HERITAGE IMPACT ASSESSMENT

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

FOR THE PROPOSED BOTTERBLOM WIND ENERGY FACILITY NORTHERN CAPE PROVINCE, SOUTH AFRICA

Type of development:

Renewable Energy Development

Client:

Enviro-Insight CC

Environmental Impact Practitioner information:

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Project Reference:
Project number 2121
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January 2022
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APPROVAL PAGE

Project Name	Proposed Botterblom Wind Energy Facility Northern Cape Province, South Africa
Report Title	Heritage Impact Assessment for the proposed Botterblom Wind Energy Facility Northern Cape Province, South Africa
Authority Reference Number	TBC
Report Status	Draft Report
Applicant Name	FE Botterblom (Pty) Ltd

Responsibility	Name	Qualifications and Certifications	Date
Fieldwork and reporting	Jaco van der Walt - Archaeologist	MA Archaeology ASAPA #159 APHP #114	September 2021 and January 2022
Fieldwork	Ruan van der Merwe - Archaeologist	BA Hons Archaeology	September 2021
Palaeontologist	Prof Marion Bamford	PhD Paleo Botany	September 2021

DOCUMENT PROGRESS

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Amendments on Document

Date	Report Reference Number	Description of Amendment
1 March 2022	2121	Technical revision

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REPORT OUTLINE

Appendix 6 of the GNR 326 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 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	*Declaration of Independence*
(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 and 7.1.
(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
(I) 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 6
(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

Executive Summary

Enviro-Insight was appointed as the Environmental Assessment Practitioner (EAP) by FE Botterblom (Pty) Ltd to undertake the required Environmental Authorisation Process for the proposed Botterblom Wind Energy Facility (WEF) close to Loeriesfontein, Northern Cape Province. Beyond Heritage was appointed to conduct a Heritage Impact Assessment (HIA) for the project and the study area was assessed on desktop level and by a non-intrusive pedestrian field survey. Key findings of the assessment include:

- The project will entail the construction of up to 35 wind turbines and associated infrastructure;
- The field survey focussed on tangible heritage located within the proposed turbine footprints as provided at the time of the survey. After the field survey was conducted the layout changed consisting of three proposed alternatives that is assessed in the report;
- Large sections of the greater area area were previously assessed (Van der Walt 2012, Morris 2013, Van der Walt 2015, Orton 2017);
- Heritage resources were found to be scarce in the study area mostly being archaeological sites and scatters dating to the Stone Age;
- The study area is indicated as of moderate paleontological sensitivity and an independent study was conducted by Prof Marion Bamford. The study concluded that there is a very small chance of fossils being disturbed;

With the implementation of the recommended mitigation measures all three alternatives are acceptable from a heritage point of view and the project can commence provided that the recommendations in this report are adhered to, based on the South African Heritage Resource Authority (SAHRA) 's approval.

Recommendations:

- Implementation of a chance find procedure for the project;
- Avoidance of known heritage sites, if this cannot be achieved mitigation will be required subject to Section 35 SAHRA permits;
- Final infrastructure must be subjected to a pre-construction survey;
- Turbines associated with alternative 3 located in the southern portion of the farm Sous (Turbine 23, 29 3, 24, 25, 14, 17 and 48) and infrastructure on the section indicated in bright blue on the geology map or red on the SAHRIS map will require a paleontological site visit prior to construction to look for any possible fossils. The palaeontologist must obtain a relevant SAHRA permit in order to collect the fossils.

Declaration of Independence

Specialist Name	Jaco van der Walt
Declaration of Independence	I declare, as a specialist appointed in terms of the National Environmental Management Act (Act No 108 of 1998) and the associated 2014 Environmental Impact Assessment (EIA) Regulations, that I: • I act as the independent specialist in this application; • I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant; • I declare that there are no circumstances that may compromise my objectivity in performing such work; • I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity; • I will comply with the Act, Regulations and all other applicable legislation; • I have no, and will not engage in, conflicting interests in the undertaking of the activity; • I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority; • All the particulars furnished by me in this form are true and correct; and • I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.
Signature	
Date	16/10/2021

a) Expertise of the specialist

Jaco van der Walt has been practising as a CRM archaeologist for 15 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 focussing 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 have conducted more than 500 impact assessments in Limpopo, Mpumalanga, North West, Free State, Gauteng, KZN as well as he Northern and Eastern Cape Provinces in South Africa.

Jaco has worked on various international projects in Zimbabwe, Botswana, Mozambique, Lesotho, DRC Zambia, Guinea and Tanzania. Through this, he has a sound understanding of the IFC Performance Standard requirements, with specific reference to Performance Standard 8 – Cultural Heritage.

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ABBREVIATIONS

ASAPA: Association of South African Professional Archaeologists
BGG Burial Ground and Graves
BIA: Basic Impact Assessment
CFPs: Chance Find Procedures
CMP: Conservation Management Plan
CRR: Comments and Response Report
CRM: Cultural Resource Management
DEA: Department of Environmental Affairs
EA: Environmental Authorisation
EAP: Environmental Assessment Practitioner
ECO: Environmental Control Officer
EIA: Environmental Impact Assessment*
EIA: Early Iron Age*
EIA Practitioner: Environmental Impact 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)
Early 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 Botterblom WEF footprint is approximately 5 736 hectares (ha) and will be located on a Portion of the Remainder of the Farm Sous 226 (Figure 1-1 to 1-4). The report forms part of the Environmental Impact Assessment (EIA) report 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, isolated scatters of Stone Age material was recorded. 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) locate, identify, record, photograph and describe sites of archaeological, historical or cultural interest; 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

FE Botterblom (Pty) Ltd is proposing the development of a WEF and associated infrastructure on a site located approximately 53 kilometres (km) north of Loeriesfontein in the Northern Cape province of South Africa (Figure 1-1 & 1-2). The proposed development will generate electricity which will feed into the National Grid. Project components and project location is outlined under Table 2 and 3.

Table 2: Project Description

Project area	The Botterblom WEF footprint is approximately 5 736 hectares (ha) located on a Portion of the Remainder of the Farm Sous 226
Magisterial District	Namaqua District Municipality
Central co-ordinate of the development	30°29'14.68"S 19°32'59.52"E
Topographic Map Number	3019 AD, DA & BC

Table 3: Infrastructure and project activities

Type of development	Renewable Energy Development
Size of development	Located on 5736 hectares
Project Components	The proposed Botterblom WEF will consist of up to 35 wind turbines, with a generation capacity of between 4.5 and 7.5 MW per turbine, depending on the available technology at the time. Each turbine will have a hub height of up to 150m and a rotor diameter of up to 175m. The final turbine model to be utilised will only be determined closer to the time of construction, depending on the technology available at the time. The components of the WEF and associated infrastructure are as follows: • up to 35 wind turbines, with a generation capacity of between 4.5 and 7.5 MW per turbine (depending on the available technology at the time); • turbines will have a hub height of up to 150m and a rotor diameter of up to 175m. The final turbine model to be utilised will only be determined closer to the time of construction (depending on the technology available at the time); • onsite substation/s of 100mX100m (33/132kV) to facilitate the connection between the WEF and Helios substation; • a Battery Energy Storage System (BESS); • concrete foundations to support turbine towers, • cabling between turbines, to be laid underground where practical; • internal/ access roads (up to 10 m in width) linking the wind turbines and other infrastructure on the site; • permanent workshop area and office for control, maintenance and storage, and • temporary laydown areas during the construction phase (which will be rehabilitated).

1.3 Alternatives

Three alternatives were provided to be assessed (Figure 1-3).

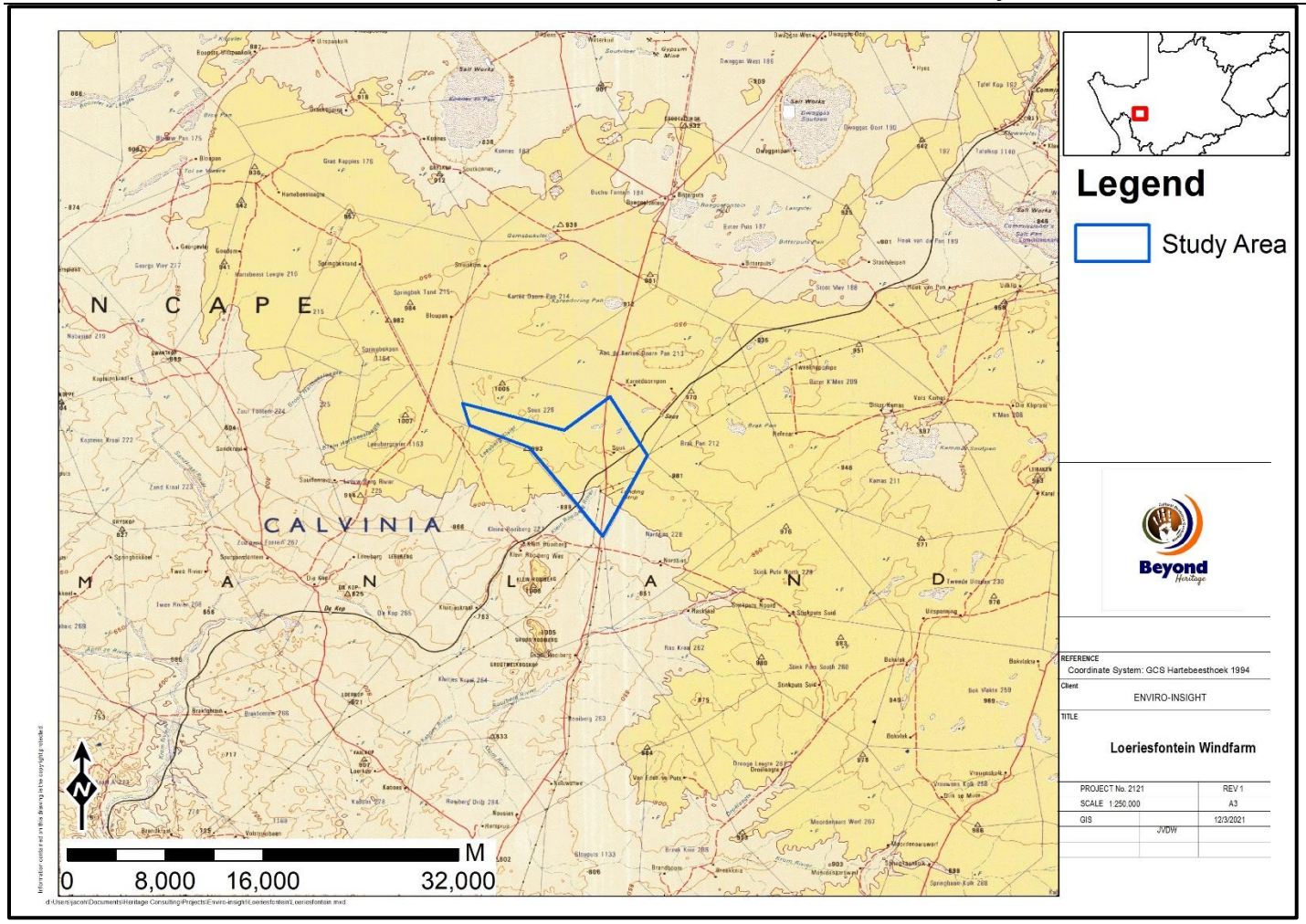


Figure 1.1. Regional setting (1: 250 000 topographical map) of the project.

