

Appendix H.6

HERITAGE ASSESSMENT



HERITAGE IMPACT ASSESSMENT

(REQUIRED UNDER SECTION 38(8) OF THE NHRA (No. 25 OF 1999))

FOR THE PROPOSED DALMANUTHA WIND ENERGY FACILITY (WEF), WITHIN THE
EMAKHAZENI LOCAL MUNICIPALITY, MPUMALANGA PROVINCE.

Type of development:

Wind Energy Facility

Client:

WSP

Developer:

ENERTRAG South Africa

Report prepared by:



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Project Reference:

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APPROVAL PAGE

Project Name	Dalmanutha Wind Energy Facility (WEF)
Report Title	Heritage Impact Assessment for the Proposed Dalmanutha (WEF), within the Emakhazeni Local Municipality, Mpumalanga Province.
Authority Reference Number	TBC
Report Status	Final Report
Applicant Name	ENERTRAG South Africa

Responsibility	Name	Qualifications and Certifications	Date
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Amendments on Document

Date	Report Reference Number	Description of Amendment

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REPORT OUTLINE

Appendix 6 of the GNR 326 Environmental Impact Assessment (EIA) Regulations published on 7 April 2017 provides the requirements for specialist reports undertaken as part of the environmental authorisation process. In line with this, Table 1 provides an overview of Appendix 6 together with information on how these requirements have been met.

Table 0-1. Specialist Report Requirements.

Requirement from Appendix 6 of GN 326 EIA Regulation 2017	Chapter
(a) Details of - (i) the specialist who prepared the report; and (ii) the expertise of that specialist to compile a specialist report including a curriculum vitae	Section a Section 12
(b) Declaration that the specialist is independent in a form as may be specified by the competent authority	<i>Declaration of Independence</i>
(c) Indication of the scope of, and the purpose for which, the report was prepared	Section 1
(cA) an indication of the quality and age of base data used for the specialist report	Section 3.4, 7 and 8.
(cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	9
(d) Duration, Date and season of the site investigation and the relevance of the season to the outcome of the assessment	Section 3.4
(e) Description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used	Section 3
(f) details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of site plan identifying site alternatives;	Section 8 and 9
(g) Identification of any areas to be avoided, including buffers	Section 8 and 9
(h) Map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers	Section 8
(I) Description of any assumptions made and any uncertainties or gaps in knowledge	Section 3.7
(j) a description of the findings and potential implications of such findings on the impact of the proposed activity including identified alternatives on the environment or activities;	Section 1.3
(k) Mitigation measures for inclusion in the EMPr	Section 10.1
(l) Conditions for inclusion in the environmental authorisation	Section 10. 1.
(m) Monitoring requirements for inclusion in the EMPr or environmental authorisation	Section 10. 5.
(n) Reasoned opinion - (i) as to whether the proposed activity, activities or portions thereof should be authorised; (iA) regarding the acceptability of the proposed activity or activities; and (ii) if the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan	Section 10.3
(o) Description of any consultation process that was undertaken during the course of preparing the specialist report	Section 5
(p) A summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	Refer to EIA report
(q) Any other information requested by the competent authority	N.A

Declaration of Independence

Specialist Name	Jaco van der Walt
Declaration of Independence	<p>I declare, as a specialist appointed in terms of the National Environmental Management Act (NEMA) (Act No 107 of 1998) and the associated 2014 Environmental Impact Assessment (EIA) Regulations (as amended), that I:</p> <ul style="list-style-type: none"> • I act as an 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 49 A of the Act. of regulation 48 and is punishable in terms of section 24F of the Act.
Signature	
Date	25/04/2023

a) Expertise of the specialist

Jaco van der Walt has been practising as a Cultural Resource Management (CRM) archaeologist for 15 years. Jaco is an accredited member of the Association of South African Professional Archaeologists (ASAPA) (#159) and APHP #114 and have conducted more than 500 impact assessments in Limpopo, Mpumalanga, North West, Free State, Gauteng, Kwa Zulu Natal (KZN) as well as the Northern and Eastern Cape Provinces in South Africa.

Jaco has worked on various international projects in Zimbabwe, Botswana, Mozambique, Lesotho, Democratic Republic of the Congo (DRC) Zambia, Guinea, Afghanistan, Nigeria and Tanzania. Through this, he has a sound understanding of the International Finance Corporations (IFC) Performance Standard requirements, with specific reference to Performance Standard 8 – Cultural Heritage

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Executive Summary

WSP was appointed as the Environmental Assessment Practitioner (EAP) by ENERTRAG South Africa (Pty) Ltd to undertake the required Environmental Authorisation Process for the proposed development of a Wind Energy Facility (Dalmanutha WEF) that will form part of the Dalmanutha WEF Cluster Development. Beyond Heritage was appointed to conduct a Heritage Impact Assessment (HIA) for the Project and the study area was assessed on a desktop level and by a non-intrusive pedestrian field survey conducted for the cluster. This report is for the Dalmanutha WEF facility including two alternatives, key findings of the assessment include:

- The Project area is situated in an agricultural landscape consisting of farms with mixed farming activities including cattle, sheep, goat, and the cultivation of various crops;
- The Project is located within a rich cultural landscape with a cultural layering dating from the Stone Age, through the Iron Age to the historical period;
- During the survey of the Dalmanutha WEF cluster, a large number of the aforementioned type sites were recorded and were grouped into four categories. **Category A** sites that are burial sites, **Category B** sites that consist of standing structures like farmsteads (some that could be older than 60 years) and farming infrastructure like kraals etc as well as ruins that could date to the recent past or be historical. **Category C** sites that are archaeological sites and findspots dating to the Late Iron Age and Middle Stone Age and **Category D** sites that relate or could potentially relate to the Anglo Boer War battlefields in the area;
- The landscape is also considered to be a heritage resource with a strong cultural component dating to Late Iron Age occupation (AD 1600-1800's) of the area represented by the various stone walled settlements dating to this period. A second cultural layer consists of 20th century farmsteads and associated infrastructure and most importantly features relating to Anglo Boer war (1899-1902) battle of 'Berg en Dal/Dalmanutha' which were fought across the study area during the time, and the old wagon route that passed to the north of the study area along the N4. The Berg en dal Monument commemorating the battle is located to the north of the study area.
- The impacts to tangible heritage resources can be mitigated by micro siting of the Project components to avoid all known significant heritage resources. The main impacts of concern relate to the two cultural landscapes identified and sense of place of the study area where the visual impacts to the cultural landscapes of the area are the key impacts of concern. The precolonial landscape of Iron Age occupation and the historical cultural landscape of the 20th century farmsteads and the 'Berg en Dal' battlefield will be impacted contextually through the addition of wind turbines and related infrastructure;
- The study area is indicated as low to high and to very high palaeontological significance and an independent study by Prof Marion Bamford (2023) concluded that it is extremely unlikely that any fossils would be preserved in the overlying soils and sands of the Quaternary; and
- From a heritage perspective the impacts on resources are similar for Alternative 1 and 2 and there is no preferred Alternative.

Direct impacts on tangible heritage resources can be mitigated to an acceptable level however the visual impacts to the cultural landscapes of the area are the key impacts of concern. The following conditions should be included as part of the authorisation should one be issued, based on the South African Heritage Resource Authority (SAHRA) 's approval.

Recommendations:

- Micro siting of Project components to preserve recorded heritage features with a 30m buffer;
- Regular monitoring of the development footprint by the ECO to implement the Chance Find Procedure for heritage and palaeontology resources (outlined in Section 10.2) in case heritage resources are uncovered during the course of construction;
- Implementation of mitigation measures from a visual impact assessment to minimise visual impacts to the cultural landscapes;

- Heritage walkdown of the final layout prior to construction with recommendations made for mitigation as required; and
- Compilation of a heritage management plan for the Dalmanutha WEF Project.

ABBREVIATIONS

ASAPA: Association of South African Professional Archaeologists
BGG Burial Ground and Graves
CFPs: Chance Find Procedures
CMP: Conservation Management Plan
CRR: Comments and Response Report
CRM: Cultural Resource Management
DFFE: Department of Fisheries, Forestry and Environment,
EA: Environmental Authorisation
EAP: Environmental Assessment Practitioner
ECO: Environmental Control Officer
EIA: Environmental Impact Assessment*
EIA: Early Iron Age*
EAP Environmental Assessment Practitioner
EMPr: Environmental Management Programme
ESA: Early Stone Age
ESIA: Environmental and Social Impact Assessment
GIS Geographical Information System
GPS: Global Positioning System
GRP Grave Relocation Plan
HIA: Heritage Impact Assessment
LIA: Late Iron Age
LSA: Late Stone Age
MEC: Member of the Executive Council
MIA: Middle Iron Age
MPRDA: Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002)
MSA: Middle Stone Age
NEMA National Environmental Management Act, 1998 (Act No. 107 of 1998)
NHRA National Heritage Resources Act, 1999 (Act No. 25 of 1999)
NID Notification of Intent to Develop
NoK Next-of-Kin
PRHA: Provincial Heritage Resource Agency
SADC: Southern African Development Community
SAHRA: South African Heritage Resources Agency

**Although EIA refers to both Environmental Impact Assessment and the Early Iron Age both are internationally accepted abbreviations and must be read and interpreted in the context it is used.*

GLOSSARY

Archaeological site (remains of human activity over 100 years old)

Earlier Stone Age (~ 2.6 million to 250 000 years ago)

Middle Stone Age (~ 250 000 to 40-25 000 years ago)

Later Stone Age (~ 40-25 000, to recently, ~ 100 years ago)

The Iron Age (~ AD 400 to 1840)

Historic (~ AD 1840 to 1950)

Historic building (over 60 years old)

1 Introduction and Terms of Reference:

Beyond Heritage was appointed to conduct a HIA for the proposed development of the Dalmanutha WEF that will form part of the Dalmanutha Wind Energy Facility Cluster Development. The Project site is located approximately 12km south-southeast of Belfast, within the Emakhazeni Local Municipality, in the Mpumalanga Province (Figure 1.1 to 1.3). The report forms part of the Environmental Impact Assessment (EIA) and Environmental Management Programme Report (EMPr) for the development.

The aim of the study is to survey the proposed development footprint to identify cultural heritage sites, document, and assess their importance within local, provincial, and national context. It serves to assess the impact of the proposed Project on non-renewable heritage resources, and to submit appropriate recommendations with regard to the responsible cultural resources management measures that might be required to assist the developer in managing the discovered heritage resources in a responsible manner. It is also conducted to protect, preserve, and develop such resources within the framework provided by the National Heritage Resources Act of 1999 (Act No 25 of 1999). The report outlines the approach and methodology utilized before and during the survey, which includes Phase 1, review of relevant literature; Phase 2, the physical surveying of the area on foot and by vehicle; Phase 3, reporting the outcome of the study.

During the survey finds included archaeological features, structures, battlefield site and burial sites. General site conditions and features on sites were recorded by means of photographs, GPS locations and site descriptions. Possible impacts were identified and mitigation measures are proposed in the following report. SAHRA as a commenting authority under section 38(8) of the National Heritage Resources Act, 1999 (Act No. 25 of 1999) require all environmental documents, compiled in support of an Environmental Authorisation application as defined by NEMA EIA Regulations section 40 (1) and (2), to be submitted to SAHRA for commenting. Upon submission to SAHRA the Project will be automatically given a case number as reference. As such the EIA report and its appendices must be submitted to the case as well as the EMPr, once it's completed by the Environmental Assessment Practitioner (EAP).

1.1 Terms of Reference

Field study

Conduct a field study to: (a) understand the heritage character of the area; b) record GPS points of sites/areas identified as significant areas; c) determine the levels of significance of the various types of heritage resources affected by the proposed development.

Reporting

Report on the identification of anticipated and cumulative impacts the operational units of the proposed Project activity may have on the identified heritage resources for all 3 phases of the Project; i.e., construction, operation and decommissioning phases. Consider alternatives, should any significant sites be impacted adversely by the proposed Project. Ensure that all studies and results comply with the relevant legislation, SAHRA minimum standards and the code of ethics and guidelines of ASAPA.

To assist the developer in managing the discovered heritage resources in a responsible manner, and to protect, preserve, and develop them within the framework provided by the National Heritage Resources Act of 1999 (Act No 25 of 1999).

1.2 Project Description

The proposed Dalmanutha WEF has two alternative layouts and both are considered in this report:

- Alternative 1 comprises up to 70 turbines; and
- Alternative 2 is a hybrid concept with 44 turbines as well as two solar fields.

Project details are provided in Table 1-1 and provided below.

Table 1-1: Project Description

Project area	The Project site is on Portions 4, 5, 15, 17 of the Farm Vogelstruispoort 384 JT and Portion 6 of the Farm Waaikraal 385 JT
Magisterial District	Emakhazeni Local Municipality
Central co-ordinate of the development	25°49'28.20"S and 30° 6'31.81"E
Topographic Map Number	2530CC

Dalmanutha Wind Facility – Alternative 1

The proposed Dalmanutha WEF will be developed with a capacity of up to 300 megawatts (MW), and will comprise the following key components:

Wind Turbines

- Up to 70 turbines, each with a foundation of approximately 25m² in diameter (500m² area and requiring ~2 500m³ concrete each) and approximately 3m depth;
- Turbine hub height of up to 200m;
- Rotor diameter up to 200m; and
- Permanent hard standing area for each wind turbine (approximately 4ha).

IPP portion onsite Substation and Battery Energy Storage System (BESS)

- IPP portion onsite substation of up to 4ha. The substation will consist of a high voltage substation yard to allow for multiple up to 132kV feeder bays and transformers, control building, telecommunication infrastructure, access road, etc.; and
- The Battery Energy Storage System (BESS) storage capacity will be up to 300MW/1200 megawatt-hour (MWh) with up to four hours of storage. It is proposed that Lithium Battery Technologies, such as Lithium Iron Phosphate, Lithium Nickel Manganese Cobalt oxides or Vanadium Redox flow technologies will be considered as the preferred battery technology; however, the specific technology will only be determined following Engineering, Procurement, and Construction (EPC) procurement. The main components of the BESS include the batteries, power conversion system and transformer which will all be stored in various rows of containers.

Operation and Maintenance Building Infrastructure

- Operations and maintenance (O&M) building infrastructure will be required to support the functioning of the WEF and for services required by operations and maintenance staff. The O&M building infrastructure will be near the onsite substation and will include:
- Operations building of approximately 200m²;
- Workshop and stores area of approximately 150m² each;
- Stores area of approximately 150m²; and
- Septic/conservancy tanks with portable toilets to service ablution facilities.

Construction Camp Laydown

- Temporary laydown or staging area -Typical area 220m x 100m = 22000m².
- Laydown area could increase to 30000m² for concrete towers, should they be required.
- Sewage: septic and/or conservancy tanks and portable toilets.

- Temporary cement batching plant, wind tower factory & yard of approximately 7ha, comprising amongst others, a concrete storage area, batching plant, electrical infrastructure and substation, generators and fuel stores, gantries and loading facilities, offices, material stores (rebar, concrete, aggregate and associated materials), mess rooms, workshops, laydown and storage areas, sewage and toilet facilities, offices and boardrooms, labour mess and changerooms, mixers, moulds and casting areas, water and settling tanks, pumps, silos and hoppers, a laboratory, parking areas, internal and access roads - Gravel and sand will be stored in separate heaps whilst the cement will be contained in a silo. The maximum height of the silo will be 20m.

Access Roads

- The Project site can be accessed easily via either the tarred R33 or the N4 national road which run along the northern and western boundaries of the site.
- There is an existing road that goes through the land parcels to allow for direct access to the project development area.
- Internal and access roads with a width of between 8m and 10m, which can be increased to approximately 12m on bends. The roads will be positioned within a 20m wide corridor to accommodate cable trenches, stormwater channels and bypass /circles of up to 20m during construction. Length of the internal roads will be approximately 60km.

Associated Infrastructure

- The medium voltage collector system will comprise of cables up to and including 33kV that run underground, except where a technical assessment suggest that overhead lines are required, within the facility connecting the turbines to the onsite substation.
- Fencing of up to 4m high around the construction camp and lighting.
- Lightning protection.
- Telecommunication infrastructure.
- Stormwater channels.
- Water pipelines.
- Offices.
- Operational control centre.
- Operation and Maintenance Area / Warehouse/workshop.
- Ablution facilities.
- A gatehouse.
- Control centre, offices, warehouses.
- Security building.
- A visitor's centre.
- Substation building.

The proposed development footprint (buildable area) is approximately 400ha (subject to finalisation based on technical and environmental requirements), and the extent of the Project area is approximately 9400 ha. The development footprint includes the turbine positions and all associated infrastructure as outlined above

Dalmanutha Wind and Solar Facility – Alternative 2

The proposed Dalmanutha Wind and Solar Energy Facility will be developed with a capacity of up to 300 megawatts (MW), and will comprise the following key components:

Wind Turbines

- Up to 44 turbines, each with a foundation of approximately 25m² in diameter (500m² area and requiring ~2 500m³ concrete each) and approximately 3m depth;
- Turbine hub height of up to 200m;
- Rotor diameter up to 200m; and
- Permanent hard standing area for each wind turbine (approximately 1ha per turbine).

