SiVEST SA (PTY) LTD

PROPOSED CONSTRUCTION OF THE KLIPKRAAL WIND ENERGY FACILITY 3, NEAR FRASERBURG, NORTHERN CAPE PROVINCE, SOUTH AFRICA

Heritage Impact Assessment

DFFE Reference:	TBA
Report Prepared by:	**PGS Heritage Pty Ltd**
Issue Date:	6 December 2022
Version No.:	0.1

Declaration of Independence

- I, Nikki Mann, 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

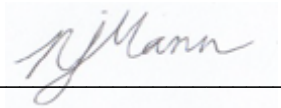
- I do not have and will not have any vested interest (either business, financial, personal or other) in the proposed activity proceeding other than remuneration for work performed in terms of the Regulations;

HERITAGE CONSULTANT: PGS Heritage (Pty) Ltd

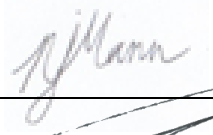
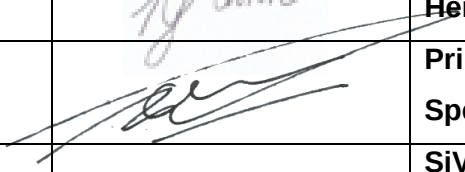
CONTACT PERSON: Nikki Mann - Archaeologist

Tel: +27 (0) 12 332 5305

Email: nikki@pgsheritage.co.za

SIGNATURE: 

ACKNOWLEDGEMENT OF RECEIPT

Report Title	Heritage Impact Assessment for the Proposed Construction of Klipkraal Wind Energy Facility 3, Near Fraserburg, Northern Cape Province, South Africa		
Control	**Name**	**Signature**	**Designation**
Author	**Nikki Mann**		**Archaeologist/ PGS Heritage**
Reviewed	**Wouter Fourie**		**Principal Heritage Specialist**
Reviewed			**SiVEST/Environmental Division**

Date:	6 12 2022
Document Title:	Heritage Impact Assessment Report
Author:	Nikki Mann
Revision Number:	0.1
Checked by:	
For:	SiVEST Environmental Division

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 author did implement the PGS HIA SOP and requirements.

SiVEST SA (PTY) LTD

PROPOSED CONSTRUCTION OF THE KLIPKRAAL WIND ENERGY FACILITY 3, NEAR FRASERBURG, NORTHERN CAPE PROVINCE, SOUTH AFRICA

Heritage Impact Assessment

EXECUTIVE SUMMARY

PGS Heritage (Pty) Ltd (PGS) has been appointed by SiVest (PTY) Ltd (hereafter referred to as "SiVEST"), on behalf of Klipkraal Wind Energy Facility 3 (Pty) Ltd (hereafter referred to as 'Klipkraal 3'), to undertake a Heritage Impact Assessment (HIA) that forms part of the Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP) for the proposed construction of the Klipkraal Wind Energy Facility (WEF), BESS and associated infrastructure near the towns of Beaufort West and Fraserburg in the Northern Cape Province of South Africa.

The proposed wind farms make up a larger wind energy facility (WEF) (with associated BESS) which will be referred to as the Klipkraal WEF, consisting of up to five (5) phases, with a combined generation capacity of up to approximately 1 500 MW, as follows:

- Klipkraal Wind Energy Facility 1: up to 300MW + BESS (part of a separate EIA process which forms part of separate application)
- Klipkraal Wind Energy Facility 2: up to 300MW + BESS (part of a separate EIA process which forms part of separate application)
- Klipkraal Wind Energy Facility 3: up to 300MW + BESS (**this application**)
- Klipkraal Wind Energy Facility 4: up to 300MW + BESS (part of a separate EIA process which forms part of separate application)
- Klipkraal Wind Energy Facility 5: up to 300MW + BESS (part of a separate EIA process which forms part of separate application)
- Klipkraal On-site Switching / Collector Substation and associated 132kV/400kV Power Line (part of a separate BA application).

The overall impact of the Klipkraal WEF 3, 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 authorised.

1. SITE NAME

The Klipkraal Wind Energy Facility 3

2. LOCATION

The proposed WEF is located approximately 35km south-east of Fraserburg, in the Northern Cape Province and is within the Karoo Hoogland Municipality (**Figure 1**).

The WEF application site incorporates the following farm portions:

- Remainder of the Farm Matjiesfontein No. 409 (RE/409)
- Remainder of the Farm Klipfontein No. 447 (RE/447)
- Portion 1 of the Farm Klipfontein No. 447 (1/447)

Figure 1: Regional Context Map.

3. DECSRIPTION OF THE PROPOSED DEVELOPMENT

It is anticipated that the proposed Klipkraal WEF 3 will comprise approximately sixty (60) wind turbines with a maximum total energy generation capacity of up to approximately 300MW (**Figure 2**). The electricity generated by the proposed WEF development will be fed into the national grid via a 132kV/400kV overhead power line. A Battery Energy Storage System (BESS) will be located next to the onsite 11-66/33/132-400kV substation. The storage capacity and type of technology would be confirmed prior to construction. This information will be provided to I&AP's prior to the commencement of construction.

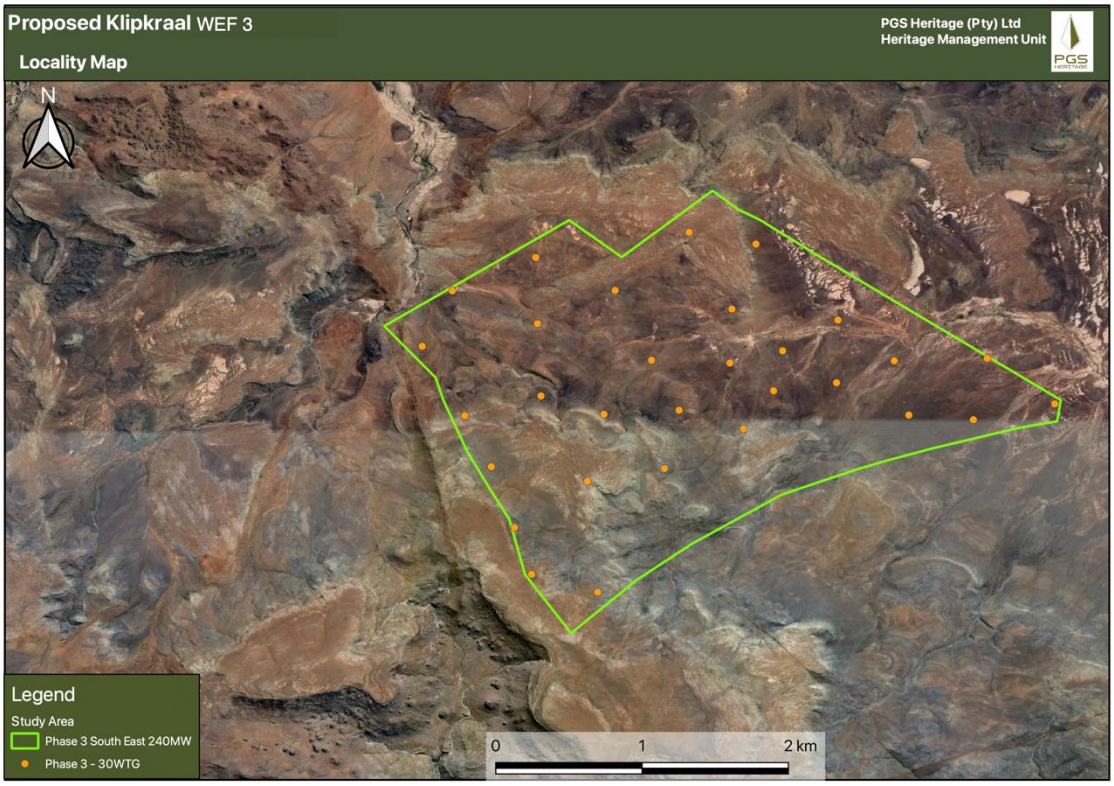


Figure 2: Klipkraal WEF 3 Site Locality.

4. HERITAGE RESOURCES IDENTIFIED

A selective survey of the study area was conducted between 22-27 September 2021. Heritage resources are unique and non-renewable and as such any impact on such resources must be seen as significant.

4.1 Archaeology, built environment and burial grounds and graves

No heritage resources were identified within the Klipkraal WEF 3 area.

4.2 Palaeontology

The Palaeontological Impact assessment (PIA) conducted by Butler (2022) determined that a small portion of the proposed Klipkraal WEF 3 is underlain by a small portion of Jurassic Dolerite while the rest of the footprint is underlain by the Teekloof Formation of the Adelaide Subgroup (Beaufort Group, Karoo Supergroup). The PalaeoMap of the South African Heritage Resources Information System indicates that the Palaeontological Sensitivity of the development is unknown (Almond and Pether, 2009; Almond *et al*., 2013). Updated Geology (Council of Geosciences, Pretoria) refines the geology of the 1983 Geological Map and indicates that the Klipkraal WEF 3 is underlain by the Middleton and Balfour Formation (Adelaide Subgroup, Beaufort Group).

In the last few decades extensive research and collecting have been conducted by palaeontologists in this part of the basin and the Fraserburg area was found to be highly fossiliferous.

A three day-site-specific field survey of the development footprint was conducted on foot 24-26 September 2021. Various fossiliferous sites, where fossils were found to be well-preserved, has been identified in the development footprint.

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 and BESS).

Construction of the facility may adversely affect potential archaeological and fossil heritage within the development footprint by damaging, destroying, disturbing or permanently sealing-in fossils preserved at or beneath the surface of the ground that are then no longer available for scientific research or other public good.

The possible pre-construction impacts calculated on the tangible cultural heritage resources is overall **VERY HIGH** to **MODERATE NEGATIVE** rating but with the implementation of the recommended buffers and management guidelines will be reduced to a **MEDIUM** - **LOW NEGATIVE** impact.

6. RECOMMENDATIONS

The calculated impact as summarised in **Section 9** of this report confirms the impact of the new Klipkraal WEF 3 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 EMPr, will mitigate possible impacts on unidentified heritage resources.

The following mitigation measures will be required if associated infrastructure does encroach upon the identified heritage sites:

- It is essential that a walk down survey of the final footprint of the new Klipkraal WEF 3 and associated grid connection infrastructure be conducted.
- A management plan for the heritage resources then needs to be compiled and approved for implementation during construction and operations.

In terms of the PIA:
As the site visit was conducted in 2021, the layout of the WEF was not yet known. The specific layout of the Klipkraal WEF 3 development was thus not investigated in detail.

It is thus recommended that a Palaeontological Walkdown of the development is conducted when the layout of the roads and turbines have been established.

The appointed Palaeontologist will also have to include a Chance Find Protocol for the Klipkraal WEF 3 development and training of accountable supervisory personnel by a qualified palaeontologist in the recognition of fossil heritage is necessary.

General

The overall impact of the Klipkraal WEF 3, on archaeological and fossil heritage, is seen as **very high** to **medium** before mitigation. Once the recommendations have been implemented, the impacts can be mitigated to a **Medium** to **Low** level.

7. ADDITIONAL SURVEY

An additional survey of the Klipkraal WEFs 1-3 final development area was conducted by a qualified archaeologist (Henk Steyn) and field assistant (Xander Fourie) from PGS (8-10 November 2022).

This has been requested by the SAHRA, as it was noted that the initial survey of the study area, as part of the HIA, was minimal (**Figure 3**, **Figure 4**).

No heritage resources were recorded within the study area during this fieldwork.

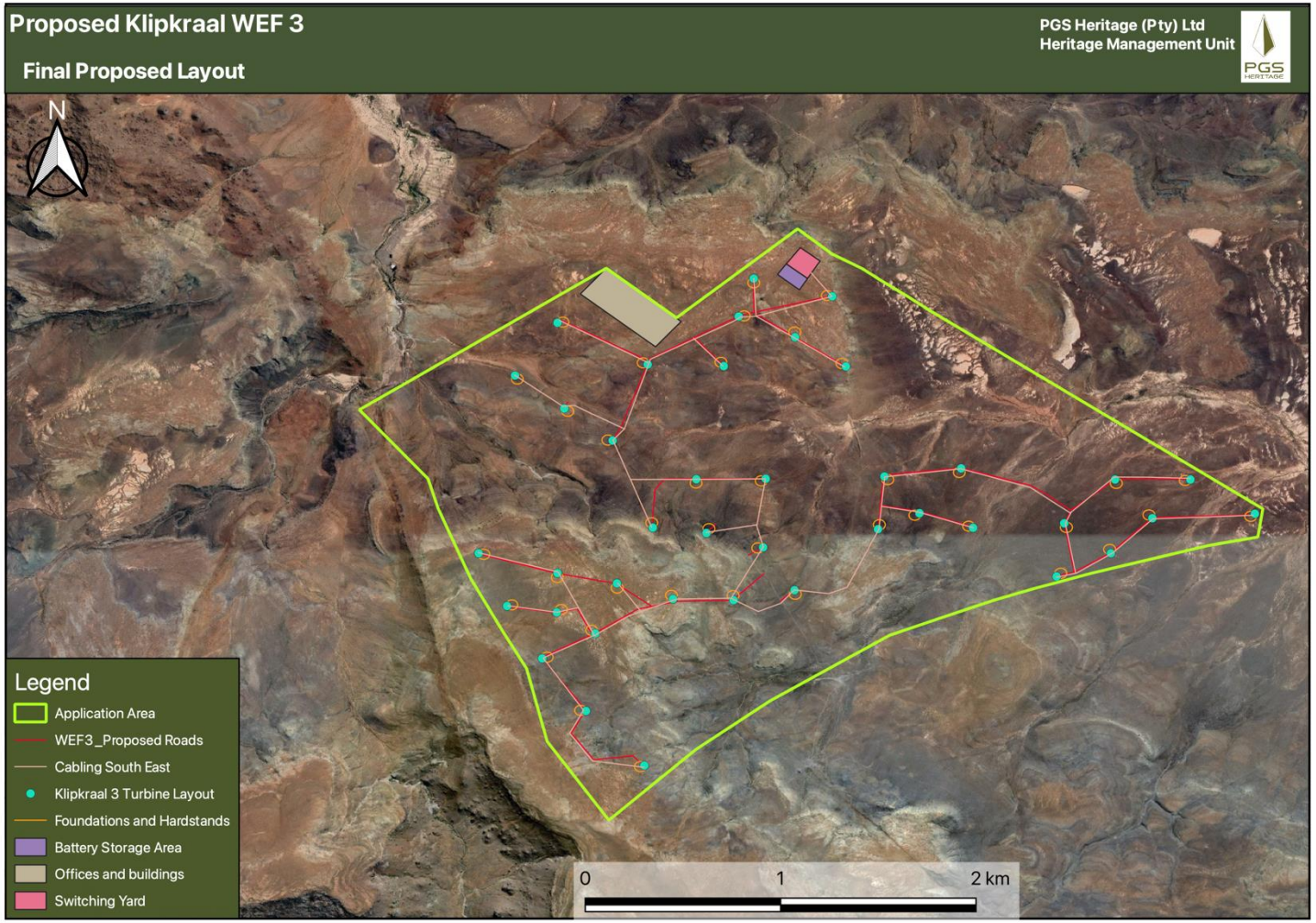


Figure 3: Final proposed development area.

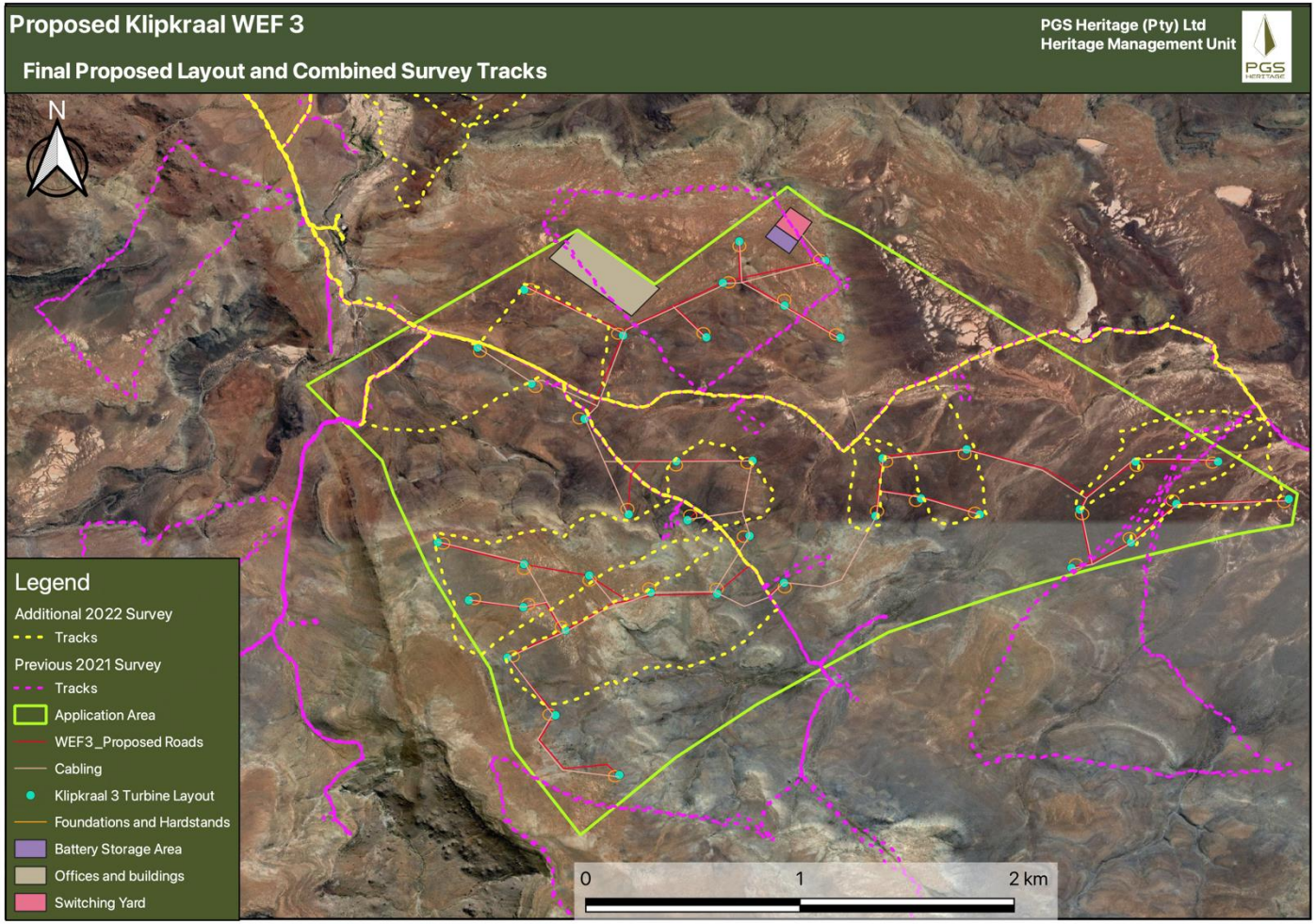


Figure 4: Final proposed development area relative to all the survey tracks.