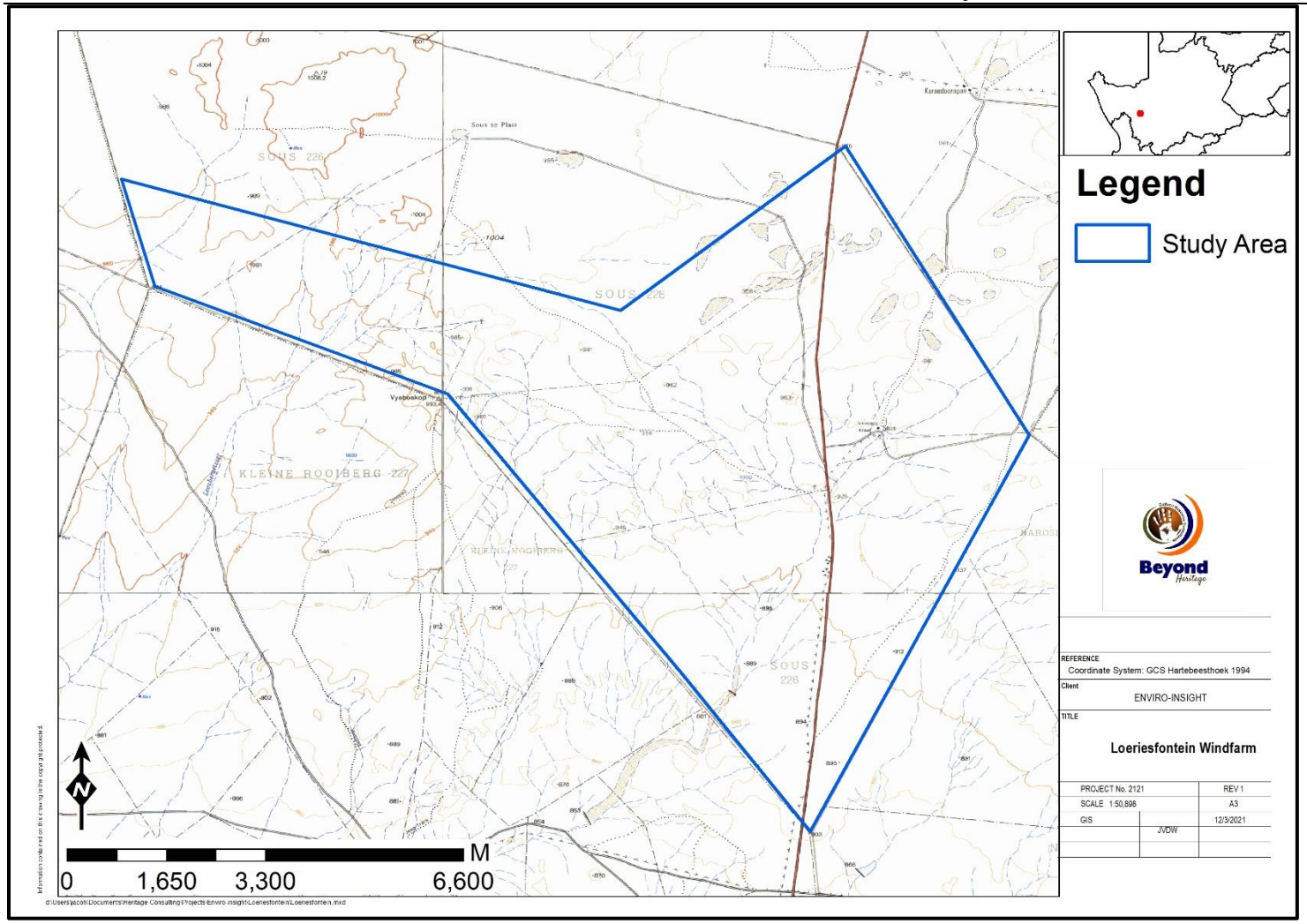


Figure 1.2. Local Setting of the project.

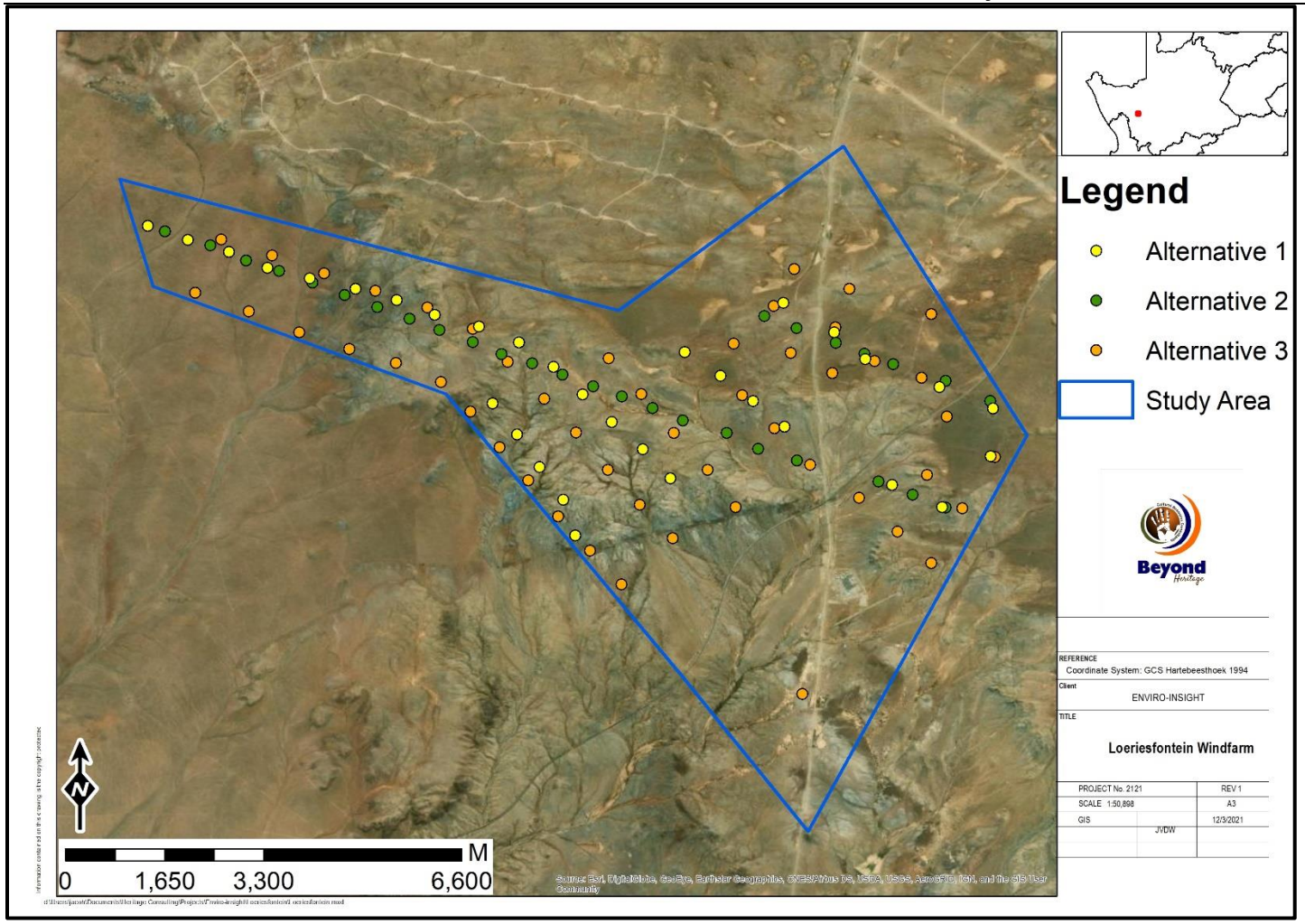


Figure 1.3. Aerial image of the development footprint indicating the three alternatives.

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)
- Mineral and Petroleum Resources Development Act (MPRDA), Act No. 28 of 2002 - Section 39(3)(b)(iii)

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 of these impacts.

The HIA should be submitted, as part of the impact assessment report or EMPr, to the PHRA if established in the province 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 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 includes (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. Graves older than 60 years, but younger than 100 years fall under Section 36 of Act 25 of 1999 (National Heritage Resources Act), as well as the Human Tissues Act (Act 65 of 1983) and are 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), as well as the Human Tissues Act (Act 65 of 1983) 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. This function is usually delegated to the Provincial MEC for Local Government and Planning; or in some cases, the MEC for Housing and Welfare. 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 Section 24 of Act 65 of 1983 (Human Tissues Act).

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 process was to capture and address any issues raised by community members and other stakeholders during key stakeholder and public meetings. The process involved:

- Placement of advertisements and site notices
- Stakeholder notification (through the dissemination of information and meeting invitations);
- Stakeholder meetings undertaken with I&APs;
- Authority Consultation

- The compilation of an EIA Report.