Solar Fields

- Solar PV array comprising PV modules (solar panels), which convert the solar radiation into direct current (DC);
- PV panels will be up to a height of 6m (when the panel is horizontal) and will be mounted on fixed tilt, single axis tracking or dual axis tracking mounting structures. Monofacial or bifacial Solar PV Modules are both considered;
- Footprint: ~160 ha; and
- Inverters, transformers and other required associated electrical infrastructure and components.

IPP portion onsite Substation and Battery Energy Storage System (BESS)

- IPP portion onsite substation of up to 4ha. The substation will consist of a high voltage substation yard to allow for multiple up to 132kV feeder bays and transformers, control building, telecommunication infrastructure, access road, etc.; and
- The Battery Energy Storage System (BESS) storage capacity will be up to 300MW/1200 megawatt-hour (MWh) with up to four hours of storage. It is proposed that Lithium Battery Technologies, such as Lithium Iron Phosphate, Lithium Nickel Manganese Cobalt oxides or Vanadium Redox flow technologies will be considered as the preferred battery technology; however, the specific technology will only be determined following Engineering, Procurement, and Construction (EPC) procurement. The main components of the BESS include the batteries, power conversion system and transformer which will all be stored in various rows of containers.

Operation and Maintenance Building Infrastructure

- Operations and maintenance (O&M) building infrastructure will be required to support the functioning of the WEF and SEF and for services required by operations and maintenance staff. The O&M building infrastructure will be near the onsite substation and will include:
- Operations building of approximately 200m²;
- Workshop and stores area of approximately 150m² each;
- Stores area of approximately 150m²; and
- Refuse area for temporary waste and septic/conservancy tanks with portable toilets to service ablution facilities.

The total combined area of the buildings will not exceed 5 000m².

Construction Camp Laydown

- Temporary laydown or staging area -Typical area 220m x 100m = 22000m².
- Laydown area could increase to 30000m² for concrete towers, should they be required.
- Sewage: septic and/or conservancy tanks and portable toilets.
- Temporary cement batching plant, wind tower factory & yard of approximately 7ha, comprising amongst others, a concrete storage area, batching plant, electrical infrastructure and substation, generators and fuel stores, gantries and loading facilities, offices, material stores (rebar, concrete, aggregate and associated materials), mess rooms, workshops, laydown and storage areas, sewage and toilet facilities, offices and boardrooms, labour mess and changerooms, mixers, moulds and casting areas, water and settling tanks, pumps, silos and hoppers, a laboratory, parking areas, internal and access roads - Gravel and sand will be stored in separate heaps whilst the cement will be contained in a silo. The maximum height of the silo will be 20m.

Access Roads

- The Project site can be accessed easily via either the tarred R33 or the N4 national road which run along the northern and western boundaries of the site.
- There is an existing road that goes through the land parcels to allow for direct access to the project development area.
- Internal and access roads with a width of between 8m and 10m for the WEF, which can be increased to approximately 12m on bends. The roads will be positioned within a 20m wide corridor to accommodate cable trenches, stormwater channels and bypass /circles of up to 20m during construction. Length of the internal roads will be approximately 60km. For the SEF, internal gravel roads will be established between the arrays and will be up to 4m wide.

Associated Infrastructure

- For the WEF, the medium voltage collector system will comprise of cables up to and including 33kV that run underground, except where a technical assessment suggest that overhead lines are required, within the facility connecting the turbines to the onsite substation. The SEF will comprise low and medium voltage cabling between components (above or below ground as needed).
- Fencing of up to 4m high around the construction camp and lighting.
- Lightning protection.
- Telecommunication infrastructure.
- Stormwater channels.
- Water pipelines.
- Offices.
- Operational control centre.
- Operation and Maintenance Area / Warehouse/workshop.
- Ablution facilities.
- A gatehouse.
- Control centre, offices, warehouses.
- Security building.
- A visitor's centre.
- Substation building.

The proposed development footprint (buildable area) for the Dalmanutha Wind and Solar Energy Facility is approximately 400ha (subject to finalisation based on technical and environmental requirements), and the extent of the Project area is approximately 8 000ha. The development footprint includes the turbine positions and all associated infrastructure as outlined above.

1.3 Alternatives

Two alternatives were provided as detailed in Section 1.2 and the area assessed allows for siting of the development to avoid impacts to heritage resources.

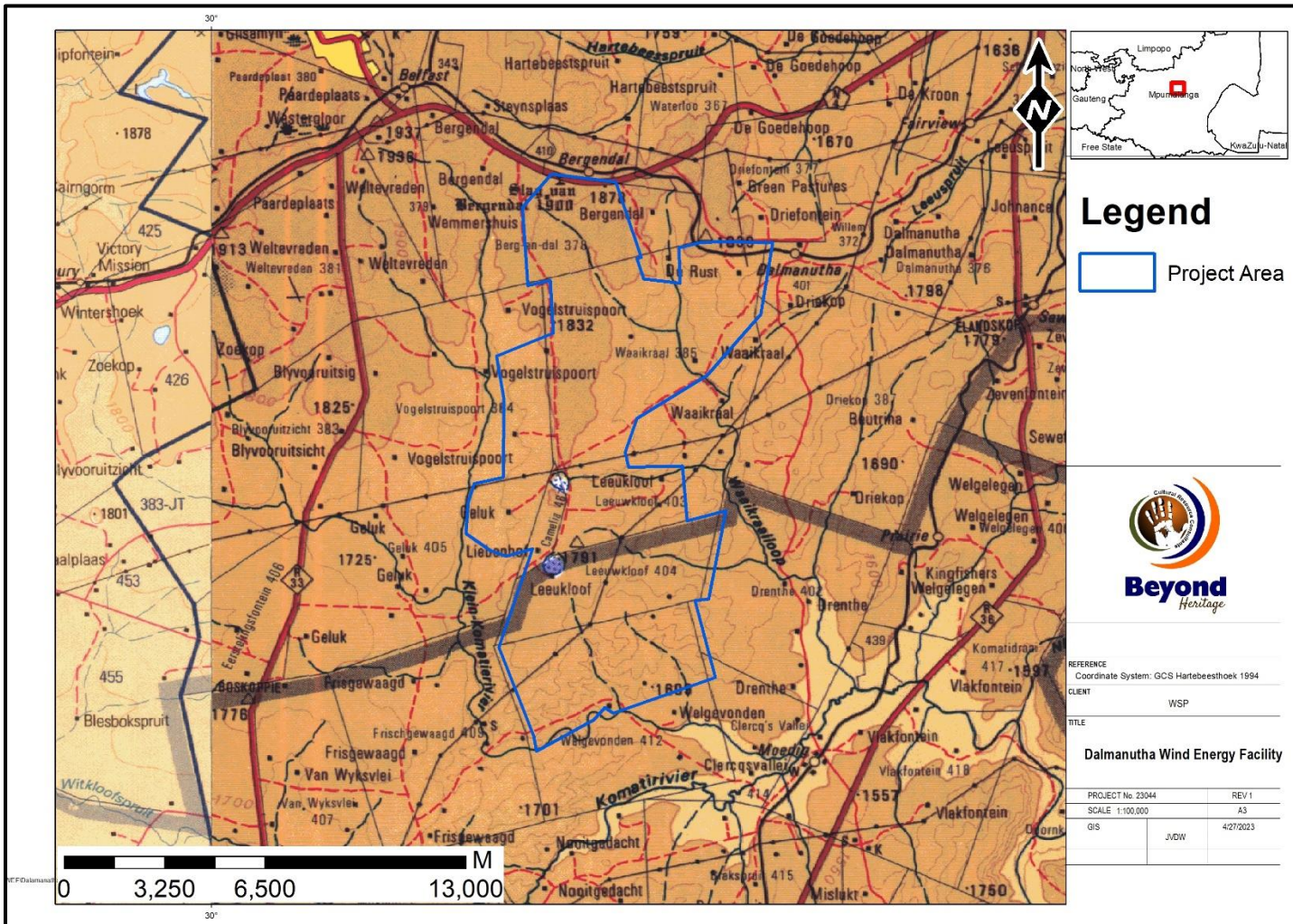


Figure 1.1. Regional setting of the Project (1: 250 000 topographical map).

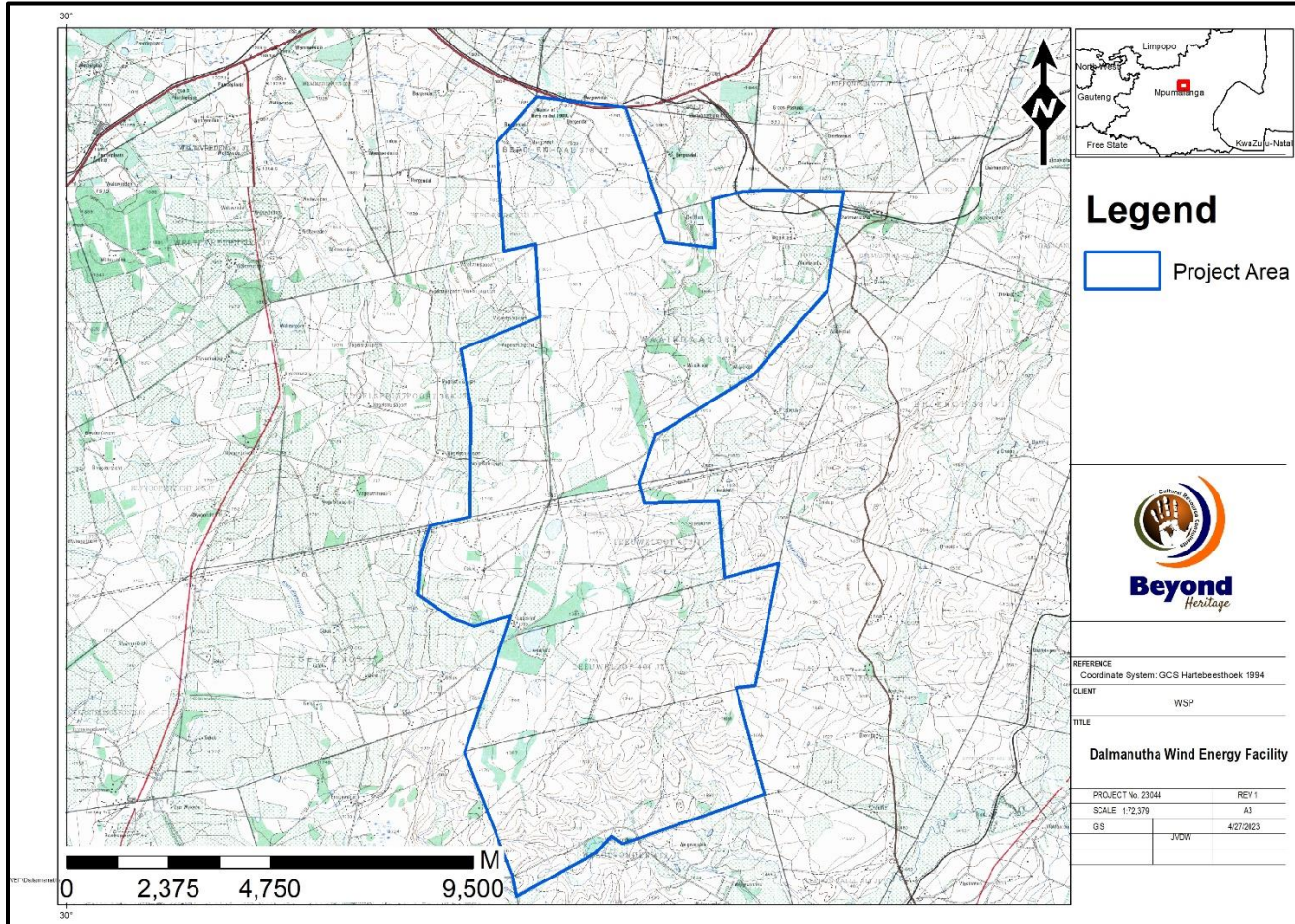


Figure 1.2. Local setting of the Project (1: 50 000 topographical map).

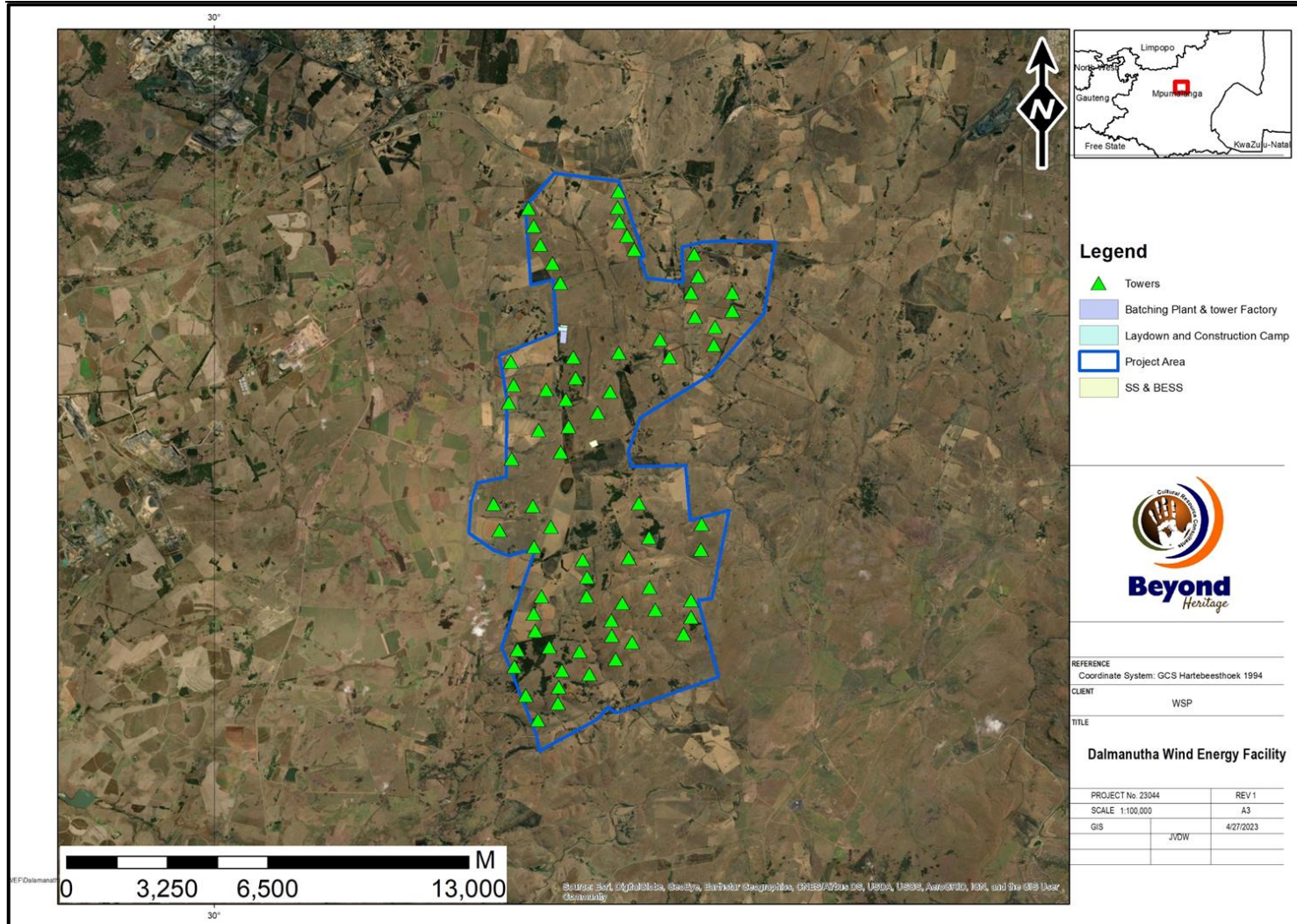


Figure 1.3. Aerial image of the study area and Project components of Alternative 1.