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
(cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	Section 8, 10
d) the date and season of the site investigation and the relevance of the season to the outcome of the assessment;	Section 2
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 8, 10
g) an identification of any areas to be avoided, including buffers;	Section 7.3 and 8
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;	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;	Section 8, 10
k) any mitigation measures for inclusion in the EMPr;	Section 8, 11 and 12
l) any conditions for inclusion in the environmental authorisation;	
m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;	Section 8 and 12
n) a reasoned opinion- i. (as to) whether the proposed activity, activities or portions thereof should be authorised; (iA) regarding the acceptability of the proposed activity or activities; and ii. if the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan;	Section 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 *gazetted* 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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Heritage Impact Assessment

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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.

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.

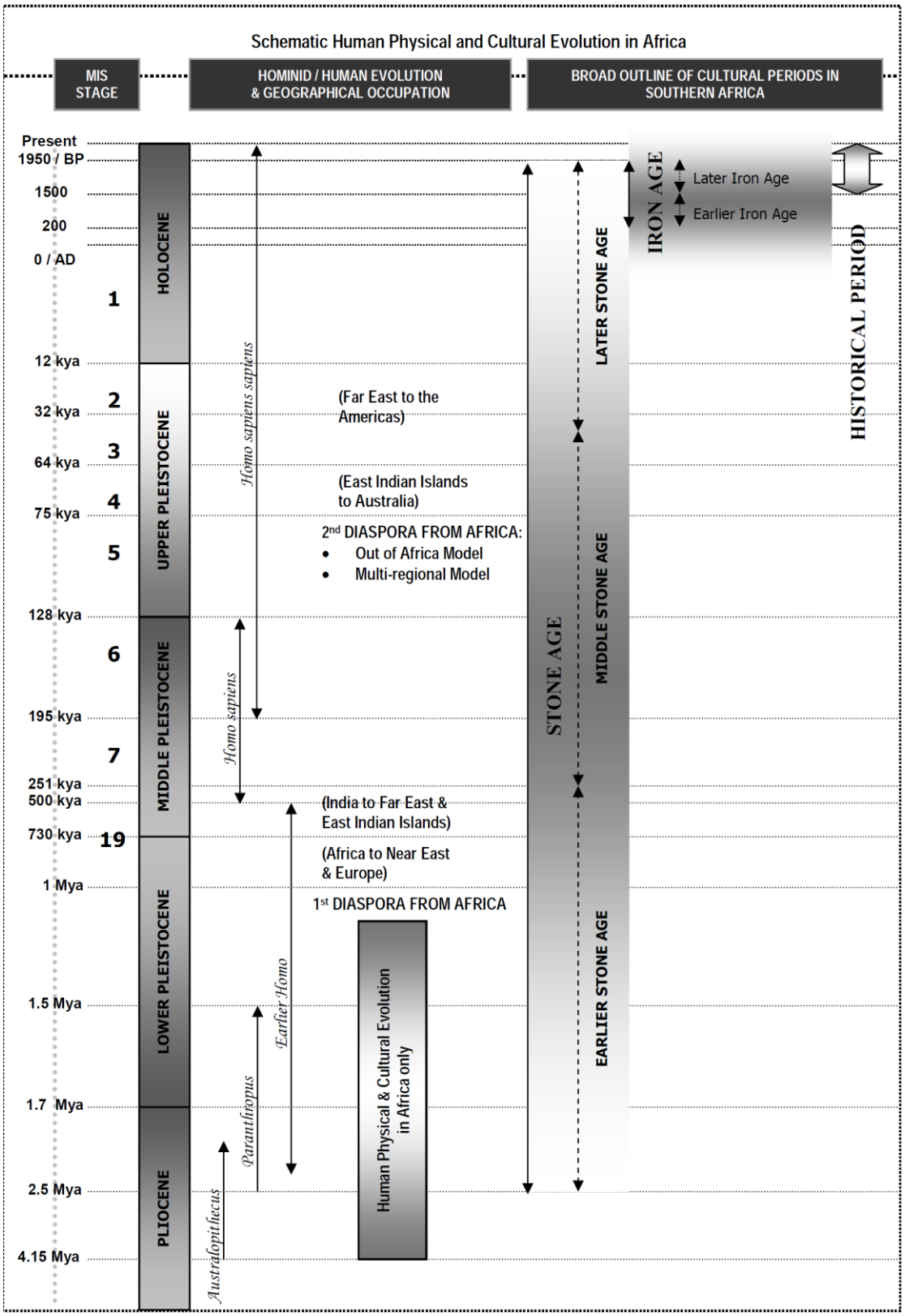

Figure 5: Human and Cultural Timeline in Africa (Morris, 2008).

List of Abbreviations

Abbreviations	Description
AIA	Archaeological Impact Assessment
Aura	Aura Development Company (Pty) Ltd
ASAPA	Association of South African Professional Archaeologists
CRM	Cultural Resource Management
DEA	Department of Environmental Affairs
DFFE	Department of Forestry, Fisheries and Environment
ECO	Environmental Control Officer
EIA practitioner	Environmental Impact Assessment Practitioner
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
ESA	Early Stone Age
GPS	Global Positioning System
HIA	Heritage Impact Assessment
I&AP	Interested & Affected Party
LSA	Late Stone Age
LIA	Late Iron Age
MSA	Middle Stone Age
MIA	Middle Iron Age
MTS	Main Transmission Substations
NCW	Not Conservation Worthy
NEMA	National Environmental Management Act
Ngwao-Boswa	Ngwao-Boswa Jwa Kapa Bokone
NHRA	National Heritage Resources Act
PHRA	Provincial Heritage Resources Authority
PSSA	Palaeontological Society of South Africa
SADC	Southern African Development Community
SAHRA	South African Heritage Resources Agency
SiVEST	SiVest (PTY) Ltd
WEF	Wind Energy Facility

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PROPOSED CONSTRUCTION OF THE KLIPKRAAL WIND ENERGY FACILITY 3, NEAR FRASERBURG, NORTHERN CAPE PROVINCE, SOUTH AFRICA

Heritage Impact Assessment

1. INTRODUCTION

PGS Heritage (Pty) Ltd (PGS) has been appointed by SiVest (PTY) Ltd (hereafter referred to as "SiVEST"), on behalf of Klipkraal Wind Energy Facility (Pty) Ltd (hereafter referred to as 'Klipkraal 3'), to undertake a Heritage Impact Assessment (HIA) that forms part of the Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP) for the proposed construction of the Klipkraal Wind Energy Facility (WEF), BESS and associated infrastructure near the towns of Beaufort West and Fraserburg in the Northern Cape Province of South Africa.

The proposed wind farms make up a larger wind energy facility (WEF) (with associated BESS) which will be referred to as the Klipkraal WEF, consisting of up to five (5) phases, with a combined generation capacity of up to approximately 1 500 MW, as follows:

- Klipkraal Wind Energy Facility 1: up to 300MW + BESS (part of a separate EIA process which forms part of separate application)
- Klipkraal Wind Energy Facility 2: up to 300MW + BESS (part of a separate EIA process which forms part of separate application)
- Klipkraal Wind Energy Facility 3: up to 300MW + BESS (**this application**)
- Klipkraal Wind Energy Facility 4: up to 300MW + BESS (part of a separate EIA process which forms part of separate application)
- Klipkraal Wind Energy Facility 5: up to 300MW + BESS (part of a separate EIA process which forms part of separate application)
- Klipkraal On-site Switching / Collector Substation and associated 132kV/400kV Power Line (part of a separate BA application).

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 Klipkraal WEF 3 will comprise sixty (60) wind turbines with a maximum total energy generation capacity of up to approximately 300MW. The electricity generated by the proposed WEF development will be fed into the national grid via a 132kV/400kV overhead power line. A Battery Energy Storage System (BESS) will be located next to the onsite 33/132kV substation. The storage capacity and type of technology would be determined at a later stage during the development phase, but most likely will comprise an array of containers, outdoor cabinets and/or storage tanks.

In terms of the Environmental Impact Assessment (EIA) Regulations, which were published on 04 December 2014 [GNR 982, 983, 984 and 985) and amended on 07 April 2017 [promulgated in Government Gazette 40772 and Government Notice (GN) R326, R327, R325 and R324 on 7 April 2017], various aspects of the proposed development are considered listed activities under GNR 327 and GNR 324 which may have an impact on the environment and therefore require authorisation from the National Competent Authority (CA), namely the Department of Forestry, Fisheries and Environment (DFFE), prior to the commencement of such activities. Specialist studies have been commissioned to assess and verify the project under the new Gazetted specialist protocols.

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 areas. The report aims to inform the EIA in the development of a comprehensive EMP 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 study was compiled by PGS and its appointed specialists and is detailed below:

The staff at PGS has a combined experience of nearly 90 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.

Ms. Nikki Mann, 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).

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).

Mrs. Elize Butler, author of the Palaeontological Impact Assessment (PIA), is the palaeontologist of Banzai Environmental (Pty) Ltd. She has conducted approximately 400 palaeontological impact assessments for developments in the Free State, KwaZulu-Natal, Eastern, Central, and Northern Cape, Northwest, Gauteng, Limpopo, and Mpumalanga. She has an MSc (*cum laude*) in Zoology (specializing in Palaeontology) from the University of the Free State, South Africa and has been working in Palaeontology for more than twenty-nine years. She has experience in locating, collecting, and curating fossils, including exploration field trips in search of new localities in the Karoo Basin. She has been a member of the Palaeontological Society of South Africa (PSSA) since 2006 and has been conducting PIAs since 2014.

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, aimed at locating and documenting sites falling within and adjacent to the proposed development footprint.

The fieldwork for the HIA was conducted by a qualified archaeologist (Nikki Mann) and field assistant (22-27 September 2021). An additional survey of the Klipkraal WEFs 1-3 final development area was conducted by a qualified archaeologist (Henk Steyn) and field assistant (Xander Fourie) from PGS (8-10 November 2022).

The fieldwork for the PIA was completed by a palaeontologist, Elize Butler, over a two day-site-specific field survey of the development footprint during the period 24-26 September 2021 (as described in the PIA).

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.

2.1.1 Archaeological specific methodology

Additional to the preceding methodological description the archaeological methodology included fulfilling the requirements of the NHRA (section 35 and 36) that protects the following features in the landscape:

- 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;
- Graves and burial grounds, including ancestral graves, royal graves, graves of traditional leaders, graves of victims of conflict, historical graves and cemeteries, and other human remains not covered by the Human Tissue Act (1983) (Act No 65 of 1983).

2.1.2 Palaeontological specific methodologies

In summary, the approach to PIA was as follows. Fossil bearing rock units occurring within the broader study area is determined from geological maps and relevant geological sheet explanations as well as satellite images. Known fossil heritage in each rock unit is inventoried from scientific literature, previous assessments of the broader study region, and the author's field experience and palaeontological database. Based on this data as well as field examination of representative exposures of all major sedimentary rock units present, the palaeosensitivity of the development area and impact significance of the proposed development is assessed together with recommendations for any further specialist palaeontological studies or mitigation. This PIA was undertaken in line with the HWC 2021 Minimum Standards for the palaeontological component of heritage impact assessment.

2.2 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.	May be declared as a National Heritage Site managed by SAHRA. Specific mitigation and scientific investigation can be permitted in	Highest Significance

Grading	Description of Resource	Examples of Possible Management Strategies	Heritage Significance
	Current examples: Langebaanweg (West Coast Fossil Park), Cradle of Humankind	certain circumstances with sufficient motivation.	
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 Ngwao-Boswa Jwa Kapa Bokone is the Provincial Heritage Resources Authority of the Northern Cape Province (Ngwao-Boswa). 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. Current examples: St George's Cathedral, Community House	May be declared as a Provincial Heritage Site managed by Ngwao-Boswa.	Exceptionally High Significance
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.		

Grading	Description of Resource	Examples of Possible Management Strategies	Heritage Significance
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 and the mountainous terrain of the farms which made access and thus coverage of the farms difficult. The size of the survey areas also meant that we were unable to assess every proposed wind turbine. It was decided to place more focus on specific sensitive areas (incl. ridges, pans, river valleys) which were considered more likely to contain 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.

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. If 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**.

In terms of the PIA, the following identified limitations should be noted:

The focal point of geological maps is the geology of the area and the sheet explanations of the Geological Maps were not meant to focus on palaeontological heritage. Many inaccessible regions of South Africa have never been reviewed by palaeontologists and data is generally based on aerial photographs alone. Locality and geological information of museums and universities databases have not been kept up to date or data collected in the past have not always been accurately documented.

Comparable Assemblage Zones in other areas is also used to provide information on the existence of fossils in an area which has not documented in the past. When using similar Assemblage Zones and geological formations for Desktop studies it is generally **assumed** that exposed fossil heritage is present within the footprint. A field-assessment has thus been conducted to improve the accuracy of the desktop assessment.

4. TECHNICAL DESCRIPTION

4.1 Project Location

The proposed WEF is located approximately 35km south-east of Fraserburg, in the Northern Cape Province and is within the Karoo Hoogland Municipality (**Figure 6)**.

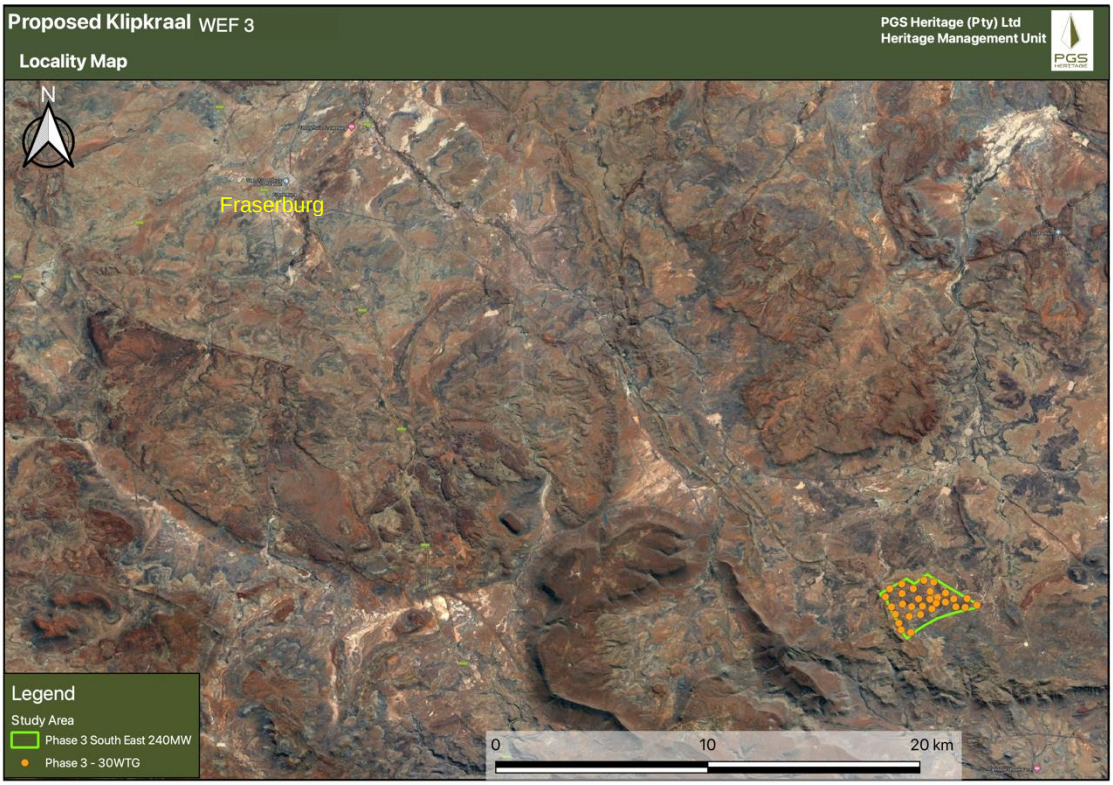


Figure 6: Regional Context Map.

4.1.1 WEF

The WEF application site as shown on the locality map below (**Figure 7**) incorporates the following farm portions:

- Remainder of the Farm Matjiesfontein No. 409 (RE/409)
- Remainder of the Farm Klipfontein No. 447 (RE/447)
- Portion 1 of the Farm Klipfontein No. 447 (1/447)

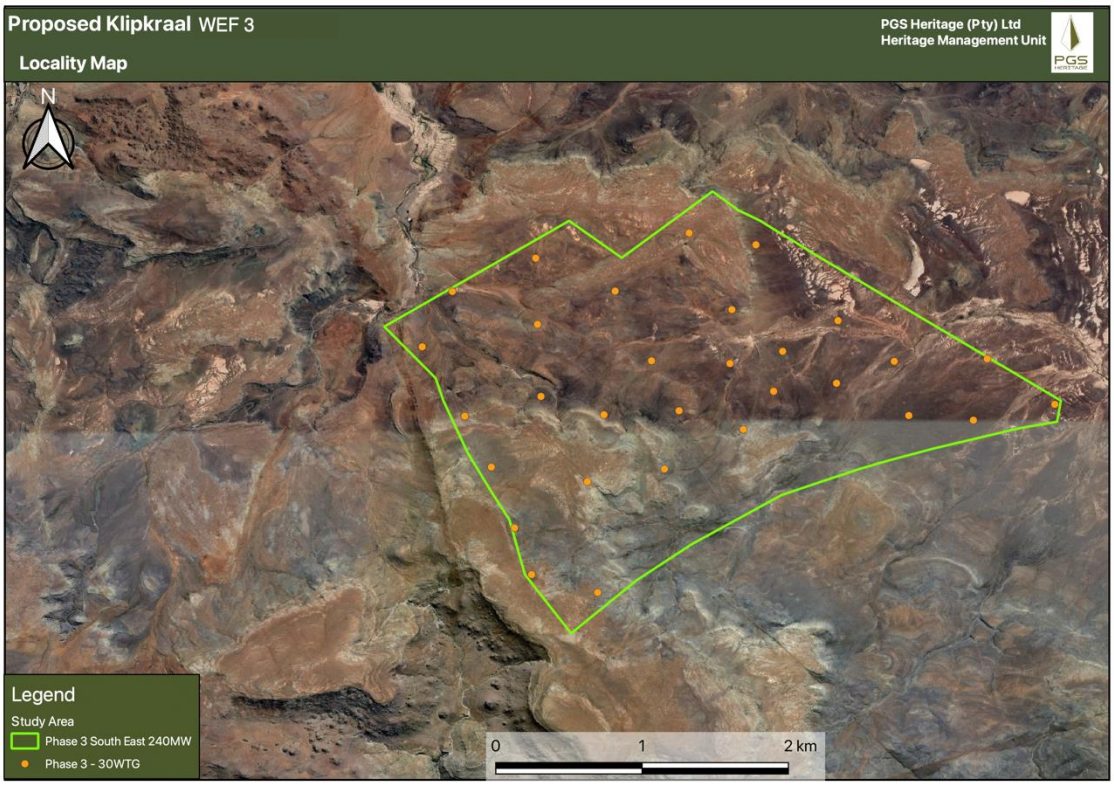


Figure 7: Klipkraal WEF 3 Site Locality.

