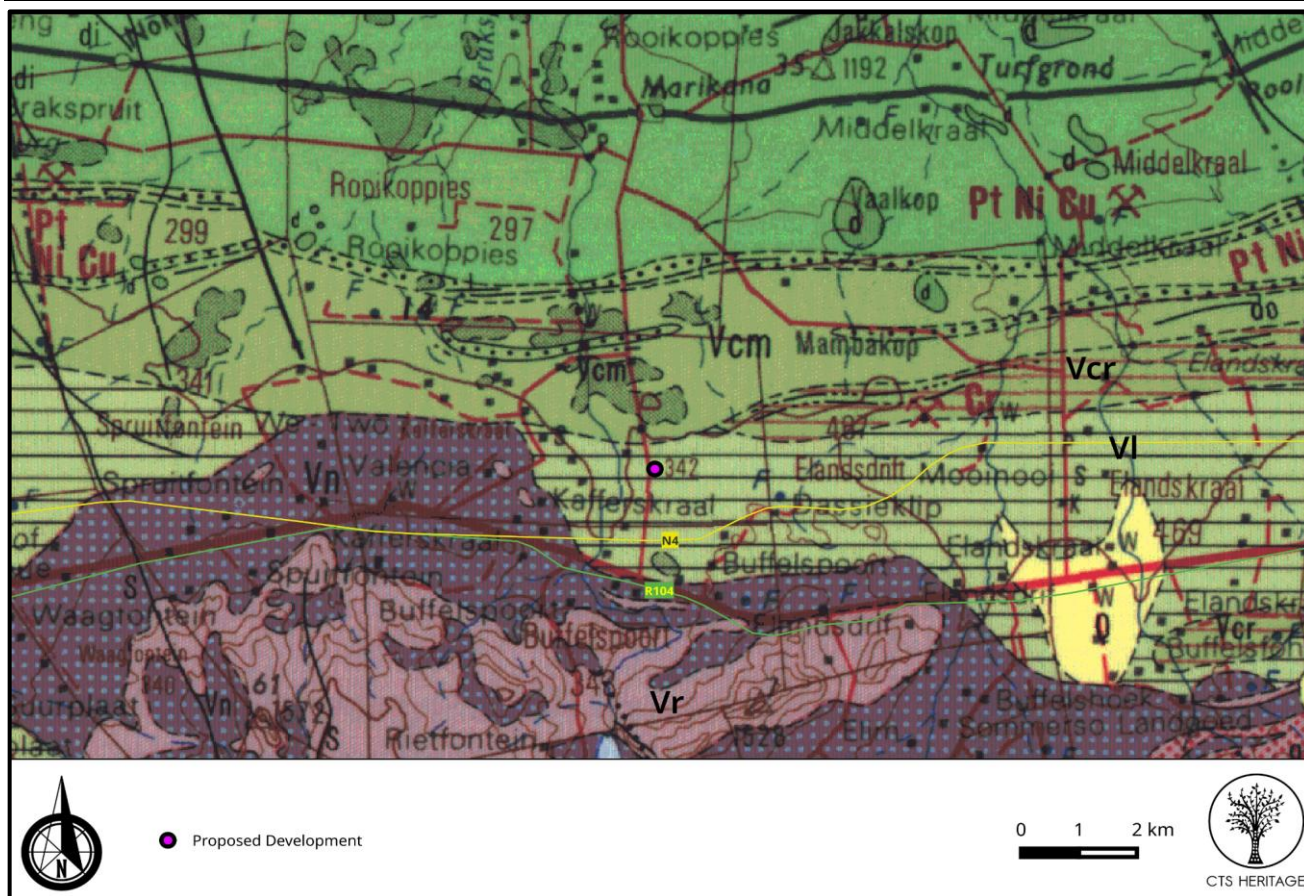


Figure 14: Extract from the 2526 Rustenburg CGS Geology Map indicating that the development area is underlain by VI: Tweelaagte Bronzitite, Groenfontein Harzburgite, Makgope Bronzitite, Eerlyk Bronzitite and Kroondal Norite

6-2.4 Terrestrial Biodiversity Assessment

The Terrestrial Biodiversity Assessment is mentioned to be imperative in the Screening Tool Report, and there is a specific environmental theme protocol that has been prescribed. An applicant intending to undertake an activity identified in the scope of this protocol, on a site identified on the screening tool as being of “very high” sensitivity for terrestrial biodiversity, must submit a **Terrestrial Biodiversity Specialist Assessment**.

According to the DFFE Screening Tool, the project area overlaps with Ecological Support Areas (ESA) 1 and the Endangered (EN) Marikana Thornveld vegetation type. However, following the site survey, one (1) terrestrial habitat was identified within the project area, namely Severely Modified, with an assigned ‘Very Low’ Site Ecological Importance (SEI) (Figure 15). This habitat is characterised by extensive loss of natural species composition, vegetation structure, and ecological functioning, and the habitat is not connected to any surrounding natural habitats. As a result, the site is no longer representative of the EN Marikana Thornveld, nor does the site offer habitat for fauna or flora Species of Conservation Concern (SCC). The functionality of the site as an ESA1 is severely limited.

No flora or fauna SCC were recorded during the assessment, and none are expected given the highly transformed nature of the site. The Very High Terrestrial Biodiversity theme as assigned by the Screening Tool is disputed and instead assigned as Low. The Animal Species Theme sensitivity, which is assigned Medium by the Screening Tool is disputed and instead assigned Low sensitivity. Finally, the Low sensitivity for the Plant Species Theme was validated. Refer to Table 5 below

Given that the development is confined to an already disturbed area within the active mine footprint, the proposed project is unlikely to result in significant additional loss of terrestrial biodiversity. 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.