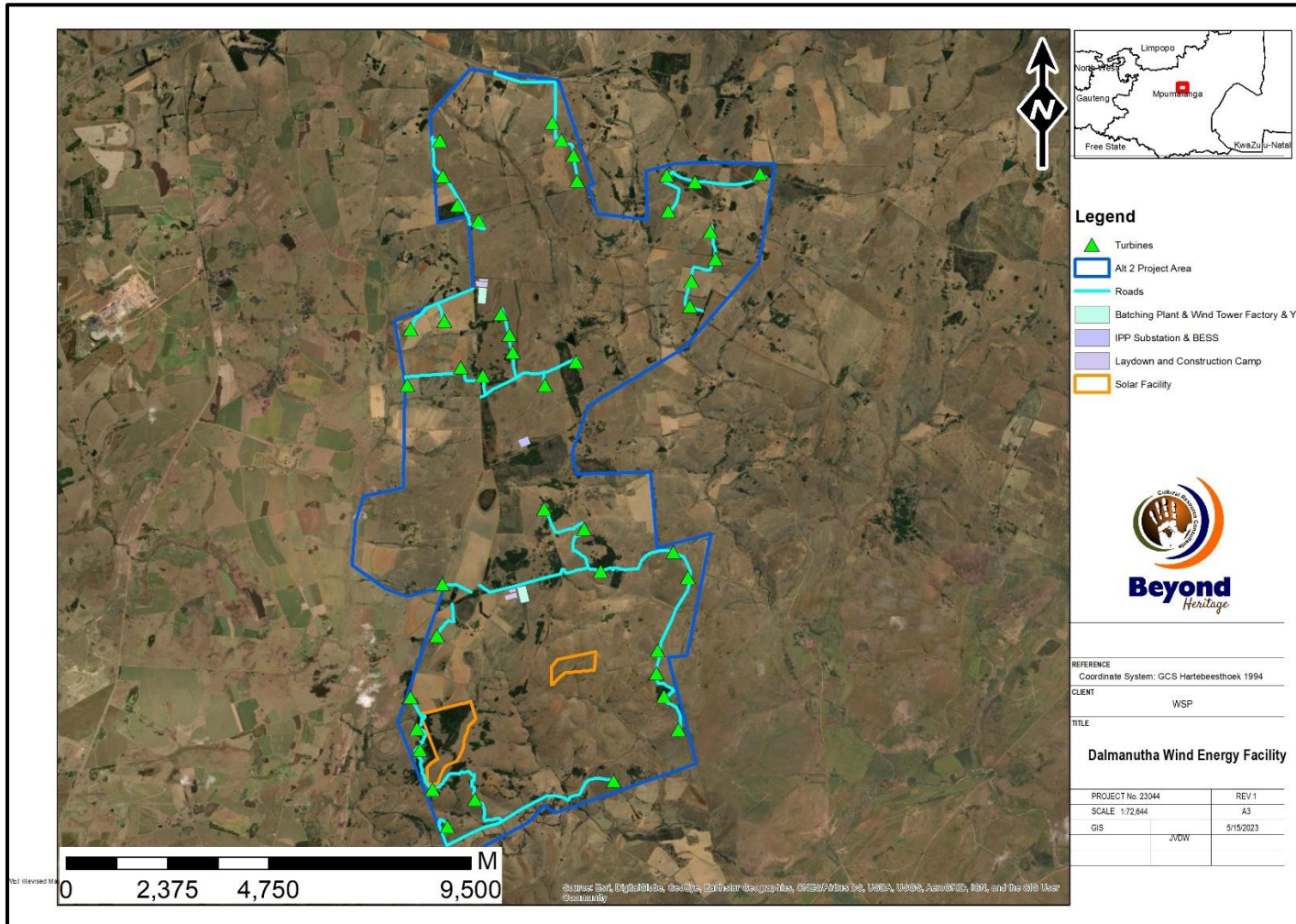


Figure 1.4. Aerial image of the study area and Project components of Alternative 2.

2 Legislative Requirements

The HIA, as a specialist sub-section of the EIA, is required under the following legislation:

- National Heritage Resources Act (NHRA), Act No. 25 of 1999)
- National Environmental Management Act (NEMA), (Act No. 107 of 1998 - Section 23(2)(b))

A Phase 1 HIA is a pre-requisite for development in South Africa as prescribed by SAHRA and stipulated by legislation. The overall purpose of heritage specialist input is to:

- Identify any heritage resources, which may be affected;
- Assess the nature and degree of significance of such resources;
- Establish heritage informants/constraints to guide the development process through establishing thresholds of impact significance;
- Assess the negative and positive impact of the development on these resources; and
- Make recommendations for the appropriate heritage management (or avoidance) of these impacts.

The HIA should be submitted, as part of the impact assessment report or EMPr, to the Provincial Heritage Resource Agency (PHRA) or to SAHRA. SAHRA will ultimately be responsible for the evaluation of Phase 1 HIA reports upon which review comments will be issued. 'Best practice' requires Phase 1 HIA reports and additional development information, as per the impact assessment report and/or EMPr, to be submitted in duplicate to SAHRA after completion of the study. SAHRA accepts Phase 1 HIA reports authored by professional archaeologists, accredited with ASAPA or with a proven ability to do archaeological work.

Minimum accreditation requirements include an Honours degree in archaeology or related discipline and 3 years post-university CRM experience (field supervisor level). Minimum standards for reports, site documentation and descriptions are set by ASAPA in collaboration with SAHRA. ASAPA is based in South Africa, representing professional archaeology in the Southern African Development Community (SADC) region. ASAPA is primarily involved in the overseeing of ethical practice and standards regarding the archaeological profession. Membership is based on proposal and secondment by other professional members.

Phase 1 HIA's are primarily concerned with the location and identification of heritage sites situated within a proposed development area. Identified sites should be assessed according to their significance. Relevant conservation or Phase 2 mitigation recommendations should be made. Recommendations are subject to evaluation by SAHRA.

Conservation or Phase 2 mitigation recommendations, as approved by SAHRA, are to be used as guidelines in the developer's decision-making process.

Phase 2 archaeological projects are primarily based on salvage/mitigation excavations preceding development destruction or impact on a site. Phase 2 excavations can only be conducted with a permit, issued by SAHRA to the appointed archaeologist. Permit conditions are prescribed by SAHRA and include (as minimum requirements) reporting back strategies to SAHRA and deposition of excavated material at an accredited repository.

In the event of a site conservation option being preferred by the developer, a site management plan, prepared by a professional archaeologist and approved by SAHRA, will suffice as minimum requirement.

After mitigation of a site, a destruction permit must be applied for with SAHRA by the applicant before development may proceed.

Human remains older than 60 years are protected by the National Heritage Resources Act, with reference to Section 36 and GNR 548 as well as the SAHRA BGG Policy 2020. Graves older than 60 years, but younger than 100 years fall under Section 36 of Act 25 of 1999 (NHRA), as well as the National Health Act of 2003 and are under the jurisdiction of SAHRA. The procedure for Consultation Regarding Burial Grounds and Graves (Section 36[5]) of Act 25 of 1999 is applicable to graves older than 60 years that are situated outside a formal cemetery administrated by a local authority. Graves in this age category, located inside a formal cemetery administrated by a local authority, require the same authorisation as set out for graves younger than 60 years, in addition to SAHRA authorisation. If the grave is not situated inside a formal cemetery, but is to be relocated to one, permission from the local authority is required and all regulations, laws and by-laws, set by the cemetery authority, must be adhered to.

Human remains that are less than 60 years old are protected under Section 2(1) of the Removal of Graves and Dead Bodies Ordinance (Ordinance No. 7 of 1925) re-instituted by Proclamation 109 of 17 June 1994 and implemented by CoGHSTA as well as the National Health Act of 2003 and are the jurisdiction of the National Department of Health and the relevant Provincial Department of Health and must be submitted for final approval to the office of the relevant Provincial Premier. . Authorisation for exhumation and reinternment must also be obtained from the relevant local or regional council where the grave is situated, as well as the relevant local or regional council to where the grave is being relocated. All local and regional provisions, laws and by-laws must also be adhered to. To handle and transport human remains, the institution conducting the relocation should be authorised under the National Health Act of 2003.

3 METHODOLOGY

3.1 Literature Review

A brief survey of available literature was conducted to extract data and information on the area in question to provide general heritage context into which the development would be set. This literature search included published material, unpublished commercial reports and online material, including reports sourced from the South African Heritage Resources Information System (SAHRIS).

3.2 Genealogical Society and Google Earth Monuments

Google Earth and 1:50 000 maps of the area were utilised to identify possible places where sites of heritage significance might be located; these locations were marked and visited during the fieldwork phase. The database of the Genealogical Society was consulted to collect data on any known graves in the area.

3.3 Public Consultation and Stakeholder Engagement:

Stakeholder engagement is a key component of any EA process, it involves stakeholders interested in, or affected by the proposed development. Stakeholders are provided with an opportunity to raise issues of concern (for the purposes of this report only heritage related issues will be included). The aim of the public consultation (conducted by the EAP) process was to capture and address any issues raised by community members and other stakeholders during key stakeholder and public meetings.

3.4 Site Investigation

The aim of the site visit was to:

- a) survey the proposed Project area to understand the heritage character of the development footprint (focussing on the current layout);
- b) record GPS points of sites/areas identified as significant areas;
- c) determine the levels of significance of the various types of heritage resources recorded in the Project area.

Table 3-1: Site Investigation Details

	Site Investigation
Date	Week of 24 October 2022
Season	Summer – The time of year did influence the survey with heavy rainfall during the survey that restricted access and dense grass cover that limited archaeological visibility. The layout was also changed after the site visit resulting in some areas not physically assessed. The development footprint was however sufficiently covered to understand the heritage character of the area (Figures 3.1 and 3.2).

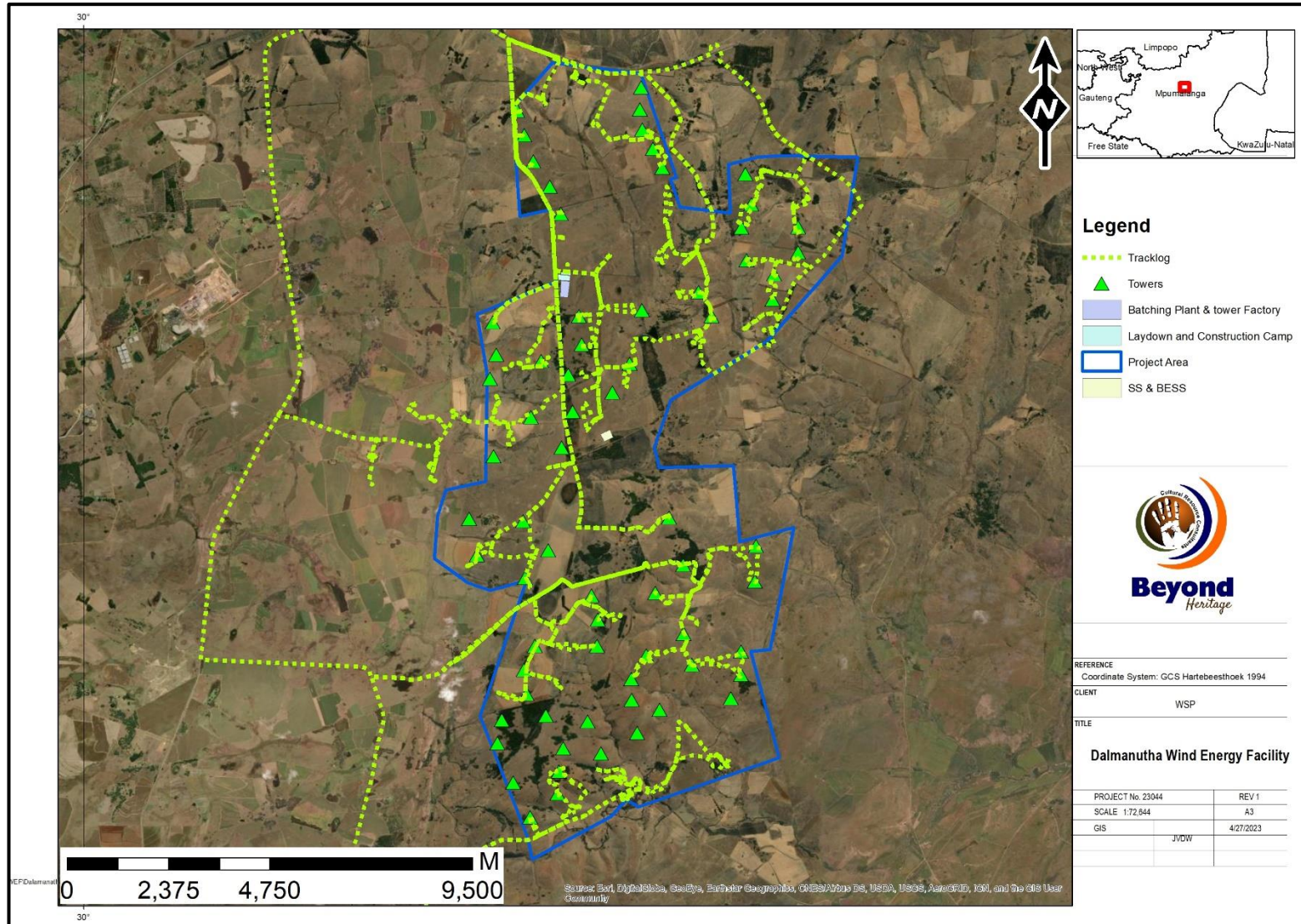


Figure 3.1. Tracklog of the survey path in green for Alternative1.

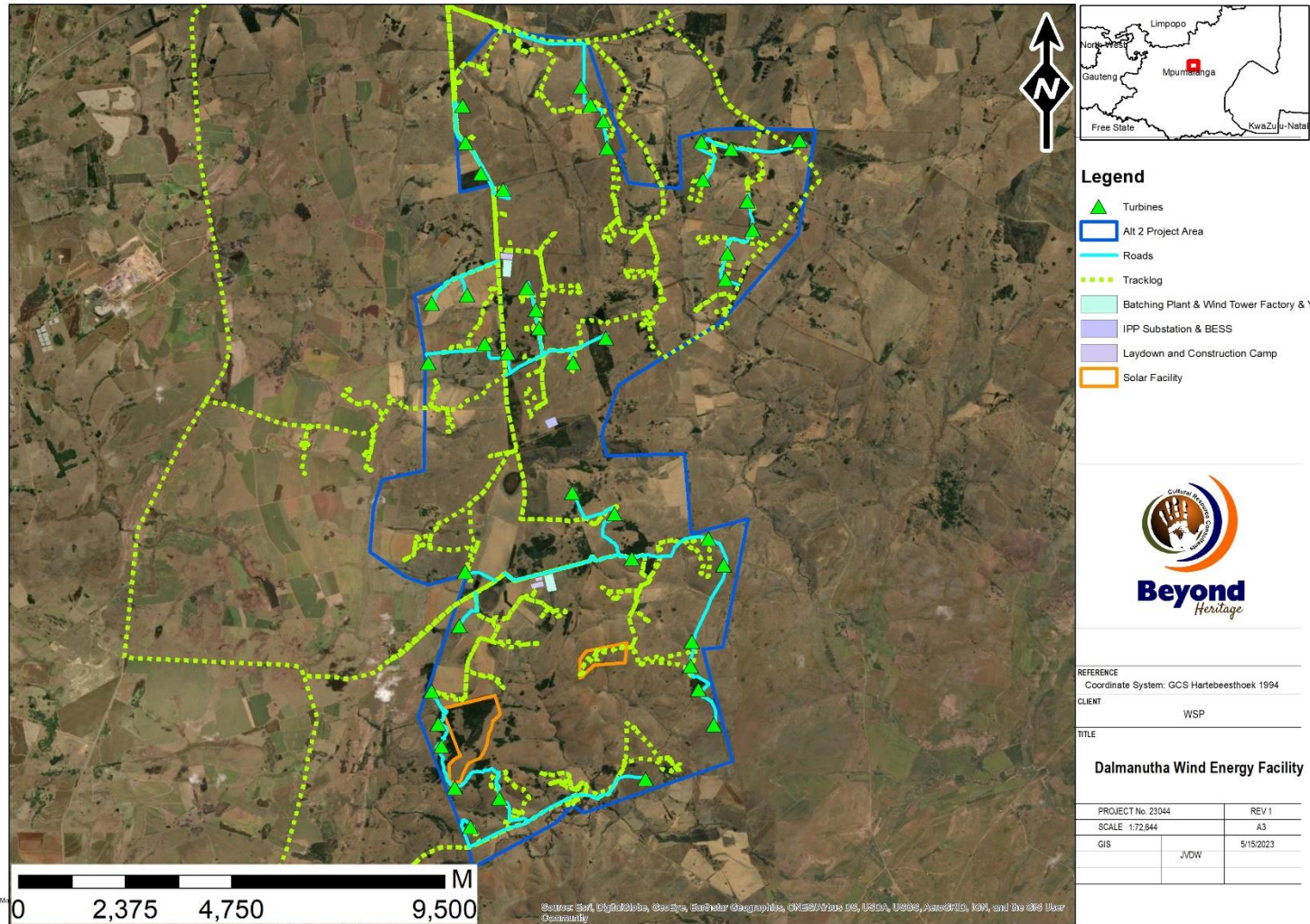


Figure 3.2. Tracklog of the survey path in green for Alternative 2.

3.5 Site Significance and Field Rating

Section 3 of the NHRA distinguishes nine criteria for places and objects to qualify as ‘part of the national estate’ if they have cultural significance or other special value. These criteria are:

- Its importance in/to the community, or pattern of South Africa’s history;
- Its possession of uncommon, rare or endangered aspects of South Africa’s natural or cultural heritage;
- Its potential to yield information that will contribute to an understanding of South Africa’s natural or cultural heritage;
- Its importance in demonstrating the principal characteristics of a particular class of South Africa’s natural or cultural places or objects;
- Its importance in exhibiting particular aesthetic characteristics valued by a community or cultural group;
- Its importance in demonstrating a high degree of creative or technical achievement at a particular period;
- Its strong or special association with a particular community or cultural group for social, cultural or spiritual reasons;
- Its strong or special association with the life or work of a person, group or organisation of importance in the history of South Africa;
- Sites of significance relating to the history of slavery in South Africa.

