

HERITAGE IMPACT ASSESSMENT: PROPOSED POFADDER WIND ENERGY FACILITY 1, ZF MGCAWU MAGISTERIAL DISTRICT, NORTHERN CAPE

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

SAHRA Case No.: 18175

Report for:

SiVEST Environmental Division
SiVEST SA (Pty) Ltd
P.O. Box 1899, Umhlanga Rocks, 4320
Email: michelleg@sivest.co.za

On behalf of:

Pofadder Wind Facility 1 (Pty) Ltd



Dr Jayson Orton
ASHA Consulting (Pty) Ltd
23 Dover Road, Muizenberg, 7945
Tel: (021) 788 1025 | 083 272 3225
Email: jayson@asha-consulting.co.za

1st draft: 15 February 2022

2nd draft: 01 March 2022

3rd draft: 21 July 2022

Final report: 30 July 2022

SUMMARY

ASHA Consulting (Pty) Ltd was appointed by Pofadder Wind Facility 1 (Pty) Ltd to assess the potential impacts to heritage resources that might occur through the proposed development of the Pofadder Wind Energy Facility (WEF) 1 on a site to the southeast of Pofadder, Northern Cape. The project is part of a set of three WEFs planned over four farm portions and an approximate centre of the Pofadder WEF 1 turbine cluster is at S29° 16' 15" E19° 44' 05".

The site is a flat, sandy plain with rare bedrock exposures and frequent patches of gravel but a low quartzite ridge runs west to east through the middle of the site. Ephemeral watercourses are present and vegetation is minimal.

Archaeological materials were found to be widespread on the plains but poorly represented on the quartzite ridge. Most were scatters of Early and Middle Stone Age artefacts associated with the gravels and best considered background scatter. These are not significant. However, occasional scatters of Later Stone Age materials were found in the wider area, usually alongside pans, but none have yet been found within the Pofadder WEF 1 project area. Other archaeological materials were rare but a pair of small stone-walled features – one with some associated historical artefacts – was noted against a rock outcrop in the northeast but will not be impacted. Two small farm complexes with associated graveyards are near the footprint area but will not be impacted in any way. All these historical features are more than 0.7 km from turbines but a WEF road comes within 320 m of the Lovedale farm complex and a powerline would be 0.7 km from the Lovedale graveyard.

The impact assessment indicates that with mitigation all impacts across all phases are expected to be in the medium to low negative range, with the one that calculates to medium being better thought of as low significance. No known archaeological sites are affected, but from the type of material found in the wider area any archaeology present in the final footprint is likely to be easily mitigated if avoidance is not possible. There are no fatal flaws. Cumulative impacts relate largely to archaeology and to the cultural landscape and N14 scenic route. It is expected that with many renewable energy facilities being developed a number of archaeological sites may be lost and the N14's integrity as a scenic route may be compromised, especially further to the west. Cumulative impacts might be of medium significance after mitigation but the present project will make very little contribution to this.

Given that (1) all the expected impacts after mitigation are in the low to medium range (with the one rated medium perhaps better rated as low), (2) direct impacts to archaeology can be easily mitigated, and (3) there are no highly significant landscapes or scenic routes in the vicinity of the site, it is the opinion of the heritage specialist that the proposed project may be authorised in full, but subject to the recommendations on turbine omissions below.

It is recommended that the proposed Pofadder WEF 1 be authorised, but subject to the following recommendations which should be included as conditions of authorisation:

- All unsurveyed parts of the final approved layout must be surveyed for archaeological sites and graves prior to construction to determine whether further mitigation measures are required; and
- If any archaeological material or human burials are uncovered during the course of development, then work in the immediate area should be halted. The find would need to be reported to the heritage authorities and may require inspection by an archaeologist. Such

heritage is the property of the state and may require excavation and curation in an approved institution.

National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) and Environmental Impact Assessment (EIA) 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
(a) details of the specialist who prepared the report; and the expertise of that specialist to compile a specialist report including a <i>curriculum vitae</i> ;	1.4 & Appendix 1
(b) a declaration that the specialist is independent in a form as may be specified by the competent authority;	Page v & 1.5
(c) an indication of the scope of, and the purpose for which, the report was prepared;	1.3
(cA) an indication of the quality and age of base data used for the specialist report;	3.1
(cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	6.6, 6.4 & 6.8
(d) the duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment;	3.2
(e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;	3
(f) details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives;	1.1.3
(g) an identification of any areas to be avoided, including buffers;	5.6
(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;	5.6
(i) a description of any assumptions made and any uncertainties or gaps in knowledge;	3.7
(j) a description of the findings and potential implications of such findings on the impact of the proposed activity, including identified alternatives on the environment or activities;	5 & 6
(k) any mitigation measures for inclusion in the EMPr;	7 & 9
(l) any conditions for inclusion in the environmental authorisation;	9
(m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;	7
(n) a reasoned opinion— i. 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 or Environmental Authorization, and where applicable, the closure plan;	8.1
(o) a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	N/A
(p) any other information requested by the competent authority	N/A
(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.	N/A



environmental affairs

Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

DETAILS OF THE SPECIALIST, DECLARATION OF INTEREST AND UNDERTAKING UNDER OATH

	(For official use only)
File Reference Number:	
NEAS Reference Number:	DEA/EIA/
Date Received:	

Application for authorisation in terms of the National Environmental Management Act, Act No. 107 of 1998, as amended and the Environmental Impact Assessment (EIA) Regulations, 2014, as amended (the Regulations)

PROJECT TITLE

Proposed construction of the Pofadder 1 Wind Energy Facility and Associated Infrastructure, near Pofadder in the Northern Cape Province.

Kindly note the following:

1. This form must always be used for applications that must be subjected to Basic Assessment or Scoping & Environmental Impact Reporting where this Department is the Competent Authority.
2. This form is current as of 01 September 2018. It is the responsibility of the Applicant / Environmental Assessment Practitioner (EAP) to ascertain whether subsequent versions of the form have been published or produced by the Competent Authority. The latest available Departmental templates are available at <https://www.environment.gov.za/documents/forms>.
3. A copy of this form containing original signatures must be appended to all Draft and Final Reports submitted to the department for consideration.
4. All documentation delivered to the physical address contained in this form must be delivered during the official Departmental Officer Hours which is visible on the Departmental gate.
5. All EIA related documents (includes application forms, reports or any EIA related submissions) that are faxed; emailed; delivered to Security or placed in the Departmental Tender Box will not be accepted, only hardcopy submissions are accepted.

Departmental Details

Postal address:
Department of Environmental Affairs
Attention: Chief Director: Integrated Environmental Authorisations
Private Bag X447
Pretoria
0001

Physical address:
Department of Environmental Affairs
Attention: Chief Director: Integrated Environmental Authorisations
Environment House
473 Steve Biko Road
Arcadia

Queries must be directed to the Directorate: Coordination, Strategic Planning and Support at:
Email: EIAAdmin@environment.gov.za


1. SPECIALIST INFORMATION

Specialist Company Name:	ASHA Consulting (Pty) Ltd		
B-BBEE	Contribution level (indicate 1 to 8 or non-compliant)	4	Percentage Procurement recognition
			0
Specialist name:	Dr Jayson Orton		
Specialist Qualifications:	D.Phil (Archaeology, Oxford, UK) MA (Archaeology, UCT)		
Professional affiliation/registration:	ASAPA CRM member No. 233 APHP member No. 043		
Physical address:	23 Dover Road, Muizenberg, 7945		
Postal address:	23 Dover Road, Muizenberg		
Postal code:	7945	Cell:	083 272 3225
Telephone:	021 788 1025	Fax:	n/a
E-mail:	jayson@asha-consulting.co.za		

2. DECLARATION BY THE SPECIALIST


I, JAYSON ORTON, declare that –

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- all the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.

Signature of the Specialist 

ASHA CONSULTING (PTY) LTD
Name of Company:

15 -02- 2022
Date

Details of Specialist, Declaration and Undertaking Under Oath 

3. UNDERTAKING UNDER OATH/ AFFIRMATION

I, Jayson Orton, swear under oath / affirm that all the information submitted or to be submitted for the purposes of this application is true and correct.

Signature of the Specialist



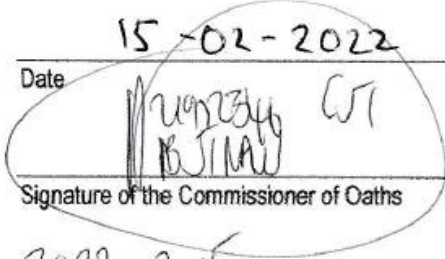
Name of Company

ASHA CONSULTING (PTY) LTD

Date

15-02-2022

Signature of the Commissioner of Oaths



Date

2022-02-15



Glossary

Acheulean: An archaeological name for the period comprising the later part of the Early Stone Age. This period started about 1.7-1.5 million years ago and ended about 250-200 thousand years ago.

Background scatter: Artefacts whose spatial position is conditioned more by natural forces than by human agency.

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

Handaxe: A bifacially flaked, pointed stone tool type typical of the Early Stone Age Acheulian Industry. It is also referred to as a large cutting tool.

Holocene: The geological period spanning the last approximately 10-12 000 years.

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

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

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

Pleistocene: The geological period beginning approximately 2.5 million years ago and preceding the Holocene.

Abbreviations

APHP: Association of Professional Heritage Practitioners

ASAPA: Association of Southern African Professional Archaeologists

CCS: cryptocrystalline silica

CRM: Cultural Resources Management

DFFE: Department of Forestry, Fisheries and the Environment

EA: Environmental Authorisation

ECO: Environmental Control Officer

EGI: Electricity Grid Infrastructure

EIA: Environmental Impact Assessment

EMPr: Environmental Management Program

ESA: Early Stone Age

GP: General Protection

GPS: global positioning system

HIA: Heritage Impact Assessment

LSA: Later Stone Age

MSA: Middle Stone Age

NBKB: Ngwao-Boswa Ya Kapa Bokoni

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

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

PPP: Public Participation Process

REDZ: Renewable Energy Development Zone

SACAA: South African Civil Aviation Authority

SAHRA: South African Heritage Resources Agency

SAHRIS: South African Heritage Resources Information System

Contents

Glossary.....	viii
Abbreviations	ix
1. INTRODUCTION	1
1.1. The proposed project	2
1.1.1. Project description	2
1.1.2. Identification of alternatives.....	4
1.1.3. Aspects of the project relevant to the heritage study.....	4
1.2. Terms of reference	5
1.3. Scope and objectives	5
1.4. Specialist credentials	5
1.5. Declaration of independence	5
2. LEGAL REQUIREMENTS AND GUIDELINES	6
2.1. National Heritage Resources Act (NHRA) No. 25 of 1999	6
2.2. Approvals and permits.....	7
2.2.1. Assessment Phase	7
2.2.2. Construction Phase	7
2.3. Guidelines	7
3. ASSESSMENT METHODOLOGY	8
3.1. Literature survey and information sources	8
3.2. Field survey.....	9
3.3. Specialist studies.....	9
3.4. Impact assessment	9
3.5. Grading	10
3.6. Consultation.....	10
3.7. Assumptions and limitations	10
4. PHYSICAL ENVIRONMENTAL CONTEXT	10
4.1. Site context	10
4.2. Site description	11
5. FINDINGS OF THE HERITAGE STUDY	13
5.1. Palaeontology	13
5.2. Archaeology	14
5.2.1. Desktop study.....	14
5.2.2. Site visit	16
5.3. Graves.....	22
5.4. Historical aspects and the Built environment	23
5.4.1. Desktop study.....	23
5.4.2. Site visit	23
5.5. Cultural landscapes and scenic routes	28
5.6. Statement of significance and provisional grading	28
5.7. Summary of heritage indicators	30
6. ASSESSMENT OF IMPACTS	31

6.1. Construction Phase.....	31
6.1.1. Impacts to archaeological resources	31
6.1.2. Impacts to graves	31
6.1.3. Impacts to the cultural landscape and context of structures	31
6.2. Operation Phase	32
6.2.1. Impacts to the cultural landscape	32
6.3. Decommissioning Phase	32
6.4. Cumulative impacts	35
6.5. Evaluation of impacts relative to sustainable social and economic benefits.....	35
6.6. Existing impacts to heritage resources.....	35
6.7. Evaluation of impacts relative to sustainable social and economic benefits.....	36
6.8. Existing impacts to heritage resources.....	36
6.9. The No-Go alternative	36
6.10. Levels of acceptable change	36
7. INPUT TO THE ENVIRONMENTAL MANAGEMENT PROGRAM	36
8. CONCLUSIONS	37
8.1. Reasoned opinion of the specialist.....	38
9. RECOMMENDATIONS	38
10. REFERENCES	38
APPENDIX 1 – Curriculum Vitae	41
APPENDIX 2 – List of heritage resources	43
APPENDIX 3 – Mapping	52
APPENDIX 4 – Site Sensitivity Verification.....	55

1. INTRODUCTION

ASHA Consulting (Pty) Ltd was appointed by Pofadder Wind Facility 1 (Pty) Ltd to conduct an assessment of the potential impacts to heritage resources that might occur through the proposed development of the Pofadder Wind Energy Facility (WEF) 1 on a site to the southeast of Pofadder, Northern Cape. The project is part of a set of three WEFs¹ planned over four farm portions as shown in Table 1. Note that three separate environmental processes are being undertaken for the three projects and will run concurrently. An approximate centre of the Pofadder WEF 1 turbine cluster is at S29° 16' 15" E19° 44' 05".