4.2 Project Description

It is anticipated that the proposed Klipkraal WEF 3 will comprise sixty (60) wind turbines with a maximum total energy generation capacity of up to approximately 300MW. The electricity generated by the proposed WEF development will be fed into the national grid via a 132kV overhead power line. The location of the BESS and substation will be confirmed during the EIA phase. The storage capacity and type of technology would be determined at a later stage during the development phase, but most likely will comprise an array of containers, outdoor cabinets and/or storage tanks.

4.2.1 Wind Farm Components

The proposed wind farm projects which form part of the larger Klipkraal WEF will each include the following components:

4.2.1.1 Wind Turbines

Wind Energy Facility	Capacity	No. of turbines
1	300 MW	60
2	300 MW	60
3	**300 MW**	**60**
4	300 MW	60
5	300 MW	60

- Approximately 60 turbines per wind farm, with a maximum export capacity of up to approximately 300MW for each wind farm. This will be subject to allowable limits in terms of the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) or any other program.
- Each wind turbine will have a maximum hub height of up to approximately 200m;
- Each wind turbine will have a maximum rotor diameter of up to approximately 200m;
- Permanent compacted hard standing areas / platforms (also known as crane pads) of approximately
- 100m x 100m (total footprint of approx. 410 000m^2) per wind turbine during construction and for on- going maintenance purposes for the lifetime of the proposed wind farm projects. This will however depend on the physical size of the wind turbine;
- Each wind turbine will consist of a foundation (i.e., foundation rings) which may vary in depth, from approximately 3m and up to 10m or greater, depending on the physical size of each wind turbine. It should be noted that the foundation can be up to as much as approximately 700m^3.

4.2.1.2 Electrical Transformers

- Electrical transformers will be constructed near the foot of each respective wind turbine in order to step up the voltage to 66kV.
- The typical footprint of the electrical transformers is up to approximately 10m x 10m, but can be up to 20m x 20m at certain locations;

4.2.1.3 Step-up/Collector Substations

- New 11-66/132-400kV step-up / collector substations, each occupying an area of up to approximately 2ha, for each wind farm being proposed [i.e., one (1) substation per phase].
- The proposed substations will include an Eskom portion and an Independent Power Producer (IPP) portion, hence the substations have been included in each respective wind farm EIA and in the grid connection infrastructure BA (substations, switching stations and power lines) to allow for handover to Eskom.
- Following construction, the substations will be owned and managed by Eskom. The current applicant will retain control of the medium voltage components (i.e., 400kV components) of the

substations, while the high voltage components (i.e., 132kV components) of these substations will likely be ceded to Eskom shortly after the completion of construction.

4.2.1.4 Main Transmission Substations (MTS)

- Two (2) new 132/400kV Main Transmission Substations (MTS) are being proposed, occupying an area of up to approximately 120ha each.
- Each proposed MTS will include an Eskom portion and an IPP portion. However, a separate substation has also been included in each respective wind farm EIA and in the grid connection infrastructure BA to allow for handover to Eskom.
- Following construction, the substations will be owned and managed by Eskom. The current applicant will retain control of the 132-400kV and lower voltage components of each MTS, while the 132/400kV voltage components of each MTS will likely be ceded to Eskom shortly after the completion of construction;

4.2.1.5 Electrical Infrastructure

- The wind turbines will be connected to the proposed substations via medium voltage (i.e., 33kV) cables.
- These cables will be buried along access roads wherever technically feasible, however, the cables can also be overhead (if required);
- Each WEF will then connect to the MTS via a 400kV line.

4.2.1.6 Battery Energy Storage Systems (BESS)

- A Battery Energy Storage System (BESS) will be constructed for each respective wind farm [i.e., one (1) BESS per phase] and will be located next to the 33-66/132-400kV step-up / collector substations which form part of the respective wind farms, or in between the wind turbines.
- It is anticipated that the type of technology will be either Lithium Ion or Sodium-Sulphur (or as determined prior to construction).
- These batteries are not considered hazardous goods as they will be storing ‘energy’.
- The size, storage capacity and type of technology will be determined / confirmed prior to construction.

4.2.1.7 Roads

- Internal roads with a width of up to approximately 15m will provide access to each wind turbine.
- Existing site roads will be used wherever possible, although new site roads will be constructed where necessary.

- Existing site roads may also be upgraded using temporary concrete stones in order to accommodate for the heavy loads.
- Turns will have a radius of up to 50m for abnormal loads (especially turbine blades) to access the various wind turbine positions.

4.2.1.8 Site Access

- The proposed wind farm application sites will be accessed via existing gravel roads from the R353 Regional Route.

4.2.1.9 Temporary Staging Areas

- Temporary staging areas will be required for each wind farm and will be located both at the foot of each wind turbine and at the storage facility (i.e., turbine development area) to allow for working requirements.
- One (1) temporary staging area per wind turbine / range of wind turbines will be required for each wind farm (i.e., for each phase).
- Temporary staging areas will cover an area of up to approximately 100m x 100m (10 000m2 / 1ha) each.

4.2.1.10 Temporary Construction Camps

- Temporary construction camps will be required during the construction phase. One (1) temporary construction camp per wind farm is being proposed [i.e., one (1) per phase].
- This area will be used as a permanent maintenance area during the operational phase. One (1) permanent Maintenance Area will be required per wind farm [i.e., one (1) per phase].
- Each combined Temporary Construction Camp / Permanent Maintenance Area will cover an area of up to approximately 2.25ha.
- A cement batching plant as well as a chemical storage area will fall within each Temporary Construction Camp and Permanent Maintenance Area.
- Each Temporary Construction Camp and Permanent Maintenance Area will be strategically placed around the proposed wind farm sites and will avoid all high sensitivity and/or 'no-go' areas.

4.2.1.11 Offices, Accommodation, a Visitors' Centre and Operation & Maintenance (O&M) Buildings

- Offices (including ablution facilities), Accommodation (including ablution facilities), a Visitors' Centre and Operation & Maintenance (O&M) buildings will be required and will occupy areas of up to approximately 100m x 100m (i.e., 1ha).
- Each wind farm (i.e., each phase) will have its own O&M building and Office, however, the Accommodation and Visitors' Centre will be centralised locations which will be shared between certain wind farm projects (i.e., shared between certain phases which will be confirmed at a later stage).

4.2.1.12 Septic Tank and Soak-Away Systems

- Each wind farm will consist of septic tank and soak-away systems.
- This will be required for construction as well as long term use.
- Septic tanks and soak-away systems will be placed 100m or more from water resource (which includes boreholes).

4.2.1.13 Wind Measuring Lattice Masts

- Two (2) wind measuring lattice masts (approximately 120m in height) have already been strategically placed within the wind farm application sites in order to collect data on wind conditions.
- Two (2) additional wind measuring lattice masts may be installed within the wind farm application sites. This will be confirmed at a later stage, prior to the respective application forms being submitted.

4.2.1.14 Fencing

- Fencing will be required and will surround each respective wind farm.
- A maximum height of 3m for the fencing is proposed. The area which the fencing will cover will be confirmed during the detailed design phase, prior to construction commencing. The type of fencing to be used will be either palisade or diamond/clear view/mesh.
- Fences will however be constructed according to specifications recommended by the Ecologist and Avifauna specialist (as per the EMPr).

4.2.1.15 Temporary Infrastructure to Obtain Water from Available Local Sources

- Temporary infrastructure to obtain water from available local sources will be required. Water may also be obtained from onsite boreholes and from the town of Fraserburg.

- New or existing boreholes, including a potential temporary above ground pipeline (approximately 50cm in diameter) for each wind farm, to feed water to the sites are being proposed.
- Water will potentially be stored in temporary water storage tanks.

4.2.1.16 Temporary Containers

- Temporary containers of up to approximately 80m3 will be required for the storage of fuel on-site during the construction phase of each wind farm.
- As mentioned, a chemical storage area will fall within the Temporary Construction Camp and permanent Maintenance Area.

4.3 Layout Alternatives

4.3.1 Wind Energy Facility

Design and layout alternatives will be considered and assessed as part of the EIA. These include alternatives for the Substation locations and also for the construction / laydown area.

4.3.2 No-go Alternative

The 'no-go' alternative is the option of not undertaking the proposed WEF infrastructure project. 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 SAHRA 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. SAHRA 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 SAHRA:

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 SAHRA is required when the proposed development triggers one or more of the following activities:
Permitting requirements for demolition of built environment features:

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 BA 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 in terms of Section 38(8) of the National Heritage Resources Act. The commenting authority is the 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 palaeontological (2012) assessments[1] were published by SAHRA and Heritage Western Cape[2][3], 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***) and a very high to medium palaeontological significance (**Figure *9***).

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	Section 6	-

[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).*

environmental sensitivity as identified on the national web-based environmental screening tool, such as new developments, infrastructure, indigenous/pristine vegetation, etc.		
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.	-

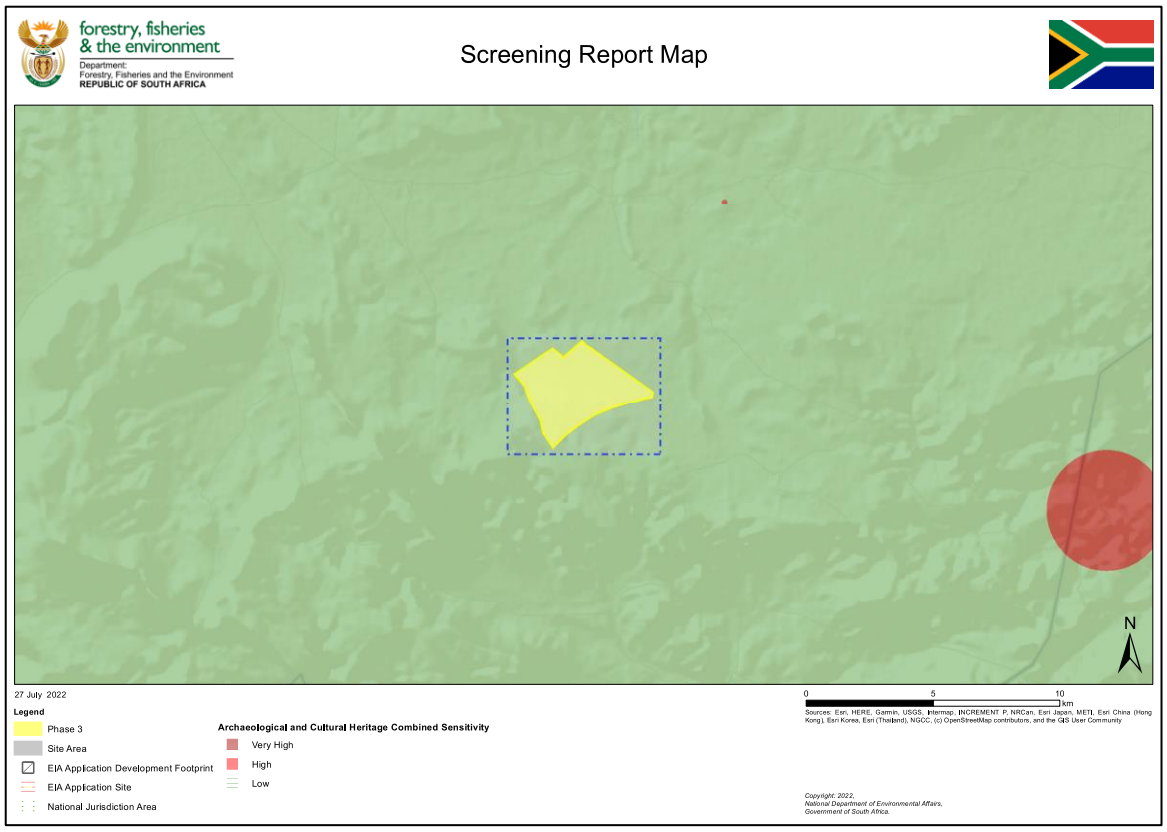


Figure 8: Archaeological sensitivity map for Klipkraal WEF 3 project area abstracted from the DFFE Screening tool.

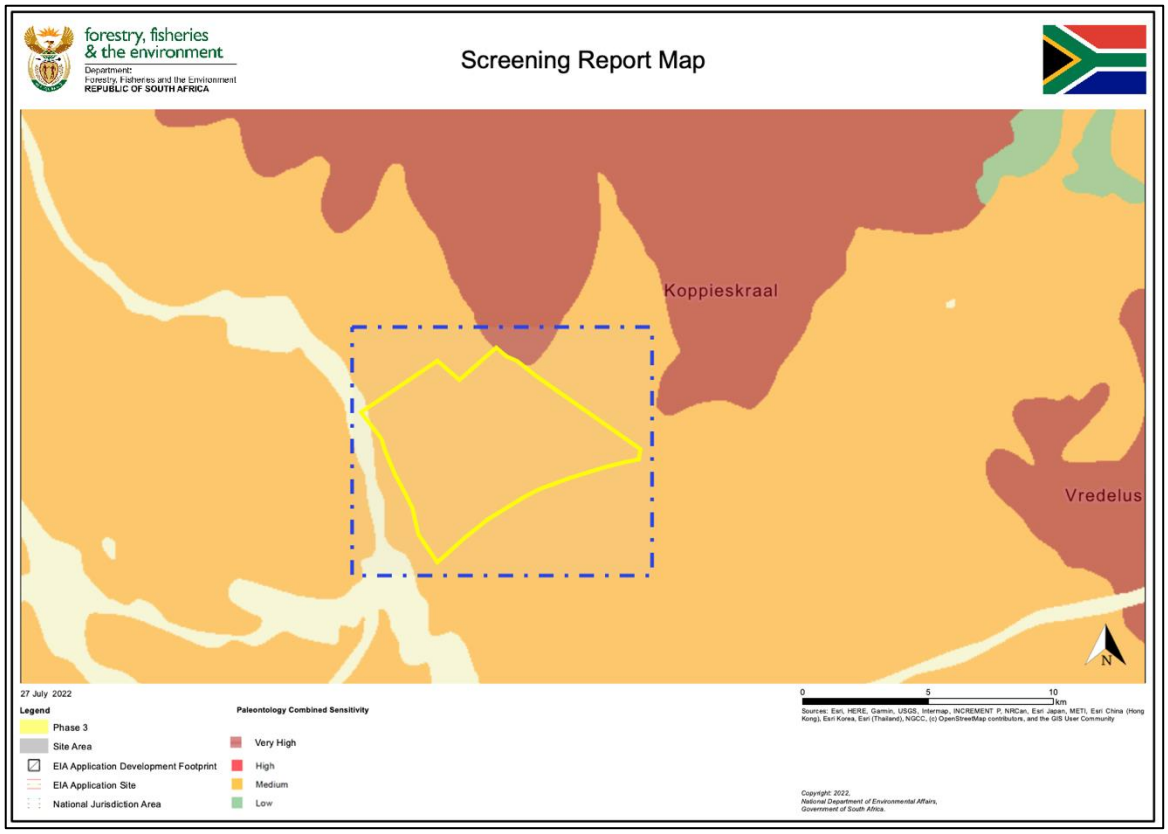


Figure 9: Palaeontological sensitivity map for Klipkraal WEF 3 project area abstracted from the DFFE Screening tool.

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

In this section, the general description of the Klipkraal WEF region is described based on a site visit that was conducted by an archaeologist and field assistant from the 22nd-27th September 2021.

The proposed Klipkraal WEF is located near Fraserburg, in the Northern Cape Province and is within the Karoo Hoogland Municipality. The study area is accessed via the tar R356, gravel roads and farm tracks (**Figure 28**). Existing infrastructure includes farmsteads with associated structures, fences (**Figure 29**), drystone walling (**Figure 27**), windmills, dams (**Figure 22**) and borrow pits (**Figure 25**). Radio masts and trigonometric beacons were also observed within the study area.

The study area is situated in the Nama-Karoo region of the Northern Cape. Most rainfall occurs during the summer period and the majority of the rivers in the region are non-perennial (**Figure 15, Figure 16**). Currently, the region has been experiencing drought conditions for the last 8 years. Summers are hot, with temperatures greater than 30°C, and winters cold with minimums of 0°C.

The topography is comprised of flat plains, rocky scree slopes (**Figure 17**) and mountainous regions ranging from approximately 1380 amsl to 1900 amsl (**Figure 10**, **Figure 11**, **Figure 12**, **Figure 13**, **Figure 14**). The area is underlain by a succession of sedimentary rocks comprising Beaufort and Ecca Group fossiliferous shale, mudstone and sandstone units. The sedimentary units are intruded by numerous igneous dykes and sills (**Figure 18**, **Figure 19**). Soils are generally shallow with large areas of exposed rock outcrop. Several areas of the study area are characterised by aeolian sands with widespread deflation zones (**Figure 21**, **Figure 23**). Erosion in the area includes sheet wash, gully erosion, rill erosion and aeolian erosion (**Figure 24**). The wind erosion accounts for many of the sandy areas within the study area's plains and flat mountain/hill tops (**Figure 20**). Bioturbation was evident throughout the study area and included aardvark/porcupine burrows (**Figure 26**), rabbit/mole warrens and widespread tracks caused by the movement of sheep.