The presence and distribution of heritage resources define a ‘heritage landscape’. In this landscape, every site is relevant. In addition, because heritage resources are non-renewable, heritage surveys need to investigate an entire project area, or a representative sample, depending on the nature of the project. In the case of the proposed Project the local extent of its impact necessitates a representative sample and only the footprint of the areas demarcated for development were surveyed. In all initial investigations, however, the specialists are responsible only for the identification of resources visible on the surface. This section describes the evaluation criteria used for determining the significance of archaeological and heritage sites. The following criteria were used to establish site significance with cognisance of Section 3 of the NHRA:

- The unique nature of a site;
- The integrity of the archaeological/cultural heritage deposits;
- The wider historic, archaeological and geographic context of the site;
- The location of the site in relation to other similar sites or features;
- The depth of the archaeological deposit (when it can be determined/is known);
- The preservation condition of the sites; and
- Potential to answer present research questions.

In addition to this criteria field ratings prescribed by SAHRA (2007), and acknowledged by ASAPA for the SADC region, were used for the purpose of this report. The recommendations for each site should be read in conjunction with section 10 of this report.

Table 3-2: Heritage significance and field ratings

<i>FIELD RATING</i>	<i>GRADE</i>	<i>SIGNIFICANCE</i>	<i>RECOMMENDED MITIGATION</i>
National Significance (NS)	Grade 1	-	Conservation; national site nomination
Provincial Significance (PS)	Grade 2	-	Conservation; provincial site nomination
Local Significance (LS)	Grade 3A	High significance	Conservation; mitigation not advised
Local Significance (LS)	Grade 3B	High significance	Mitigation (part of site should be retained)
Generally Protected A (GP. A)	-	High/medium significance	Mitigation before destruction
Generally Protected B (GP. B)	-	Medium significance	Recording before destruction
Generally Protected C (GP.C)	-	Low significance	Destruction

3.6 Impact Assessment Methodology

The following impact assessment methodology was provided by WSP.

Criteria by which impacts is to be assessed:

Criteria	Number of Points to Score				
	Score 1	Score 2	Score 3	Score 4	Score 5
Impact Magnitude (M)	Very low	Low	Medium	High	Very high
Impact Extent (E)	Site only	Local	Regional	National	International
Impact Reversibility (R)	Reversible		Recoverable		Irreversible
Impact Duration (D)	Immediate	Short Term	Medium term	Long term	Permanent
Probability of Occurrence (P)	Improbable	Low	Medium	High	Definite

Based on impact significance criteria determined by DEAT, 1998					
CRITERIA	SCORE 1	SCORE 2	SCORE 3	SCORE 4	SCORE 5
Impact Magnitude (M) The degree of alteration of the affected environmental receptor	Very low	Low	Medium	High	Very high
Impact Extent (E) The geographical extent of the impact on a given environmental receptor	Site: Site only	Local: Inside activity area	Regional: Outside activity area	National: National scope or level	International: Across borders or boundaries
Impact Reversibility (R) The ability of the environmental receptor to rehabilitate or restore after the activity has caused environmental change	Reversible: Recovery without rehabilitation		Recoverable: Recovery with rehabilitation		Irreversible: Not possible despite action
Impact Duration (D) The length of permanence of the impact on the environmental receptor	Immediate: On impact	Short term: 0-5 years	Medium term: 5-15 years	Long term: Project life	Permanent: Indefinite
Probability of Occurrence (P)	Improbable	Low Probability	Probable	Highly Probably	Definite

The likelihood of an impact occurring in the absence of pertinent environmental management measures or mitigation					
ENVIRONMENTAL SIGNIFICANCE = (MAGNITUDE + EXTENT + REVERSIBILITY + DURATION) x PROBABILITY					
TOTAL SCORE	4 to 15	16 to 30	31 to 60	61 to 80	81 to 100
ENVIRONMENTAL SIGNIFICANCE RATING	Very low	Low	Moderate	High	Very High

Negative			Positive		
N1	N1 - Very Low	4-15	P1	P1 - Very Low	4-15
N2	N2 - Low	16-30	P2	P2 - Low	16-30
N3	N3 - Moderate	31-60	P3	P3 - Moderate	31-60
N4	N4 - High	61-80	P4	P4 - High	61-80
N5	N5 - Very High	81-100	P5	P5 - Very High	81-100

3.7 Assumptions, Limitations and Constraints of the study

The authors acknowledge that the brief literature review is not exhaustive on the literature of the area. Due to the subsurface nature of heritage resources, the possibility of discovery of heritage resources during the construction phase cannot be excluded. Heavy rainfall during the survey caused gravel roads to become waterlogged which created access restraints. This limitation is successfully mitigated with the implementation of a chance find procedure and monitoring of the study area by the ECO. This report only deals with the current layout of the proposed development and consisted of non-intrusive surface surveys that focussed on tangible resources. This study did not assess the impact on medicinal plants and intangible heritage as it is assumed that these components would have been highlighted through the public consultation process if relevant.

Field data were recorded by handheld GPS and Mobile GPS applications. It must be noted that during the process of converting spatial data to final drawings and maps the accuracy of spatial data may be compromised. Printing or other forms of reproduction might also distort the spatial distribution in maps. Due care has been taken to preserve accuracy. It is possible that new information could come to light in future, which might change the results of this Impact Assessment.

4 Description of Socio-Economic Environment

According to Census 2011, of the 47 216 people in the Emakhazeni Local municipality, 87,2% are black African, 10,8% are white, with the other population groups making up the remaining 2%. Of those aged 20 years and older, 28,7% have completed matric, 7,4% have some form of higher education, and 15% have no schooling. One in four (25,9%) of the 18 454 economically active (employed or unemployed but looking for work) people in the municipality are unemployed. Among the 9 694 economically active youth (15–35 years) in the area, 34,2% are unemployed (statssa.gov.za).

5 Results of Public Consultation and Stakeholder Engagement:

5.1.1 Stakeholder Identification

Adjacent landowners and the public at large were informed of the proposed activity as part of the EIA process by the EAP. Site notices and advertisements notifying interested and affected parties were placed at strategic points and in local newspapers as part of the process. No heritage concerns have been raised thus far.

6 Contextualising the study area:

6.1 Literature Review (SAHRIS)

Several heritage sites are known for the area, most notably Anglo Boer War battlefield sites relating to the Battle of Bergendal, Late Iron Age stone walled settlement sites, burial sites and historical sites and features. The following Cultural Resource Management (CRM) assessments (Table 6-1) were conducted in the larger area and consulted for this report:

Table 6-1. CRM reports consulted for the study.

Author	Year	Project	Findings
Van Schalkwyk, J.	2003	Archaeological Survey of a Section of The Secunda-Mozambique Gas Pipeline, Carolina District, Mpumalanga.	Cemeteries
Coetzee, T.	2005	Archaeological Investigation of the Proposed Black Eagle Valley - Residential Estate, Waterval Boven, Mpumalanga.	Iron Age Stone Walled Settlements, farming structures and 2 cemeteries.
Pistorius, J.C.C.	2007	A Phase I Heritage Impact Assessment (HIA) Study for The Upgrading of Eskom's Nooitgedacht Substation on The Farm Wintershoek 451 Near Carolina In the Mpumalanga Province of South Africa.	No sites
Van Schalkwyk, J.A.	2007a	Heritage Impact Assessment for The Planned Development on The Farms Hebron 421JT And Twyfelaar 11 IT, Carolina Municipal District, Mpumalanga Province	Iron Age, Historical Sites and Cemeteries were recorded.
Van Schalkwyk, J.A.	2007b	Heritage Impact Scoping Report for The Planned Hendrina-Marathon Powerline, Mpumalanga Province.	Settlements to initiation sites, industrial and farming related sites as well as cemeteries were noted in the area.
Pelser, A and Van der Walt, J.	2008	A Report on A Heritage Impact Assessment for Proposed Opencast Coal Mining Operations for The Klippan Colliery on The Farm Klippan 452 JS (Emachibini), Wonderfontein, Mpumalanga.	Graves.
Pelser, A.	2012	A Report on a Heritage Impact Assessment (HIA) For the Proposed Motshaotshela Colliery Project, Close to Hendrina, Mpumalanga Province.	Cemeteries
Van Wyk Rowe, C.	2014	Phase 1 Archaeological / Heritage Impact Assessment for The Development Of A Footbridge Across The Elands River, Elandshoek, Mpumalanga.	Historical structures
Van der Walt, J.	2015	Archaeological Impact Assessment for the proposed widening of the N4 National Road, Section 6E, Near Waterval-Onder, Mpumalanga Province.	Stone Cairn and two stonewalled sites
Celliers, J.P.	2018	Phase 1 Archaeological and Heritage Impact Assessment on the farm Mooifontein 292 JT in respect of proposed agricultural development, Mpumalanga Province.	Stone enclosure
Van der Walt, J.	2020	Heritage Impact Assessment for the N4 Interchange, Mpumalanga Province.	Stone enclosures

6.1.1 Google Earth and The Genealogical Society of South Africa (Graves and burial sites)

Google Earth and 1:50 000 maps of the area were utilised to identify possible places where archaeological and historical sites might be located. The database of the Genealogical Society of South Africa indicated no known grave sites within the study area.

6.2 Archaeological Background

The archaeology of the area spans across the Stone Age, Iron Age, and Historical period.

6.2.1 Stone Age

South Africa has a long and complex Stone Age sequence of more than 2 million years. The broad sequence includes the Later Stone Age, the Middle Stone Age and the Earlier Stone Age. Each of these phases contains sub-phases or industrial complexes, and within these we can expect regional variation regarding characteristics and time ranges. For (CRM) purposes it is often only expected/ possible to identify the presence of the three main phases. Yet sometimes the recognition of cultural groups, affinities or trends in technology and/or subsistence practices, as represented by the sub-phases or industrial complexes, is achievable. The three main phases can be divided as follows.

- » Later Stone Age (LSA); associated with Khoi and San societies and their immediate predecessors. - Recently to ~30 thousand years ago.
- » Middle Stone Age (MSA); associated with Homo sapiens and archaic modern human - . 30-300 thousand years ago.
- » Earlier Stone Age (ESA); associated with early Homo groups such as Homo habilis and Homo erectus. - 400 000-> 2 million years ago.

Mpumalanga currently does not have an extensive ESA archaeological record, at Maleoskop on the farm Rietkloof, only a few ESA artefacts have been found and stone tools consisted of choppers (Oldowan), hand axes, and cleavers (Acheulean) (Esterhuysen & Smith 2007), and some surface scatters have been recorded near Piet Retief (Nel & Karodia 2013).

Although the MSA and LSA has not been extensively studied in Mpumalanga, evidence for these periods has been excavated from Bushman Rock Shelter in the Ohrigstad District (Esterhuysen & Smith 2007; Lombard et al. 2012) and it is known that San communities lived near Lake Chrissie as recently as the 1950s (e.g., Schlebusch et al 2016). MSA and LSA surface scatters have also been investigated in the vicinity of Piet Retief, and De Wittekrans nearby Camden is a Later Stone Age archaeological rock art site complex (Nel & Karodia 2013).

6.2.2 Iron Age

The archaeology of farming communities of southern Africa encompasses three phases. The Early Iron Age (200-900 CE) represents the arrival of Bantu-speaking farmers in southern Africa. Living in sedentary settlements often located next to rivers, these farmers cultivated sorghum, beans, cowpeas, and kept livestock. The Middle Iron Age (900-1300 CE) is mostly confined to the Limpopo Valley in southern Africa with Mapungubwe Hill probably representing the earliest 'state' in this region (Huffman 2007).

The Late Iron Age (1300-1840s CE) marks the arrival and spread of ancestral Eastern Bantu-speaking Nguni and Sotho-Tswana communities into southern Africa. The location of Late Iron Age settlements is usually on or near hilltops for defensive purposes. The Late Iron Age as an archaeological period ended by 1840 CE, when the Mfecane caused major socio-political disruptions in southern Africa (Huffman 2007).

Dates from Early Iron Age sites indicated that by the beginning of the 5th century CE Bantu-speaking farmers had settled in the Mpumalanga Lowveld. Subsequently, farmers continued to move into and

between the Lowveld and Highveld of Mpumalanga. Iron Age sites such as Welgelegen Shelter, Robertsdrift and Tafelkop dates from the 12th to the 18th century (Derricourt & Evers 1973; Esterhuysen & Smith 2007).

The later phases of the Iron Age (AD 1600-1800's) are represented by various tribes including Ndebele, Swazi, BaKoni, and Pedi, marked by extensive stonewalled settlements found throughout the escarpment and particularly around Machadodorp, Lydenburg, Badfontein, Sekhukuneland, Roosenekal and Steelpoort. The BaKoni were the architects of a unique archaeological stone building complex who by the 19th century spoke seKoni which was similar to Sepedi. The core elements of this tradition are stone-walled enclosures, roads, and terraces.

Researchers such as Mike Evers (1975) and David Collett (1982) identified three basic settlement layouts in this area. These sites can be divided into simple and complex ruins. Simple ruins are normally small in relation to more complex sites and have smaller central cattle byres and fewer huts. Complex ruins consist of a central cattle byre, which has two opposing entrances and several semi-circular enclosures surrounding it. The perimeter wall of these sites is sometimes poorly visible. Huts are built between the central enclosure and the perimeter wall. These are all connected by trackways referred to as cattle tracks. These tracks are made by building stone walls, which forms a walkway for cattle to the centrally located cattle byres.

Individual sites range from simple enclosures, which consist of single or two concentric stonewalled circles found in small, isolated settlements, to complex sites with large central enclosures which have smaller enclosures attached to their outer walls. The walls are built with undressed, locally occurring, stone. Walls on average are 0.5 to approximately 1 meter high, although often only the foundation stones are left. The Early Iron Age site Plaston is located close to Witrivier.

During the mid-17 century Europeans started to settle in modern-day Cape Town. During and after the conflict caused by the Mfecane (1820-1840), during the reign of king kaSenzangakhona Zulu, known as Shaka, Dutch-speaking farmers started to migrate to the interior regions of South Africa. A period that is marked by various skirmishes and battles between the local inhabitants, Dutch settlers and the British (Giliomee & Mbenga 2007).

6.2.3. Battlefields and war history

The discovery of diamonds and gold in the northern provinces had very important consequences for South Africa. After the discovery of these resources, the British, who at the time had colonised the Cape and Natal, had intentions of expanding their territory into the northern Boer republics. This eventually led to the Anglo-Boer War, which took place between 1899 and 1902 in South Africa, and which was one of the most turbulent times in South Africa's history.

Even before the outbreak of war in October 1899 British politicians, including Sir Alfred Milner and Mr. Chamberlain had declared that should Britain's differences with the Z.A.R. result in violence, it would mean the end of republican independence. This decision was not immediately publicised, and republican leaders based their assessment of British intentions on the more moderate public utterances of British leaders. Consequently, in March 1900, they asked Lord Salisbury to agree to peace on the basis of the status quo ante bellum. Salisbury's reply was, however, a clear statement of British war aims (Du Preez 1977).

During the British advance between February to September 1900, Lord Roberts replaced Genl. Buller as the supreme commander and applied a different tactic in confronting the Boer forces instead of a frontal attack approach he opted to encircle the enemy. This proved successful and resulted for instance in the surrender of Genl. Piet Cronje and 4000 burghers at Paardeberg on 27 February 1900.

This was the start of a number of victories for the British and shortly after they occupied Pretoria on 5

June 1900, a skirmish at Diamond Hill resulted in the Boer forces under command of Louis Botha, retreated alongside the Delagoa Bay railway to the east. Between the 21-27 August, Botha and 5000 burghers defended their line at Bergendal but were overwhelmed by superior numbers and artillery. This resulted in the Boer forces retreating even further east and three weeks later the British reached Komatipoort and thus the whole of the Eastern Transvaal south of the Delagoa Bay railway line was now occupied by British Forces. At the time of the War, a number of Blockhouses were located alongside the existing railway, including one near Wonderfontein in the vicinity of the Belfast area.

The “Scorched earth” policy implemented by Roberts led to the establishment of a number of camps where Boer women and children were harboured as a result of their homes being burnt and food reserves destroyed. This policy was also imposed on black people who stayed on Boer farms but also on their own pieces of land and homesteads. Maladministration, bad planning, insufficient medical assistance, malnutrition and exposure led to many deaths among people in these camps both white and black. An estimated 27 927 Boer women and children and a further 14 154 black people succumbed in these camps (Bergh 1999). Belfast was the location of two camps for black people during the war (Bergh 1999).