Figure 1: Extract from 1:50 000 topographic mapsheets 2918BC and 2918BD showing the location of the site. Black polygons show farm portions, blue lines show the turbine rows. Source of basemap: Chief Directorate: National Geo-Spatial Information. Website: www.ngi.gov.za.

Table 1: Farm portions involved in the overall project. The present report deals with Pofadder WEF 1.

Farm Portion	Pofadder WEF 1	Pofadder WEF 2	Pofadder WEF 3
Sand Gat 150/3			
Lovedale 201/remainder			
Ganna-Poort 202/remainder			
Quagga Maag 200			Road only

¹ The other two are to be known as Pofadder Wind Energy Facility 2 and Pofadder Wind Energy Facility 3.

1.1. The proposed project

1.1.1. Project description

The applicant Pofadder Wind Facility 1 (Pty) Ltd is proposing the development of a commercial Wind Energy Facility (WEF) and associated infrastructure on a site located approximately 20 km southeast of Pofadder within the Kai !Garib Local Municipality and the ZF Mgcawu District Municipality in the Northern Cape Province.

A preferred project site with an extent of approx. 3 600ha has been identified as a technically suitable area for the development of the Pofadder WEF 1, which will comprise of up to 28 turbines with a combined contracted capacity of up to 224 MW.

The Pofadder WEF 1 project site is proposed to accommodate the following infrastructure, which will enable the wind farm to supply a contracted capacity of up to 200 MW:

- Up to 28 wind turbines, each with a maximum of 8 MW output per turbine, with a maximum export capacity of approximately 224 MW. This will be subject to allowable limits in terms of the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP). The final number of turbines and layout of the WEF will, however, be dependent on the outcome of the Specialist Studies conducted during the EIA process;
- Each wind turbine will have a maximum hub height and rotor diameter of up to 200 m;
- Concrete turbine foundations and turbine hardstands;
- Each turbine will have a circular foundation with a diameter of up to 32 m and this will be placed alongside the 45 m wide hardstand resulting in an area of about 45 m x 32 m that will be permanently disturbed for the turbine foundation. The combined permanent footprint for the turbines will be approximately 4.2 ha;
- Each turbine will have a crane hardstand of approximately 70 m x 45 m. The permanent footprint for turbine crane hardstands will be approximately 9 ha;
- Each turbine will have a blade hardstand of approximately 80 m x 45 m (3 600 m²). The combined permanent footprint for blade hardstands will be approximately 10 ha;
- One new 33/132 kV on-site substation occupying an area of approximately 1.6 ha;
- The wind turbines will be connected to the proposed on-site substation via medium voltage (33 kV) underground cables, which will mainly run alongside the access roads. Where burying of cables is not possible due to technical, geological, environmental or topographical constraints, cables will be overhead via 33 kV monopoles;
- The main access road will be 8 – 12 m wide (to allow vehicles to pass);
- Internal roads with a width of 6 – 8 m will provide access to each wind turbine. Existing farm roads will be upgraded and used wherever possible, although new site roads will be constructed where necessary;

- A 12 m wide corridor may be temporarily impacted during construction and rehabilitated to 6 m wide corridor after construction. The internal gravel roads will have an approximate 6 – 8 m wide surface and there will be up to 12 m wide impacted during the construction phase, with additional space required for cut and fill, side drains and other stormwater control measures, turning areas and vertical and horizontal turning radii to ensure safe delivery of the turbine components;
- Pofadder WEF 1 will have a total road network of approximately 48 km;
- One construction laydown / staging area of up to approximately 7 ha (to be rehabilitated following construction). It should be noted that no on-site labour camps will be required in order to house workers overnight as all workers will be accommodated in the nearby towns, and transported daily to site (by bus);
- The gate house and security house will occupy an area of up to 0.5 ha.
- Battery Energy Storage System (BESS) of approximately 3.6 ha;
- One permanent Operation and Maintenance (O&M) building (including offices, warehouses, workshops, canteen, visitors centre and staff lockers) occupying an area of up to 1 ha;
- A temporary site camp establishment and concrete batching plant occupying an area of up to 1.6 ha;
- Galvanized palisade fencing to be used at the substations with the maximum height of the fencing to be up to 3.5 m; and
- Water will either be sourced from either the Local Municipality, supplied from a private contractor and trucked in, from existing boreholes located within the application site or from a new borehole if none of these options are available.

In order to evacuate the energy generated by the WEFs to supplement the national grid, Pofadder Grid (Pty) Ltd is proposing two grid connection alternatives which will be assessed separately.

The EA applications for the three wind farm projects and gridline are being undertaken in parallel as they are co-dependent, i.e. one will not be developed without the other.

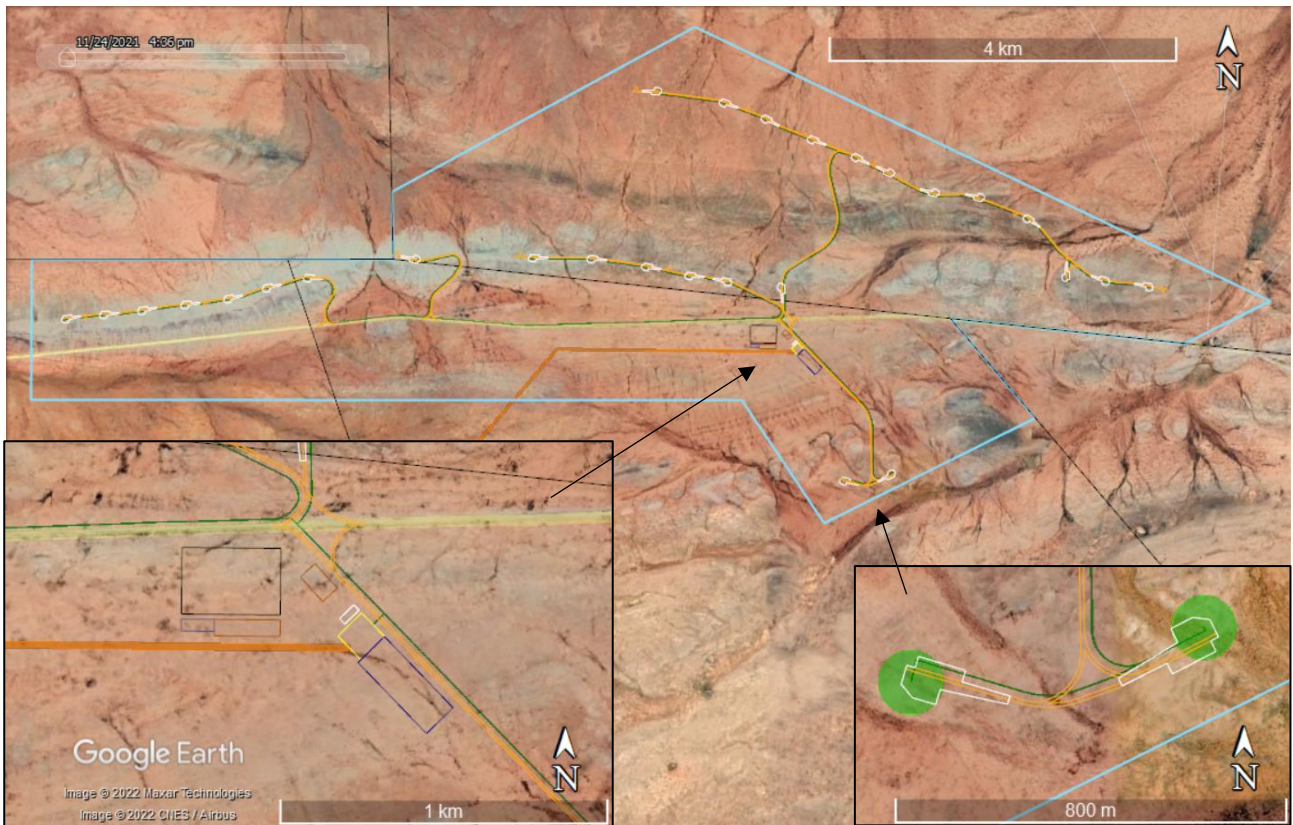


Figure 2: Aerial view of the study area showing the layout and location of the proposed project within the farm portions. The two insets show details. Green circles with white polygons = turbine foundations with hardstands, green lines = internal powerlines, dark orange = 132 kV powerline, light orange lines = roads, black block = laydown area, light brown blocks = batching plant (two options), grey block = warehouse, white block = offices, yellow block = substation, blue block = battery storage.

1.1.2. Identification of alternatives

The site has been screened for environmental sensitivities and the layout designed to avoid sensitive locations. As such, no alternative project layouts are assessed here. However, there are two batching plant location options on the south and east sides of the proposed laydown area. The No-Go option will also be considered in the assessment. The site is suited to wind energy generation and thus other forms of power generation technology have not been considered.

1.1.3. Aspects of the project relevant to the heritage study

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

1.2. Terms of reference

ASHA Consulting was asked to conduct a field assessment and desktop study and compile a Heritage Impact Assessment (HIA) for the proposed project. The HIA was to meet the requirements of the heritage authorities and include the following:

- Describe the affected environment;
- Describe the legal, policy and planning context;
- Identify and (where required) respond to issues;
- Identify opportunities and constraints;
- Predict and assess impacts; and
- Recommend management actions and monitoring programmes.

ASHA was also asked to subcontract a palaeontological specialist to provide a desktop assessment of the potential palaeontological impacts. This would form a separate report to be submitted along with the HIA.

1.3. Scope and objectives

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

1.4. Specialist credentials

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

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

1.5. Declaration of independence

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

2. LEGAL REQUIREMENTS AND GUIDELINES

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

The NHRA protects a variety of heritage resources as follows:

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

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

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

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

- a) its importance in the community, or pattern of South Africa’s history;

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

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

2.2. Approvals and permits

2.2.1. Assessment Phase

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

2.2.2. Construction Phase

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

2.3. Guidelines

SAHRA have issued minimum standards documents for archaeological and palaeontological specialist studies. There is also a Western Cape Provincial guideline for heritage specialists working

in an EIA context and which is generally useful. The reporting has been prepared in accordance with these guidelines. The relevant documents are as follows:

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

3. ASSESSMENT METHODOLOGY

3.1. Literature survey and information sources

A survey of available literature was carried out to assess the general heritage context into which the development would be set. The information sources used in this report are presented in Table 2. Data were also collected via a field survey.

Table 2: Information sources used in this assessment.

Data / Information	Source	Date	Type	Description
Maps	Chief Directorate: National Geo-Spatial Information	Various	Spatial	Historical and current 1:50 000 topographic maps of the study area and immediate surrounds
Aerial photographs	Chief Directorate: National Geo-Spatial Information	Various	Spatial	Historical aerial photography of the study area and immediate surrounds
Aerial photographs	Google Earth	Various	Spatial	Recent and historical aerial photography of the study area and immediate surrounds
Cadastral data	Chief Directorate: National Geo-Spatial Information	Various	Survey diagrams	Historical and current survey diagrams, property survey and registration dates
Background data	South African Heritage Resources Information System (SAHRIS)	Various	Reports	Previous impact assessments for any developments in the vicinity of the study area
Palaeontological sensitivity	South African Heritage Resources Information System (SAHRIS)	Current	Spatial	Map showing palaeontological sensitivity and required actions based on the sensitivity.
Background data	Books, journals, websites	Various	Books, journals, websites	Historical and current literature describing the study area and any relevant aspects of cultural heritage.

3.2. Field survey

The scoping layout for all three projects was subjected to a detailed foot survey on 21-24 November 2021. This was during early summer but, in this very dry area, the season makes no meaningful difference to vegetation covering and hence the ground visibility for the archaeological survey. Other heritage resources are not affected by seasonality. During the survey the positions of finds and survey tracks were recorded on a hand-held Global Positioning System (GPS) receiver set to the WGS84 datum (Figure 3). Photographs were taken at times in order to capture representative samples of both the affected heritage and the landscape setting of the proposed development.

