

APPENDIX

F-3 *HERITAGE*

HERITAGE IMPACT ASSESSMENT: PROPOSED IMPUMELELO GRID CONNECTION NEAR SECUNDA, MPUMALANGA

Required under Section 38(8) of the National Heritage Resources Act (No. 25 of 1999)

SAHRA Case ID: 20226

Report for:

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On behalf of:

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SUMMARY

ASHA Consulting (Pty) Ltd was appointed by ENERTRAG South Africa (Pty) Ltd to assess the potential impacts to heritage resources that might occur through the proposed construction of the Impumelelo grid connection extending between the proposed Impumelelo Wind Energy Facility (WEF; separate application) to the northeast of Greylingstad and the existing Zandfontein Substation to the west of Secunda, Mpumalanga (Figures 1 & 2). Approximate end-points for the study area are:

- Southwest end at the Impumelelo WEF: S26° 40' 25.3" E28° 50' 29.1" (Alternative 2);
- Southwest end at the Impumelelo WEF: S26° 39' 47.0" E28° 51' 09.1" (Alternative 1); and
- Northeast at the Zandfontein Substation: S26° 40' 05" E28° 51' 10".

The project is proposed across numerous farm portions and will be up to 34 km long.

The proposed project would include powerlines with monopole and/or lattice pylons and a fenced substation of 2.5 ha. The proposed alignments almost exclusively follow roads and a coal conveyor.

The survey revealed a Late Iron Age settlement, historical ruins, a graveyard and a possible grave. Although farmsteads were not visited, a number of houses in the area are expected to be older than 60 years. None will be directly affected, although one does lie within the assessed corridor. The landscape is a heritage resources but has been somewhat compromised by the presence of a coal mine at either end of the corridor. There are relatively few other large industrial facilities in the surrounding area.

The present Alternative 1 layout may impact on a graveyard that lies in the centre of the corridor, while an Iron Age settlement lies partly within the substation footprint of Alternative 2. While much of the corridor has not been surveyed, careful examination on aerial photography suggests no further obvious sites and it is expected that any remaining impacts discovered during a pre-construction survey of the final layout could be dealt with through micrositing of infrastructure during the final EMPr approval stage.

The Alternative 1 Substation location and Alternative 2 powerline route are preferred, although the Alternative 2 substation could still be used if necessary, since about three quarters of the footprint is outside the heritage buffer zone there and the footprint could be reconfigured to avoid the site.

It is recommended that the proposed Impumelelo grid connection be authorised with either alternative, although Alternative 2 is marginally preferred. The following recommendations should be included as conditions of authorisation:

- If Alternative 1 is used then no pylons may be placed within 30 m of the IM001 graveyard falling within the corridor;
- The powerlines may span over the IM001 graveyard buffer but should preferably not pass over the site itself;
- If Alternative 2 is used then the substation footprint must be reconfigured to avoid the IM011 Iron Age settlement and its 50 m buffer;
- The potential grave at IM004 should be avoided;
- A pre-construction survey needs to be undertaken on all unploughed sections of the final layout;
- No stones may be removed from any archaeological site; and

- If any archaeological material or human burials are uncovered during the course of development then work in the immediate area should be halted. The find would need to be reported to the heritage authorities and may require inspection by an archaeologist. Such heritage is the property of the state and may require excavation and curation in an approved institution.

Glossary

Early Stone Age: Period of the Stone Age extending approximately between 2 million and 200 000 years ago.

Hominid: a group consisting of all modern and extinct great apes (i.e. gorillas, chimpanzees, orangutans and humans) and their ancestors.

Iron Age: Period post-dating about AD 200 and occurring in Eastern South Africa and featuring farming communities who practised iron smelting. It is split into the Early Iron Age (AD 200 to AD 900), the Middle Iron Age (AD 900 to AD 1300) and the Late Iron Age (AD 1300 to AD 1840).

Later Stone Age: Period of the Stone Age extending over the last approximately 20 000 years.

Middle Stone Age: Period of the Stone Age extending approximately between 200 000 and 20 000 years ago.

Abbreviations

APHP: Association of Professional Heritage Practitioners

ASAPA: Association of Southern African Professional Archaeologists

BA: Basic Assessment

CCP: Central Cattle Pattern

CRM: Cultural Resources Management

EA: Environmental Authorisation

ECO: Environmental Control Officer

EGI: Electricity Grid Infrastructure

EIA: Environmental Impact Assessment

EMPr: Environmental Management Program

ESA: Early Stone Age

GP: General Protection

GPS: global positioning system

HIA: Heritage Impact Assessment

LSA: Later Stone Age

MSA: Middle Stone Age

NEMA: National Environmental Management Act (No. 107 of 1998)

NHRA: National Heritage Resources Act (No. 25) of 1999

PPP: Public Participation Process

REDZ: Renewable Energy Development Zone

SAHRA: South African Heritage Resources Agency

SAHRIS: South African Heritage Resources Information System

Contents

Glossary	iv
Abbreviations	iv
1. INTRODUCTION	1
1.1. The proposed project	3
1.1.1. Project description	3
1.1.2. Identification of alternatives.....	5
1.1.3. Aspects of the project relevant to the heritage study.....	6
1.2. Terms of reference	6
1.3. Scope and purpose of the report	6
1.4. The authors.....	6
1.5. Declaration of independence	7
2. LEGISLATIVE CONTEXT	7
2.1. National Heritage Resources Act (NHRA) No. 25 of 1999	7
2.2. Approvals and permits.....	8
2.2.1. Assessment Phase	8
2.2.2. Construction Phase	9
2.3. Guidelines	9
3. METHODS.....	9
3.1. Literature survey and information sources	9
3.2. Field survey.....	10
3.3. Specialist studies.....	11
3.4. Impact assessment	11
3.5. Grading	11
3.6. Consultation.....	12
3.7. Assumptions and limitations	12
4. PHYSICAL ENVIRONMENTAL CONTEXT	12
4.1. Site context	12
4.2. Site description	13
5. FINDINGS OF THE HERITAGE STUDY	18
5.1. Palaeontology	18
5.2. Archaeology	19
5.2.1. Desktop study.....	19
5.2.2. Site visit	21
5.3. Graves	30
5.4. Historical aspects and the Built environment	32
5.4.1. Desktop study.....	32
5.4.2. Site visit	35
5.5. Cultural landscapes and scenic routes	36
5.6. Statement of significance and provisional grading	36
6. ASSESSMENT OF IMPACTS	38
6.1. Construction Phase.....	38

6.1.1. Impacts to archaeological resources	38
6.1.2. Impacts to graves	39
6.1.3. Impacts to the cultural landscape	39
6.2. Operation Phase	39
6.2.1. Impacts to the cultural landscape	40
6.3. Decommissioning Phase	43
6.4. Substation Construction Phase	39
6.4.1. Alternative 1	Error! Bookmark not defined.
6.4.2. Alternative 2	Error! Bookmark not defined.
6.5. Cumulative impacts	43
6.6. Evaluation of impacts relative to sustainable social and economic benefits.....	43
6.7. Existing impacts to heritage resources	45
6.8. The No-Go alternative	45
6.9. Levels of acceptable change	45
7. INPUT TO THE ENVIRONMENTAL MANAGEMENT PROGRAM	45
8. CONCLUSIONS	46
8.1. Reasoned opinion of the specialist.....	48
9. RECOMMENDATIONS	48
10. REFERENCES	49
APPENDIX 1 – Curriculum Vitae	52
APPENDIX 2 – Site Sensitivity Verification.....	54
APPENDIX 3 – Mapping	55

1. INTRODUCTION

ASHA Consulting (Pty) Ltd was appointed by ENERTRAG South Africa (Pty) Ltd to assess the potential impacts to heritage resources that might occur through the proposed construction of the Impumelelo grid connection extending between the proposed Impumelelo Wind Energy Facility (WEF) to the northeast of Greylingstad¹ and the existing Zandfontein Substation to the west of Secunda, Mpumalanga (Figures 1 & 2). Approximate end-points for the study area are:

- Southwest end at the Impumelelo WEF: S26° 40' 25.3" E28° 50' 29.1" (Alternative 2);
- Southwest end at the Impumelelo WEF: S26° 39' 47.0" E28° 51' 09.1" (Alternative 1); and
- Northeast at the Zandfontein Substation: S26° 40' 05" E28° 51' 10".

The project is proposed across numerous farm portions as shown in Table 1 and will be up to 34 km long.

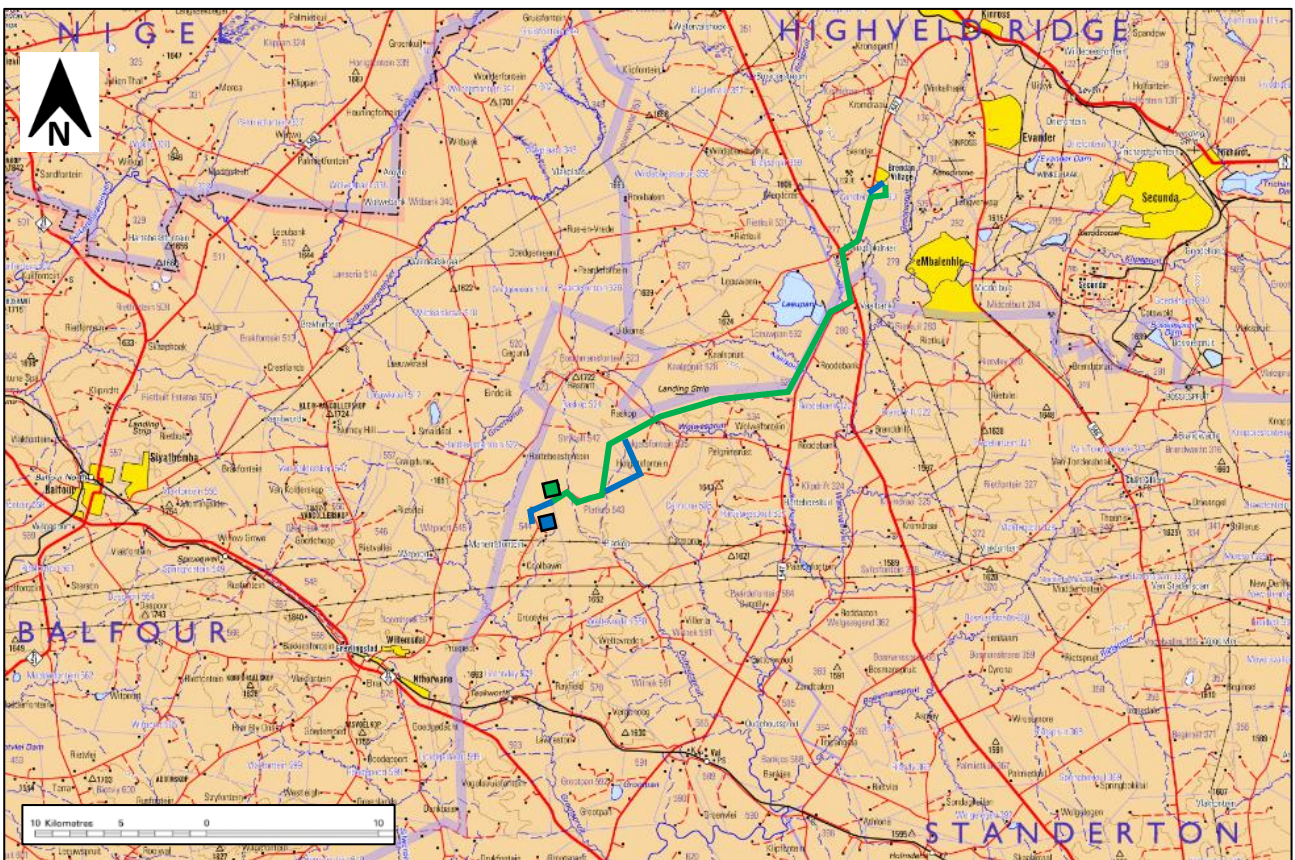


Figure 1: Extract from 1:50 000 topographic map 2628 showing the location of the site (Option 1 is shown by green blue substation block and powerline route, Option 2 is shown by the blue substation block and powerline route). Source of basemap: Chief Directorate: National Geo-Spatial Information. Website: www.ngi.gov.za.

¹ Note that the Impumelelo WEF is being assessed separately under its own EIA process.

Table 1: List of farm portions affected by the proposed project.