7 Description of the Physical Environment

The vegetation and landscape are described by Mucina and Rutherford (2006) as Steenkampsberg Montane Grassland and Eastern Highveld Grassland. The Steenkampsberg Montane Grassland is described as mountainous with plateau grasslands, mountain slopes and shallow valleys. Grasslands are short with high forb diversity. The Eastern Highveld Grassland is described as slightly to moderately undulating plains, including some low hills and pan depressions. The vegetation is short dense grassland dominated by the usual highveld grass composition (*Aristida*, *Digitaria*, *Eragrostis*, *Themeda*, *Tristachya* etc.) with small, scattered rocky outcrops with wiry, sour grasses and some woody species (*Acacia caffra*, *Celtis africana*, *Diospyros lycioides* subsp *lycioides*, *Parinari capensis*, *Protea caffra*, *P. welwitschii* and *Rhus magalismsontanum*).

The Project area is situated about 12 km south of Belfast and about 3km east of the R33 in a agricultural landscape consisting of various farms with mixed farming activities that include cattle, sheep and goat farming as well as the cultivation of various crops and the landscape is dotted with farmsteads and farming related infrastructure. The landscape is marked by rolling hills covered in dense grass cover. Hilly areas are rocky with lower laying areas marked by quaternary sand cover. Scattered thickets of trees that include 'black wattle' and 'eucalyptus' are found across the landscape. General site conditions are illustrated in Figures 7.1 to 7.6.



Figure 7.1. General view of the landscape showing the rolling hills towards the southern boundary of the Project area.



Figure 7.2. Image showing the mountainous terrain throughout the southern parts of the Project area.



Figure 7.3. Thickets of trees are scattered across the Project area.



Figure 7.4. Large open fields towards the centre of the Project area.



Figure 7.5. Large scale cultivation characterises the study area.

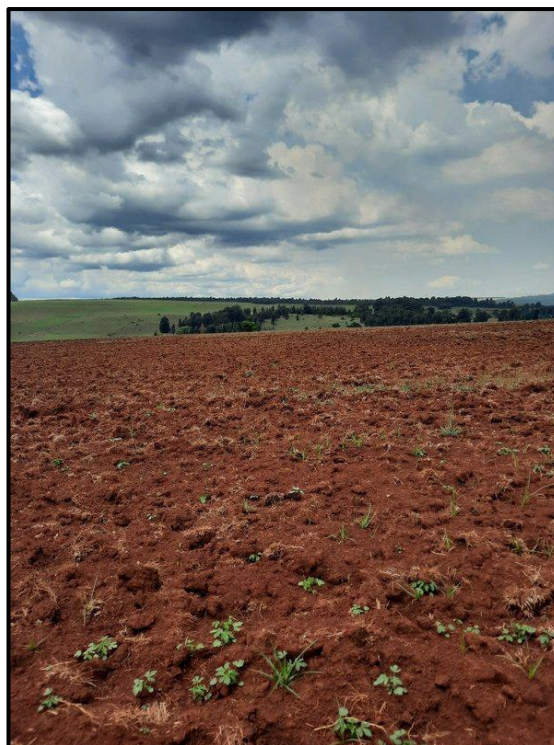


Figure 7.6. Image showing newly ploughed fields towards the eastern edge of the Project area.

8 Heritage Baseline - Findings of the Survey

8.1 Heritage Resources

The Project area is vast and situated in an expansive landscape known to be culturally significant with a cultural layering dating from the Stone Age, through the Iron Age to the historical period. This was confirmed during the survey of the Dalmanutha WEF cluster, and many sites were recorded and were grouped into four categories based on site type. **Category A** sites are burial sites, **Category B** sites consists of standing structures like farmsteads (some that could be older than 60 years) and farming infrastructure like kraals etc as well as ruins that could date to the recent past or be historical. **Category C** sites are archaeological sites and findspots dating to the Late Iron Age and Middle Stone Age and **Category D** sites that relate or could potentially relate to the Anglo Boer War battlefields in the area. The four categories are briefly explained in Section 8.1.1 to 8.1.4. The study area is vast and some sites were recorded during remote sensing and will require field verification.

The site distribution in relation to the Project area is illustrated in Figure 8.1. Spatial data is provided to the client in shp file format.

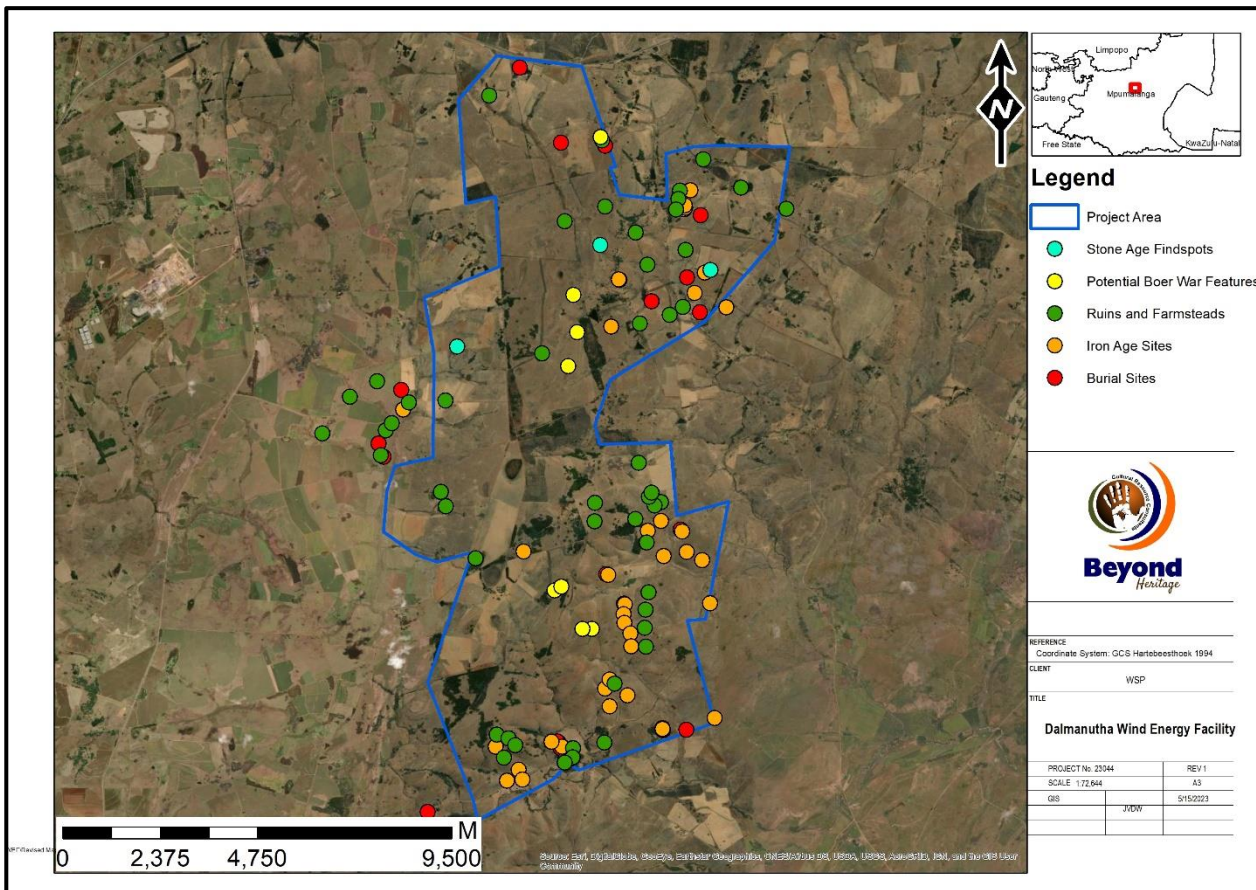


Figure 8.1. Site distribution map.

8.1.1 Category A – Burial Sites

Burial sites are expected to occur throughout the landscape. Recorded burial sites consist of stone packed grave dressings close to and sometimes within Iron Age settlements (Category C sites) possibly indicating direct descendants of community who have a direct link to these type sites, as well as informal graves and graves with formal headstones associated with farmsteads at Category B sites.

Recorded burial sites are listed in Table 8-1 with selected sites illustrated in Figures 8.2 to 8.5.

Table 8-1. Burial sites identified in the study area.

Graves/Cemetery	Description
DN001	Small historical cemetery situated next to the main road running along the southern edge of the proposed project area. 9 Graves
DN004	Various historical graves scattered throughout the large Iron-age site. 7 – 10 Graves.
DN005	Various historical graves scattered throughout the large Iron-age site. 12 Graves
DN007	Historical graves scattered throughout the large Iron-age site. 3 Graves
DN009	Possible grave situated near a historical farmstead. 1 Grave
DN010	Historical cemetery situated near a historical farmstead. The cemetery has been enclosed with a tall stone and cement-built wall. The cemetery contains a small monument dedicated to <i>Jacob de Clercq</i> . 13 Graves.
DN018	Small cemetery situated within a large Iron-age site. 16 Graves
DN020	1 Grave situated within an Iron- age site.
DN028	3 Graves situated with an Iron- age site.
DN029	Small cemetery situated with an Iron-age site. 8-10 Graves
DN039	Small cemetery situated within a historical site. 5 Graves.
DN043	Small historical cemetery situated near a historical farmstead. 6 Graves.
DN045	Small cemetery containing various graves. The cemetery is fenced off with some modern graves present. The site is near a historical farmstead. 25 – 30 Graves.
DN049	Small cemetery situated with an Iron-age site. 15 – 20 Graves.
DN059	Small historical cemetery situated near the Bergendal Monument. 15 Graves.
DN062	Small cemetery situated near various historical sites. 11 Graves.
DN075	Small historical cemetery situated near the main road. 3 Graves.
DN076	Large fenced off cemetery situated near historical sites. 20 – 30 Graves.
DN078	Various graves scattered around a large Iron-age site. 5 – 10 Graves.
DN081	Possible graves. Requires field verification.
DN114	Possible graves. Requires field verification.
DN115	Possible graves. Requires field verification.
DN118	Possible graves. Requires field verification.
DN120	Possible burial site. Requires field verification.



Figure 8.2. DN010 – Jacob de Clercq Memorial



Figure 8.3. DN018 – Burial site with in multi component site.



Figure 8.4. Formal grave with headstone at DN039



Figure 8.5. Small cemetery with formal and informal graves at DN049.

Significance – High Social significance

Field Rating – GP 3A

8.1.2 Category B – Built environment.

The study area is characterised by intensive farming dating from at least the 20th century and recorded features include various structures such as farmsteads, storerooms, labourer houses and associated agricultural structures such as kraals, and stables. Many of these can be described as vernacular stone architecture where mostly dolerite ('blouklip') were used to construct farmsteads and kraals and date to the second half of the 19th century well into the early 20th century in the Eastern Highveld. Some of the recorded structures are modern while others are historical (older than 60 years). Category B structures are often found constructed on top or near Category D LIA sites where the stone walls were dismantled and used to build recent structures. Recorded sites are listed in Table 8-2 with selected sites illustrated in Figures 8.6 to 8.9.

Table 8-2. Recorded structures in the study area.

Historical	Description
DN002	Possible historical kraal that has been modified by modern construction.
DN008	Large historical farmstead situated near the main road. The farmstead contains various structures including a large historical house.
DN011	Large, degraded stone-built structure situated on top of a small hill. Possibly a historical house.
DN015	Section of a historical packed stone wall.
DN016	Historical packed stone wall running along the edge of a large hill. This feature may have been part of a wall to keep cattle from roaming too far.
DN017	Large historical structure situated on the edge of a large hill near the long stone wall feature at DN016.
DN022	Small historical packed stone circle situated at a fairly high elevation. Possibly part of historical battle fields.
DN023	Small historical packed stone circle situated at a fairly high elevation. Possibly part of historical battle fields.
DN024B	Remnants of a small historical settlement situated on the remains of a possible archaeological site. The site includes various stone built degraded structures among circular packed stone enclosures. Some historical artefacts were also identified such as a lower grindstone.
DN032	Possible loosely packed stone cairn situated near various historical and iron-age sites.
DN035	Large series of historical packed stone features and structures. The site contains the remnants of various square structures as well as a rondavel. The site may have been built using the stones from nearby archaeological sites.
DN040	Remnants of a historical stone-built feature. The foundation and small section of walling are the only visible remnants.
DN044	Large historical and degraded farmstead that contains various structures including a large kraal structure as well as a large stone-built farmhouse.
DN047	Natural spring that has been fenced off with some packed stones around the edge. May possibly be of cultural significance.
DN048	Large historical kraal structure.
DN051	Large historical kraal structure.
DN055	Remnants of a stone-built structure. Only the foundation and section of walling is still visible.
DN056	Large historical farmstead that contains various structures including a large kraal structure as well as the farmhouse.
DN057	Small historical structure situated near agricultural fields. The structure is fairly degraded.
DN058	Small series of packed stone walling running along the top of a rocky ridge line. The features are possibly part of a historical agricultural structure.
DN060	Small, packed stone enclosure situated near a rocky ridge line.
DN061B	Large, packed stone walled features scattered across a small area. These include a large circular enclosure as well as a square structure. These structures may be from various time periods.
DN065	Remnants of a large historical packed stone structure.
DN066	Historical metal artefact found near a historical site.
DN067	Remnants of a small, packed stone structure. The feature is fairly degraded and overgrown.
DN071	Remnants of the historical railroad that runs alongside the new modern railroad.
DN072	Remnants of a historical farmstead located near the newer structures within a thicket of trees. The site includes multiple degraded foundations.
DN073	Large degrading historical farmstead including large, packed stone walling as well as a large stone built structure.

Historical	Description
DN077B	Remnants of an Iron-age settlement. The site includes various circular packed stone enclosures and features. The site extent is fairly large and scattered across a wide area. Some of the packed stone features within the site seem to have been built more recently using the stones from the archaeological features. Various graves were also identified within the site.
DN079	Remnants of various square structure-built form stone. Possibly part of a historical settlement.
DN080	Large historical farmstead. The site is fairly degraded with some of the features being used currently. The site includes a degraded farmhouse as well as various packed stone kraal structures.
DN083	Series of possible historical stone-built features.
DN089	Large square historical structure built of archaeological enclosures. Stones used for the square structure were possibly sourced from the iron-age settlement.
DN093	Possible historical structure. Requires field verification.
DN094	Possible historical structure. Requires field verification.
DN096	Possible historical structure. Requires field verification.
DN097	Possible historical structure. Requires field verification.
DN098	Possible historical structure. Requires field verification.
DN099	Possible historical structure. Requires field verification.
DN100	Possible historical structure. Requires field verification.
DN101	Possible historical structure. Requires field verification.
DN102	Possible historical structure. Requires field verification.
DN104	Possible historical structure. Requires field verification.
DN105	Possible historical structure. Requires field verification.
DN106	Possible historical structure. Requires field verification.
DN108	Possible historical structure. Requires field verification.
DN109	Possible historical structure. Requires field verification.
DN111	Possible historical structure. Requires field verification.
DN112	Large historical farmstead.
DN116	Large historical farmstead.
DN117	Large square historical structure built of archaeological enclosures. Stones used for the square structure were possibly sourced from the iron-age settlement.
DN121	Possible historical structure such as a large kraal. Requires field verification.



Figure 8.6. Farmstead at DN008

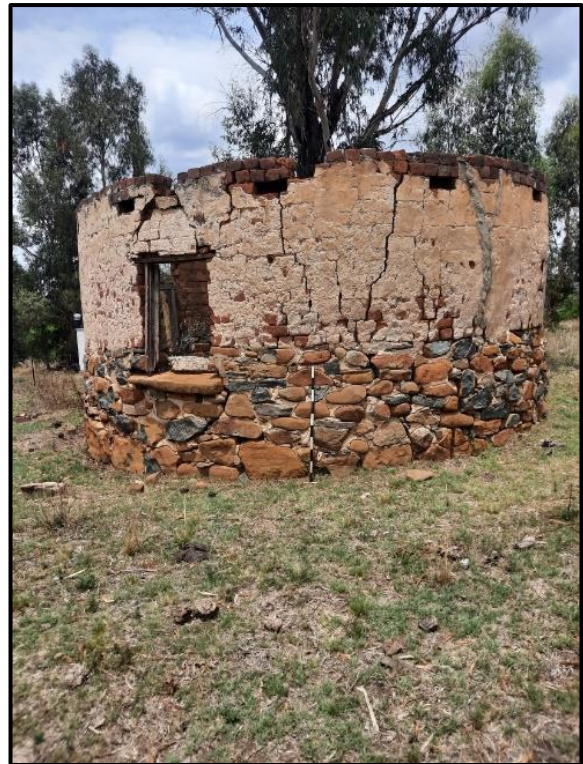


Figure 8.7. Structure at DN008



Figure 8.8. Farming infrastructure at DN056



Figure 8.9. Structure at DN073

Significance – Low to Medium significance

Field Rating – GP B

8.1.3 Category C – Archaeological Sites/ Findspots

The archaeological record of the area consists of isolated Stone Age artefacts dating to the MSA and LSA mostly made on quartzite (briefly described in Table 8-3) as well as Later Iron Age stone walled settlements. These Late LIA farming communities were the ancestors of modern Sotho-Tswana and Nguni societies. The north-western and southern portions of the region came to be broadly occupied by the Kgatla (Bakgatla), Rolong (Barolong), Ntwane (Bantwane), Koni (Bakone), Kopa (Bakopa) and Southern Ndebele mixed farming communities. The settlements in the study area are likely associated with the Koni and these settlements are marked by low stone walls with enclosures and terraces that is described as simple and complex ruins (Evers 1975 and Collett 1982) dating to (AD 1600-1800's). Recorded sites are listed in Table 8-3 and 8-4 with selected Stone Age sites illustrated in Figures 8.10 & 8.11. Photographs of LIA sites with plan drawings of simple and complex ruins (LIA) are illustrated in Figures 8.12 to 8.17.

