



SiVEST SA (PTY) LTD

**PROPOSED CONSTRUCTION OF THE KRAALTJIES
WIND ENERGY FACILITY NEAR BEAUFORT WEST,
WESTERN CAPE PROVINCE, SOUTH AFRICA**

Archaeological Impact Assessment

DFFE Reference:	14/12/16/3/3/2/2264
Report Prepared by:	PGS Heritage Pty Ltd
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Declaration of Independence

- I, Wouter Fourie, declare that –
- General declaration:
- I act as the independent heritage practitioner 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 heritage impact assessments, 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 will take into account, to the extent possible, the matters listed in section 38 of the NHRA when preparing the application and any report relating to the application;
- 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;
- I will ensure that information containing all relevant facts in respect of the application is distributed or made available to interested and affected parties and the public and that participation by interested and affected parties is facilitated in such a manner that all interested and affected parties will be provided with a reasonable opportunity to participate and to provide comments on documents that are produced to support the application;
- I will provide the competent authority with access to all information at my disposal regarding the application, whether such information is favourable to the applicant or not
- All the particulars furnished by me in this form are true and correct;
- I will perform all other obligations as expected from a heritage practitioner in terms of the Act and the constitutions of my affiliated professional bodies; and
- I realise that a false declaration is an offence in terms of regulation 71 of the Regulations and is punishable in terms of section 24F of the NEMA.

Disclosure of Vested Interest

- I do not have and will not have any vested interest (either business, financial, personal or other) in the proposed activity proceeding other than remuneration for work performed in terms of the Regulations;


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ACKNOWLEDGEMENT OF RECEIPT

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PGS confirms that this HIA report is done in accordance with the QMS implemented by PGS Heritage. The report structure and format followed is that of SiVEST Environmental as per the appointment scope and deliverable of SiVEST. The authors did implement the PGS HIA SOP and requirements

SiVEST SA (PTY) LTD

PROPOSED CONSTRUCTION OF THE KRAALTJIES WIND ENERGY FACILITY, NEAR BEAUFORT WEST, WESTERN CAPE PROVINCE, SOUTH AFRICA

ARCHAEOLOGICAL IMPACT ASSESSMENT

EXECUTIVE SUMMARY

PGS Heritage (Pty) Ltd (PGS) has been appointed by SiVEST (Pty) Ltd (hereafter referred to as “SiVEST”), on behalf of South African Mainstream Renewable Power Developments (Pty) Ltd (hereafter referred to as “Mainstream”), to undertake the assessment of the proposed construction of the up to 240MW Kraaltjies Wind Energy Facility (WEF) near Beaufort West in the Western Cape Province of South Africa.

1. SITE NAME

The Kraaltjies WEF and associated infrastructure.

2. LOCATION

The proposed WEF is located approximately 52km south of Beaufort West in the Western Cape Province. It is within the Beaufort West Local Municipality, in the Central Karoo District Municipality (**Figure 1**).

The WEF application site is approximately 3960.29 hectares (ha) in extent and incorporates the following farm portions:

- Portion 10 of the Farm Brits Eigendom No 374; and
- Portion 25 of the Farm Brits Eigendom No 374.



Figure 1: Regional context of the Kraaltjies study area.

3. DESCRIPTION OF THE PROPOSED DEVELOPMENT

It is anticipated that the proposed Kraaltjies WEF will comprise up to twenty (20) wind turbines with a maximum total energy generation capacity of up to approximately 240MW (**Figure 2**). The electricity generated by the proposed WEF development will be fed into the national grid via a 132kV overhead power line.

The 132kV overhead power line will however require a separate EA and will be subject to a separate Basic Assessment (BA) process, which will be undertaken in parallel to the EIA process as far as possible. A BESS will be located next to the onsite 11-33kV/132kV substation.

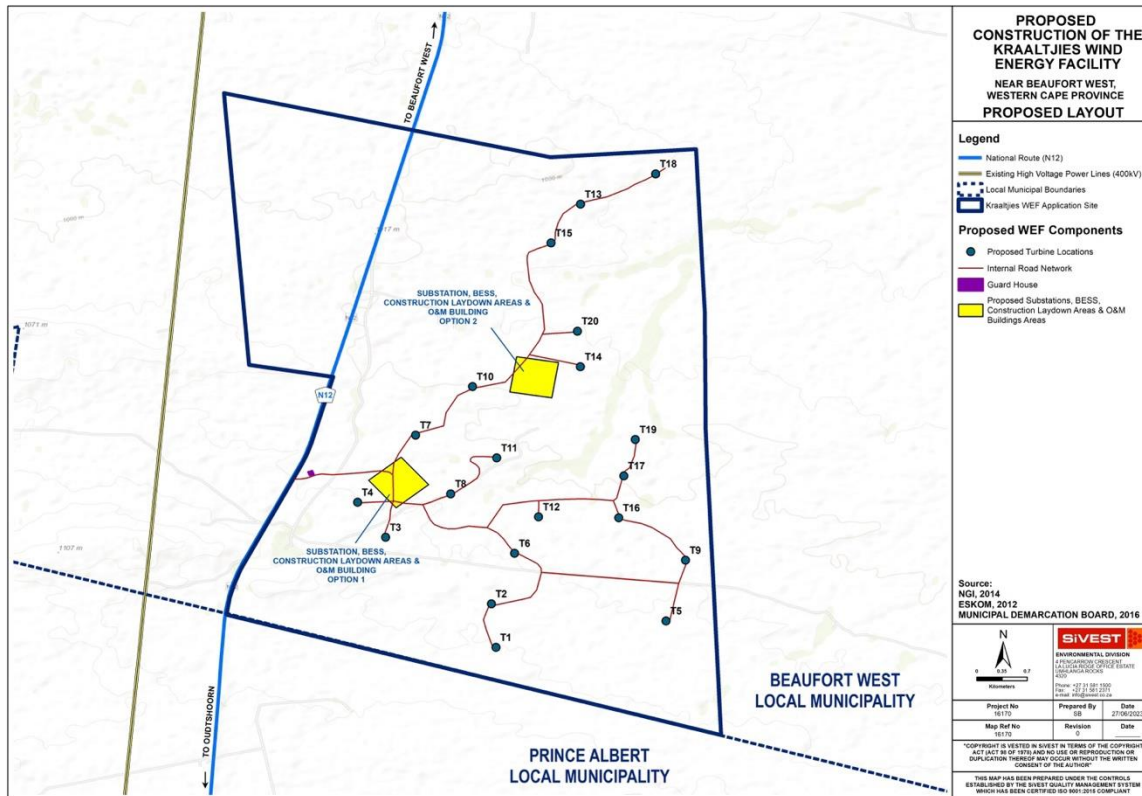


Figure 2: Proposed layout and development area for Kraaltjies WEF and associated infrastructure.

4. HERITAGE RESOURCES IDENTIFIED

A selective survey of the study area was conducted in February 2021. Focus was placed on the areas identified for the placement of the proposed turbines and associated substation sites within the larger assessment area. Heritage resources are unique and non-renewable and as such any impact on such resources must be seen as significant.

Archaeology, built environment and burial grounds and graves

The fieldwork conducted to evaluate the possible impact of the new Kraaltjies WEF has revealed the presence of forty-four (44) heritage resources.

Burial Grounds and graves

Two (2) burial grounds (**K027, KC001**) were rated as having high heritage significance.

Historical Structures

The farmstead at **KC001** was rated as having high heritage significance. Four (4) structures (**K012(K012/1, K012/2, K012/3, K012/4)**) were rated as having medium heritage significance and three (3) structures (**K026 (K026/1), K036**) were rated as having low heritage significance.

Archaeological features

Three (3) Stone Age sites (**K022, K033, K039**) were rated as having medium heritage significance and two (2) Stone Age sites (**K001, K003**) were rated as having low heritage significance.

Twenty-nine (29) find spots (**K002, K004-5, K007-8, K010-11, K013-21, K023-25, K028-32, K034-35, K038, K040**) comprise a number of low-density Stone Age surface artefact scatters and were rated as having low heritage significance. These are primarily from the Middle Stone Age (MSA), although both Later Stone Age (LSA) and earlier Early Stone Age (ESA) material was identified. All of these artefact assemblages occur in heavily deflated and eroded areas, so their scientific potential and heritage significance is somewhat lowered. Based on findings from a range of other heritage reports in the area, these types of sites are to be expected in this region.

5. ANTICIPATED IMPACTS ON HERITAGE RESOURCES

The pre-construction and construction phase of the proposed WEF will entail extensive surface clearance as well as excavations into the superficial sediment cover and underlying bedrock (e.g., for widened or new access roads, wind turbine foundations, hardstanding areas, on-site substation, underground cables, construction laydown area, O&M building, guard house and BESS). The possible pre-construction impacts calculated on the tangible cultural heritage resources is overall **MODERATE NEGATIVE** rating but with the implementation of the recommended buffers and management guidelines will be reduced to a **LOW NEGATIVE** impact.

6. RECOMMENDATIONS

The calculated impact as summarised in **Section 9** of this report confirms the impact of the new Kraaltjies WEF and associated infrastructure will be reduced with the implementation of the mitigation measures. This finding in addition to the implementation of a chance finds procedure, as part of the EMP, will mitigate possible impacts on unidentified heritage resources.

The following mitigation measures will be required:

- 50m buffer zones around grave sites (**K027, KC001**)
- 30m buffer zone around farmsteads (**KC001**)
- 30m buffer zone around historical structures (**K012(K012/1, K012/2, K012/3, K012/4)**)
- 30m buffer zones around Stone Age sites with a medium heritage significance (**K022, K033, K039**)

- If significant Stone Age sites (medium heritage significance or higher) can't be avoided, then sites must be sampled by a qualified specialist under a permit issued by SAHRA
- An induction and training program on managing archaeological resources must be included in the induction programs for the Environmental Control/Site Officer working on the project.
- An assessment of the footprint areas must be done if the project is to commence immediately pre-construction and any findings must be handled through the Chance finds protocol.
- A chance finds protocol must be developed that includes the process of work stoppage, site protection, evaluation and informing HWC of such finds and a final process of mitigation implementation.

The above recommendations were included in the final layout in this report (Figure 3).

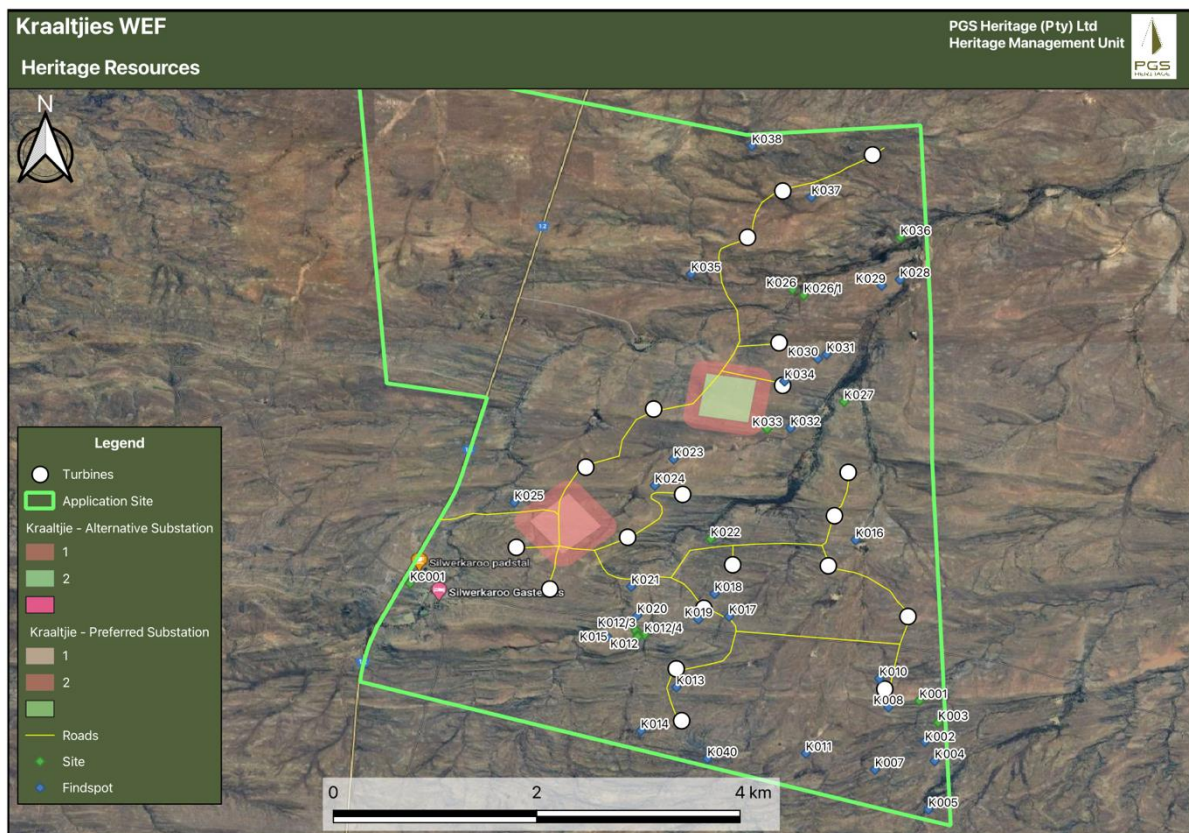


Figure 3: Locality of the heritage resources identified within the WEF study area.

General

In the event that heritage resources are discovered during site clearance, construction activities must stop in the vicinity, and a qualified archaeologist must be appointed to evaluate and make recommendations on mitigation measures.

The overall impact of the Kraaltjies WEF, on the heritage resources, is seen as acceptably **low** after the recommendations have been implemented and therefore, impacts can be mitigated to acceptable levels allowing for the development to be granted environmental authorisation.

NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 1998 (ACT NO. 107 OF 1998) AND ENVIRONMENTAL IMPACT REGULATIONS, 2014 (AS AMENDED) - REQUIREMENTS FOR SPECIALIST REPORTS (APPENDIX 6)

Regulation GNR 326 of 4 December 2014, as amended 7 April 2017, Appendix 6	Section of Report
1. (1) A specialist report prepared in terms of these Regulations must contain- 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;	Page ii of Report- Contact details and company Section 1.2 and Appendix A
b) a declaration that the specialist is independent in a form as may be specified by the competent authority;	Page ii
c) an indication of the scope of, and the purpose for which, the report was prepared;	Section 1.1
(cA) an indication of the quality and age of base data used for the specialist report;	Section 2, 6 and 7
(cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	Section 8, 9 and 10
d) the date and season of the site investigation and the relevance of the season to the outcome of the assessment;	Section 2 and 6
e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;	Section 2
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 a site plan identifying site alternatives;	Section 7 and 8
g) an identification of any areas to be avoided, including buffers;	Section 8 and 12
h) a map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;	Figure 23, Figure 24; Section 8
i) a description of any assumptions made and any uncertainties or gaps in knowledge;	Section 3
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;	Executive Summary and Section 9, 10, 11 and 12
k) any mitigation measures for inclusion in the EMPr;	Section 8 and 12

Regulation GNR 326 of 4 December 2014, as amended 7 April 2017, Appendix 6	Section of Report
l) any conditions for inclusion in the environmental authorisation;	Section 8 and 12
m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;	Section 8 and 12
n) a reasoned opinion- <ul style="list-style-type: none"> i. (as to) whether the proposed activity, activities or portions thereof should be authorised; <ul style="list-style-type: none"> (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; 	Executive Summary; Section 12
o) a description of any consultation process that was undertaken during the course of preparing the specialist report;	
p) a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	
q) any other information requested by the competent authority.	
2) Where a government notice <i>gazetted</i> by the Minister provides for any protocol or minimum information requirement to be applied to a specialist report, the requirements as indicated in such notice will apply.	NEMA Appendix 6 and GN648

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Glossary of Terms

Archaeological resources

This includes:

- 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;
- 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;
- 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 in the Maritimes Zones Act, 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;
- features, structures and artefacts associated with military history which are older than 75 years and the site on which they are found.

Cultural significance

This means aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance

Development

This means any physical intervention, excavation, or action, other than those caused by natural forces, which may in the opinion of the heritage authority in any way result in a change to the nature, appearance or physical nature of a place or influence its stability and future well-being, including:

- construction, alteration, demolition, removal or change in use of a place or a structure at a place;
- carrying out any works on or over or under a place;
- subdivision or consolidation of land comprising a place, including the structures or airspace of a place;
- constructing or putting up for display signs or boards;
- any change to the natural or existing condition or topography of land; and
- any removal or destruction of trees, or removal of vegetation or topsoil

Early Stone Age

The archaeology of the Stone Age between 700 000 and 2 500 000 years ago.

Fossil

Mineralised bones of animals, shellfish, plants and marine animals. A trace fossil is the track or footprint of a fossil animal that is preserved in stone or consolidated sediment.

Heritage

That which is inherited and forms part of the National Estate (historical places, objects, fossils as defined by the National Heritage Resources Act 25 of 1999).

Heritage resources

This means any place or object of cultural significance and can include (but not limited to) as stated under Section 3 of the NHRA,

- places, buildings, structures and equipment of cultural significance;
- places to which oral traditions are attached or which are associated with living heritage;
- historical settlements and townscapes;
- landscapes and natural features of cultural significance;
- geological sites of scientific or cultural importance;
- archaeological and palaeontological sites;
- graves and burial grounds, and
- sites of significance relating to the history of slavery in South Africa;

Holocene

The most recent geological time period which commenced 20 000 years ago.

Late Stone Age

The archaeology of the last 30 000 years associated with fully modern people.

Late Iron Age (Early Farming Communities)

The archaeology of the last 1000 years up to the 1800's, associated with iron-working and farming activities such as herding and agriculture.

Middle Stone Age

The archaeology of the Stone Age between 20 000-300 000 years ago, associated with early modern humans.

Heritage Site

Site in this context refers to an area place where a heritage resource is located and not a proclaimed heritage site as contemplated under s27 of the NHRA.

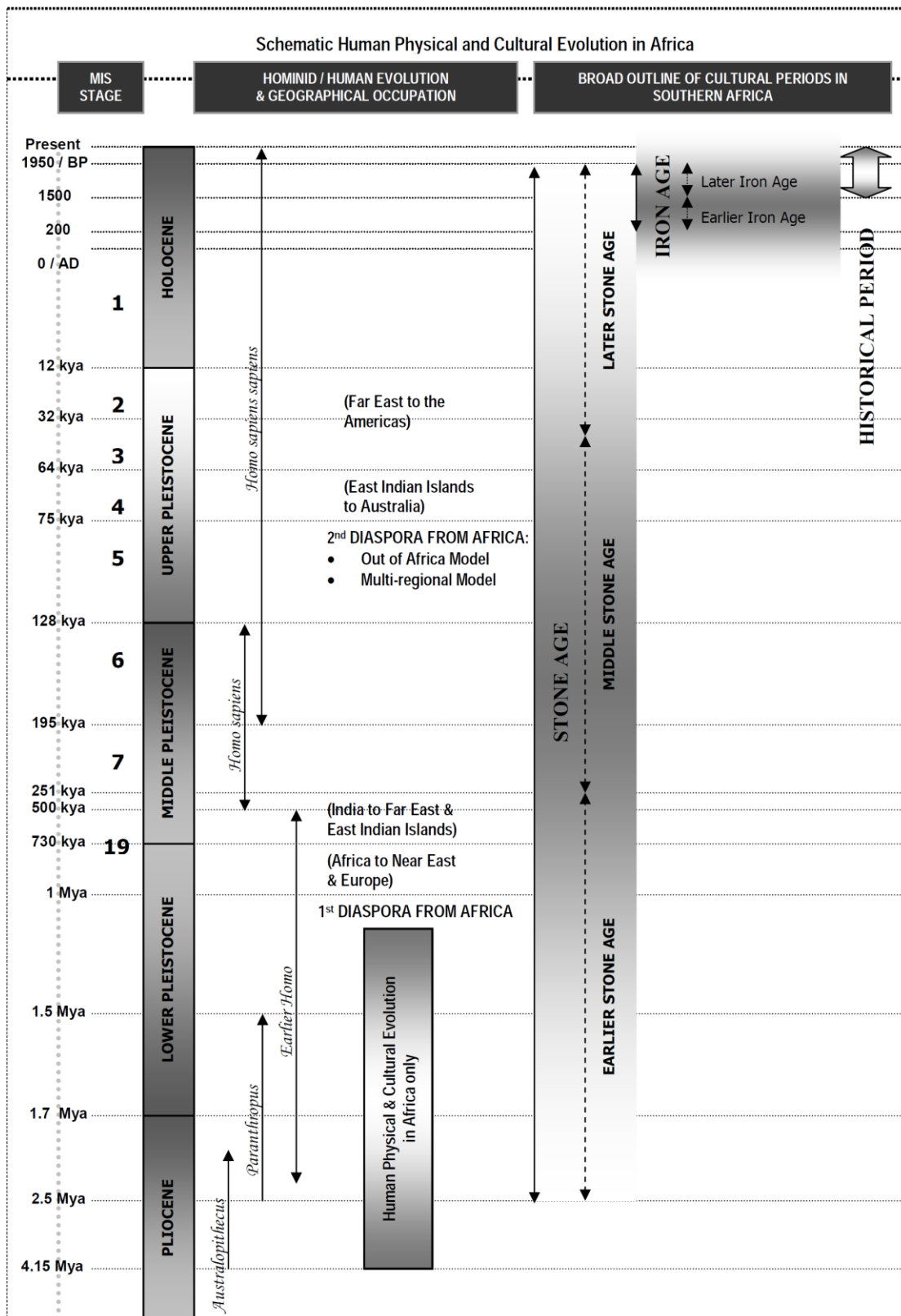


Figure 4: Human and Cultural Timeline in Africa (Morris, 2008).