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

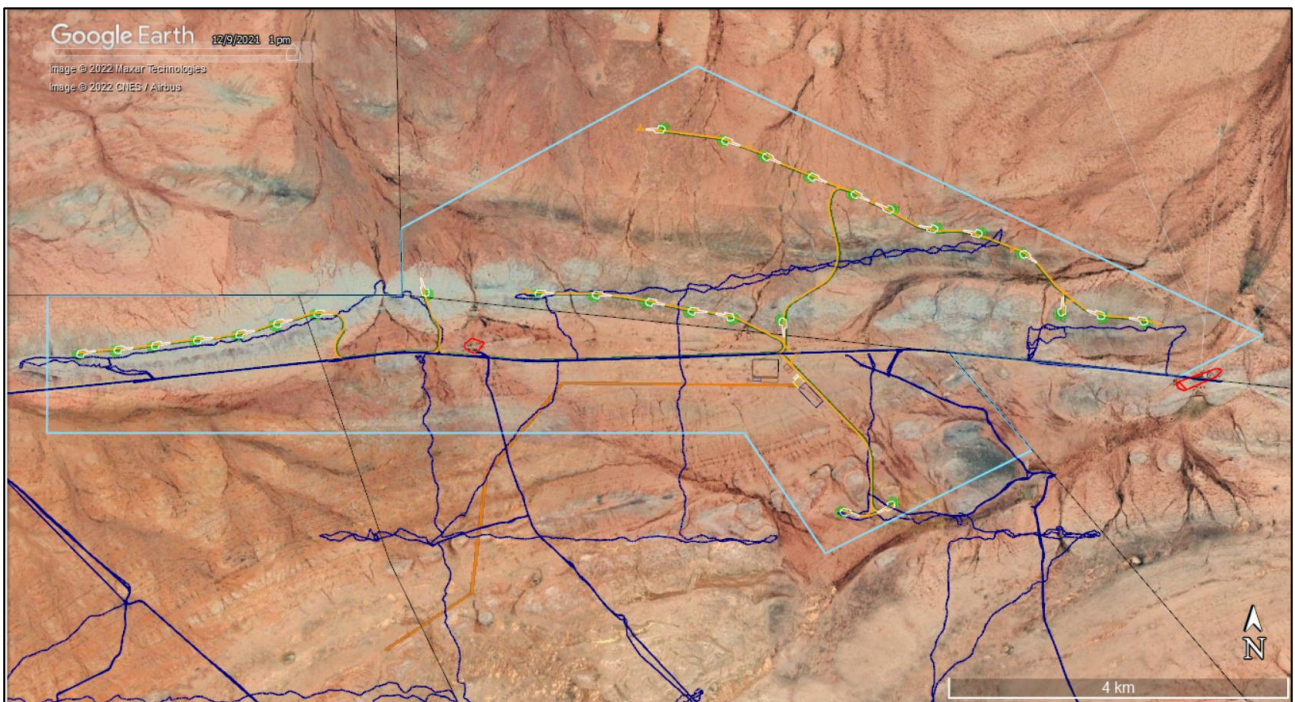


Figure 3: Aerial view of the Pofadder WEF 1 layout (key as per Figure 2) showing the survey tracks (blue lines).

3.3. Specialist studies

A specialist desktop palaeontological study was commissioned for this project. The report was written by Prof. Marion Bamford and is submitted separately with this HIA.

3.4. Impact assessment

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

3.5. Grading

S.7(1) of the NHRA provides for the grading of heritage resources into those of National (Grade I), Provincial (Grade II) and Local (Grade III) significance. Grading is intended to allow for the identification of the appropriate level of management for any given heritage resource. Grade I and II resources are intended to be managed by the national and provincial heritage resources authorities respectively, while Grade III resources would be managed by the relevant local planning authority. These bodies are responsible for grading, but anyone may make recommendations for grading.

It is intended under S.7(2) that the various provincial authorities formulate a system for the further detailed grading of heritage resources of local significance, but this is generally yet to happen. SAHRA (2007) has formulated its own system² for use in provinces where it has commenting authority. In this system sites of high local significance are given Grade IIIA (with the implication that the site should be preserved in its entirety) and Grade IIIB (with the implication that part of the site could be mitigated and part preserved as appropriate) while sites of lesser significance are referred to as having 'General Protection' (GP) and rated as GP A (high/medium significance, requires mitigation), GP B (medium significance, requires recording) or GP C (low significance, requires no further action).

3.6. Consultation

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

3.7. Assumptions and limitations

The field study was carried out at the surface only and hence any completely buried archaeological sites would not be readily located. Similarly, it is not always possible to determine the depth of archaeological material visible at the surface. The site was very large and could not be surveyed comprehensively. However, the survey did provide a generally good understanding of the study area which is deemed sufficient for the impact assessment process.

4. PHYSICAL ENVIRONMENTAL CONTEXT

4.1. Site context

The site lies in a remote, rural area some 34 km southeast of Pofadder. The R358 runs from north to south some 13 km to the west of the site, while a smaller gravel road runs west to east through the site. Turbines are proposed both to the north and south of this latter road. The study area lies about 70 km east of the Springbok Renewable Energy Development Zone (REDZ) but does fall within the Northern Electricity Grid Infrastructure (EGI) corridor.

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

4.2. Site description

The study area is an extensive flat plain with minimal relief, the main exception being a low ridge of white quartzite that runs through the northern part of the project area (Figure 4). Occasional shallow water courses occur with some of these penetrating the quartzite ridge (Figure 5). The open plains tend to be sandy (Figure 6) with some gravel patches in places (Figure 7). Away from the northern hills, rock outcrops on the plains are rare and, when present, are only up to about 0.5 m high at most (Figure 8).



Figure 4: Looking towards the west along the north side of the quartzite ridge in the far north of the study area.



Figure 5: Looking towards the southwest along the north side of the row of hills in the far north of the study area. Shallow watercourses run from the plains towards and through the quartzite ridge.



Figure 6: Looking towards the north through the centre of the study area with the hills in the far north just visible on the skyline (arrowed).



Figure 7: View towards the southeast showing an example of gravel-covered surface near the south-eastern part of the study area.



Figure 8: Looking towards the southeast through the southern part of the study area and showing the nature of the gravel and rare bedrock outcrops (foreground and middleground) encountered on the plains.

5. FINDINGS OF THE HERITAGE STUDY

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

5.1. Palaeontology

The SAHRIS Palaeosensitivity Map shows the site to be of variable sensitivity (Figure 9). While parts are marked as being of moderate and low sensitivity, other areas are unknown. Because of this, a desktop study has been commissioned. Its findings are presented in a separate report.

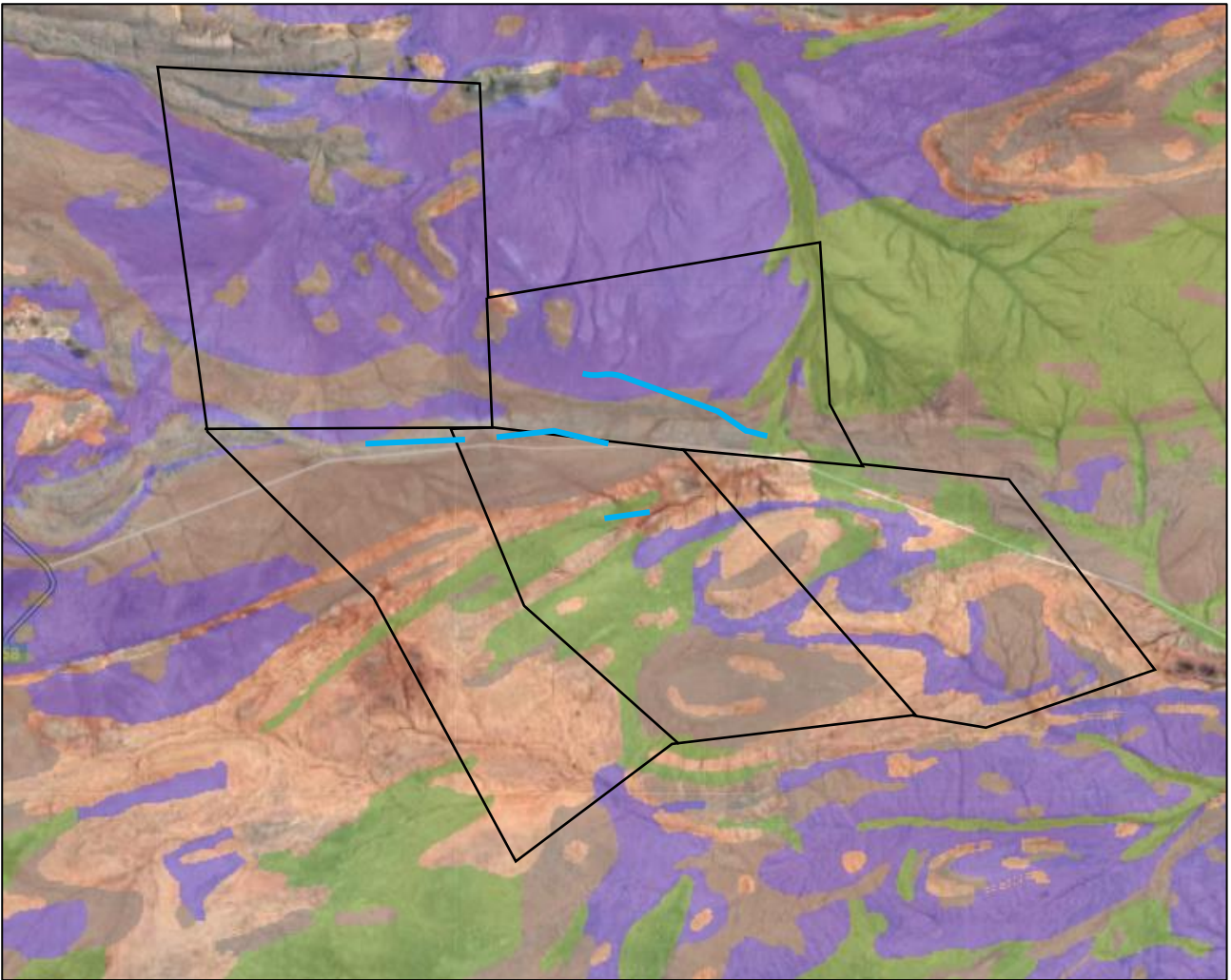


Figure 9: Extract from the SAHRIS Palaeosensitivity Map showing the site to be of variable sensitivity including very low (grey), low (blue) and medium (green). Some areas are unknown (clear). The black polygons are the farm portions involved in the project, while the turquoise lines indicate the proposed rows of turbines.

5.2. Archaeology

5.2.1. Desktop study

Academic archaeological research from the Pofadder area is lacking but many cultural resources management (CRM) projects have been carried out in the broader area with the result that the archaeology of the area is actually fairly well understood.

Early (ESA) and Middle Stone Age (MSA) materials tend to be relatively rare in the northern Bushmanland area but artefacts of this age are known from Gamsberg, near Aggeneys to the west of Pofadder, where stone suitable for flaking was available (Morris 2010). Also in this general area, Webley and Halkett (2012) found a widespread background scatter of predominantly quartz, but with some quartzite artefacts. The material is particularly prevalent in those areas where the soil surface is covered in quartz pebbles and cobbles. The size of the artefacts suggests that they pertain to the MSA but diagnostic features were absent. To the northeast of the Paulputs Substation, Morris

(2012) record a scatter of ESA and MSA artefacts. These are the only finds of this age known by the present author to have been found in the Pofadder area.

According to Morris (2011a) Later Stone Age (LSA) sites are the predominant archaeological trace noted in surveys in the Aggeneys-Pofadder region, but he notes sites of any age to be generally sparse (Morris 2011c). Beaumont *et al.* (1995) noted that most LSA sites then known in Bushmanland appeared to be ephemeral occupations by small groups of people in the hinterland both north and south of the Orange River. This was in sharp contrast to the substantial herder encampments along the Orange River floodplain. Away from the river, LSA material, mainly quartz flakes, appear to often be focused around the base of granite hills (Morris 2011a, b & c; Orton 2018; Pelsler 2011; Webley & Halkett 2011). Beaumont *et al.* (1995) agree, and add that red dunes and the margins of seasonal pans also served as foci for LSA occupation.