3.4 Site Investigation

The aim of the site visit was to:

a) survey the proposed project area to locate, identify, record, photograph and describe sites of archaeological, historical or cultural interest;

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 4: Site Investigation Details

	Site Investigation
Date	11 – 14 September 2021
Season	The survey was conducted in early spring. Little vegetation was found within the project area with archaeological visibility being high. Although the layout changed after the site visit the project area was sufficiently covered to understand the heritage character of the area (Figure 3.1).

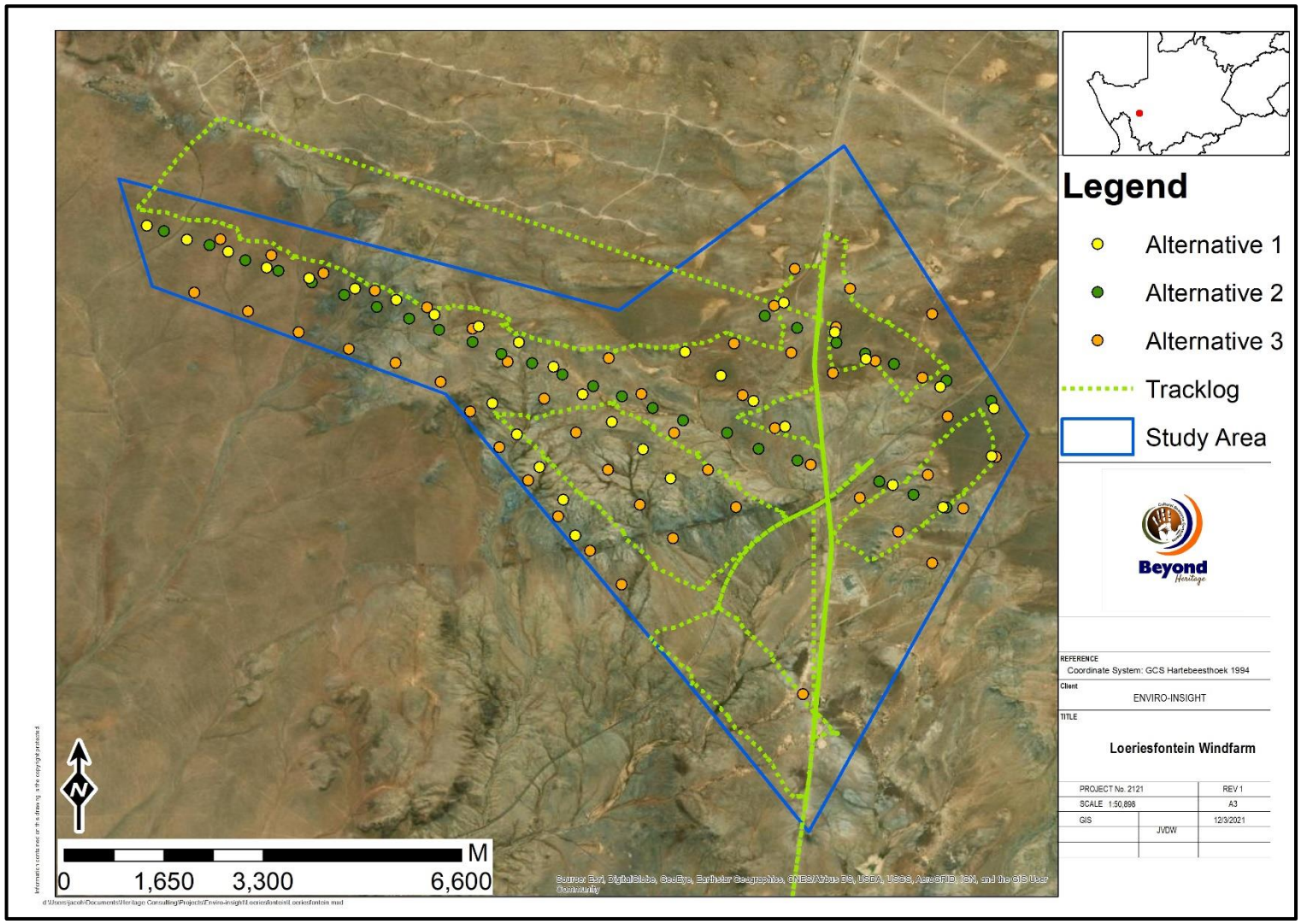


Figure 3.1: Tracklog of the survey in green.

3.5 Impact Assessment Methodology

The criteria below are used to establish the impact rating on sites:

- The **nature**, which shall include a description of what causes the effect, what will be affected and how it will be affected.
- The **extent**, wherein it will be indicated whether the impact will be local (limited to the immediate area or site of development) or regional, and a value between 1 and 5 will be assigned as appropriate (with 1 being low and 5 being high):
- The **duration**, wherein it will be indicated whether:
  - the lifetime of the impact will be of a very short duration (0-1 years), assigned a score of 1;
  - the lifetime of the impact will be of a short duration (2-5 years), assigned a score of 2;
  - medium-term (5-15 years), assigned a score of 3;
  - long term (> 15 years), assigned a score of 4; or
  - permanent, assigned a score of 5;
  - The **magnitude**, quantified on a scale from 0-10 where; 0 is small and will have no effect on the environment, 2 is minor and will not result in an impact on processes, 4 is low and will cause a slight impact on processes, 6 is moderate and will result in processes continuing but in a modified way, 8 is high (processes are altered to the extent that they temporarily cease), and 10 is very high and results in complete destruction of patterns and permanent cessation of processes.
  - The **probability of occurrence**, which shall describe the likelihood of the impact actually occurring. Probability will be estimated on a scale of 1-5 where; 1 is very improbable (probably will not happen), 2 is improbable (some possibility, but low likelihood), 3 is probable (distinct possibility), 4 is highly probable (most likely) and 5 is definite (impact will occur regardless of any prevention measures).
  - The **significance**, which shall be determined through a synthesis of the characteristics described above and can be assessed as low, medium or high; and
  - the **status**, which will be described as either positive, negative or neutral.
  - the degree to which the impact can be reversed.
  - the degree to which the impact may cause irreplaceable loss of resources.
  - the *degree* to which the impact can be mitigated.

The **significance** is calculated by combining the criteria in the following formula:
S=(E+D+M) P
S = Significance weighting
E = Extent
D = Duration
M = Magnitude
P = Probability

The **significance weightings** for each potential impact are as follows:

- < 30 points: Low (i.e., where this impact would not have a direct influence on the decision to develop in the area),
- 30-60 points: Medium (i.e., where the impact could influence the decision to develop in the area unless it is effectively mitigated),
- 60 points: High (i.e., where the impact must have an influence on the decision process to develop in the area).

3.6 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 nature of heritage resources and pedestrian surveys, the possibility exists that some features or artefacts may not have been discovered/recorded and the possible occurrence of graves and other cultural material cannot be excluded. Similarly, the depth of cultural deposits and the extent of heritage sites cannot always be accurately determined due its subsurface nature. This report only deals with the footprint area of the proposed development and consisted of non-intrusive surface surveys. 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. 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, Hantam Municipality has a total population of 21 578, of which 82,2% are coloured, 12,1% are white, 4,4% are black African, and 0,7% consists of Indian/Asian. The remainder of the population (0,6%) is made up by other groups.

Of those aged 20 years and older, 18,8% completed Grade 12, 19,7% have some primary education, 8,4% completed primary education, 30,6% completed some secondary education, 8,1% have some higher education and only 14,4% had no schooling. Of the 7 085 economically active (employed and unemployed but looking for work) people in the municipality, 11,8% are unemployed.

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.

6 Literature / Background Study:

6.1 Literature Review (SAHRIS)

The general area is known to contain Stone Age remains highlighted by the following CRM assessments (Table 6) that were consulted for this report:

Table 5. CRM reports consulted for the study.

Author	Year	Project	Findings
Fourie, W.	2011	Heritage Impact Assessment for the proposed Solar Project on the farm Kaalspruit, Loeriesfontein.	No sites identified
Van Schalkwyk, J.	2011	Heritage Impact Assessment for the proposed establishment of a wind farm and PV facility by Mainstream Renewable Power in the Loeriesfontein Region, Northern Cape Province.	MSA low density surface scatters LSA high density surface scatters Historical farmstead associated with two informal graves. Only one has a headstone, that of HGJ Lintvelt, a young boy who died in 1913.
Van der Walt, J.	2012	Archaeological Impact Assessment for the proposed Hantam PV Solar Energy Facility on the farm Narosies 228, Loeriesfontein, Northern Cape Province	No Sites

Webley, L. Halkett, D.	2012	Heritage Impact Assessment: Proposed Loeriesfontein Photo-Voltaic Solar Power Plant On Portion 5 of the Farm Klein Rooiberg 227, Northern Cape Province.	MSA lithics randomly scattered across landscape Seven LSA Sites with associated lithics and grooved stones, some pottery, also historical era artefacts A stone circle that functioned a stockpost, associated with an old enamel bowl, a tin, a wire hook and two rusted sardine cans.
Morris, D.	2013	Specialist Input for the Environmental Basic Assessment and Environmental Management Program for the Khobab Wind Energy Facility: Power Line Route Options, Access Road and Substation Positions.	LSA Sites
Orton, J.	2014	Heritage Impact Assessment for the proposed re-alignment of the authorized 132kV Power Line for the Loeriesfontein 2 WEF, Calvinia Magisterial District, Northern Cape	LSA sites, stone cairn, historical farmstead
Van der Walt, J.	2015	Heritage Walkthrough for the proposed infrastructure of the approved Loeriesfontein Solar Plant Phase 2 and 3, Northern Cape Province	LSA Sites
Fourie, W.	2017a	Heritage Impact Report Graskoppies Wind Energy Facility (WEF)	MSA low density scatters LSA low, medium and high-density lithic scatters, with ostrich eggshell Old well, stone walling Historical farmstead
Fourie, W.	2017b	!Xhaboom Wind Energy Facility (WEF) Heritage Impact Report	LSA low density scatter with ostrich eggshell
Fourie, W.	2017c	Itemba Wind Energy Facility (WEF) Heritage Impact Report	LSA low density scatter Historical farmstead
Orton, J.	2017	Heritage impact assessment for the proposed Kokerboom 1 Wind Energy Facility on farm 227/Rem and farm 1163/Rem, north of Loeriesfontein, Calvinia Magisterial District, Northern Cape.	Stone Age sites and historical artefacts.
Van der Walt, J.	2017	Heritage walk down Helios Power Line	Stone Age Artefacts and historical farm stead
Fourie, W.	2020	Heritage Impact Assessment Proposed Construction and Operation of the Battery Energy Storage System (Bess) and Associated Infrastructure for the authorised Loeriesfontein 3 Pv Solar Energy Facility Located Near Loeriesfontein in The Hantam Local Municipality, Namakwa District in The Northern Cape Province of South Africa	No sites identified
Orton, J.	2021a	Heritage Impact Assessment for The Proposed Kokerboom 3 Wind Energy Facility on Farms 214/1	LSA scatters with associated ostrich eggshell Historical farmstead