List of Abbreviations

Abbreviations	Description
AIA	Archaeological Impact Assessment
APHP	Association of Professional Heritage Practitioners
ASAPA	Association of South African Professional Archaeologists
BESS	Battery Energy Storage System
CCS	Cryptocrystalline silica
CRM	Cultural Resource Management
DFFE	Department of Forestry, Fisheries and Environment
DWS	Department of Water and Sanitation
ECO	Environmental Control Officer
EIA practitioner	Environmental Impact Assessment Practitioner
EIA	Environmental Impact Assessment
ESA	Early Stone Age
GN	Government Notice
GPS	Global Positioning System
HIA	Heritage Impact Assessment
HWC	Heritage Western Cape
I&AP	Interested & Affected Party
LSA	Late Stone Age
LIA	Late Iron Age
Mainstream	South African Mainstream Power Developments (Pty) Ltd
MSA	Middle Stone Age
MIA	Middle Iron Age
NCA	National Competent Authority
NEMA	National Environmental Management Act
NHRA	National Heritage Resources Act
O&M	Operation and Maintenance
PGS	PGS Heritage (Pty) Ltd
REIPPPP	Renewable Energy Independent Power Producer Procurement Programme
SADC	Southern African Development Community
SAHRA	South African Heritage Resources Agency
SIVEST	SiVEST (PTY) Ltd
WEF	Wind Energy Facility

1. INTRODUCTION

PGS Heritage (Pty) Ltd (PGS) has been appointed by SiVEST SA (Pty) Ltd (hereafter referred to as “SiVEST”), on behalf of South Africa Mainstream Renewable Power Developments (Pty) Ltd (hereafter referred to as “Mainstream”), to undertake the assessment of the proposed construction of the up to 240MW Kraaltjies Wind Energy Facility (WEF) near Beaufort West in the Western Cape Province.

The overall objective of the development is to generate electricity by means of renewable energy technology capturing wind energy to feed into the National Grid.

It is anticipated that the proposed Kraaltjies WEF will comprise of up to twenty (20) wind turbines with a maximum total energy generation capacity of up to approximately 240MW. The electricity generated by the proposed WEF development will be fed into the national grid via a 132kV overhead power line (this will form part of a separate Basic Assessment application, and as such is not included in this report).

1.1 Scope of the Study

The aim of the study is to identify possible heritage sites and finds that may occur in the proposed development area. The AIA aims to assist the developer in managing the discovered heritage resources in a responsible manner, in order to protect, preserve, and develop them within the framework provided by the National Heritage Resources Act (Act 25 of 1999) (NHRA).

1.2 Specialist Credentials

This AIA was compiled by PGS.

The staff at PGS has a combined experience of nearly 70 years in the heritage consulting industry. PGS and its staff have extensive experience in managing HIA processes. PGS will only undertake heritage assessment work where they have the relevant expertise and experience to undertake that work competently.

Wouter Fourie, the Project Coordinator, is registered with the ASAPA as a Professional Archaeologist and is accredited as a Principal Investigator; he is further an Accredited Professional Heritage Practitioner with the Association of Professional Heritage Practitioners (APHP).

Ms. Nikki Mann, the author of this report, graduated with her Master’s degree (MSc) in Archaeology and is registered as a Professional Archaeologist with the Association of Southern African Professional Archaeologists (ASAPA).

Ruan van der Merwe, field archaeologist who assisted with the fieldwork, holds a BA (Hons) in Archaeology.

Wynand van Zyl, field archaeologist who assisted with the fieldwork, holds a BA (Hons) in Archaeology.

2. ASSESSMENT METHODOLOGY

The applicable maps, tables and figures, are included as stipulated in the NHRA (no 25 of 1999), the NEMA (no 107 of 1998). The HIA process consisted of three steps:

Step I – Literature Review: A detailed archaeological and historical overview of the study area and surroundings were undertaken. This work was augmented by an assessment of reports and data contained on the South African Heritage Resources Information System (SAHRIS). Additionally, an assessment was made of the available historic topographic maps. All these desktop study components were undertaken to support the fieldwork.

Step II – Physical Survey: A physical survey was conducted on foot through the proposed project area by 2 qualified archaeologists (four days in February 2021), aimed at locating and documenting sites falling within and adjacent to the proposed development footprint.

Step III – The final step involved the recording and documentation of relevant archaeological resources, the assessment of resources in terms of the HIA criteria and report writing, as well as mapping and constructive recommendations.

The significance of heritage sites was based on five main criteria:

- Site integrity (i.e. primary vs. secondary context),
- Amount of deposit, range of features (e.g., stonewalling, stone tools and enclosures),
- Density of scatter (dispersed scatter)
 - Low - <10/50m²
 - Medium – 10-50/50m²
 - High - >50/50m²
- Uniqueness; and
- Potential to answer present research questions.

Impacts on these sites by the development will be evaluated as follows:

2.1 Site Significance classification standards

Site significance classification standards use is based on the heritage classification of s3 in the NHRA and developed for implementation keeping in mind the grading system approved by SAHRA for archaeological impact assessments. The update classification and rating system as developed by Heritage Western Cape (2016) is implemented in this report

Site significance classification standards prescribed by the Heritage Western Cape Guideline (2016), were used for the purpose of this report (**Table 1** and **Table 2**).

Table 1: Rating system for archaeological resources

Grading	Description of Resource	Examples of Possible Management Strategies	Heritage Significance
I	Heritage resources with qualities so exceptional that they are of special national significance. Current examples: Langebaanweg (West Coast Fossil Park), Cradle of Humankind	May be declared as a National Heritage Site managed by SAHRA. Specific mitigation and scientific investigation can be permitted in certain circumstances with sufficient motivation.	Highest Significance
II	Heritage resources with special qualities which make them significant, but do not fulfil the criteria for Grade I status. Current examples: Blombos, Paternoster Midden.	May be declared as a Provincial Heritage Site managed by HWC. Specific mitigation and scientific investigation can be permitted in certain circumstances with sufficient motivation.	Exceptionally High Significance
III	Heritage resources that contribute to the environmental quality or cultural significance of a larger area and fulfils one of the criteria set out in section 3(3) of the Act but that does not fulfil the criteria for Grade II status. Grade III sites may be formally protected by placement on the Heritage Register.		
IIIA	Such a resource must be an excellent example of its kind or must be sufficiently rare. Current examples: Varschedrift; Peers Cave; Brobartia Road Midden at Bettys Bay	Resource must be retained. Specific mitigation and scientific investigation can be permitted in certain circumstances with sufficient motivation.	High Significance
IIIB	Such a resource might have similar significances to those of a Grade III A resource, but to a lesser degree.	Resource must be retained where possible where not possible it must be fully investigated and/or mitigated.	Medium Significance
IIIC	Such a resource is of contributing significance.	Resource must be satisfactorily studied before impact. If the recording already done (such as in an HIA or permit application) is not sufficient, further recording or even mitigation may be required.	Low Significance
NCW	A resource that, after appropriate investigation, has been determined to not have enough heritage significance to be retained as part of the National Estate.	No further actions under the NHRA are required. This must be motivated by the applicant or the consultant and approved by the authority.	No research potential or other cultural significance

Table 2: Rating system for built environment resources

Grading	Description of Resource	Examples of Possible Management Strategies	Heritage Significance
I	Heritage resources with qualities so exceptional that they are of special national significance. Current examples: Robben Island	May be declared as a National Heritage Site managed by SAHRA.	Highest Significance
II	Heritage resources with special qualities which make them significant in the context of a province or region, but do not fulfil the criteria for Grade I status.	May be declared as a Provincial Heritage Site managed by HWC.	Exceptionally High Significance

Grading	Description of Resource	Examples of Possible Management Strategies	Heritage Significance
	Current examples: St George's Cathedral, Community House		
II	Such a resource contributes to the environmental quality or cultural significance of a larger area and fulfils one of the criteria set out in section 3(3) of the Act but that does not fulfil the criteria for Grade II status. Grade III sites may be formally protected by placement on the Heritage Register.		
IIIA	Such a resource must be an excellent example of its kind or must be sufficiently rare. These are heritage resources which are significant in the context of an area.	This grading is applied to buildings and sites that have sufficient intrinsic significance to be regarded as local heritage resources; and are significant enough to warrant that any alteration, both internal and external, is regulated. Such buildings and sites may be representative, being excellent examples of their kind, or may be rare. In either case, they should receive maximum protection at local level.	High Significance
IIIB	Such a resource might have similar significances to those of a Grade III A resource, but to a lesser degree. These are heritage resources which are significant in the context of a townscape, neighbourhood, settlement or community.	Like Grade IIIA buildings and sites, such buildings and sites may be representative, being excellent examples of their kind, or may be rare, but less so than Grade IIIA examples. They would receive less stringent protection than Grade IIIA buildings and sites at local level.	Medium Significance
IIIC	Such a resource is of contributing significance to the environs. These are heritage resources which are significant in the context of a streetscape or direct neighbourhood.	This grading is applied to buildings and/or sites whose significance is contextual, i.e. in large part due to its contribution to the character or significance of the environs. These buildings and sites should, as a consequence, only be regulated if the significance of the environs is sufficient to warrant protective measures, regardless of whether the site falls within a Conservation or Heritage Area. Internal alterations should not necessarily be regulated.	Low Significance
NCW	A resource that, after appropriate investigation, has been determined to not have enough heritage significance to be retained as part of the National Estate.	No further actions under the NHRA are required. This must be motivated by the applicant and approved by the authority. Section 34 can even be lifted by HWC for structures in this category if they are older than 60 years.	No research potential or other cultural significance

3. ASSUMPTIONS AND LIMITATIONS

Not detracting in any way from the comprehensiveness of the fieldwork undertaken, it is necessary to realise that the heritage resources located during the fieldwork do not necessarily represent all the possible heritage resources present within the area. Various factors account for this, including the subterranean nature of some archaeological sites. As such, should any heritage features and/or objects not included in the present inventory be located or observed, a heritage specialist must immediately be contacted.

The fieldwork focussed on the identification of archaeological resources within the application area and did not assess the final layout of the WEF. The mitigation measures included and proposed for the EMPR for the WEF should address this limitation.

Such observed or located heritage features and/or objects may not be disturbed or removed in any way until such time that the heritage specialist has been able to make an assessment as to the significance of the site (or material) in question. This applies to graves and cemeteries as well. In the event that any graves or burial places are located during the development, the procedures and requirements pertaining to graves and burials will apply as set out in **Section 5**.

4. TECHNICAL DESCRIPTION

4.1 Project Location

The proposed WEF and associated infrastructure is located approximately 52km south of Beaufort West in the Western Cape Province. It is within the Beaufort West Local Municipality, in the Central Karoo District Municipality (**Figure 5**).



Figure 5: Regional Context Map

4.1.1 WEF

The WEF application site as shown on the locality map below (**Figure 6**) is approximately 3994.9 hectares (ha) in extent and incorporates the following farm portions:

- Portion 10 of the Farm Brits Eigendom No 374; and
- Portion 25 of the Farm Brits Eigendom No 374.

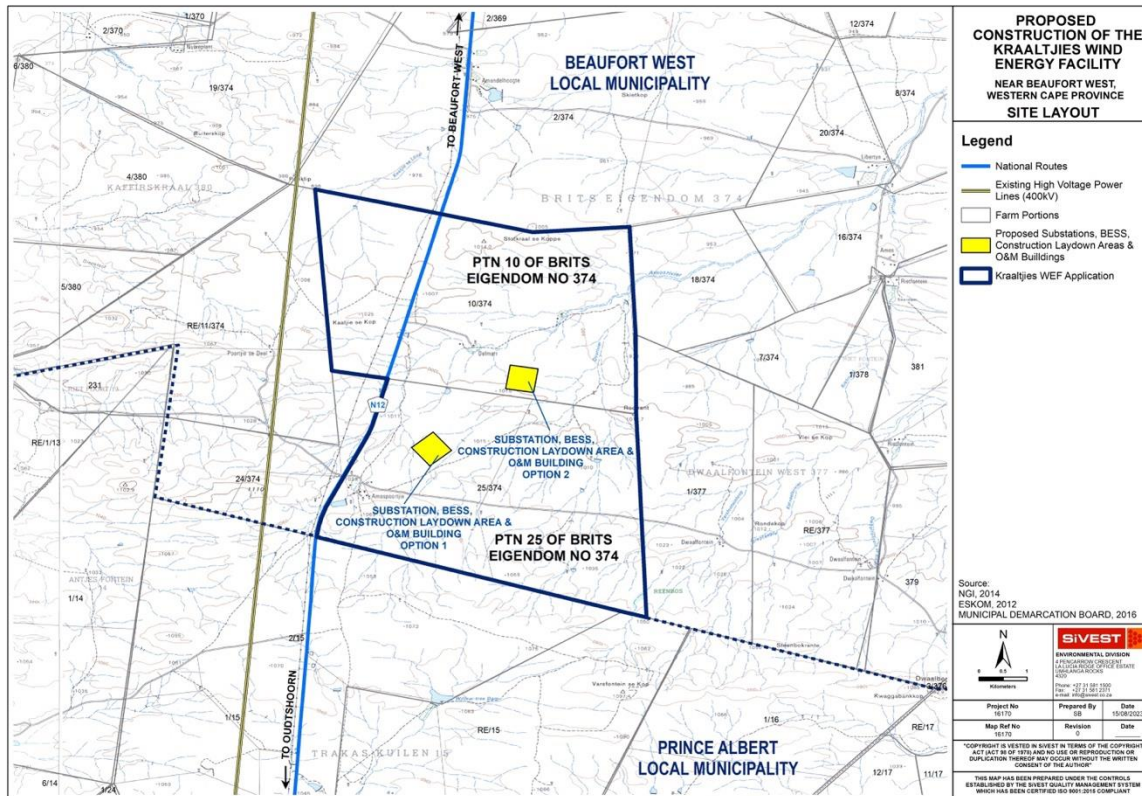


Figure 6: Kraaltjies WEF Site Locality.

4.2 Project Description

It is anticipated that the proposed Kraaltjies WEF will comprise up to twenty (20) wind turbines with a maximum total energy generation capacity of up to approximately 240MW. The electricity generated by the proposed WEF development will be fed into the national grid via a 132kV overhead power line. The 132kV overhead power line will however require a separate EA and is subject to a separate BA process, which is currently being undertaken in parallel to this EIA process.

4.2.1 Wind Farm Components

- Up to twenty (20) wind turbines, with a maximum export capacity of approximately 240MW. This will be subject to allowable limits in terms of the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP). The final number of turbines and layout of the WEF will, however, be dependent on the outcome of the Specialist Studies conducted during the EIA process.
- Each wind turbine will have a hub height of up to 120m to 200m and rotor diameter of up to approximately 200m.
- Permanent compacted hardstand areas / platforms (also known as crane pads) of approximately 90m x 50m (total footprint of approx. 4 500m²) per turbine during construction and for on-going maintenance purposes for the lifetime of the proposed development.

- Each wind turbine will consist of a foundation of up to approximately 15m x 15m in diameter. In addition, the foundations will be up to approximately 3m in depth.
- Electrical transformers (690V/33kV) adjacent to each wind turbine (typical footprint of up to approximately 2m x 2m) to step up the voltage to 11-33kV.
- Associated infrastructure of approximately 25ha which includes:
 - One (1) new 11-33kV/132kV IPP on-site substation including associated equipment and infrastructure the proposed substation will be a step-up substation and will include an Eskom portion and an IPP portion, hence the substation has been included in the WEF EIA and in the grid infrastructure (substation and 132kV overhead power line) BA to allow for handover to Eskom. Following construction, the substation will be owned and managed by Eskom.
 - A Battery Energy Storage System (BESS) will be located next to the onsite 11-33kV/132kV substation. .
 - One (1) construction laydown / staging area of up to approximately 3ha. It should be noted that no construction camps will be required in order to house workers overnight as all workers will be accommodated in the nearby town.
 - Operation and Maintenance (O&M) buildings, including offices, a guard house, operational control centre, O&M area / warehouse / workshop and ablution facilities to be located on the site identified for the substation.
- The wind turbines will be connected to the proposed substation via medium voltage (11-33kV) underground cabling and overhead power lines.
- Road servitude of 8m and a 20m underground cable or overhead line servitude.
- The main access road will be approximately 8 - 12 m wide. During construction the internal and access roads will be up to 13.5m in some parts (i.e. for bringing in transformers etc), after construction they will be rehabilitated back down to 8m or less. Turns will have a radius of up to 50m for abnormal loads (especially turbine blades) to access the various wind turbine positions. It should be noted that the proposed application site will be accessed via the N12 National Route. During operation, internal roads with a width of up to approximately 5m (excluding reserves) wide will provide access to each wind turbine. Existing site roads will be used wherever possible, although new site roads will be constructed where necessary.
- A wind measuring lattice (approximately 140m in height) mast has already been strategically placed within the wind farm application site in order to collect data on wind conditions.
- No new fencing is envisaged at this stage. Current fencing is standard farm fence approximately 1-1.5m in height. Fencing might be upgraded (if required) to be up to approximately 2m in height; and
- Water will either be sourced from existing boreholes located within the application site or will be trucked in, should the boreholes located within the application site be limited.

4.3 Alternatives

4.3.1 Wind Energy Facility

No other activity alternatives are being considered. Renewable Energy development in South Africa is highly desirable from a social, environmental and development point of view and a wind energy facility is considered suitable for this site due to the high wind resource in this area.

The choice of technology selected for the Kraaltjies WEF is based on environmental constraints and technical and economic considerations. No other technology alternatives are being considered as wind energy facilities are more suitable for the site than other forms of renewable energy due to the high wind resource.

The size of the wind turbines will depend on the development area and the total generation capacity that can be produced as a result. The choice of turbine to be used will ultimately be determined by technological and economic factors at a later stage.

Design and layout alternatives will be considered and assessed as part of the EIA. These include alternatives for the Substation locations also including for the on-site substation (Eskom and IPP portions), construction laydown area, BESS and O&M buildings. The proposed layout is shown in **Figure 7** below.