In recent years pans have been found to be very important with several locally significant sites now known alongside ephemeral water sources. Perhaps the most important sites are large pans with exposed granite bedrock depressions that trap pools of rainwater and around which many artefacts occur. However, small patches of exposed bedrock just a few meters wide and located in the open plains can also trap water in small holes of about 0.5 to 1.0 m wide. Several of the latter were recorded and sampled by Orton (2015, 2016). The granite outcrops often also have smoothed patches where grinding (presumably of seeds and other plant foods) took place. Similar grinding patches and/or shallow grooves have been found in a number of other areas around Pofadder (Orton 2018, 2019; Orton & Webley 2012).

Unusual for the area are small stone-walled features. Orton (2019) documented some of these on and around dolerite outcrops where the small weathered boulders are suitable for piling into walls.

Near the Paulputs substation, northeast of Pofadder, many Later Stone Age (LSA) artefact scatters have been recorded around rocky hills with some of them being very dense (Orton 2018; Pelsler 2011, 2012). Morris (2012) and Orton (2019) also recorded small quartz outcrops that had been quarried.

Despite the above observations, archaeological remains are likely to be patchy since, in a 15 km linear survey between Pofadder and Pella, Halkett (2010) failed to record any archaeological material. Orton (2019:15) has summarised the four main types of archaeological sites he found in his survey as follows:

1. "Artefact scatters associated with or located on top of dolerite hills;
2. Quartz outcrops exploited for stone for making stone tools;
3. Bedrock outcrops that trap water and bear ground patches; and
4. Artefact scatters associated with pans."

Rock art is known from the region, but the nearest sites are at Aggeneys, between Aggeneys and Springbok and to the east of Kenhardt and thus require no further discussion here beyond noting that the majority of the paintings are geometric motifs that can be ascribed to Khoekhoe herders (Orton 2013; Rudner & Rudner 1968).

Historical accounts of travels through southern Africa frequently provide clues to the precolonial occupation of the land. John Barrow and George Thompson both passed through this general area leaving observations on the local population.

Barrow (1801:387) wrote of the plains between the Kamiesberg Mountains and the Orange River that:

"These plains are now desolate and uninhabited. All those numerous tribes of Namaquas, possessed of vast herds of cattle, are, in the course of less than half a century, dwindled away to four hordes, which are not very numerous, and in a great measure subservient to the Dutch peasantry, who dwell among them."

Thompson (1824:288) noted the following:

"The extensive plains, lying between the Gariep and the Kamiesberg, are represented, by old writers, as occupied by a numerous race of people, possessed of large flocks and herds, and living in ease and abundance. Of these, the tribe now resident at Pella and its vicinity, is the only one remaining."

Both texts show that the area was well inhabited in the past but that colonial expansion was taking its toll on the indigenous inhabitants. Nevertheless, these observations suggest that archaeological remains, at least pertaining to the more recent prehistoric period, should be abundant on the landscape.

5.2.2. Site visit

All finds are listed in Appendix 2 with mapping contained in Appendix 3. The vast majority of finds can be classified as background scatter. These are low density scatters of mostly ESA materials associated with dark-coloured gravels. Much of this gravel appears from aerial photography to lie south of the EIA phase layout but similar finds may still occur within the footprint. The illustrated finds from this gravel all come from the area to the south of the current layout but fell within the scoping layout. Some areas had some large blades (Figure 10), and Acheulean handaxes were fairly commonly encountered (Figure 11). Rare items were diagnostic of the MSA, for example a flake with a faceted platform (Figure 12). Figures 13 and 14 show further examples of these artefacts with the latter including a particularly large flake. Occasional large blocks of what may be *in situ* bedrock were noted to have been flaked (Figure 15). Figure 16 shows three more examples of handaxes. All of these materials are likely to be of Pleistocene age.



Figure 10: Stone artefacts from waypoint 499. There are three handaxes at top left with several blades beneath them. 15 cm ruler for scale.



Figure 11: Close-up of the three handaxes from waypoint 499. 15 cm ruler for scale.



Figure 12: Stone artefacts from waypoint 501. An MSA flake with a faceted platform is arrowed. 15 cm ruler for scale.



Figure 13: Stone artefacts from waypoint 502. 15 cm ruler for scale.



Figure 14: Stone artefacts from waypoint 535. 15 cm ruler for scale.



Figure 15: Flaked outcrop/boulder from waypoint 538. 15 cm ruler for scale.



Figure 16: Examples of handaxes found in the study area. Left is from the scatter at waypoint 513 and is heavily weathered, the other two are isolated finds.

While walking over the larger study area it became evident that there was a relationship between the density of artefacts and the type of substrate. Artefacts were more dense where the dark gravel was more dense. The relationship is summarised in Table 3.

Table 3: The visual character and artefactual content of the four types of gravel identified in the wind farm study area.

Gravel type	Archaeology
Dark rocks, ranging from sub-angular fragments to rounded cobbles, located on red sand. The clasts vary in size and occasional rocks seem to be protruding bedrock. There are very few lighter coloured stones present.	The types and density of artefacts vary greatly, but the presence of artefacts in this gravel type is almost universal.
Dark rocks as described above occur on a lighter-coloured gravel which is either calcrete gravel or a combination of calcrete and pale quartzite on red sand.	When present, the types and density of artefacts vary, but artefacts only occur in some areas with this gravel type.
Calcrete gravel over a calcrete substrate.	Artefacts are very rarely seen on calcrete exposures.
Bedrock outcrop gravels form through weathering of exposed quartzite or other bedrock outcrops and occur around the outcrops or over the top of the larger outcrops which form hills and ridges.	Artefacts are extremely rarely seen on weathering bedrock outcrop exposures.

Historical finds also occurred in the Pofadder WEF 1 project area. Two small stone-walled features were found against the southern side of a rock outcrop in the north of the study area (Figures 17 & 18). One of them had a light scatter of glass, ceramics, metal items and bone fragments with most of them likely being early 20th century in age (Figure 19). Some 250 m to the northeast was a small cluster of stones of unknown function (Figure 20). Given the bedrock exposure in the area, this is not a grave. Elsewhere a broken wine bottle (late 19th century/early 20th century) was seen on its own (Figure 21).



Figure 17: Stone feature at waypoint 486 which is a short distance away from the project footprint.



Figure 18: Stone feature at waypoint 487 which is a short distance away from the project footprint.



Figure 19: Artefacts from alongside the stone feature at waypoint 487.



Figure 20: Stone feature at waypoint 488.



Figure 21: Glass wine bottle fragments at waypoint 494.

An earthen-walled dam was seen adjacent to the west-east main road and had stone-walled ends to prevent erosion of the wall when the dam was full and overflowing (Figure 22).



Figure 22: Earthen dam with end walls at waypoint 566.

5.3. Graves

No isolated graves were seen anywhere in the greater study area. Some graveyards were recorded, with the farm graveyard on Lovedale 201 being in the Pofadder WEF 1 project area, some 1.2 km from the nearest project road. Its oldest grave dates to 1920 (Figure 23). Another possible graveyard lies on a neighbouring farm but is 1.6 km from the nearest project infrastructure.

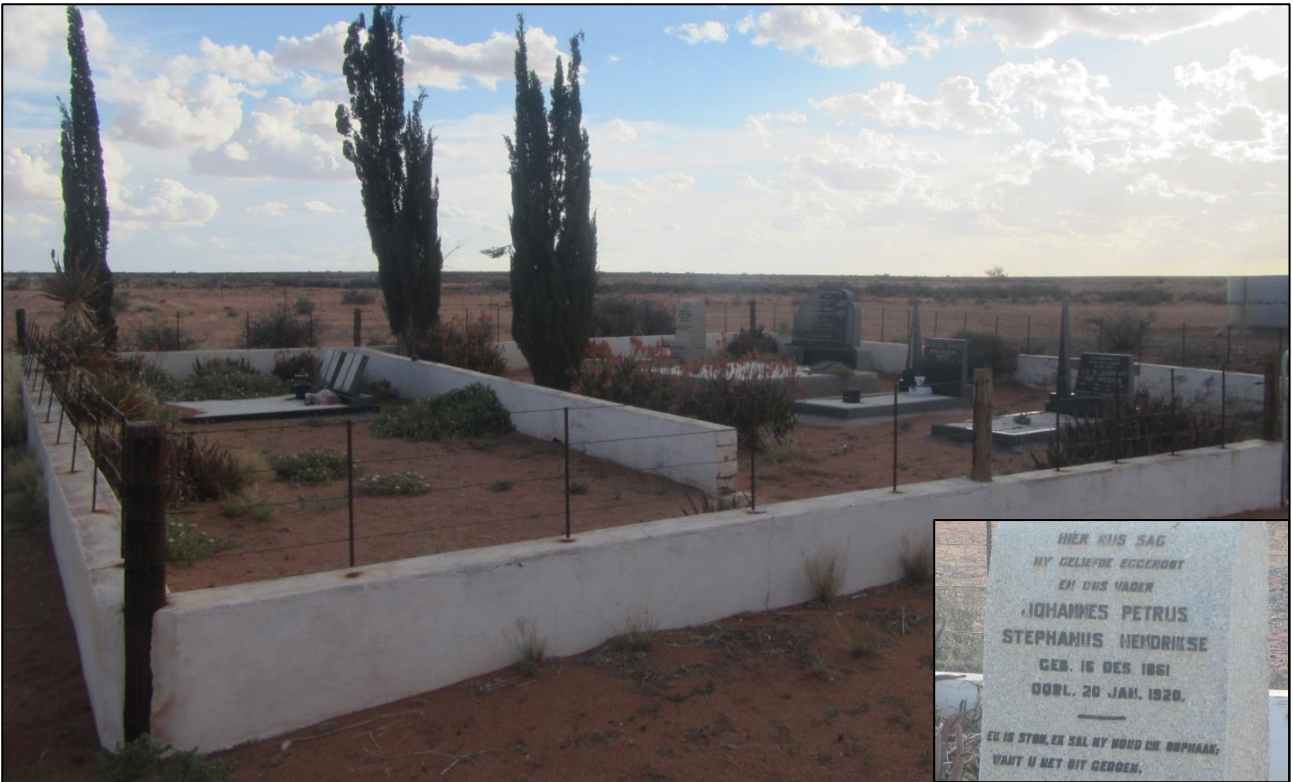


Figure 23: Lovedale Farm graveyard at waypoint 495. The inset shows the oldest grave.

5.4. Historical aspects and the Built environment

5.4.1. Desktop study

Because it lies so far from the original Cape Colony (i.e. Cape Town), this area was colonised quite late with most farms only granted in the very late 19th or even early 20th centuries. As a result, very few historical structures and features exist on the landscape. The majority of buildings date to the early-mid-20th century and tend to be of low or no heritage significance.

Pofadder is located some 34 km to the northwest of the study area. Pofadder was founded as a mission station in 1875 by Reverend Christian Schroder. It was named after a Koranna chief, Klaas Pofadder, who had lived at the perennial spring located there and was shot there after raiding livestock from farmers to the west (Bulpin 2001). Colonists began settling around the spring from 1889 but only in 1917 were the first residential plots surveyed (Marais 2021). The town was established in 1918 and named Theronville but the earlier name for the area stuck and eventually became the accepted name of the village (Bulpin 2001).

The survey diagrams for the four farm portions involved in the project indicate that the two northern farms were surveyed first. De Neus and Sand-Gat date to 1881, while Lovedale and Ganna Poort both date to 1913.

5.4.2. Site visit

Four historical resources were recorded. One is a stone boundary beacon built on the quartzite ridge at the intersection of three farms (Figure 24). It is at the south-eastern corner of De Neus and south-

western corner of Sand-Gat, while the northern boundary of Lovedale has a slight bend at this point. The second is the farm complex on Lovedale. The complex was not examined in detail but it contains at least two historical buildings of which the main house, according to the owner, likely dates to the 1920s (Figure 25). The main house is a local variation of 'Karoostyle' (Marincowitz 2006) with a recessed central portion of the façade. This was closed in at a later date to create an extra room. A more recently added room lies on the northern side of the house. The house is in excellent condition having been well-maintained over the years. A simpler cottage lies a short distance away (Figure 26). The whole werf is shown in Figure 27.



Figure 24: Stone boundary cairn at waypoint 524.



Figure 25: The main farmhouse on Lovedale 201 located at waypoint 496.



Figure 26: Second cottage in the Lovedale farm complex at waypoint 496.



Figure 27: Aerial view of the Lovedale farm complex. The main house (Fig. 28) is in the south and the second cottage (Fig. 29) in the east.