		And 214/2, North of Loeriesfontein, Calvinia Magisterial District, Northern Cape	
Orton, J.	2021b	Heritage Impact Assessment for The Proposed Kokerboom 4 Wind Energy Facility on Farm 213/Rem, North of Loeriesfontein, Calvinia Magisterial District, Northern Cape	MSA and LSA ephemeral scatters Historical era artefacts
Van der Walt, J.	2021	Heritage Scoping Report. For the Proposed Botterblom Wind Energy Facility Northern Cape Province, South Africa	Scoping report

6.2 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 (2006), 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 6. Heritage significance and field ratings

FIELD RATING	*GRADE*	*SIGNIFICANCE*	*RECOMMENDED MITIGATION*
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

6.2.1 Genealogical Society and Google Earth Monuments

No known grave sites are indicated in the study area.

6.3 Background to the general area

6.3.1 Archaeological Context of the study area

The Karoo remains a region with a relatively low level of archaeological research and survey coverage. Currently, new archaeological observations in the area are predominantly in the context of cultural resources management (Orton 2016; Morris 2018). These observations are within impact assessment reports available in the SAHRIS database of the South African Heritage Resources Agency (e.g., Van der Walt 2017; Orton 2021a, b).

Surface scatters of stone tools from the ESA and MSA is widespread, a common archaeological occurrence across Karoo plains. They are generally highly visible on eroding surfaces and often considered as background scatter, often exposed due to erosion (Van Schalkwyk 2011; Webley & Halkett 2012; Orton 2016, 2021b; Fourie 2017a; Morris 2018). Although there is plentiful evidence for MSA in the Karoo, proper archaeological context for these sites is non-existent. Thus, significant phases that reflect the emergence of anatomically and behaviourally modern *Homo sapiens* (e.g., Henshilwood *et al*. 2002), may be absent - given the arduous nature of acquiring sustainable water and food resources in such an arid landscape (Morris 2018).

Later Stone Age sites often occur in rock shelters and/or amongst boulders on the slopes or tops of dolerite hills. In addition, LSA sites may also be present as clusters of nearby sites, typically near springs, and some may include rock art (e.g., Rudner & Rudner 1968; Beaumont *et al.* 1995). These nomadic hunter-gatherer communities used smaller stone tools, than their MSA predecessors, though hunting behaviour during the MSA are varied (e.g., Lombard 2007). Smaller lithics possibly enabled greater hunting success (e.g., Lombard & Parsons 2008), which allowed for greater mobility across the landscape, resulting in improved access to food and water resources (Morris 2018). During the Final LSA (last 2000 years) lithic production strategies suggest a lesser dependence on hunting for food at some sites, this behaviour is connected with the introduction of livestock (e.g., Sadr 2008; Lombard & Parsons 2008; Morris 2018). During the final LSA, the use of stone for constructing shelters, cairns, walling, small hunting blinds (e.g., Parsons 2000; Veldman 2014) and very large stone funnels for hunting and trapping game like Springbok is also visible on the Karoo landscape (Van der Walt & Lombard 2018; Lombard & Badenhorst 2019).

In the immediate study area, based on impact assessment reports, archaeological sites occur in the form of MSA low density surface scatters, mostly flakes made of hornfels, hardened shale and chalcedony. LSA material, including cores, flakes, blades, backed bladelets, segments, and scrapers made from hardened shale and chalcedony, hornfels, quartz, chert and opaline cryptocrystalline silicates are slightly more common. Some sites and surface scatters include ostrich eggshell fragments, some beads, thin-walled pottery, lower grindstones and portable grooved stones. Also occurring in the area is stone walling, cairns and some stone circles. Historical era farmsteads and artefacts such as glass, glass bottles, metal, enamel ware are also present (Van Schalkwyk 2011; Webley & Halkett 2012; Orton 2014, 2021a, b; Fourie 2017a, b, c; Van Der Walt 2017).

6.3.2 Historical context of Loeriesfontein Town

The project area is *ca*. 50 km north of the small town of Loeriesfontein. There are several references to "Loeriesfontein" in Burger (1986), however, none that explains the origins of the name. One theory is that the town is named after the Grey Lourie (Go-away bird/Kwêvoël), which is unlikely, Grey Lourie's are not common Karoo residents, they are fruit-eaters preferring to stay near Acacia woodlands (e.g., Dean 1997; Sinclair *et al*. 2020).

Another theory is that it comes from the Afrikaans word "loer", which means to peep, in the context of hunters watching a waterhole. However, the most likely origin for the town's name, is that it was named after a Jewish pedlar named Lurie, who frequented a nearby spring. Pedlars, many of whom was Jewish played an important role in the Karoo towns and their economies. The town grew around a general store established in 1894 by a pedlar, named Fredrick Turner. The store still exists, currently a SPAR owned by Victor Haupt, the grandson of Fredrick Turner (Schoeman 2013; Davids 2021).

Namaqualand served as the southern gateway to the Orange River, during the 18th century, which made it a dangerous frontier of violence, raids and reprisals between various groups of Africans and Europeans (e.g., Giliomee & Mbenga 2007). The Namaqua remained undisturbed until the Dutch began engaging in the cattle trade and then setting up more permanent settlements from the 1750s onwards around farms in the region (Vernal 2015). Prior to any European settlement at Loeriesfontein, it was occupied by people with mixed descent, born from European fathers and Khoisan mothers, today referred to as Coloureds. Given the remote location, the area was not yet on Cape Colonial radar. The earliest mention of places nearby Loeriesfontein, is by John Barrow who travelled to the area during the 1790s, he mentions names like Hantam River and Onder-Bokkeveld (Barrow 1801).

Loeriesfontein was granted a permit of occupation in 1860 by Sir George Grey (British Colonial Administrator), with the provision that 'it will not be alienated but be held for the use of the persons of colour of mixed race' (Vernal 2015). Therefore, Loeriesfontein was, in fact, first indicated on a map in that year. The Land Surveyor, J. M. Wentzel received an order to measure and draw up the crown land farm known as Loeriesfontein (Davids 2021).

Determining the economic growth of Loeriesfontein between the 1860s and the 1880s proves challenging as the available data focusses on the 1880s when people were recovering from a drought and an outbreak of syphilis. The evidence suggests that having a piece of land at Loeriesfontein was the main objective for individuals especially during the 1860s. By 1873, a further 43 people acquired land at who had received permission from Sydney Fryer the field-cornet at the time. The area was expansive enough to accommodate a flexible pattern whereby residents would use 'as much land as he/she can clear for themselves.' Residents eked out a living by renting out portions of their land allotment to local white farmers, as well as obtaining many goats or sheep possible to generate income (Vernal 2015; Davids 2021).

From 1888 to 1892 the proposed sale of land, due to complaints of cattle and crop theft, shortage of labour due to the syphilis outbreak and drought, created a cauldron of conflict between the local coloureds, white farmers and the British colonial authorities, a resulting vast number correspondence between the inhabitants, the Department of Native Affairs, the Colonial Office, the Department of Lands, Mines and Agriculture, the Commissioner of Crown Lands and Public Works, and the Office of the Surveyor-General (Vernal 2015; Davids 2021). However, the sale did not take place and the community claimed ancestry and inheritance as justification for possessing the area (Anon. 1893; Vernal 2015).

Since 1892 residential and building lots had been allocated, and erven and commonage by 1898 (Anon. 1892, 1894, 1898). In 1899, the first police station and police cells were erected (Anon. 1899; Möller 1988). By January 1904 Loeriesfontein elected its first Town Council, but only received municipal status in 1958, and thereafter several other developments took place, schools and medical facilities etc. Loeriesfontein is currently under land reform negotiations and some areas are still considered as municipal commonage. However, similar to the late 19th century (*cf*. Vernal 2015), there is still issues to be resolved with regards to land rights, restitution claims and its settlement between the Communal Property Association and the Loeriesfontein Emerging Farmer's Association (Davids 2021).

6.4 Cultural Landscape

Historical land use and the cultural landscape are linked since the cultural landscape is shaped to some extent by the history of the area. The farm is used for the farming of livestock in recent years, evident by fences and watering holes. Historical maps indicate older mining activities in the surrounding area with no developments in the project area. The landscape is largely a natural one, but has now been compromised by neighbouring wind farm developments, the Helios Substation, associated power lines and a railway line that create a new 'cultural' layer on the landscape.

6.5 Graves and Burial Sites

No known graves are indicated on databases consulted but graves and cemeteries are widely distributed across the landscape and can be expected anywhere.

7 Description of the Physical Environment

The site is generally flat and gently undulating. The flatter ground tends to be sandy, while on the low hills erosion has resulted in the surfaces being gravelled. Rock outcrops are rare, although the hills do have exposed shale bedrock visible in places. Occasional small, low dolerite outcrops were present. The study area is an expansive natural landscape characterised by open areas and limited infrastructure such as an existing railway that traverses the study area and adjacent wind farm developments.

Figure 7.1. General site conditions north of the railway.

Figure 7.2. Existing wind farm to the north of the study area.

Figure 7.3. General site conditions in the study area.

Figure 7.4. Existing railway in the study area.