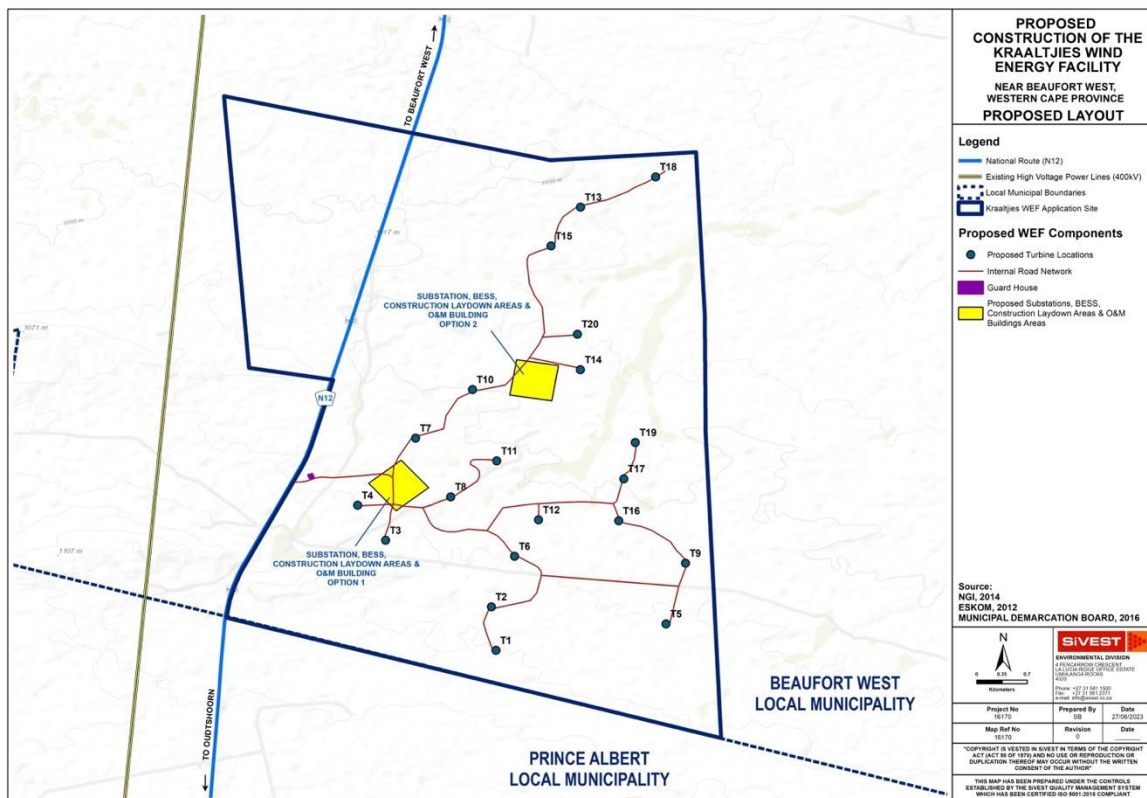


Figure 7: Proposed layout and development area.

4.3.2 No-go Alternative

The 'no-go' alternative is the option of not undertaking the proposed WEF and associated infrastructure projects. Hence, if the 'no-go' option is implemented, there would be no development. This alternative would result in no environmental impacts from the proposed project on the site or surrounding local area. It provides the baseline against which other alternatives are compared and will be considered throughout the report.

5. LEGAL REQUIREMENT AND GUIDELINES

5.1 Statutory Framework: The National Heritage Resources (Act 25 of 1999)

The NHRA has applicability, as the study forms part of an overall HIA in terms of the provisions of Section 34, 35, 36 and 38 of the NHRA and forms part of a heritage scoping study that serves to identify key heritage resources, informants, and issues relating to the palaeontological, archaeological, built environment and cultural landscape, as well as the need to address such issues during the impact assessment phase of the HIA process.

5.1.1 Section 35 – Archaeology, Palaeontology and Meteorites

According to Section 35 (Archaeology, Palaeontology and Meteorites) and Section 38 (Heritage Resources Management) of the NHRA, PIAs and AIAs are required by law in the case of developments in areas underlain by potentially fossiliferous (fossil-bearing) rocks, especially where substantial bedrock excavations are envisaged, and where human settlement is known to have occurred during prehistory and the historic period.

5.1.2 Section 36 – Burial Grounds & Graves

A section 36 permit application is made to the Heritage Western Cape (HWC) or the competent provincial heritage authority which protects burial grounds and graves that are older than 60 years and must conserve and generally care for burial grounds and graves protected in terms of this section, and it may make such arrangements for their conservation as it sees fit. HWC must also identify and record the graves of victims of conflict and any other graves which it deems to be of cultural significance and may erect memorials associated with these graves and must maintain such memorials. A permit is required under the following conditions:

Permitting requirements for burial grounds and graves older than 60 years (prehistoric) and historic burials to the HWC:

- a) destroy, damage, alter, exhume or remove from its original position or otherwise disturb the grave of a victim of conflict, or any burial ground or part thereof which contains such graves.
- b) destroy, damage, alter, exhume, remove from its original position or otherwise disturb any grave or burial ground older than 60 years which is situated outside a formal cemetery administered by a local authority; or

- c) bring onto or use at a burial ground or grave referred to in paragraph (a) or (b) any excavation equipment, or any equipment which assists in the detection or recovery of metals.
- d) SAHRA or a provincial heritage resources authority may not issue a permit for the destruction or damage of any burial ground or grave referred to in subsection (3)(a) unless it is satisfied that the applicant has made satisfactory arrangements for the exhumation and re-interment of the contents of such graves, at the cost of the applicant.

5.1.3 Section 38 HIA as a Specialist Study within the EIA in Terms of Section 38(8)

A NHRA Section 38 (Heritage Impact Assessments) application to HWC is required when the proposed development triggers one or more of the following activities:

- a) the construction of a road, wall, power line, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length;
- b) the construction of a bridge or similar structure exceeding 50 m in length;
- c) any development or other activity which will change the character of a site,
 - i. exceeding 5 000 m² in extent; or
 - ii. Involving three or more existing erven or subdivisions thereof; or
 - iii. involving three or more erven or divisions thereof which have been consolidated within the past five years; or
 - iv. the costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority;
- d) the re-zoning of a site exceeding 10 000 m² in extent; or
- e) any other category of development provided for in regulations by SAHRA or a provincial heritage resources authority

In this instance, the heritage assessment for the property is to be undertaken as a component of the EIA for the project. Provision is made for this in terms of Section 38(8) of the NHRA, which states that:

This is an HIA submitted to the relevant authority (DEA) in terms of Section 38(8) of the National Heritage Resources Act. The commenting authority is HWC.

An HIA report is required to identify, and assess archaeological resources as defined by the Act, assess the impact of the proposal on the said archaeological resources, review alternatives and recommend mitigation (see methodology above).

Section 38 (3) Impact Assessments are required, in terms of the statutory framework to conform to basic requirements as laid out in Section 38(3) of the NHRA. These are:

- The identification and mapping of heritage resources in the area affected
- The assessment of the significance of such resources
- The assessment of the impact of the development on the heritage resources
- An evaluation of the impact on the heritage resources relative to sustainable socio/economic benefits
- Consideration of alternatives if heritage resources are adversely impacted by the proposed development
- Consideration of alternatives
- Plans for mitigation in the future

5.1.4 Notice 648 of the Government Gazette 45421

Although minimum standards for archaeological (2007) and paleontological (2012) assessments¹ were published by SAHRA and Heritage Western Cape²³, GN.648 requires sensitivity verification for a site selected on the national web based environmental screening tool for which no specific assessment protocol related to any theme has been identified. The requirements for this Government Notice (GN) are listed in **Table 3** and the applicable section in this report noted. The screening tool indicated a **low** archaeological and cultural heritage significance (**Figure 8**).

Table 3: Reporting requirements for GN648

GN 648	Relevant section in report	Where not applicable in this report
2.2 (a) a desktop analysis, using satellite imagery;	Section 7	
2.2 (b) a preliminary on-site inspection to identify if there are any discrepancies with the current use of land and environmental status quo versus the environmental sensitivity as identified on the national web-based environmental screening tool, such as new developments, infrastructure, indigenous/pristine vegetation, etc.	Section 6	-
2.3(a) confirms or disputes the current use of the land and environmental sensitivity as identified by the national web- based environmental screening tool;	Section 6	-
2.3(b) contains motivation and evidence (e.g., photographs) of either the verified or different use of the land and environmental sensitivity;	Section 6 provides a description of the current use and confirms/doesn't confirm the status in the screening report.	-

¹ South African Heritage Resources Agency. 2007. *Minimum Standards: Archaeological and Palaeontological Components of Impact Assessment Reports*. May 2007.

² Heritage Western Cape. 2016. *Guide for Minimum Standards for Archaeology and Palaeontology Reports Submitted to Heritage Western Cape*. June 2016.

³ Heritage Western Cape 2016. *Guidelines for Heritage Impact Assessments required in terms of Section 38 of the National Heritage Resources Act (Act 25 of 1999)*.

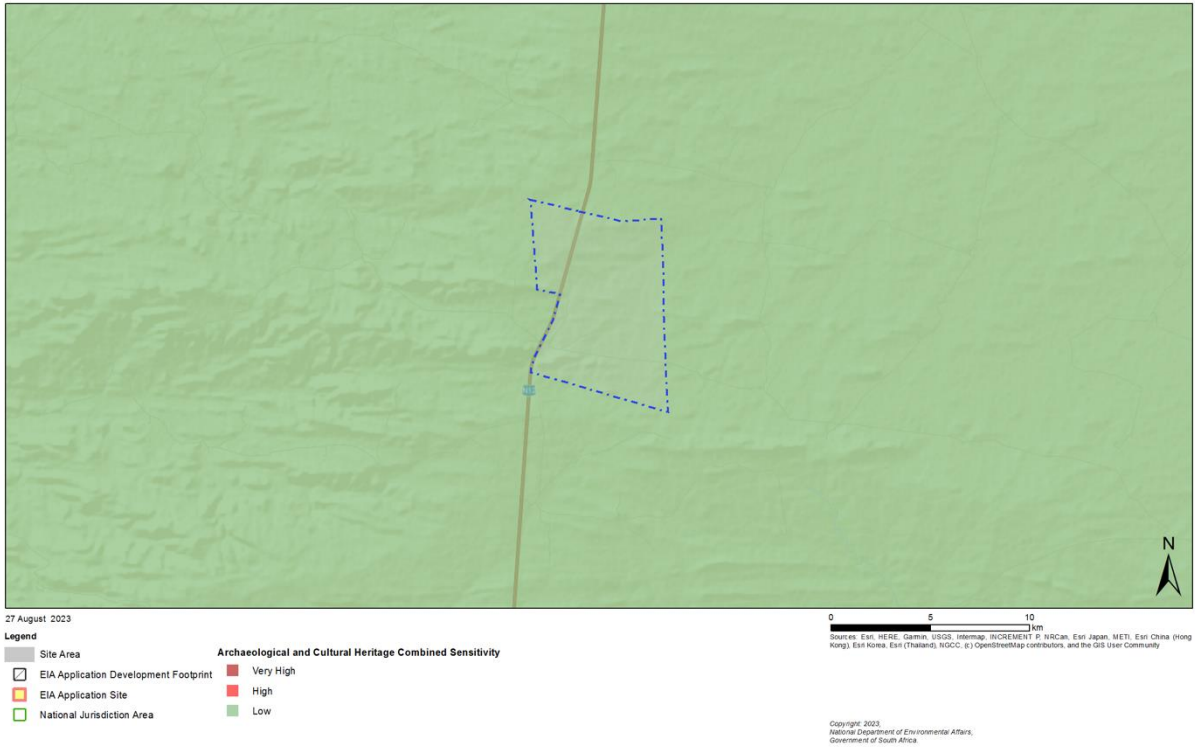


Figure 8: DFFE Screening tool outcome indicating low significance

5.1.5 NEMA – Appendix 6 requirements

The HIA report has been compiled considering the National Environmental Management Act (Act No. 107 of 1998) (NEMA) and Environmental Impact Assessment (EIA) Regulations, 2014 (as amended) Appendix 6 requirements for specialist reports as indicated in the table on page vi and vii of this report.

6. DESCRIPTION OF THE RECEIVING ENVIRONMENT

A site visit was conducted by two archaeologists from PGS in February 2021. The general vicinity of the proposed development area was assessed.

The proposed development area is located approximately 52km south of the town of Beaufort West in the Western Cape Province. The study area is located within an arid and sparsely vegetated region of the Karoo which is currently experiencing a drought. This has resulted in farms in the area being restricted to farming small numbers of livestock which include Dorper sheep, cattle and game which include kudu, gemsbok and small buck.

The study area is underlain by Karoo Supergroup sedimentary rocks. Rock types encountered include hornfels, mudstones, siltstone, silcrete, CCS (chert), carbonates and fine-grained sandstones, some of which have been silicified and metamorphosed. In terms of the topography, the study area comprises relatively flat portions of land which have undergone extensive erosion with the development of occasional scree slopes. There are also remnants of rocky ridges. The flat sandy plains (often bioturbated) with areas of sheet wash are frequently cut by ephemeral streams. The soils were predominately sandy with gravel and large rock fragments.

The vegetation of the study area is typical of the Nama-Karoo biome and comprises grasses, stunted shrubs and thorn trees which are established along stream courses (Palmer & Hoffman, 1997). Therefore, the archaeological visibility of the area was ideal for surveying.

The study area is serviced by the formal N12, graded gravel roads and farm tracks. Photographs of the general study area are provided below.



Figure 9: General view of sandstone outcrop on rocky ridge.



Figure 10: General view of outwash plain.



Figure 11: View of sparse vegetation within a deflation zone.



Figure 12: General view of bioturbated gravel sands.



Figure 13: View of typical rock and sandy soils.



Figure 14: General view of sparsely vegetated rock-strewn surface on hillslope.



Figure 15: View of typical scree slope.



Figure 16: View of a rocky ridge and scree slope.

7. BACKGROUND RESEARCH

The previous section provided a topographical description of the proposed development area. This section seeks to describe the historical origins of the receiving environment.

The examination of heritage databases, historical data and cartographic resources represents a critical additional tool for locating and identifying heritage resources and in determining the historical and cultural context of the study area. Therefore, an internet literature search was conducted, and relevant archaeological and historical texts were also consulted. Relevant topographic maps and satellite imagery were studied.

7.1 Archival/Historical Maps

Historical topographic maps (1:50 000) for various years (1965, 1987, 2005) were available for utilisation in the background study. These maps were assessed to observe the development of the area, as well as the location of possible historical structures and burial grounds. The study area was overlain on the map sheets to identify structures or graves situated within or immediately adjacent to the study area that could possibly be older than 60 years and thus protected under Section 34 and 36 of the NHRA.

7.1.1 1: 50 000 Topographical Map 3222DC - First Edition 1965

A section of the First Edition of the 3222DC (AMANDELHOOGTE) Topographical Sheet is depicted in **Figure 17** and **Figure 18**. This map sheet was based on aerial photography undertaken in 1962, was surveyed in 1965 and was printed by the Trigonometrical Survey Office in 1966.

Several sites containing either farmsteads and/or graves are depicted in the vicinity of the study area. All these identified sites are likely to be at least 56 years old.

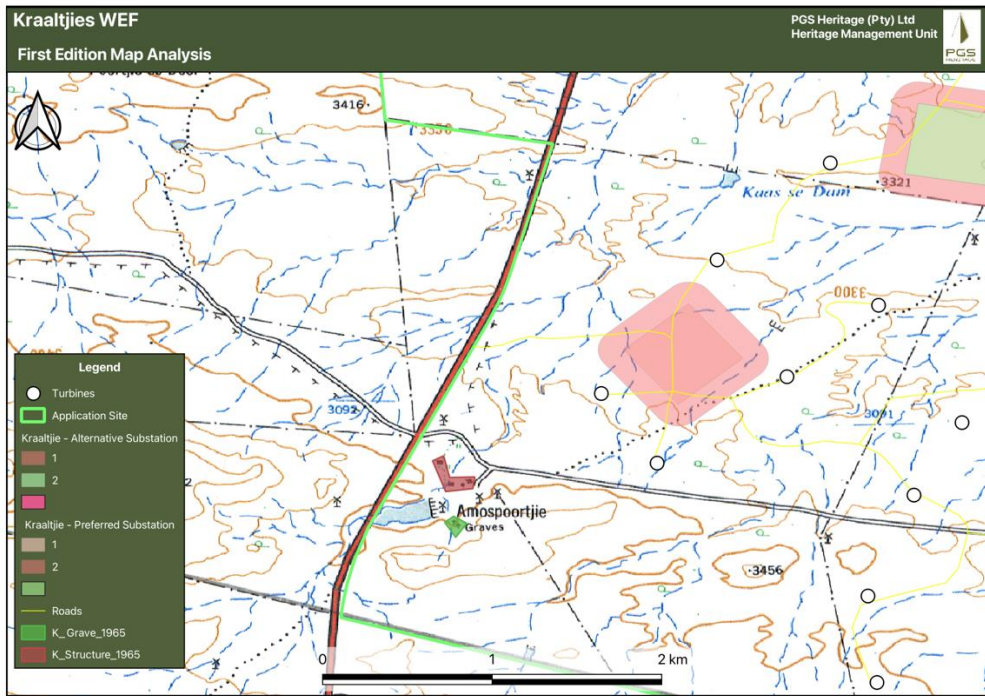


Figure 17: First Edition of 3222DC Topographic Map 1: 50 000 dating to 1965, showing the proposed Kraaltjies WEF, with two possible heritage features (farmstead: red polygon; grave: green polygon) located within the project area.

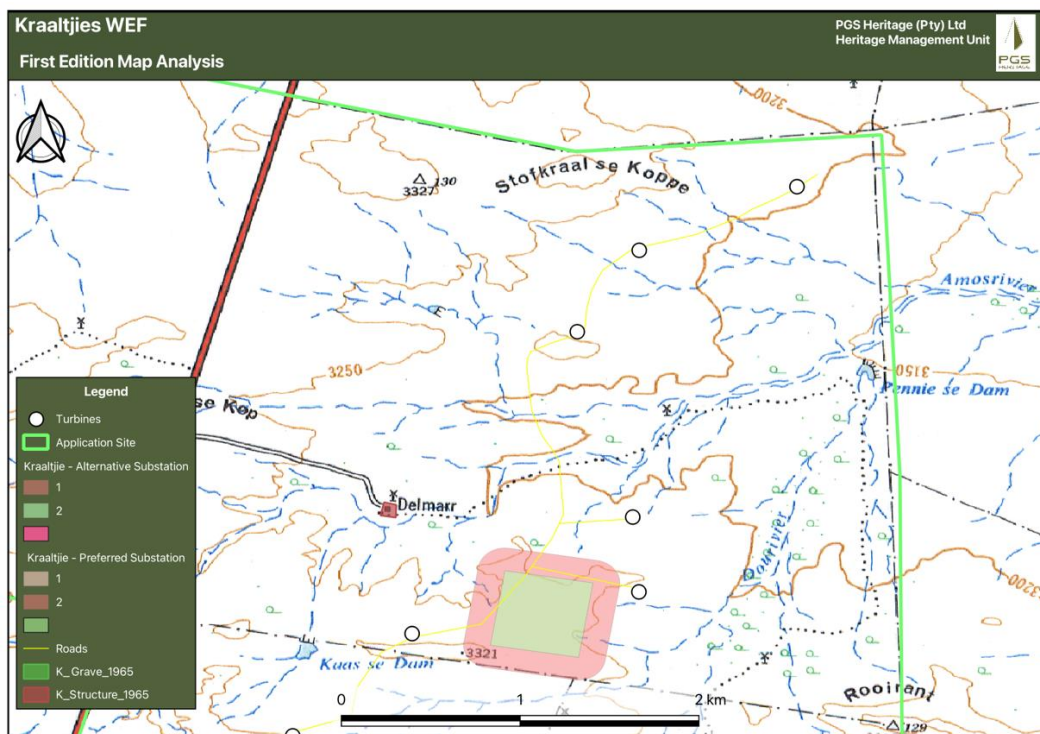


Figure 18: First Edition of 3222DC Topographic Map 1: 50 000 dating to 1965, showing the proposed Kraaltjies WEF, with one possible heritage feature (farmstead: red polygon) located within the proposed project area.

7.2 Aspects of the area's history

7.2.1 Previous Heritage Studies in area

It is well known that the Karoo contains a long and rich archaeological record dating from the ESA to the historic period. However, vast areas of the region have yet to be subjected to systematic analytical research.

Scatters of ESA through to LSA artefacts have been widely reported in the general vicinity of Beaufort West. This is a result of the erosional nature of the environment, which tends to leave artefacts exposed on the surface rather than buried beneath layers of sediment. To date, heritage studies in the area have shown that these artefacts have occurred in secondary contexts, often associated with gravel deposits, having been subjected to erosion of the soils in which they were once deposited (Dreyer 2005; Halkett 2009; Kaplan 2006, 2007; Orton 2010; Webley & Hart 2010a, 2010b; Webley & Lanham 2011). Although context is generally poor, the Karoo is still regarded as a region that is very rich in archaeological and historical heritage.

Historical resources, such as farmsteads, kraals and graves, are also observed within the Beaufort West region (Halkett 2009; Webley & Hart 2010b). To the northeast of Beaufort West, rock engravings have been identified on dolerite boulders that are characteristic of parts of the Karoo (Orton, 2010; Parkington *et al.*, 2008). The lack of caves and rock shelters in the Karoo region, results in the majority of archaeological sites in the area being classified as open-air sites. As such, the artefacts are generally not *in-situ* and organic remains are rarely preserved.