The third is a farmstead that was only seen from a distance. It lies just beyond the eastern edge of the project area, but its structures lie some 700 m to 900 m away from the nearest project infrastructure and 800 m to 1 km from the nearest turbine. It contains a few historical structures (Figure 28). They are split by the local gravel road passing through the study area and actually fall on two different farms. Those to the south, on the Remainder of Quagga-Maag 200 (not part of the

study area), seem likely to be the oldest. One of these is built in the same style as the Lovedale farm house with a recessed central stoep (Figure 29). It seems to be in reasonable condition but, judging by a boarded up window and another that appears broken, it is empty and derelict. A stone kraal and water reservoir also form part of this complex. The main farmstead lies to the north of the road and also appears to contain at least one heritage building, though this looked, from the small amount visible between trees and another house, to be early-mid-20th century in age. The nearest turbine is at least 660 m from the nearest structure in this complex.



Figure 28: View of the farm complex on Sand-Gat 150/3.



Figure 29: The older house at waypoint 489 to the south of the gravel road.

The fourth is a farmstead lying 1.7 km to 2.0 km west of the nearest Pofadder WEF 1 turbine and seems to be in poor condition, although only those structures closest to the road were examined. Figures 30 and 31 show structures there, while Figure 32 shows a stone-walled reservoir.



Figure 30: Dilapidated structure at the farmstead ay waypoint 526.



Figure 31: Structure with bricked up windows at the farmstead ay waypoint 526.



Figure 32: Stone-walled water reservoir at waypoint 526.

5.5. Cultural landscapes and scenic routes

The landscape is largely a natural one with only minimal anthropogenic inputs in the form of rare buildings and a scattering of fences, farm tracks, wind pumps and small earthen dams. Because of the flatness of the landscape, the quartzite ridge in the north of the project area is a prominent feature. The four farmsteads of the wider study area (two in the study area and one to the west and east) have all been placed along the southern side of the ridge. This is probably because of the drainage lines that lead northwards, penetrating the ridge in places. Farm dams are located at many of these spots.

The site lies in a remote location well away from commonly used roads that might be regarded as scenic routes. This aspect is thus of no further concern.

5.6. Statement of significance and provisional grading

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

The archaeological resources are deemed to have generally low cultural significance at the local level for their scientific value and most can be graded GPC. However, a few sites – the historical ones – have slightly greater significance and have been rated GPB.

Graves are deemed to have high cultural significance at the local level for their social value. They are allocated a grade of IIIA.

The built heritage features have medium to high cultural significance at the local level for their aesthetic, architectural, historical and social values.

The cultural landscape is largely a natural landscape with aesthetic value and is rated as having medium cultural significance at the local level.

Figures 33 and 34 show the distribution of heritage resources graded GPB or higher.

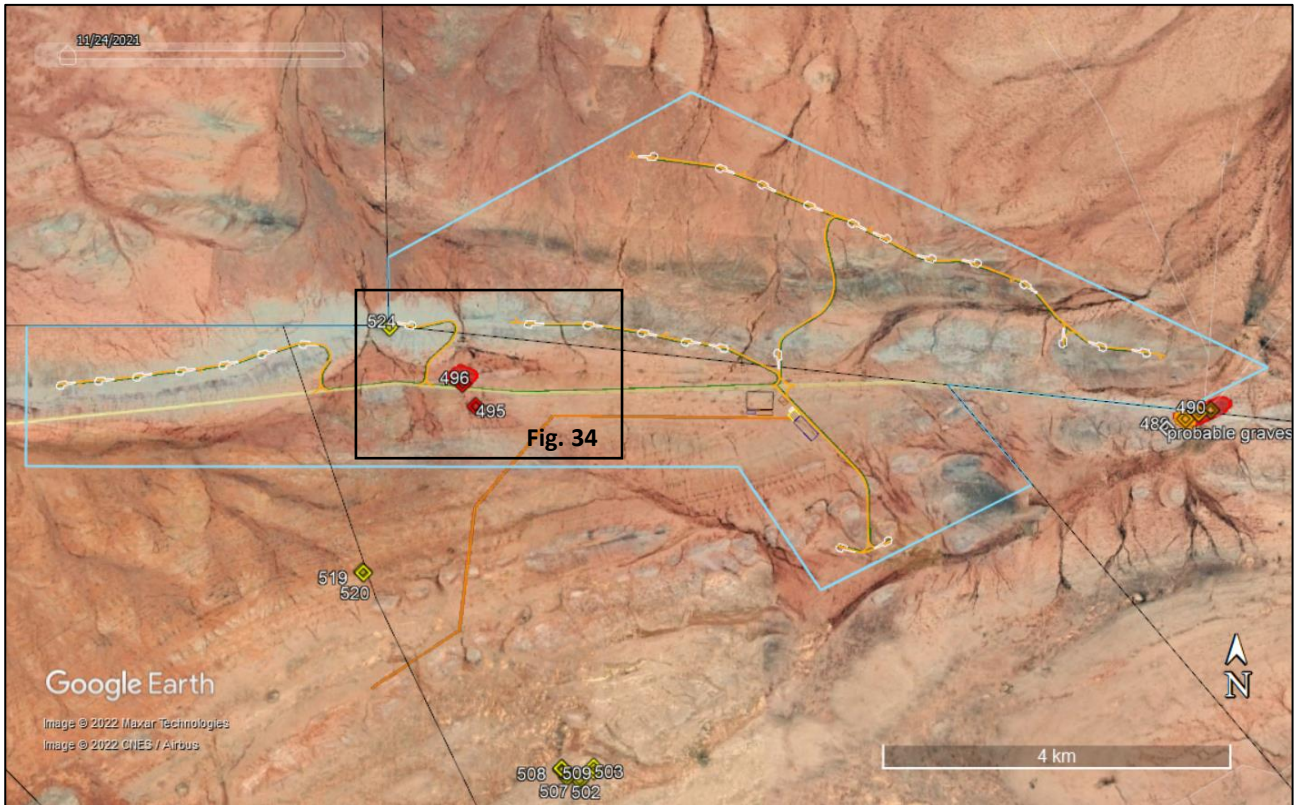


Figure 33: Aerial view of the Pofadder WEF 1 layout showing the locations of all heritage resources graded GPB and above. Yellow polygons are GPB/low-medium, orange are IIIB/medium-high and red are IIIA/high. The one location where the layout comes close to heritage resources is labelled and enlarged below.

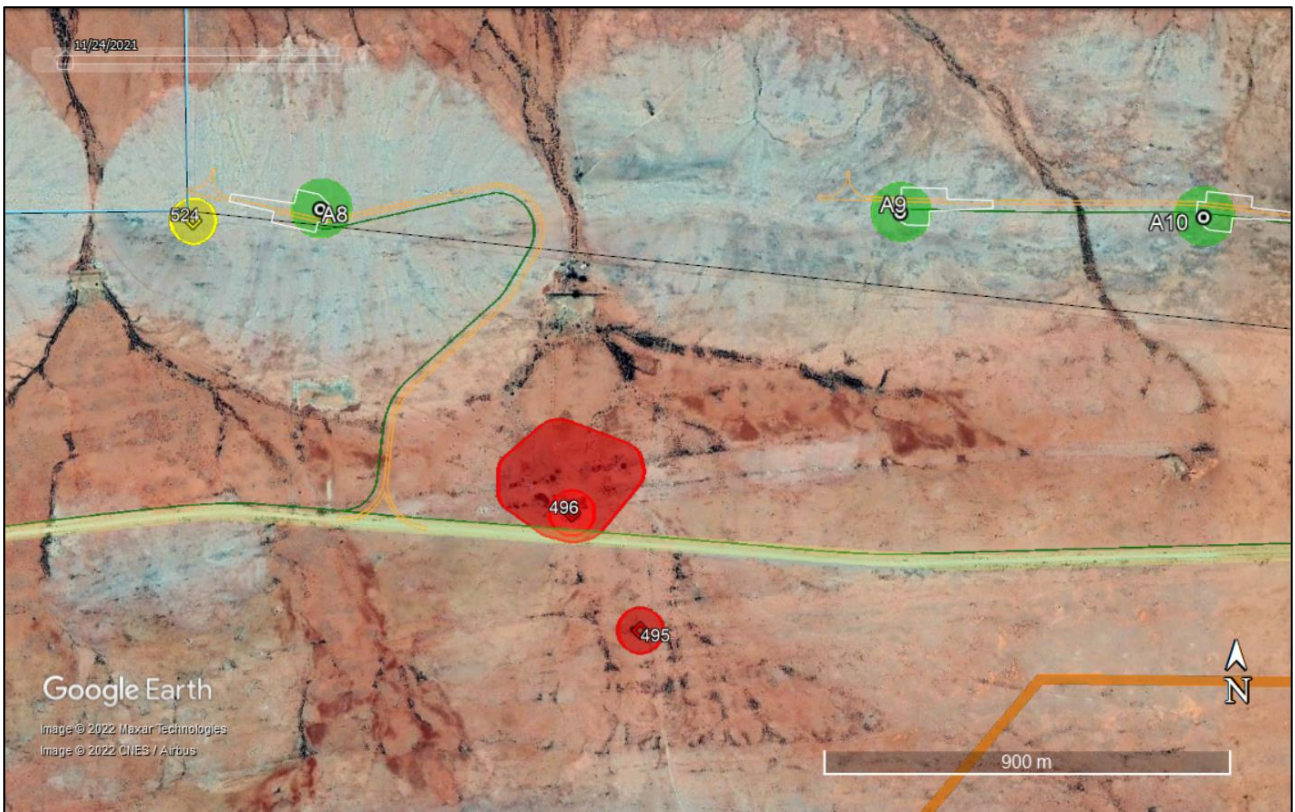


Figure 34: Aerial view showing the location of the stone boundary cairn at waypoint 524 and the Lovedale farmstead at waypoint 496.

5.7. Summary of heritage indicators

- Indicator: Significant archaeological resources should be avoided if possible.
- Indicator: If they cannot be avoided, significant archaeological resources should not be damaged or destroyed without further study as appropriate.
- Indicator: Graves should be avoided.
- Indicator: Significant historical structures should be avoided by at least 500 m.
- Indicator: The cultural landscape should not be dominated by the proposed development as seen from publicly accessible viewpoints.

6. ASSESSMENT OF IMPACTS

The assessment of palaeontological impacts will be undertaken by the palaeontological specialist and is thus excluded from this assessment. Impacts to archaeology and graves would occur during construction only, while impacts to the landscape would occur during the construction, operation and decommissioning phases. Landscape impacts are visual/contextual impacts and, since no direct built heritage impacts would occur, visual/contextual impacts to structures are included in the cultural landscape assessment. No impacts would occur during the planning phase and thus no assessment is provided for this phase.

6.1. Construction Phase

6.1.1. Impacts to archaeological resources

Direct impacts to archaeological resources would occur during the construction phase when grubbing of the project footprint takes place and possibly also when excavations for foundations and other infrastructure are made. Given the low local cultural significance of the identified archaeology, the impact extent would be limited to the site, and because no culturally significant sites are currently known within the layout, the intensity of the impacts has been rated low. The impact significance is **low negative** (Table 4). With mitigation, which would entail checking any unsurveyed parts of the footprint and recording and sampling any affected sites, the impact significance drops slightly but is still **low negative**. There are no fatal flaws in terms of construction phase impacts to archaeology.

6.1.2. Impacts to graves

Direct impacts to graves may occur during the construction phase when grubbing of the project footprint takes place and possibly also when excavations for foundations and other infrastructure are made. Given the high cultural significance of graves and the potential for their total destruction, the impact intensity is high. The extent would be limited to the site though. Because graves are unique and could be totally and permanently destroyed, the calculated impact significance is **high negative** despite the very low probability of impacts occurring (Table 4). With mitigation, which would entail reporting of accidentally discovered graves and following the required exhumation procedure, the impact significance drops to **medium negative**. Because of the very low probability of impacts it seems that a significance of low negative may be more appropriate. There are no fatal flaws in terms of construction phase impacts to graves.

6.1.3. Impacts to the cultural landscape and context of structures

Direct impacts to the cultural landscape and the local context or setting of historical structures would occur during the construction phase when construction equipment, turbines and other infrastructure are introduced to what is otherwise a rural/natural landscape. The impacts would last for as long as the construction phase and are reversible with removal of all equipment and infrastructure from the site. The impact significance calculates to **low negative** (Table 4). Mitigation measures can never screen or hide the large equipment and structures but can help to reduce the intensity of the impacts at the site-specific extent. Such measures would generally aim to reduce the duration of construction and minimise the amount of land area that is scarred. A measure recommended by the heritage consultant to reduce landscape scarring has already been

incorporated into the layout. These measures will improve the overall situation, but the assessment rating remains **low negative**. There are no fatal flaws in terms of construction phase impacts to the cultural landscape.