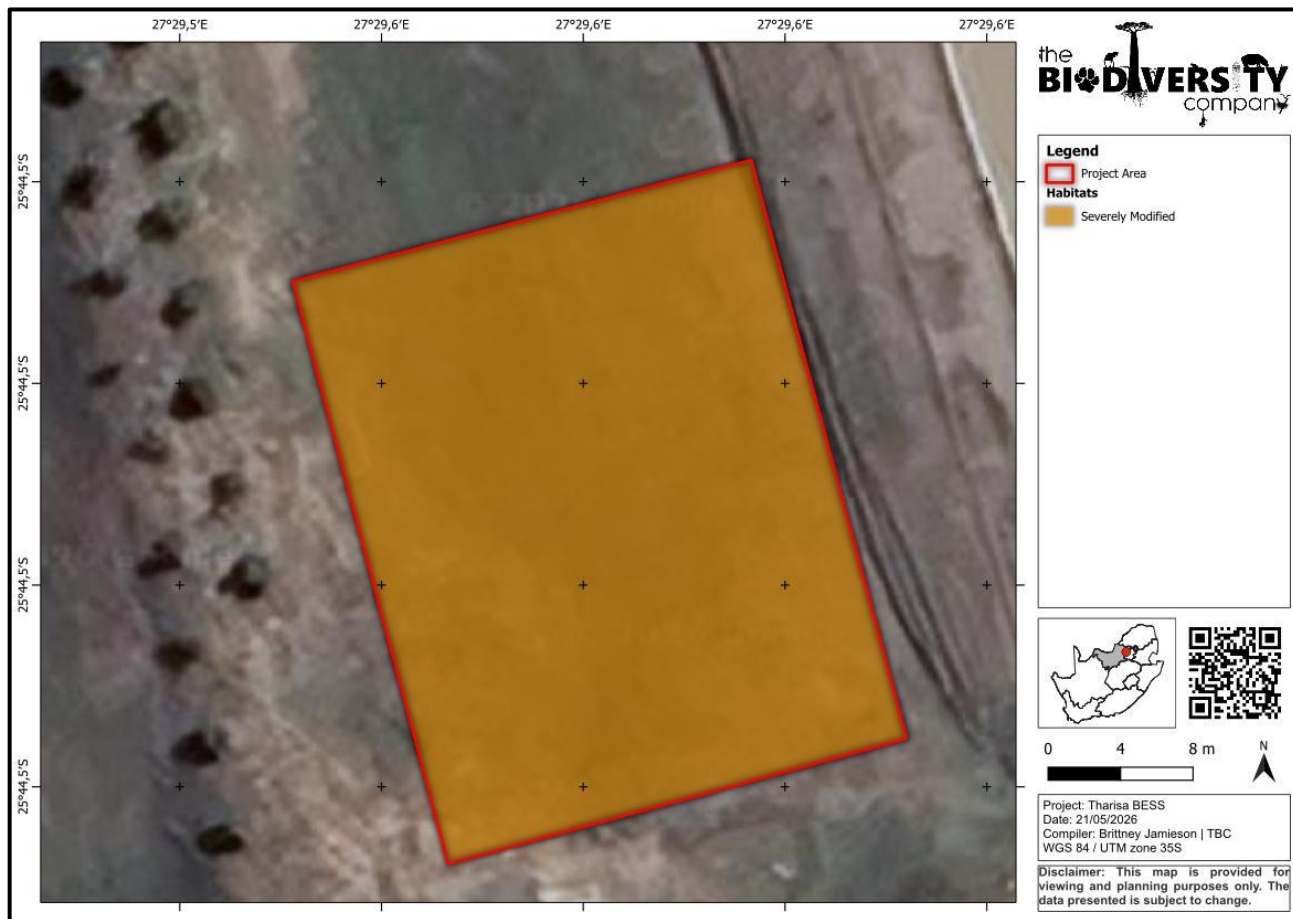


Figure 15: Map illustrating different habitat types within the project area

Table 5: Summary of the Screening Tool vs Specialist Assigned Sensitivities

Screening Theme	Tool	Screening Tool	Specialist	Tool Validated or Disputed by Specialist - Reasoning
Animal Theme	Medium	Low	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	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	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.

6-2.5 Aquatic Biodiversity Impact Assessment

The Aquatic Biodiversity Impact Assessment is mentioned to be imperative in the Screening Tool Report, and there is a specific environmental theme protocol that has been prescribed. An applicant intending to undertake an activity identified in the scope of this protocol on a site identified on the screening tool as being of “low” sensitivity for aquatic biodiversity, must submit an **Aquatic Biodiversity Compliance Statement**.

A field survey for the area was undertaken on 18 May 2026, which is a late wet season survey, to confirm the presence of freshwater features (wetlands) and to verify their sensitivity as given by the National Web-based Environmental Screening Tool. The seasonality is not considered to be a limiting factor to the assessment of which the results are conclusive.

The following sections discuss the results from the field survey that was conducted to verify the aquatic biodiversity theme sensitivity of the site. A map indicating the identified features within the Project Area of Influence (PAOI) is provided in Figure 16 and representative survey points are provided in Table 6. No natural watercourses or wetlands were identified within the proposed project area. An off channel process water PCD is located within the 32 m PAOI, however is not intersected by the proposed works and is associated with the

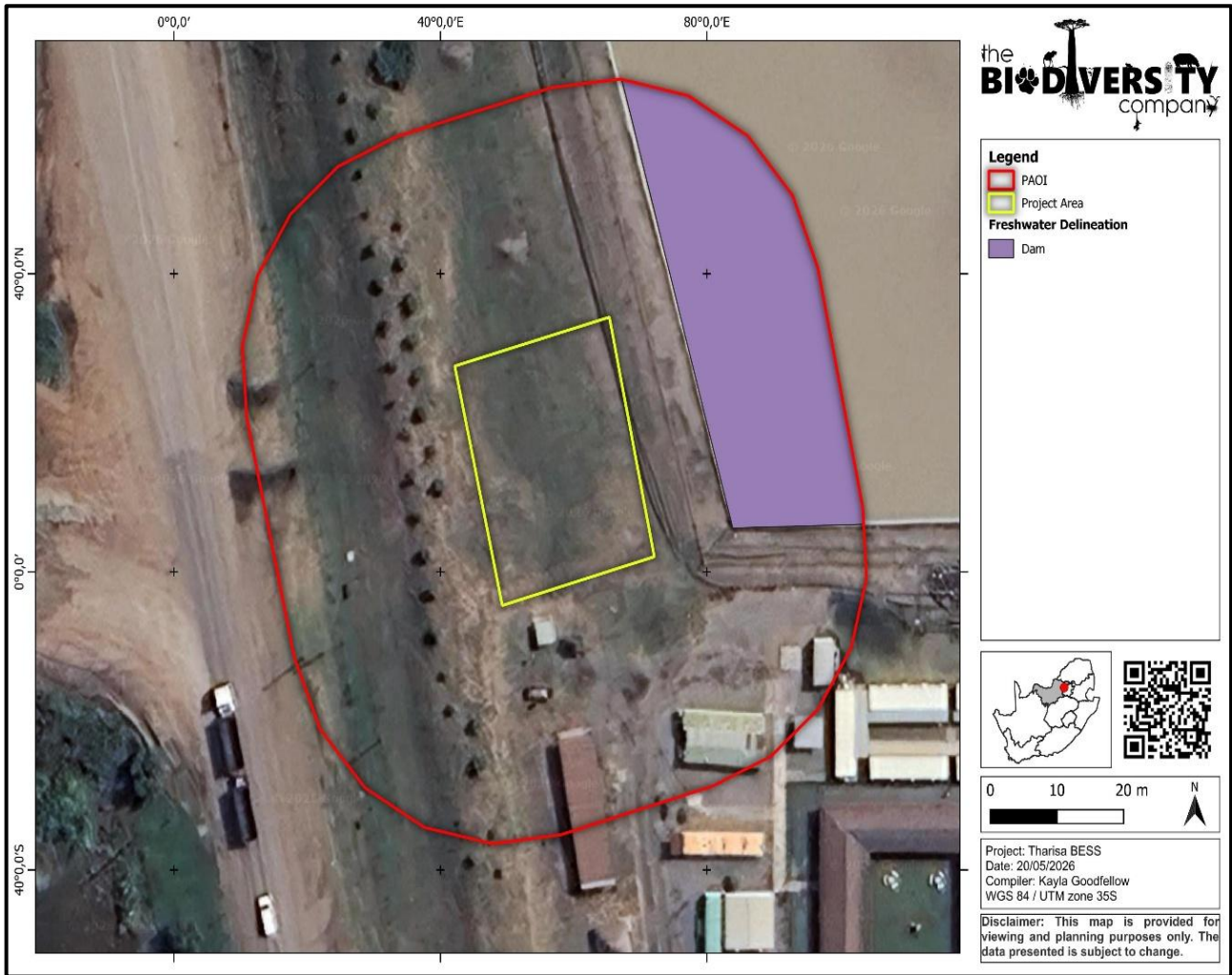






Figure 16: Watercourse Features Identified within the Proposed Project Area

Table 6: Spatially Representative Survey Sites

Survey Point	Description	Photographs
<p>Site GPS Reference: 001 Date: 18/05/2026 GPS Coordinates: 25°44'28.99"S 27°29'33.42"E</p>	<p>Non-wetland</p>	
<p>Site GPS Reference: 002 Date: 18/05/2026 GPS Coordinates: 25°44'28.95"S 27°29'33.48"E</p>	<p>Non-wetland</p>	
<p>Site GPS Reference: 003 Date: 18/05/2026 GPS Coordinates: 25°44'29.21"S 27°29'33.70"E</p>	<p>Non-wetland</p>	
<p>Site GPS Reference: 004 Date: 18/05/2026 GPS Coordinates: 25°44'29.57"S 27°29'34.64"E</p>	<p>Dam</p>	

As per the Screening Report, the allocated sensitivities for each of the relevant themes are either disputed or

validated for the areas assessed as described in Table 7 below.