A review of SAHRIS has revealed that a number of other archaeological studies have been performed within the wider vicinity of the study area. The following studies were conducted around the study area of this report:

- **Cape Archaeological Survey (CAS) cc and Associates. 2016. Heritage Impact Assessment: Proposed Construction of Two Power Lines & Three Substations for the Mainstream Wind Energy Facility. Land Parcel Beaufort West, Remainder of Farm Trakaskuilen No 15, Portion 1 Trakaskuilen No 15, Portion 1 of Witpoortje No 16.** CAS was appointed by SiVest Environmental Division on behalf of their client Mainstream Renewable Power South Africa (Pty) Ltd to conduct an AIA report. The study area was situated on the N12 between Beaufort West and Klaarstroom. Several MSA open sites, positioned on the summit areas of low rides and koppies, were identified. There was also a general background presence of MSA with occasional flakes or cores observed in the open. There was little evidence of LSA activity in the area. Most of the raw material used was a fine-grained chert with a reddish outer patina (grey when flaked). In terms of colonial period archaeology, there

were several farm complexes with buildings, historic dumps and derelict structures. The area hadn't been systematically studied or researched, so the archaeological sensitivity of the proposed wind farm on archaeological features was seen as high.

- **Dreyer, C. 2005. Archaeological and historical investigation of the proposed residential developments at the farms Grootfontein 180 & Bushmanskop 302, Beaufort West, south-western Cape.** The study area is located approximately 20km west of Beaufort West. Scattered and isolated lithics were found in the area. A trihedra, Acheulian or Victoria West I handaxe, a bifacial worked Oldowan chopper with minimal retouch, a number of isolated flakes and core flakes and several small assemblages of LSA scrapers were identified. On the flood plain near the Sand River, fragments of ostrich eggshell and one single ostrich eggshell bead were also identified.
- **Fourie, W. 2018. AIA: Proposed Construction of a Linking Station, two (2) Power Lines and two (2) On-site Substations for the Beaufort West and Trakas Wind Farms, near Beaufort West in the Western Cape Province.** PGS Heritage (Pty) Ltd (PGS) was appointed by SiVEST to undertake an Archaeological Impact Assessment (AIA). The study area was located approximately 50km south of Beaufort West. Two archaeological sites and seven findspots were identified. The archaeological resources identified during the fieldwork comprised a large number of Stone Age surface artefact scatters. These were primarily from the MSA, although both LSA and earlier ESA material was identified. All of these artefact assemblages occurred in heavily deflated and eroded areas, so their scientific potential and heritage significance is somewhat lowered.
- **Halkett, D. 2009. An archaeological assessment of uranium prospecting on portions 1, 3 and 4 of the farm Eerste Water 349, and remainder of the farm Ryst Kuil 351, Beaufort West.** ACO Associates was appointed by Ferret Mining and Environmental Services (Pty) Ltd to undertake a scoping survey. Heritage sites were quite sparse in the area. Pre-colonial stone age sites (ESA, MSA and LSA) and colonial sites related to farming and settlement (incl. cemeteries, small, ruined dwellings, stone kraal, fragments of annular ware and transfer printed refined earthenware ceramics) were identified. There were patinated and polished ESA/MSA artefacts made of hornfels and siltstone. LSA material is rarer but one scatter of LSA material was identified in close proximity to a dry river course.
- **Kinahan, J. 2008. Archaeological Baseline Survey of the Proposed Ryst Kuil Uranium Project.** Kinahan was appointed by Turgis Consulting (Pty) Ltd on behalf of UraMin-Mago-Lukisa JV Company (Pty) Ltd to conduct an archaeological baseline survey. The study area was located approximately 45km southeast of Beaufort West. In general, the study area was characterised by a low density of surface material, with much displacement by sheet erosion. None of the ESA material (isolated quartzite artefacts) were in-situ as all showed evidence of fluvial transport. Isolated MSA finds were observed. These finds probably formed part of a continuous surface scatter, but lateral disturbance may have greatly exaggerated the distribution and number of these sites. The lack of focal points in the landscape means that

there were no major MSA site concentrations. MSA artefacts were dominated by quartzite and hornfels. There was also some evidence of Levallois core production and a few Howieson's Poort segments found at a number of sites. Isolated and local scatters of LSA materials were also apparent. A number of these sites were associated with lithic raw material sources (chert and hornfels outcrops). Late pre-colonial sites included a number of suspected hut circles and short lengths of stone walling, as well as possible burial cairns. Historic stone structures (dry-stone construction and mud-brick construction) along with imported items (crockerly and rifle cartridges) were also noted.

- **Nilssen, P. 2011. Archaeological Impact Assessment. Proposed Beaufort West Photovoltaic (Solar) Park: southern portion of properties; 2/158 Lemoenkloof, RE 9/161 Kuilspoor, RE 162 Suid-lemoensfontein and RE 1/163 Bulskop, Beaufort West, Western Province.** The study area was approximately 8km southeast of Beaufort West. The finds included numerous isolated and very low-density scatters of Stone Age artefacts ranging in age from the ESA to the LSA. Due to their temporally mixed nature and the absence of other faunal/cultural remains, these finds were considered to be of low heritage significance. There were also several archaeological occurrences that represented isolated events that were recorded as medium to high heritage significance.
- **Orton, J. 2011. Heritage Impact Assessment for a proposed Photo-Voltaic Facility on Steenrots Fontein 168/1, Beaufort West Magisterial District, Western Cape. University of Cape Town: Archaeology Contracts Office.** The UCT Archaeological Contracts Office was appointed by the Council for Scientific and Industrial Research (CSIR) to conduct a HIA. Most of the archaeological material was likely MSA (background scatters) and the artefacts were generally weathered. Historical material included fragments of a bottle and fragments of an annular ware bowl. All of the finds were recorded as low significance.
- **Webley, L. & Halkett, D. 2015. Archaeological Impact Assessment: Proposed Uranium Mining and Associated Infrastructure on Portions of the Farms Quaggasfontein and Rystkuil* near Beaufort West in the Western Cape and De Pannen near Aberdeen in the Eastern Cape.** Webley and Halkett were appointed by Ferret Mining & Environmental Services (Pty) Ltd, on behalf of a client, to conduct an AIA report. Archaeological material comprised small numbers of ESA artefacts, scatters of MSA and occasional LSA. The majority were manufactured on indurated shales (hornfels) and some artefacts were manufactured from a chert band. Artefact numbers were very low and of low significance. One LSA site, Site D009, was located on the banks of a little stream. Amongst the identified lithics, was a characteristic LSA drill and thumbnail scraper.
- **Webley, L. & Lanham, J. 2011. Heritage Assessment of the Proposed upgrade to the stormwater retention facilities at Beaufort West, Western Cape.** Archaeology Contracts Office (ACO) were appointed by Kayad Knight Piesold (Pty) Ltd to conduct a heritage impact assessment. No heritage resources were identified.

- **Vidamemoria Heritage Consultants. 2015. Heritage Impact Assessment: DR 2403 Central Karoo, Beaufort West – Central Karoo District Municipality, Western Cape.** Vidamemoria was appointed by Aurecon South Africa (Pty) Ltd to conduct a HIA for a proposed borrow pit. The study area was located approximately 44.5km southeast of Murraysburg. No heritage resources were identified.
- **Vidamemoria Heritage Consultants. 2012. Heritage Impact Assessment: DR 2308 Central Karoo, Beaufort West – Central Karoo District Municipality, Western Cape.** Vidamemoria was appointed by Aurecon South Africa (Pty) Ltd to conduct a HIA for a proposed borrow pit. The study area was located approximately 40km southwest of Beaufort West. Low density scatters of mixed MSA and LSA artefacts were observed in a secondary context and were of low archaeological heritage significance.

7.2.2 Archaeological Background

Table 4: Summary of archival data found on the general area.

DATE	DESCRIPTION
<p>Early Stone Age (2.5 million to 250 000 years ago)</p>	<p>The Earlier Stone Age (ESA) is the first phase identified in South Africa’s archaeological history and comprises two technological phases. The earliest of these is known as Oldowan and is associated with crude flakes and hammer stones. It dates to approximately 2 million years ago. The second technological phase is the Acheulian and comprises more refined and better made stone artefacts such as the cleaver and bifacial hand axe. The Acheulian dates to approximately 1.5 million years ago.</p> <p>Isolated ESA lithics, including occasional handaxes have been reported from the area surrounding Beaufort West, but they are generally quite ephemeral. Kinahan (2008) identified 7 ESA sites during an assessment of Ryst Kuil. He recorded isolated quartzite artefacts and commented that “none of the ESA material was considered to be in primary context and therefore of little research value”.</p> <p>No Early Stone Age sites are known within the immediate vicinity of the study area. However, this is probably due more to a lack of research on the surroundings of the study area rather than a lack of sites.</p>
<p>Middle Stone Age (250 000 to 40 000 years ago)</p>	<p>The Middle Stone Age (MSA) is the second oldest phase identified in South Africa’s archaeological history. This phase is associated with flakes, points and blades manufactured by means of the so-called ‘prepared core’ technique.</p> <p>Within the region around Beaufort West, heritage reports have shown that MSA artefacts are widespread and occur in isolated as well as relatively dense concentrations over large areas. According to Kinahan (2008), the MSA sites in the area of his assessment (Ryst Kuil) “probably formed part of a continuous surface scatter almost without focal points”. He noted that the MSA artefacts were mainly made from quartzite and hornfels.</p> <p>No Middle Stone Age sites are known within the immediate vicinity of the study area. However, this is probably due more to a lack of research on the surroundings of the study area rather than a lack of sites.</p>

DATE	DESCRIPTION
<p>Later Stone Age (40 000 years ago to the historic past)</p>	<p>The Later Stone Age (LSA) is the third archaeological phase identified and is associated with an abundance of very small artefacts known as microliths.</p> <p>According to heritage reports conducted in the region, LSA artefacts are not as common as ESA and MSA stone artefacts in the area. Artefacts are generally made from hornfels and in some cases chert which was most likely sourced from a chert horizon that caps some of the low hills in the area. LSA artefacts are generally located close to dry river courses (Kinahan, 2008; Halkett, 2009). There have also been hut circles and stone kraals identified which have been interpreted as representing pre-colonial pastoralist groups.</p> <p>No Later Stone Age sites are known in the vicinity of the study area. However, this is in all likelihood rather due to a lack of research focus on the surroundings of the study area than a lack of sites.</p>
<p>17th – 19th Century</p>	<p>Beaufort West historically was an important centre for sheep farming, trade and transport. This was also an area of interaction between various cultural groups.</p> <p>During the eighteenth and early nineteenth century the Koup was one of the last refuges of the San. A shortage of surface water meant that populations of San hunter-gatherers, and later Khoekhoe pastoralists were confined to areas with springs. During the second half of the 18th century, farmers started moving northward into the Karoo, settling in areas known as the Nuweveld and the Koup (Figure 19, Figure 20).</p> <p>The movement of small groups of Xhosa into the Karoo during the 18th century resulted from a century of frontier wars in the Eastern Cape. The movement of Xhosa into the Karoo accelerated subsequent to the great cattle killing of 1856 and 1857. Many Xhosa migrated into the Karoo in search of work in order to survive. Many of these migrants fleeing starvation in the devastated lands east of the Kei River helped build some of the beautiful stone kraals that have become a feature of the Karoo.</p>

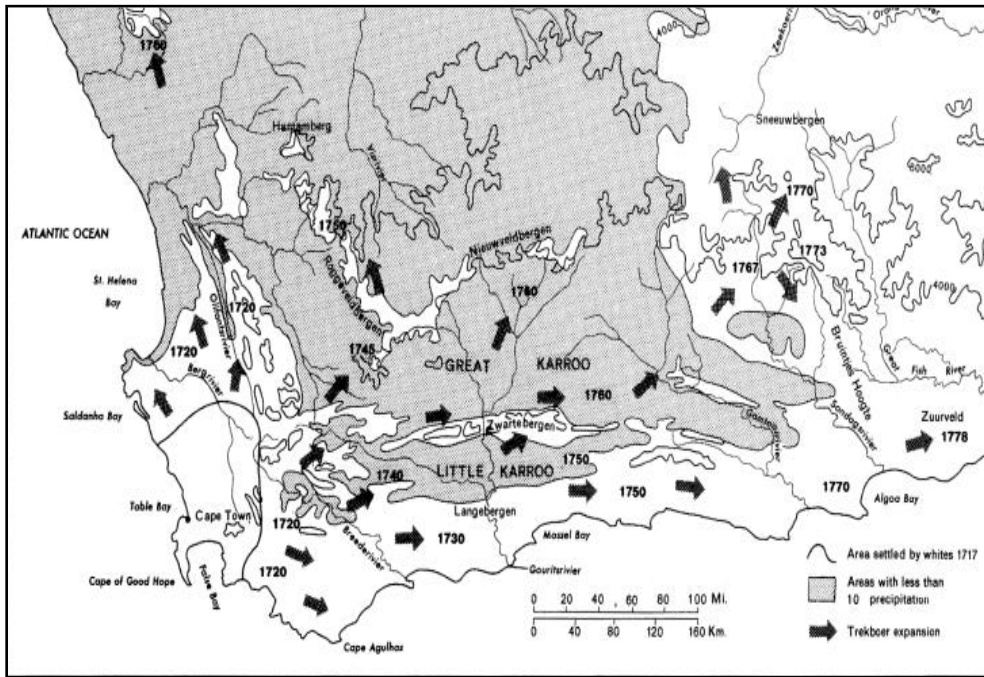
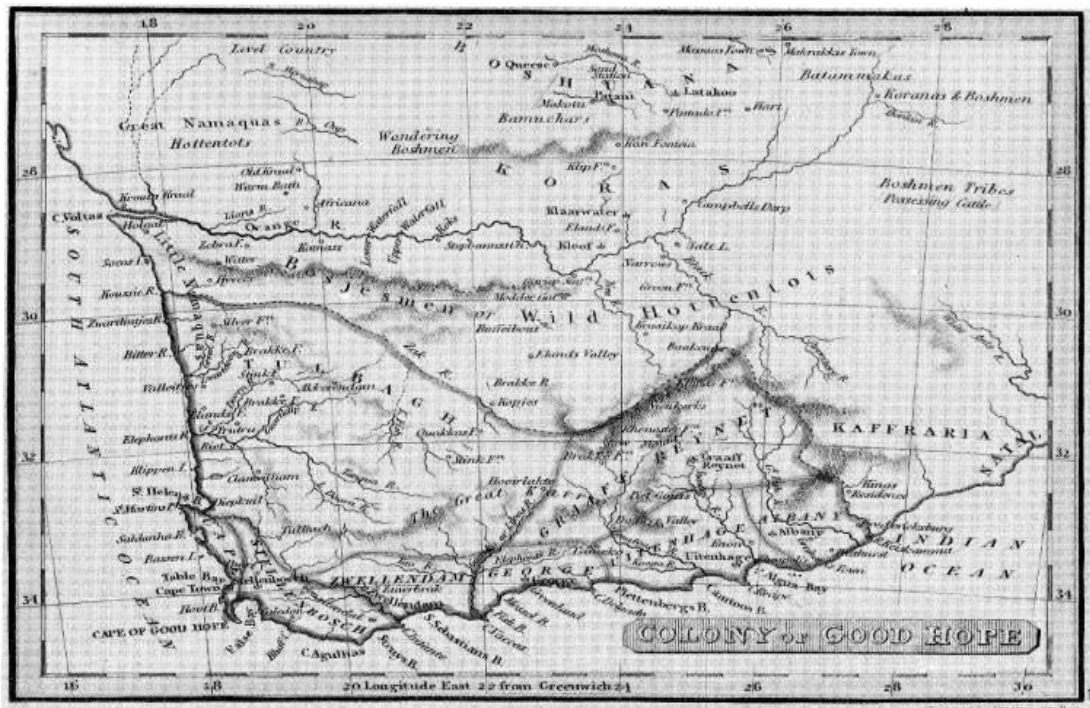


Figure 19: Trekboer and colonial expansion by 1717-1788 in the study region (Reference: Guelke & Shell 1992: 818).



The Cape Colony, 1820

Figure 20: Early map of the Cape illustrates the expansion of farmers towards the east and northeast Karoo (Reference: Watson, R.L. 1990).

7.3 Findings of the historical desktop study

The findings can be compiled as follows and have been combined to produce a heritage sensitivity map for the project based on the desktop assessment (**Figure 21**).

7.3.1 Heritage Screening

A Heritage Screening Report was compiled using the Department of Forestry, Fisheries and Environment National Web-based Environmental Screening Tool as required by Regulation 16(1)(v) of the Environmental Impact Assessment Regulations 2014, as amended. According to the Heritage screening report, the directly affected area has a low sensitivity rating (**Figure 8**).

The field work in the study area demonstrates that Stone Age sites, historical structures, and burial grounds of heritage significance warrant conservation. The low rating as provided by the Environmental Screening Tool possibly reflects scarcity of heritage reports conducted in the region.

7.3.2 Heritage Sensitivity

The sensitivity maps were produced by overlying:

- Satellite Imagery;
- Current Topographical Maps;
- First edition Topographical Maps dating from the 1960's

This enabled the identification of possible heritage sensitive areas around the proposed development area that included:

- Structures/Buildings
- Archaeological Heritage sites

By superimposition and analysis, it was possible to rate these structure/areas according to age and thus their level of protection under the NHRA. Note that these structures refer to possible tangible heritage sites as listed in **Table 5**.

Table 5: Tangible heritage sites in the study area

Name	Description	Legislative protection
Architectural Structures/Dwellings	Possibly older than 60 years	NHRA Sect 3 and 34
Archaeological sites	Artefacts and/or structures/sites	NHRA Sect 3 and 35 and Sect 27

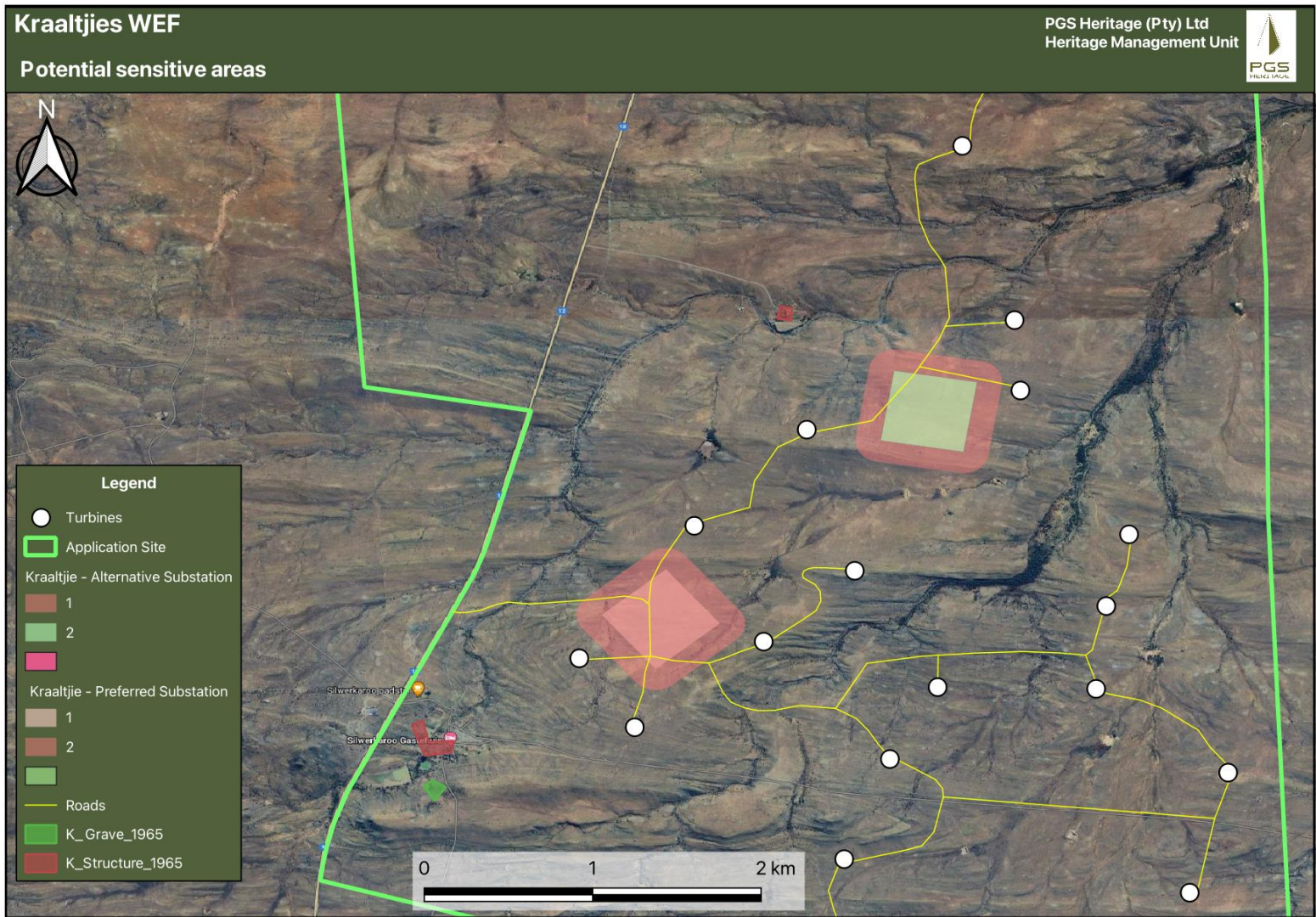


Figure 21: Possible heritage sensitivity areas; Farmstead (red polygon) and graves (green polygon) within the Kraaltjies WEF study area.