6.2. Operation Phase

6.2.1. Impacts to the cultural landscape

Direct impacts to the cultural landscape would occur during the operation phase due to the presence of the WEF in the landscape. The industrial type facility is out of character with the rural/natural landscape and the red flashing aviation warning lights on the towers would result in a considerable change to the night time sense of place in an environment that is usually very dark. It is notable that in order to achieve their purpose they are visible over great distances. The cultural landscape impacts would be felt in the local area/district but the impact intensity would be fairly low which leads to a significance rating of **medium negative** (Table 4). Only two mitigation measures are suggested. One is to ensure that all maintenance vehicles and activities remain in designated areas to avoid any new damage to the landscape. The other is more important and involves reducing night time impacts through the use of a warning system designed to minimise use of the red aviation warning lights. Such a system is not currently approved by the South African Civil Aviation Authority but should one be approved by the time the project reaches construction then it must be installed. With mitigation the impact significance is expected to be reduced to **low negative**. There are no fatal flaws in terms of operation phase impacts to the cultural landscape.

6.3. Decommissioning Phase

Decommissioning phase impacts will be much the same as those for the construction phase except that there is the potential for longer term landscape scarring if rehabilitation is ineffective. It is assumed that the duration will be similar and the expected impact significance is **medium negative** (Table 4). Mitigation would aim to reduce the duration of activity and ensure effective rehabilitation of the site. With mitigation the significance reduces to **low negative**.

Table 4: Impact assessment table.

Pofadder Wind Energy Facility 1																				
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
Construction Phase																				
Archaeological resources	Grubbing and excavations for roads, turbines and other infrastructure will directly impact on archaeological sites and artefacts	1	2	4	4	4	1	15	-	Low	- Survey all unsurveyed parts of the approved layout. - Record and sample/excavate any affected archaeological sites	1	2	4	2	4	1	13	-	Low
Graves	Grubbing and excavations for roads, turbines and other infrastructure may directly impact on graves	1	1	4	4	4	4	56	-	High	- Report graves found accidentally and follow required exhumation procedure	1	1	4	2	4	2	30	-	Medium
Cultural landscape and structures	Introduction of construction equipment and turbines directly alters landscape quality, sense of place and context of structures	2	4	1	2	1	2	20	-	Low	- Keep construction duration as short as possible. - Minimise landscape scarring. - Rehabilitate any areas not required during operation.	2	4	1	2	1	2	20	-	Low
Operational Phase																				
Cultural landscape and structures	Existence of the WEF in a rural/natural landscape directly alters landscape quality, sense of place and context of structures, including night time impacts from red flashing lights	2	3	2	1	4	3	36	-	Medium	- No maintenance activities to take place outside of the authorised footprint and all vehicles to remain on authorised roads and tracks. - If approved by SACAA at the time, use a warning system in which the red lights stay off at night until needed.	2	2	2	1	4	2	22	-	Low

Decommissioning Phase																				
Cultural landscape and structures	Introduction of construction equipment directly alters landscape quality, sense of place and context of structures	2	4	1	2	1	3	30	-	Medium	Keep decommissioning duration as short as possible. Ensure effective rehabilitation of all areas.	2	4	1	2	1	2	20	-	Low
Cumulative																				
All heritage resources	Grubbing of surface and introduction of WEF to the landscape directly impacts archaeology and alters landscape	2	4	2	2	4	3	45	-	High	As per individual impacts above but with the addition of pre-construction surveys where there is any uncertainty or where layouts have changed since the original surveys	2	4	3	2	4	2	30	-	Medium

6.4. Cumulative impacts

Cumulative impacts for archaeological heritage are very difficult to evaluate because of the highly variable but generally sparse distribution of archaeological sites, and the varying quality of surveys. It is also impossible to find and record everything so some loss of archaeological materials would be expected. Most projects within 35 km of the present study area are located away from the N14, but there will still be some impacts to this road (especially well to the west nearer Aggeney's and well outside the 35 km radius) which can be considered a scenic route – it is also a tourist route leading to the Augrabies Falls National Park (Figure 35). The cumulative impacts to heritage resources may have a significance of **high negative** with the potential impacts to archaeology and the wider landscape being the main drivers of this, although it is noted that some scientific benefit has been derived from archaeological mitigation work at another local project (Orton 2016). Where there is uncertainty, or if layouts have changed since the original surveys, pre-construction surveys would reduce the chances of significant archaeological impacts through the identification of sites requiring avoidance or mitigation. Reducing the use of aviation warning lights for WEFs will also reduce landscape impacts. Post-mitigation the significance of cumulative impacts to heritage resources can be expected to be **medium negative**. The present project will make very little contribution to the cumulative impacts though.

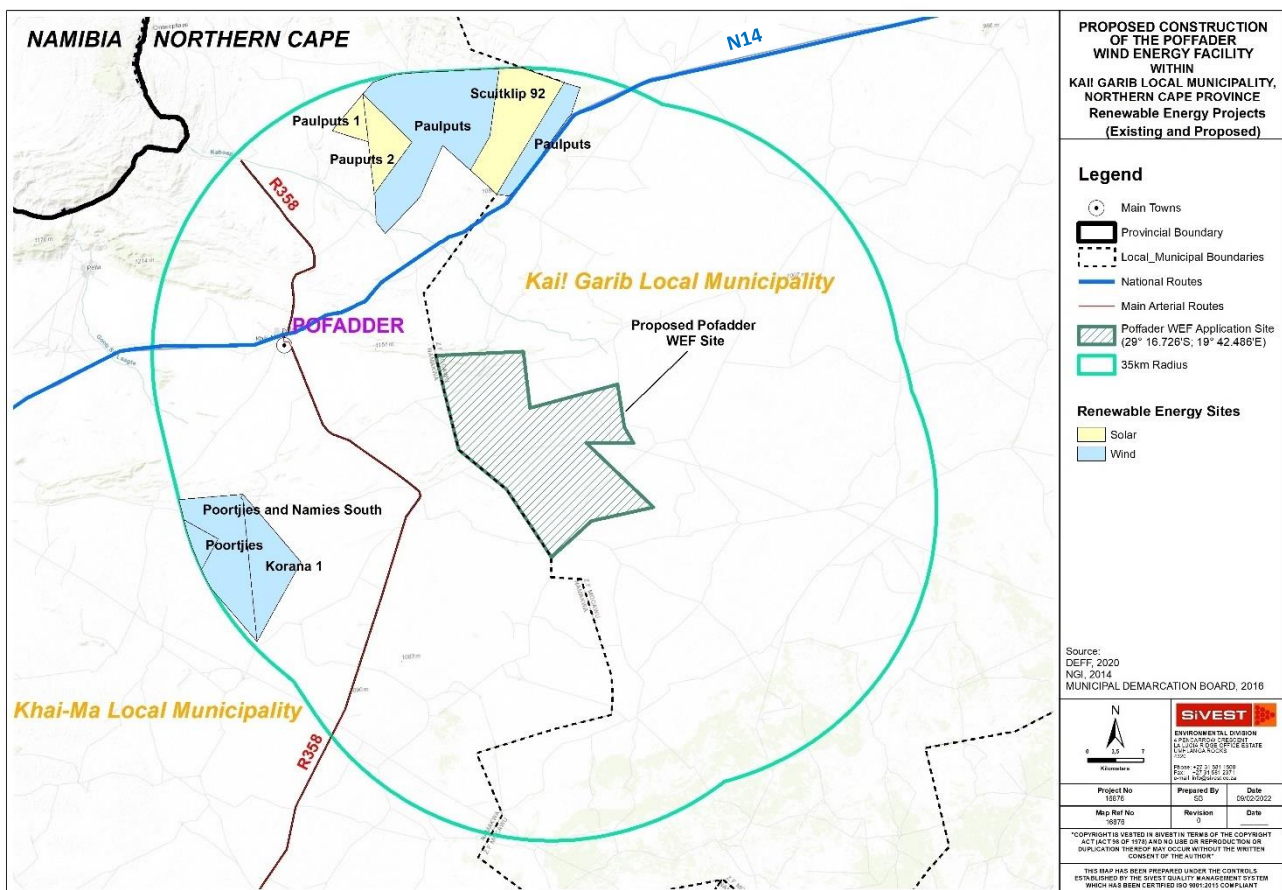


Figure 35: Map showing other renewable energy facilities considered during assessment of cumulative impacts.

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

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

The project is expected to provide construction period employment, a proportion of which would be sourced from the local community. A number of jobs would also be created in the long term to run the facility. Perhaps the biggest socio-economic benefit, however, is the contribution that the project would make to the supply of electricity in South Africa. A stable and reliable supply, especially based on a greater proportion of renewable energy, is crucial for further economic development which would benefit the country as a whole. These socio-economic benefits outweigh the expected heritage impacts.

6.8. Existing impacts to heritage resources

There are currently no obvious threats to heritage resources on the site aside from the natural degradation, weathering and erosion that will affect archaeological materials, fossils, structures and possibly graves. Trampling of artefacts from grazing animals and/or farm/other vehicles could also occur. There are no currently known threats to the landscape. Overall, existing impact significance would be **negligible negative** or even **neutral**.

6.9. The No-Go alternative

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

6.10. Levels of acceptable change

Any impact to an archaeological or palaeontological resource or a grave is deemed unacceptable until such time as the resource has been inspected and studied further if necessary. Impacts to the landscape are difficult to quantify but in general a development that visually dominates the landscape from many publicly accessible vantage points is undesirable.

7. INPUT TO THE ENVIRONMENTAL MANAGEMENT PROGRAM

The actions recorded in Table 5 should be included in the environmental management program (EMPr) for the project.

Table 5: Heritage considerations for inclusion in the EMPr.

Impact	Mitigation / management objectives & outcomes	Mitigation / management actions	Monitoring		
			Methodology	Frequency	Responsibility
Impacts to archaeology and graves					
Damage or destruction of	Avoid impacts (preferred) or locate	Pre-construction survey of unsurveyed	Appoint archaeologist to	Once-off	Project developer

Impact	Mitigation / management objectives & outcomes	Mitigation / management actions	Monitoring		
			Methodology	Frequency	Responsibility
archaeological sites or graves	and sample or rescue sites/burials before disturbance	areas, micrositing of infrastructure	conduct survey well before construction		
Damage or destruction of archaeological sites or graves	Rescue information, artefacts or burials before extensive damage occurs	Reporting chance finds as early as possible, protect in situ and stop work in immediate area	Inform staff and carry out inspections of new excavations	Ongoing basis	Construction Manager or Contractor
				Whenever on site (at least weekly)	ECO
Impacts to the cultural landscape					
Visible landscape scarring	Minimise landscape scarring	Ensure disturbance is kept to a minimum and does not exceed project requirements. Rehabilitate areas not needed during operation.	Monitoring of surface clearance relative to approved layout	Ongoing basis	Construction Manager or Contractor
				As required	ECO

8. CONCLUSIONS

The main heritage concerns for this project are archaeological sites and the cultural landscape. Some archaeological sites are within the current layout but none of these are highly significant sites and none require *in situ* conservation. It is, of course, always best to avoid any sites that have some research value and hence cultural significance, but excavation within a commercial mitigation context would be completely acceptable for all of the sites concerned here. Impacts to the landscape are unavoidable and mitigation can only deal with impacts at a very localised level. The remaining concern is the introduction of the red flashing lights at night which would cause a considerable change in the night time sense of place with the lights being strongly visible in an otherwise very dark landscape, and potentially over great distances. This impact may be mitigable if there is an approved system in place to allow the lights to come on only when required. Table 6 lists the heritage indicators and the responses.

Table 6: Heritage indicators and project responses.

Indicator	Project Response
Significant archaeological resources should be avoided if possible.	No known significant resources occur within the project footprint.
If they cannot be avoided, significant archaeological resources should not be damaged or destroyed without further study as appropriate.	Mitigation will be recommended for those sites that have not been avoided.
Graves should be avoided.	All known graves have been avoided.
Significant historical structures should be avoided by at least 500 m.	All known historical structures have been avoided with the minimum distance between turbines and structures being approximately 750 m. A WEF road comes

	within about 300 m of historical structures but this acceptable.
The cultural landscape should not be dominated by the proposed development as seen from publicly accessible viewpoints.	The site is quite remote and away from all well-used public roads and scenic routes, although the turbines on the ridge to the north of the road through the site would be very prominent. This issue is of no concern during the day due to the remoteness of the site but the red aviation warning lights will result in a night time landscape impact which could be visible over great distances.

Overall there are no highly significant concerns for this project and the expected impacts can largely be mitigated. The remaining concerns are likely outweighed by the socio-economic benefits of the project. Figures 33 and 34 map the known heritage resources, showing those that are affected by the project layout.

8.1. Reasoned opinion of the specialist

Given that (1) all the expected impacts after mitigation are in the low to medium range (with those rated medium perhaps better rated as low), (2) direct impacts to archaeology can generally be easily mitigated if it is found during the preconstruction survey that impacts would occur, and (3) there are no highly significant landscapes or scenic routes in the vicinity of the site, it is the opinion of the heritage specialist that the proposed project may be authorised in full, but subject to the recommendations on turbine omissions below.