Portion Number	Farm Number	Farm Name
3	130	Zandfontein
2	130	Zandfontein
5	130	Zandfontein
8	130	Zandfontein
9	130	Zandfontein
0	279	Grootspruit
1	280	De Bank of Vaalbank
2	280	De Bank of Vaalbank
4	280	De Bank of Vaalbank
6	280	De Bank of Vaalbank
2	528	
3	528	Kafferfontein?
9	528	Kaalspruit
6	528	
7	528	Kaalspruit
16	323	Roodebank
0	542	
3	535	
4	535	Holgatsfontein
20	535	Holgatsfontein
18	535	Holgatsfontein
17	535	Holgatsfontein
19	535	Holgatsfontein
16	535	Holgatsfontein
15	535	
14	535	Holgatsfontein
3	535	Holgatsfontein
17	535	Holgatsfontein
0	529	
2	543	Platkop
4	543	Platkop
5	543	Platkop
9	543	Platkop
3	277	Sprinbokdraai
5	277	
2 (8)	277	Sprinbokdraai
5	277	Sprinbokdraai
20	323	Roodebank
3	130	
1	534	Wolvenfontein
18	534	Wolvenfontein
19	534	Wolvenfontein
20	534	Wolvenfontein
16	532	

Portion Number	Farm Number	Farm Name
0	544	Mahemsfontein
7	544	Mahemsfontein
8	544	Mahemsfontein
25	522	Hartbeestfontein
6	522	Hartbeestfontein

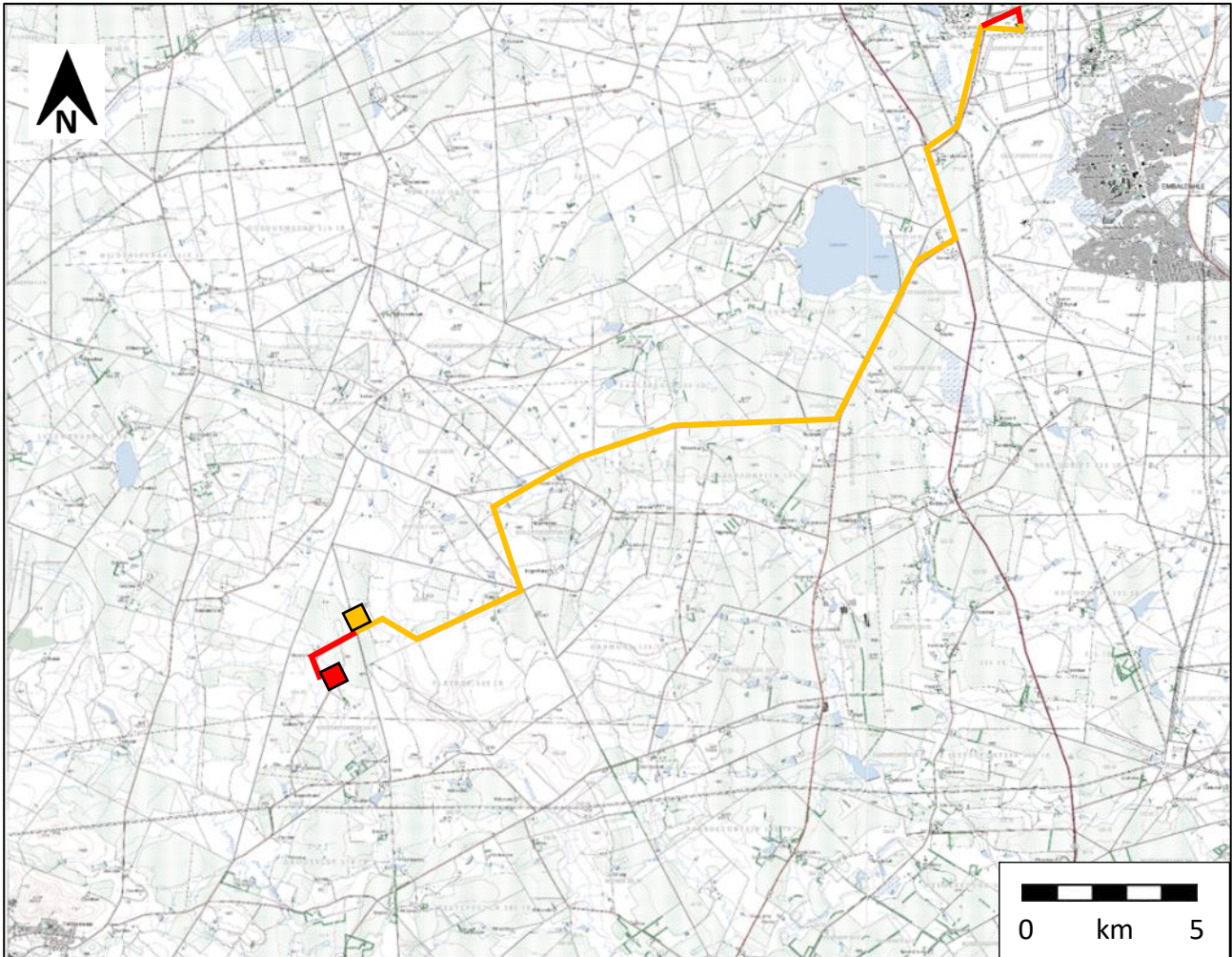


Figure 2: Extract from 1:50 000 topographic map 2628DB and 2629CA showing the location of the corridors (orange block and line are the Alternative 1 substation and powerline, red is Alternative 2 substation).

1.1. The proposed project

1.1.1. Project description

The proposed Impumelelo grid connection and associated infrastructure include various components as listed in Table 2. Figure 3 shows the proposed project layout.

Table 2: Project details for the Impumelelo 132kV Grid Connection.

Facility Name	Impumelelo 132kV Grid Connection
Applicant	Impumelelo Wind (Pty) Ltd (Registration Number: 2022/601923/07)
Municipalities	The project is located in the Dipaleseng Local Municipality of the Gert Sibande District Municipality
Affected Farms	Refer to Error! Reference source not found.
Powerline corridor length	Approx.~34km (To be confirmed prior to construction)
Powerline assessment corridors width	500m (250m either side of centre line)
Powerline servitude	32m per 132kV powerline Option 1 (~33km) Option 2 (~34km)
Powerline pylons:	Monopole or Lattice pylons, or a combination of both where required
Powerline pylon height:	Maximum 40m height
Temporary laydown or staging area:	Typical area 220m x 100m = 22000m ² . Laydown area could increase to 30000m ² for concrete towers, should they be required.
Site access	R547 and R23
Height of substation fencing	Up to 3 m high Galvanised steel
Substation area	2.5 ha (to be located adjacent to the Impumelelo WEF substation)



Figure 3: Proposed project layout. Orange block and line are the Alternative 1 substation and powerline, Red is Alternative 2).

1.1.2. Identification of alternatives

The proposed project entails the construction of up to 132kV transmission line from the onsite substation to the Zandfontein Substation as per the following alternatives:

Grid Connection Alternative 1 (Preferred): The proposed powerline will be approximately ~33 km and will connect to the Impumelelo WEF to the Zandfontein Substation via the onsite substation located on portion 5/543 of Farm Platkop (preferred substation – Option 1). This alternative spans over existing road and farm boundaries.

The preferred pylon and powerline will be 132 kV Intermediate Self-Supporting single circuit or double circuit. The powerline will have a 500m (250m on either side of center line) assessment corridor to allow for micro-siting.

Grid Connection Alternative 2: The proposed powerline will be approximately ~34 km and will connect to the Impumelelo WEF to the Zandfontein Substation via the onsite substation located on portion 0/544 of Farm Mahemsfontein. This alternative spans across the WEF around the Carmona Substation thereafter following the existing road and farm boundaries.

1.1.3. Aspects of the project relevant to the heritage study

All aspects of the proposed development are relevant, since excavations for foundations and/or services may impact on archaeological and/or palaeontological remains, while all above-ground aspects create potential visual (contextual) impacts to the cultural landscape and any significant heritage sites that might be visually sensitive.

1.2. Terms of reference

ASHA Consulting was asked to:

- Describe regional and local features of the receiving environment;
- Conduct a field survey to search for sensitive areas and sites of heritage significance;
- Map sensitive features and provide spatial data to inform the final project layout;
- Assess the potential impacts on identified heritage resources;
- Identify relevant legislation and legal requirements; and
- Provide recommendations on possible mitigation measures and management guidelines.

1.3. Scope and purpose of the report

A heritage impact assessment (HIA) is a means of identifying any significant heritage resources before development begins so that these can be managed in such a way as to allow the development to proceed (if appropriate) without undue impacts to the fragile heritage of South Africa. This HIA report aims to fulfil the requirements of the heritage authorities such that a comment can be issued by them for consideration by the Mpumalanga Department of Environmental Affairs (DARDLEA) who will review the Environmental Impact Assessment (EIA) and grant or refuse authorisation. The HIA report will outline any management and/or mitigation requirements that will need to be complied with from a heritage point of view and that should be included in the conditions of authorisation should this be granted.

1.4. The authors

Dr Jayson Orton has an MA (UCT, 2004) and a D.Phil (Oxford, UK, 2013), both in archaeology, and has been conducting Heritage Impact Assessments and archaeological specialist studies in South Africa (primarily in the Western Cape and Northern Cape provinces) since 2004 (please see curriculum vitae included as Appendix 1). He has also conducted research on aspects of the Later Stone Age in these provinces and published widely on the topic. He is an accredited heritage practitioner with the Association of Professional Heritage Practitioners (APHP; Member #43) and also holds archaeological accreditation with the Association of Southern African Professional Archaeologists (ASAPA) CRM section (Member #233) as follows:

- Principal Investigator: Stone Age, Shell Middens & Grave Relocation; and
- Field Director: Colonial Period & Rock Art.

Jaco van der Walt has been practising as a CRM archaeologist for 20 years. He obtained an MA degree in Archaeology from the University of the Witwatersrand focussing on the Iron Age in 2012 and is a PhD candidate at the University of Johannesburg focusing on Stone Age Archaeology with specific interest in the Middle Stone Age (MSA) and Later Stone Age (LSA). Jaco is an accredited

member of ASAPA (#159) and APHP (#114) and has conducted more than 500 impact assessments in Limpopo, Mpumalanga, North West, Free State, Gauteng, 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, DRC, Zambia, Guinea, Tanzania as well as Afghanistan. Through this, he has a sound understanding of the IFC Performance Standard requirements, with specific reference to Performance Standard 8 – Cultural Heritage.

1.5. Declaration of independence

ASHA Consulting (Pty) Ltd and its consultants have no financial or other interest in the proposed development and will derive no benefits other than fair remuneration for consulting services provided.

2. LEGISLATIVE CONTEXT

2.1. National Heritage Resources Act (NHRA) No. 25 of 1999

The NHRA protects a variety of heritage resources as follows:

- Section 34: structures older than 60 years;
- Section 35: prehistoric and historical material (including ruins) more than 100 years old as well as military remains more than 75 years old, palaeontological material and meteorites;
- Section 36: graves and human remains older than 60 years and located outside of a formal cemetery administered by a local authority; and
- Section 37: public monuments and memorials.

Following Section 2, the definitions applicable to the above protections are as follows:

- Structures: “any building, works, device or other facility made by people and which is fixed to land, and includes any fixtures, fittings and equipment associated therewith”;
- Palaeontological material: “any fossilised remains or fossil trace of animals or plants which lived in the geological past, other than fossil fuels or fossiliferous rock intended for industrial use, and any site which contains such fossilised remains or trace”;
- Archaeological material: a) “material remains resulting from human activity which are in a state of disuse and are in or on land and which are older than 100 years, including artefacts, human and hominid remains and artificial features and structures”; b) “rock art, being any form of painting, engraving or other graphic representation on a fixed rock surface or loose rock or stone, which was executed by human agency and which is older than 100 years, including any area within 10m of such representation”; c) “wrecks, being any vessel or aircraft, or any part thereof, which was wrecked in South Africa, whether on land, in the internal waters, the territorial waters or in the maritime culture zone of the Republic, as defined respectively in sections 3, 4 and 6 of the Maritime Zones Act, 1994 (Act No. 15 of 1994), and any cargo, debris or artefacts found or associated therewith, which is older than 60 years or which SAHRA considers to be worthy of conservation”; and d) “features, structures and artefacts associated with military history which are older than 75 years and the sites on which they are found”;

- Grave: “means a place of interment and includes the contents, headstone or other marker of such a place and any other structure on or associated with such place”; and
- Public monuments and memorials: “all monuments and memorials a) “erected on land belonging to any branch of central, provincial or local government, or on land belonging to any organisation funded by or established in terms of the legislation of such a branch of government”; or b) “which were paid for by public subscription, government funds, or a public-spirited or military organisation, and are on land belonging to any private individual.”

Section 3(3) describes the types of cultural significance that a place or object might have in order to be considered part of the national estate. These are as follows:

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

While landscapes with cultural significance do not have a dedicated Section in the NHRA, they are protected under the definition of the National Estate (Section 3). Section 3(2)(c) and (d) list “historical settlements and townscapes” and “landscapes and natural features of cultural significance” as part of the National Estate. Furthermore, some of the points in Section 3(3) speak directly to cultural landscapes.

2.2. Approvals and permits

2.2.1. Assessment Phase

Section 38(8) of the NHRA states that if an impact assessment is required under any legislation other than the NHRA then it must include a heritage component that satisfies the requirements of S.38(3). Furthermore, the comments of the relevant heritage authority must be sought and considered by the consenting authority prior to the issuing of a decision. Under the National Environmental Management Act (No. 107 of 1998; NEMA), as amended, the project is subject to an EIA. The present report provides the heritage component. Mpumalanga Provincial Heritage Resource Authority (MPHRA; for built environment and cultural landscapes) and the South African Heritage Resources Agency (SAHRA; for archaeology and palaeontology) are required to provide comment on the proposed project in order to facilitate final decision making by the DARDLEA.