Vegetation cover is dominated by low (dwarf) shrubs intermixed with grasses, succulents, geophytes and annual forbs (Mucina & Rutherford, 2006). As a result, the archaeological visibility of the area was ideal for surveying. Taller shrubs and trees occur along drainage lines and on rocky outcrops. Drought and overgrazing accounts for the stunted and limited distribution of vegetation. The main form of agriculture in the region is sheep farming. Other livestock encountered included horses and small game.

Figure 10: Typical Karroo landscape of low-lying plains with flat topped hills and mountains (facing south).

Figure 11: Hill and mountainous region with flat-lying stratigraphy (facing south).

Figure 12: General view from southern portion of the additional proposed wind farm, showing a deflation zone in the distance with sparsely vegetated stony and sandy soils.

Figure 13: Scree slope developed at the base of a hill with numerous angular rock fragments.

Figure 14: Common rock pavement found in the region.

Figure 15: Ephemeral stream developed at base of hill.

Figure 16: Typical ephemeral stream in low-lying area with coarse grained sands.

Figure 17: Rocky slope comprising sandstone-mudstone rock fragments.

Figure 18: Flat lying Karroo sediments with gabbro-dolerite sill at the top of Klipkraal se Berg (near southwestern farm boundary).

Figure 19: Resistant gabbro outcrop at top of hill with commonly occurring rounded boulders in the northern portion of the additional proposed wind farm area.

Figure 20: Aeolian orange-brown sands on low-lying plain.

Figure 21: Deflation zone commonly observed within low-lying plains in the study area.

Figure 22: Large dry dam observed in the study area.

Figure 23: Deflation zone with typical mud cracks.

Figure 24: Typical erosion of orange-brown soils at base of hill (near western farm boundary).

Figure 25: One of numerous borrow pit in the study area.

Figure 26: Typical bioturbation occurring in the region.

Figure 27: Dry stone walling observed within the study area.

Figure 28: Farm track observed on the property (facing north).

Figure 29: Fencing demarking farm grazing areas.

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 and Historical Maps

The examination of historical data and cartographic resources represents a critical tool for locating and identifying heritage resources and in determining the historical and cultural context of the study area. Relevant topographic maps and satellite imagery were studied to identify structures, possible burial grounds or archaeological sites present in the footprint area.

Historical topographic maps (1:50 000) for various years (1972, 1986, 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, ruins 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.

The relevant topographical maps include:

- Extract from Cape of Good Hope, **1836**. (**Figure 30**)
- Extract from South Africa (with) Environs of the Cape, **1883 (Figure 31**)
- Beaufort West, **1901 (Figure 32)**
- Beaufort West, **1901**. 3rd ed (**Figure 33**)
- First Edition- 3221BB Topographical Sheet was based on aerial photography undertaken in 1965, was surveyed in **1972** and was drawn in 1973 by the Director – General of Surveys.
- Second Edition- 3221BB Topographical Sheet Published by the Chief Director of Surveys and Mapping, Mowbray, **1986**

Furthermore, from the Chief Surveyor-General database (http://csg.dla.gov.za/) the following Farm was surveyed:

- Farm Klipfontein 447 was surveyed by (Sgd.) Capt. Bird in June 1830 for the Widow of Johan George Seiberhagen (**Figure 34**)

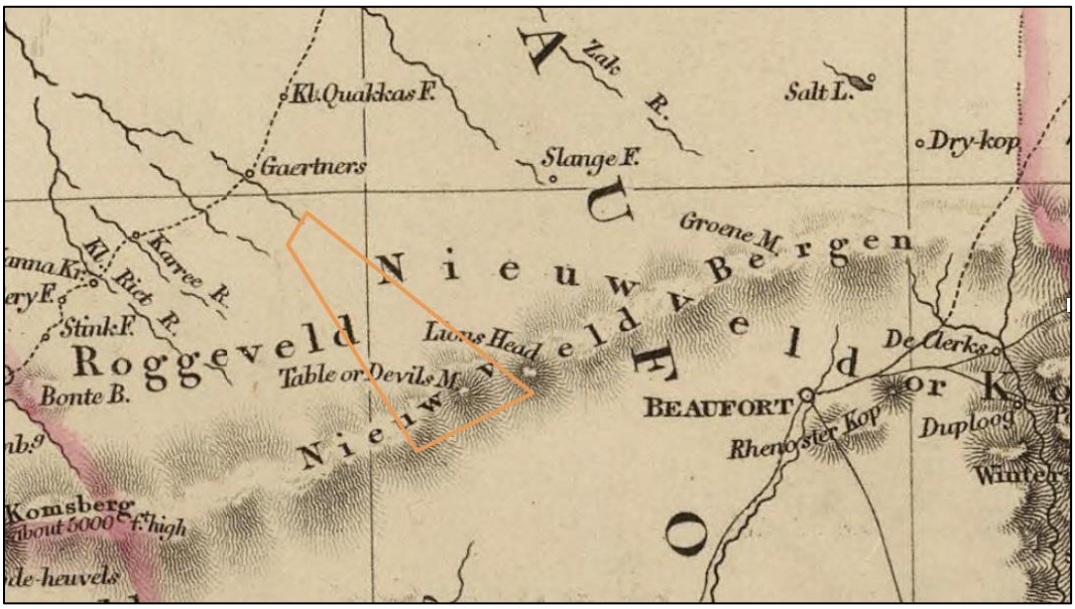


Figure 30: Extract from the Topographical map Cape of Good Hope dating 1836. The approximate location of the *Klipkraal WEF* study area is indicated (orange polygon). (Publisher: John Arrowsmith)[4]

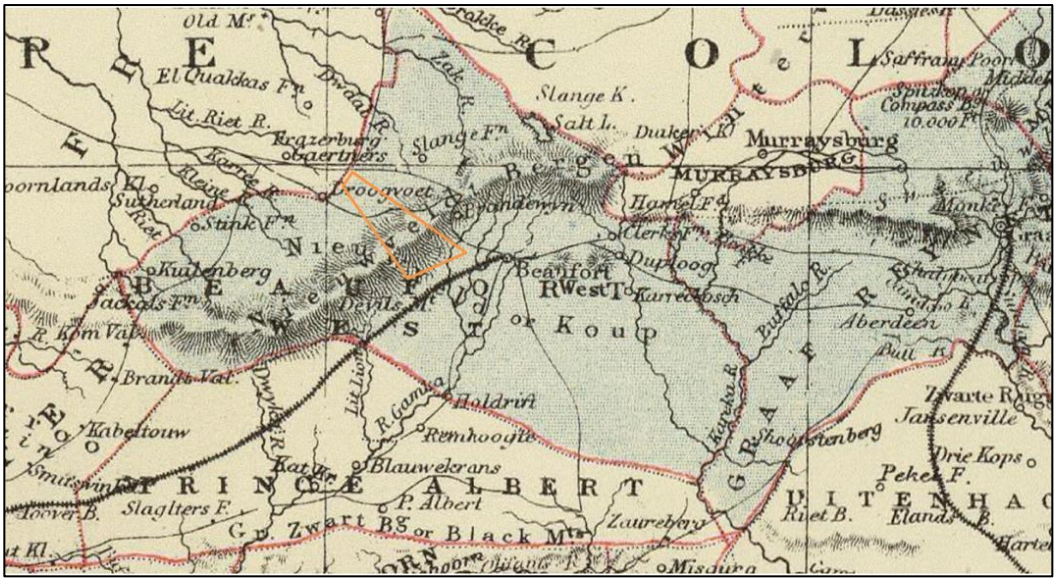


Figure 31: Extract from South Africa (with) Environs of the Cape Topographical map dating to 1883. The approximate location of the study area is indicated (orange polygon). (Publisher: Letts, Son & Co.)[5]

[4] https://www.davidrumsey.com/luna/servlet/detail/RUMSEY~8~1~33872~1170024:Cape-of-GoodHope-?sort=Pub_Date%2CPub_List_No_InitialSort&qvq=w4s:/where%2FAfrica%25252C%2BSouthern%2FSouth%2BAfrica;q:%22%20;sort:Pub_Date%2CPub_List_No_InitialSort;lc:RUMSEY~8~1&mi=6&trs=34

[5] https://www.davidrumsey.com/luna/servlet/detail/RUMSEY~8~1~31457~1150413:South-Africa-?sort=Pub_Date%2CPub_List_No_InitialSort&qvq=w4s:/where%2FAfrica%25252C%2BSouthern%2FSouth%2BAfrica;q:%22%20;sort:Pub_Date%2CPub_List_No_InitialSort;lc:RUMSEY~8~1&mi=21&trs=34

Figure 32: Extract from the Topographic map Beufort West, dating to 1901 showing several farm names in the project area (Matjes Fontein: green polygon; Klipkraal: purple polygon)[6].

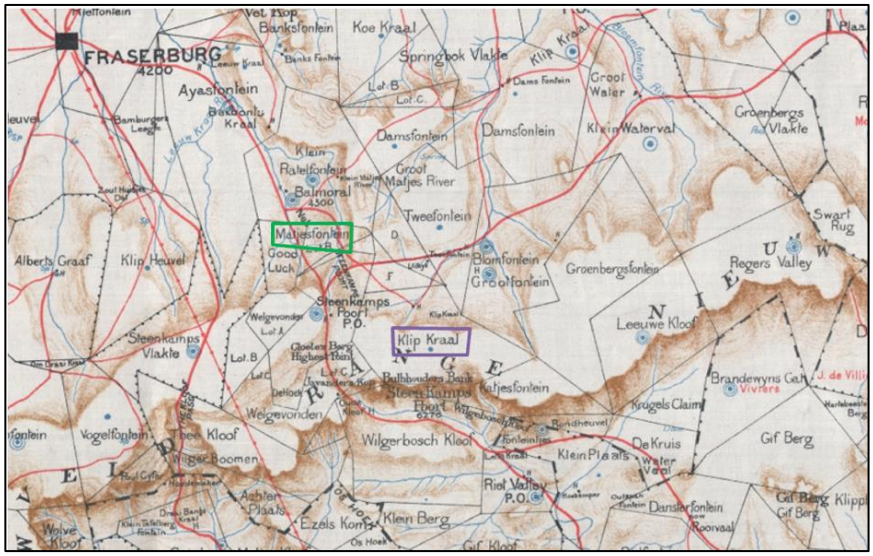


Figure 33: Extract from the 3rd edition Topographic map Beaufort West, dating to 1901 showing several farm names in the project area (Matjes Fontein: green polygon; Klipkraal: purple polygon) (University of Cape Town Libraries).

[6] Board, C. "Certainly better than nothing at all" : a re-examination of the Imperial map of South Africa 1899-1902. Proceedings of the 21st International Cartographic Conference, Durban, 2003. Available online: http://icaci.org/files/documents/ICC_proceedings/ICC2003/Papers/109.pdf (accessed 15 Sept. 2021)., "This map is not to be considered as absolutely accurate."

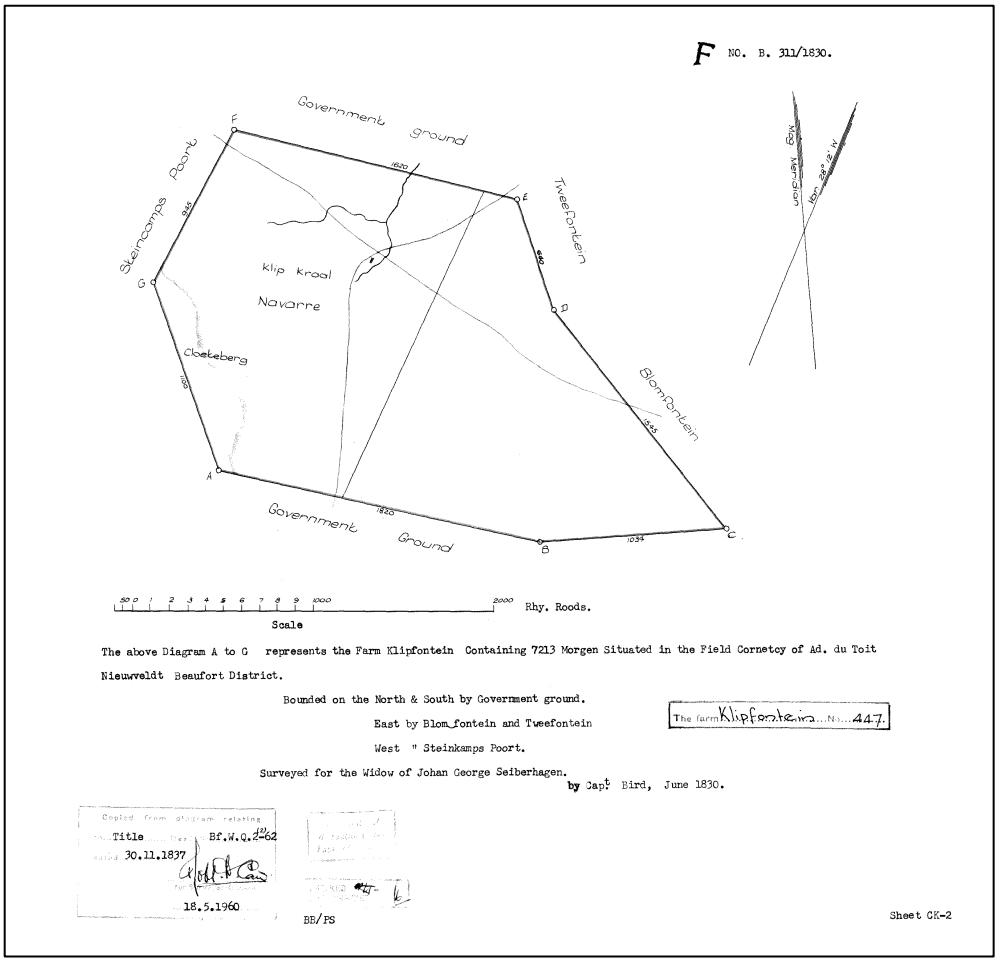


Figure 34 SG-Diagram from the Chief Surveyor-General database for Farm Klipfontein 447 was surveyed by (Sgd.) Capt. Bird in June 1830 for the Widow of Johan George Seiberhagen.

7.1.1 1: 50 000 Topographical Map 3221BB - First Edition 1972

A section of the First Edition of the 3221BB Topographical Sheet is depicted in **Figure 35**. The map was compiled from aerial photography undertaken in 1965, was surveyed in 1972 and was drawn in 1973 by the Director – General of Surveys.

One structure (kraal) was identified adjacent to the area proposed for wind turbines. The structure depicted is likely to be at least 50 years old.

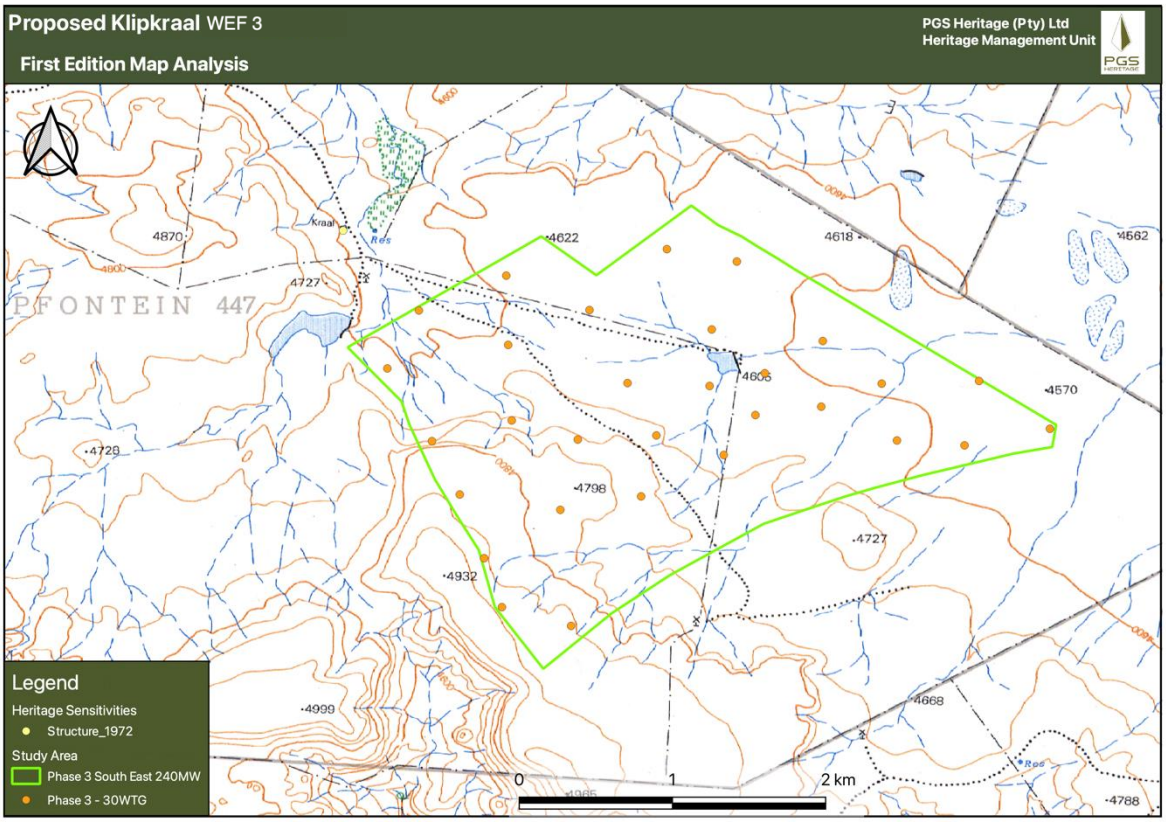


Figure 35: Section of the topographical map 3221BB – First Edition, showing the historical structure (kraal; yellow waypoint) located adjacent to the proposed development area.

7.2 Aspects of the area's history

7.2.1 Previous Heritage Studies in the 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, including the immediate vicinity of the study area, have yet to be subjected to systematic analytical research. As a result, the discussion below is based on research undertaken in areas which are further afield.

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 this region 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.