Table 7: Summary of the Screening Tool and Specialist Assigned Ecological Sensitivities

Features	Screening Tool Theme	Environmental Screening Tool Sensitivity	Specialist Sensitivity	Tool Validated or Disputed by Specialist - Reasoning
Project area and 32 m PAOI	Aquatic Biodiversity Theme	Low	Low	Validated – No natural wetlands were identified within this area.

Given that no natural freshwater ecosystems were identified, the development will occur within areas of “Low” aquatic biodiversity sensitivity. No impact is expected on freshwater biodiversity based on current information and field verification results. The Norm for the Exclusion of Identified Activities Associated with the Development and Expansion of Battery Storage Facilities, in terms of GN. 4557, published in Gazette No. 50387, 27 March 2024 can therefore be applied for the aquatic biodiversity theme.

It is the opinion of the specialist that the project can be favourably considered and is not subject to any conditions given the absence of natural watercourses within 32 m of the project area.

Standard mitigation and management measures will apply, even where impacts are low.

6-2.6 Plant Species Assessment

The Plant Species Assessment is mentioned to be imperative in the Screening Tool Report, and there is a specific environmental theme protocol that has been prescribed. An applicant intending to undertake an activity identified in the scope of this protocol, on a site identified by the screening tool as being of “low” sensitivity for terrestrial plant species, must submit a **Terrestrial Plant Species Compliance Statement**, depending on the outcome of a site inspection undertaken in accordance with paragraph 4.

No flora or fauna SCC were recorded during the assessment, and none are expected given the highly transformed nature of the site. The “low” sensitivity for the Plant Species Theme was validated. Refer to Table 5 above.

6-2.7 Animal Species Assessment

The Animal Species Assessment is mentioned to be imperative in the Screening Tool Report, and there is a specific environmental theme protocol that has been prescribed. An applicant intending to undertake an activity identified in the scope of this protocol on a site identified by the screening tool as being of “medium” sensitivity for terrestrial animal species must submit either a **Terrestrial Animal Species Specialist Assessment Report** or a **Terrestrial Animal Species Compliance Statement**, depending on the outcome of a site inspection undertaken in accordance with paragraph 4.

No fauna SCC were recorded during the assessment, and none are expected given the highly transformed nature of the site. The Animal Species Theme sensitivity, which is assigned “medium” by the Screening Tool is disputed and instead assigned “low” sensitivity. Refer to Table 5 above.

6-2.8 Agriculture Theme

The Agricultural Assessment is mentioned to be imperative in the Screening Tool Report, and there is a specific environmental theme protocol that has been prescribed. An applicant intending to undertake an activity identified in the scope of this protocol, on a site identified by the screening tool as being of “high” sensitivity for agriculture, must submit **Agro-Ecosystem Specialist Assessment Report** unless: information gathered from the site sensitivity verification differs from the designation of “high” agricultural sensitivity, and it is found to be of a “medium” or “low” sensitivity.

An Agricultural Specialist Assessment has been undertaken.

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. 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 (refer to Figure 17).

Table 8: 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	Very Restricted potential. Regular and/or severe limitations due to soil, slope, temperature, or rainfall. Non-arable.	Low
Stilfontein and Johannesburg	8	Very low potential. Very severe limitations due to soil, slope, temperature, or rainfall. Non-arable.	Low

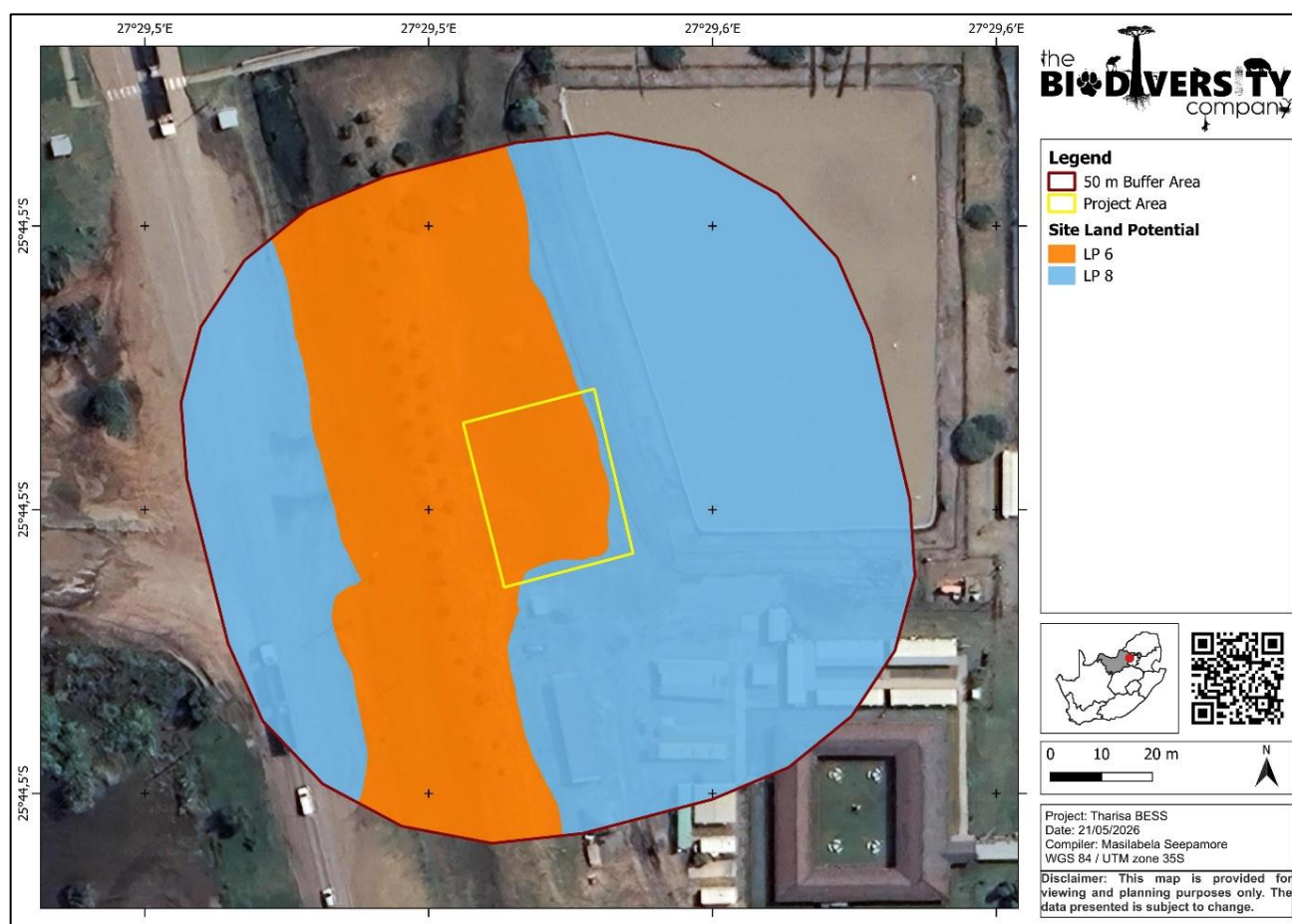


Figure 17: Land Potential within the 50 m Buffer Area

Fifteen land capabilities have been digitised by [Department of Agriculture, Forestry and Fisheries (DAFF)¹, 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. No highly sensitive field crop boundaries were identified within the 50 m buffer area of the proposed project area and associated infrastructure

¹ The DAFF is now referred to as the DFFE.