2.2.2. Construction Phase

If archaeological or palaeontological mitigation is required prior to construction, then the appointed archaeologist or palaeontologist would need to obtain a permit from SAHRA. This would be issued in their name. This is so that the heritage authority can ensure that the appointed practitioner has proposed an appropriate methodology that will result in the mitigation being done properly. A built environment permit, if required, would need to be obtained from the PHRA.

2.3. Guidelines

SAHRA have issued minimum standards documents for archaeological and palaeontological specialist studies. There is also a Western Cape Provincial guideline for heritage specialists working in an EIA context and which is generally useful. The reporting has been prepared in accordance with these guidelines. The relevant documents are as follows:

- Winter, S. & Baumann, N. 2005. Guideline for involving heritage specialists in EIA processes: Edition 1. CSIR Report No ENV-S-C 2005 053 E. Republic of South Africa, Provincial Government of the Western Cape, Department of Environmental Affairs & Development Planning, Cape Town.
- SAHRA. 2007. Minimum Standards: archaeological and palaeontological components of impact assessment reports. Document produced by the South African Heritage Resources Agency, May 2007.

3. METHODS

3.1. Literature survey and information sources

A survey of available literature was carried out to assess the general heritage context into which the development would be set. The information sources used in this report are presented in Table 3 with relevant dates of each source referenced in the text as needed. Data were also collected via a field survey. The data quality is suitable for the purpose of informing this report.

Table 3: Information sources used in this assessment.

Data / Information	Source	Date	Type	Description
Maps	Chief Directorate: National Geo-Spatial Information	Various	Spatial	Historical and current 1:50 000 topographic maps of the study area and immediate surrounds
Aerial photographs	Chief Directorate: National Geo-Spatial Information	Various	Spatial	Historical aerial photography of the study area and immediate surrounds
Aerial photographs	Google Earth	Various	Spatial	Recent and historical aerial photography of the study area and immediate surrounds

Data / Information	Source	Date	Type	Description
Cadastral data	Chief Directorate: National Geo-Spatial Information	Various	Survey diagrams	Historical and current survey diagrams, property survey and registration dates
Background data	South African Heritage Resources Information System (SAHRIS)	Various	Reports	Previous impact assessments for any developments in the vicinity of the study area
Palaeontological sensitivity	South African Heritage Resources Information System (SAHRIS)	Current	Spatial	Map showing palaeontological sensitivity and required actions based on the sensitivity.
Background data	Books, journals, websites	Various	Books, journals, websites	Historical and current literature describing the study area and any relevant aspects of cultural heritage.

3.2. Field survey

The WEF site, which includes part of the powerline route, was surveyed on 30 and 31 March 2022. A second site visit was carried out on 18 January 2023 to check new areas included in the WEF and also to examine the rest of the powerline route. Unfortunately access to most of the route was not possible, including a long section following a mine conveyor servitude, so it was generally only examined from the road where possible. These visits were during summer and, being a summer rainfall area, the grass was dense which negatively affected the ground visibility for the archaeological survey. Planted fields also tended to be in full growth. Other heritage resources are not affected by seasonality. During the surveys the positions of finds and survey tracks were recorded on a hand-held Garmin Global Positioning System (GPS) receiver set to the WGS84 datum (Figure 4). Photographs were taken at times in order to capture representative samples of both the affected heritage and the landscape setting of the proposed development. Due to the low ground coverage and access restrictions, the study area was also carefully examined on aerial photography.

It should be noted that the amount of time between the dates of the field inspection and final report do not materially affect the outcome of the report.

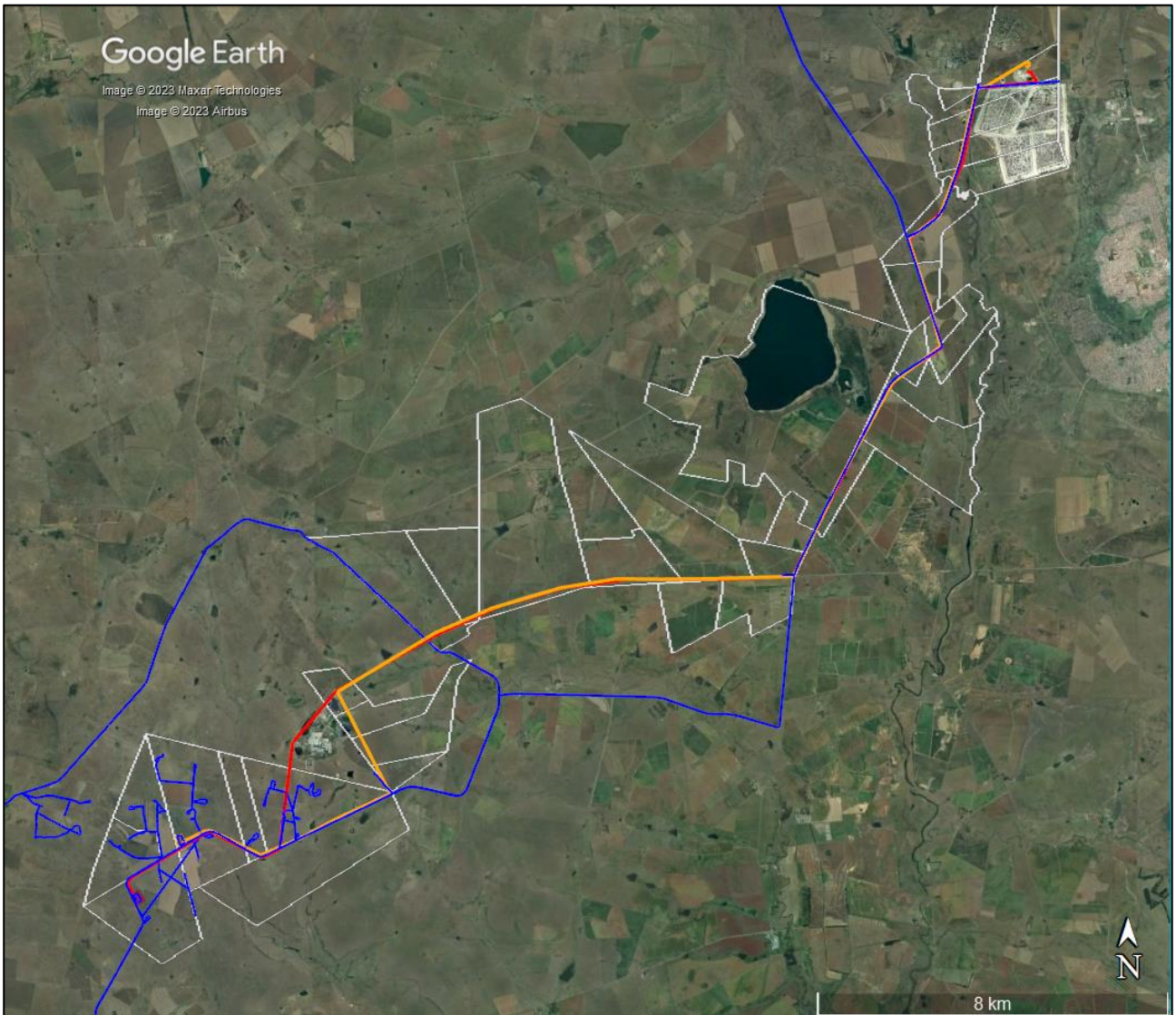


Figure 4: Aerial view of the study area (key as per Figure 3) showing the survey tracks (blue lines).

3.3. Specialist studies

A separate palaeontological specialist study has been compiled by Prof. Marion Bamford and is submitted separately with this HIA.

3.4. Impact assessment

For consistency among specialist studies, the impact assessment was conducted through application of a methodology supplied by WSP.

3.5. Grading

It is intended under S.7(2) that the various provincial authorities formulate a system for the further detailed grading of heritage resources of local significance but this is generally yet to happen. SAHRA

(2007) has formulated its own system² for use in provinces where it has commenting authority. In this system sites of high local significance are given Grade IIIA (with the implication that the site should be preserved in its entirety) and Grade IIIB (with the implication that part of the site could be mitigated and part preserved as appropriate) while sites of lesser significance are referred to as having 'General Protection' (GP) and rated as GP A (high/medium significance, requires mitigation), GP B (medium significance, requires recording) or GP C (low significance, requires no further action).

3.6. Consultation

The NHRA requires consultation as part of an HIA but, since the present study falls within the context of an EIA which includes a public participation process (PPP), no dedicated consultation was undertaken as part of the HIA. Interested and affected parties would have the opportunity to provide comment on the heritage aspects of the project during the PPP.

3.7. Assumptions and limitations

The field study was carried out at the surface only and hence any completely buried archaeological sites would not be readily located. Similarly, it is not always possible to determine the depth of archaeological material visible at the surface. A large proportion of the routes were not accessible and had to be examined remotely. The longest inaccessible section follows a conveyor servitude and is expected to be somewhat disturbed, while part also follows the R547 and R50 (in total some 24 km follow these existing conveyor and road servitudes). Other areas are within ploughed or disturbed lands, but some intact grassland is also included. It is assumed that archaeological features will not be present in ploughed lands and that the road and conveyor servitudes will be heavily disturbed. In some non-planted areas the grass was also very dense which greatly reduced ground visibility. It is assumed that stone features would, however, generally be protruding from the grass but due to the height of the grass it is easily possible to miss small features and/or graves located more than a few meters away. Nonetheless, aerial photography was scrutinised to locate any further obvious sites.

Cumulative impacts are difficult to assess due to the variable site conditions that would have been experienced in different areas and in different seasons. Survey quality is thus likely to be variable. As such, some assumptions need to be made in terms of what and how much heritage might be impacted by other developments in the broader area.

4. PHYSICAL ENVIRONMENTAL CONTEXT

4.1. Site context

The corridors start about 12 km northeast of Greylingstad and extend to an area immediately south of Brendan Village (which lies west of Secunda). The study area covers multiple farms that are used for various farming activities such as cattle and crop farming and farmsteads are scattered through the area. Local public roads are both gravel and tar, and coal mines lie near both ends of the corridors.

² The system is intended for use on archaeological and palaeontological sites only.

4.2. Site description

The study area is a relatively flat landscape characterised by open fields with dense grass cover and scattered thickets of small trees. Large, cultivated fields with maize, sunflower and beans are scattered across the study area with the open fields in between used for cattle grazing. Several roads and a coal conveyor belt cut through the area and much off the corridors' length follows these features. Figures 5 to 15 show the physical appearance of the study area with the photographs proceeding from the southwest towards the northeast along the routes.



Figure 5: View along grid connection corridor into the coal conveyor servitude.



Figure 6: View along grid connection corridor into the coal conveyer servitude.



Figure 7: View along grid connection corridor where it runs adjacent to the R547 road.



Figure 8: View along grid connection corridor where it runs adjacent to the R547 road.



Figure 9: View along grid connection corridor where it runs adjacent to the R547 road.



Figure 10: View along grid connection corridor where it runs adjacent to the R547 road.



Figure 11: View along grid connection corridor where it runs adjacent to the R50 road.



Figure 12: View along grid connection corridor where it runs adjacent to the R50 road.



Figure 13: View east across the grid connection corridor where the conveyor crosses beneath the R50 road. The R50 is behind the viewer and the conveyor runs from right to left beneath the gravel road.



Figure 14: View east along the grid corridor where it follows a road leading off the R547. A mine dump lies to the right.



Figure 15: View along the northernmost part of the corridor where it runs adjacent to a mine.

5. FINDINGS OF THE HERITAGE STUDY

This section describes the heritage resources recorded in the study area during the course of the project.

5.1. Palaeontology

The SAHRIS Palaeosensitivity Map shows the site to be of mixed sensitivity with at least half the area rated as very high (Figure 16). However, areas of moderate and zero sensitivity also occur. Due to the sandy substrate, generally dense vegetation covering throughout the study area and the fact

that much of the routes lie along existing developed servitudes, a desktop palaeontological study was carried out. This has been submitted separately with this HIA.