9. RECOMMENDATIONS

It is recommended that the proposed Pofadder WEF 1 be authorised, but subject to the following recommendations which should be included as conditions of authorisation:

- All unsurveyed parts of the final approved layout must be surveyed for archaeological sites and graves prior to construction to determine whether further mitigation measures are required; and
- If any archaeological material or human burials are uncovered during the course of development then work in the immediate area should be halted. The find would need to be reported to the heritage authorities and may require inspection by an archaeologist. Such heritage is the property of the state and may require excavation and curation in an approved institution.

10. REFERENCES

Barrow, J. 1801. *An account of travels into the interior of southern Africa, in the years 1797 and 1798: including cursory observations on the geology and geography of the southern part of that continent; the natural history of such objects as occurred in the animal, vegetable and mineral kingdoms; and sketches of the physical and moral character of the various tribes of*

inhabitants surrounding the settlement of the Cape of Good Hope. London: T. Cadell Jun. and W. Davies.

- Beaumont, P., Smith, A.B. & Vogel, J.C. 1995. Before the Einiqua: The Archaeology of the Frontier Zone. In Smith, A.B. (ed) *Einiqualand: studies of the Orange River frontier*: 236-300. UCT Press: Cape Town.
- Bulpin, T.V. 2001. *Discovering Southern Africa*. Muizenberg: Discovering Southern Africa Productions cc.
- Halkett, D. 2010. An assessment of impact on archaeological heritage resulting from replacement of a section of the existing bulkwater supply pipeline from Pella to Pofadder, Northern Cape. Unpublished report for Van Zyl Environmental. University of Cape Town: Archaeology Contract Office.
- Marais, J. 2021. History of Pofadder. Retrieved from <https://southafrica.co.za/history-pofadder.html> on 28th December 2021.
- Marincowitz, H. 2006. *Karoostyle: Folk architecture of Prince Albert and its environs*. Prince Albert: Fransie Pienaar Museum.
- Morris, D. 2010. Cultural Heritage Assessment: Gamsberg. Supplementary observations to a previous specialist report on archaeological resources. Kimberley: McGregor Museum.
- Morris, D. 2011a. A Phase 1 Heritage Impact Assessment for the proposed Aggeneis – Paulputs 220kV transmission line. Unpublished report for SSI Engineers and Environmental Consultants. Kimberley: McGregor Museum.
- Morris, D. 2011b. SATO Energy Holdings: Zuurwater Photovoltaic Energy Generation Facility development near Aggeneys, Northern Cape. Report for SATO Energy Holdings. Kimberley: McGregor Museum.
- Morris, D. 2011c. Black Mountain Concentrated Solar Power Facility development at Aggeneys, Northern Cape. Report for Aurora Power Solutions (Pty) Ltd. Kimberley: McGregor Museum.
- Orton, J. 2013. Geometric rock art in western South Africa and its implications for the spread of early herding. *South African Archaeological Bulletin* 68: 27-40.
- Orton, J. 2015. Final archaeological survey for the proposed Konkoonsies II Solar Energy Facility, Kenhardt Magisterial District, Northern Cape. Report prepared for Savannah Environmental (Pty) Ltd. Muizenberg: ASHA Consulting (Pty) Ltd.
- Orton, J. 2016. Archaeological mitigation for the proposed Konkoonsies II Solar Energy Facility, Kenhardt Magisterial District, Northern Cape. Report prepared for Ramizone (RF) (Pty) Ltd. Muizenberg: ASHA Consulting (Pty) Ltd.
- Orton, J. 2018. Heritage Impact Assessment: Scoping and Environmental Impact Assessment for the proposed development of the 300 MW Paulputs Solar PV Energy Facility on Konkoonsies

91/2/rem and 91/5 near Pofadder, in the Khaï-Ma Local Municipality (Kenhardt Magisterial District, Northern Cape Province). Unpublished report prepared for Gaea Enviro (Pty) Ltd. Lakeside: ASHA Consulting (Pty) Ltd.

Orton, J. 2019. Heritage Impact Assessment: proposed Paulputs Wind Energy Facility and associated Grid Connection near Pofadder, Kenhardt Magisterial District, Northern Cape. Report prepared for Arcus Consultancy Services South Africa (Pty) Ltd. Lakeside: ASHA Consulting (Pty) Ltd.

Orton, J. & Webley, L. 2012. Scoping heritage impact assessment for the Pofadder Wind and Solar Energy Facility, Kenhardt Magisterial District, Northern Cape. Report prepared for Savannah Environmental (Pty) Ltd. St James: ACO Associates cc.

Pelser, A. J. 2011. A report on an Archaeological Impact Assessment (AIA) for the proposed solar energy plant on Konkoonsies 91, Pofadder District, Northern Cape. Report for Robert de Jong & Associates.

Rudner, J. & Rudner, I. 1968. Rock-Art in the Thirstland Areas. *South African Archaeological Bulletin* 23: 75-89.

Thompson, G. 1827. *Travels and adventures in southern Africa*. London: Henry Colburn.

Webley, L. & Halkett, D, 2011. Heritage Impact Assessment: Proposed Aggeneis – Oranjemond 400kV line and substations upgrade, Northern Cape Province. Report for Savannah Environmental (Pty) Ltd.

Webley, L. & Halkett, D. 2012. Heritage Impact Assessment: Proposed Aggeneys photo-voltaic solar power plant on Portion 1 of the Farm Aroams 57, Northern Cape Province. Report for Digby Wells Environmental.

Webley, L. 2012. Desktop Heritage Impact Assessment: Proposed 1.5 Ha extension of Gravel Mine, Portion 2 of the farm Aroams 57, near Aggeneys, Northern Cape Province. Report for Greenmined Environmental. St James: ACO Associates cc.

Wikipedia. 2011. <http://en.wikipedia.org/wiki/Kangnasaurus>. Website accessed 28th December 2021.

Winter, S. & Baumann, N. 2005. Guideline for involving heritage specialists in EIA processes: Edition 1. CSIR Report No ENV-S-C 2005 053 E. Republic of South Africa, Provincial Government of the Western Cape, Department of Environmental Affairs & Development Planning, Cape Town.

SAHRA. 2007. Minimum Standards: archaeological and palaeontological components of impact assessment reports. Document produced by the South African Heritage Resources Agency, May 2007.

APPENDIX 1 – Curriculum Vitae



Curriculum Vitae

Jayson David John Orton

ARCHAEOLOGIST AND HERITAGE CONSULTANT

Contact Details and personal information:

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

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

Education:

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

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

Employment History:

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

Professional Accreditation:

Association of Southern African Professional Archaeologists (ASAPA) membership number: 233

CRM Section member with the following accreditation:

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

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

- Accredited Professional Heritage Practitioner

➤ **Memberships and affiliations:**

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

Fieldwork and project experience:

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

Feasibility studies:

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

Phase 1 surveys and impact assessments:

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

Phase 2 mitigation and research excavations:

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

Awards:

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

APPENDIX 2 – List of heritage resources

Table A2.1: List of heritage resources recorded during the survey. For non-archaeological resources a significance has been given instead of a grade. Note that, for additional context, all resources recorded during the survey are listed, but the relevant projects are indicted in the second and third columns. The present report considers the **Pofadder WEF 1** records. Waypoints falling more than about 350 m from the footprint have not been allocated to a project.

Waypoint	WEF	Grid	Co-ordinates	Description	Grade
456	3		S29 18 15.7 E19 46 29.7	Gravel exposure on red sand with ESA flakes and cores.	GPC
457	3		S29 21 22.2 E19 44 57.5	Gravel exposure on red sand with ESA flakes and cores.	GPC
458	3		S29 21 28.4 E19 44 53.3	Gravel exposure on red sand with ESA flakes and cores.	GPC
459	3		S29 21 47.4 E19 45 12.3	Gravel exposure on red sand with ESA flakes and cores. Two handaxes were seen here.	GPC
460	3		S29 21 45.6 E19 46 03.1	Gravel exposure on red sand alongside a pan with ESA flakes and cores.	GPC
461	3		S29 21 45.5 E19 46 10.3	Gravel exposure on red sand with ESA flakes and cores.	GPC
462	3		S29 21 48.4 E19 46 31.6	Gravel exposure on red sand with ESA flakes and cores.	GPC
463	3		S29 21 45.4 E19 46 42.0	Gravel exposure on red sand with ESA flakes and cores.	GPC
464	3		S29 21 42.7 E19 46 48.4	Gravel exposure on red sand with ESA flakes and cores.	GPC
465	3		S29 21 39.2 E19 46 53.0	Gravel exposure on red sand with ESA flakes and cores.	GPC
466	3		S29 21 41.3 E19 46 59.1	Gravel exposure on red sand with ESA flakes and cores. One diagnostic MSA flake with a faceted platform was seen here as well.	GPC
467	3		S29 21 17.4 E19 47 38.5	Gravel exposure on red sand with ESA flakes and cores. A handaxe was seen here.	GPC
468	3		S29 21 10.8 E19 47 39.6	Gravel exposure on red sand with ESA flakes and cores.	GPC
469	3		S29 20 57.4 E19 47 39.5	A light scatter of quartz artefacts on red sand alongside a pan. Also some quartzite flakes. The artefacts are small, suggesting LSA, but yet are also all quite weathered suggesting a relatively great age and they might actually be MSA.	GPC
470	3	Grid	S29 20 28.6 E19 47 34.3	A light scatter of quartz artefacts on red sand alongside a pan. Also some quartzite flakes. The artefacts are small, suggesting LSA, but yet are also all quite weathered	GPC

Waypoint	WEF	Grid	Co-ordinates	Description	Grade
				suggesting a relatively great age and they might actually be MSA.	
471	3	Grid	S29 20 28.4 E19 47 29.1	Gravel exposure on red sand alongside a pan with ESA flakes and cores.	GPC
472	3	Grid	S29 20 28.3 E19 47 27.3	An ephemeral scatter of LSA quartz flakes close to a pan.	GPC
473	3		S29 17 50.2 E19 46 48.0	Gravel exposure on red sand with ESA flakes and cores.	GPC
474	3		S29 17 49.6 E19 46 52.7	Gravel exposure on red sand with ESA flakes and cores.	GPC
475	3		S29 18 03.9 E19 46 31.1	Gravel exposure on red sand with ESA flakes and cores.	GPC
476	3		S29 18 11.0 E19 46 21.0	Gravel exposure on red sand with ESA flakes and cores. Two handaxes were seen here as well.	GPC
477	3		S29 18 15.0 E19 46 15.5	Gravel exposure on red sand with ESA flakes and cores. A handaxe and a Levallois core were seen here as well.	GPC
478	3		S29 18 18.9 E19 46 08.6	Gravel exposure on red sand with ESA flakes and cores. A handaxe was seen here.	GPC
479	3		S29 18 27.8 E19 46 02.2	Gravel exposure on red sand with ESA flakes and cores.	GPC
480	3		S29 18 34.2 E19 45 59.2	Gravel exposure on red sand with ESA flakes and cores. A handaxe was seen here.	GPC
481	3		S29 18 52.9 E19 45 42.0	Gravel exposure on red sand with ESA flakes and cores.	GPC
482	3		S29 18 42.8 E19 45 42.3	Gravel exposure on red sand with ESA flakes and cores.	GPC
483	3		S29 18 32.4 E19 45 42.3	Gravel exposure on red sand with ESA flakes and cores.	GPC
484	3		S29 21 22.2 E19 49 45.4	Gravel exposure with ESA flakes and cores. The gravel here overlay calcrete instead of the usual red sand.	GPC
485	3		S29 17 30.8 E19 46 31.1	A large earth-walled dam with stone lining.	GPC
486	1		S29 16 37.8 E19 47 25.7	A small stone enclosure of 1.5 m diameter built against a quartzite outcrop.	GPC
487	1		S29 16 37.5 E19 47 25.9	A small stone enclosure of 2.0 m diameter built against a quartzite outcrop. There is an overhanging section of rock here and a name has been scratched under the overhang. The name starts and ends with an "E" but the three or four letters in between are not readily legible. There is a light scatter of clear, blue and green glass, some	GPC