8. FIELDWORK FINDINGS

A selective survey of the study area was conducted in February 2021. Due to the nature of cultural remains, with the majority of artefacts occurring below surface, two archaeologists from PGS conducted a vehicle and foot-survey of the proposed development area. The fieldwork was logged with GPS devices to provide a tracklog of the area covered.

The fieldwork identified 44 heritage finds that were then classified as either find spots, structures (incl. historical farmsteads), burial grounds and graves or possible grave sites. The fieldwork completed for the AIA component has confirmed the presence of 5 Stone Age sites (**K001, K003, K022, K033, K039**), 29 findspots (**K002, K004-5, K007-8, K010-11, K013-21, K023-25, K028-32, K034-35, K038, K040**), 9 structures (**K012 (K012/1, K012/2, K012/3, K012/4), KC001, K026 (K026/1), K036**) and 2 grave and burial ground sites (**K027, KC001**) that may be affected by the proposed development.

8.1 Heritage Resources identified within the WEF

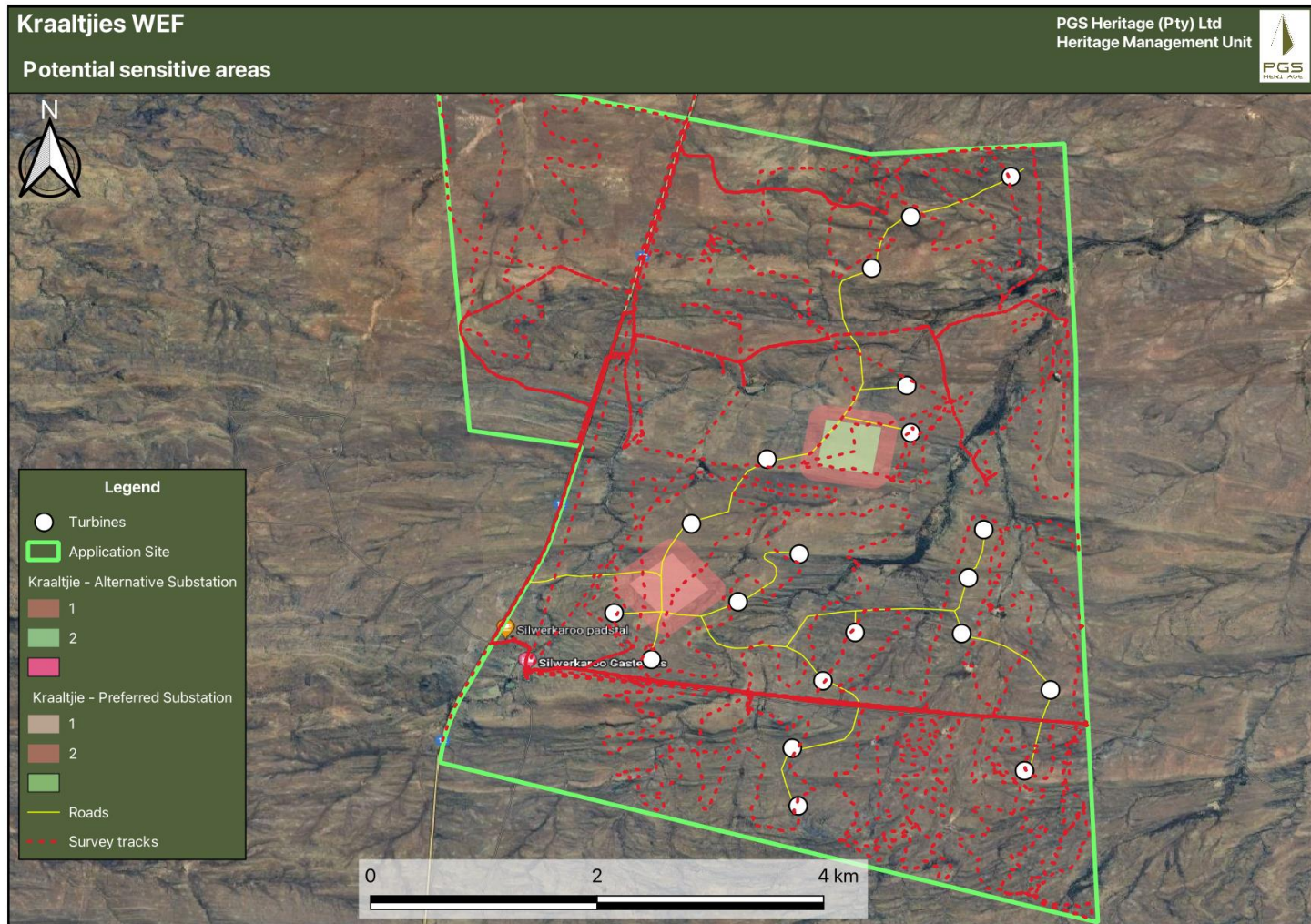


Figure 22: Track log recordings from the site visit to Kraaltjies WEF.

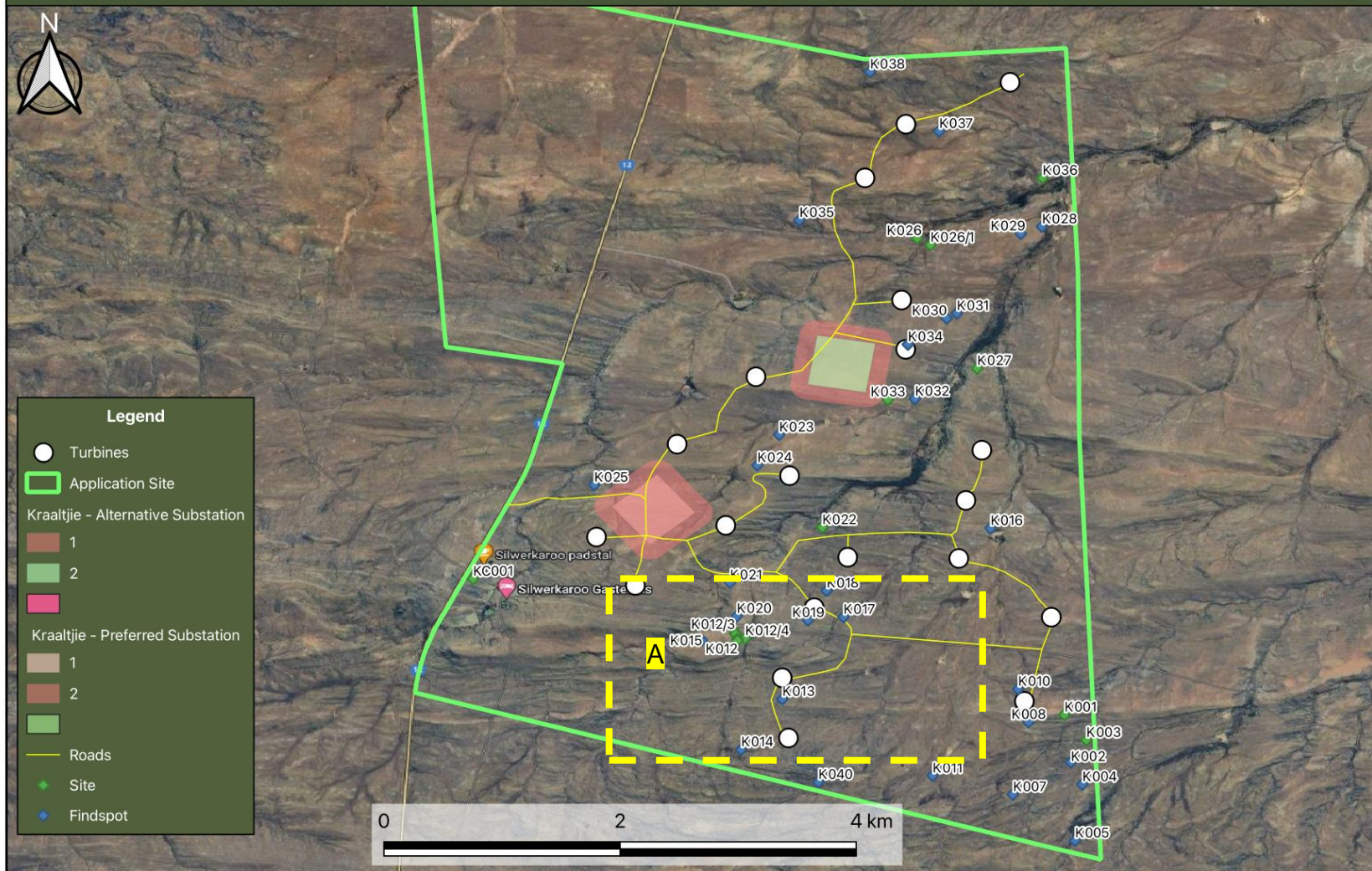


Figure 23: Locality of the heritage resources identified within the Kraaltjies WEF study area. See inset below.

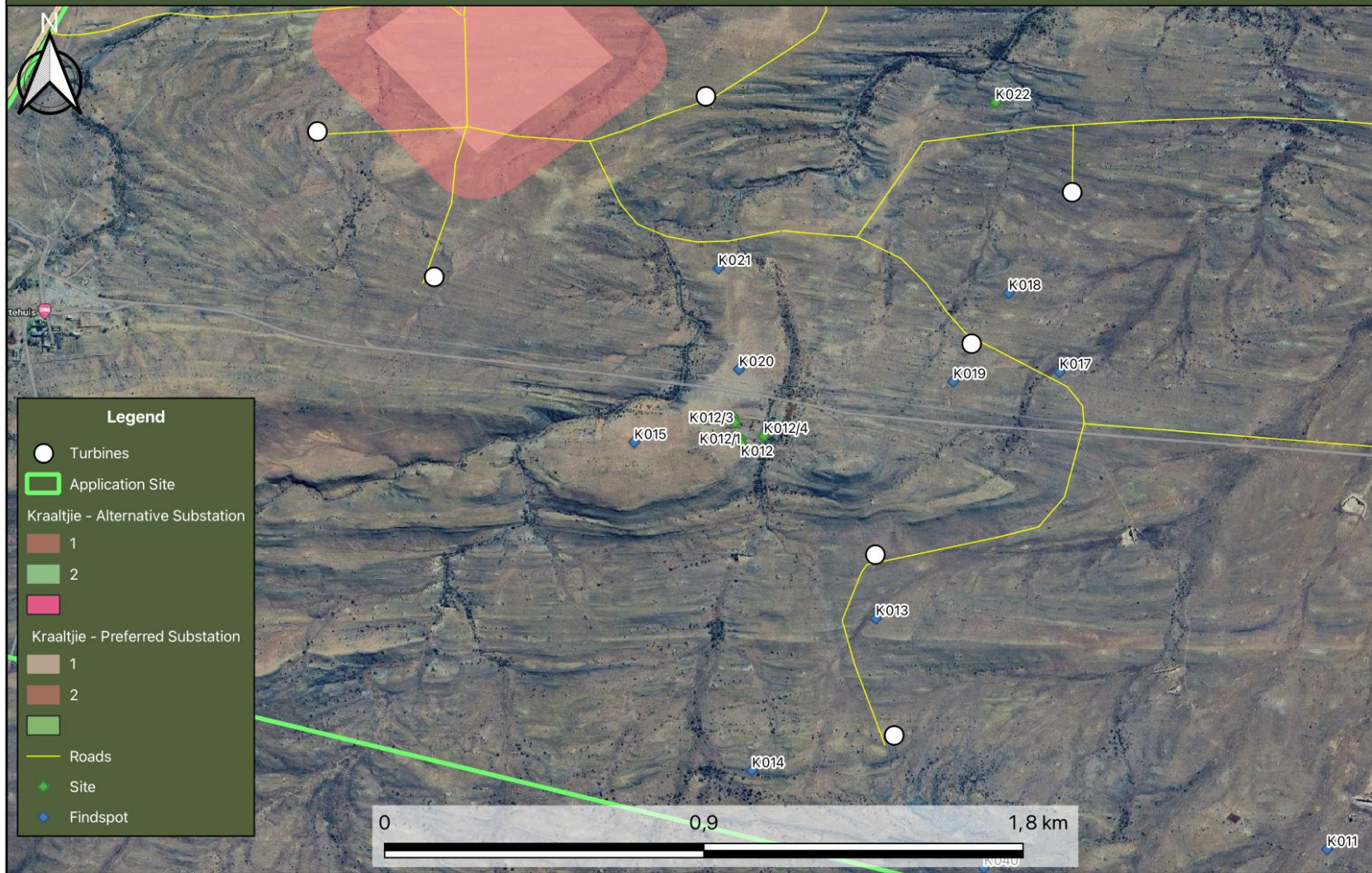


Figure 24: Kraaltjies WEF. Inset A.

8.1.1 Find spots

The twenty-nine (29) find spots (**Table 7**) were only documented where more than 5 identifiable modified lithics were observed within a 5-metre radius. Most of the find spots were found to coincide with ridges and sheet wash plains which were characterised by low density scatters of lithics consisting mainly of flakes, debitage and cores. This observation also correlates with the findings of the previous heritage studies undertaken in the Beaufort West region. Raw materials utilised included silcrete, hornfels, CCS (chert), silicified mudstone, silicified siltstone and quartzite. Mostly MSA flakes and debitage were identified, although some ESA and LSA artefacts were observed within the study area. Additionally, single isolated artefacts were also observed across portions of the study area.

Table 7: Find spots identified within the WEF



Site Number	Lat	Lon	Description	Sensitivity	Heritage Rating
K002	33°54'23.40"S	22°36'26.37"E	Low density LSA and MSA scatter	Low	NCW
K004	33°54'30.61"S	22°36'30.09"E	Low density LSA and MSA scatter	Low	NCW
K005	33°54'48.98"S	22°36'27.72"E	Low density LSA and MSA scatter	Low	NCW
K007	33°54'33.90"S	22°36'7.46"E	Low density LSA and MSA scatter	Low	NCW
K008	33°54'10.29"S	22°36'12.56"E	Low density LSA and MSA scatter	Low	NCW
K010	33°53'59.50"S	22°36'9.14"E	Low density LSA and MSA scatter	Low	NCW
K011	33°54'27.81"S	22°35'41.27"E	Low density LSA and MSA scatter	Low	NCW
K013	33°54'2.78"S	22°34'52.28"E	Low density LSA and MSA scatter	Low	NCW
K014	33°54'19.27"S	22°34'38.84"E	Low density LSA and MSA scatter	Low	NCW
K015	33°53'43.65"S	22°34'26.07"E	Low density LSA and MSA scatter	Low	NCW
K016	33°53'7.06"S	22°36'0.15"E	Low density LSA and MSA scatter	Low	NCW
K017	33°53'36.02"S	22°35'12.22"E	Low density LSA and MSA scatter	Low	NCW
K018	33°53'27.45"S	22°35'6.72"E	Low density LSA and MSA scatter	Low	NCW
K019	33°53'37.07"S	22°35'0.69"E	Low density LSA and MSA scatter	Low	NCW
K020	33°53'35.73"S	22°34'37.44"E	Low density LSA and MSA scatter	Low	NCW
K021	33°53'24.76"S	22°34'35.21"E	Low density LSA and MSA scatter	Low	NCW
K023	33°52'36.55"S	22°34'51.24"E	Low density LSA and MSA scatter	Low	NCW
K024	33°52'46.51"S	22°34'44.13"E	Low density LSA and MSA scatter	Low	NCW
K025	33°52'52.92"S	22°33'50.94"E	Low density LSA and MSA scatter	Low	NCW
K028	33°51'28.65"S	22°36'16.93"E	Low density LSA and MSA scatter	Low	NCW
K029	33°51'30.93"S	22°36'10.03"E	Low density LSA and MSA scatter	Low	NCW
K030	33°51'58.57"S	22°35'45.89"E	Low density LSA and MSA scatter	Low	NCW
K031	33°51'56.94"S	22°35'49.16"E	Low density LSA and MSA scatter	Low	NCW
K032	33°52'24.85"S	22°35'35.51"E	Low density LSA and MSA scatter	Low	NCW
K034	33°52'7.09"S	22°35'33.23"E	Low density LSA and MSA scatter	Low	NCW
K035	33°51'26.55"S	22°34'57.86"E	Low density LSA and MSA scatter	Low	NCW
K037	33°50'57.50"S	22°35'43.42"E	Low density LSA and MSA scatter	Low	NCW
K038	33°50'38.13"S	22°35'20.88"E	Low density LSA and MSA scatter	Low	NCW
K040	33°54'29.87"S	22°35'4.01"E	Low density LSA and MSA scatter	Low	NCW

8.1.2 Sites

The 9 structures (K012 (K012/1, K012/2, K012/3, K012/4), K026 (K026/1), K036, KC001), 2 grave and burial ground sites (K027, KC001), and 5 archaeological sites (K001, K003, K022, K033, K039) identified (Table 8), were predominantly situated close to farm roads in the study area.

Table 8: Archaeological resources identified within the WEF

Site number	Lat	Lon	Description	Heritage Significance	Heritage Rating
K001	32°54'7.91"S	22°36'24.26"E	<p>A low to medium density surface scatter of MSA artefacts was identified at this location. The artefact scatter is located on a rocky ridge line next to a small drainage line. The artefacts consist mostly of flakes, a core, a broken blade, a possible scraper, and other miscellaneous flakes. They are made from CCS and hornfels (patinated).</p> <p>As reported in other heritage studies in the region, it is unlikely that the artefacts are observed in their primary context due to the erosional nature of the environment, which tends to leave artefacts exposed on the surface. The site is provisionally rated as IIIC with low heritage significance due to the density of the material.</p> <p>Recommendation:</p> <ul style="list-style-type: none"> - K001 is not located within the proposed layout footprint area. It is unlikely that the site will be impacted upon. - No mitigation is required. The documentation of the site in this HIA report is sufficient and the site can be destroyed without a permit, only with the approval of this report as provided here. 	Low	IIIC

Site number	Lat	Lon	Description	Heritage Significance	Heritage Rating
			 <p data-bbox="304 820 1016 847">Figure 25: Small surface scatter of artefacts observed at K001.</p>	 <p data-bbox="1162 820 2040 847">Figure 26: General view of the rocky ridge line near a small drainage at K001.</p>	
K003	32°54'16.19"S	22°36'31.38"E	<p data-bbox="804 904 1617 1011">A low to medium density surface scatter of MSA artefacts was identified at this location. The artefact scatter is located on a sandy outcrop next to a small drainage line. The artefacts consist mostly of flakes, cores and a possible LSA flake. They are made from chert and hornfels.</p> <p data-bbox="804 1043 1601 1177">As reported in other heritage studies in the region, it is unlikely that the artefacts are observed in their primary context due to the erosional nature of the environment, which tends to leave artefacts exposed on the surface. The site is provisionally rated as IIIC with low heritage significance due to the density of the material.</p> <p data-bbox="804 1209 1016 1230">Recommendation:</p> <ul data-bbox="853 1238 1608 1388" style="list-style-type: none"> - K003 is not located within the proposed layout footprint area. It is unlikely that the site will be impacted upon. - No mitigation is required. The documentation of the site in this HIA report is sufficient and the site can be destroyed without a permit, only with the approval of this report as provided here. 	Low	IIIC

Site number	Lat	Lon	Description	Heritage Significance	Heritage Rating
	<p>Figure 27: Small scatter of MSA Lithic artefacts.</p>			<p>Figure 28: A CCS LSA flake observed at K003.</p>	
	K012	32°53'43.73"S		22°34'37.64"E	<p>The site comprises a small, demolished farmstead built from locally sourced stone blocks. It is situated in a large open area near a large drainage line, adjacent to a farm track. The site includes two separate stone ruins, a small enclosure and a packed stone wall built into the side of the nearby stream.</p> <p>K012/1 – Small stone foundation or the remnants of a small structure. K012/2 – A small, packed stone platform or the remnants of a second structure. K012/3 – Small packed stone enclosure used for smaller livestock. K012/4 – Packed stone wall built into the side of a nearby stream. This feature seems to relate to water erosion.</p> <p>The small homestead is situated on the side of a slope near a small stream. Various historical refuse material is scattered across the site. A large prickly pear tree is also situated close to the stone structures. The site is situated on a slight slope near a small stream in an area dominated by rocky terrain.</p> <p>A structure is not depicted at this locality on the 3322BA topographical sheet dating to 1965 or 1987. The building style and materials however suggest that the farmstead is older than 60 years. As no additional</p>

Site number	Lat	Lon	Description	Heritage Significance	Heritage Rating
			<p>information was available, the site is provisionally rated as IIIB with medium heritage significance.</p> <p>Recommendation:</p> <ul style="list-style-type: none"> - K012/3 is located 550m north of the proposed layout footprint area. - If there are plans to expand the current farm road, it is recommended that a no-go-buffer-zone of at least 30m is kept to the closest WEF infrastructure. - If development occurs within 30m of the site, the structures will need to be satisfactorily studied and recorded before impact occurs. - Recording of the structure i.e. (a) map indicating the position and footprint of the structure (b) photographic recording of the structure (c) measured drawings of the floor plans of the structure. 		