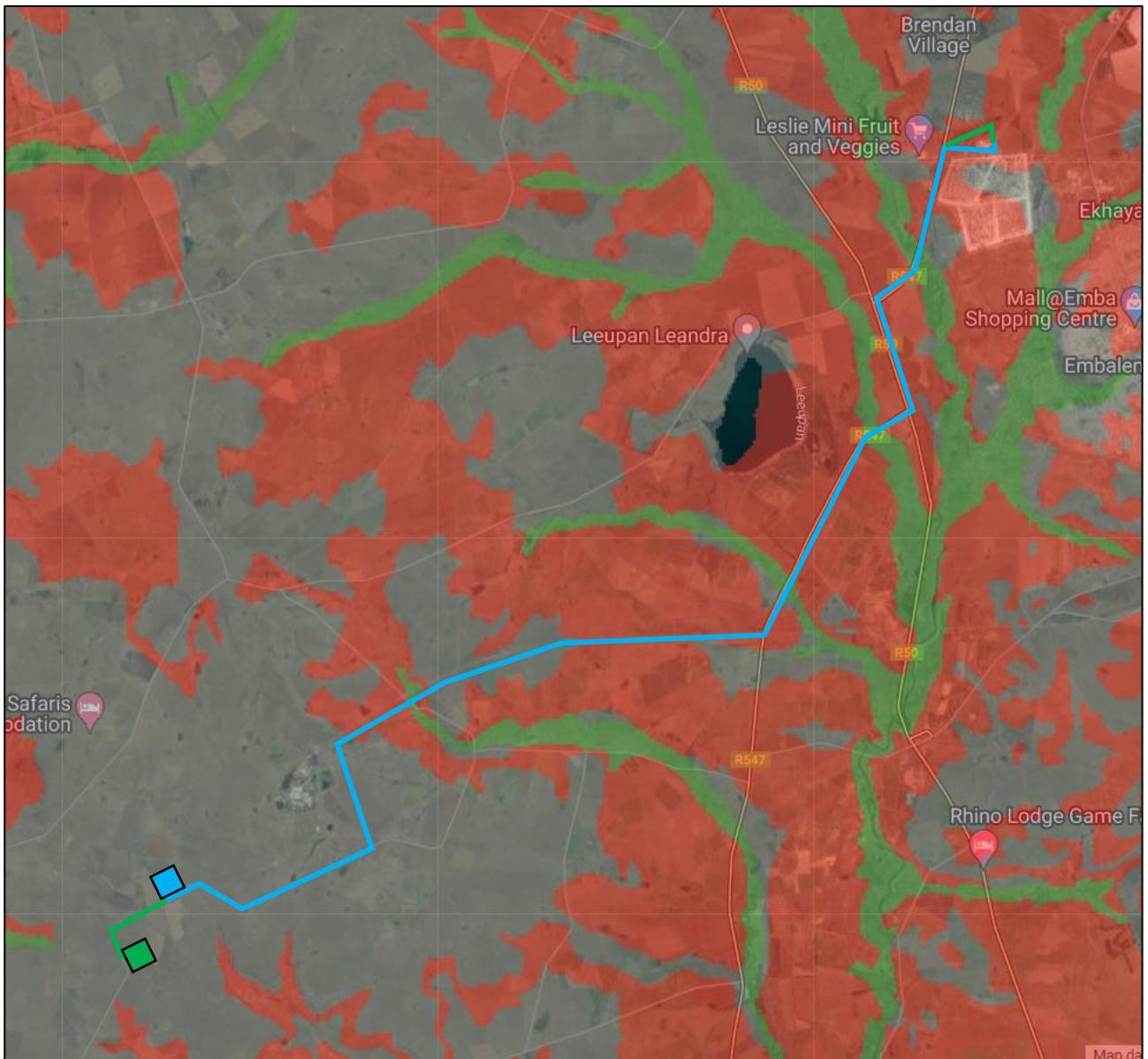


Figure 16: Extract from the SAHRIS Palaeosensitivity Map showing the corridors (blue and green lines) to be of variably very high (red shading), moderate (green shading) and zero palaeontological sensitivity (grey shading).

5.2. Archaeology

5.2.1. Desktop study

ESA assemblages have been investigated from the Maleoskop Site near Groblersdal, approximately 100 km south of the project area (Esterhuysen & Smith 2007). Other prolific Stone Age sites in Mpumalanga include Bushman Rock Shelter and Heuningneskrans Shelter, located approximately 70 km southeast of the project area (Louw 1969; Plug 1982; Klein 1984). Within the vicinity of the project area, previous impact assessment surveys have shown that MSA and LSA stone tools are

widely distributed as scatters across the landscape. Evidence for these periods has been excavated from Bushman Rock Shelter in the Ohrigstad District (Esterhuysen & Smith 2007) and it is known that San communities lived near Lake Chrissie as recently as the 1950s (e.g. Schlebusch *et al.* 2016).

Dates from Early Iron Age sites indicate 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. By 1500 CE the escarpment was populated by chiefdoms, including Pedi and Bokoni communities. These chiefdoms would have had trade relations with Ndundza, Swazi and Zulu kingdoms, exchanging salt, cattle and metals as evidenced by the archaeological record (Esterhuysen & Smith 2007; Delius *et al.* 2012). Iron Age settlements within the surrounding areas include that of Wildebeestfontein near Kinross in the Bethal District. This site consisted of nine middens and several depressions indicating dwellings, with a layout pattern similar to Type V settlements with some possible alteration due to the Difeqane. Another important site is that of Robertsdrift, a Type V settlement at the confluence of the Vaal and Klip rivers outside Standerton. It was discovered after aerial photographs were taken of the area. Ceramics with comb stamping motifs were identified during excavations (Derricourt & Evers, 1973). Aerial imagery of the present study area has revealed the presence of Iron Age settlements in various areas, both within and outside of the study area. Unfortunately, most of these sites could not be visited due to access not being available.

Other CRM surveys that have taken place in the vicinity of the present study area reveal the variety of heritage resources commonly encountered in the area. These are listed in Table 4.

Table 4: CRM reports compiled for other projects close to the present study area.

Author	Year	Project	Findings
Henderson, Z & Koortzen, C	2007	2007. Heritage Assessment Report Zeus Substation Expansion, Vlakfontein 328, Gert Sibande (DC 30) District, Mpumalanga, South Africa. Unpublished report for PBA International.	A burial ground containing 56 graves was identified during the impact assessment. The oldest identified date on the headstone is 1922 (Henderson & Koortzen, 2007).
Van Schalkwyk, J.A.	2008	Heritage Impact Assessment for the Standerton Extension 8 Project, Standerton, Mpumalanga. Unpublished report for Interdesign Landscape Architects	A Second World War aerodrome was identified during the impact assessment. It was part of the vast Joint Air Training Scheme that was operated by the South African Air Force and the Royal Air Force.
Pistorius, J.C.C.	2008	A phase 1 Heritage Impact Assessment (HIA) study for Sasol's proposed new gas and liquid pipelines in Secunda (Mpumalanga) to Sasol Infrachem and Natref in Sasolburg (Free State) on the Highveld in the Republic of South Africa.	A total of three farmstead complexes, 11 historical houses and 14 burial grounds were identified along the proposed pipeline corridor (Pistorius, 2008).
Khan, S.K. & Higgitt, N.	2012	Heritage Statement for the Zandbaken Coal Mine Project, Zandbaken 585 IR, Sandbaken 363 IS and Bosman's Spruit 364 IS, Standerton, Mpumalanga	Desktop assessment highlighting graves and built environment sites in the region

5.2.2. Site visit

A number of archaeological resources were recorded in the study area during the surveys. Those that are relevant to the powerline corridors are listed in Table 5 and then individually described and illustrated below. Mapping is presented in Appendix 3. The sites listed here are within 300 m of the centre corridor lines which encompasses slightly more land than the 500 m wide corridors being assessed.

Table 5: List of heritage finds recorded during the field survey (note that the SAHRA grading system is not applicable to buildings).

Waypoint	Location	Nature	Grade
IM001	26°39'13.00"S 28°53'55.30"E	Graves	IIIA
IM002	26°39'44.83"S 28°52'05.10"E	Archaeological – stone feature	GPC
IM004	26°39'43.36"S 28°51'32.52"E	Archaeological – stone features & possible graves	GPC & IIIA
IM011	26°40'25.71"S 28°50'28.81"E	Archaeological – stone feature	GPB
IM019	26°36'36.35"S 28°58'22.23"E	Building	---

The most significant archaeological sites recorded are large stone-walled Iron Age settlements built on and around hills. These date to the Late Iron Age and follow the Central Cattle Pattern (CCP) (Huffman 2001) settlement layout. These sites were identified from aerial imagery as they stand out clearly on the landscape. Spatially these settlements show close affiliation with Type N settlements (Maggs 1976). Type N settlements date to the 15th to 17th centuries in the Free State, and during this time they spread across the Vaal into the hilly areas around Gauteng (Dreyer 1992). Here it developed into a settlement pattern referred to as Klipriviersberg (Huffman 2007) dating to the 18th and 19th centuries (the sites we identified, including IM011, are thus from this period). These sites are marked by several small stock kraals, and walls separating residential zones and unmarked graves are likely to occur in them. Larger settlements are also more common during this period.

Other stone-walled sites are historical and assumed to be the dwellings and associated structures of white farmers. Most of them likely have their roots in the 19th century but would have fallen into disuse during the 20th century. They are generally of quite low significance because of their poor condition and relatively recent origin. Historical buildings were often purposefully demolished so that the stones could be reused elsewhere on the farms and this may explain the very limited rubble at most of the sites. It is possible that abandoned houses may have been used by farm labourers before their eventual demolition and, as such, the possibility of still-born babies having been buried there must be considered. The chances of this happening are, however, very small and such remains would likely not be found during earthmoving.

Also found were some ruined farm structures which, due to their poor condition and relatively recent age, have low significance.

Site Number: IM002	Description: Ephemeral stone packed foundation of what could have been a rectangular dwelling of farm labourers. The feature measures approximately 4 x 3 meters.	Period: Historic, recent
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Coordinates: 26°39'44.83"S 28°52'5.10"E.



Figure 17: Stone foundation barely visible in the grass.



Figures 18 & 19: *Remains of stone wall foundation.*



Figure 20: *1955 (201_009_04327) and modern aerial views of the site. A pale patch in the region of the site could indicate some activity there in 1955.*

Statement of Significance and Grade:

Low, unless containing still born graves - GPC.

Site Number:	Description:	Period:
IM004	<p>Remnants of various packed stone foundations, stone packed kraals, stone outer walls and cement slabs. The features are found over an area of approximately 85 x 80 meters. This area also included oval stone packed cairns measuring approximately 2 meters long and 1.2 meters wide that could be graves.</p> <p>The possible graves are also located near the stone structures.</p>	Historic, recent

Coordinates:
26°39'43.36"S
28°51'32.52"E



Figures 21 & 22: Drystone walling.



Figures 23 & 24: Drystone walling.



Figure 25: Remains of drystone-walled structures.

Figure 26: Remains of a cement floor.



Figures 27 & 28: Stone mounds that might be graves.



Figures 29 & 30: Stone mounds that might be graves, but the general scatter of rocks may suggest otherwise.

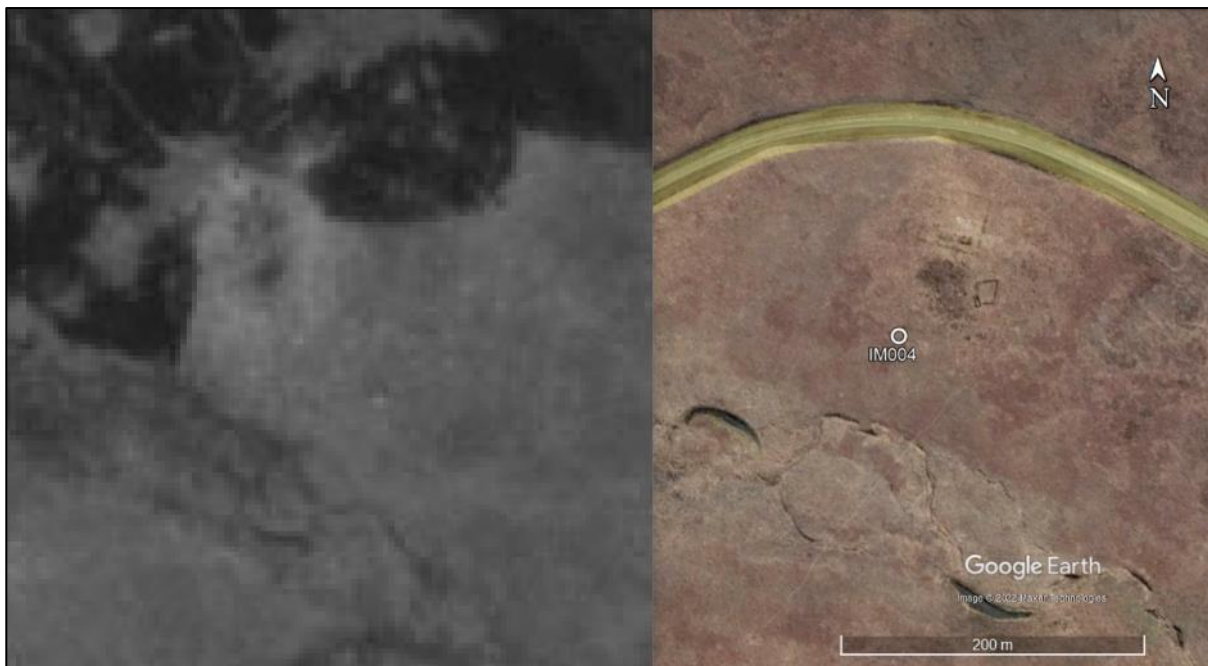


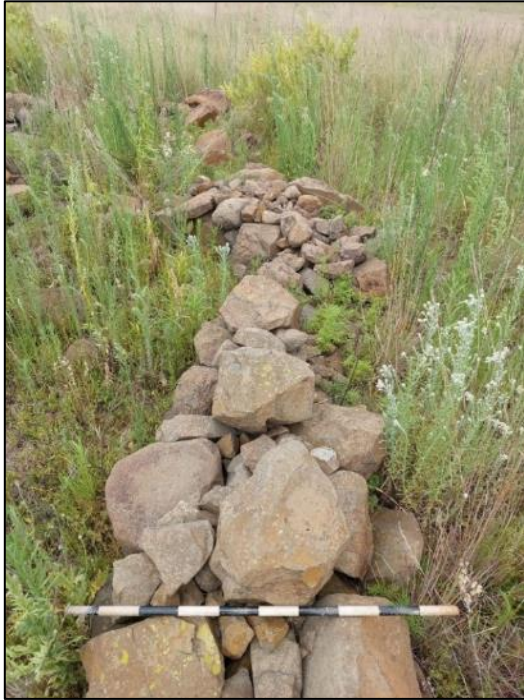
Figure 31: 1955 (201_009_04328) and modern aerial views showing a large light patch on the older image where the site is. The darkest central spot identifies the kraal.