8 Findings of the Survey

8.1 Heritage resources

It is important to note that the survey focussed on the turbine locations of the original layout. After the survey was conducted other alternatives was proposed, covering other areas much of which was previously covered (Van der Walt 2012, Morris 2013, Van der Walt 2015, Orton 2017). The various assessments culminated in a total of 32 locations where heritage observations were made, Table 7 lists all heritage resources recorded during the surveys in relation to the project area and are mapped in Figure 8.1. For continuity waypoint numbers and site numbers were retained as initially recorded as well as gradings, significance ratings and recommendations mostly summarised in Orton (2017).

Stone Age artefacts were recorded mostly as isolated scatters of very little heritage significance except for denser concentrations of artefacts (Botterblom 1 and 2). These sites are located on respectively a hilltop area and a dry stream bed, the recorded isolated scatters could have washed down from similar locations as these were found to be prime localities for recorded sites in the area. Artefacts date to well weathered and patinated MSA flakes and a core as well as LSA lithics on quartz and CCS with occasional ostrich eggshell fragments (Fig 8.2 to 8.7).

No grave sites, historical material or built heritage was recorded during the current survey. The only other observation made was a sandstone memorial for Jan G du Toit who passed away here on 18 March 1953 (Fig. 8.8).

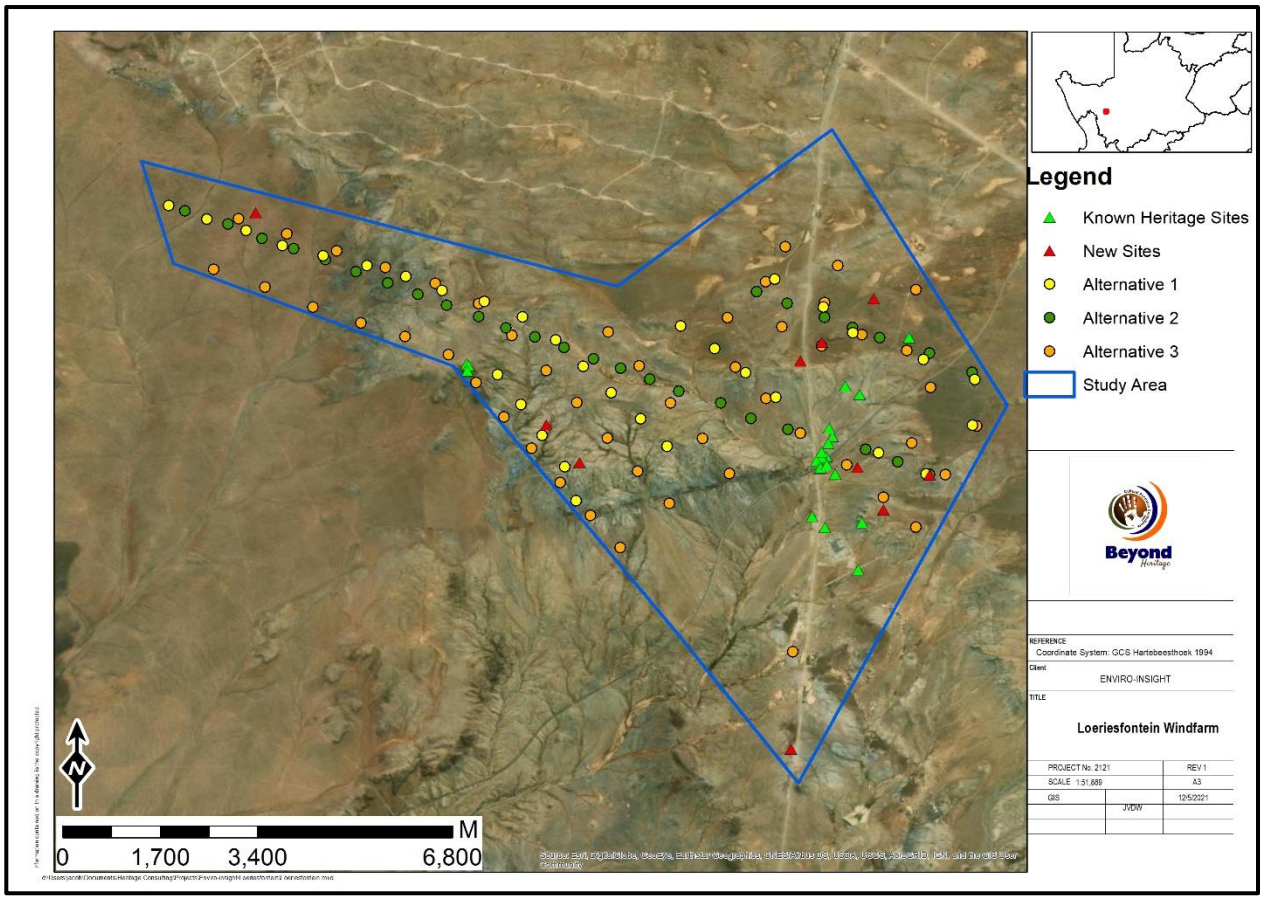


Figure 8.1. Site distribution map in relation to the proposed layouts.

Figure 8.2. LSA artefact on milky quartz at Waypoint 115

Figure 8.3. LSA flake on quartz with cortex at Waypoint 117.

Figure 8.4. Isolated core on CCS at Waypoint 282

Figure 8.5. Isolated discoid core on heavily patinated Hornfells likely dating to the MSA at Waypoint 284

Figure 8.6. Lithics on fine grained material at Botterblom 1.

Figure 8.7. LSA scatter of quartz flakes and OES fragments at Botterblom 2

Figure 8.8. Memorial at waypoint 285.

Table 7. All features recorded in the study area.

Label	Longitude	Latitude	Source	Site Type	Description	Field Rating	Heritage Significance
1	19° 33' 49.5999" E	30° 30' 09.0000" S	Orton 2017	Recent	Four small stone, brick and cement structures no doubt related to the airstrip	No Rating	No Rating
2	19° 33' 51.7999" E	30° 29' 42.4000" S	Orton 2017	Stone Age	LSA site on hilltop. Cryptocrystalline silica (CCS), quartz, hornfels, ostrich eggshell, cores, blades, 1 adze, 20 m diameter	GP B	Low to Medium
4	19° 33' 30.8000" E	30° 29' 45.1999" S	Orton 2017	Stone Age	Ephemeral background scatter of heavily weathered stone artefacts, probably pertaining to the MSA	GP C	Very Low
13	19° 33' 42.3000" E	30° 28' 25.4001" S	Orton 2017	Stone Age	Small LSA scatter of CCS within an area of about 2 m2 and located on the crest of a hill	GP B	Low to Medium
14	19° 33' 50.4001" E	30° 28' 30.0000" S	Orton 2017	Historical/ Recent	Dump with shale pieces, red frog bricks, glass, ceramics, metal, animal bones and ashy patches. Most material is 20th century but a few items may date to the very late 19th century. A small vernacular house in stone and mud but with a more recent addition in brick on southern end lies to the east along with a recent (but traditional style) kookskerm and outdoor bread oven. The house also has a corrugated iron addition. The roof, which may once have been a brakdak (see Fagan 2008), is now of corrugated iron.	GP A	Medium High (Avoid)
15	19° 33' 32.6999" E	30° 28' 57.6000" S	Orton 2017		Isolated lower grindstone on bank of stream bed.	GP C	Very Low
16	19° 33' 31.6999" E	30° 29' 04.8999" S	Orton 2017	Stone Age	Ephemeral LSA scatter of CCS artefacts 100 m from the dry stream bed.	GP C	Very Low
17	19° 33' 29.8999" E	30° 29' 05.6000" S	Orton 2017	Stone Age	Ephemeral LSA scatter of CCS artefacts 65 m from the dry stream bed.	GP C	Very Low
18	19° 33' 28.8001" E	30° 29' 05.3000" S	Orton 2017	Stone Age	Ephemeral LSA scatter of CCS artefacts 35 m from the dry stream bed.	GP C	Very Low