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.

As per the Screening Report, the allocated sensitivities for each of the relevant themes are either disputed or validated for the areas assessed as described in Table 9. 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, and consideration is given to any observed active agricultural practices (Figure 18).

Table 9: 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.

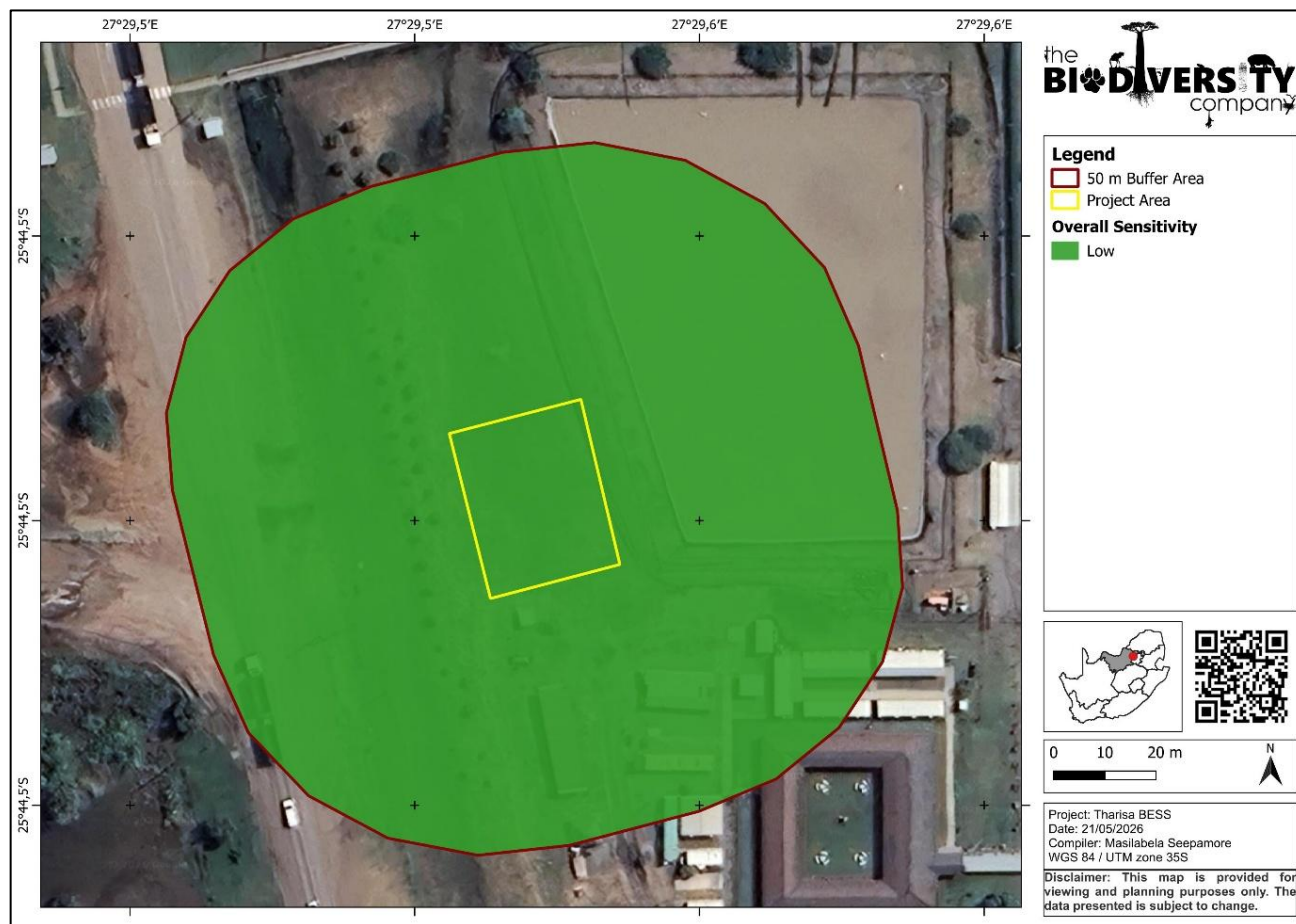


Figure 18: Overall Sensitivity of the project area

6-2.9 Civil Aviation Theme

An applicant intending to undertake an activity identified in the scope of this protocol for which a specialist assessment has been identified on the screening tool on a site identified as being of “high” sensitivity for civil aviation, must submit a **Civil Aviation Compliance Statement**.

A Civil Aviation Compliance Statement has been compiled. The DFFE Screening Tool has identified the project site as having a “high” sensitivity in relation to civil aviation installations, primarily associated with the presence of dangerous airspace (FAD70E – Magaliesberg Flying Training Area East) within the broader project area. This sensitivity is acknowledged. However, the findings of the Civil Aviation Compliance Statement confirm that the proposed Tharisa BESS Development will not result in any direct or indirect impact on civil aviation operations, airspace, or infrastructure. The identified sensitivity is considered to reflect regional airspace classifications rather than site-specific constraints applicable to the project footprint. No further civil aviation-related investigations are therefore required to inform the registration process for the proposed project.




A site visit was undertaken to verify the conditions of the project area and the surrounding environment.

The site visit confirmed that:

- The project area comprises low-lying, disturbed ground within an active mining environment;
- Surrounding land uses include open pit mining, processing infrastructure and internal haul roads;
- No aviation-related infrastructure (e.g. towers, navigation aids or radar installations) is present within or immediately adjacent to the project footprint; and
- The area is not characterised by vertical structures that would present an aviation obstacle.

The site photographs presented below (Table 10 – Photographs). The accompanying map in Figure 19 illustrates the points from which the site photographs were taken, providing spatial context to the project site.

Table 10: Photographs of the Project Site

No	Photographs taken from a vantage point located to the south and east of the identified BESS Development area, parallel to and adjacent to Marikana Road. The approximate coordinates of the photo location are 25°44'29.20"S; 27°29'33.76"E.
1.	 <p data-bbox="363 770 762 846"> Date: 27 May 2026 Time: 09:53 Location: Marikana Road, South Africa Co-ordinates: 25°44'29.832"S, 27°29'34.576"E </p> 
2.	 <p data-bbox="363 1406 762 1482"> Date: 27 May 2026 Time: 09:54 Location: Marikana Road, South Africa Co-ordinates: 25°44'29.832"S, 27°29'34.576"E </p> 

No Photographs taken from a vantage point located to the south and east of the identified BESS Development area, parallel to and adjacent to Marikana Road. The approximate coordinates of the photo location are 25°44'29.20"S; 27°29'33.76"E.

3.



4.




No	Photographs taken from a vantage point located to the south and east of the identified BESS Development area, parallel to and adjacent to Marikana Road. The approximate coordinates of the photo location are 25°44'29.20"S; 27°29'33.76"E.
5.	 <p data-bbox="363 734 758 808"> Date: 27 May 2026 Time: 09:56 Location: Marikana Road, South Africa Co-ordinates: 25°44'29.892'S, 27°29'33.204'E </p>



Figure 19: Site Photographs taken by the Aviation Specialist

A 35 km radius assessment was undertaken to identify the presence of civil aviation aerodromes in the broader project area (refer to Figure 20). The assessment indicates that the following aerodromes are located within or near the outer extent of the radius:

6-2.9.1 Rustenburg Airfield (FARG)

The Rustenburg Airfield is a general aviation aerodrome serving light aircraft operations and local aviation activity in the Rustenburg area. It is located approximately 25 km northwest of the project site. Given its scale, function, distance from the project and the project’s low-profile infrastructure, no site-specific obstacle or operational constraints on the project are anticipated.