Statement of Significance and Grade:

Low - GPC, but stone cairns could mark burial sites which would be high - IIIA.

<p>Site Number:</p> <p>IM011</p>	<p>Description:</p> <p>Small Late Iron Age settlement marked by the ephemeral remains of enclosures and stone walling of which only the foundations remain. The site is situated on a small, low hill. The small hill is overgrown with tall grass making it difficult to determine the site layout and extent. High likelihood of graves occurring in association with this site.</p>	<p>Period:</p> <p>Historic</p>
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Coordinates:
26°40'25.71"S
28°50'28.81"E





Figures 32 – 27: General site conditions at IM011 showing the remains of stone walling scattered across the low overgrown hill.

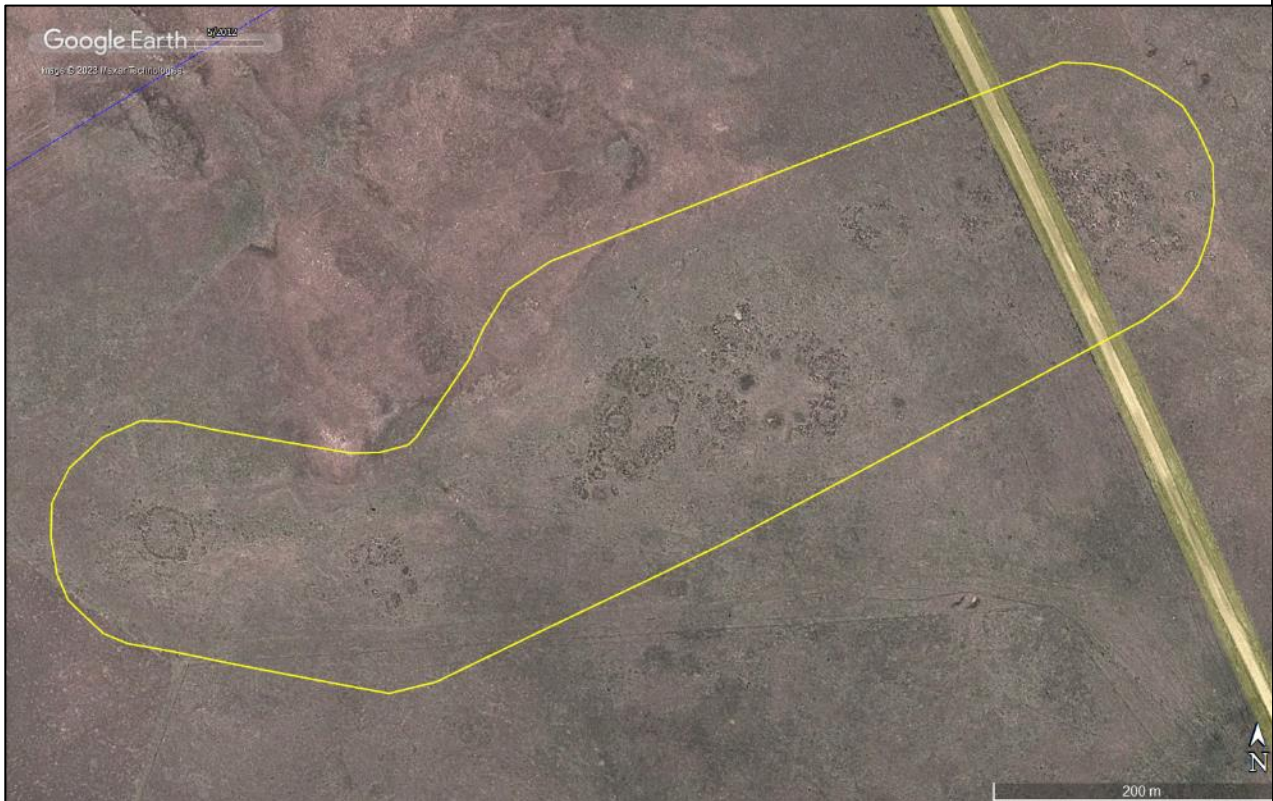


Figure 38: Aerial view dated 2012 with the site in the 50 m buffer polygon. This is the clearest imagery available, but the enclosures to the east of the road (and which were surveyed) are not readily visible.

Statement of Significance:

Low to medium – GPB

Graves, if present are high – IIIA

Site Number:	Description:	Period:
IM019	Small farmstead that includes a house older than 70 years and which likely dates to the early 20 th century. Several features were visible around the house in 2012 but some are no longer present.	Historic, recent

Coordinates:
26°36'36.35"S
28°58'22.23"E



Figure 39: Aerial view dated 2012 showing several features.



Figure 40: Aerial view dated 1953 (326_004_03635) and 2022 (Google Earth) showing that the house (arrowed) was present in 1953 and that various features have disappeared since 2012.

Statement of Significance:

Medium

5.3. Graves


Site Number:	Description:	Period:
IM001	Small cemetery located on the fence line adjacent to a public road. Some graves possibly older than 60 years and thus the site could be heritage (included for precautionary reasons). There two cement graves with cement headstones dating to 1971 of the Radebe family and a further three packed stone graves, which are quite likely older. Some stones along the fence may indicate a disturbed grave.	Historic, recent
Coordinates: 26°39'13.00"S 28°53'55.30"E		
		
<p>Figures 41 & 42: Cement graves and gravestones.</p>		



Figure 43: Stone adjacent to the fence that may have been removed from a grave and placed along the fence or could indicate a disturbed grave.



Figure 44: One of the stone mound graves lying just to the west of the two cement graves. The road is visible at far right.



Figure 45: Graves and general site conditions recorded at IM001.



Figure 46: 1955 (201_009_04327) and modern aerial views showing that the road was not there yet in 1955. The modern road alignment is indicated by the white dashed line.

Statement of Significance and Grade:

High – IIIA

5.4. Historical aspects and the Built environment

5.4.1. Desktop study

During the mid-17th century, the Dutch East India Company established a trading post at modern-day Cape Town. Simultaneously, the Portuguese colonised Lourenço Marques (Maputo), Mozambique. As such, the Mpumalanga landscape became a thoroughfare for local and foreign traders. However, the increasing intensity of interaction among indigenous peoples and European merchants led to intensified competition over control of trade routes and accumulating wealth. Consequently, political centralisation led to warfare and population displacement (Derricourt & Evers 1973; Esterhuysen & Smith 2007; Delius *et al.* 2012).

By the 1830s, Dutch-speaking farmers started to migrate from modern-day Cape Town towards the interior regions of South Africa. Dutch-speaking migrants entering the region were confronted with existing tension between local groups due to the ongoing Mfecane, trade conflicts, and pressure from foreign merchants. Motivated to improve their own economic position within the area, more conflict between the Dutch, Sotho-Tswana and Nguni speaking communities started to take place (Giliomee & Mbenga 2007). Ultimately, Dutch-speaking farmers did settle in Mpumalanga and neighbouring provinces.

The discovery of coal, gold and diamonds during the mid-19th century led to a variety of socio-economic changes within South Africa. Since the discovery of mineral wealth, the new wage-economy and migrant labour systems contributed to the demise of traditional homestead

economies and social organisation. In addition, competition for resources led to conflict, political upheavals and ultimately warfare (e.g., Crush & Soutter 1999; Delius 2014).

During the 1850s coalfields were already being exploited. Coal served a variety of purposes, as it still does today. From powering steam trains, ships, furnaces for smelting metals, it was also utilised within a domestic context, to heat up space and cook food. Since the discovery of diamonds and gold the industrial demand for coal increased significantly. Lucrative mining continued until the onset of the South African War of 1899 -1902 when the workforce joined the war effort, and, as usual during wartime, railways and infrastructure were destroyed. Following the end of the South African War, activities within the South African Union (formed in 1910) were aimed at stabilising the economy by focusing on agriculture and coal mining. However, post-war socio-economic and political crises, especially after World War I (1914-1918) had a profound economic and political impact on the South African coal industry and mine workers (Giliomee & Mbenga 2007). Due to the relative economic and political stability after World War II (1939-1945), mining towns were established and coal mining continued. Today coal is still an integral part of the South African economy, used for the generation of electricity, synthetic fuels, and petrochemical products (Mathu & Chinomona 2013).

The site itself is an agricultural landscape and, as shown on the historical aerial photography in Figure 47 and modern view in Figure 48, its overall character has not changed over the last 67 years. A few specific changes are noticeable, however:

- The cultivated lands have changed slightly with some no longer in use and some new or extended ones;
- Some new farmsteads have been added in the area since 1955 (including at last two close to the corridors);
- Some farmsteads have had new structures added;
- The Impumelelo Mine has been developed near the south-western end of the study area and extensive mining infrastructure occurs near Brendan Village in the northeast;
- Various small farm dams have been added to the landscape; and
- The lake in the central part of the study area was far smaller but this is dependent on seasonal rainfall with 2009 imagery showing it even larger than today.

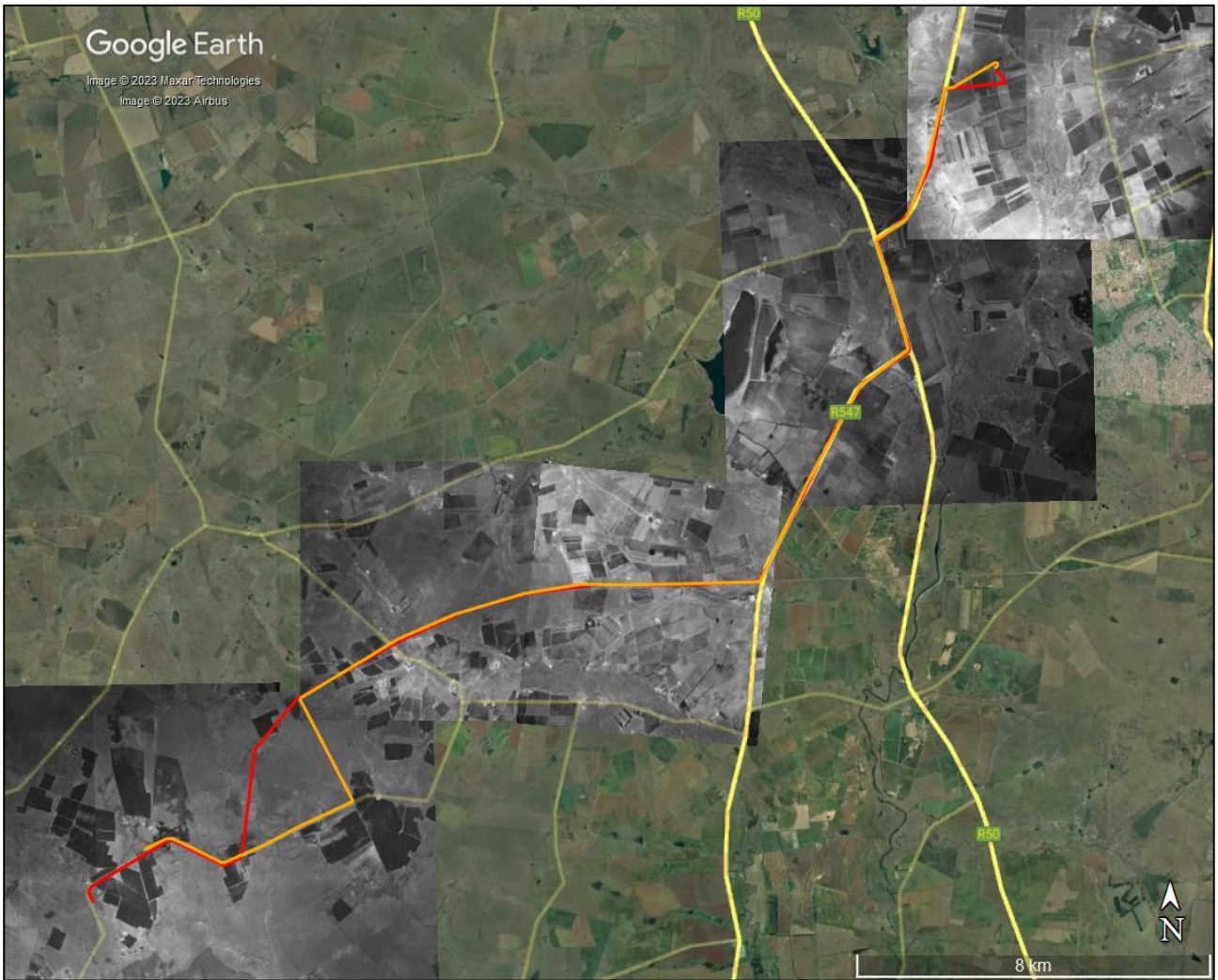


Figure 47: Aerial view with 1953 and 1955 images overlaid on Google Earth showing the landscape as a patchwork of arable lands (dark areas) and grassland.