Figure 29: View of the small stone foundation at K012/1.



Figure 30: View of the small, packed stone platform at K012/2.





Figure 31: View of the small, packed stone enclosure at K012/3.



Figure 32: View of the packed stone wall or water break in the nearby stream at K012/4.




Figure 33: Views of the environment surrounding K012.

Site number	Lat	Lon	Description	Heritage Significance	Heritage Rating
<div style="display: flex; justify-content: space-around;">   </div> <p data-bbox="689 842 1572 869" style="text-align: center;">Figure 34: Sample of the refuse material scattered across the surface at K012.</p>					
K022	32°53'6.76"S	22°35'5.28"E	<p>A large scatter of mostly MSA artefacts was identified at this location. The relatively high density of artefacts (5 artefacts/m²) were scattered at the top of a rocky ridge line. The rocky ridge is situated between two drainage lines within a small valley. The artefacts consist mostly of cores, debitage (flakes, chips and chunks) and possible formal tools. The artefacts are made from chert and hornfels.</p> <p>The high artefact density suggests that the site may represent multiple periods of occupation. However, as reported in other heritage studies in the region, it is unlikely that the artefacts are observed in their primary context due to the erosional nature of the environment, which tends to leave artefacts exposed on the surface. The site is provisionally rated as IIIB with medium heritage significance due to the density of the material and the quality of the artefacts.</p>	Medium	IIIB

Site number	Lat	Lon	Description	Heritage Significance	Heritage Rating
			<p>Recommendation:</p> <ul style="list-style-type: none"> - K022 is located approximately 100m north of the proposed layout footprint area. It is likely that the site will be impacted upon. - A no-go-zone of 30m should be demarcated. - If the development does not fall within 30m of the site, no mitigation is required. - If the site can't be avoided, then it must be sampled by a qualified specialist under a permit issued by SAHRA. 		



Figure 35: Sample of the MSA artefacts observed at K022.

Site number	Lat	Lon	Description	Heritage Significance	Heritage Rating
					
<p align="center">Figure 36: Rocky ridge line sitting in a shallow valley between to small drainage lines.</p>					
K026	32°51'32.46"S	22°35'36.25"E	<p>The site comprises a historical stone ruin situated near an existing windpump and water reservoir. The remnants of the structure seem to indicate a continued occupation or use over a long period of time due to the various building materials observed at the site. A newer brick structure appears to have been built on top of the large stone foundation of an older structure. The brick elements could also have been a section of the structure that was added later. The structure has since been demolished.</p> <p>Building rubble is scattered across the area along with a small midden located at K026/1.</p> <p>The site is situated near an area with historically cultivated crops between two fair sized drainage lines. The surrounding environment is largely flat and rocky with small drainage lines crossing the landscape.</p>	Low	IIIC

Site number	Lat	Lon	Description	Heritage Significance	Heritage Rating
			<p>According to the farm foreman, Mark, the structure had been used as an abattoir.</p> <p>The exact age of the poorly preserved structure is not known. A structure was depicted at this locality on the 3222DC topographical sheet dating to 1987. However, the building style and materials suggest that the structure is potentially older than 60 years. As no additional information was available, the site is provisionally rated as IIIC with low heritage significance.</p> <p>Recommendation:</p> <ul style="list-style-type: none"> - K026 is situated adjacent to an existing farm road. - Even if there are plans to expand the current farm road, no mitigation is required due to the condition of the site. - The documentation of the site in this HIA report is sufficient and the site can be destroyed without a permit, only with the approval of this report as provided here. 		



Figure 37: Views of the foundation observed at K026 near the wind pump.



Figure 38: View of the remnants of an older structure and the large stone blocks piled near the foundation at K026.


Site number	Lat	Lon	Description	Heritage Significance	Heritage Rating
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Figure 39: 3222DC topographical sheet surveyed in 1987 depicts a structure at K026.



Figure 40: Views of the midden and refuse material located at K026/1.

Site number	Lat	Lon	Description	Heritage Significance	Heritage Rating
					
<p>Figure 41: View of the environment surrounding K026.</p>					
K027	32°52'14.85"S	22°35'55.79"E	<p>The site comprises a stacked stone grave with a headstone on either side. It is situated on a rocky surface between two large drainage lines. The grave appears to be historical in age.</p> <p>Burial grounds and graves are protected under Section 36 of the NHRA 25 of 1999. Thus, the cemetery is provisionally rated as having a high heritage significance with a heritage rating of IIIA. All graves have high levels of emotional, religious and in some cases historical significance. It is also important to understand that the identified graves could have significant heritage value to the relevant families.</p> <p>Recommendation:</p> <ul style="list-style-type: none"> - K027 is located in an area that is not demarcated for development and it is adjacent to an existing farm track. 	High	IIIA

Site number	Lat	Lon	Description	Heritage Significance	Heritage Rating
			<ul style="list-style-type: none"> - The grave site should be demarcated with a 50-meter no-go-buffer-zone and the grave should be avoided. - A Grave Management Plan should be developed for the graves, to be implemented during the construction and operation phases (which needs to be approved by HWC prior to construction). 		



Figure 42: Views of the packed stone grave at K027.

K033	32°52'25.07"S	22°35'26.69"E	<p>A large scatter of mostly MSA artefacts was identified at this location. The relatively high density of artefacts (5-10 artefacts/m²) was located on the side of a low-lying hill/ridge line between two small drainage lines. The surrounding environment is dominated by rock boulders and fragments. The artefacts consist mostly of cores, debitage (flakes, chips and chunks) and possible formal tools. The artefacts are made from hornfels and chert.</p> <p>As reported in other heritage studies in the region, it is unlikely that the artefacts are observed in their primary context due to the erosional nature of the environment, which tends to leave artefacts exposed on the surface.</p>	Medium	IIIB
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Site number	Lat	Lon	Description	Heritage Significance	Heritage Rating
			<p>The site is provisionally rated as IIIB with medium heritage significance due to the density of the material.</p> <p>Recommendation:</p> <ul style="list-style-type: none"> - K033 is located 50m from the proposed layout footprint area. - A no-go-zone of 30m should be demarcated. - If the development does not fall within 30m of the site, no mitigation is required. - If the site can't be avoided, then it must be sampled by a qualified specialist under a permit issued by SAHRA. 		





Figure 43: Sample of artefacts observed at K033.



Figure 44: General view of K033.

Site number	Lat	Lon	Description	Heritage Significance	Heritage Rating
K036	32°51'12.78"S	22°36'17.11"E	<p>The site comprises a small farmstead ruin, located on a relatively flat and sandy area near a small drainage line. The area seems to have been cleared of loose rock which could also indicate past cultivation activities. The site contains the remains of two separate structures that were built using stones locally sourced from the surrounding environment. The first structure has been demolished. The second structure is only visible due to a small section of the packed stone foundation being exposed on the surface. Various refuse materials are scattered across the site.</p> <p>The exact age of the poorly preserved structure is not known. However, the building style and materials suggest that the structure is potentially older than 60 years. As no additional information was available, the site is provisionally rated as IIIC with low heritage significance.</p> <p>Recommendation:</p> <ul style="list-style-type: none"> – K036 is situated adjacent to an existing farm road. – Even if there are plans to expand/upgrade the current farm road, no mitigation is required due to the condition of the site. – The documentation of the site in this HIA report is sufficient and the site can be destroyed without a permit, only with the approval of this report as provided here. 	Low	IIIC



Figure 45: Views of the demolished stone structure at K036.

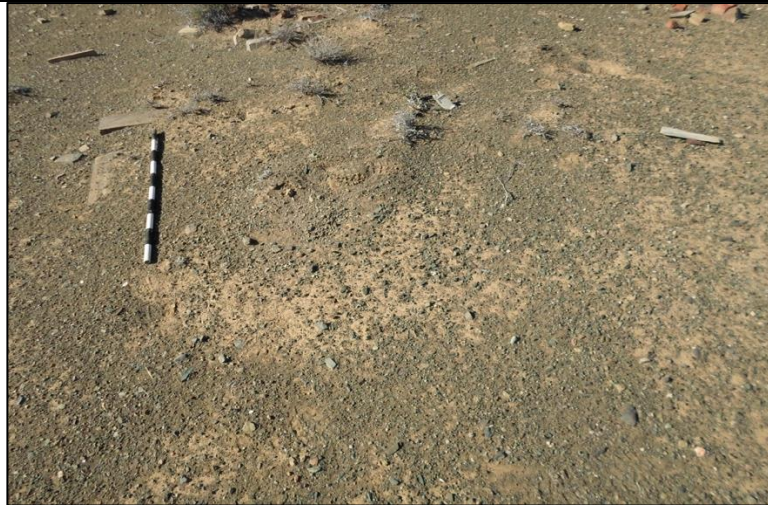




Figure 46: View of the half-buried structure only visible through a small section exposed through the sandy soil.



Figure 47: Sample of historical refuse material observed at K036.

Site number	Lat	Lon	Description	Heritage Significance	Heritage Rating
 <p data-bbox="938 663 1323 687">Figure 48: General views of K036.</p>					
K039	32°51'29.09"S	22°33'21.29"E	<p data-bbox="804 724 1617 858">A small scatter of mostly MSA artefacts was identified at this location. The relatively high density of artefacts (5 artefacts/m²) was located on the top of a rocky hill. The hill has a rocky ridge outcrop and is steep. The artefacts consist mostly of cores, debitage (flakes, chips and chunks) and possible blades. The artefacts are made from hornfels and chert.</p> <p data-bbox="804 890 1617 1024">As reported in other heritage studies in the region, it is unlikely that the artefacts are observed in their primary context due to the erosional nature of the environment, which tends to leave artefacts exposed on the surface. The site is provisionally rated as IIIB with medium heritage significance due to the density of the material.</p> <p data-bbox="804 1056 1016 1080">Recommendation:</p> <ul data-bbox="853 1086 1525 1145" style="list-style-type: none"> - K039 is in an area that is not demarcated for development. - No mitigation is required. 	Medium	IIIB

Site number	Lat	Lon	Description	Heritage Significance	Heritage Rating
<div style="display: flex; flex-wrap: wrap; justify-content: space-around;">  </div> <p data-bbox="801 1246 1458 1273" style="text-align: center;">Figure 49: Sample of the MSA artefacts observed at K039.</p>					


Site number	Lat	Lon	Description	Heritage Significance	Heritage Rating
					

Figure 50: General views of K039.

Site number	Lat	Lon	Description	Heritage Significance	Heritage Rating
KC001	32°53'23.57"S	22°33'11.43"E	<p>The Silwerkaroo Guesthouse is situated on the eastern edge of the proposed development area. The guesthouse contains multiple historical structures that are currently being used as guesthouse accommodation. These include a historical farmhouse and adjoining storehouse as well as a large, packed stone kraal. A nearby workers house is also built in the same style as the main structures.</p> <p>The most important aspect of the location is the small cemetery located near the main road. The cemetery contains about 40 – 45 graves of various styles. Some are packed stone with weathered headstones while some are built with cement and brick that have been painted white. The entire site is situated in an excluded zone of the proposed development. The site likely forms part of the original farmstead within the surrounding areas. The earliest date observed on a grave was 1892.</p> <p>A farmstead with graves is depicted at this locality on the 3222DC topographical sheet dating to 1965. The building style and materials also suggest that the farmstead is older than 60 years.</p> <p>As no additional information was available, the farmstead is provisionally rated as IIIA with high heritage significance.</p> <p>Burial grounds and graves are protected under Section 36 of the NHRA 25 of 1999. Thus, the cemetery is provisionally rated as having a high heritage significance with a heritage rating of IIIA. All graves have high levels of emotional, religious and in some cases historical significance. It is also important to understand that the identified graves could have significant heritage value to the relevant families.</p> <p>Recommendation:</p> <ul style="list-style-type: none"> – KC001 is in an area that is not demarcated for development; however, it is adjacent to an existing farm track. – If there are plans to expand the current farm road, it is recommended that a no-go-buffer-zone of at least 30m is kept to the closest WEF infrastructure. – The grave site should be demarcated with a 50-meter no-go-buffer-zone and the grave should be avoided. – A Grave Management Plan should be developed for the graves, to be implemented during the construction and operation phases (which needs to be approved by HWC prior to construction). 	High	IIIB/IIIA






Site number	Lat	Lon	Description	Heritage Significance	Heritage Rating
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Figure 51: Views of the main guesthouse structures at KC001.



Figure 52: Views of the large, packed stone kraal at KC001.

Site number	Lat	Lon	Description	Heritage Significance	Heritage Rating
<div style="display: flex; flex-wrap: wrap;"> <div style="width: 50%; text-align: center;">  </div> <div style="width: 50%; text-align: center;">  </div> <div style="width: 33%; text-align: center;">  </div> <div style="width: 33%; text-align: center;">  </div> <div style="width: 33%; text-align: center;">  </div> </div> <p style="text-align: center;">Figure 53: Views of the formal and informal graves at KC001.</p>					

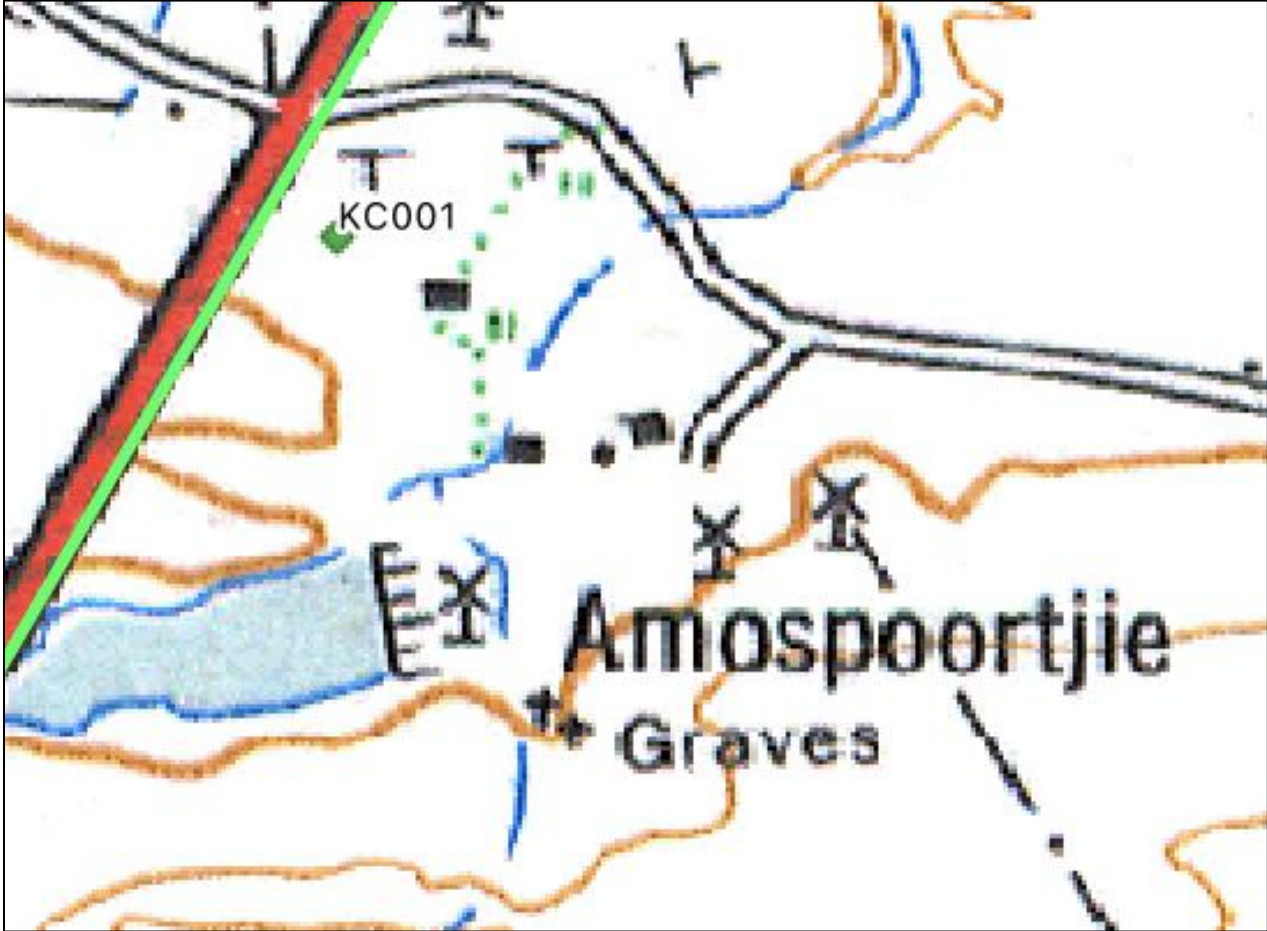
Site number	Lat	Lon	Description	Heritage Significance	Heritage Rating
			 <p>The image is a topographical map from a 1965 survey. It shows a landscape with brown contour lines, blue lines representing water features, and black lines for roads or paths. A prominent red and green diagonal line runs from the top-left towards the center. In the upper-left quadrant, there is a cluster of small black rectangles representing structures, with the label 'KC001' next to them. In the lower-right quadrant, there is a larger area labeled 'Amospoortjie Graves' with several 'X' marks indicating individual graves. A blue shaded area is visible in the lower-left quadrant.</p>		

Figure 54: 3222DC topographical sheet surveyed in 1965 depicts several structure and graves at K026.

9. IDENTIFICATION AND ASSESSMENT OF IMPACTS

The fieldwork findings have shown that the study area is characterised by find spots, Stone Age sites, structures, and burial grounds. From the proposed location of the WEF, the cultural significance of some of the heritage resources and their context may be impacted by proximity to development area.

Archaeological remains are rare objects, often preserved due to unusual circumstances and are non-renewable resources. When a development is proposed, and specialist studies are undertaken as part of the wider evaluation of heritage resources, this provides an opportunity into a depository that would not otherwise exist. In this sense the impact is POSITIVE for archaeology provided that efforts are made to preserve or mitigate heritage resources in the study footprint, prior to and during the construction phase of the development.

The general nature of impacts from the proposed development will be visual with regard to spatial and built heritage, and physical with regard to archaeological heritage resources. Mitigation measures for heritage resources will be recommended to mitigate impacts.