Table 8-3. Stone age Features in the Project area.

Stone-Age	Description
DN042	<ul style="list-style-type: none"> Large MSA cores located next to an active agricultural field.
DN054	<ul style="list-style-type: none"> Series of MSA lithic artefacts scattered across a wide area around a large rocky cliff and waterfall. The artefacts were scattered along the high edges of the cliff.
DN063	<ul style="list-style-type: none"> Various large MSA artefacts situated around an active agricultural field.



Figure 8.10. Stone Age artefacts from DN054.



Figure 8.11. Weathered artefact from DN063.

Significance – Low significance

Field Rating – GP

Table 8-4. Recorded Iron Age features in the Project Area.

Iron-Age	Description
DN003	Remnants of a large iron-age settlement situated on the side of a hill. The site consists of various stone-built features and enclosures scattered across a wide area. Various graves were also identified among the enclosures.
DN006	Small stone packed feature situated near the top of a small hill. The feature may be part of the larger iron-age settlement nearby.
DN012	A small section of packed stone walling situated on the side of a large thickets of trees. The site possibly extends into the thicket of trees.
DN013	
DN014	The remnants of a large circular iron-age settlement situated on a large open field. The site is fairly degraded with only some of the walling still visible. The site is overgrown with small shrubs and grasses.
DN019	The remnants of an extensive iron-age settlement situated around a large rocky hill. This site includes various circular packed stone enclosures, cleared agricultural fields as well as a section of the site that seems to have been historically occupied. A small cemetery is also situated within the site. The site extends across the hill with various packed stone features scattered across the area.
DN021	The remnants of a large circular iron-age settlement situated on a large open field. The site is fairly degraded with only some of the walling still visible. The site is fairly overgrown with small shrubs and grasses.
DN024A	Remnants of a small historical settlement situated on the remains of a possible archaeological site. The site includes various stone built degraded structures among circular packed stone enclosures. Some historical artefacts were also identified such as a lower grindstone.
DN025	Remnants of an Iron-age settlement. The site includes various circular packed stone enclosures and features.
DN026	Remnants of an Iron-age settlement. The site includes various circular packed stone enclosures and features.
DN027	Remnants of an Iron-age settlement. The site includes various circular packed stone enclosures and features.
DN030	Remnants of an Iron-age settlement. The site includes various circular packed stone enclosures and features.
DN031	Remnants of an Iron-age settlement. The site includes various circular packed stone enclosures and features.
DN033	Remnants of an Iron-age settlement. The site includes various circular packed stone enclosures and features.
DN034	Remnants of an Iron-age settlement. The site includes various circular packed stone enclosures and features.
DN038	Remnants of an Iron-age settlement. The site includes various circular packed stone enclosures and features. The site extent is large and scattered across a wide area. Some of the packed stone features within the site seem to have been built more recently using the stones from the archaeological features. Various graves were also identified within the site.
DN041	Remnants of a packed stone structure. The feature is extremely degraded with only the foundation still visible.
DN046	Small series of circular Iron-Age stone walled features. The small iron-age settlement also includes modern graves that have been constructed among the stone walled features.
DN061A	Large stone packed, walled features scattered across a small area. These include a large circular enclosure as well as a square structure. These structures may be from various time periods.
DN064	Remnants of an Iron-age settlement. The site includes various circular packed stone enclosures and features.
DN068	Large series of packed stone enclosures and structures. These features are possibly part of an iron-age settlement scattered across the immediate area. Various packed stone walling is still visible.
DN069	Large series of packed stone enclosures and structures. These features are possibly part of an iron-age settlement scattered across the immediate area. Various packed stone walling is still visible.
DN070	Series of packed stone foundations as well as the remnants of circular stone enclosures. The site is possibly part of an iron-age site.
DN074	Large lower grindstone situated near a loose stone bridge. The artefact may have been moved out of context when the bridge was built by recent farmers.
DN077A	Remnants of an Iron-age settlement. The site includes various circular packed stone enclosures and features. The site extent is fairly large and scattered across a wide area. Some of the packed stone features within the site seem to have been built more recently using the stones from the archaeological features. Various graves were also identified within the site.

Iron-Age	Description
DN082	Series of circular stone walled enclosures.
DN084	Series of circular stone walled enclosures.
DN085	Series of circular stone walled enclosures with some features that seem historical in shape.
DN086	Series of circular stone walled enclosures.
DN087	Series of circular stone walled enclosures.
DN088	Series of circular stone walled enclosures.
DN090	Series of circular stone walled enclosures.
DN091	Series of circular stone walled enclosures.
DN092	Series of circular stone walled enclosures. Part of a much larger series of archaeological sites.
DN095	Series of circular stone walled enclosures.
DN103	Possible stone walled settlement site. Requires field verification.
DN107	Series of circular stone walled enclosures.
DN110	Series of circular stone walled enclosures. Large site extent.
DN113	Series of circular stone walled enclosures. Large site extent.
DN119	Series of circular stone walled enclosures. Large site extent.

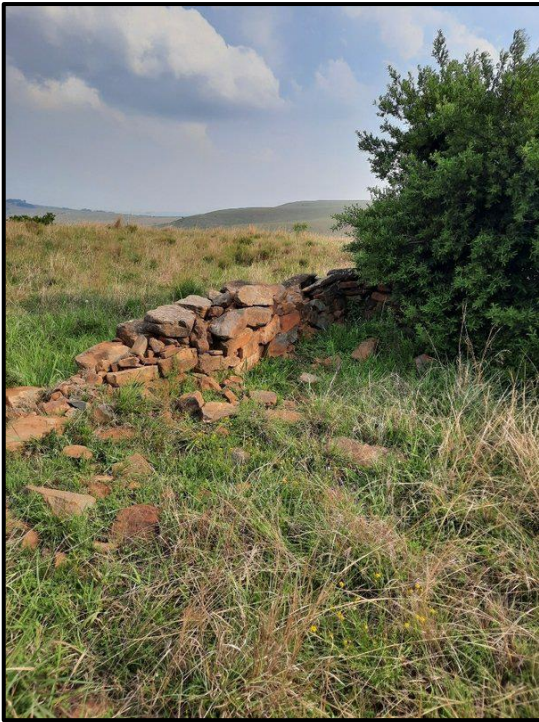


Figure 8.12. Stone walls at DN038.



Figure 8.13. General site conditions at DN064.



Figure 8.14. Dilapidated stone packed features at DN041.



Figure 8.15. Lower Grindstone at DN074.

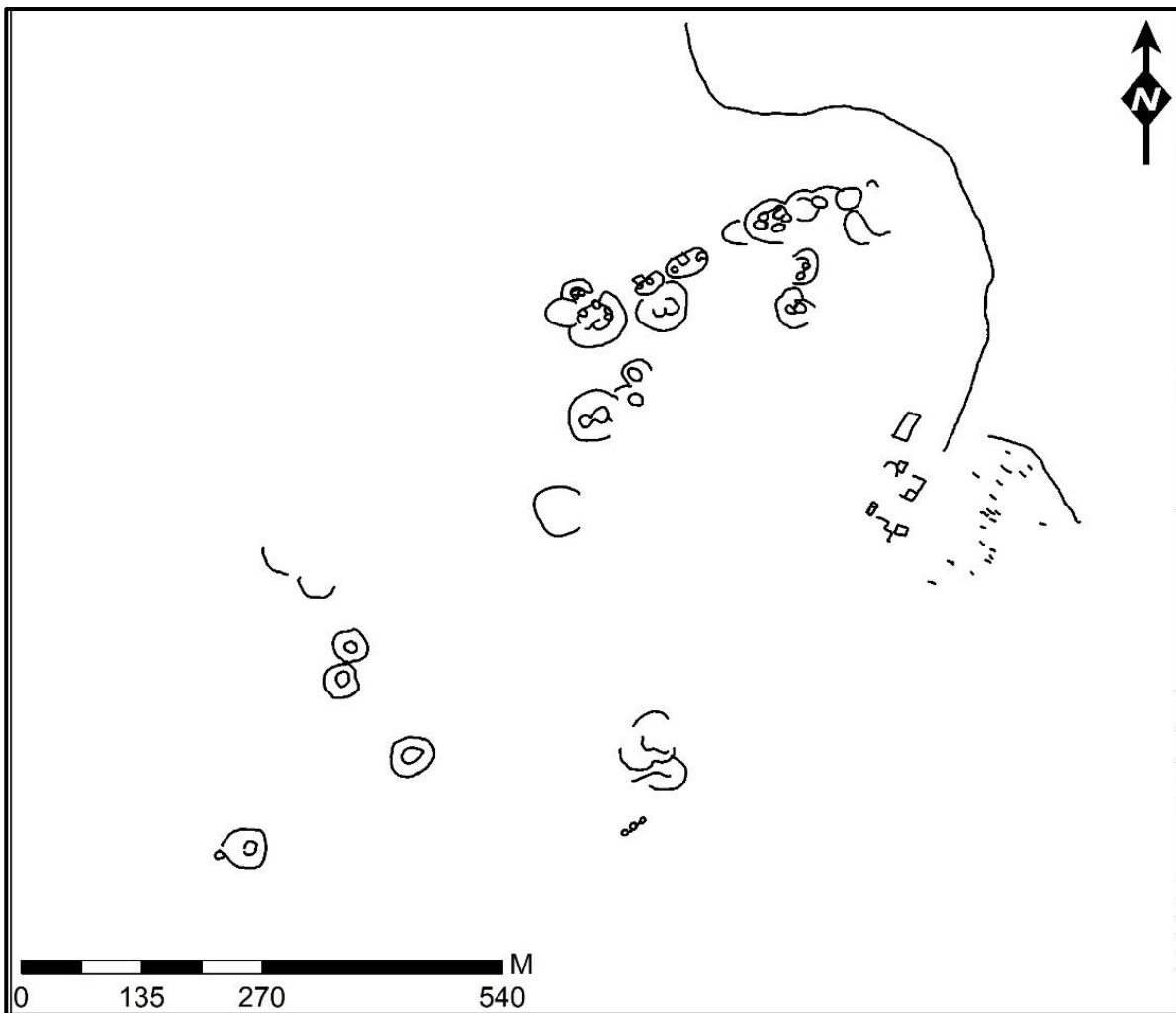


Figure 8.16. Plan drawing of complex LIA settlement DN018 to DN0220

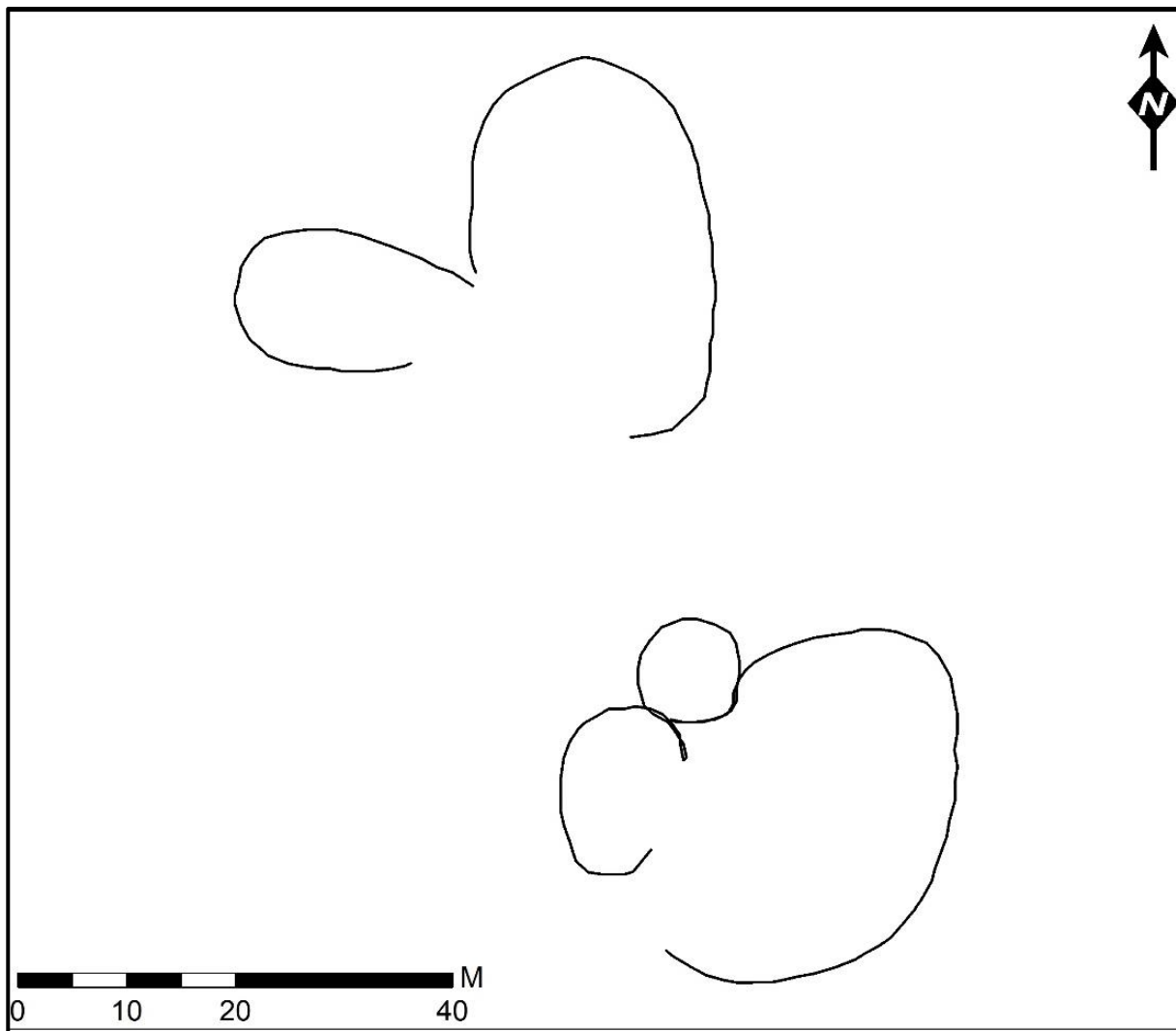


Figure 8.17. Plan drawing of simple ruins at LIA site DN028.

Significance –Medium to high significance

Field Rating – GP B

8.1.4 Category D- Battlefield features

The greater study area also forms part of the Anglo Boer war 'Berg en Dal/Dalmanutha' battlefield. Multiple associated features are scattered across the landscape including possible stone packed fortifications or sangers situated along the tops of some of the hills, the historical railroad from the Project area towards Machadodorp, the 'Berg en Dal' memorial situated on the northern boundary of the Project area along the N4 and possibly some of the historical farmsteads in the larger Project area.

Small stone packed fortifications that are situated at the tops of various ridge lines or hills are generally placed at sites where they have a good view of the landscape towards the southwest of the project area. These 'sangers' are usually built from packed stones forming a crude wall of about half a meter and are

shaped as half circles. Recorded sites are listed in Table 8-5 with selected sites illustrated in Figures 8.18 to 8.23. Plan drawing of selected features are illustrated in Figure 8.24.

Table 8-5. Recorded battlefield sites in the Project area.