6-2.9.2 Orient Airfield (FAOI)

The Orient Airfield is an uncontrolled general aviation aerodrome used primarily for light aircraft and recreational flying activities. It is located approximately 34 km south-southeast of the project site. Given its scale, function, distance from the project and the project’s low-profile infrastructure, no site-specific obstacle or operational constraints on the project are anticipated.

6-2.9.3 Brits Airfield (FABS)

The Brits Airfield is a small general-aviation aerodrome supporting light-aircraft operations and flight training. It is located approximately 35 km east of the project site, placing it at the outer edge of the 35 km assessment radius. Given its scale, function, distance from the project and the project’s low-profile infrastructure, no site-specific obstacle or operational constraints on the project are anticipated.

No additional major aerodromes were identified within a 35 km radius. Importantly, no aerodromes, airstrips or aviation infrastructure are located within proximity to the project footprint, and none impose site-specific operational or obstacle-related constraints on the proposed development.

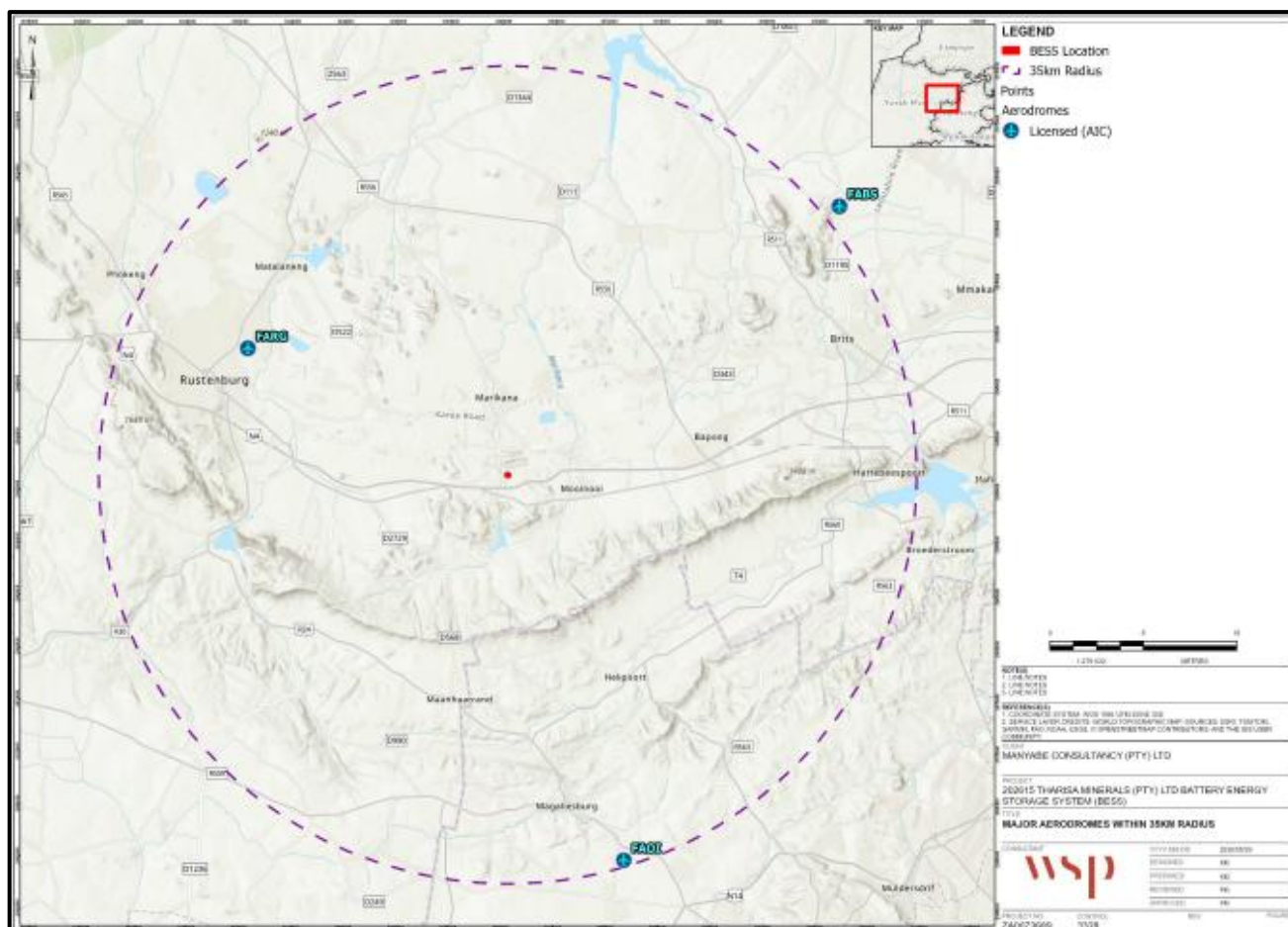


Figure 20: Major Aerodromes within a 35km Radius

6-2.10 Defence Theme

An applicant intending to undertake an activity identified in the scope of this protocol for which a specialist assessment has been identified on the screening tool on a site identified as being of “low” sensitivity, no further assessment requirements are identified. For that reason, no further assessment under this theme has been undertaken.

SECTION 7: SATELLITE IMAGERY

7-1 SATELLITE IMAGERY

Figure 21 provides a satellite image of the study area as of March 2025, while the historical image of January 2013 (Figure 22) shows the landcover ≈12 years ago.