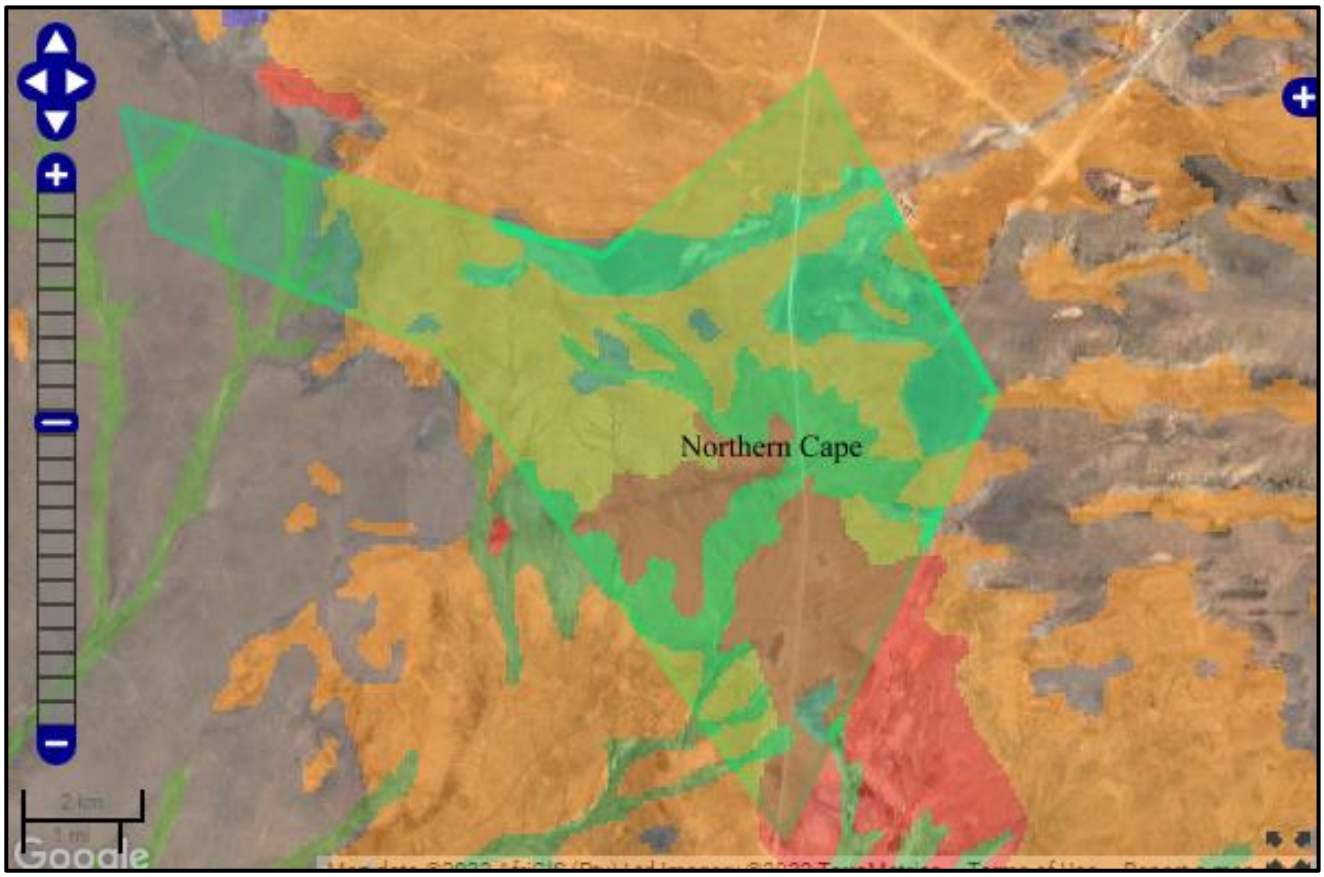
19	19° 33' 29.0001" E	30° 29' 02.5001" S	Orton 2017	Stone Age	Ephemeral LSA scatter of CCS artefacts near dry stream bed but with some historical glass and ceramics also present	GP C	Very Low
20	19° 33' 26.0001" E	30° 29' 07.3000" S	Orton 2017	Stone Age	LSA scatter of CCS, ostrich eggshell, 1 tooth enamel fragment on bank of dry stream bed. Probably truncated by disturbance from the gravel road. GP B Low-medium [4 hours]	GP B	Low to Medium
21	19° 33' 27.3999" E	30° 29' 11.8999" S	Orton 2017	Historic	Ephemeral scatter of historical ceramics with one bearing the text "…E IN BEL…", presumably "made in Belgium". Late 19th/early 20th century.	GP C	Very Low
22	19° 33' 28.5001" E	30° 29' 11.3000" S	Orton 2017	Stone Age	Very large LSA scatter of CCS, ostrich eggshell on the side of a dolerite outcrop just downslope of disturbed area. Scatter is about 15 m by 20 m. Also a boulder with "AL" scratched on it but this is recent	GP A	Medium to high
23	19° 33' 32.0001" E	30° 29' 09.7001" S	Orton 2017	Stone Age	Smaller LSA scatter of CCS and ostrich eggshell further east on same hill. Also some historical ceramic fragments.	GP B	Low to medium
394	19° 30' 08.2999" E	30° 28' 12.3999" S	Orton 2017	Stone Age	A light scatter of white CCS and ostrich eggshell on a hill.	GP C	Low
395	19° 30' 09.5000" E	30° 28' 13.5001" S	Orton 2017	Stone Age	Scatter of white CCS artefacts and large amounts of ostrich eggshell on a hill.	GP B	Medium
396	19° 30' 08.7999" E	30° 28' 16.5001" S	Orton 2017	Stone Age	Small scatter with a handful of white CCS artefacts on a hill	GP C	Low

397	19° 33' 23.6000" E	30° 29' 38.9999" S	Orton 2017	Stone Age	Small scatter of CCS artefacts immediately alongside existing construction camp.	GP C	Very Low
114	19° 34' 04.0117" E	30° 29' 35.0989" S	New site	Stone Age	Weathered MSA Flake	GP C	Isolated find - Low
115	19° 34' 30.0179" E	30° 29' 15.4608" S	New site	Stone Age	LSA artefact on milky quartz	GP C	Isolated find - Low
116	19° 33' 49.3271" E	30° 29' 11.2164" S	New site	Stone Age	MSA lithic artefact.	GP C	Isolated find - Low
117	19° 31' 12.2160" E	30° 29' 08.3293" S	New site	Stone Age	LSA flake on quartz with cortex.	GP C	Isolated find - Low
Botr1	19° 30' 53.3519" E	30° 28' 47.0497" S	New site	Stone Age	Various lithic artefacts scattered over a wide area on the top of a low hill covered in Shale. The Lithics consist of mostly cores possibly dating to the LSA.	GP B	Medium
Botr2	19° 33' 16.9812" E	30° 28' 11.0209" S	New site	Stone Age	LSA scatter of quartz flakes found together with OES fragments next to a dry stream washing down a small hill.	GP B	Medium
282	19° 33' 58.3955" E	30° 27' 35.7012" S	New site	Stone Age	Isolated core on CCS. Raw material still has cortex	GP C	Isolated find - Low
283	19° 33' 29.1096" E	30° 28' 00.4332" S	New site	Stone Age	Few fragmented OES fragments and a isolated flake on milky quartz. Possibly washed down from nearby elevated area	GP C	Isolated find - Low
284	19° 28' 09.0408" E	30° 26' 47.1949" S	New site	Stone Age	Isolated discoid core on heavily patinated Hornfells likely dating to the MSA. LSA lithics is fresh looking and not patinated	GP C	Isolated find - Low
285	19° 33' 11.6173" E	30° 31' 50.2895" S	New site	Memorial	Sandstone memorial for Jan G du Toit who passed away here on 18 March 1953	GP A	High Social significance

14	19° 33' 36.6984" E	30° 29' 15.0000" S	SAHRA	Stone Age	Scattered stone artefacts dating to the MSA/LSA	Grade 111B	High Significance
15	19° 33' 35.2008" E	30° 28' 53.6988" S	SAHRA	Stone Age	Scattered stone artefacts dating to the MSA/LSA	Grade 111B	High Significance
16	19° 33' 33.1992" E	30° 28' 48.9000" S	SAHRA	Stone Age	Scattered stone artefacts dating to the MSA/LSA	Grade 111B	High Significance
17	19° 34' 18.5016" E	30° 27' 57.7008" S	SAHRA	Stone Age	Scattered stone artefacts dating to the MSA/LSA	Grade 111B	High Significance

8.2 Paleontological Heritage

Based on the SAHRA Paleontological map the study area is of insignificant, moderate, high and very high sensitivity (Figure 8.9) and an independent study was conducted by Prof Marion Bamford for this aspect (Bamford 2021). The study concluded it is extremely unlikely that any fossils would be preserved in the alluvium of the Quaternary. There is a very small chance that trace fossils may occur in the shales of the early Permian Tierberg Formation so a Fossil Chance Find Protocol should be added to the EMPr. If fossils are found by the environmental officer, or other responsible person once excavations for foundations and infrastructure have commenced then they should be rescued, and a palaeontologist called to assess and collect a representative sample. If turbines and infrastructure are going to be placed in the southernmost part of the project area, on the section indicated in bright blue on the geology map or red on the SAHRIS map then a palaeontologist should be called to check the site and look for any possible fossils. The palaeontologist must obtain a relevant SAHRA permit in order to collect the fossils.



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 8.9. Paleontological sensitivity of the study area as indicated on the SAHRA Palaeontological sensitivity map.

9 Potential Impact

Impacts to archaeological resources would mostly occur during the construction phase and will be of low magnitude since none of the turbines is placed on or near known sites (Figure 9.1 to 9.3). A few recorded resources of higher significance that will potentially be impacted on by the project, specifically by roads and ancillary infrastructure, are the sites clustered around Waypoint 20 and 22 (Table 8) and if so, mitigation will be required.

Isolated artefacts (Table 8) are out of context and scattered too sparsely to be of any significance apart from mentioning them in this report and this is considered sufficient mitigation if impacted on. Any additional effects to subsurface heritage resources can be successfully mitigated by implementing a chance find procedure. Mitigation measures for specific sites as outlined under Table 7 and additional recommendations in this report should be implemented during all phases of the project. Impacts of the project on heritage resources is expected to be low during all phases of the development (Table 9 & 10).

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.

9.1.3 Operation Phase

Impacts and effects during open pit mining operations include excavations. Potential impacts include destruction or partial destruction of non-renewable heritage resources.

Table 8. Potential impacts on recorded heritage resources.

Label	Site Type	Field Rating	Heritage Significance	Impact
1	Recent	No Rating	No Rating	No impact expected
2	Stone Age	GP B	Low to Medium	No impact expected
4	Stone Age	GP C	Very Low	No impact expected
13	Stone Age	GP B	Low to Medium	No impact expected
14	Historical/ Recent	GP A	Medium High (Avoid)	No impact expected
15	Grinder	GP C	Very Low	Possible impact by roads and infrastructure
16	Stone Age	GP C	Very Low	Possible impact by roads and infrastructure
17	Stone Age	GP C	Very Low	Possible impact by roads and infrastructure
18	Stone Age	GP C	Very Low	Possible impact by roads and infrastructure

19	Stone Age	GP C	Very Low	Possible impact by roads and infrastructure
20	Stone Age	GP B	Low to Medium	Possible impact by roads and infrastructure
21	Historic	GP C	Very Low	Possible impact by roads and infrastructure
22	Stone Age	GP A	Medium to high	Possible impact by roads and infrastructure
23	Stone Age	GP B	Low to medium	No impact expected
394	Stone Age	GP C	Low	More than 200 m away from closest turbine impact
395	Stone Age	GP B	Medium	More than 200 m away from closest turbine no impact
396	Stone Age	GP C	Low	More than 200 m away from closest turbine no impact
397	Stone Age	GP C	Very Low	More than 200 m away from closest turbine no impact
114	Stone Age	GP C	Isolated find - Low	
115	Stone Age	GP C	Isolated find - Low	20 m from alternative 2
116	Stone Age	GP C	Isolated find - Low	No Impact expected
117	Stone Age	GP C	Isolated find - Low	More than 200 m away from closest turbine no impact
Botr1	Stone Age	GP B	Medium	200 m away from turbine
Botr2	Stone Age	GP B	Medium	200 m away from turbine
282	Stone Age	GP C	Isolated find - Low	No Impact expected
283	Stone Age	GP C	Isolated find - Low	60 m from turbine
284	Stone Age	GP C	Isolated find - Low	Indirect Impact alternative 3 284 m More than 200 m away from turbine position
285	Memorial	GP A	High Social significance	No Impact expected
Hel03	Stone Age	Grade 111B	High Significance	No Impact expected
Hel04	Stone Age	Grade 111B	High Significance	No Impact expected
Hel05	Stone Age	Grade 111B	High Significance	No Impact expected
Hel02	Stone Age	Grade 111B	High Significance	No Impact expected

9.1.4 Impact Assessment for the Project

Table 9. Potential Impact on Waypoint 20 and 22 .