9.1 General Observations

In this section, an assessment will be made of the impact of the proposed development on the identified heritage sites. An overlay of all the heritage sites identified during the fieldwork over the proposed development footprint areas was made to assess the impact of the proposed development on these identified heritage sites. This overlay resulted in the following observations:

The following general observations will apply for the impact assessment undertaken in this report:

- The impact assessment rating is based on the rating scale as contained in **Appendix B**.
- Heritage sites assessed to have a low heritage significance are not included in these impact risk assessment calculations. The reason for this is that sites of low significance will not require mitigation. The documentation of these sites in this HIA report is sufficient and the sites can be destroyed without a permit, but only with the approval of this report as provided here. These sites are the 2 Stone Age sites (**K001, K003**), 29 findspots (**K002, K004-5, K007-8, K010-11, K013-21, K023-25, K028-32, K034-35, K038, K040**) and 3 structures (**K026 (K026/1), K036**).
- One Stone Age sites (**K039**) of medium heritage significance was located a considerable distance away from the proposed layout footprint area. The site is not included in these impact risk assessment calculations, as it will not require mitigation.
- Two grave and burial ground sites (**K027, KC001**) and one historical farmstead (**KC001**) of high heritage significance were located adjacent to existing farm tracks. **The final updated layout**

of the WEF, as included in this report, avoids the burial grounds with more than 300m and the farmstead with at least a 1000m buffer.

- Four structures (**K012(K012/1, K012/2, K012/3, K012/4)**) of medium heritage significance were located less than 100m away from existing farm tracks. **The site and its structures are avoided with the new WEF layout.**
- The WEF layout avoids two Stone Age sites (K033, K022) of medium heritage significance.
- It is necessary to realise that the heritage resources located during the fieldwork do not necessarily represent all the possible heritage resources present within the area. Various factors account for this, including the size of the study area and the subterranean nature of some heritage sites. The impact assessment conducted for heritage sites assumes the possibility of finding heritage resources during the project life and has been conducted as such.
- Three project phases have been identified by SiVEST namely the Pre-Construction Phase, Construction Phase and Operational Phase. As site clearing activities of all the development footprint areas are grouped under the Pre-Construction Phase, the highest level of impact on the identified heritage sites is expected during this phase. No impacts are expected during the Operational Phase. All the identified heritage sites are expected to be destroyed in terms of the pre-mitigation impact assessments undertaken below, whereas only those sites not mitigated by amendments to the proposed development footprints will also be destroyed in terms of the post-mitigation impact assessment calculations undertaken below.

The following impact rating tables are based on the proposed WEF development layout within the region.

9.2 Pre construction

Table 9: Assessment of the Impact of Proposed WEF on Heritage Sites

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION										RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION									
		E	P	R	L	D	I/M	TOTAL	STATUS (+ OR -)	S	E		P	R	L	D	I/M	TOTAL	STATUS (+ OR -)	S		
		Planning Phase																				
Damage to 2 sites containing burial grounds (K027 and KC001)	The graves and burial grounds are located less than 100m away from existing farm roads. The expansion of existing farm roads may impact the sites.	2	3	4	4	4	2	34	-	Medium	- The grave site should be demarcated with a 50m no-go-buffer-zone and the grave should be avoided. - A Grave Management Plan should be developed for the graves, to be implemented during the construction and operation phases (which needs to be approved by HWC prior to construction).	2	1	4	4	4	1	15	-	Low		
Damage to one historical farmstead (KC001)	One historical homestead is located less than 100m away from existing farm roads. The expansion of existing farm roads may impact the sites.	2	2	4	4	4	2	32	-	Medium	- A no-go-buffer-zone of at least 30m should be kept to the closest WEF infrastructure (incl. roads). - If development occurs within 30m of KC001, the structures will need to be satisfactorily studied and recorded before impact occurs. - Recording of the structure i.e. (a) map indicating the position and footprint of the	2	1	4	4	4	1	15	-	Low		

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION															
		E	P	R	L	D	I/M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I/M	TOTAL	STATUS (+ OR -)	S							
												structure (b) photographic recording of the structure (c) measured drawings of the floor plans of the structure.															
Damage to four historical structures (K012/1, K012/2, K012/3, K012/4)	Four structures are located less than 100m away from existing farm roads. The expansion of existing farm roads may impact the sites.	2	2	4	4	4	2	32	-	Medium	-	A no-go-buffer-zone of at least 30m should be kept to the closest WEF infrastructure (incl. roads).	2	1	4	4	4	1	15	-	Low						
Unidentified heritage resources	Due to the size of the area assessed, there's a possibility of encountering heritage features in un-surveyed areas does exist.	1	3	4	2	4	2	28	-	Medium		An induction and training program on managing archaeological resources must be included in the induction programs for the Environmental Control/Site Officer working on the project. An assessment of the footprint areas must be done if the project is to commence immediately pre-construction and any findings must be handled through the Chance finds protocol. Implementation and training of the Chance finds program must be included.	1	3	4	2	4	1	14	-	Low						

SiVEST Environmental

Project Description: **Proposed Construction of the Kraaltjies Wind Energy Facility - AIA**

Version No. 4

Prepared by: **PGS Heritage Pty Ltd for SiVEST**

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9.3 Cumulative Impacts

This section evaluates the possible cumulative impacts (CI) on heritage resources with the addition of the Kraaltjies WEF. The CI on heritage resources evaluated a 35-kilometer radius (**Figure 55**).

The following must be considered in the analysis of the cumulative effect of development on heritage resources:

- **Fixed datum or dataset:** There is no comprehensive heritage data set for the Beaufort West region and thus we cannot quantify how much of a specific cultural heritage element is present in the region. The region has never been covered by a heritage resources study that can account for all heritage resources. Further to this none of the heritage studies conducted can with certainty state that all heritage resources within the study area has been identified and evaluated;
- **Defined thresholds:** The value judgement on the significance of a heritage site will vary from individual to individual and between interest groups. Thus, implicating that heritage resources' significance can and does change over time. And so, will the tipping threshold for impacts on a certain type of heritage resource;
- **Threshold crossing:** In the absence of a comprehensive dataset or heritage inventory of the entire region we will never be able to quantify or set a threshold to determine at what stage the impact from developments on heritage resources has reached or is reaching the danger level or excludes the new development on this basis. (Godwin, 2011)

With regards to the historical resources, in most cases given a low-medium heritage significance on a local scale and in the majority of the cases were recommended as being easily mitigated or avoidable.

While the graves sites in all cases given a high heritage significance on a local scale and in most of the cases were recommended as being no-go areas or extensive mitigation required.

The table below provides an analysis of the projected cumulative impact this project will add to impact on heritage resources.

Table 10: Renewable energy developments proposed within a 35km radius of the Kraaltjies WEF application site.

Project	DEA Reference No	Technology	Capacity	Status of Application / Development
Proposed Beaufort West Wind Farm	12/12/20/1784/1	Wind	140MW	Approved
Proposed Trakas Wind Farm	12/12/20/1784/2	Wind	140MW	Approved
Proposed Wind and Solar Facility on the Farm Lombardskraal 330	14/12/16/3/3/2/406	Solar	20MW	EIA in Process
Proposed Leeu Gamka Solar Power Plant	12/12/20/2296	Solar	-	Withdrawn/ lapsed
Proposed Heuveltjies WEF	TBA	Wind	140MW	EIA in Process
Kwagga WEF 1	Pending	Wind	279 MW	EIA in Process
Kwagga WEF 2	Pending	Wind	341 MW	EIA in Process
Kwagga WEF 3	Pending	Wind	204.6 MW	EIA in Process
Koup 1 WEF	TBA	Wind		EIA in Process
Koup 2 WEF	TBA	Wind	140 MW	EIA in Process

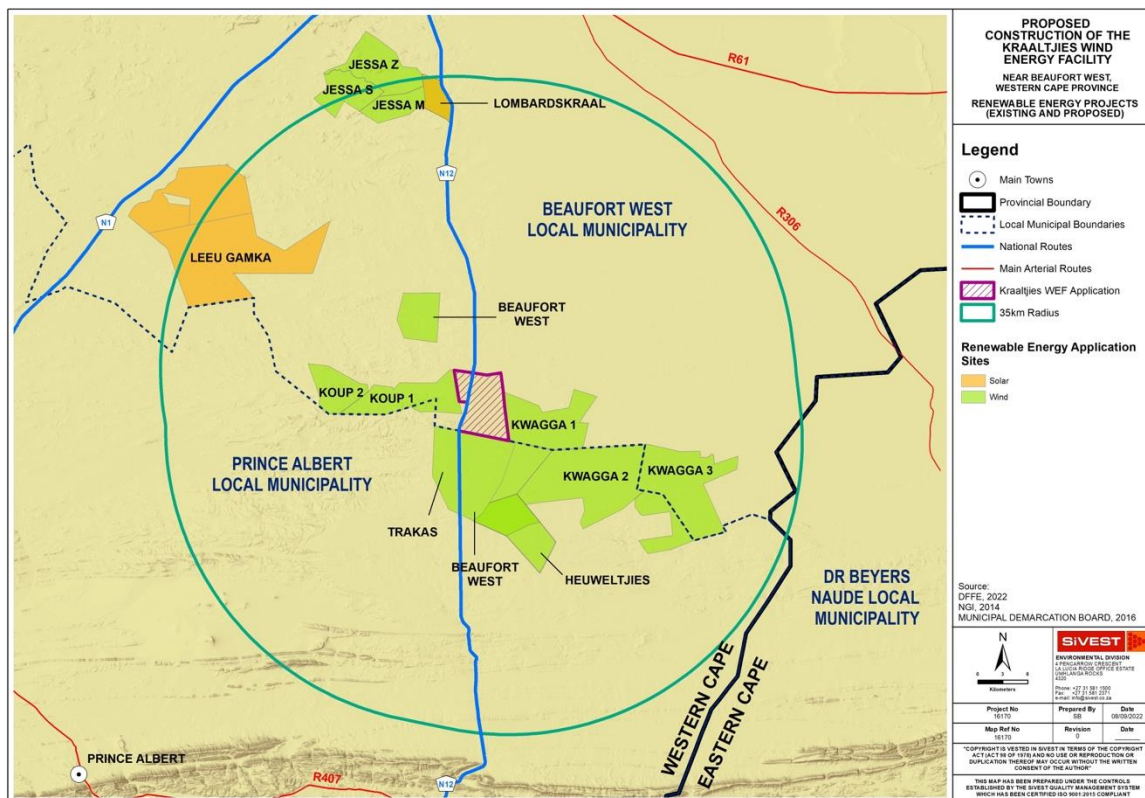


Figure 55: Renewable energy facilities proposed within a 35km radius of the proposed development (provided by SiVEST).

Table 11: Impact Rating - Cumulative

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	TOTAL	STATUS	S		E	P	R	L	D	I / M	TOTAL	STATUS	S
CumulativePhase																				
Heritage Resources	The extent that the addition of this project will have on the overall impact of developments in the region on heritage resources.	4	2	4	4	4	2	36	-	Medium	It can clearly be noted that the area in general is abundant with Stone Age and historical remains. However, until a regional detailed study is commissioned by HWC or SAHRA, no further mitigations measures can be proposed other than those already recommended for the site-specific mitigation of sites in this report.	4	1	4	4	4	1	17	-	Low

9.4 Overall Impact Rating

It is the author's considered opinion that this additional load on the overall impact on heritage resources will be **low**. With a detailed and comprehensive regional dataset this rating could possibly be adjusted and to be more accurate.

10. COMPARATIVE ASSESSMENT OF ALTERNATIVES

An assessment of the options for the substation shows that there will not be an impact on heritage resources. Therefore, no preference for substation exists.

Key

PREFERRED	The alternative will result in a low impact/reduce the impact
FAVOURABLE	The impact will be relatively insignificant
NOT PREFERRED	The alternative will result in a high impact/increase the impact
NO PREFERENCE	The alternative will result in equal impacts

Alternative	Preference	Reasons
SUBSTATION		
Substation site Option 1	NO PREFERENCE	No archaeological resources inside the proposed footprint area
Substation site Option 2	NO PREFERENCE	No archaeological resources inside the proposed footprint area

10.1 The No-Go Alternative

Environmental and heritage legislation requires the consideration of the no-go option. There will be impacts as the project would not proceed. There would also be no socio-economic benefits or increase in energy generation of renewable energy sources (see Section 5 of this report for a full description of the legal requirement).

11. GENERAL RECOMMENDATIONS AND MITIGATION MEASURES

11.1 Construction phase

The project will encompass a range of activities during the construction phase, including vegetation clearance, excavations and infrastructure development associated with the project.

It is possible that cultural material will be exposed during construction and may be recoverable, keeping in mind delays can be costly during construction and as such must be minimised. Development surrounding infrastructure and construction of facilities results in significant disturbance, however foundation holes do offer a window into the past, and it thus may be possible to rescue some of the data and materials. It is also possible that substantial alterations will be implemented during this phase of the project, and these must be catered for. Temporary infrastructure developments are often changed or added to the project as required. In general, these are low impact developments as they are superficial, resulting in little alteration of the land surface, but still need to be catered for.

During the construction phase, it is important to recognize any significant material being unearthed, making the correct judgment on which actions should be taken. It is recommended that the following chance find procedure should be implemented as part of the Environmental Management Programme (EMPr).

11.2 Chance finds procedure

- A heritage practitioner / archaeologist should be appointed to develop a heritage induction program and conduct training for the ECO as well as team leaders in the identification of heritage resources and artefacts. The ECO (following this training) can be permitted to provide similar induction and awareness training to contractors that will undertake construction of the project.
- An appropriately qualified heritage practitioner / archaeologist must be identified to be called upon if any possible heritage resources or artefacts are identified.
- Should an archaeological site or cultural material be discovered during construction (or operation), the area should be demarcated, and construction activities halted using the appropriate protocol.
- The qualified heritage practitioner / archaeologist will then need to come out to the site and evaluate the extent and importance of the heritage resources and make the necessary recommendations for mitigating the find and the impact on the heritage resource.
- The contractor therefore should have some sort of a contingency plan so that operations could move elsewhere temporarily while the materials and data are recovered.

- Construction can commence as soon as the site has been cleared and signed off by the heritage practitioner / archaeologist.

11.3 Possible finds during construction

The study area occurs within a greater historical and archaeological site as identified during the desktop and fieldwork phase. Soil clearance for infrastructure as well as the proposed development activities, could uncover the following:

- High density concentrations of stone artefact; and
- Unmarked graves.

11.4 Timeframes

It must be kept in mind that mitigation and monitoring of heritage resources discovered during construction activity will require permitting for collection or excavation of heritage resources and lead times must be worked into the construction time frames. **Table 12** gives guidelines for lead times on permitting.

Table 12: Lead times for permitting and mobilisation

Action	Responsibility	Timeframe
Preparation for field monitoring and finalisation of contracts	The contractor and service provider	Approximately 1 month
Application for permits to do necessary mitigation work	Service provider – Archaeologist and HWC	Approximately 3 months
Documentation, excavation and archaeological report on the relevant site	Service provider – Archaeologist	Approximately 3 months
Handling of chance finds – Graves/Human Remains	Service provider – Archaeologist and HWC	Approximately 2 weeks
Relocation of burial grounds or graves in the way of construction	Service provider – Archaeologist, HWC, local government and provincial government	Approximately 6 months

11.5 Heritage Management Plan for EMPr implementation

Table 13: Heritage Management Plan for EMPr implementation

Area and site no.	Mitigation measures	Phase	Timeframe	The responsible party for implementation	Monitoring Party (frequency)	Target	Performance indicators (monitoring tool)
General project area	<ul style="list-style-type: none"> An induction and training program on managing archaeological resources must be included in the induction programs for the Environmental Control/Site Officer working on the project. An assessment of the footprint areas must be done if the project is to commence immediately pre-construction and any findings must be handled through the Chance finds protocol. Implement chance find procedures in case where possible heritage finds are uncovered. 	Construction and operation	During construction and operation	Applicant ECO Heritage Specialist	ECO (monthly / as or when required)	Ensure compliance with relevant legislation and recommendations from SAHRA under Section 34-36 and 38 of NHRA	ECO Monthly Checklist/Report
Graves and Burial grounds (K027 and KC001)	<ul style="list-style-type: none"> The sites should be demarcated with a 50-meter no-go-buffer-zone and the graves should be avoided and left in situ. A Grave Management Plan should be developed for the graves, to be implemented during the construction and operation phases (which needs approval by HWC prior to construction). If the site is going to be impacted directly and the graves need to be removed a grave relocation process for these sites is recommended as a 	Construction and operation	Prior to and during construction	Applicant ECO Heritage Specialist	Applicant ECO	Ensure compliance with relevant legislation and recommendations from HWC under Section 36 and 38 of NHRA	ECO Monthly Checklist/Report

Area and site no.	Mitigation measures	Phase	Timeframe	The responsible party for implementation	Monitoring Party (frequency)	Target	Performance indicators (monitoring tool)
	mitigation and management measure. This will involve the necessary social consultation and public participation process before grave relocation permits can be applied for with the HWC under the NHRA and National Health Act regulations.						
Historical Structures (incl. Farmsteads) that were rated as medium or high heritage significance (KC001)	<ul style="list-style-type: none"> In terms of general conservation of the historical structures, a 30m no-go buffer zone is recommended. If development occurs within 30m of the farmsteads, the buildings will need to be satisfactorily studied and recorded before impact occurs. Recording of the buildings i.e. (a) map indicating the position and footprint of all the buildings and structures (b) photographic recording of all the buildings and structures (c) measured drawings of the floor plans of the principal buildings. 	Pre-construction	Pre-construction	Applicant ECO	Applicant ECO	Ensure compliance with relevant legislation and recommendations from HWC under Section 36 and 38 of NHRA	ECO Monthly checklist/report
Historical Structures that were rated as low heritage significance (K026, K026/1, K036)	<ul style="list-style-type: none"> The expansion of existing farm tracks may impact upon the site, but no mitigation is required due to the condition of the site. The documentation of the site in this HIA report is sufficient and the site can be destroyed without a permit but with the approval of this report. 	Pre-construction	Pre-construction	Applicant ECO	Applicant ECO	Ensure compliance with relevant legislation and recommendations from HWC under Section 36 and 38 of NHRA	ECO Monthly checklist/report
Stone Age sites that were rated as medium heritage	<ul style="list-style-type: none"> A no-go-buffer-zone of 30m should be demarcated. If the site can't be avoided, then it must be sampled by a qualified 	Pre-construction	Pre-construction	Applicant ECO	Applicant ECO	Ensure compliance with relevant legislation and recommendations from HWC under	ECO Monthly checklist/report

Area and site no.	Mitigation measures	Phase	Timeframe	The responsible party for implementation	Monitoring Party (frequency)	Target	Performance indicators (monitoring tool)
significance (K022, K033)	specialist under a permit issued by SAHRA					Section 36 and 38 of NHRA	
Stone Age site that was rated as medium heritage significance (K039) but doesn't fall within proposed development area.	<ul style="list-style-type: none"> No mitigation required. 	Pre-construction	Pre-construction	Applicant ECO	Applicant ECO	Ensure compliance with relevant legislation and recommendations from HWC under Section 36 and 38 of NHRA	ECO Monthly checklist/report
Stone Age sites that were rated as low heritage significance (K001, K003)	<ul style="list-style-type: none"> No mitigation required. 	Pre-construction	Pre-construction	Applicant ECO	Applicant ECO	Ensure compliance with relevant legislation and recommendations from HWC under Section 36 and 38 of NHRA	ECO Monthly checklist/report
Stone Age findspots that were rated as low heritage significance (K002, K004-5, K007-8, K010-11, K013-21, K023-25, K028-32, K034-35, K038, K040)	<ul style="list-style-type: none"> No mitigation required. 	Pre-construction	Pre-construction	Applicant ECO Archaeologist	Applicant ECO	Ensure compliance with relevant legislation and recommendations from HWC under Section 36 and 38 of NHRA	ECO Monthly checklist/report

12. CONCLUSIONS AND RECOMMENDATIONS

PGS has been appointed by SiVEST on behalf of Mainstream, to undertake the assessment of the proposed construction of the Kraaltjies WEF near Beaufort West in the Western Cape Province of South Africa.

Heritage resources are unique and non-renewable and as such any impact on such resources must be seen as significant.

The fieldwork conducted for the evaluation of the possible impact of the new Kraaltjies WEF has revealed the presence of forty-four (44) heritage resources.

12.1 Burial Grounds and graves

Two (2) burial grounds (**K027, KC001**) were rated as having high heritage significance.

12.2 Historical Structures

The farmstead at **KC001** was rated as having high heritage significance. Four (4) structures (**K012(K012/1, K012/2, K012/3, K012/4)**) were rated as having medium heritage significance and three (3) structures (**K026 (K026/1), K036**) were rated as having low heritage significance.

12.3 Archaeological features

Three (3) Stone Age sites (**K022, K033, K039**) were rated as having medium heritage significance and two (2) Stone Age sites (**K001, K003**) were rated as having low heritage significance.