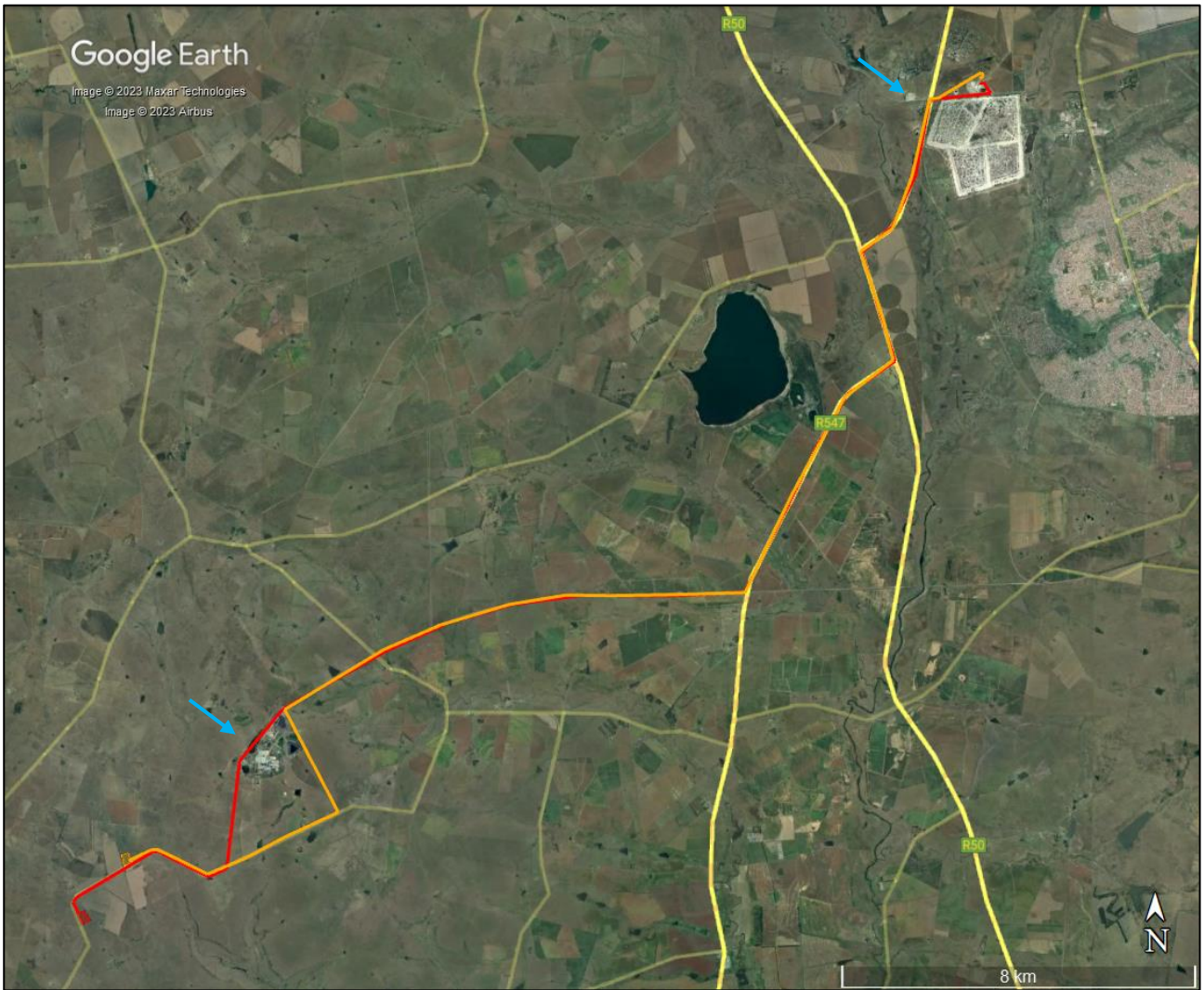


Figure 48: Modern aerial view (Google Earth) showing a similar patchwork of arable lands and grassland. Significant additions to the landscape are the mines at either end of the corridors (blue arrows).

5.4.2. Site visit

It is evident from the historical archaeological finds (including those documented in the WEF study) that the agricultural landscape is historical, but many structures in the area (including a number now in ruin) seem to be relatively modern. A number of existing structures are older than 60 years but, because the WEF survey focused on the then-proposed turbine locations and access to the powerline land parcels was not possible, no houses were visited. No buildings, historical or otherwise, will be directly impacted (because they are always avoided by development) but some do lie within the corridor. The vast majority of the latter are modern though (e.g. Figure 49).



Figure 49: Aerial views dated 1944 (55_025_01447) and 2021 (Google Earth) showing that the farmstead in this area was absent in 1944.

5.5. Cultural landscapes and scenic routes

Cultural landscapes are the product of the interactions between humans and nature in a particular area. Sauer (1925) defined them thus: “The cultural landscape is fashioned from a natural landscape by a cultural group. Culture is the agent, the natural area is the medium, the cultural landscape the result”.

As shown in Figure 93, the historical landscape is an agricultural one characterised by grazing lands (grass) and arable lands (planted with crops). The landscape is extensive and is punctuated by towns and coal mines. It is not a particularly sensitive cultural landscape with most of its development having taken place during the 20th century. Locally, it is compromised by the coal mine located immediately north of the study area. Landscape integrity is better in the southern part of the study area where some hills contribute to the scenic aspect.

The R50 is the main thoroughfare through the general study area. The lack of obvious scenic aspects beyond the rural landscape means that this road cannot be considered a scenic route. The north-eastern end of the proposed corridors is heavily compromised by the large mine dump and associated mining infrastructure at the Middelbult Simunye Mine (see Figures 13 & 14).

5.6. Statement of significance and provisional grading

Section 38(3)(b) of the NHRA requires an assessment of the significance of all heritage resources. In terms of Section 2(vi), “cultural significance” means aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance. The reasons that a place may have cultural significance are outlined in Section 3(3) of the NHRA (see Section 2 above).

The archaeological resources are deemed to have low to medium cultural significance at the local level for their scientific value and can be graded GPB or GPC.

Graves are deemed to have high cultural significance at the local level for their social value. They are allocated a grade of IIIA. Possible graves are included here for precautionary reasons.

Built heritage resources are considered up to medium significance at the local level for their architectural, historical and social values.

The cultural landscape is largely an agricultural landscape with medium to low aesthetic value due to the visual intrusion from the nearby coal mines which add an industrial component to parts of the landscape. It is rated as having low cultural significance at the local level.

Figures 50 and 51 show a grade map with all heritage resources currently known to fall within the corridors. They are indicated with 50 m buffers.



Figure 50: Grade map of the study area showing the locations of all sites found. They are coloured as follows: Grade IIIA = red, GPA = light orange, GPB = yellow and GPC = white. See enlargement in Figure 51.



Figure 51: Enlargement from Figure 50.

6. ASSESSMENT OF IMPACTS

The impacts identified for the Impumelelo grid connection are as follows:

- *Construction phase:*
 - Impacts to palaeontology
 - Impacts to archaeology
 - Impacts to graves
 - Impacts to the cultural landscape
- *Operation phase:*
 - Impacts to the cultural landscape
- *Decommissioning phase:*
 - Impacts to the cultural landscape

While palaeontological heritage is assessed in the separate specialist study, all the other impacts are considered here.

6.1. Construction Phase (Alternative 1)

6.1.1. Impacts to archaeological resources

Direct impacts to archaeological resources would occur during the construction phase when grubbing and construction commence. No culturally significant archaeological sites are expected to be impacted by the proposed project. The impact significance thus calculates to **very low negative**

(Table 6). Mitigation would entail surveying the final alignment to determine whether any archaeological sites requiring mitigation might still occur. Any parts of the route running through arable lands do not need to be examined. Once construction is underway any further sites discovered during construction should be protected and reported. With mitigation, the significance remains **very low negative**.

There are no fatal flaws in terms of construction phase impacts to archaeology.

6.1.2. Impacts to graves

One graveyard lies within the corridor, as does a potential grave. Because of the very high cultural significance of graves the magnitude of impacts to graves is rated high. Because most of the layout remains unsurveyed there is still a chance of impacts occurring elsewhere as well. The resulting impact significance is **moderate negative** (Table 6). Mitigation will entail avoiding all graves and potential graves and reporting any chance finds of unmarked graves during construction. A farm-style fence with a pedestrian access gate should also be erected around the IMP001 graveyard. A pre-construction survey should also be undertaken to determine whether any graves are visible in the final footprint. With mitigation the significance would reduce to **very low negative**.

Impacts to graves would be considered a fatal flaw but if all graves and possible graves are avoided then there are no fatal flaws in terms of construction phase impacts to graves.

6.1.3. Impacts to the cultural landscape

The local landscape is already compromised by the nearby coal mines, and powerlines are not highly visible over long distances. As such, the intrusion into this landscape of the construction equipment and powerlines is considered to be of low magnitude. Due to the certainty of an impact occurring, the significance calculates to **moderate negative** (Table 6). Minimising the construction duration, minimising landscape disturbance in general and ensuring rehabilitation of areas not needed during operation will result in a reduction in the significance to **low negative**.

There are no fatal flaws in terms of construction phase impacts to the cultural landscape.

6.2. Construction Phase (Alternative 2)

6.2.1. Impacts to archaeological resources

Direct impacts to archaeological resources would occur during the construction phase when grubbing and construction commence. The most significant site in the project area is an Iron Age site in the Alternative 2 substation footprint. This means that there is a high likelihood of impacts and the resulting impact significance is **high negative** (Table 7). Mitigation would entail avoiding the site and surveying the final alignment to determine whether any further archaeological sites requiring mitigation might still occur. The risk of graves in these settlements must be remembered, although archaeological deposits tend to be uncommon. Any parts of the route running through arable lands do not need to be examined. Once construction is underway any further sites discovered during construction should be protected and reported. With mitigation, the significance reduces to **very low negative**.

There are no fatal flaws in terms of construction phase impacts to archaeology.

6.2.2. Impacts to graves

Only one possible grave has been recorded in the Alternative 2 corridor. Because of the very high cultural significance of graves the magnitude of impacts to graves is rated high but the chances of an impact occurring are low. Because most of the layout remains unsurveyed there is still a chance of impacts occurring elsewhere as well. The resulting impact significance is **low negative** (Table 7). Mitigation will entail avoiding all graves and potential graves and reporting any chance finds of unmarked graves during construction. A pre-construction survey should also be undertaken to determine whether any graves are visible in the final footprint. With mitigation the significance would reduce to **very low negative**.

Impacts to graves would be considered a fatal flaw but if all graves and possible graves are avoided then there are no fatal flaws in terms of construction phase impacts to graves.

6.2.3. Impacts to the cultural landscape

The local landscape is already compromised by the nearby coal mines, and powerlines are not highly visible over long distances. As such, the intrusion into this landscape of the construction equipment and powerlines is considered to be of low magnitude. Due to the certainty of an impact occurring, the significance calculates to **moderate negative** (Table 7). Minimising the construction duration, minimising landscape disturbance in general and ensuring rehabilitation of areas not needed during operation will result in a reduction in the significance to **low negative**.

There are no fatal flaws in terms of construction phase impacts to the cultural landscape.

6.3. Operation Phase (Alternatives 1 & 2)

6.3.1. Impacts to the cultural landscape

As before, the local landscape is already compromised by the nearby coal mines. As such, the intrusion into this landscape of the powerline and substation is considered to be of only low magnitude. Due to the certainty of an impact occurring, the significance calculates to **moderate negative** (Table 6). There are no specific mitigation measures that can be applied during operation other than the best practice measure of ensuring that all maintenance work occurs within designated areas. Post-mitigation significance would remain at the **moderate negative** level.

There are no fatal flaws in terms of operation phase impacts to the cultural landscape.

Table 6: Assessment of impacts for the Alternative 1 Impumelelo grid connection and substation.