More intensive occupation of the Karoo started around 13 000 years ago during the LSA (Webley and Hart, 2010c). Distinctive stone tool assemblages, referred to as the Lockshoek have been identified in the region and characteristic of this period is large knife-like tools with natural backing. Large scrapers are also common. The Lockshoek industry disappears abruptly around 9000 years ago (Webley & Hart, 2010c). The Karoo seems to have been largely unoccupied until 4500 BP, presumably as a result of drier conditions.

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 (which may contain stone artefacts, ostrich eggshell fragments and ceramics). As such, the artefacts are generally not *in-situ* and organic remains are rarely preserved.

A review of SAHRIS has revealed that a very limited number of other archaeological studies have been performed within close proximity to the study area:

- ***Dreyer, C. 2004. Archaeological and historical investigation of the proposed developments at the sewerage dams, Fraserburg, Northern Cape.*** *The study area is located approximately 20km northwest of the current study area. No archaeological or historical material was found in the inspected area.*
- ***Webley, L. & Hart, T. 2010c. Scoping Archaeological Impact Assessment: Proposed prospecting on Blydevooruitzicht 299 (site 5), Fraserburg, Northern Cape****. Webley and Halkett (The Archaeology Contracts Office, ACO) were appointed by Tasman Pacific Minerals (Pty) Ltd to conduct a scoping AIA report. The project area was situated 20km north of Fraserburg on the road to Williston (40km northwest from the current study area). Two stone artefact scatters and a small stone shepherd's house were identified outside of the proposed drill area on the Blydevooruitzicht North site. On the Blydevooruitzicht South site, a dense cluster of stone artefacts, ostrich eggshell fragments and three potsherds were identified outside of the proposed drilling area.*
- ***Webley ,L. & Hart, T. 2010d. Scoping Archaeological Impact Assessment: Proposed Prospecting on Kooker's Grafs Vlakte 221 and Slingers Fontein 491 (Site 45), Fraserburg, Northern Cape.*** *Webley and Halkett (The Archaeology Contracts Office, ACO) were appointed by Tasman Pacific Minerals (Pty) Ltd to conduct a scoping AIA report. The project area located off the gravel road between Fraserburg and Carnarvon. On Kooker's Grafs Vlakte they identified a number of Middle and Later Stone Age artefact scatters. They also identified a single "Lockshoek" scraper. There was also a small stone kraal and stone*

"oven" suggesting that a shepherd may have lived in the area for a while, presumably during the 20th century. On Slingers Fontein they identified a few scatters of stone tools (Early and Middle Stone Age) on the site; however the densest accumulation of stone tools occurred outside of the study area around a large pan. There also identified a stone structure, presumably a shepherd's overnight hut dating to the 20th century, on a ridge.

- **Orton, J. 2022. Heritage Impact Assessment: Proposed Hoogland 3 Wind Farm and Hoogland 4 Wind Farm, Beaufort West Magisterial District, Western Cape and Fraserburg Magisterial District, Northern Cape.** *Orton was appointed by SLR South Africa Consulting (Pty) Ltd, on behalf of Red Cape Energy (Pty) Ltd, to conduct a HIA report. The project area was situated approximately 50km east of Fraserburg (approx. 30km northeast of the current study area)." Large numbers of heritage resources occur in the area with the majority being historical archaeological sites and engravings. The former include ruined stone-walled structures of varying types and functions, ash and rubbish middens and other features related to historical occupation. The engravings include a variety of images but with horses and other animals the most common. Geometric images, carts and cars, people and Nine men's morris gameboards also occur in the engravings. Other resources include fossils, Stone Age artefact scatters (mostly LSA but also rare ESA/MSA), Stone Age rock engravings, graves and graveyards, buildings, the cultural landscape and places associated with living heritage (the latter are mostly recent engraving sites). "*

The studies listed below were conducted around the wider vicinity of study area of this report (ordered in descending order from closest to furthest):

- ***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 (40km south-southeast of the current study area). Low density scatters of mixed MSA and LSA artefacts were observed in a secondary context and were of low archaeological heritage significance.*
- ***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 (50km southeast of the current study area). Scattered and isolated lithics were found in the area. A trihedra, Acheulian or Victoria West I hand axe, 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.*

- ***Nilssen, P. 2010. Archaeological Impact Assessment: Proposed upgrade of Merweville Water Treatment Works, Merweville, Beaufort West Municipality, Central Karoo.*** *Nilssen was appointed by Aurecon South Africa (Pty) Ltd to conduct an AIA. The study area was within Merweville (65km south-southwest of the current study area). Apart from an old cemetery, no tangible heritage resources were recorded in the study area.*
- ***Deacon, H.J. 2005. Archaeological/Palaeontological Assessment: Merweville-Prince Albert Road 'Far North' Quarry Site.*** *Deacon was appointed by the client Site Plan Consulting. The study site was located 10km from Merweville (70km south-southwest of current study area). A stone slab with engravings of three female figures was known to occur on the property. There were isolated occurrences of stone artefacts but none in a context that would warrant further investigation.*
- ***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. The study area was approximately 5km south of Beaufort West (70km southeast of the current study area). 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 study area was approximately 5km east of Beaufort West (75km southeast of the current study area).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.*
- ***Nilssen, P. 2011. Archaeological Impact Assessment. Proposed Beaufort West Photovoltaic (Solar) Park: southern portion of properties; 2/158 Lemoenkloof, RE 9/161 Kuilspoort, RE 162 Suid-lemoensfontein and RE 1/163 Bulskop, Beaufort West, Western Province.*** *The study area was approximately 8km south east of Beaufort West (80km southeast of the current study area). 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.

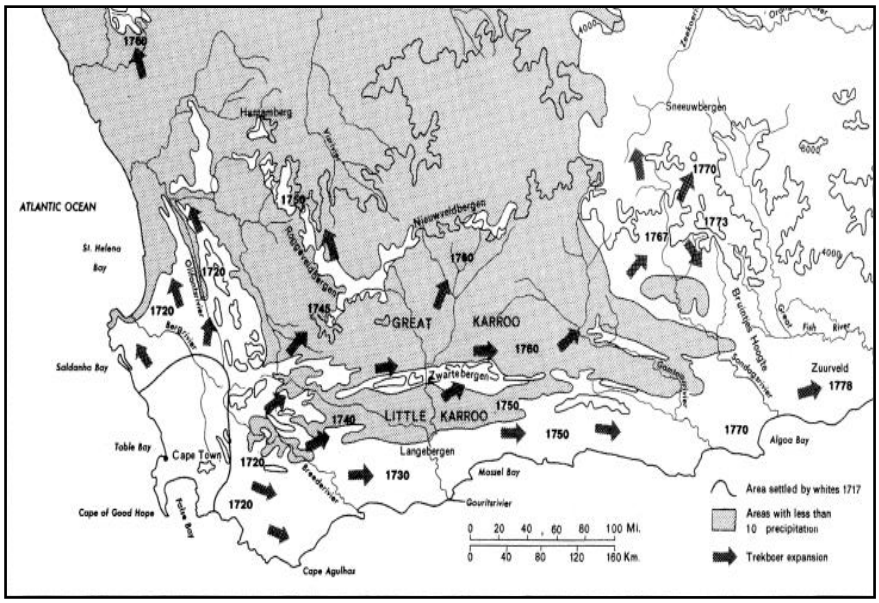
- ***Cape Archaeological Survey (CAS) cc and Associates. 2016. Heritage Impact Assessment: Proposed Construction of Two Power Lines & Three Substations for the Mainstream Wind Energy Facility. Land Parcel Beaufort West, Remainder of Farm Trakaskuilen No 15, Portion 1 Trakaskuilen No 15, Portion 1 of 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 (approximately 100km southeast of the current study area). 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.*
- ***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 (100km southeast of the current study area). 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. The study area was located approximately 110km southeast of the current study area. 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.*

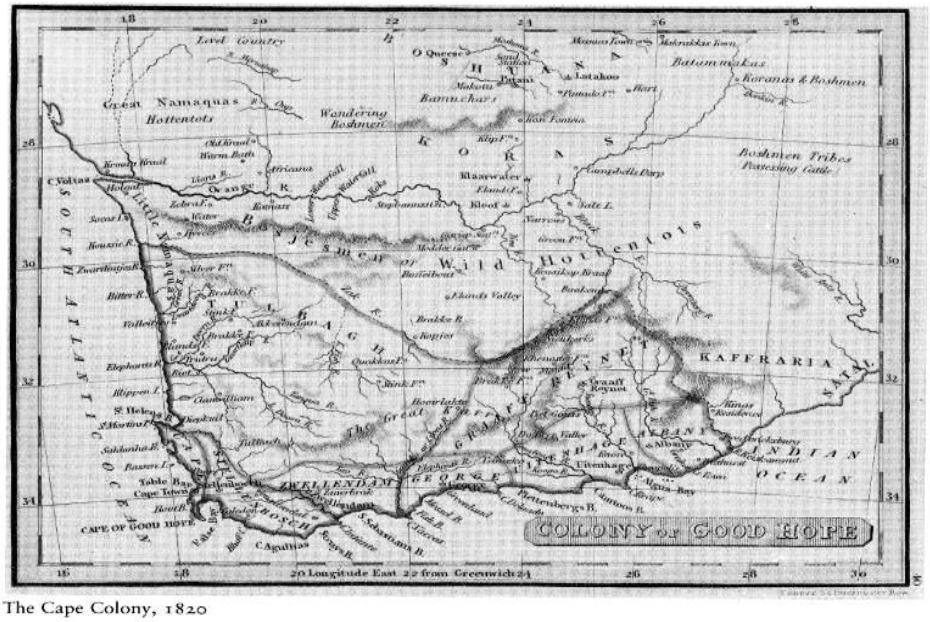
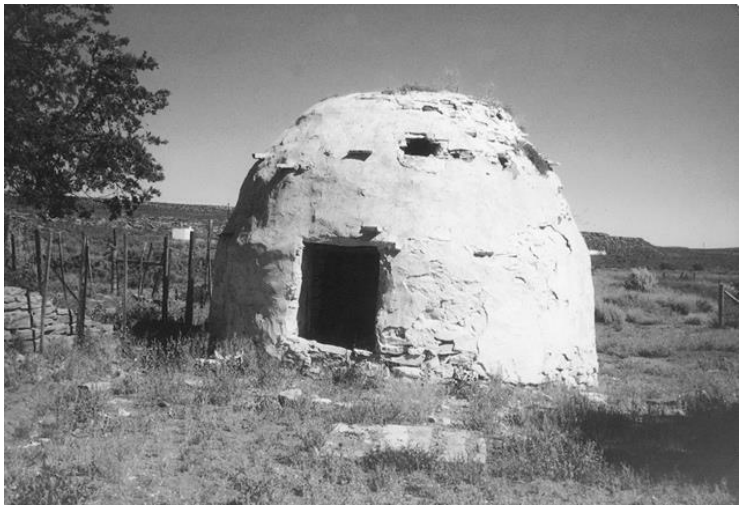
- ***Kinahan, J. 2008. Archaeological Baseline Survey of the Proposed Ryst Kuil Uranium Project.*** *Kinahan was appointed by Turgis Consulting (Pty) Ltd on behalf of UraMin-Mago-Lukisa JV Company (Pty) Ltd to conduct an archaeological baseline survey. The study area was located approximately 45km southeast 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 (crockery and rifle cartridges) were also noted.*

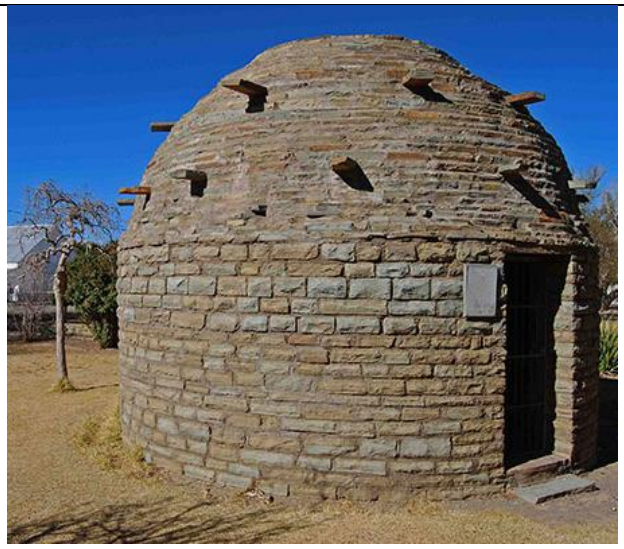
7.2.2 Archaeological and Historical Background

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

DATE	DESCRIPTION
Early Stone Age (2.5 million to 250 000 years ago)	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. Isolated ESA lithics, including occasional hand axes 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". *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.*
Middle Stone Age (250 000 to 40 000 years ago)	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. This phase is further associated with modern humans and complex cognition (Wadley, 2013). 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. *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.*
Later Stone Age (40 000 years ago to the historic past)	The Later Stone Age (LSA) is the third archaeological phase identified and is associated with an abundance of very small artefacts known as microliths. According to heritage reports conducted in the Beaufort West 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. *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.*
18th – 19th Century	Beaufort West historically was an important centre for sheep farming, trade and transport. This was also an area of interaction between various cultural groups. 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 Plateau and the Koup (*Figure 36*, *Figure 37*). The first Europeans to arrive in the region were Trekboers who arrived in 1759. This time was characterised by conflict and the dispossession of the San as more trekboere/migrant stock farmers moved onto the San's traditional hunting lands. The San were forced to move out of the area into what is today known as Bushmanland.  **Figure 36: Trekboer and colonial expansion by 1717-1788 in the study region (Reference: Guelke & Shell 1992: 818).**

	 The Cape Colony, 1820 **Figure 37: Early map of the Cape illustrates the expansion of farmers towards the east and northeast Karoo (Reference: Watson, R.L. 1990).**
1780	The first Europeans to settle in the Fraserburg area arrived in 1780. The first settler to be recorded as living in this part of the Karoo was Willem Steenkamp. The mountain range, Steenkampsberg, situated south of Fraserburg was named after this early settler.
19th century	The historically significant corbelled houses are unique to the Karoo area (**Figure 38**). They were built by early trekboers in the early 1800s as dwellings and granaries. The early settlers made use of the only building material abundantly available in the area, which was rock. A replica corbelled house was constructed in front of the Fraserburg town hall in 1991 (**Figure 39**).  **Figure 38: Historic photograph of a Corbelled house (https://fraserburgtourism.co.za/attractions/).**

	 **Figure 39: Replica Corbelled House outside the Fraserburg Town Hall (https://www.karoo-southafrica.com/western-upper-karoo/fraserburg/)**
1803	The remains of the early mission that was established to spread Christianity to the early inhabitants of the district, can be seen just outside Fraserburg at Kerkplaas[7]. The church and home of the Reverend J.J Kicherer was built in 1803 by the London Missionary Society.  **Figure 40: An undated photograph of a structure** **(http://www.karoohoogland.gov.za/fraserburg-photo-gallery/)**
1825	In 1825, the Scottish cleric Reverent Colin Fraser came to serve the Dutch Reformed congregation in Beaufort West as a minister. When he first arrived in Beaufort West, there was no a church available for his services. For many years, he held his services under a wagon canvas strung between two trees[8]. Five years later a church was finally constructed in Beaufort West.
1851	There was a substantial number of stock farmers in the district west of Beaufort West and in 1851, a parish was established for the Dutch Reformed Church. Fraserburg was founded in West Nuweveld and established on the farm Rietfontein[9]. The village was named after the Scottish cleric Reverent Colin Fraser and a church elder, Meyerburg (Raper, 2004). Fraser was in fact the father of the wife of the President of the Orange Free State, President M.T. Steyn[10].

[7] https://www.karoo-southafrica.com/western-upper-karoo/fraserburg/history-of-fraserburg/
[8] https://aridareas.co.za/roses-s-roundup/rev-colin-frasers-rural-ministry/
[9] https://www.karoo-southafrica.com/western-upper-karoo/fraserburg/history-of-fraserburg/
[10] https://www.karoo-southafrica.com/western-upper-karoo/fraserburg/history-of-fraserburg/

	 **Figure 41 : Reverend Colin Fraser (https://www.karoo-southafrica.com/western-upper-karoo/fraserburg/history-of-fraserburg/)**
1856	In 1856, the Old Parsonage (Ou Pastorie) in Fraserburg was built for the Reverend Carl Arnoldus Bamberger. He was the first minister to the newly established congregation[11].The church house is typical Cape Dutch in appearance, it has a reed roof, yellowwood floorboards, white washed walls and small window panes. The front entrance and discharge pipes are elaborate and four of the interior walls are curved. The celling boards were also made of yellowwood but they were replaced with pine in the early 1900s due to warping[12]. At one stage, it was the only formal building in the village. Today, the building houses a museum collection and an fossil exhibit.  **Figure 42: Ou Pastorie Museum (https://fraserburg.co.za/about-fraserburg/).**
1857-1860	Ostrich farming, in particular, feather 'farming', gained some economic importance in the region and supplemented the merino wool trade. The success of the ostrich feather industry in the Eastern Cape influenced farmers in the Northern Cape. Stone pens were built in order to

[11] https://www.karoo-southafrica.com/western-upper-karoo/fraserburg/history-of-fraserburg/
[12] https://fraserburg.co.za/about-fraserburg/

	enclose ostrich nesting habitats which were located along small drainages and rivers (Beyleveld, 1967).
1858	During the 19th century, the only transport in the region was by horse and horse drawn carriage. The post was delivered to Fraserburg by stagecoach from Beaufort West and the majority of farmers in the district only visited the town about four times a year for the Church Communion[13]. In 1858, a post office was established in Fraserburg.
1859	In 1859, a magistrate's office was opened in Fraserburg.
1860	A police station was opened in Fraserburg in 1860. The town's first medical doctor also arrived in the same year.
1861	In 1861, a hexagonal stone bell tower was built by a local artisan, Adam Jacobs. The 9m tall bell tower is known as the Peperbus ("Pepperpot"). It was constructed to serve as a market house and the bell was rung for the market. Through time, the tower was also utilised by multiple individuals and groups. In 1861, it was used as the magistrate's private office by Mr Balston. In 1862, it served as a council chamber when the village attained municipal status. In 1866, the tower became the town's first library in 1866. It became the School Board office in 1951 and later it was used as a storeroom[14]. The bell tower was proclaimed a National Monument in 1971 and it's now a Northern Cape provincial heritage site.  **Figure 43: Die Peperbus (https://fraserburg.co.za/about-fraserburg/).**
1862	On 6 June 1862, the town was declared a municipality[15].
1870	In 1870, the town's first attorney and noted Afrikaans author, H.W.A. Cooper moved to the town. It was in Fraserburg, that he wrote the "Boerebrieven" (farmers letter) in the Afrikaans newspaper *Het Volksblad.* Cooper was an Englishman who wrote under the pseudonym Samuel Zwaartman[16].