Possibly Battlefield related	Description
DN022	Small historical packed stone circle situated at a high elevation. Possibly part of historical battle fields.
DN023	Small historical packed stone circle situated at a high elevation. Possibly part of historical battle fields.
DN036	Small series of packed stone walled features scattered across a wide area. These features are possibly part of an historical battlefield. These features are built along a rocky ridge line at high elevations.
DN037	Small series of packed stone walled features scattered across a wide area. These features are possibly part of an historical battlefield. These features are built along a rocky ridge line at high elevations.
DN050	Small series of packed stone walled features scattered across a wide area. These features are possibly part of an historical battlefield. These features are built along a rocky ridge line at high elevations.
DN052	Small series of packed stone walled features scattered across a wide area. These features are possibly part of an historical battlefield. These features are built along a rocky ridge line at high elevations.
DN053	Small series of packed stone walled features scattered across a wide area. These features are possibly part of an historical battlefield. These features are built along a rocky ridge line at high elevations.
DN060	



Figure 8.18. DN022 - Possible gun placement/ fortification



Figure 8.19. DN023 - Possible gun placement/ fortification

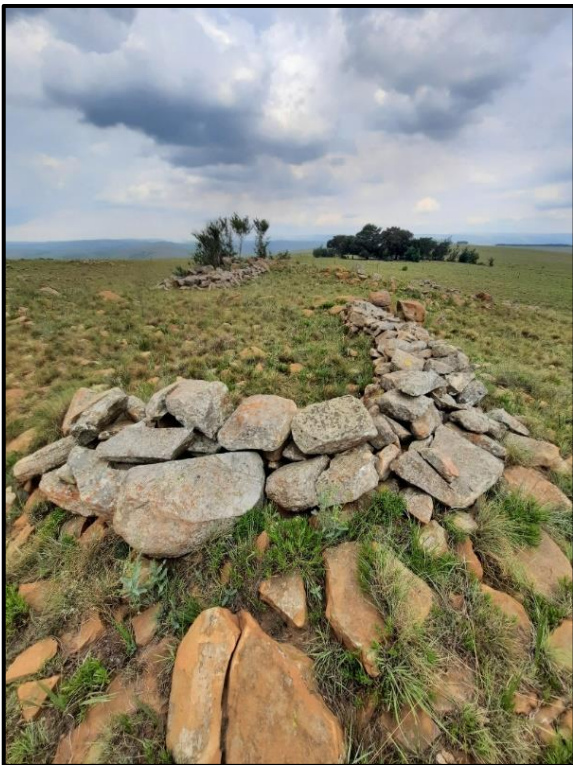


Figure 8.20. DN036 – Packed stone fortification/ sanger



Figure 8.21. DN036 – Packed stone fortification/ sanger

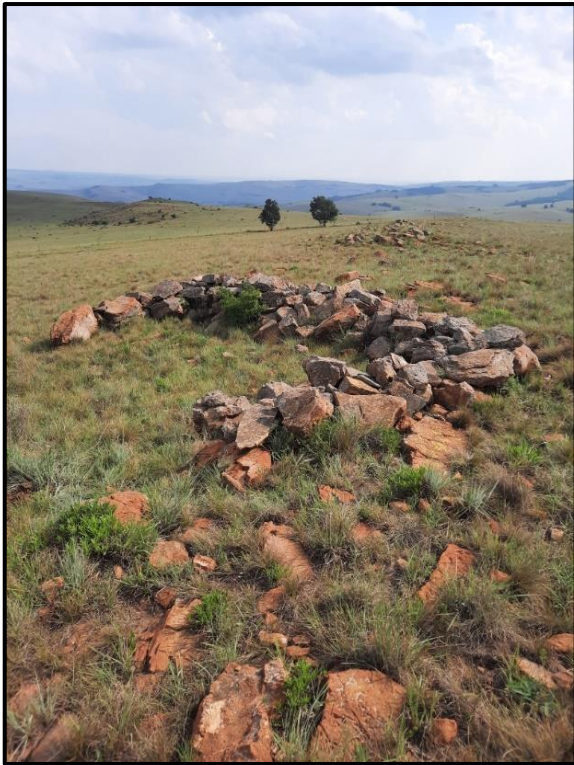


Figure 8.22. DN037 – Packed stone fortification/ sanger.



Figure 8.23. DN071 – Remnants of the historical railroad.



Figure 8.24. Plan drawing of stone packed features at Site DN036 and DN037.

Significance –High significance

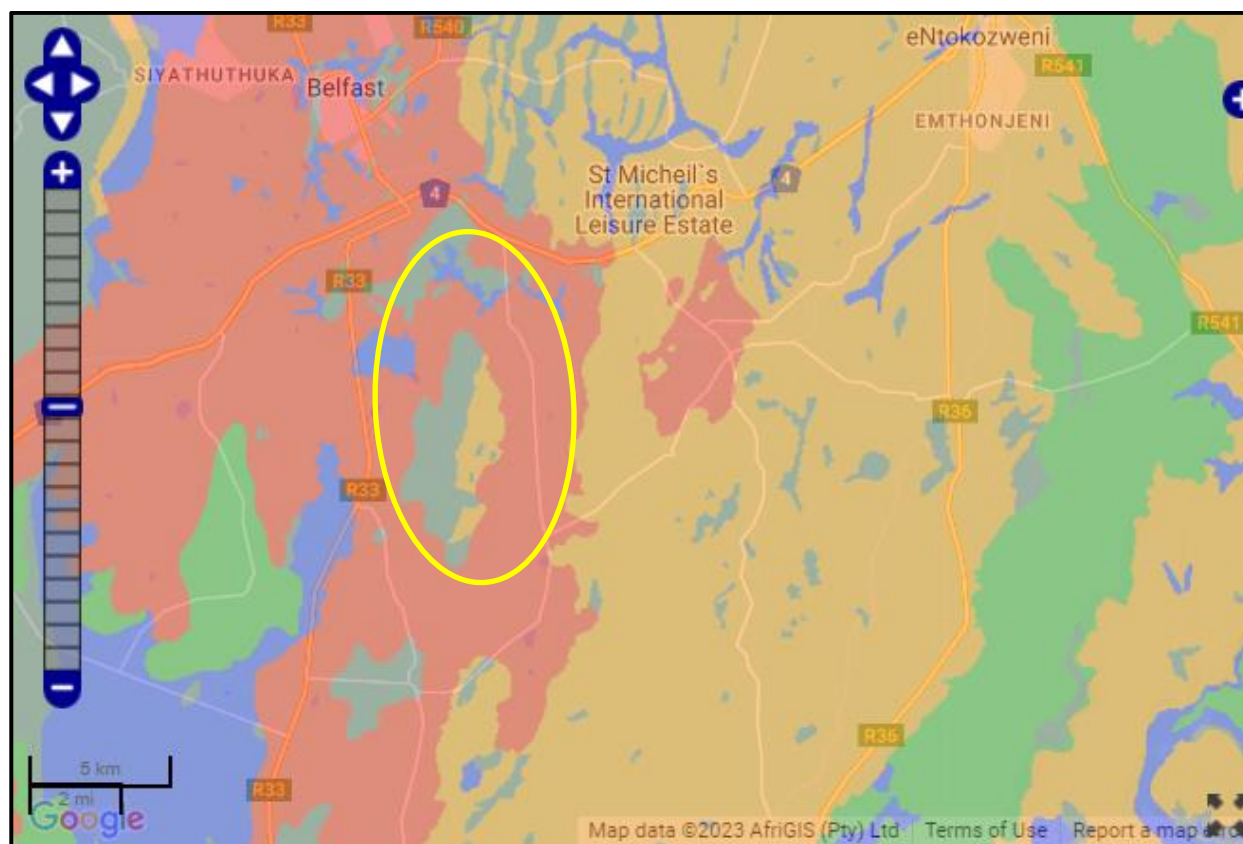
Field Rating – GP A

8.2 Cultural Landscape

Regionally the area is mostly cultivated, and forms part of a landscape characterised by wide scale cultivation and mining activities. Development in the study area is limited to farming infrastructure such as access roads, fences, and agricultural developments. The study area is part of a large cultural landscape that include battlefield sites, cemeteries and an intensive Later Iron Age occupation.

8.3 Paleontological Heritage

The study area is indicated as low to high and to very high palaeontological significance on the SAHRA Paleontological map (Figure 8.6). In independent study was conducted by Prof Marion Bamford for this aspect. The study concluded that the proposed site lies on the non-fossiliferous diabase (volcanic rock) and the very highly sensitive shales of the early Permian Vryheid formation (Ecca Group, Karoo Supergroup) that might contain fossils of the *Glossopteris* flora. A site visit verification was carried out in February 2023 and no fossils were found on the surface in the project footprint. Nonetheless, a Fossil Chance Find Protocol should be added to the EMP. Based on this information it is recommended that no further palaeontological impact assessment is required unless fossils are found by the contractor, environmental officer or other designated responsible person once excavations or drilling activities have commenced. Since the impact will be low pre-mitigation and very low post-mitigation, as far as the palaeontology is concerned, the Project should be authorised. There is no cumulative impact and there are no no-go areas.



Colour	Sensitivity	Required Action
RED	VERY HIGH	Field assessment and protocol for finds is required
ORANGE/YELLOW	HIGH	Desktop study is required and based on the outcome of the desktop study, a field assessment is likely
GREEN	MODERATE	Desktop study is required
BLUE	LOW	No palaeontological studies are required however a protocol for finds is required
GREY	INSIGNIFICANT/ZERO	No palaeontological studies are required
WHITE/CLEAR	UNKNOWN	These areas will require a minimum of a desktop study. As more information comes to light, SAHRA will continue to populate the map

Figure 8.25. Paleontological sensitivity of the approximate study area (yellow polygon) as indicated on the SAHRA Palaeontological sensitivity map.

9 Potential Impact

On the current layout only a Historical farmstead at DN080 will be impacted on (Figure 9.1). As the site is of low to medium significance due to its age, avoidance of the site is suggested. Other sites within the Project area will not be impacted by turbines, roads or associated infrastructure.

Impacts to heritage resources without mitigation within the Project footprint will be permanent and negative and occur during the pre-construction and construction activities. It is assumed that the pre-construction and construction phase involves the removal of topsoil and vegetation as well as the establishment of infrastructure. These activities can impact on heritage features and impacts include destruction or partial destruction of non-renewable heritage resources. Impacts during the operation phase is considered to affect the cultural landscape and sense of place.

The main cause of impacts to heritage resources is physical disturbance of the material itself and its context during removal of topsoil and vegetation as well as the excavations associated with the establishment of infrastructure. In terms of this Project the main source of impacts will happen during the following activities for Alternative 1 and 2:

- Establishment of new roads and upgrade of existing roads;
- Excavations of foundations for the turbines at WEF;
- Flicker effect associated with rotating blades of the WEF towers on the surrounding landscape;
- Visual impact of the WEF towers on the landscape and sense of place;
- Establishment of laydown areas;
- Trenches for cables and erection of powerlines;
- Excavations during construction of the sub stations;

For Alternative 2 (the solar component) the following additional impacts are expected:

- Establishment of new roads and upgrade of existing roads;
- Earthworks for temporary infrastructure including laydown areas;
- Visual impact of the PV Facility on the landscape and sense of place;
- Excavation and levelling of the PV facility footprint;
- Trenches for cables and erection of powerlines;
- Influx of people into the area that could desecrate the burial sites;
- Excavations during construction of the sub stations.

Impacts to the cultural landscape would occur during all three phases and would relate to the presence of very tall industrial-type structures in a landscape that is distinctly rural and/or natural in character. They would be negative impacts because of the general incompatibility between wind turbines and the cultural landscape. Because the cultural landscape is highly developed, it has been accorded high cultural significance and hence the extent of the impacts would be local. The magnitude of impacts is likely to be low because the area is so remote and there is an existing layer of electrical infrastructure and agricultural activity in the surrounding landscape. Damage to the landscape is reversible with rehabilitation but the impacts are considered to be long term impacts because the facility is likely to operate for many years. If the facility is constructed, then the probability is probable because the existence of the turbines will be inescapable. The impact can be addressed by implementing best practice measures to reduce the visual impacts in line with the recommendations made in the Visual Impact Assessment.

9.1.1 Pre-Construction phase

It is assumed that the pre-construction phase involves the removal of topsoil and vegetation as well as the establishment of infrastructure. These activities can have a negative and irreversible impact on heritage

features if any occur. Impacts include destruction or partial destruction of non-renewable heritage resources.

9.1.2 Construction Phase

During this phase, the impacts and effects are similar in nature but more extensive than the pre-construction phase. Potential impacts include destruction or partial destruction of non-renewable heritage resources. Vibration from the vehicles using the access road can cause the walls to shift and crack at DN080.

9.1.3 Operation Phase

Vibration from the vehicles using the access road can cause the walls to shift and crack at DN080.

Based on the current layout the following features will be directly impacted on by the development. Site specific mitigation measures are included Table 9-1.

Table 9-1. Sites that will be impacted on based on the current layout.

Site	Description	Impact
DN010	Historical cemetery situated near a historical farmstead. The cemetery has been enclosed with a tall stone and cement-built wall. The cemetery contains a small monument dedicated to <i>Jacob de Clercq</i> . 13 Graves.	Alternative 2 (~43m from the road)
DN029	Small cemetery situated with an Iron-age site. 8-10 Graves	Alternative 1 (~19 m from road and WTG 53)
DN039	Small cemetery situated within a historical site. 5 Graves.	Alternative 1 (~17 m from road)
DN045	Small cemetery containing various graves. The cemetery is fenced off with some modern graves present. The site is near a historical farmstead. 25 – 30 Graves.	Alternative 1 (~60 m from turbine)
DN062	Small cemetery situated near various historical sites. 11 Graves.	~188 m road in Alternative 1
DN035	Large series of historical packed stone features and structures. The site contains the remnants of various square structures as well as a rondavel. The site may have been built using the stones from nearby archaeological sites.	Alternative 1 – Road (to be micro sited)
DN044	Large historical and degraded farmstead that contains various structures including a large kraal structure as well as a large stone-built farmhouse.	Alternative 1 – Road (to be micro sited)
DN051	Large historical kraal structure.	Alternative 1 – Road (to be micro sited) Alternative 2 – Road (to be micro sited)
DN071	Remnants of the historical railroad that runs alongside the new modern railroad.	Alternative 2 Road to be micro sited
DN019	The remnants of an extensive iron-age settlement situated around a large rocky hill. This site includes various circular packed stone enclosures, cleared agricultural fields as well as a section of the site that seems to have been historically occupied. A small cemetery is also situated within the site. The site extends across the hill with various packed stone features scattered across the area.	Alternative 2 Road to be micro sited
DN030	Remnants of an Iron-age settlement. The site includes various circular packed stone enclosures and features.	Alternative 1 – Road and WTG 53 (must be micro sited).
DN031	Remnants of an Iron-age settlement. The site includes various circular packed stone enclosures and features.	Alternative 1 – Road (to be micro sited)
DN033	Remnants of an Iron-age settlement. The site includes various circular packed stone enclosures and features.	Alternative 1 – Road (to be micro sited)
DN034	Remnants of an Iron-age settlement. The site includes various circular packed stone enclosures and features.	Alternative 1 – Road and WTG 54 (to be micro sited)
DN038	Remnants of an Iron-age settlement. The site includes various circular packed stone enclosures and features. The site extent is large and scattered across a wide area. Some of the packed stone features within the site seem to have been built more recently using the stones from the archaeological features. Various graves were also identified within the site.	Alternative 1 – Road
DN041	Remnants of a packed stone structure. The feature is extremely degraded with only the foundation still visible	Alternative 2 Road to be micro sited
DN064	Remnants of an Iron-age settlement. The site includes various circular packed stone enclosures and features.	Alternative 1 – road to be rerouted and secondary

		impact by WTG 12 (should be micro sited). Alternative 2 – road and WTG 12 to be micro sited
DN091	Series of circular stone walled enclosures.	Alternative 2 Road and WTG 39 to be micro sited
DN036	Small series of packed stone walled features scattered across a wide area. These features are possibly part of an historical battlefield. These features are built along a rocky ridge line at high elevations.	Alternative 2
DN037	Small series of packed stone walled features scattered across a wide area. These features are possibly part of an historical battlefield. These features are built along a rocky ridge line at high elevations.	Alternative 2

Observation points in relation to the Project area are illustrated in Appendix A.

9.1.4 Impact Assessment for the Project for Alternative 1

Table 9-2. Impact assessment on the Project area during the construction phase.

Impact number	Aspect	Description	Stage	Character	Ease of Mitigation	Pre-Mitigation							Post-Mitigation						
						(M+)	E+	R+	D)x	P=	S	Rating	(M+)	E+	R+	D)x	P=	S	Rating
Impact 1:	DN029 DN039 DN045 DN062	Graves located within the proposed development area close to roads and wind turbines	Construction	Negative	The graves should be avoided, demarcated with access for family and 30m buffer.	4	2	5	5	5	80	N4	4	2	5	5	1	16	N2
						Significance						N4 - High					N2 - Low		
Impact 2:	DN035 DN041 DN051	Historical infrastructure will be damaged / destroyed by the proposed development	Construction	Negative	Avoidance is the preferred course of action, if not possible the sites can be mitigated prior to destruction.	2	2	4	4	4	48	N3	3	2	4	4	1	13	N1
						Significance						N3 - Moderate					N1 - Very Low		
Impact 3:	DN030 DN031 DN033 DN034 DN038 DN064	Iron Age sites will be damaged/ destroyed by the development	Construction	Negative	Avoidance is the preferred course of action, if not possible the sites can be mitigated prior to destruction.	2	2	4	4	4	48	N3	3	2	4	4	1	13	N1
						Significance						N3 - Moderate					N1 - Very Low		
Significance						N3 - Moderate					N1 - Very Low								
Impact 4:	Cultural Landscape	The project will alter the sense of place and impact on the cultural landscape.	Construction	Negative	Best practice measures to reduce visual impact.	2	2	4	4	3	36	N3	2	2	4	4	2	24	N2
						Significance						N3 - Moderate					N1 - Very Low		

Significance	N3 - Moderate	N2 - Low
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Table 9-3. Impact assessment on the Project area during the operational phase.