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:	Archaeology	Damage to or destruction of archaeological resources	Construction	Negative	High	1	1	5	5	1	12	N1	1	1	5	5	1	12	N1
Significance						N1 - Very Low							N1 - Very Low						
Impact 2:	Graves	Damage to or destruction of graves	Construction	Negative	High	5	3	5	5	3	54	N3	1	3	5	5	1	14	N1
Significance						N3 - Moderate							N1 - Very Low						
Impact 3:	Cultural landscape	Visual intrusion into and change of character of the cultural landscape	Construction	Negative	Low	1	3	3	2	5	45	N3	1	3	3	2	3	27	N2
Significance						N3 - Moderate							N2 - Low						
Impact 4:	Cultural landscape	Visual intrusion into and change of character of the cultural landscape	Operation	Negative	Low	1	3	3	4	5	55	N3	1	3	3	4	3	33	N3
Significance						N3 - Moderate							N3 - Moderate						
Impact 5:	Cultural landscape	Visual intrusion into and change of character of the cultural landscape	Decommissioning	Negative	Low	1	3	3	2	5	45	N3	1	3	3	2	3	27	N2
Significance						N3 - Moderate							N2 - Low						

Table 7: Assessment of impacts for the Alternative 2 Impumelelo grid connection and substation.

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:	Archaeology	Damage to or destruction of archaeological resources	Construction	Negative	High	3	3	5	5	5	80	N4	1	3	5	5	1	14	N1
Significance						N4 - High						N1 - Very Low							
Impact 2:	Graves	Damage to or destruction of graves	Construction	Negative	High	1	1	5	5	2	24	N2	1	1	5	5	1	12	N1
Significance						N2 - Low						N1 - Very Low							
Impact 3:	Cultural landscape	Visual intrusion into and change of character of the cultural landscape	Construction	Negative	Low	1	3	3	2	5	45	N3	1	3	3	2	3	27	N2
Significance						N3 - Moderate						N2 - Low							
Impact 4:	Cultural landscape	Visual intrusion into and change of character of the cultural landscape	Operation	Negative	Low	1	3	3	4	5	55	N3	1	3	3	4	3	33	N3
Significance						N3 - Moderate						N3 - Moderate							
Impact 5:	Cultural landscape	Visual intrusion into and change of character of the cultural landscape	Decommissioning	Negative	Low	1	3	3	2	5	45	N3	1	3	3	2	3	27	N2
Significance						N3 - Moderate						N2 - Low							

6.4. Decommissioning Phase (Alternatives 1 & 2)

Decommissioning impacts are essentially the same as those in the construction phase. The significance calculates to **moderate negative** (Table 6). Minimising the decommissioning duration and ensuring full rehabilitation post-closure will not change the rating which remains **moderate negative**.

There are no fatal flaws in terms of decommissioning phase impacts to the cultural landscape.

6.5. Cumulative impacts

Various other projects are proposed in the wider area and might impact upon heritage resources. Cumulative impacts would occur through the construction, operation and decommissioning of many projects in the same general area. The projects considered in the assessment of cumulative impacts are listed in Table 8. In terms of archaeology, Iron Age settlements are large and quite widespread which means that there is a fair chance of impacts (most notably from the Impumelelo WEF). Mitigation (as proposed for the various projects) would bring the significance down from **high negative** to **low negative** (Table 8). Graves are generally unlikely to be impacted but are present widely in the landscape and one potential grave in the present project is at risk of impacts. Furthermore, graves can be present within the Iron Age settlements. Mitigation would reduce the impact significance from **high negative** to **very low negative**. Cumulative impacts to the landscape are likely to be **moderate negative** before mitigation for all three phases. With mitigation these are likely to reduce to **low negative** for the construction and decommissioning phases but remain **moderate negative** for the operation phase.

Table 8: Other projects considered for the cumulative impact assessment.

Project	Relative location
The authorised Tutuka 65.9 MW Solar Photovoltaic (PV) Energy Facility and its associated infrastructure (Ref: 14/12/16/3/3/2/754)	23km to the southeast
The authorised Forzando North Coal Mine Solar PV Facility, 9.5MW, (Ref: 14/12/16/3/3/1/452)	55km to the northeast
The proposed Impumelelo WEF	Approximately 25km to the west
The proposed Vhuvhili Solar Energy Facility (NEAS No. MPP/EIA/0001063/2022)	Approximately 10km to the east

6.6. Evaluation of impacts relative to sustainable social and economic benefits

Section 38(3)(d) of the NHRA requires an evaluation of the impacts on heritage resources relative to the sustainable social and economic benefits to be derived from the development.

The proposed powerline would serve to evacuate energy produced by the proposed Impumelelo WEF which will result in obvious benefits to society at many levels. There will be local job creation during construction and operation but, more widely, an improvement in electricity supply in South Africa will stimulate the economy and result in new job opportunities opening up and quality of life improving. These are clear economic and social benefits and, if mitigation is applied as suggested above, then the socio-economic benefits outweigh the residual impacts.

Table 8: Assessment of cumulative impacts.

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:	Archaeology	Damage to or destruction of archaeological resources	Construction	Negative	High	3	3	5	5	5	80	N4	1	3	5	5	2	28	N2
Significance						N4 - High							N2 - Low						
Impact 2:	Graves	Damage to or destruction of graves	Construction	Negative	High	5	3	5	5	4	72	N4	1	3	5	5	1	14	N1
Significance						N4 - High							N1 - Very Low						
Impact 3:	Cultural landscape	Visual intrusion into and change of character of the cultural landscape	Construction	Negative	Low	1	3	3	2	5	45	N3	1	3	3	2	3	27	N2
Significance						N3 - Moderate							N2 - Low						
Impact 4:	Cultural landscape	Visual intrusion into and change of character of the cultural landscape	Operation	Negative	Low	1	3	3	4	5	55	N3	1	3	3	4	3	33	N3
Significance						N3 - Moderate							N3 - Moderate						
Impact 5:	Cultural landscape	Visual intrusion into and change of character of the cultural landscape	Decommissioning	Negative	Low	1	3	3	2	5	45	N3	1	3	3	2	3	27	N2
Significance						N3 - Moderate							N2 - Low						

6.7. Existing impacts to heritage resources

There are currently no obvious threats to heritage resources on the site aside from the natural degradation, weathering and erosion that will affect archaeological materials. Trampling from grazing animals and/or farm/other vehicles could also occur. These impacts would be of **very low negative** significance. The local landscape, which is generally agricultural in nature, is, as noted above, already impacted by the local coal mines but there are relatively few mines in this area compared to other parts of the Highveld so the impact is considered only **moderate negative**. Such mines are an expected part of the Highveld landscape and have been for many years.

6.8. The No-Go alternative

If the project were not implemented then the site would stay as it currently is (impact significance of **low negative**). Although the heritage impacts with implementation would be greater than the existing impacts, the loss of socio-economic benefits is more significant and suggests that the No-Go option is less desirable in heritage terms.

6.9. Levels of acceptable change

Any impact to an archaeological or palaeontological resource or a grave is deemed unacceptable until such time as the resource has been inspected and studied further if necessary. Impacts to the landscape are difficult to quantify but in general a development that visually dominates the landscape from many publicly accessible vantage points is undesirable. Because of the limited mass of the proposed powerline, such an impact to the landscape is not envisaged.

7. INPUT TO THE ENVIRONMENTAL MANAGEMENT PROGRAM

The actions recorded in Table 9 should be included in the environmental management program (EMPr) for the project.

Table 9: Heritage considerations for inclusion in the EMPr.

Impact	Mitigation / management objectives & outcomes	Mitigation / management actions	Monitoring		
			Methodology	Frequency	Responsibility
Impacts to archaeology and graves					
Damage or destruction of archaeological sites or graves	Avoid impacts (preferred) or locate and sample or rescue sites/burials before disturbance	Pre-construction survey, micro-siting of infrastructure, make recommendations for mitigation.	Appoint archaeologist to conduct survey well before construction	Once-off	Project developer
Damage or destruction of archaeological sites or graves	Rescue information, artefacts or burials before extensive damage occurs	Reporting chance finds as early as possible, protect in situ and stop work in immediate area.	Inform staff to be vigilant and carry out inspections of new excavations	Ongoing basis	Construction Manager or Contractor
				Whenever on site (at least weekly)	ECO
Impacts to the cultural landscape					

Impact	Mitigation / management objectives & outcomes	Mitigation / management actions	Monitoring		
			Methodology	Frequency	Responsibility
Visible landscape scarring	Minimise landscape scarring	Ensure disturbance is kept to a minimum and does not exceed project requirements. Rehabilitate areas not needed during operation.	Monitoring of surface clearance relative to approved layout	Ongoing basis	Construction Manager or Contractor
				As required	ECO

8. CONCLUSIONS

Heritage resources were generally uncommon in the corridor and most of those found should be easily avoided. The exception is the Iron Age settlement that falls partly within the Alternative 2 Substation footprint (Figure 52). Two other potential concerns exist. One is a very low significance archaeological site that has a potential grave associated with it (Figure 53) but this should be easily avoided. The Other is a graveyard that lies right in the centre of the corridor, adjacent to a road (Figure 54). While it is best to avoid this site with a 50 m buffer, it is acknowledged that an alignment close to the public road is likely to be most feasible. As such, the powerlines may span over the 50 m buffer area but no pylon should be built within 30 m of the graveyard. It is also preferred that the powerlines do not span directly over the graveyard. With so little of the layout surveyed there is also a chance that more graves may come to light. A pre-construction survey will be very important to minimise potential impacts. Much of the overall corridors lies within ploughed lands and these are considered as being of very low sensitivity. Only sections of the final alignment located out of the ploughed lands need to receive a pre-construction survey.

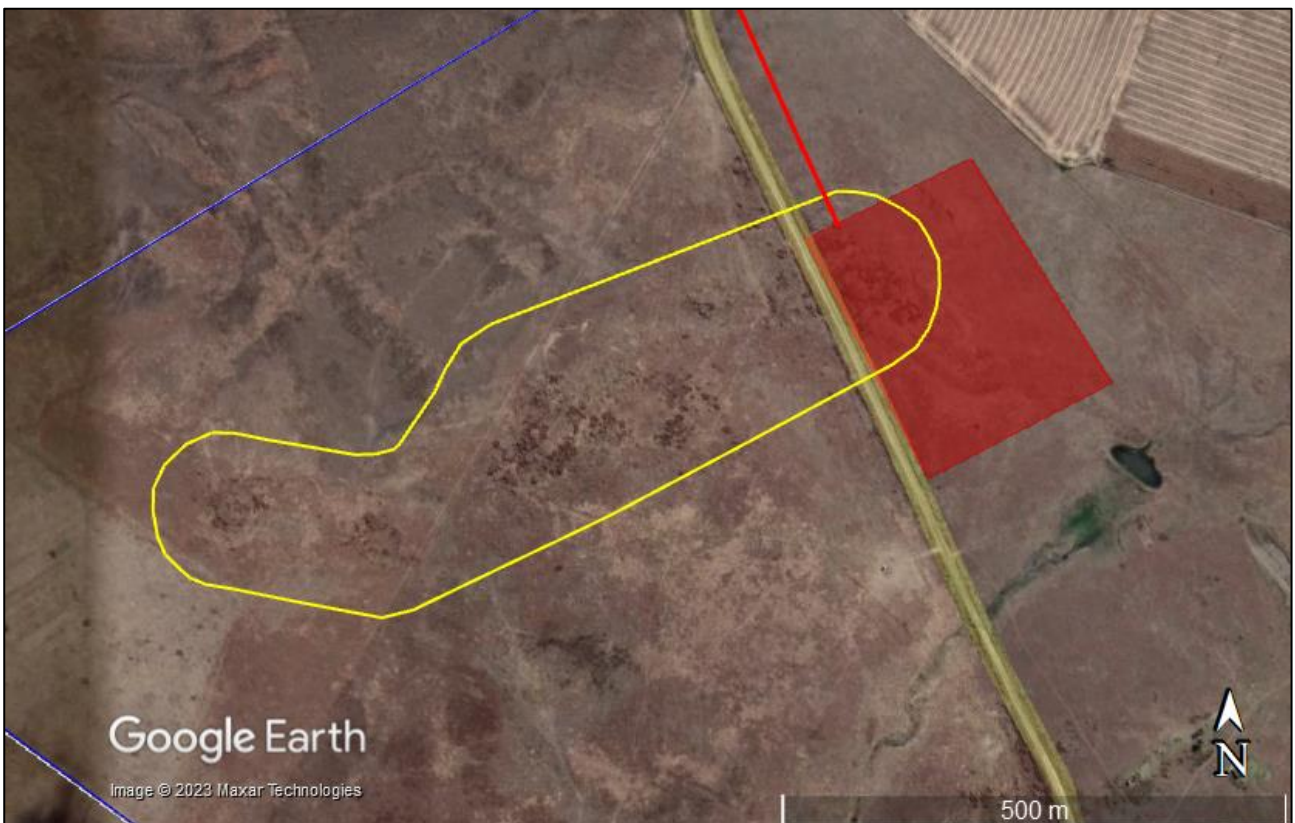


Figure 52: Aerial view of the vicinity of the Alternative 2 substation (red polygon) and the Iron Age settlement (yellow polygon, including buffer).