Figure 21: Google Earth Satellite Image of the Study Area in March 2025

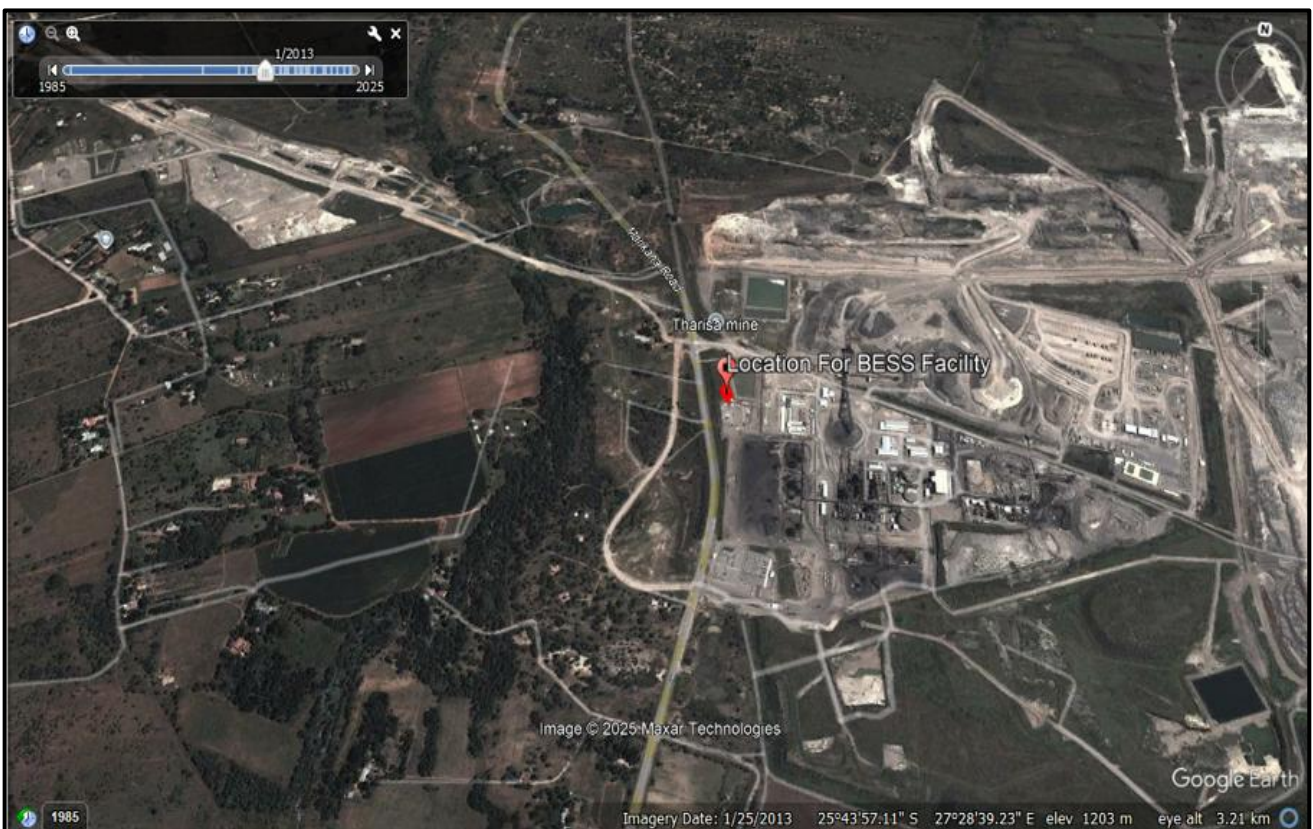


Figure 22: Historical Google Earth Satellite Image of the Study Area in January 2013

7-2 KNOWN ENVIRONMENTAL SENSITIVITIES

The project area overlaps with ESA1 and the EN Marikana Thornveld vegetation type. However, following the site survey, one (1) terrestrial habitat was identified within the project area, namely Severely Modified, with an assigned 'Very Low' SEI (Figure 15 and Figure 23). This habitat is characterised by extensive loss of natural species composition, vegetation structure, and ecological functioning, and the habitat is not connected to any surrounding natural habitats. As a result, the site is no longer representative of the EN Marikana Thornveld, nor does the site offer habitat for fauna or flora SCC. The functionality of the site as an ESA1 is severely limited.

There are currently no known heritage or palaeontological sites within 500m of the proposed BESS Development (refer to Figure 11 and Figure 13).

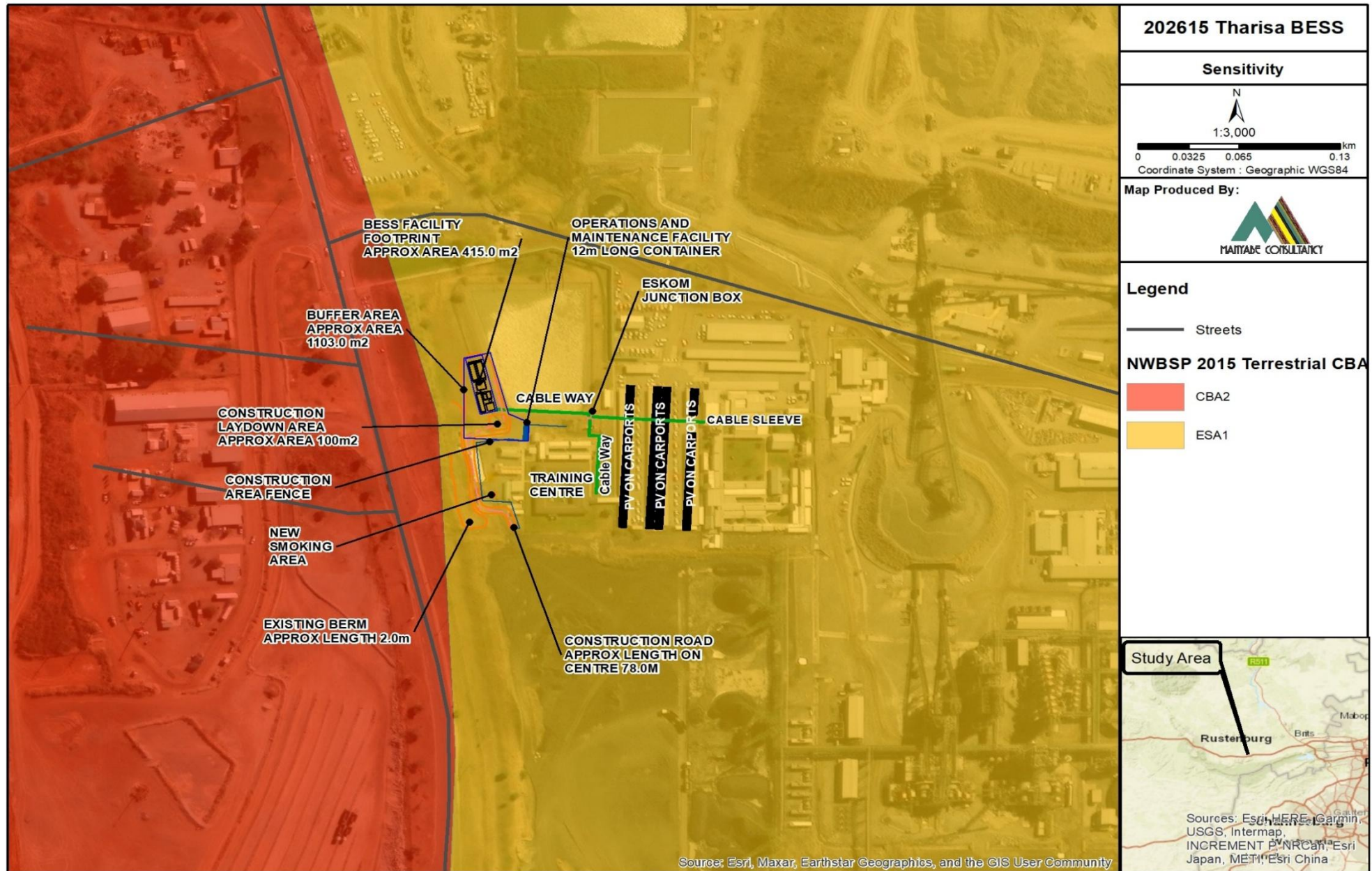


Figure 23: Critical Biodiversity Area and Ecological Support Area Map

SECTION 8: ON SITE ASSESSMENT

A site visit was undertaken by the EAP on 26 February 2026 to assess the proposed BESS Development project area. The purpose of the site inspection was to gain a first-hand understanding of the existing environmental conditions, identify any potential environmental sensitivities, and verify the current land use and level of disturbance within the proposed development footprint. During the site visit, the EAP conducted a visual assessment of the project area and its immediate surroundings, paying particular attention to features such as vegetation cover, topography, existing infrastructure, drainage characteristics, and any environmentally sensitive receptors that may be present.

The site inspection confirmed that the proposed BESS Development is located within an area that has already been modified and disturbed by existing mining-related activities. In addition, a series of photographs were taken to document the current state of the site and to provide visual evidence of the baseline conditions observed during the assessment. The photographic evidence captured during the site visit is presented in Table 11 below.

Table 11: Photographic Evidence of the Proposed Site Development Area



Photographs taken from the north looking south from the observation point located within the Tharisa Mine.





Photographs taken from the south looking north from the observation point located within the Tharisa Mine.



Photographs taken from the West looking East from the observation point located within the Tharisa Mine.

SECTION 9: CUMULATIVE IMPACTS

Cumulative impacts are the combined, incremental effects of a proposed project when added to other past, present, and reasonably foreseeable future actions. Assessing them prevents major environmental degradation such as groundwater depletion or habitat loss caused by the compounding effect of multiple developments in one area.

Spatial and temporal scope of the cumulative assessment (i.e. geographic radius of 30 km for renewable projects; and 35 km for the presence of civil aviation aerodromes) was conducted. Consideration was given to existing mining activities within the broader area.