[13] https://www.karoo-southafrica.com/western-upper-karoo/fraserburg/history-of-fraserburg/
[14] "THE PEPPERPOT - Businesses in The Karoo". *www.karoo-information.co.za*. Retrieved 2021-09-13.
[15] https://fraserburgtourism.co.za/attractions/
[16] "Fraserburg". Karoo Hoogland. Retrieved 13 September 2021.

	 **Figure 44: Henry William Alexander Cooper (https://www.karoo-southafrica.com/western-upper-karoo/fraserburg/history-of-fraserburg/).**
1870	In 1870, a powder magazine was erected by John Findlay. It was used to store ammunition in case war should break out with the neighbouring Korannas under leadership of Kupido Pofadder and Klaas Springbok. It was also used by the British troops during the Anglo-Boer War[17]. The roof is dome-shaped to limit danger from fire. The power magazine still stands on the edge of the town.  **Figure 45: Historic photograph of the powder magazine (https://fraserburgtourism.co.za/attractions/).**

[17] http://www.karoohoogland.gov.za/fraserburg-tourist-attractions/

	 **Figure 46: Powder Magazine (https://fraserburgtourism.co.za/attractions/).**
1938	In 1938, Fraserburg's first power station was installed with 7 Lister Blackstone generators. The seven Lister Blackstone engines can still be seen in the town.  **Figure 47: Old Power Station.**

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 broader Klipkraal WEF project area based on the desktop assessment (**Figure *48***).

7.3.1 Heritage Screening

A Heritage Screening Report was compiled using the Department of Environment, Forestry and Fisheries 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 low rating as provided by the Environmental Screening Tool is possibly reflects scarcity of heritage reports conducted in the region. The field work that has to date been conducted in the study area did not reveal heritage resources of heritage significance but further fieldwork is required for better coverage of the study area. Therefore, the DFFE screening tool sensitivity map in **Figure *8*** cannot be confidently supported or challenged at this time.

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
- Graves/burial ground

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 site 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

Observation of the previous heritage reports has shown that archaeological sites are in abundance in the surrounding areas and especially near certain landscape features. This factor needs to be held in consideration.

7.3.3 Possible Heritage Finds

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). The analysis of the studies conducted in the area assisted in the development of the following landform to heritage find matrix in **Table 6**. Dry river courses have been referenced as having possible heritage sensitivity within the study area.

Table 6: Landform type to heritage find matrix

LAND FORM TYPE	HERITAGE TYPE
Crest and foot hill	LSA and MSA scatters
Pans/ dry river courses	LSA/MSA scatters
Outcrops	Occupation sites dating to LSA
Farmsteads	Historical archaeological material

The following areas within the study area have been referenced as having possible heritage sensitivity:

Drainage lines/ Dry water course

Drainage lines, such as dry riverbeds, erosion dongas as well as sheet erosion has been shown to yield rich archaeological deposits due to the exposure of archaeological material as well as the fact that human settlement is drawn to water sources in arid regions (Kruger 2012; Orton 2012; PGS 2012).

Ridges/Outcrops

Numerous ridges, koppies and mountains have been identified in the study area and are associated with human settlement and activity. Stonewalling from herders, rock engravings and knapping sites associated with Later Stone Age manufacturing technology is known to occur in these areas (Arthur, 2008, Kruger 2012; Orton 2012; PGS 2011 and 2012, Van Ryneveld 2008).

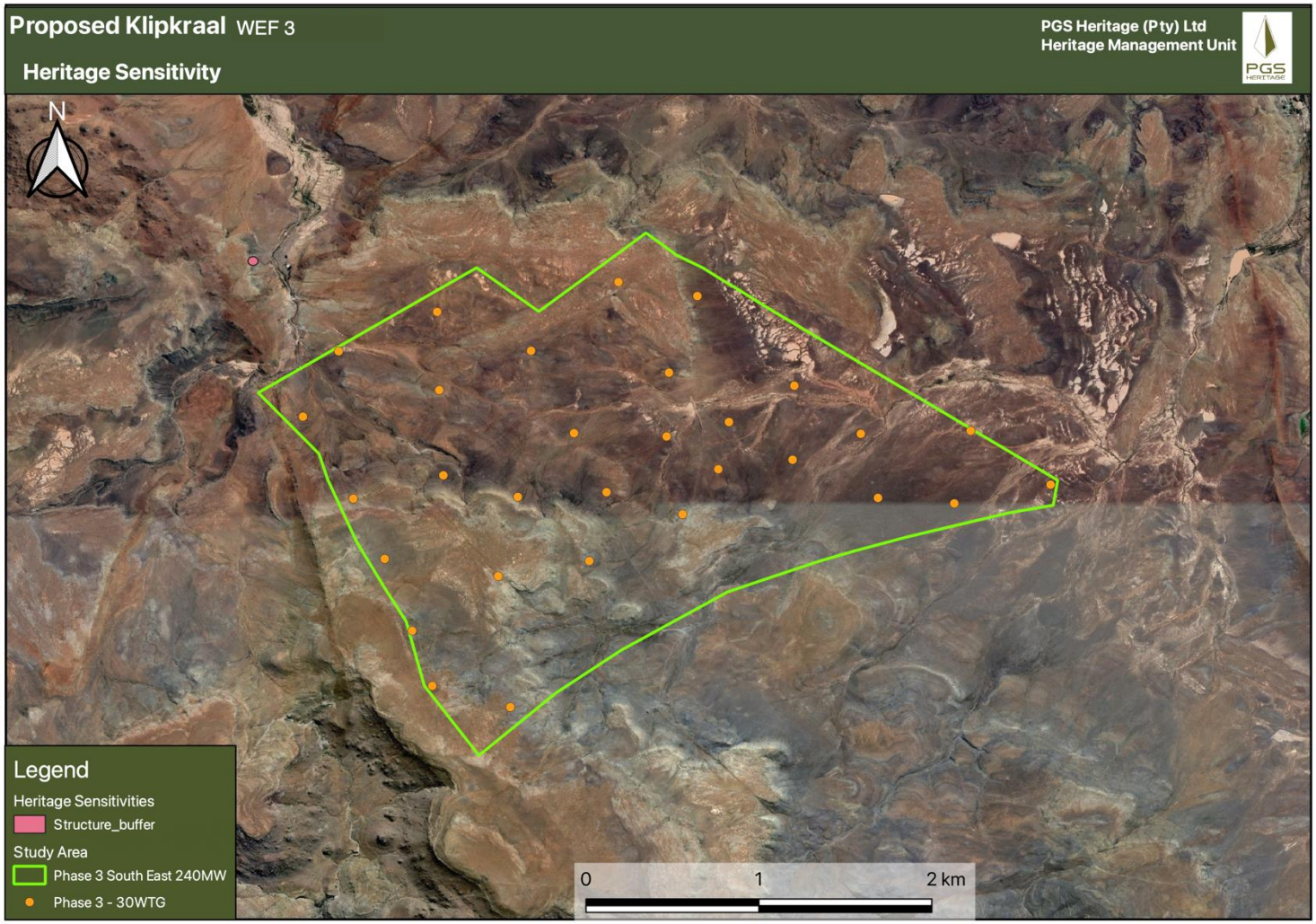


Figure 48: Heritage Sensitivity map indicating possible sensitive areas adjacent to and within the proposed project area.

8. FIELDWORK FINDINGS

A selective survey of the study area was conducted from the 22nd-27th September 2021. Due to the nature of cultural remains, with most artefacts occurring below surface, one archaeologist from PGS and a field assistant 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 (**Figure 49**). Approximately 130km of the larger assessment region was traversed.

No heritage resources were identified within the Klipkraal WEF 3 area (**Figure 51**).

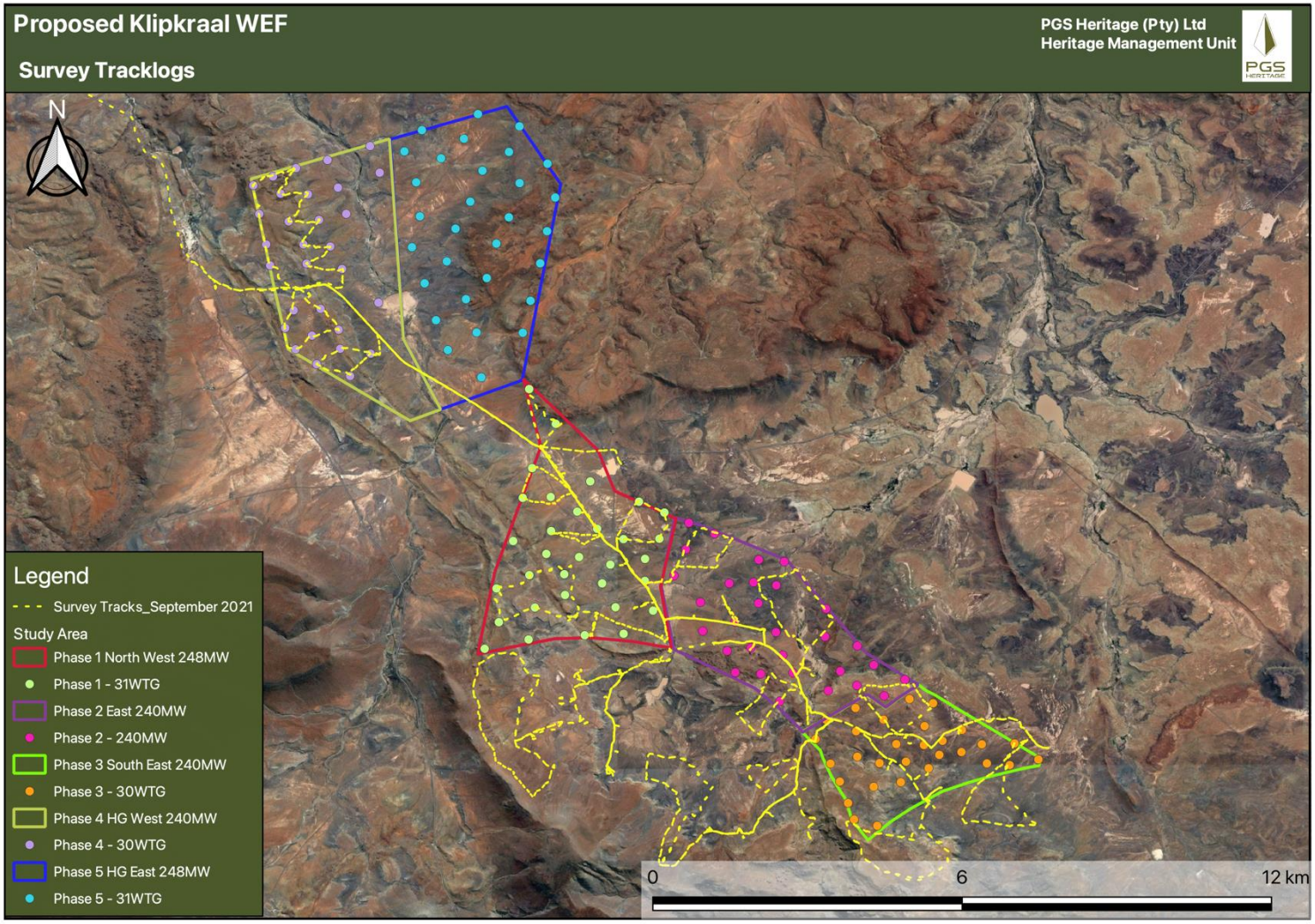


Figure 49: Track log recordings from the field surveys conducted in September 2021.

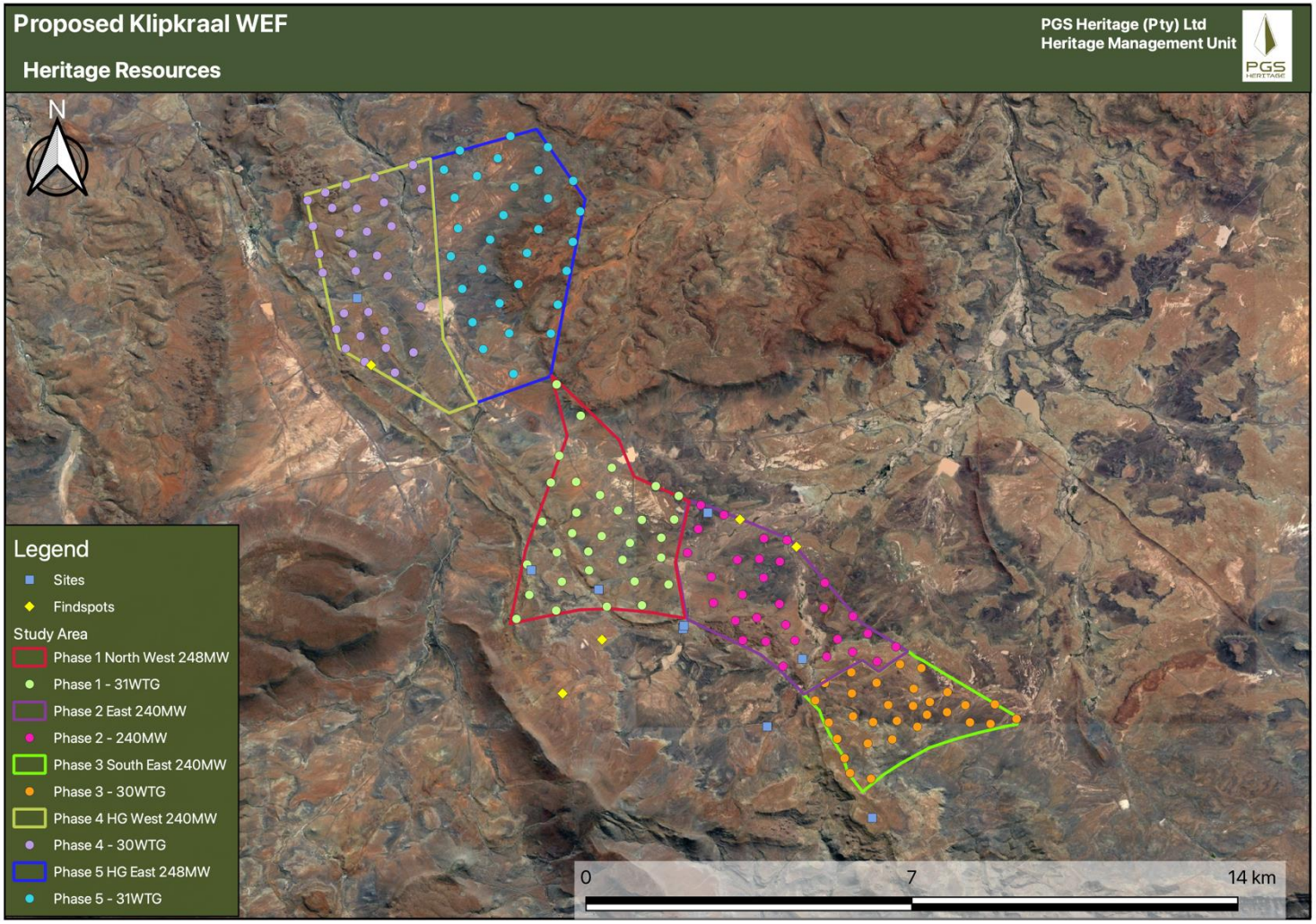


Figure 50: Heritage resources (findspot: yellow diamond; site: blue square) identified within the larger Klipkraal WEF region.

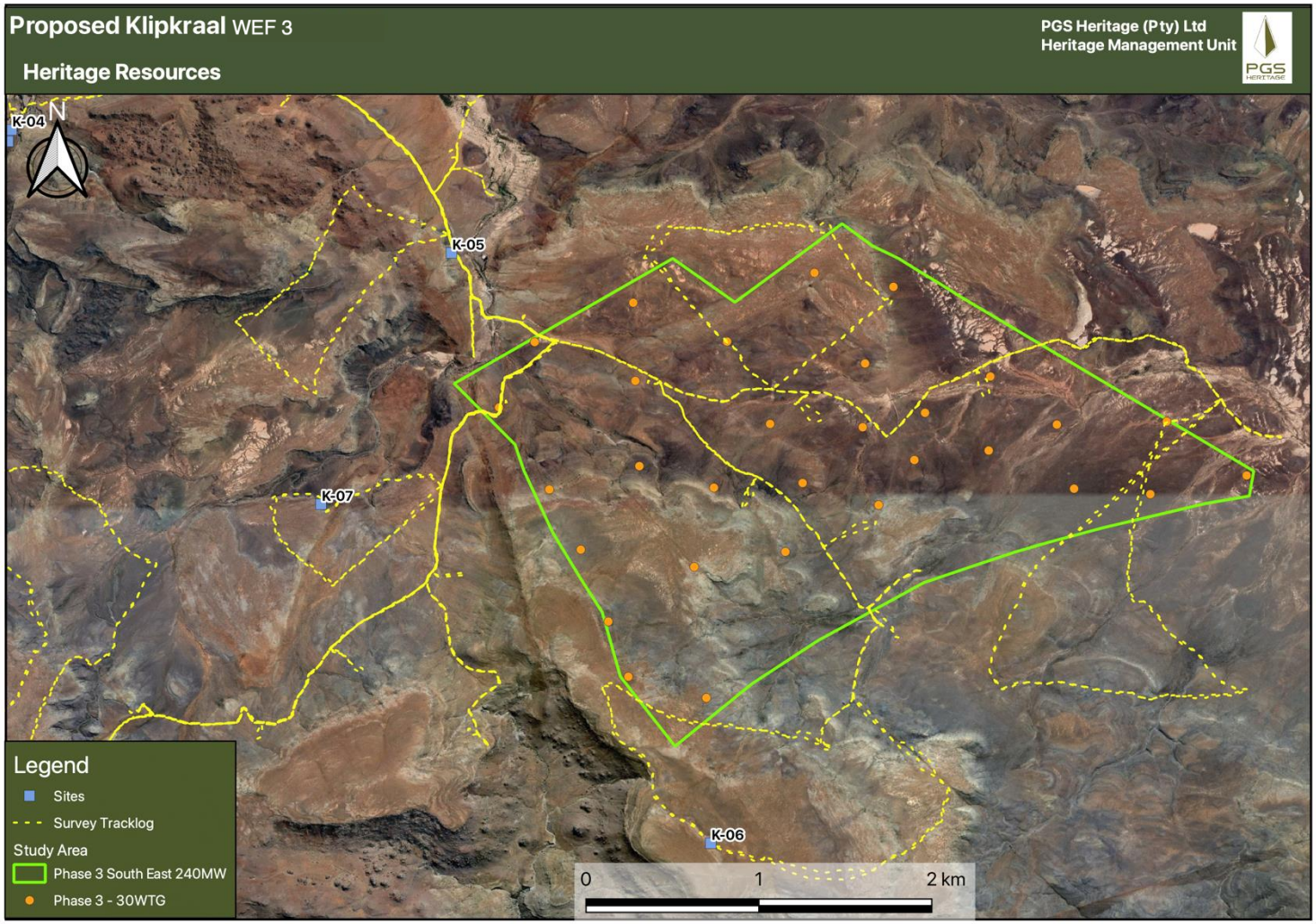


Figure 51: Map illustrating that no heritage resources were identified within the Klipkraal WEF 3 region.