Twenty-nine (29) find spots (**K002, K004-5, K007-8, K010-11, K013-21, K023-25, K028-32, K034-35, K038, K040**) comprise a number of low-density Stone Age surface artefact scatters and were rated as having low heritage significance. These are primarily from the Middle Stone Age (MSA), although both Later Stone Age (LSA) and earlier Early Stone Age (ESA) material was identified. All of these artefact assemblages occur in heavily deflated and eroded areas, so their scientific potential and heritage significance is somewhat lowered. Based on findings from a range of other heritage reports in the area, these types of sites are to be expected in this region.

12.4 Recommendations

The calculated impact as summarised in **Section 9** of this report confirms the impact of the new Kraaltjies WEF will be reduced from **negative medium** to **negative low** with the implementation of the mitigation measures. This finding in addition to the implementation of a chance finds procedure, as part of the EMP, will mitigate possible impacts on unidentified heritage resources.

The following mitigation measures will be required:

- 50m buffer zones around grave sites (**K027, KC001**)
- 30m buffer zone around farmsteads (**KC001**)
- 30m buffer zone around historical structures (**K012(K012/1, K012/2, K012/3, K012/4)**)
- 30m buffer zones around Stone Age sites with a medium heritage significance (**K022, K033, K039**)
- If significant Stone Age sites (medium heritage significance or higher) can't be avoided, then sites must be sampled by a qualified specialist under a permit issued by SAHRA
- An induction and training program on the management of heritage resources must be included in the induction programs for all staff working on the project.
- An induction and training program on managing archaeological resources must be included in the induction programs for the Environmental Control/Site Officer working on the project.
- An assessment of the footprint areas must be done if the project is to commence immediately pre-construction and any findings must be handled through the Chance finds protocol.
- A chance finds protocol must be developed that includes the process of work stoppage, site protection, evaluation and informing HWC of such finds and a final process of mitigation implementation.

The above measures were included in the final design layout as indicated in **Figure 23**.

12.5 General

In the event that heritage resources are discovered during site clearance, construction activities must stop in the vicinity, and a qualified archaeologist must be appointed to evaluate and make recommendations on mitigation measures.

The overall impact of the Kraaltjies WEF and associated infrastructure, on the heritage resources, is seen as acceptably **low** after the recommendations have been implemented and therefore, impacts can be mitigated to acceptable levels allowing for the development to be granted environmental authorisation.

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Vidamemoria Heritage Consultants. (2012) Heritage Impact Assessment: DR 2308 Central Karoo, Beaufort West – Central Karoo District Municipality, Western Cape.



APPENDIX A – CV

NIKKI MANN
Professional Archaeologist, PGS Heritage

Key Qualifications:

MSc Archaeology (phylolith analysis) - University of Cape Town - 2017

BSc Honours Archaeology - University of Cape Town – 2014

Bachelor of Science (BSc) - University of Cape Town - Majors in Archaeology, and Environmental and Geographical Science -2013

Professional Archaeologist – Association of Southern African Professional Archaeologists (**ASAPA**)

Archaeological Experience

- 2021- Current – Archaeologist – PGS Heritage (Pty) Ltd
- Kathu Tyre Management Plant HIA. Kathu. EXM. **Position:** Heritage Specialist.
- Kathu Borrow Pit Screening. Kathu. EXM. **Position:** Heritage Specialist.
- Kolomela Mine Expansion. Postmasburg. EXM. **Position:** Heritage Specialist.
- Kudumane HIA update. Hotazel. SRK. **Position:** Heritage Specialist.
- Victoria West Pipeline project. Victoria West. iXEng. **Position:** Heritage Specialist.
- 10MW Chelsea Solar PV. Gqeberha, Eastern Cape. SLR. **Position:** Heritage Specialist.
- Koup 1 and Koup 2 WEF. Beaufort West, Western Cape. SiVEST. **Position:** Heritage Specialist.
- Victoria West Pipelines. Victoria West, Northern Cape. iXEng. – **Position:** Heritage Specialist.
- East Orchards Poultry Farm Project. Delmas, Mpumalanga. EcoSphere. – **Position:** Heritage Specialist.
- Phase 1 Archaeological Impact Assessment (**Phase 1 AIA**): Gunstfontein Wind Energy Facility (WEF) and overhead powerline, near Sutherland, Northern Cape, South Africa. – Position: Archaeological Specialist (November 2020).
- Phase 1 Archaeological Impact Assessment (**Phase 1 AIA**): Proposed development of an overhead powerline for the approved Oya PV Facility, between Sutherland and Matjiesfontein, Northern and Western Cape, South Africa. – Position: Archaeological Specialist (October 2020).
- Phase 1 Archaeological Impact Assessment (**Phase 1 AIA**): Proposed development of infrastructure for the approved Kudusberg Wind Energy Facility (WEF), between Sutherland and Matjiesfontein, Northern and Western Cape, South Africa. – Position: Archaeological Specialist (October 2020).
- Phase 1 Archaeological Impact Assessment (**Phase 1 AIA**): Proposed Square Kilometre Array (SKA) fibre optic cable, between Beaufort West and Carnarvon, Northern and Western Cape, South Africa. (September 2020).
- Phase 1 Archaeological Impact Assessment (**Phase 1 AIA**): Kolkies PV (Photovoltaics) Project, north of Touws River, Western Cape, South Africa. – Position: Archaeological Specialist (September 2020).
- Phase 1 Archaeological Impact Assessment (**Phase 1 AIA**): Pienaarspoort Wind Energy Facility (WEF) Project 1 and 2, north-west of Matjiesfontein, Western Cape, South Africa. – Position: Archaeological Specialist (September 2020).

- Phase 1 Archaeological Impact Assessment (**Phase 1 AIA**): Swellendam Wind Energy Facility (WEF), Swellendam, Western Cape, South Africa. – Position: Archaeological Specialist (August 2020).
- **Phase 2 Archaeological Mitigation**: Proposed development of infrastructure in the Port of Ngqura within the Coega Industrial Development Zone (IDZ), Nelson Mandela Bay Municipality, Eastern Cape, South Africa: Contract Archaeologist, excavation of Later Stone Age (LSA) shell middens (July 2020). Contracted to work with PGS Heritage.
- Polihali Dam Heritage Management Project, Lesotho: Junior field archaeologist, excavation of Later Stone Age (LSA) sites (May 2019- May 2020) as part of PGS Heritage.
 - Duties included excavation of rock shelters, site supervision, site recording, photography, lab work, section drawing and digital illustration (Inkscape and Photoshop), assisting in report writing and implementation of HSE practices.
- Ledi-Geraru Research Project, Ethiopia: excavation of Early Stone Age (ESA) sites (February-March 2020; Directed by Dr David R. Braun)
- Gorras Farm, Northern Cape, South Africa: excavation of middens next to a corbelled building; Historical site (October 2018; supervised by Simon Lee Hall and UCT PhD student Ms Vuyiswa Thembelihile Lupuwana)
 - Duties included excavation of middens and surface collection.
- **Phase 2 Archaeological Mitigation**: Proposed development of boreholes and associated pipelines for the Langebaan Aquifer within the Hopefield Private Nature Reserve, Hopefield, Western Cape.- Position: Archaeological specialist (August 2018).
- Koobi Fora Field School, Kenya: Intern, excavation of Early Stone Age (ESA) and Middle Stone Age (MSA) sites (June-July 2018; Directed by Dr David R. Braun, Kathryn Ranhorn (Postdoctoral Research Fellow at Harvard University) and Jonathan Reeves (PhD student at The George Washington University))
- Data extraction to SAHRIS (South African Heritage Resource Agency) for CTS Heritage (April 2018)
- Phase 1 Archaeological Impact Assessment (**Phase 1 AIA**): Matjiesfontein Road Extension Project,. Matjiesfontein, Western Cape. – Position: Archaeological Specialist (April 2018).
- Ledi-Geraru Research Project, Ethiopia: excavation of Early Stone Age (ESA) sites (February-March 2018; Directed by Dr David R. Braun)
- Ferrycarrig, Irish National Heritage Park, Wexford, southeast Ireland: Excavation of ringwork castle site associated with the Anglo-Norman invasion of Ireland (January 2018; Directed by Dr Denis Shine and Dr Stephen Mandal)

WOUTER FOURIE

Professional Heritage Specialist and Professional Archaeologist and Director PGS Heritage

Summary of Experience

Specialised expertise in Archaeological Mitigation and excavations, Cultural Resource Management and Heritage Impact Assessment Management, Archaeology, Anthropology, Applicable survey methods, Fieldwork and project management, Geographic Information Systems, including *inter alia* -

Involvement in various grave relocation projects (some of which relocated up to 1000 graves) and grave “rescue” excavations in the various provinces of South Africa

Involvement with various Heritage Impact Assessments, within South Africa, including -

- Archaeological Walkdowns for various projects
- Phase 2 Heritage Impact Assessments and EMPs for various projects
- Heritage Impact Assessments for various projects
- Iron Age Mitigation Work for various projects, including archaeological excavations and monitoring
- Involvement with various Heritage Impact Assessments, outside South Africa, including -
- Archaeological Studies in Democratic Republic of Congo
- Heritage Impact Assessments in Mozambique, Botswana and DRC
- Grave Relocation project in DRC

Key Qualifications

BA [Hons] (Cum laude) - Archaeology and Geography - 1997

BA - Archaeology, Geography and Anthropology - 1996

Professional Archaeologist - Association of Southern African Professional Archaeologists (ASAPA) - Professional Member

Accredited Professional Heritage Specialist – Association of Professional Heritage Practitioners (APHP)

CRM Accreditation (ASAPA) -

Principal Investigator - Grave Relocations

Field Director – Iron Age

Field Supervisor – Colonial Period and Stone Age

Accredited with Amafa KZN

Key Work Experience

2003- current - Director – Professional Grave Solutions (Pty) Ltd

2007 – 2008 - Project Manager – Matakoma-ARM, Heritage Contracts Unit, University of the Witwatersrand

2005-2007 - Director – Matakoma Heritage Consultants (Pty) Ltd

2000-2004 - CEO– Matakoma Consultants

1998-2000 - Environmental Coordinator – Randfontein Estates Limited. Randfontein, Gauteng

1997-1998 - Environmental Officer – Department of Minerals and Energy. Johannesburg, Gauteng

Worked on various heritage projects in the SADC region including, Botswana, Mozambique, Malawi, Mauritius and the Democratic Republic of the Congo



APPENDIX B – IMPACT ASSESSMENT METHODOLOGY

ENVIRONMENTAL IMPACT ASSESSMENT (EIA) METHODOLOGY

The Environmental Impact Assessment (EIA) Methodology assists in evaluating the overall effect of a proposed activity on the environment. Determining of the significance of an environmental impact on an environmental parameter is determined through a systematic analysis.

1.1 Determination of Significance of Impacts

Significance is determined through a synthesis of impact characteristics which include context and intensity of an impact. Context refers to the geographical scale (i.e., site, local, national or global), whereas intensity is defined by the severity of the impact e.g., the magnitude of deviation from background conditions, the size of the area affected, the duration of the impact and the overall probability of occurrence. Significance is calculated as shown in **Table 1**.

Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. The total number of points scored for each impact indicates the level of significance of the impact.

1.2 Impact Rating System

The impact assessment must take account of the nature, scale and duration of effects on the environment and whether such effects are positive (beneficial) or negative (detrimental). Each issue / impact is also assessed according to the various project stages, as follows:

- Planning;
- Construction;
- Operation; and
- Decommissioning.

Where necessary, the proposal for mitigation or optimisation of an impact should be detailed. A brief discussion of the impact and the rationale behind the assessment of its significance has also been included.

The significance of Cumulative Impacts should also be rated (As per the Excel Spreadsheet Template).

1.2.1 Rating System Used to Classify Impacts

The rating system is applied to the potential impact on the receiving environment and includes an objective evaluation of the possible mitigation of the impact. Impacts have been consolidated into one (1) rating. In assessing the significance of each issue, the following criteria (including an allocated point system) is used:

Table 1: Rating of impacts criteria

ENVIRONMENTAL PARAMETER		
A brief description of the environmental aspect likely to be affected by the proposed activity (e.g. Surface Water).		
ISSUE / IMPACT / ENVIRONMENTAL EFFECT / NATURE		
Include a brief description of the impact of environmental parameter being assessed in the context of the project. This criterion includes a brief written statement of the environmental aspect being impacted upon by a particular action or activity (e.g. oil spill in surface water).		
EXTENT (E)		
This is defined as the area over which the impact will be expressed. Typically, the severity and significance of an impact have different scales and as such bracketing ranges are often required. This is often useful during the detailed assessment of a project in terms of further defining the determined.		
1	Site	The impact will only affect the site
2	Local/district	Will affect the local area or district
3	Province/region	Will affect the entire province or region
4	International and National	Will affect the entire country
PROBABILITY (P)		
This describes the chance of occurrence of an impact		
1	Unlikely	The chance of the impact occurring is extremely low (Less than a 25% chance of occurrence).
2	Possible	The impact may occur (Between a 25% to 50% chance of occurrence).
3	Probable	The impact will likely occur (Between a 50% to 75% chance of occurrence).
4	Definite	Impact will certainly occur (Greater than a 75% chance of occurrence).
REVERSIBILITY (R)		
This describes the degree to which an impact on an environmental parameter can be successfully reversed upon completion of the proposed activity.		
1	Completely reversible	The impact is reversible with implementation of minor mitigation measures
2	Partly reversible	The impact is partly reversible but more intense mitigation measures are required.
3	Barely reversible	The impact is unlikely to be reversed even with intense mitigation measures.
4	Irreversible	The impact is irreversible and no mitigation measures exist.
IRREPLACEABLE LOSS OF RESOURCES (L)		
This describes the degree to which resources will be irreplaceably lost as a result of a proposed activity.		
1	No loss of resource.	The impact will not result in the loss of any resources.
2	Marginal loss of resource	The impact will result in marginal loss of resources.
3	Significant loss of resources	The impact will result in significant loss of resources.
4	Complete loss of resources	The impact is result in a complete loss of all resources.
DURATION (D)		
This describes the duration of the impacts on the environmental parameter. Duration indicates the lifetime of the impact as a result of the proposed activity.		

1	Short term	The impact and its effects will either disappear with mitigation or will be mitigated through natural process in a span shorter than the construction phase (0 – 1 years), or the impact and its effects will last for the period of a relatively short construction period and a limited recovery time after construction, thereafter it will be entirely negated (0 – 2 years).
2	Medium term	The impact and its effects will continue or last for some time after the construction phase but will be mitigated by direct human action or by natural processes thereafter (2 – 10 years).
3	Long term	The impact and its effects will continue or last for the entire operational life of the development, but will be mitigated by direct human action or by natural processes thereafter (10 – 50 years).
4	Permanent	The only class of impact that will be non-transitory. Mitigation either by man or natural process will not occur in such a way or such a time span that the impact can be considered transient (Indefinite).
INTENSITY / MAGNITUDE (I / M)		
Describes the severity of an impact (i.e. whether the impact has the ability to alter the functionality or quality of a system permanently or temporarily).		
1	Low	Impact affects the quality, use and integrity of the system/component in a way that is barely perceptible.
2	Medium	Impact alters the quality, use and integrity of the system/component but system/ component still continues to function in a moderately modified way and maintains general integrity (some impact on integrity).
3	High	Impact affects the continued viability of the system/component and the quality, use, integrity and functionality of the system or component is severely impaired and may temporarily cease. High costs of rehabilitation and remediation.
4	Very high	Impact affects the continued viability of the system/component and the quality, use, integrity and functionality of the system or component permanently ceases and is irreversibly impaired (system collapse). Rehabilitation and remediation often impossible. If possible rehabilitation and remediation often unfeasible due to extremely high costs of rehabilitation and remediation.
SIGNIFICANCE (S)		
Significance is determined through a synthesis of impact characteristics. Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. This describes the significance of the impact on the environmental parameter. The calculation of the significance of an impact uses the following formula:		
Significance = (Extent + probability + reversibility + irreplaceability + duration) x magnitude/intensity.		

The summation of the different criteria will produce a non-weighted value. By multiplying this value with the magnitude/intensity, the resultant value acquires a weighted characteristic which can be measured and assigned a significance rating.

Points	Impact Significance Rating	Description
5 to 23	Negative Low impact	The anticipated impact will have negligible negative effects and will require little to no mitigation.
5 to 23	Positive Low impact	The anticipated impact will have minor positive effects.
24 to 42	Negative Medium impact	The anticipated impact will have moderate negative effects and will require moderate mitigation measures.
24 to 42	Positive Medium impact	The anticipated impact will have moderate positive effects.
43 to 61	Negative High impact	The anticipated impact will have significant effects and will require significant mitigation measures to achieve an acceptable level of impact.
43 to 61	Positive High impact	The anticipated impact will have significant positive effects.
62 to 80	Negative Very high impact	The anticipated impact will have highly significant effects and are unlikely to be able to be mitigated adequately. These impacts could be considered "fatal flaws".
62 to 80	Positive Very high impact	The anticipated impact will have highly significant positive effects.



APPENDIX C: SITE SENSITIVITY VERIFICATION REPORT

(IN TERMS OF PART A OF THE ASSESSMENT PROTOCOLS PUBLISHED IN GN 320 ON 20 MARCH 2020)

1. Introduction

South African Mainstream Power Developments (Pty) Ltd is proposing to construct the Kraaltjies WEF, comprising up to twenty (20) wind turbines with a maximum total energy generation capacity of up to 240MW, with a 132kV overhead power line connection to the national grid. A Battery Energy Storage System (BESS) will be located next to the onsite 33/132kV substation. The WEF project areas are in the Great Karoo region approximately 52 km south of Beaufort West, Western Cape Province.

In accordance with Appendix 6 of the National Environmental Management Act (Act 107 of 1998, as amended) (NEMA) Environmental Impact Assessment (EIA) Regulations of 2014, a site sensitivity verification has been 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 (Screening Tool).

2. Site sensitivity verification

The site sensitivity verification of the proposed Kraaltjies WEF is based on:

- A desktop review of (a) the relevant 1:50 000 scale topographic map 3222DC -Current and historical editions (1965, 1987, 2005), (b) Google Earth© satellite imagery, (c) published historical and archaeological literature, as well as (d) several previous HIA and AIA assessments undertaken in the general vicinity of the study area.
- A field assessment of the Kraaltjies WEF project area by the author and field archaeologists during February 2021.

3. Outcome of site sensitivity verification

It is well known that the Karoo contains a long and rich archaeological record dating from the ESA to the historic period. However, vast areas of the region have yet to be subjected to systematic analytical research.

The evaluation of satellite imagery and the analysis of the studies previously undertaken in the area has indicated that certain areas may be sensitive from a heritage perspective. Archaeological surveys and studies in the area have shown rocky outcrops, dry riverbeds, riverbanks and confluence to be prime localities for archaeological finds and specifically Stone Age sites (Kinahan, 2008; Halkett, 2009; Webley & Halkett, 2015).

Scatters of ESA through to LSA artefacts have been widely reported in the general vicinity of Beaufort West. This is a result of the erosional nature of the environment, which tends to leave artefacts exposed on the surface rather than buried beneath layers of sediment. To date, heritage studies in the area have shown that these artefacts have occurred in secondary contexts, often associated with gravel deposits, having been subjected to erosion of the soils in which they were once deposited (Dreyer 2005; Halkett 2009; Kaplan 2006, 2007; Orton 2010; Webley & Hart 2010a, 2010b; Webley & Lanham 2011). Although context is generally poor, the Karoo is still regarded as a region that is very rich in archaeological and historical heritage.

The field work in the study area demonstrates that Stone Age sites, burial grounds and historical structures of heritage significance warrant conservation.

4. National Environmental Screening Tool

The Archaeological and Cultural Heritage Sensitivity Map for the Kraaltjies WEF project area prepared using the DFFE screening tool indicates a **Low Sensitivity** rating for the study area (**Figure 8**). The low rating as provided by the Environmental Screening Tool possibly reflects scarcity of heritage reports conducted in the region. The field work that was conducted in the study area demonstrates that there are in fact Stone Age sites, burial grounds and historical structures of heritage significance that warrant conservation.

Therefore, the DFFE screening tool sensitivity map in **Figure 8** is not fully supported based on the findings of this fieldwork.

5. Conclusion

The Archaeological and Cultural Heritage sensitivity of the Kraaltjies WEF project area has been evaluated, based on desktop studies and site visit. It is concluded that the low rating as provided by the Environmental Screening Tool likely reflects the scarcity of heritage reports conducted in the region.