Nature: During the construction phase activities resulting in disturbance of surfaces and/or sub-surfaces may destroy, damage, alter, or remove from its original position archaeological and paleontological material or objects.		
	Without mitigation	**With mitigation (Preservation/ excavation of site)**
Extent	Local (2)	Local (2)
Duration	Permanent (5)	Permanent (5)
Magnitude	Low (4)	Minor (2)
Probability	Probable (3)	Improbable (2)
Significance	**33 (Medium)**	**18 (Low)**
Status (positive or negative)	Negative	Negative
Reversibility	Not reversible	Not reversible
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	NA	NA
Mitigation: • Avoidance of known heritage sites, if this cannot be achieved mitigation will be required subject to Section 35 SAHRA permits;		
Cumulative impacts: With the implementation of the mitigation measures in this report the proposed project will have a low cumulative impact on the extensive natural landscape.		
Residual Impacts: Although surface sites can be avoided or mitigated, there is a chance that completely buried sites would still be impacted on, but this cannot be quantified.		

Table 10. Impact assessment of the proposed project on the other recorded heritage resources

Nature: During the construction phase activities resulting in disturbance of surfaces and/or sub-surfaces may destroy, damage, alter, or remove from its original position archaeological and paleontological material or objects.		
	Without mitigation	**With mitigation (Preservation/ excavation of site)**
Extent	Local (2)	Local (2)
Duration	Permanent (5)	Permanent (5)
Magnitude	Minor (2)	Minor (2)
Probability	Probable (3)	Improbable (2)
Significance	**27 (Low)**	**18 (Low)**
Status (positive or negative)	Negative	Negative
Reversibility	Not reversible	Not reversible
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	NA	NA
Mitigation: • Implementation of a chance find procedure for the project. • Avoidance of known heritage sites, if this cannot be achieved mitigation will be required subject to Section 35 SAHRA permits; • Final infrastructure must be subjected to a pre-construction survey		
Cumulative impacts: The proposed project will have a low cumulative impact as no significant heritage resources will be adversely affected. Cumulative impacts are deemed to be of low significance in this case because the broader landscape is extensive and is likely to hold many similar archaeological resources.		
Residual Impacts: Although surface sites can be avoided or mitigated, there is a chance that completely buried sites would still be impacted on, but this cannot be quantified.		

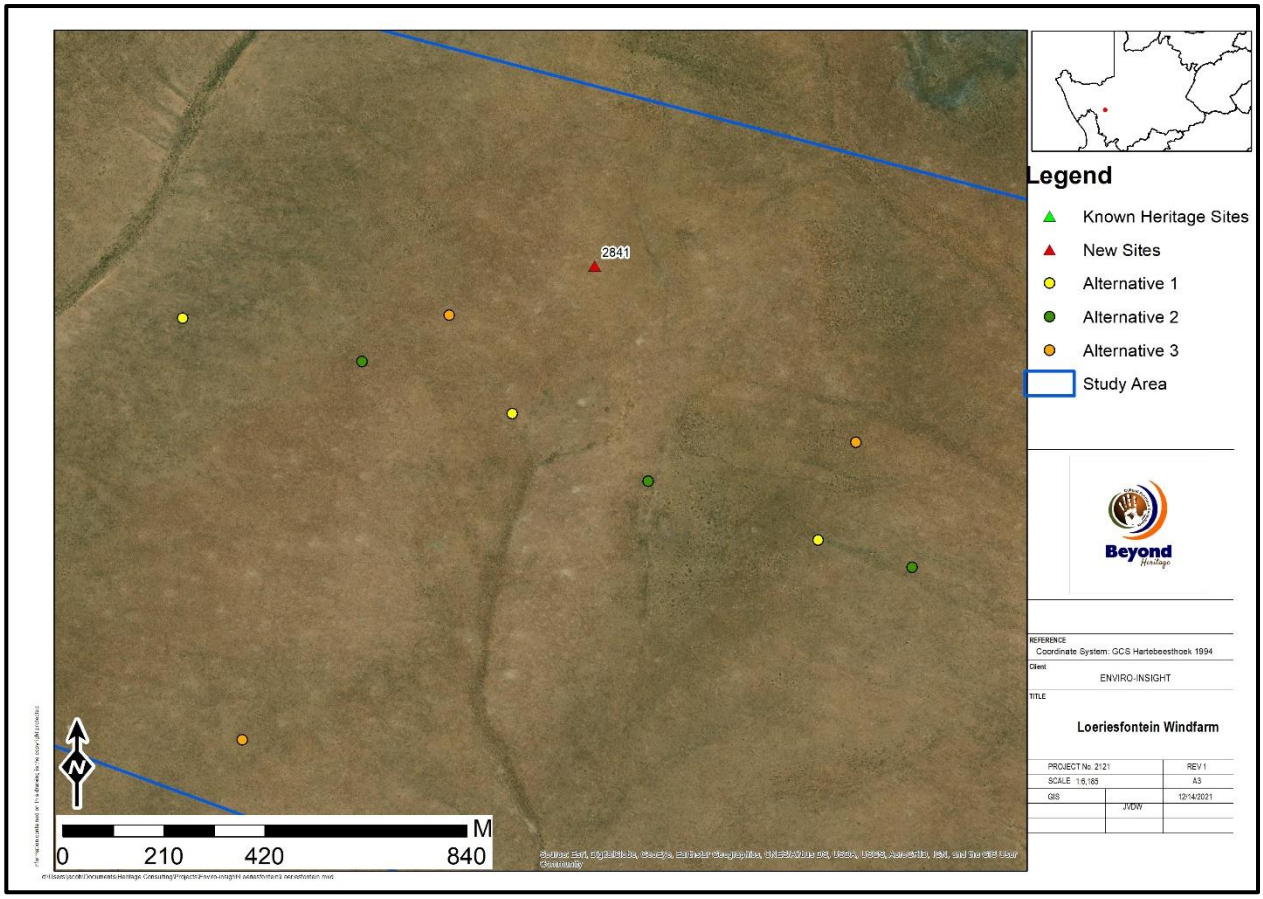


Figure 9.1. Waypoint 284 in relation to the turbine alternatives .

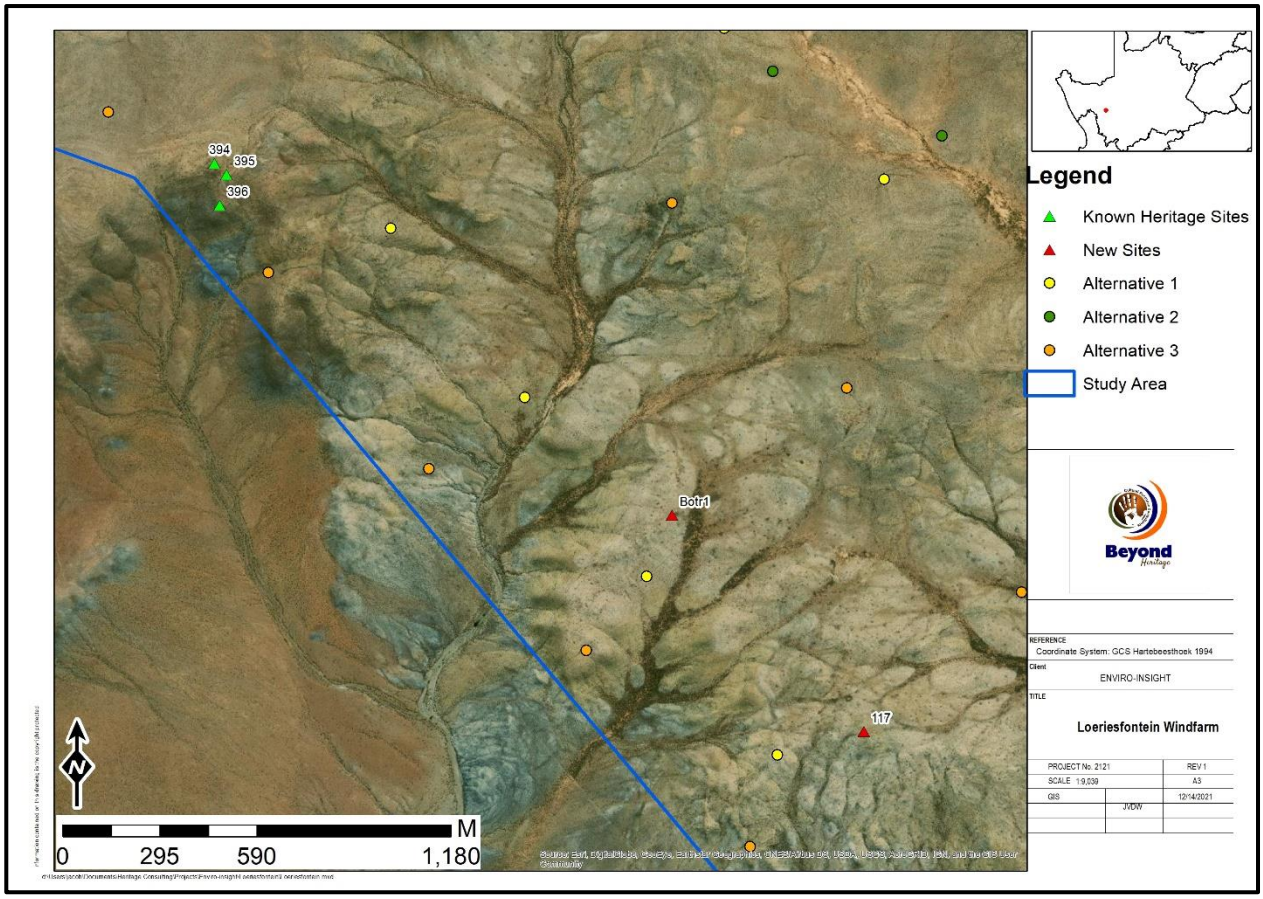


Figure 9.2. Turbine alternatives in relation to Botr 1, 394, 395 and 396.