8.1 Sensitivity assessment outcome

From the desktop assessment medium to low heritage sensitive areas were identified in the broader region. No heritage resources were identified within the Klipkraal WEF 3 area.

9. PALAEONTOLOGY

According to the PIA conducted by Banzai Environmental (Butler, 2022) the geology of the Klipkraal WEF 3 project area is covered by 1: 250 000 geology sheet Sutherland 3220 (1983) (Council of Geoscience, Pretoria) (**Figure 52**). This map indicates that the development is underlain by a small portion of Jurassic Dolerite (Jd, red) while the rest of the footprint is underlain by the Teekloof Formation (Pte; green) of the Adelaide Subgroup (Beaufort Group, Karoo Supergroup).

The PalaeoMap of the South African Heritage Resources Information System (

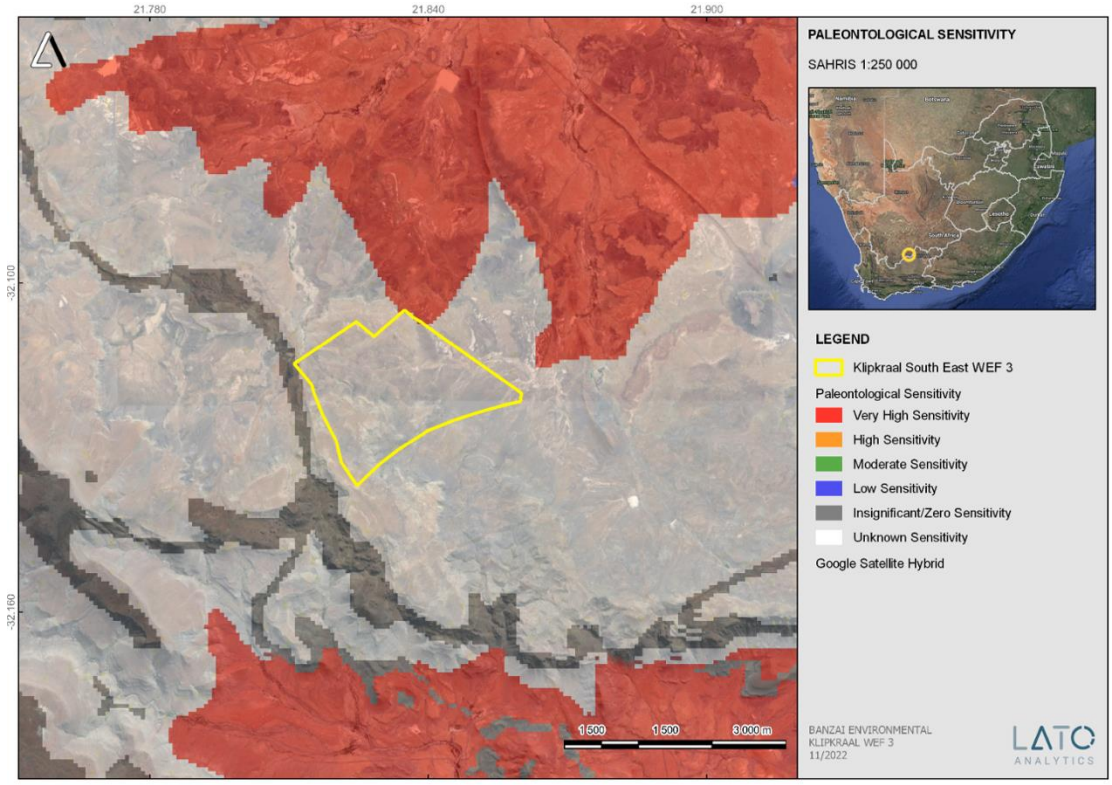


Figure *53*) indicates that the Palaeontological Sensitivity of the development is unknown (Almond and Pether, 2009; Almond *et al*., 2013).

Updated Geology (Council of Geosciences, Pretoria; **Figure 54**) refines the geology of the 1983 Geological Map and indicates that the Klipkraal WEF 3 is underlain by the Middleton and Balfour Formation (Adelaide Subgroup, Beaufort Group.

An overall 2-day site-specific field survey of the development footprint was conducted on foot and by motor vehicle between 24-26 September 202.

Several fossiliferous sites were identified during the site visit.

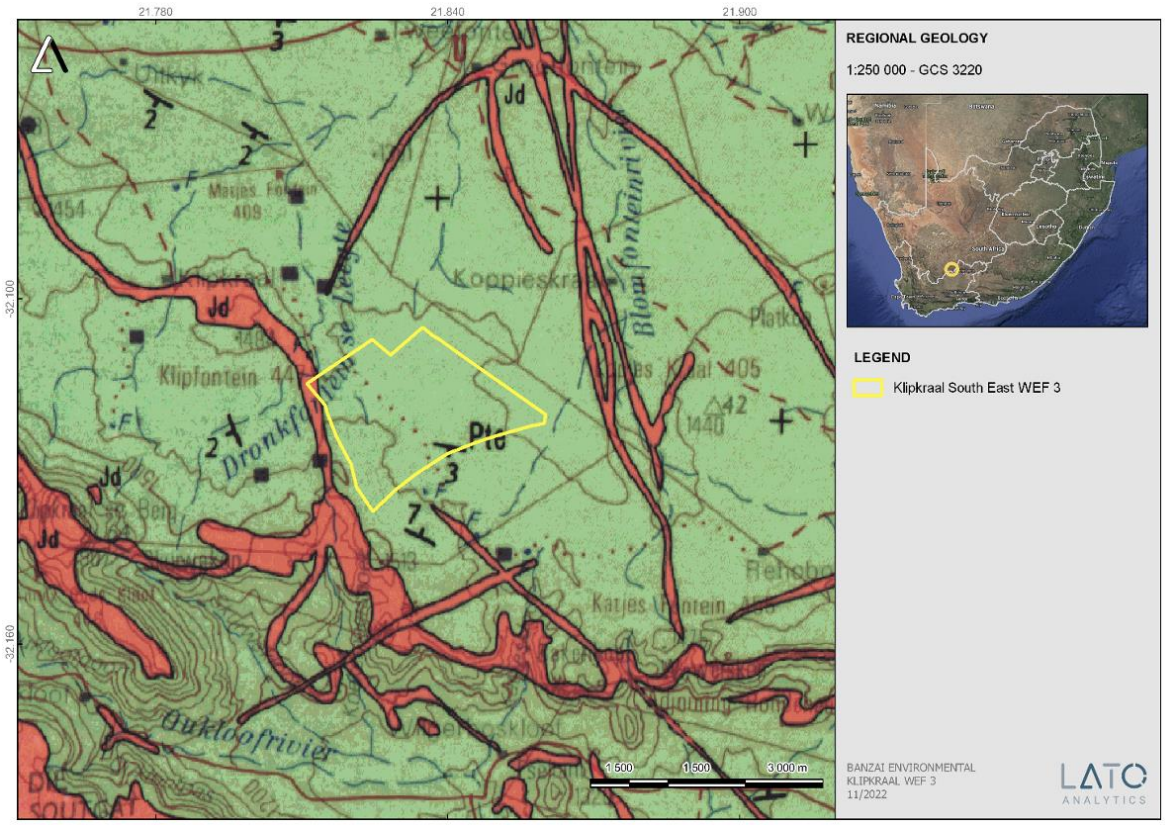
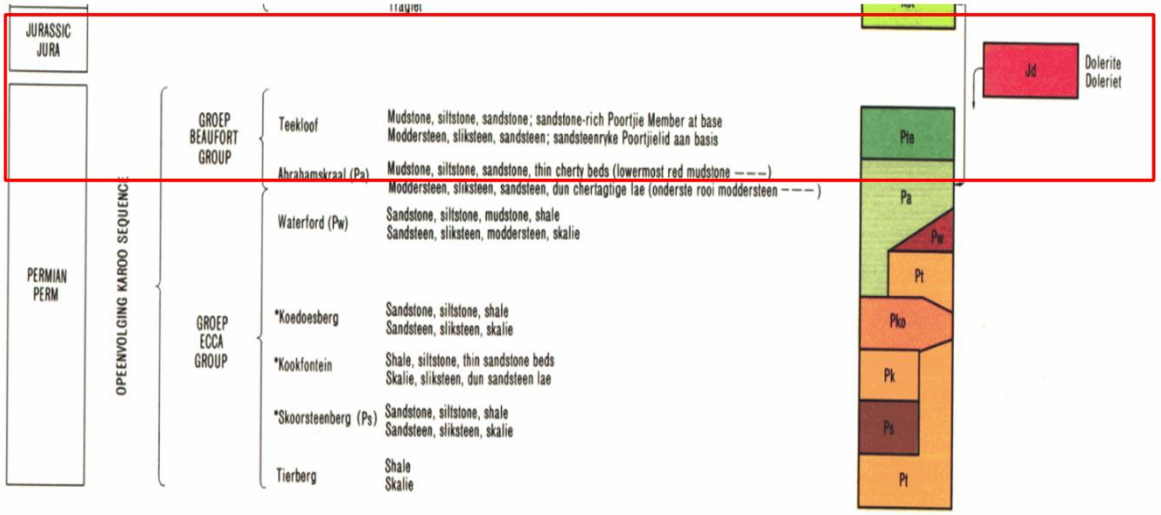


Figure 52: Extract of the 1:250 000 Sutherland 3220 (1983) Geological map (council of Geoscience, Pretoria) indicating that the development is underlain by the Teekloof Formation (Pte, green) of the Adelaide Subgroup (Beaufort Group, Karoo Supergroup), while the most western margin is underlain by Jurassic dolerite (Jd, red).

Table 7: Legend of the 1:250 000 Sutherland 3220 (1983) Geological map (council of Geoscience, Pretoria).



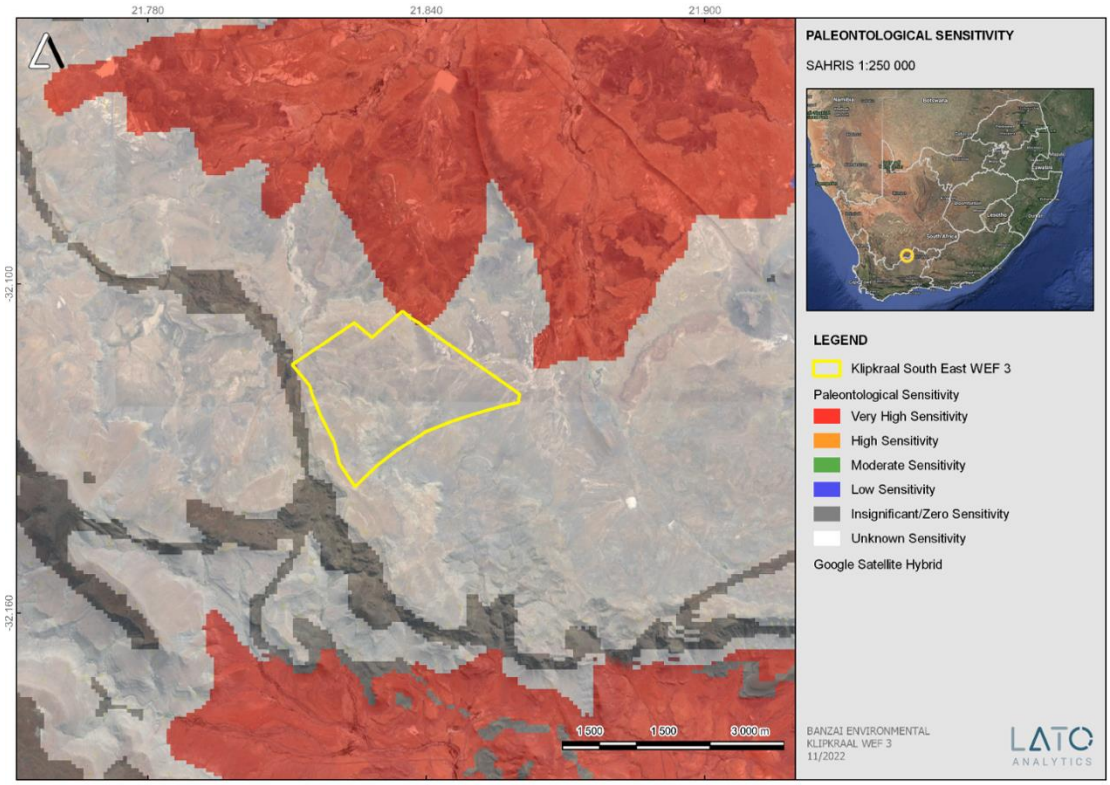


Figure 53: Extract of the 1: 250 000 SAHRIS PalaeoMap map (Council of Geosciences) indicating the proposed Klipkraal WEF 3 development.

Table 8: Palaeontological Sensitivity according to the SAHRIS PalaeoMap (Almond et al, 2013; SAHRIS website)

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

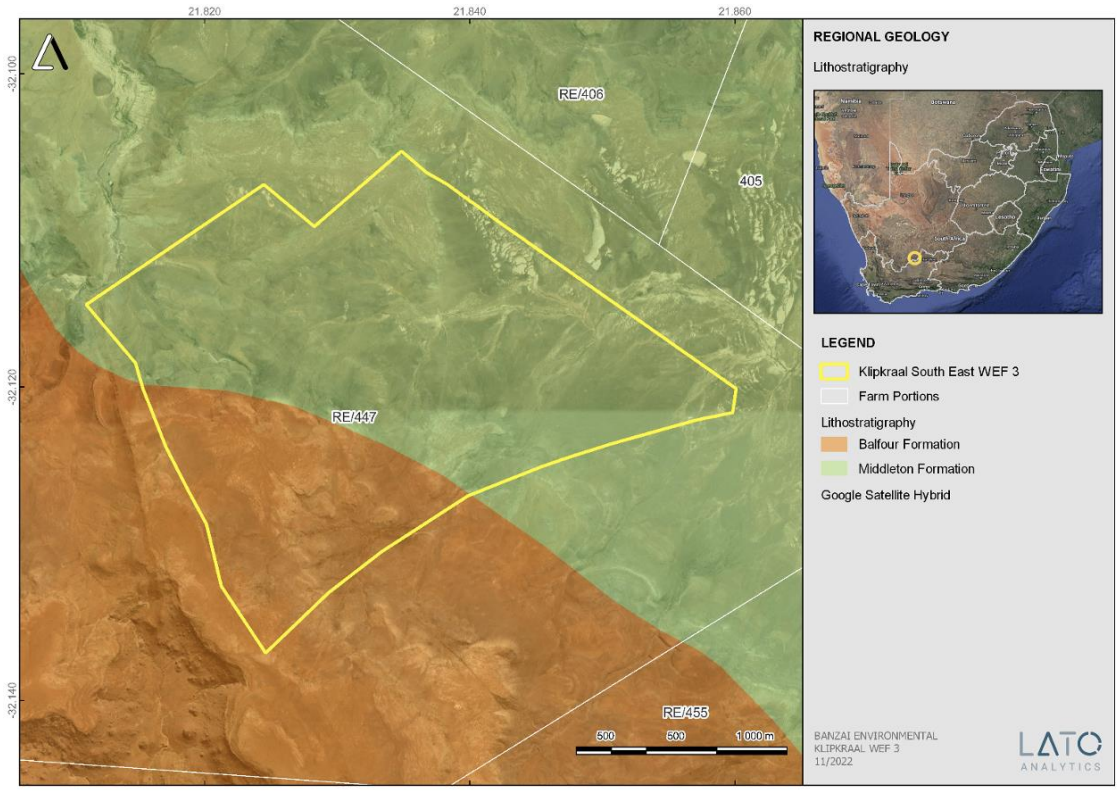


Figure 54: Updated geology (compiled by the Council of Geosciences, Pretoria) indicates that the Klipkraal WEF 3 is underlain by the Middleton and Balfour Formation (Adelaide Subgroup, Beaufort Group, Karoo Supergroup).