Should Alternative 2 be used, then an alternative configuration of the substation area to avoid this site will be required. Although not of high cultural significance, mitigation could be extensive due to the nature of the site and it (and its 50 m buffer as mapped in this report) is best avoided.

The expected impacts for the two alternatives vary with Alternative 1 likely to result in more significant impacts to graves along the powerline route and Alternative 2 likely to result in more significant impacts to archaeology at the substation. In sum, the Alternative 1 substation location and Alternative 2 powerline route are preferred from a heritage point of view, but ultimately either alternative could be used with the successful application of mitigation measures.

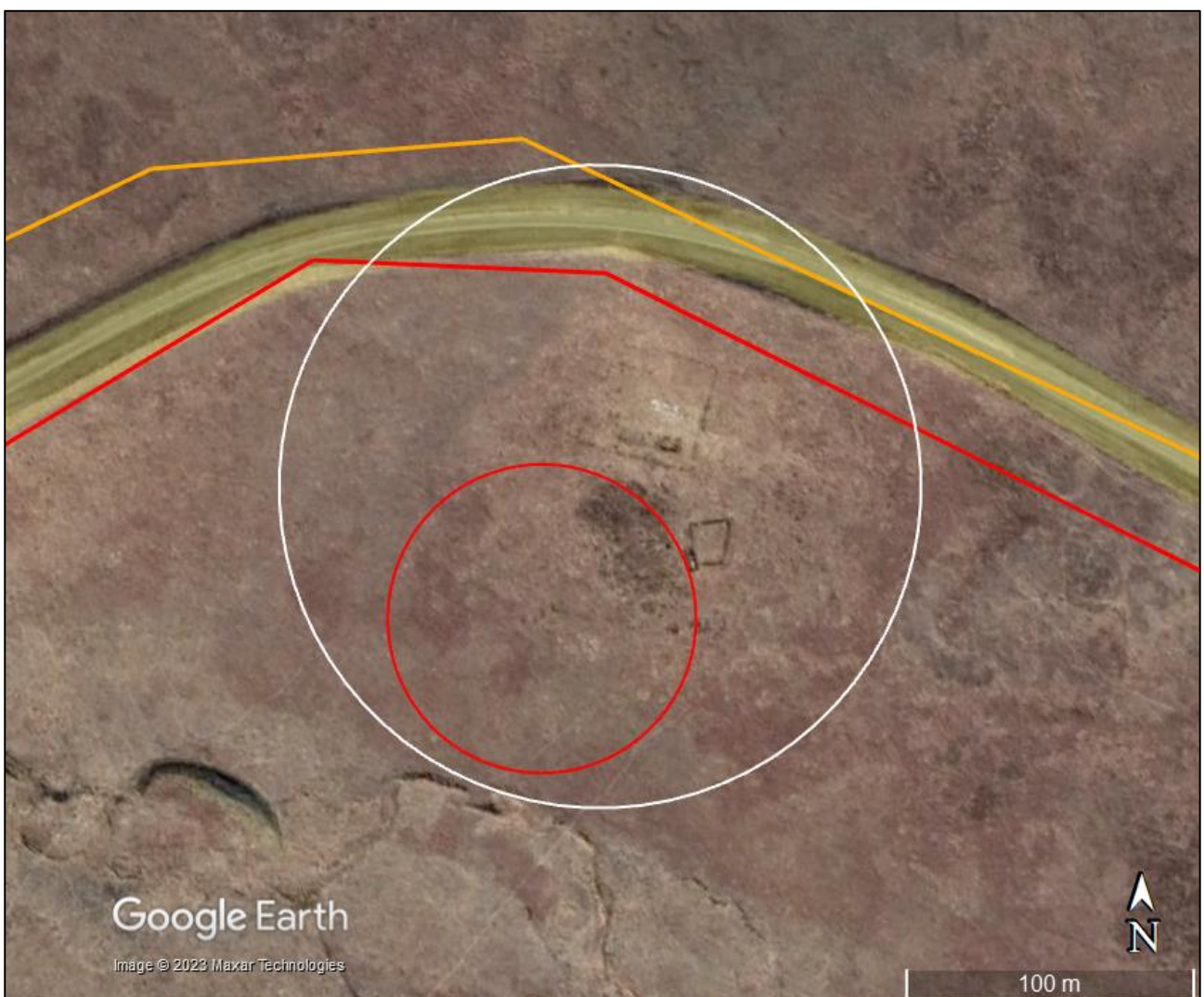


Figure 53: Aerial view of the area just east of the Alternative 1 substation showing the very low significance archaeological site (white circle, including buffer) and possible grave (red circle, including buffer).



Figure 54: Aerial view of the graveyard in the Alternative 2 corridor showing it to be very close to the corridor centre line.

8.1. Reasoned opinion of the specialist

Most of the two corridors is, or is likely to be, of low sensitivity. Micro-siting of infrastructure during the final EMPr approval stage will likely account for all potential impacts, although further micro-siting may still be needed after the pre-construction survey. The main concerns for this project are the graveyard in the Alternative 1 corridor and the Iron Age settlement in the Alternative 2 substation footprint. It is the opinion of the heritage consultant that the proposed Impumelelo grid connection may be authorised in full with Alternative 2 being slightly preferred and on condition that layout changes are made to account for the archaeological site in the Alternative 2 substation footprint should that alternative be used.

9. RECOMMENDATIONS

It is recommended that the proposed Impumelelo grid connection be authorised with either alternative, although Alternative 2 is marginally preferred. The following recommendations should be included as conditions of authorisation:

- If Alternative 1 is used then no pylons may be placed within 30 m of the IM001 graveyard falling within the corridor;
- The powerlines may span over the IM001 graveyard buffer but should preferably not pass over the site itself;
- If Alternative 2 is used then the substation footprint must be reconfigured to avoid the IM011 Iron Age settlement and its 50 m buffer;
- The potential grave at IM004 should be avoided;
- A pre-construction survey needs to be undertaken on all unploughed sections of the final layout;
- No stones may be removed from any archaeological site; and
- If any archaeological material or human burials are uncovered during the course of development then work in the immediate area should be halted. The find would need to be reported to the heritage authorities and may require inspection by an archaeologist. Such heritage is the property of the state and may require excavation and curation in an approved institution.

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APPENDIX 1 – Curriculum Vitae



Curriculum Vitae

Jayson David John Orton

ARCHAEOLOGIST AND HERITAGE CONSULTANT

Contact Details and personal information:

Address: 23 Dover Road, Muizenberg, 7945
Telephone: (021) 788 1025
Cell Phone: 083 272 3225
Email: jayson@asha-consulting.co.za

Birth date and place: 22 June 1976, Cape Town, South Africa
Citizenship: South African
ID no: 760622 522 4085
Driver's License: Code 08
Marital Status: Married to Carol Orton
Languages spoken: English and Afrikaans

Education:

SA College High School	Matric	1994
University of Cape Town	B.A. (Archaeology, Environmental & Geographical Science) 1997	
University of Cape Town	B.A. (Honours) (Archaeology)*	1998
University of Cape Town	M.A. (Archaeology)	2004
University of Oxford	D.Phil. (Archaeology)	2013

*Frank Schweitzer memorial book prize for an outstanding student and the degree in the First Class.

Employment History:

Spatial Archaeology Research Unit, UCT	Research assistant	Jan 1996 – Dec 1998
Department of Archaeology, UCT	Field archaeologist	Jan 1998 – Dec 1998
UCT Archaeology Contracts Office	Field archaeologist	Jan 1999 – May 2004
UCT Archaeology Contracts Office	Heritage & archaeological consultant	Jun 2004 – May 2012
School of Archaeology, University of Oxford	Undergraduate Tutor	Oct 2008 – Dec 2008
ACO Associates cc	Associate, Heritage & archaeological consultant	Jan 2011 – Dec 2013
ASHA Consulting (Pty) Ltd	Director, Heritage & archaeological consultant	Jan 2014 –

Professional Accreditation:

Association of Southern African Professional Archaeologists (ASAPA) membership number: 233
 CRM Section member with the following accreditation:

- Principal Investigator: Coastal shell middens (awarded 2007)
 Stone Age archaeology (awarded 2007)
 Grave relocation (awarded 2014)
- Field Director: Rock art (awarded 2007)
 Colonial period archaeology (awarded 2007)

Association of Professional Heritage Practitioners (APHP) membership number: 43

- Accredited Professional Heritage Practitioner

➤ **Memberships and affiliations:**

South African Archaeological Society Council member	2004 – 2016
Assoc. Southern African Professional Archaeologists (ASAPA) member	2006 –
UCT Department of Archaeology Research Associate	2013 – 2017
Heritage Western Cape APM Committee member	2013 –
UNISA Department of Archaeology and Anthropology Research Fellow	2014 –
Fish Hoek Valley Historical Association	2014 –
Kalk Bay Historical Association	2016 –
Association of Professional Heritage Practitioners member	2016 –

Fieldwork and project experience:

Extensive fieldwork and experience as both Field Director and Principle Investigator throughout the Western and Northern Cape, and also in the western parts of the Free State and Eastern Cape as follows:

Feasibility studies:

- Heritage feasibility studies examining all aspects of heritage from the desktop

Phase 1 surveys and impact assessments:

- Project types
 - Notification of Intent to Develop applications (for Heritage Western Cape)
 - Desktop-based Letter of Exemption (for the South African Heritage Resources Agency)
 - Heritage Impact Assessments (largely in the Environmental Impact Assessment or Basic Assessment context under NEMA and Section 38(8) of the NHRA, but also self-standing assessments under Section 38(1) of the NHRA)
 - Archaeological specialist studies
 - Phase 1 archaeological test excavations in historical and prehistoric sites
 - Archaeological research projects
- Development types
 - Mining and borrow pits
 - Roads (new and upgrades)
 - Residential, commercial and industrial development
 - Dams and pipe lines
 - Power lines and substations
 - Renewable energy facilities (wind energy, solar energy and hydro-electric facilities)

Phase 2 mitigation and research excavations:

- ESA open sites
 - Duinefontein, Gouda, Namaqualand
- MSA rock shelters
 - Fish Hoek, Yzerfontein, Cederberg, Namaqualand
- MSA open sites
 - Swartland, Bushmanland, Namaqualand
- LSA rock shelters
 - Cederberg, Namaqualand, Bushmanland
- LSA open sites (inland)
 - Swartland, Franschhoek, Namaqualand, Bushmanland
- LSA coastal shell middens
 - Melkbosstrand, Yzerfontein, Saldanha Bay, Paternoster, Dwarskersbos, Infanta, Knysna, Namaqualand
- LSA burials
 - Melkbosstrand, Saldanha Bay, Namaqualand, Knysna
- Historical sites
 - Franschhoek (farmstead and well), Waterfront (fort, dump and well), Noordhoek (cottage), variety of small excavations in central Cape Town and surrounding suburbs
- Historic burial grounds
 - Green Point (Prestwich Street), V&A Waterfront (Marina Residential), Paarl

Awards:

Western Cape Government Cultural Affairs Awards 2015/2016: Best Heritage Project.

APPENDIX 2 – Site Sensitivity Verification

As required in Part A of the Government Gazette 43110, GN 320, a site sensitivity verification was undertaken in order to confirm the current land use and environmental sensitivity of the proposed project area as identified by the National Web-Based Environmental Screening Tool. The details of the site sensitivity verification are noted below:

<i>Date of Site Visit</i>	30 and 31 March 2022 and 18 January 2023
<i>Specialist Name</i>	Jaco van der Walt
<i>Professional Registration Number</i>	ASAPA: 159; APHP: 114
<i>Specialist Affiliation / Company</i>	Beyond Heritage (Pty) Ltd

Method of the Site Sensitivity Verification

Access was a challenge for the survey which meant that only those areas falling within the associated WEF project area could be looked at on site. Importantly, both substation alternatives were examined. The remainder was looked at remotely from neighbouring roads. Subsequent work included assessing modern and historical aerial photography in combination with the authors' accumulated knowledge of the local landscape. Desktop research was also used to inform on the heritage context of the area. This information is presented in the report (Sections 5.2.1 and 5.4.1).

Outcome

The first map below is extracted from the screening tool report and shows the archaeological and heritage sensitivity to be low throughout the study area with the exception of one small area of high sensitivity in the west that appears to be associated with a farmstead. The site visit showed that in fact the majority of the site is of low sensitivity but that a number of small areas (where heritage resources were found) considered to be of medium to high sensitivity. The second map below shows the areas considered to be sensitive from a heritage point of view. Medium to high cultural significance site (orange and red) can be considered high sensitivity while low cultural significance sites can be considered as being of medium sensitivity. A photographic record and description of the relevant heritage resources are contained within the impact assessment report.

APPENDIX 3 – Mapping

The mapping below shows the locations of all finds.

Grade IIIA = red

Grade GPA = orange

Grade GPB = yellow

Grade GPC = white

Substation and powerline Alternative 1 in Orange

Substation and powerline Alternative 2 in Red