Impact number	Receptor	Description	Stage	Character	Ease of Mitigation	Pre-Mitigation							Post-Mitigation						
						(M+)	E+	R+	D)x	P=	S		(M+)	E+	R+	D)x	P=	S	
Impact 1:	DN029 DN039 DN045 DN062	Graves located within the proposed development area close to roads and wind turbines	Operational	Negative	Implementation of the Heritage Management Plan for the Project.	4	2	5	5	4	64	N4	4	2	5	5	1	16	N2
						Significance							N4 - High						
Impact 2:	DN035 DN044 DN051	Historical infrastructure will be damaged / destroyed by the proposed development	Operational	Negative	Implementation of the Heritage Management Plan for the Project.	2	2	4	4	4	48	N3	3	2	4	4	1	13	N1
						Significance							N3 - Moderate						
Impact 3:	DN030 DN031 DN033 DN034 DN038 DN064	Iron Age sites will be damaged/ destroyed by the development	Operational	Negative	Implementation of the Heritage Management Plan for the Project.	2	2	4	4	4	48	N3	3	2	4	4	1	13	N1
						Significance							N3 - Moderate						
Significance						N3 - Moderate						N1 - Very Low							
Impact 4:	Cultural Landscape	The project will alter the sense of place and impact on the cultural landscape.	Operational	Negative	Best practice measures to reduce visual impact.	2	2	4	4	3	36	N3	2	2	4	4	2	24	N2
						Significance							N3 - Moderate						

Table 9-4. Impact assessment on the Project area during the decommissioning phase.

Impact number	Receptor	Description	Stage	Character	Ease of Mitigation	Pre-Mitigation							Post-Mitigation						
						(M+)	E+	R+	D)x	P=	S		(M+)	E+	R+	D)x	P=	S	
Impact 1:	DN029 DN039 DN045 DN062	Graves located within the proposed development area close to roads and wind turbines	Decommissioning	Negative	Implementation of the Heritage Management Plan for the Project	4	2	5	5	4	64	N4	4	2	5	5	1	16	N2
						Significance						N4 - High						N2 - Low	
Impact 2:	DN035 DN044 DN051	Historical infrastructure will be damaged / destroyed by the proposed development	Decommissioning	Negative	Implementation of the Heritage Management Plan for the Project	2	2	4	4	4	48	N3	3	2	4	4	1	13	N1
						Significance						N3 - Moderate						N1 - Very Low	
Impact 3:	DN030 DN031 DN033 DN034 DN038 DN064	Iron Age sites will be damaged/ destroyed by the development	Decommissioning	Negative	Implementation of the Heritage Management Plan for the Project	2	2	4	4	4	48	N3	3	2	4	4	1	13	N1
						Significance						N3 - Moderate						N1 - Very Low	
Significance						N3 - Moderate						N1 - Very Low							
Impact 4:	Cultural Landscape	The project will alter the sense of place and impact on the cultural landscape.	Construction	Negative	Best practice measures to reduce visual impact.	2	2	4	4	3	36	N3	2	2	4	4	2	24	N2
						Significance						N3 - Moderate						N2 - Low	

Table 9-5. Impact assessment on the cumulative impact of the Project area.

Impact number	Receptor	Description	Stage	Character	Ease of Mitigation	Pre-Mitigation						Post-Mitigation							
						(M+	E+	R+	D)x	P=	S	(M+	E+	R+	D)x	P=	S		
Impact 1:	Cultural landscape and record of the area	The project will alter the sense of place and cultural landscape and can contribute to the depletion of the heritage record of the area	Cumulative	Negative	Implement best practice to preserve heritage resources and reduce visual impacts on the landscape.	4	3	5	5	3	51	N3	3	2	4	4	2	26	N2
						Significance						N3 - Moderate						N2 - Low	

9.1.5 Impact Assessment for the Project for Alternative 2

Table 9-6. Impact assessment on the Project area during the construction phase.

Impact number	Aspect	Description	Stage	Character	Ease of Mitigation	Pre-Mitigation						Rating
						(M+	E+	R+	D)x	P=	S	
Impact 1:	DN010	Graves located within the proposed development area close to roads and wind turbines	Construction	Negative	The graves should be avoided, demarcated with access for family and 30m buffer.	4	2	5	5	5	80	N4
						Significance						N4 - High
Impact 2:	DN071 DN051	Historical infrastructure will be damaged / destroyed by the proposed development	Construction	Negative	Avoidance is the preferred course of action, if not possible the sites can be mitigated prior to destruction.	2	2	4	4	4	48	N3
						Significance						N3 - Moderate
Impact 3:	DN019 DN041 DN039 DN064	Iron Age sites will be damaged/ destroyed by the development	Construction	Negative	Avoidance is the preferred course of action, if not possible the sites can be mitigated prior to destruction.	2	2	4	4	4	48	N3
						Significance						N3 - Moderate

						Significance						N3 - Moderate					
Impact 4:	DN036 DN037	Battlefield sites will be damaged/ destroyed.	Construction	Negative	Avoidance is the preferred course of action, if not possible the sites can be mitigated prior to destruction.	4	3	4	4	4	60	N3					
						Significance						N3 - Moderate					
Impact 5:	Cultural Landscape	The project will alter the sense of place and impact on the cultural landscape.	Construction	Negative	Best practice measures to reduce visual impact.	2	2	4	4	3	36	N3					
						Significance						N3 - Moderate					

Table 9-7. Impact assessment on the Project area during the operational phase.

Impact number	Aspect	Description	Stage	Character	Ease of Mitigation	Pre-Mitigation						Rating					
						(M+)	E+	R+	D)x	P=	S						
Impact 1:	DN010	Graves located within the proposed development area close to roads and wind turbines	Operational	Negative	The graves should be avoided, demarcated with access for family and 30m buffer.	4	2	5	5	5	80	N4					
						Significance						N4 - High					
Impact 2:	DN071 DN051	Historical infrastructure will be damaged / destroyed by the proposed development	Operational	Negative	Avoidance is the preferred course of action, if not possible the sites can be mitigated prior to destruction.	2	2	4	4	4	48	N3					
						Significance						N3 - Moderate					
Impact 3:	DN019 DN041 DN039 DN064	Iron Age sites will be damaged/ destroyed by the development	Operational	Negative	Avoidance is the preferred course of action, if not possible the sites can be mitigated prior to destruction.	2	2	4	4	4	48	N3					
						Significance						N3 - Moderate					

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Impact 4:	DN036 DN037	Battlefield sites will be damaged/ destroyed.	Operational	Negative	Avoidance is the preferred course of action, if not possible the sites can be mitigated prior to destruction.	4	3	4	4	4	60	N3
Significance						N3 - Moderate						
Impact 5:	Cultural Landscape	The project will alter the sense of place and impact on the cultural landscape.	Operational	Negative	Best practice measures to reduce visual impact.	2	2	4	4	3	36	N3
Significance						N3 - Moderate						

Table 9-8. Impact assessment on the Project area during the decommissioning phase.

Impact number	Aspect	Description	Stage	Character	Ease of Mitigation	Pre-Mitigation						Rating
						(M+	E+	R+	D)x	P=	S	
Impact 1:	DN010	Graves located within the proposed development area close to roads and wind turbines	Decommissioning	Negative	The graves should be avoided, demarcated with access for family and 30m buffer.	4	2	5	5	5	80	N4
Significance						N4 - High						
Impact 2:	DN071 DN051	Historical infrastructure will be damaged / destroyed by the proposed development	Decommissioning	Negative	Avoidance is the preferred course of action, if not possible the sites can be mitigated prior to destruction.	2	2	4	4	4	48	N3
Significance						N3 - Moderate						
Impact 3:	DN019 DN041 DN039 DN064	Iron Age sites will be damaged/ destroyed by the development	Decommissioning	Negative	Avoidance is the preferred course of action, if not possible the sites can be mitigated prior to destruction.	2	2	4	4	4	48	N3
Significance						N3 - Moderate						

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Impact 4:	DN036 DN037	Battlefield sites will be damaged/ destroyed.	Decommissioning	Negative	Avoidance is the preferred course of action, if not possible the sites can be mitigated prior to destruction.	4	3	4	4	4	60	N3
Significance						N3 - Moderate						
Impact 5:	Cultural Landscape	The project will alter the sense of place and impact on the cultural landscape.	Decommissioning	Negative	Best practice measures to reduce visual impact.	2	2	4	4	3	36	N3
Significance						N3 - Moderate						

Table 9-9. Impact assessment on the cumulative impact of the Project area.

Impact number	Receptor	Description	Stage	Character	Ease of Mitigation	Pre-Mitigation						
						(M+	E+	R+	D)x	P=	S	
Impact 1:	Cultural landscape and record of the area	The project will alter the sense of place and cultural landscape and can contribute to the depletion of the heritage record of the area	Cumulative	Negative	Implement best practice to preserve heritage resources and reduce visual impacts on the landscape.	4	3	5	5	3	51	N3
Significance						N3 - Moderate						

10 Conclusion and recommendations

The study has found the project area to be situated in an expansive landscape known to be culturally significant and rich in heritage resources. This was confirmed during the survey of the Dalmanutha WEF cluster, and numerous sites were recorded dating from the Stone Age, through the Iron Age to the historical period. The impacts to tangible heritage resources can be mitigated by micro siting of the Project components to avoid all known significant heritage resources. The main impacts of concern relate to the two cultural landscapes identified and sense of place of the study area where the visual impacts to the cultural landscapes of the area are the key impacts of concern. The precolonial landscape of Iron Age occupation and the historical cultural landscape of the 20th century farmsteads and the 'Berg en Dal' battlefield will be impacted contextually through the addition of wind turbines and related infrastructure;

In terms of the palaeontological heritage the study area is indicated as low to high, to very high palaeontological significance and an independent study by Prof Marion Bamford concluded that it is extremely unlikely that any fossils would be preserved in the overlying soils and sands of the Quaternary and was confirmed during a site visit and walkthrough in February 2023 that confirmed that there were no fossils of the *Glossopteris* flora on the surface.

Direct impacts on tangible heritage resources can be mitigated to an acceptable level however the visual impacts to the cultural landscapes of the area are the key impacts of concern. The following conditions should be included as part of the authorisation should one be issued, based on the South African Heritage Resource Authority (SAHRA) 's approval.

10.1 Recommendations for condition of authorisation

The following recommendations for Environmental Authorisation apply and the project may only proceed based on approval from SAHRA:

Recommendations:

- Micro siting of Project components to preserve recorded heritage features with a 30m buffer;
- Regular monitoring of the development footprint by the ECO to implement the Chance Find Procedure for heritage and palaeontology resources (outlined in Section 10.2) in case heritage resources are uncovered during the course of construction.
- Implementation of mitigation measures from a visual impact assessment to minimise visual impacts to the cultural landscapes;
- Heritage walkdown of the final layout prior to construction with recommendations made for mitigation as required; and
- Compilation of a heritage management plan for the Dalmanutha WEF Project.

10.2 Chance Find Procedures

10.2.1 Heritage Resources

The possibility of the occurrence of subsurface finds cannot be excluded. Therefore, if during construction any possible finds such as stone tool scatters, artefacts or bone and fossil remains are made, the operations must be stopped, and a qualified archaeologist must be contacted for an assessment of the find and therefore chance find procedures should be put in place as part of the EMP. A short summary of chance find procedures is discussed below and monitoring guidelines applicable to the Chance Find procedure is discussed below and monitoring guidelines for this procedure are provided in Section 10.5.

This procedure applies to the developer's permanent employees, its subsidiaries, contractors and subcontractors, and service providers. The aim of this procedure is to establish monitoring and reporting procedures to ensure compliance with this policy and its associated procedures. Construction crews must be properly inducted to ensure they are fully aware of the procedures regarding chance finds as discussed below.

- If during the pre-construction phase, construction, operations or closure phases of this project, any person employed by the developer, one of its subsidiaries, contractors and subcontractors, or service provider, finds any artefact of cultural significance or heritage site, this person must cease work at the site of the find and report this find to their immediate supervisor, and through their supervisor to the senior on-site manager.
- It is the responsibility of the senior on-site Manager to make an initial assessment of the extent of the find and confirm the extent of the work stoppage in that area.
- The senior on-site Manager will inform the ECO of the chance find and its immediate impact on operations. The ECO will then contact a professional archaeologist for an assessment of the finds who will notify the SAHRA.

10.2.2 Monitoring Programme for Palaeontology – to commence once the excavations / drilling activities begin.

1. The following procedure is only required if fossils are seen on the surface and when drilling/excavations commence.
2. When excavations begin the rocks and discard must be given a cursory inspection by the environmental officer or designated person. Any fossiliferous material (plants, insects, bone or trace fossils) should be put aside in a suitably protected place. This way the project activities will not be interrupted.
3. Photographs of similar fossils must be provided to the developer to assist in recognizing the trace fossils such as stromatolites in the dolomites or the Quaternary bones, rhizoliths, traces. This information will be built into the EMP's training and awareness plan and procedures.
4. Photographs of the putative fossils can be sent to the palaeontologist for a preliminary assessment.
5. If there is any possible fossil material found by the developer/environmental officer then the qualified palaeontologist sub-contracted for this project, should visit the site to inspect the selected material and check the dumps where feasible.
6. Fossil plants or vertebrates that are considered to be of good quality or scientific interest by the palaeontologist must be removed, catalogued and housed in a suitable institution where they can be made available for further study. Before the fossils are removed from the site a SAHRA permit must be obtained. Annual reports must be submitted to SAHRA as required by the relevant permits.

7. If no good fossil material is recovered, then no site inspections by the palaeontologist will be necessary. A final report by the palaeontologist must be sent to SAHRA once the project has been completed and only if there are fossils.
8. If no fossils are found and the excavations have finished, then no further monitoring is required.

10.3 Reasoned Opinion

The overall impact of the Project can be mitigated to an acceptable level and residual impacts can be managed to an acceptable level through implementation of the recommendations made in this report. The socio-economic benefits also outweigh the possible impacts of the development if the correct mitigation measures are implemented for the Project.

10.4 Potential risk

Potential risks to the proposed Project are the occurrence of intangible features, unrecorded cultural material and burial sites. This can cause delays during construction, as well as additional costs involved in mitigation, as well as possible layout changes.

10.5 Monitoring Requirements

Day to day monitoring can be conducted by the Environmental Control Officers (ECO). The ECO or other responsible persons should be trained along the following lines:

- *Induction training:* Responsible staff identified by the developer should attend a short course on heritage management and identification of heritage resources.
- *Site monitoring and watching brief:* As most heritage resources occur below surface, all earth-moving activities need to be routinely monitored in case of accidental discoveries. The greatest potential impacts are from pre-construction and construction activities. The ECO should monitor all such activities daily. If any heritage resources are found, the chance finds procedure must be followed as outlined above.

Table 10-1. Monitoring requirements for the Project

Heritage Monitoring					
Aspect	Area	Responsible for monitoring and measuring	Frequency	Proactive or reactive measurement	Method
Cultural Resources Chance Finds	Entire Project area	ECO	Weekly (Pre construction and construction phase)	Proactively	<ul style="list-style-type: none"> • If risks are manifested (accidental discovery of heritage resources) the chance find procedure should be implemented: <ol style="list-style-type: none"> 1. Cease all works immediately; 2. Report incident to the Sustainability Manager; 3. Contact an archaeologist/ palaeontologist to inspect the site; 4. Report incident to the competent authority; and 5. Employ reasonable mitigation measures in accordance with the requirements of the relevant authorities. • Only recommence operations once impacts have been mitigated.

10.6 Management Measures for inclusion in the EMPr

Table 10-2. Heritage Management Plan for EMPr implementation

Area	Mitigation measures	Phase	Timeframe	Responsible party for implementation	Target	Performance indicators (Monitoring tool)
DN080	Micro siting of Project components to preserve recorded heritage features with a 30m buffer;	Pre Construction	Pre Construction	Applicant EAP	Ensure compliance with relevant legislation and recommendations from SAHRA under Section 35, 36 and 38 of NHRA	ECO Checklist/Report
General Project area	Regular monitoring of the development footprint by the ECO to implement the Chance Find Procedure for heritage and palaeontology resources (outlined in Section 10.2) in case heritage resources are uncovered during construction;	Construction	Throughout the project	Applicant EAP	Ensure compliance with relevant legislation and recommendations from SAHRA under Section 35, 36 and 38 of NHRA	ECO Checklist/Report
General Project area	Implementation of mitigation measures from a visual impact assessment to minimise visual impacts to the cultural landscapes	Construction	Throughout the project	Applicant EAP	Ensure compliance with relevant legislation and recommendations from SAHRA under Section 35, 36 and 38 of NHRA	ECO Checklist/Report
General Project area	Walkdown of the final impact areas;	Pre Construction	Pre Construction	Applicant EAP	Ensure compliance with relevant legislation and recommendations from SAHRA under Section 35, 36 and 38 of NHRA	ECO Checklist/Report
General Project area	Compilation of a heritage management plan for the Dalmanutha WEF Project.	Pre-Construction, Construction, Operation	Throughout the Project	Applicant EAP	Ensure compliance with relevant legislation and recommendations from SAHRA under Section 35, 36 and 38 of NHRA	ECO Checklist/Report

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