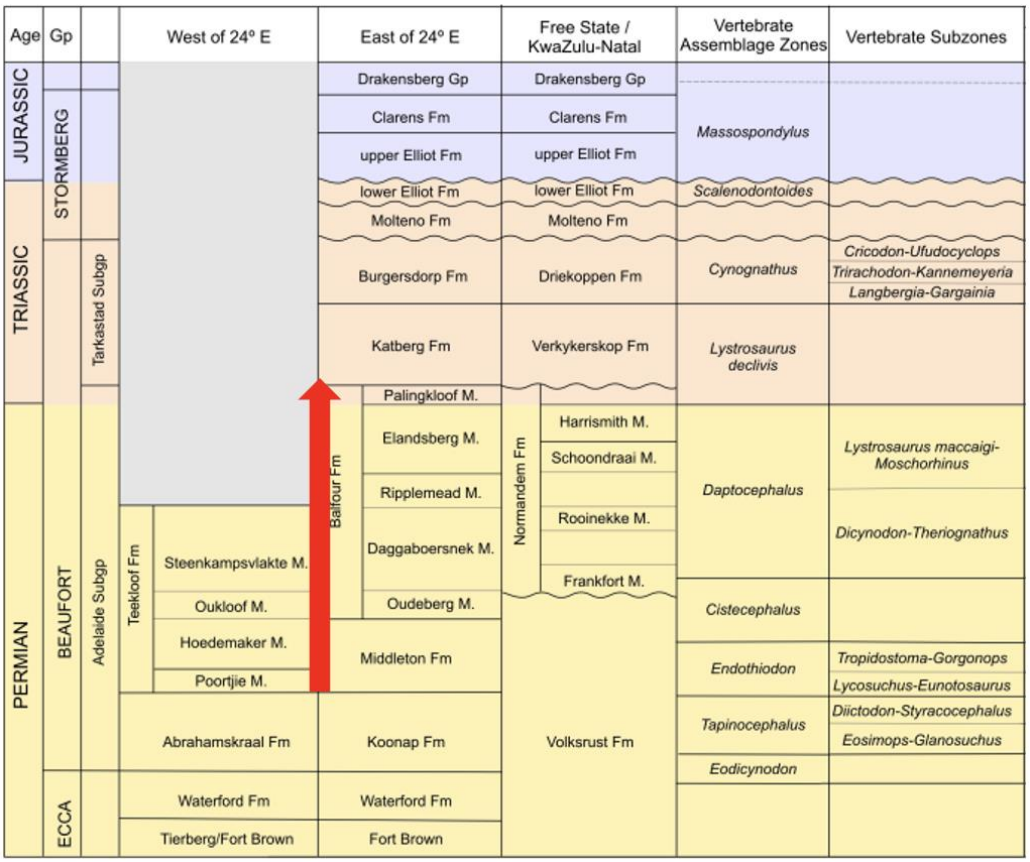


Figure 55: Vertebrate biozonation range chart for the Main Karoo Basin of South Africa.

Figure 56: Fossilized bone fragment (GPS -32.122222 21.830278).

Figure 57: Weathered vertebral column (GPS -32.121944 21.830000).

10. IDENTIFICATION AND ASSESSMENT OF IMPACTS

The various heritage specialists that worked on the identification of heritage resources and assessed their significance based their findings on a set of guidelines developed by the HWC (2021) in line with the NHRA and international best practice.

Tangible heritage resources are 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, it provides an opportunity into a depository that would not otherwise exist. In this sense the impact is POSITIVE for some heritage resources 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 the spatial and built heritage, and physical with regard to archaeological and palaeontological heritage resources. The following section provides an analysis of the impact of the proposed project on the identified heritage resources within the proposed development area. Mitigation measures will be recommended to mitigate impacts.

10.1 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:

No heritage sites were identified during the field survey.

It is also 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.

10.2 Identification of impacts

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 and BESS). Construction of the facility may adversely affect potential archaeological and fossil heritage within the development footprint by damaging, destroying, disturbing or permanently sealing-in fossils preserved at or beneath the surface of the ground that are then no longer available for scientific research or other public good. The possible pre-construction impacts calculated on the tangible cultural heritage resources is overall VERY HIGH - MODERATE NEGATIVE rating but with the implementation of the recommend buffers and management guidelines will be reduced to a MEDIUM - LOW NEGATIVE impact.

The impact assessment rating is based on the rating scale as contained in **Appendix B**.

10.3 Impact Assessment Ratings

Table 9: Assessment of the Impact of Proposed Development 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
Pre-Construction/Construction Phase																				
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	1. A management plan, after a walkdown of the final layout, for the heritage resources needs then to be compiled and approved for implementation during construction and operations.	1	3	4	2	4	1	14	-	Low
Palaeontological Resources	Damage, disturbance, destruction or sealing-in of legally-protected, scientifically valuable fossil heritage at or beneath the ground surface within the	2	4	4	4	4	4	72	-	Very High	1. **Palaeontological Walkdown is recommended during the EIA phase.**	2	4	4	4	4	2	34	-	Medium

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
	road footprint, mainly due to ground clearance and excavations.										2. Most recorded fossil sites can be effectively mitigated by a professional palaeontologist in the pre-construction phase (recording / collection). 3. Newly exposed fossils can be mitigated through a Chance Fossil Finds Procedure. However, residual impacts following mitigation may be locally high, given the unavoidable difficulties of identifying and sampling fossils from on-going construction phase excavations and site clearance.									

10.4 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 more accurate.

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.

11.2 Chance find 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.
- 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.

- 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 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
- 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 10** gives guidelines for lead times on permitting.

Table 10: Lead times for permitting and mobilisation

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

11.5 Heritage Management Plan for EMPr implementation

Table 11: Heritage Management Plan for EMPr implementation

Area and site no.	Mitigation measures	Phase	Target
General project area	• Implement a chance find procedures in case where possible heritage finds are uncovered.	Construction and operation	Ensure compliance with relevant legislation and recommendations from SAHRA under Section 34-36 and 38 of NHRA
Palaeontological Finds	• A pre-construction palaeontological heritage walkdown of the final WEF layout. • The appointed Palaeontologist will also have to include a Chance Find Protocol for the Klipkraal WEF 3 development and training of accountable supervisory personnel by a qualified palaeontologist in the recognition of fossil heritage is necessary.	Pre-construction/ Construction	Ensure compliance with relevant legislation and recommendations from SAHRA under Section 35 of NHRA.

12. CONCLUSIONS and RECCOMMENDATIONS

PGS has been appointed by SiVEST, to undertake a HIA that forms part of the EIA and EMP for the proposed construction of the Klipkraal WEF near Fraserburg in the Northern 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.

12.1 Archaeology

No heritage resources were identified within the Klipkraal WEF 3 area.

12.2 Palaeontology

The PIA conducted by Butler (2022) determined that a small portion of the proposed Klipkraal WEF 3 is underlain by a small portion of Jurassic Dolerite while the rest of the footprint is underlain by the Teekloof Formation of the Adelaide Subgroup (Beaufort Group, Karoo Supergroup). The PalaeoMap of the South African Heritage Resources Information System indicates that the Palaeontological Sensitivity of the development is unknown (Almond and Pether, 2009; Almond *et al*., 2013). Updated Geology (Council of Geosciences, Pretoria) refines the geology of the 1983 Geological Map and indicates that the Klipkraal WEF 3 is underlain by the Middleton and Balfour Formation (Adelaide Subgroup, Beaufort Group).

In the last few decades extensive research and collecting have been conducted by palaeontologists in this part of the basin and the Fraserburg area was found to be highly fossiliferous.

A three day-site-specific field survey of the development footprint was conducted on foot 24-26 September 2021. Various fossiliferous sites, where fossils were found to be well-preserved, has been identified in the development footprint.

12.3 Recommendations

The calculated impact as summarised in **Section 9** of this report confirms the impact of the new Klipkraal WEF 3 will be reduced from **VERY HIGH** - **MODERATE NEGATIVE** rating to a **MEDIUM** - **LOW NEGATIVE** impact rating with the implementation of the mitigation measures. This finding in

addition to the implementation of a chance finds procedure, as part of the EMPr, will mitigate possible impacts on unidentified heritage resources.

The following mitigation measures will be required if associated infrastructure does encroach upon the identified heritage sites:

- It is essential that a walk down survey of the final footprint of the new Klipkraal WEF 3 and associated grid connection infrastructure be conducted.
- A management plan for the heritage resources then needs to be compiled and approved for implementation during construction and operations.

In terms of the PIA:
As the site visit was conducted in 2021, the layout of the WEF was not yet known. The specific layout of the Klipkraal WEF 3 development was thus not investigated in detail.

It is thus recommended that a Palaeontological Walkdown of the development is conducted when the layout of the roads and turbines have been established.

The appointed Palaeontologist will also have to include a Chance Find Protocol for the Klipkraal WEF 3 development and training of accountable supervisory personnel by a qualified palaeontologist in the recognition of fossil heritage is necessary.

12.4 General

The overall impact of the Klipkraal WEF 3, on archaeological and fossil heritage, is seen as **very high** to **medium** before mitigation. Once the recommendations have been implemented, the impacts can be mitigated to a **Medium** to **Low** level.

12.5 Additional Survey

An additional survey of the Klipkraal WEFs 1-3 final development area was conducted by a qualified archaeologist (Henk Steyn) and field assistant (Xander Fourie) from PGS (8-10 November 2022). This has been requested by the SAHRA, as it was noted that the initial survey of the study area, as part of the HIA, was minimal (**Figure 58**, **Figure 59**).

No heritage resources were recorded within the study area during this fieldwork.

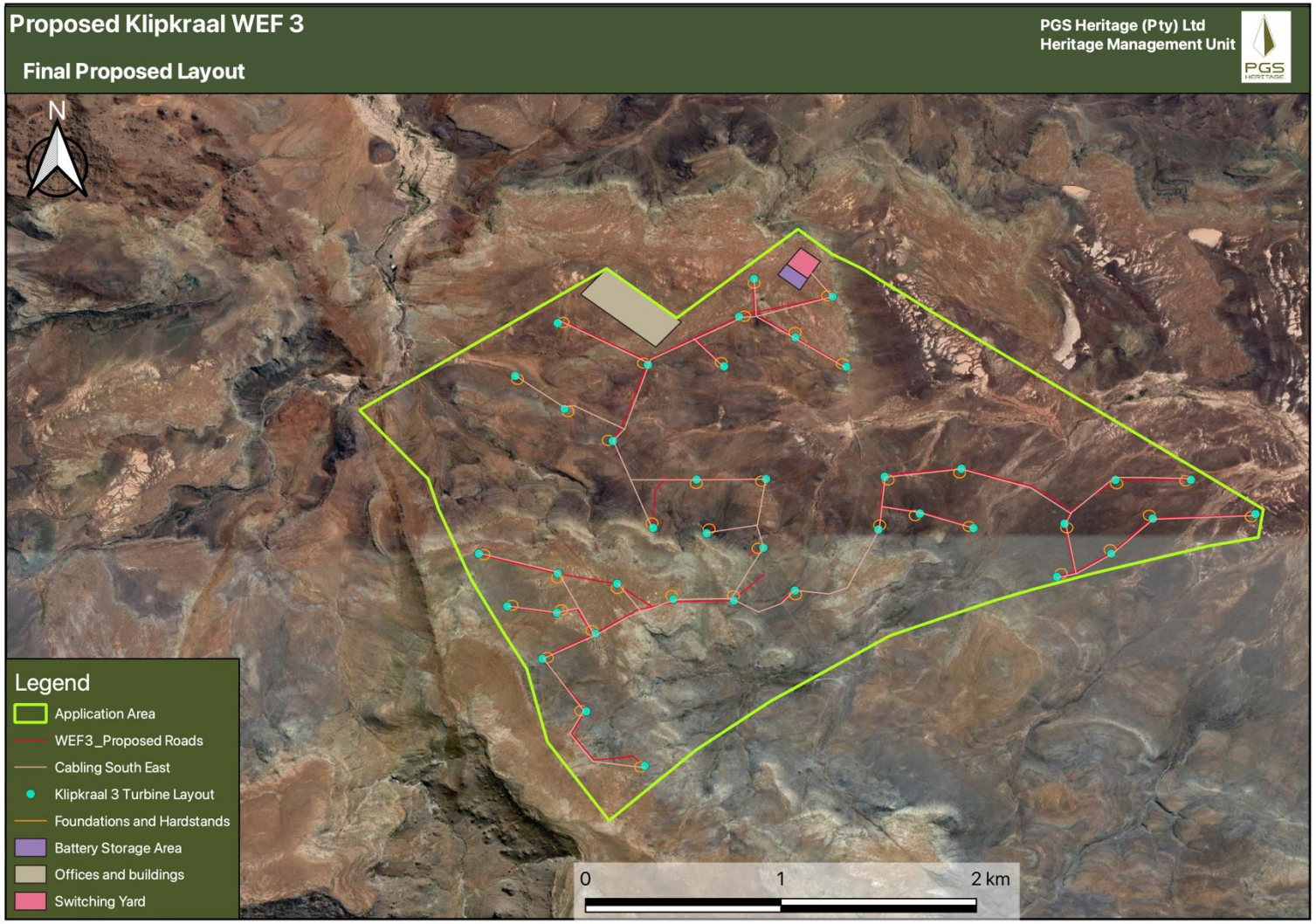


Figure 58: Final proposed development area.

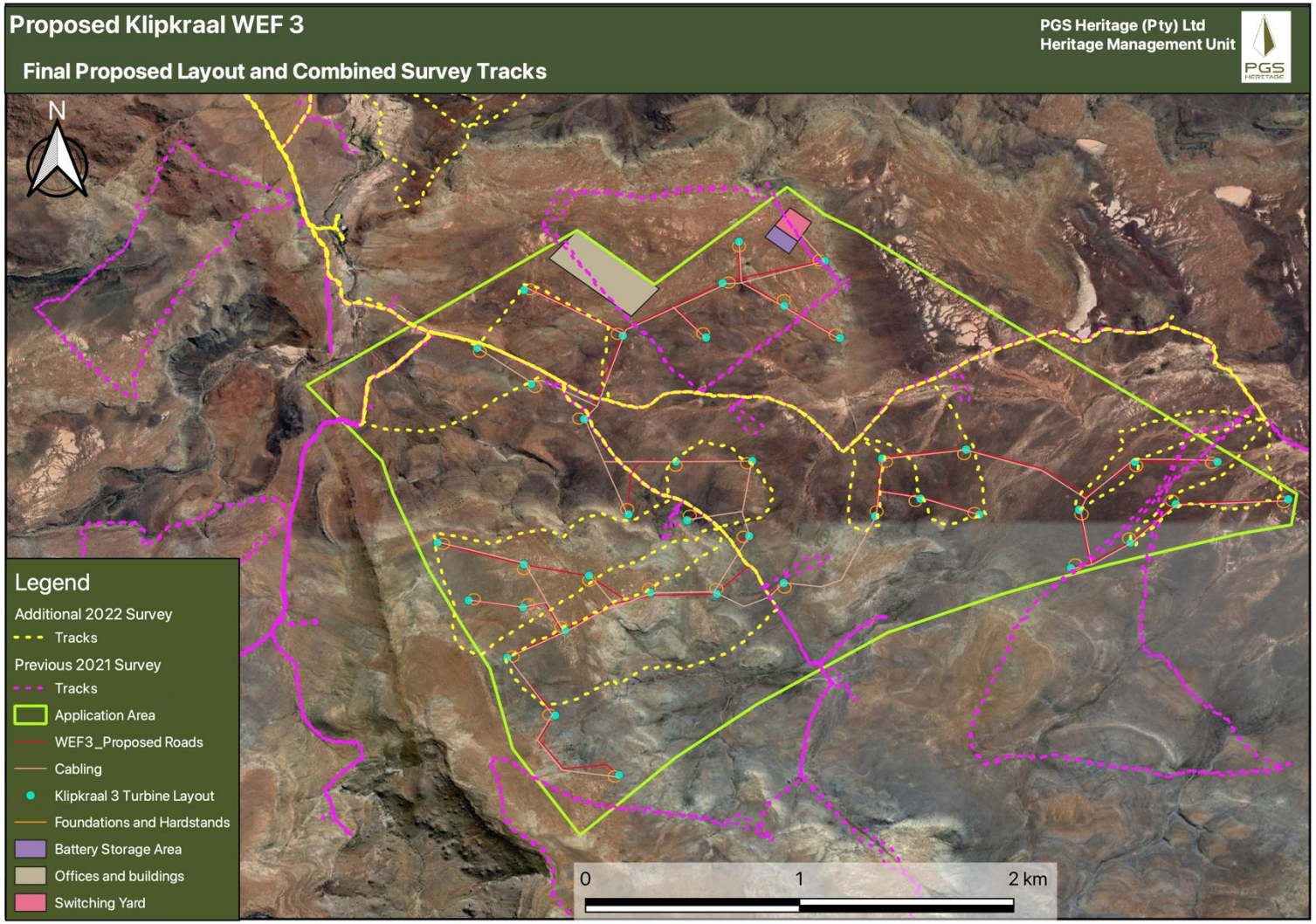


Figure 59: Final proposed development area relative to all the survey tracks.

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APPENDIX A – CV

NIKKI MANN
-Professional Archaeologist, PGS Heritage

Key Qualifications:

MSc Archaeology (phytolith 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
- 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- curent - 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

1 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

PGS Heritage (Pty) Ltd (PGS) has been appointed by SiVest (PTY) Ltd (hereafter referred to as "SiVEST"), on behalf of Aura Development Company (Pty) Ltd (hereafter referred to as 'Aura'), to undertake a HIA that forms part of the Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP) for the proposed construction of the Klipkraal Wind Energy Facility (WEF) near the towns of Beaufort West and Fraserburg in the Northern Cape Province of South Africa.

The proposed wind farms make up a larger wind energy facility (WEF) (with associated BESS) which will be referred to as the Klipkraal WEF, consisting of up to five (5) phases, with a combined generation capacity of up to approximately 1 500 MW, as follows:

- Klipkraal Wind Energy Facility 1: up to 300MW + BESS (part of a separate EIA process which forms part of separate application)
- Klipkraal Wind Energy Facility 2: up to 300MW + BESS (part of a separate EIA process which forms part of separate application)
- Klipkraal Wind Energy Facility 3: up to 300MW + BESS (**this application**)
- Klipkraal Wind Energy Facility 4: up to 300MW + BESS (part of a separate EIA process which forms part of separate application)
- Klipkraal Wind Energy Facility 5: up to 300MW + BESS (part of a separate EIA process which forms part of separate application)
- Klipkraal On-site Switching / Collector Substation and associated 132kV/400kV Power Line (part of a separate BA application).

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 Klipkraal WEF is based on:

- A desktop review of (a) the relevant 1:50 000 scale topographic map 3221BB – Current and historical editions (1972, 1986, 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 Klipkraal WEF project area by the author and field assistant during the period 22 to 27 September 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 burial grounds and historical structures of heritage significance warrant conservation.

4. National Environmental Screening Tool

The Archaeological and Cultural Heritage Sensitivity Map for the Klipkraal 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 has to date been conducted in the study area did not reveal heritage resources of heritage significance but further fieldwork is required for better coverage of the study area.

Therefore, the DFFE screening tool sensitivity map in **Figure *8*** cannot be confidently supported or challenged at this time.

5. Conclusion

The Archaeological and Cultural Heritage sensitivity of the Klipkraal WEF has been evaluated, based on desktop studies and a site visit. Further fieldwork is required for better coverage of the study area. Therefore, the DFFE screening tool sensitivity map in **Figure *8*** cannot be confidently supported or challenged at this time.