9-1 TERRESTRIAL BIODIVERSITY

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, such as the presence of existing mining disturbance in the broader landscape; and the absence of ecological connectivity to intact habitats.

After implementation of the mitigation measures, 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.

9-2 AQUATIC BIODIVERSITY

Given the absence of wetlands in proximity to the proposed development, no material cumulative impacts are anticipated based on the absence of natural wetlands within the project area and immediate zone of influence.

9-3 SOIL AND AGRICULTURAL POTENTIAL

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. The cumulative impact of the proposed project within a 30 km radius considering other similar renewable projects (approved and in progress) is anticipated to be “medium” pre-mitigation and “low” post-mitigation (refer to Figure 24). The project area has undergone historic and current modifications due to human activities. After implementation of the mitigation measures, 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.

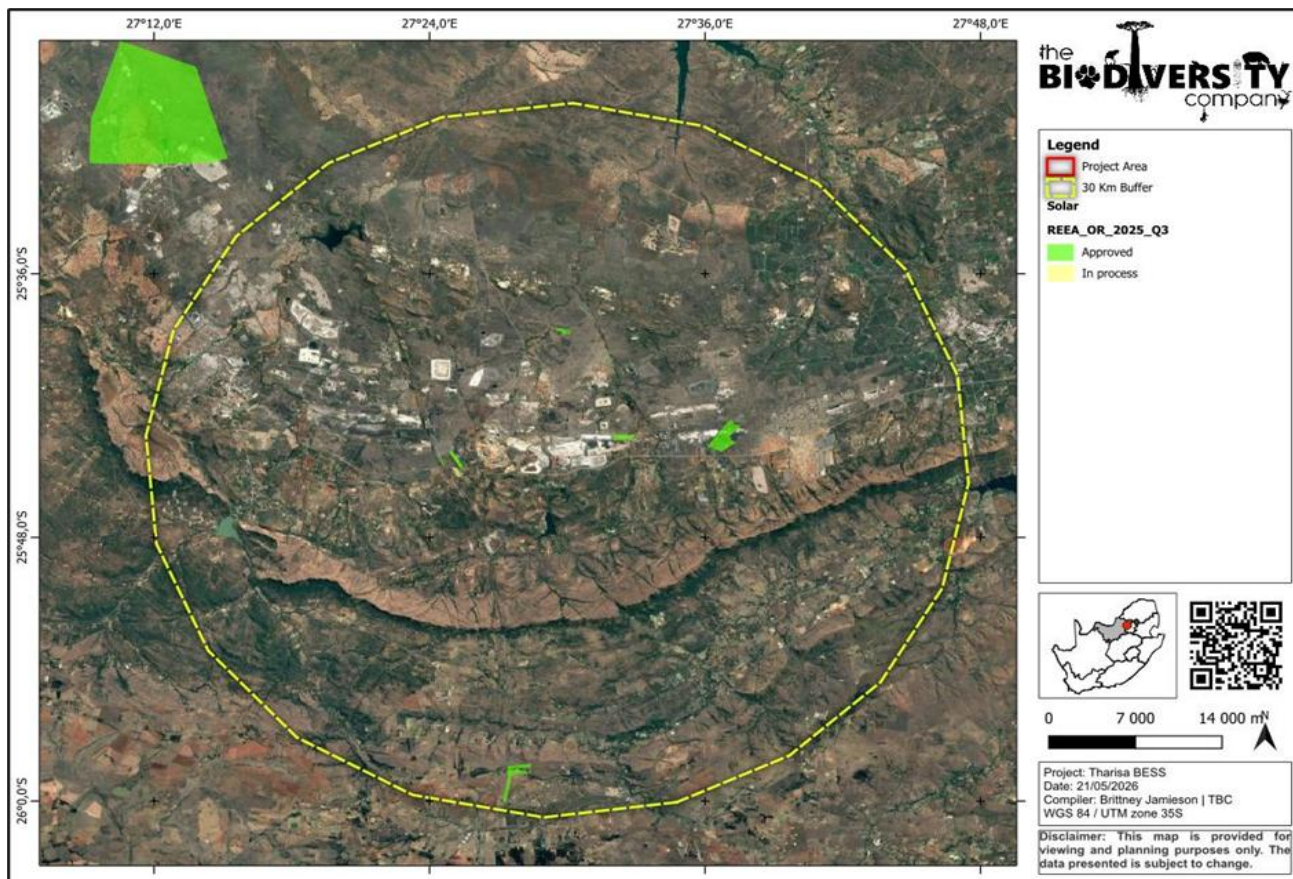


Figure 24: Similar Renewable Projects within a 30 km Radius Surrounding the Proposed Development

9-4 CIVIL AVIATION

The high sensitivity assigned by the DFFE Screening Tool to the Project site is driven by the presence of FAD70E (Magaliesberg Flying Training Area East) and the broader regional airspace context. However, these sensitivities are regional in nature and do not impose site-specific constraints on the proposed development.

The project:

- Is confined to an existing mining footprint;
- Comprises low-height, ground-mounted infrastructure; and
- Does not introduce obstacles or operational interference within the airspace.

Accordingly, no material cumulative impacts on airspace use, flight operations, or aviation infrastructure are anticipated.

Table 12: Summary of Cumulative Impacts per Theme

Environmental Theme	Impact Drivers	Pre-Mitigation Impact	Post-Mitigation Impact	Residual Risk / Outcome
Terrestrial Biodiversity	Existing mining disturbance; severely modified habitat; lack of ecological connectivity.	Low	Low	No material cumulative impact. Disturbance consistent with existing baseline conditions.
Aquatic Biodiversity	No wetlands or watercourses within development footprint or immediate influence area.	Low (negligible)	Low (negligible)	No material cumulative impact anticipated due to absence of aquatic receptors.
Soil & Agricultural Potential	Low agricultural potential soils; existing land disturbance; regional renewable developments.	Medium	Low	Reduced to low following mitigation; no loss of productive agricultural land anticipated.
Civil Aviation	Regional airspace sensitivity (FAD70E); presence of aerodromes within broader region.	Low	Low	No material cumulative impact; infrastructure is low-profile and does not affect airspace.

Based on the above assessment, cumulative impacts across all environmental themes are considered to be low following implementation of standard mitigation measures. The proposed development occurs within an already disturbed mining environment and does not introduce significant additional pressures on environmental or socio-economic receptors. As such, cumulative impacts do not preclude the application of the BESS exclusion norm, subject to ongoing compliance with the EMPr.

SECTION 10: OVERVIEW OF THE REGISTRATION PROCESS

As per Section 2.1 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, which was adopted on 27 March 2024, from the requirement to obtain an EA, the activities contemplated in paragraph 3 of the Norm are excluded from the requirement to obtain an EA, when undertaken in compliance with the requirements contemplated in the paragraph as well as paragraphs 4, 5 and 6, read with paragraph 7 or 8 of the Norm-

2.1.1. where the activities have not yet been commenced with; and

2.1.2. when the activities are proposed entirely in areas of "low" or "medium" environmental sensitivity as identified by the screening tool and verified by relevant specialists as contemplated in paragraph 4, for each of the following environmental themes-

2.1.2.1. Agriculture;

2.1.2.2. Aquatic biodiversity;

2.1.2.3. Terrestrial biodiversity inclusive of flora and ecosystems;

2.1.2.4. Animal species; and

2.1.2.5. Plant species; (a) with the exception of linear infrastructure which forms an integral part of the facility, which is located in a pre-negotiated corridor, which may be located in areas of "very high", "high", "medium" or "low" environmental sensitivity on condition that the requirements contained in paragraph 2.2 are complied with.