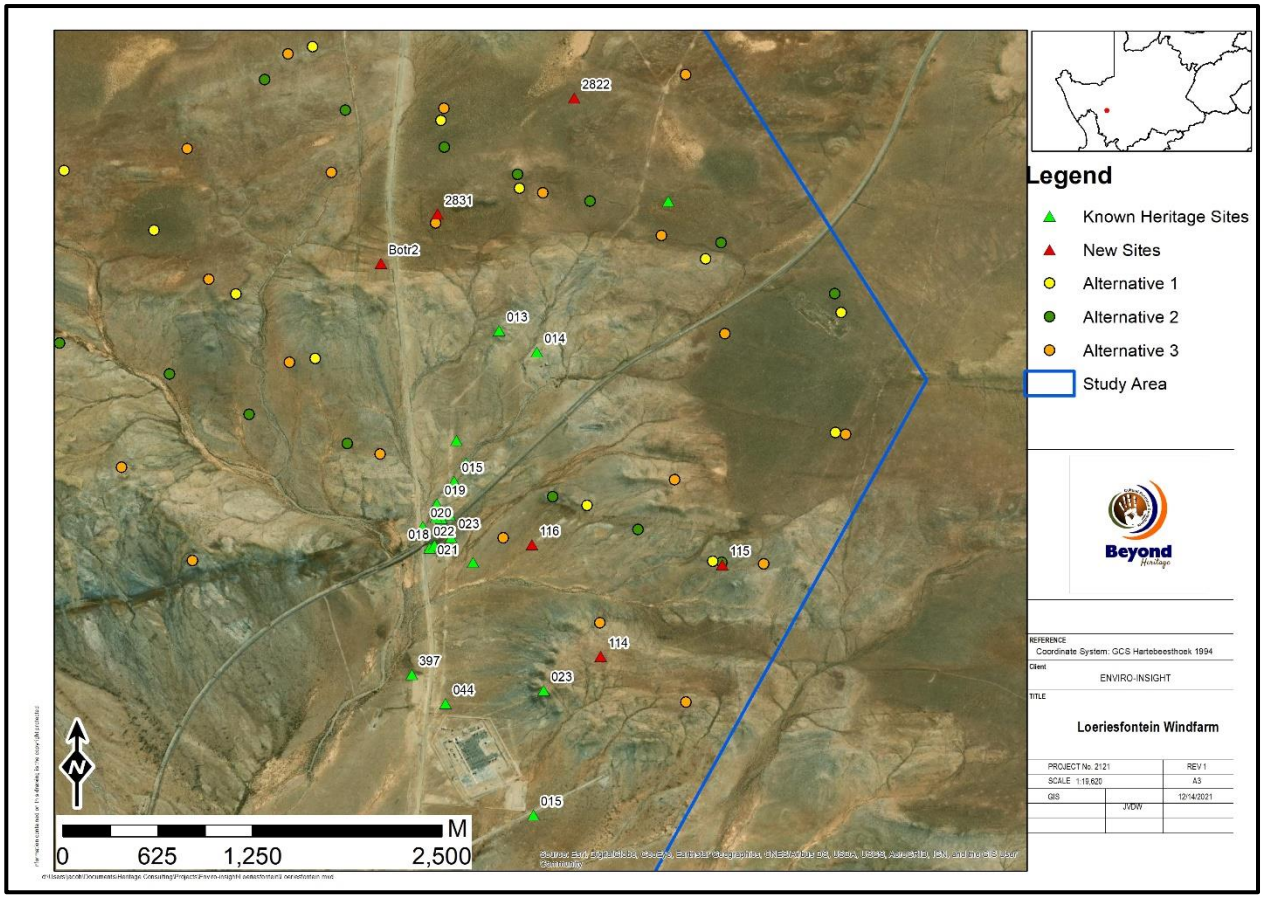


Figure 9.3. Turbine alternatives in relation to Waypoint 115 and 283.

10 Conclusion and recommendations

It is important to note that the survey focussed on the turbine locations of the original layout. After the survey was conducted other alternatives was proposed, covering other areas much of which was previously covered (Van der Walt 2012, Morris 2013, Van der Walt 2015, Orton 2017). The various assessments culminated in a total of 32 locations where heritage observations were made, Table 7 lists all heritage resources recorded during the surveys in relation to the project area and are mapped in Figure 8.1. For continuity waypoint numbers and site numbers were retained as initially recorded as well as gradings, significance ratings and recommendations mostly summarised in Orton (2017).

The current assessment recorded isolated scatters of lithics having low little heritage significance except for denser concentrations of artefacts (Botterblom 1 and 2). These sites are located on respectively a hilltop area and a dry stream bed, the recorded isolated scatters could have washed down from similar locations as these were found to be prime localities for recorded sites in the area. The lithics consist of well weathered and patinated MSA flakes and a core as well as LSA lithics on quartz and CCS with occasional ostrich eggshell fragments. No grave sites, historical material or built heritage was recorded during the current survey. The only other observation made was a sandstone memorial for Jan G du Toit who passed away here on 18 March 1953.

The study area is indicated as of moderate to very high paleontological sensitivity and an independent study was conducted by Prof Marion Bamford. The study concluded it is extremely unlikely that any fossils would be preserved in the alluvium of the Quaternary. There is a very small chance that trace fossils may occur in the shales of the early Permian Tierberg Formation so a Fossil Chance Find Protocol should be added to the EMPr. If fossils are found by the environmental officer, or other responsible person once excavations for foundations and infrastructure have commenced then they should be rescued, and a palaeontologist called to assess and collect a representative sample. If turbines and infrastructure are going to be placed in the southernmost part of the project area, on the section indicated in bright blue on the geology map or red on the SAHRIS map then a palaeontologist should be called to check the site and look for any possible fossils. The palaeontologist must obtain a relevant SAHRA permit in order to collect the fossils (Bamford 2021).

The three alternatives are all considered to be acceptable since the turbines avoid significant heritage sites and the impact of the proposed project on heritage resources can be mitigated to an acceptable level. It is recommended that the proposed project can commence on the condition that the following recommendations (Section 10.1) are implemented as part of the EMPr and based on approval from SAHRA:

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:

- Implementation of a chance find procedure for the project;
- Avoidance of known heritage sites, if this cannot be achieved mitigation will be required subject to Section 35 SAHRA permits;
- Final infrastructure must be subjected to a pre-construction survey;
- Turbines associated with alternative 3 located in the southern portion of the farm Sous (Turbine 23, 29 3, 24, 25, 14, 17 and 48) and infrastructure on the section indicated in bright blue on the geology map or red on the SAHRIS map will require a paleontological site visit prior to construction to look for any possible fossils. The palaeontologist must obtain a relevant SAHRA permit in order to collect the fossils.

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 therefor chance find procedures should be put in place as part of the EMP. A short summary of chance find procedures is discussed below.

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 Palaeontological resources

Chance finds protocol for Palaeontology – to commence once the excavations / drilling / mining 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 must be given a cursory inspection by the environmental officer or designated person. Any fossiliferous material (trace fossils, plants, insects, bone, coal) 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 fossil plants, vertebrates, invertebrates or trace fossils in the shales and mudstones. 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 is considered to be low 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 and unrecorded cultural resources (of which graves are the highest risk). This can cause delays during construction, as well as additional costs involved in mitigation, as well as additional layout changes.

10.5 Monitoring Requirements

Ideally, site monitoring should be conducted by an experienced archaeologist or heritage specialist. 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 the initial soil removal and subsequent earthworks during construction. 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 11. Monitoring requirements for the project

Heritage Monitoring					
Aspect	**Area**	**Responsible for monitoring and measuring**	**Frequency**	**Proactive or reactive measurement**	**Method**
Clearing activities and construction	Entire project area	ECO	Weekly (Pre construction and construction phase)	Proactively	• If risks are manifested (accidental discovery of heritage resources) the chance find procedure should be implemented: 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.

Heritage Monitoring					
Aspect	**Area**	**Responsible for monitoring and measuring**	**Frequency**	**Proactive or reactive measurement**	**Method**
					• Only recommence operations once impacts have been mitigated.

10.6 Management Measures for inclusion in the EMPr

Table 12. Heritage Management Plan for EMPr implementation

Area	Mitigation measures	Phase	Timeframe	Responsible party for implementation	Target	Performance indicators (monitoring tool)
General project area	Implement chance find procedures in case possible heritage finds are uncovered	Pre Construction and 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	Avoidance of known heritage sites, if this cannot be achieved mitigation will be required subject to Section 35 SAHRA permits;	Pre Construction and construction	Throughout the project	Applicant EAP	Ensure compliance with relevant legislation and recommendations from SAHRA under Section 35, of NHRA	ECO Checklist/Report
General project area	Final infrastructure must be subjected to a pre-construction survey;	Pre 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
Southern portion of project area	Turbines associated with alternative 3 located in the southern portion of the farm Sous (Turbine 23, 29 3, 24, 25, 14, 17 and 48) and	Pre Construction	Throughout the project	Applicant EAP	Ensure compliance with relevant legislation and recommendations from SAHRA under	ECO Checklist/Report

Area	Mitigation measures	Phase	Timeframe	Responsible party for implementation	Target	Performance indicators (monitoring tool)
	infrastructure on the section indicated in bright blue on the geology map or red on the SAHRIS map will require a paleontological site visit prior to construction to look for any possible fossils. The palaeontologist must obtain a relevant SAHRA permit in order to collect the fossils.				Section 35 and 38 of NHRA	

10.7 Knowledge Gaps

Due to the subsurface nature of heritage resources, the possibility of discovery of heritage resources during the construction phase cannot be excluded. This limitation is successfully mitigated with the implementation of a chance find procedure.

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