As concluded through the specialist SSVRs/ Compliance Statement, the proposed project footprint complies with Section 2.1. The activities that are excluded in relation to the proposed BESS Development are as follows:

Number and date of the relevant notice:	Activity No (s) and Activity Description (in terms of the relevant notice)	Describe each listed activity as per project description
GN.R. 327, 08 December 2014	14: The development and related operation of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic metres.	<p>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).</p> <p>A Rebalancer Unit will be installed adjacent to containers with a total chemical volume of 12 m³. i.e. 5 m³ HCl; 5 m³ NaOH (50%); and 2 m³ Fe-Cr/HCl electrolyte.</p> <p>The aggregate threshold will equal to 98 m³.</p>

10-1 PUBLIC PARTICIPATION PROCESSES

Section 5.1 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, which was adopted on 27 March 2024, from the requirement to obtain an EA states that "the EAP or environmental scientist on behalf of the proponent must identify and consult with parties who may be affected by the proposed facility, including as a minimum the following;

- Adjacent landowners and land occupiers;
- Relevant conservation and biodiversity entities/agencies;
- Relevant non-governmental organisations involved with ecology including bird preservation;
- Relevant tourist and farmers associations;
- The relevant heritage resources authorities and
- Relevant local government authority.

The consultation process must as a minimum include the following;

Notification of the proposed development including-

- Details of the proponent;
- A detailed project description including the need and desirability of the proposed project;
- The location of the proposed facility including a map generated at an appropriate scale that displays the extent of the proposed facility in as much detail as possible overlaid on the identified environmental sensitivities per theme;
- Notification of where the SSVR and Environmental Management Programme (EMPr) can be accessed; and
- A request for inputs and the timeframe in which inputs are to be submitted.

To fulfil the requirements of Section 5.1 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, which was adopted on 27 March 2024, from the requirement to obtain an EA, MC will undertake the PPP as follows:

(a) Announcement of the project

MC will announce the project and the availability of the SSVR, and the EMPr. The reports will be subjected to a PPP of at least **30 days** (from **Friday, 26 June 2026** to **Monday, 27 July 2026**).

The following processes will be undertaken to announce the project process and the draft reports:

- An I&AP database will be compiled and will be maintained and will include all potential Interested and Affected Parties (I&APs) in respect of the application in accordance with Regulation 42.
- Letters will be sent to all I&APs, (written in any of the manners provided for in section 47D of the NEMA, announcing the project and the availability of the reports, containing project information and a locality map) including:
 - The municipal councillor of the ward in which the site is situated;
 - Any organisation of ratepayers that represents the community in the area;
 - The municipality which has jurisdiction in the area;
 - Any organ of state having jurisdiction in respect of any aspect of the activity; and
 - Any other party as required by the Competent Authority (CA), including adjacent communities' members.
- Affected parties of the proposed project, who cannot be reached via mail, fax or e-mail will be visited for delivery of the letters. The letters will attach sheets which will allow I&APs to register and/ or/ comment on the project.
- Four (4) site notice boards will be fixed at a place conspicuous to and accessible by the public at the boundary of the site where the activity to which the application relates. Site notices will be written in English (2) and Setswana (2).
- One (1) advertisement (translated in both English and Setswana) will be placed in the Rustenburg Herald newspaper.
- The draft reports will also be made available on the MC website (<https://manyabeconsultancy.com/stakeholder-engagement/>); and at the Marikana Public Library.
- SMS notifications of the availability of the reports for public comment will be distributed.
- Telephonic consultation will be undertaken with I&APs to obtain comments about the draft reports; and to share information about the Project.

For ease of reference, a summary of the Public Participation Process (PPP) is provided below for I&APs:

Item	Details
Access to Documents	<p>The Draft SSVR and EMPr will be made available for public review at the following locations:</p> <ul style="list-style-type: none"> • Manyabe Consultancy website: https://manyabeconsultancy.com/stakeholder-engagement/. • Marikana Public Library. • On request from the EAP via email.

Item	Details
Comment Submission	I&APs are invited to submit written comments during the public participation period (30 days). Comments can be submitted via: <ul style="list-style-type: none"> • Email • SMS • Telephonic consultation • Written submission forms accompanying notification letters
Public Participation Period	The draft reports will be available for review for a minimum period of 30 days, from 26 June 2026 to 27 July 2026 .
Contact Details	Environmental Assessment Practitioner (EAP): Manyabe Consultancy (Pty) Ltd Contact Person: Ms. Mpho Manyabe Telephone: 011 863 1079 Email: mpho@manyabeconsultancy.com
Additional Notification Channels	<ul style="list-style-type: none"> • Site notices placed at the project site (English and Setswana). • Newspaper advertisement (Rustenburg Herald). • Direct notification to stakeholders and authorities.

Subsequent to the 30 days' period, all comments and representations received from I&APs will be considered and recorded in the Comments and Responses Report (CRR). All I&APs who would have participated in the PPP will be thanked and their comments acknowledged.

(b) Announcement of the registration

MC will ensure that all registered I&APs are notified of the registration. I&APs will be drawn to the fact that appeals may be lodged against the outcome in terms of the National Appeals Regulations, 2025, if such appeals are available in the circumstances of the registration. The notification of registration will be advertised through the following methods:

- Personalised letters to individuals and organisations on the stakeholder database; and
- On the MC website (<https://manyabeconsultancy.com/stakeholder-engagement/>).

SECTION 11: EAP STATEMENT

The Site Sensitivity Verification Assessment undertaken for the proposed Tharisa BESS Development confirmed that the proposed project area is situated entirely within the existing Tharisa Mine footprint on previously disturbed and transformed land. The assessment included a desktop review, screening tool analysis, specialist input, satellite imagery review, and a site inspection to verify the environmental sensitivities associated with the proposed development area.

The findings of the assessment indicate that the preferred development site exhibits predominantly low to medium environmental sensitivities and is largely characterised by existing mining-related disturbances and infrastructure. No critical environmental features were identified within the proposed development footprint that would preclude the establishment of the BESS Development. Furthermore, the specialist studies undertaken confirmed that the proposed project is unlikely to result in significant impacts on biodiversity, aquatic resources, agricultural potential, heritage resources, palaeontological resources, visual receptors, or civil aviation operations, provided that the recommended mitigation and management measures are implemented.

The proposed BESS Development will support Tharisa's sustainability and decarbonisation objectives by enabling the storage and efficient utilisation of renewable energy generated by the associated solar PV system. The project will improve energy security, reduce reliance on conventional energy sources, and demonstrate innovative Fe-Cr flow battery technology developed using materials sourced from the Tharisa Mine.

In conclusion, based on the outcomes of the site sensitivity verification and specialist assessments, the proposed development is considered environmentally acceptable and suitable for implementation at the preferred site. The project complies with the requirements 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, and it is therefore concluded that the proposed Tharisa BESS Development is suitable for registration for exclusion from the requirements to obtain EA, subject to adherence to all applicable management and mitigation measures. All relevant themes have been confirmed as low or medium sensitivity following site verification; and the project meets Section 2.1 requirements of GN 4557 based on the specialists and EAP inputs.

**Appendix A:
Environmental Assessment Practitioner (EAP) Curriculum Vitae**

**Appendix B:
Screening Tool Report**

Appendix C: Specialist Studies Reports

**Appendix C1:
Heritage Screener/ High-Level Desktop Report**

**Appendix C2:
Civil Aviation Compliance Statement**

**Appendix C3:
Terrestrial Biodiversity, Plant and Animal Theme Site Sensitivity Verification Report**

**Appendix C4:
Agricultural Theme Site Sensitivity Verification Report**

**Appendix C5:
Aquatic Biodiversity Theme Site Sensitivity Verification Report**