Waypoint	WEF	Grid	Co-ordinates	Description	Grade
				plain white refined earthenware fragments, some bones and some metal.	
488	1		S29 16 30.3 E19 47 30.5	A small stone feature of about 1 m diameter. It is located on a gravel-coated bedrock ridge so no chance of being a grave.	GPC
489			S29 16 53.0 E19 47 30.2	A stone kraal of about 20x20 m, an outbuilding that looks modern and a Karoostyle cottage. The cottage is likely late 19 th century or early 20 th century. It has two bays with a central, roofed stoep. It faces east. The windows are sash windows. An external hearth and chimney stack occurs on the north-western corner of the house. These structures were not visited as they occur just outside the study area.	High
490			S29 16 50.9 E19 47 35.9	A stone-walled water reservoir. Aerial photography shows that it has several compartments. It is probably late 19 th century or early 20 th century in age. This structure was not visited as it is just outside the study area.	Medium
491			S29 16 49.8 E19 47 41.0	An early-mid-20 th century house with a newer house (c. 1960s) immediately to its north.	Medium
492	1		S29 16 01.9 E19 45 39.5	A flaked quartz outcrop.	GPC
494	1		S29 16 00.6 E19 46 06.3	Fragments of a dark green historical wine bottle. The base shows that it was made in a mould.	GPC
495	1		S29 16 48.5 E19 42 28.7	Van Niekerk family graveyard with earliest grave being dated 1920.	IIIA
496	1		S29 16 40.1 E19 42 23.1	This is the Lovedale farm complex. The main house is an early 20 th century flat-roofed Karoostyle cottage that has been very well looked after and still has many original features. There have, however, been additions to the original layout. The house is U-shaped with two identical bays with small decorative pediments and a different pediment above the recessed central section. It faces east. The original stoep has been roofed to create what is effectively a <i>voorkamer</i> . There are bedrooms in the bays and a living room in the middle at the back with a kitchen to its north. The joinery is of	High

Waypoint	WEF	Grid	Co-ordinates	Description	Grade
				steel, although a wooden sash window is present in the room added to the north end. According to the owner, it was built in the 1920s. His family acquired the farm in 1914.	
497	2	Grid	S29 18 51.1 E19 43 56.2	Gravel exposure on red sand with ESA flakes and cores.	GPC
498	2	Grid	S29 18 52.7 E19 43 53.7	Gravel exposure on red sand with ESA flakes and cores.	GPC
499	2	Grid	S29 18 55.0 E19 43 50.0	Gravel exposure on red sand with ESA flakes and cores. There were also several large blades here as well as three handaxes. One handaxe was short and oval-shaped, while the other two both had broken tips.	GPC
500	2	Grid	S29 19 05.1 E19 43 54.4	Gravel exposure on red sand with ESA flakes and cores. Included here was a large Levallois flake as well as a large blade with a faceted platform. The latter is likely MSA.	GPC
501	2	Grid	S29 19 05.0 E19 43 50.5	Gravel exposure on red sand with ESA flakes and cores. One diagnostic MSA blade with a faceted platform also seen here.	GPC
502	2	Grid	S29 19 03.0 E19 43 18.7	A faint stone circle with walls no more than 30 cm high and a section of low walling maybe 50 cm high a few meters away on a low rock outcrop. There are some Stone Age artefacts in the area, but they are probably not related.	GPB
503	2	Grid	S29 19 01.5 E19 43 18.8	A stone cairn on a low rock outcrop. There is a fragment of pink glass nearby.	GPB
504	2	Grid	S29 19 06.5 E19 43 12.9	A small circular stone-walled structure with walls up to about 40 cm high on a low rock outcrop.	GPB
505	2	Grid	S29 19 05.3 E19 43 12.3	A possible stone circle on a low rock outcrop.	GPC
506	2	Grid	S29 19 05.4 E19 43 07.5	A C-shaped stone circle with walls up to about 30 cm high on a low rock outcrop.	GPB
507	2	Grid	S29 19 02.7 E19 43 05.2	An H-shaped stone structure with walls up to about 40 cm high on a low rock outcrop. One piece of clear glass and one piece of green glass were seen here.	GPB
508	2	Grid	S29 19 02.4 E19 43 05.4	A small circular stone-walled structure with walls up to about 20 cm high on a low rock outcrop.	GPB
509	2	Grid	S29 19 02.1 E19 43 05.2	A stone cairn on a low rock outcrop. It is about 50 cm high.	GPB
510	2	Grid	S29 18 59.8 E19 42 55.7	Gravel exposure on red sand with ESA flakes and cores.	GPC

Waypoint	WEF	Grid	Co-ordinates	Description	Grade
511	2	Grid	S29 19 01.4 E19 42 54.2	Gravel exposure on red sand with ESA flakes and cores. One ESA blade and one MSA blade were seen here.	GPC
512	2	Grid	S29 19 02.4 E19 42 47.2	Gravel exposure on red sand with ESA flakes and cores.	GPC
513	2	Grid	S29 19 03.1 E19 42 39.3	Gravel exposure on red sand with ESA flakes and cores. Also one handaxe seen here.	GPC
514	2	Grid	S29 19 05.0 E19 42 35.7	Gravel exposure on red sand with ESA flakes and cores, including one large radial core.	GPC
515	2	Grid	S29 18 53.4 E19 42 23.3	Gravel exposure on red sand with ESA flakes and cores.	GPC
516		Grid	S29 18 45.0 E19 42 17.3	A thin, semi-circular line of stones in a pan. Its function is indeterminate.	GPC
517			S29 18 41.4 E19 42 15.7	Gravel exposure on red sand with ESA flakes and cores.	GPC
518	2		S29 17 50.6 E19 41 39.8	An ephemeral scatter of LSA quartz flaked artefacts and some ostrich eggshell fragments. The site is located adjacent to a small pan.	GPC
519	2		S29 17 49.9 E19 41 41.3	A large, dense scatter of ostrich eggshell fragments with some LSA quartzite and quartz flakes.	GPB
520	2		S29 17 49.5 E19 41 40.8	A good scatter of LSA flaked artefacts in quartz, quartzite and cryptocrystalline silica (CCS). Also some ostrich eggshell and a single transfer-printed refined white earthenware fragment.	GPB
521	2		S29 17 47.4 E19 41 38.3	A shallow grinding groove and a very shallow grinding patch on two separate exposures of bedrock alongside a small pan with bedrock in its base. No artefacts seen in the surrounding area.	GPC
522	2		S29 17 51.4 E19 41 40.1	An ephemeral quartz flaked artefact and ostrich eggshell scatter located towards the southern end of what is effectively a very low pan dune to the southeast of a small pan.	GPC
523	2		S29 17 50.6 E19 41 41.7	A bedrock outcrop that has been used as an anvil. There is a quartz core (c. 10 cm long) lying next to it.	GPC
524	1		S29 16 19.4 E19 41 52.3	A large cairn built of quartzite blocks on a quartzite ridge and located at the junction of three farms. Some fences have been tied onto the cairn with wire which is resulting in the cairn starting to fall over on one side.	GPB

Waypoint	WEF	Grid	Co-ordinates	Description	Grade
525			S29 16 16.7 E19 41 43.8	An ephemeral scatter of LSA quartz flaked artefacts and ostrich eggshell fragments on a sandy river terrace alongside a stream.	GPC
526			S29 17 01.3 E19 38 21.4	This is the farm werf of Ganna Poort. There is a farmhouse that is a U-shaped cottage similar to the Lovedale one but with small end gables. The stoep has also been built in to create an extra room. It faces east. The structure is poorly maintained and most of its windows and doors have been removed and the openings bricked up. There are additions to the rear and a shed to the south with a large steel sliding door facing west. Nearby is a stone-walled reservoir, still functional and still in use. There are other structures in the area as well but these were not examined.	Medium
527	2		S29 18 42.6 E19 40 36.4	Gravel exposure on red sand with ESA flakes and cores.	GPC
528		Grid	S29 20 41.5 E19 41 40.4	Gravel exposure on red sand with ESA flakes and cores.	GPC
529		Grid	S29 20 47.7 E19 41 40.5	Gravel exposure on red sand with ESA flakes and cores.	GPC
530	2		S29 19 11.4 E19 41 11.3	Gravel exposure on red sand with ESA flakes and cores.	GPC
531		Grid	S29 20 42.1 E19 41 46.0	Gravel exposure on red sand with ESA flakes and cores.	GPC
532		Grid	S29 20 44.2 E19 41 46.1	Gravel exposure on red sand with ESA flakes and cores.	GPC
533		Grid	S29 20 35.2 E19 41 45.8	Gravel exposure on red sand with ESA flakes and cores.	GPC
534		Grid	S29 20 24.9 E19 41 44.2	Gravel exposure on red sand with ESA flakes and cores. Also one handaxe seen here.	GPC
535		Grid	S29 20 01.4 E19 41 43.0	Gravel exposure on red sand with ESA flakes and cores.	GPC
536	2	Grid	S29 19 11.5 E19 41 41.5	Gravel exposure on red sand with ESA flakes and cores.	GPC
537	2		S29 19 00.0 E19 41 39.2	Gravel exposure on red sand with ESA flakes and cores.	GPC
538	2		S29 18 52.9 E19 41 39.1	Gravel exposure on red sand with ESA flakes and cores. There was an enormous core here.	GPC
539	2		S29 18 50.5 E19 41 54.2	Gravel exposure on red sand with ESA flakes and cores.	GPC
540	2		S29 18 51.4 E19 42 02.2	Gravel exposure on red sand with ESA flakes and cores.	GPC

Waypoint	WEF	Grid	Co-ordinates	Description	Grade
541	2		S29 18 49.6 E19 42 03.3	Gravel exposure on red sand with ESA flakes and cores. There was also a piece of outcrop here whose edge had been flaked as a core <i>in situ</i> .	GPC
542	2		S29 18 49.5 E19 42 07.1	Gravel exposure on red sand with ESA flakes and cores.	GPC
543	2		S29 18 48.3 E19 42 06.2	Gravel exposure on red sand with ESA flakes and cores. Also one handaxe seen here.	GPC
544			S29 18 46.9 E19 42 03.3	Gravel exposure on red sand with ESA flakes and cores.	GPC
545			S29 20 41.7 E19 33 08.1	A farm complex on Farm 207/rem. There is a mid-20 th century house as well as an earlier house now in very bad shape. The earlier house started off as a rectangular, stone Karoostyle cottage, undoubtedly 19 th century, but then was extended to become a U-shaped cottage with an open stoep in front facing towards the east. This change was likely early 20 th century. One end of the original cottage was extended slightly to achieve the desired proportions and then the bays were built onto the front along with the floor of the stoep. A Dover stove lies inside one of the front rooms. The entire original cottage has been hollowed out and turned into a shed through the addition of a large metal door on the new (north) end. One of the front windows is a sash window. The other is missing but two hinges on the frame suggest it had a casement window. Some other outbuildings and a stone-walled kraal also occur as part of the complex. Although the original house is in very poor shape and probably no more than medium significance, the entire complex is given high significance.	High
546		Grid	S29 21 03.1 E19 30 58.5	A small, very simple cottage with a flat roof but no pediment. It has a door and window in front facing south. A stone-walled kraal lies immediately to its west and a low stone wall/alignment links the kraal and the plinth on which the cottage was built. Most rocks have been robbed from the kraal so that it is variably one or two courses high. It has two rooms. The rocks came from the quartzite ridge immediately north of the	Low

Waypoint	WEF	Grid	Co-ordinates	Description	Grade
				kraal. A sundried brick plinth lies to the east of the house but there are no other building materials associated with that spot. There is a cement brick kookskerm behind the cottage and also a toilet.	
547		Grid	S29 21 01.3 E19 30 59.1	A small, piled stone structure of about 1 m by 1 m built against a rock ledge on top of a quartzite ridge.	GPC
548		Grid	S29 21 01.4 E19 30 59.8	A large stone beacon built on top of a quartzite ridge. Its significance is unknown and it does not lie along a farm boundary as might have been expected.	Medium
549		Grid	S29 21 06.5 E19 30 50.6	A stone-walled water reservoir that has been converted into a livestock enclosure by breaking out holes and replacing with gates. There is some internal fencing but it also has some original internal walls present. Original structure is probably late 19 th century in age.	Medium
550		Grid	S29 21 08.1 E19 30 52.4	A mid-20 th century cottage with an outside toilet and cement brick kookskerm. Some stone-lined dam walls lie behind the house (i.e. to its south) and would result in the flooding of large areas to the south if the dams were full. There is also a stone ruin herewith very few standing sections remaining. It was built from quartzite blocks from the nearby ridge.	Low
551		Grid	S29 21 03.7 E19 31 10.3	A pair of graves with dates of death of 1936 and 1951.	IIIA
552		Grid	S29 19 36.0 E19 18 38.9	A recent graveyard with dates of death from 1976 onwards. Less than 60 years old so not a heritage resource.	---
555	3	Grid	S29 19 27.8 E19 46 03.5	Gravel exposure on red sand with ESA flakes and cores. Also one handaxe here.	GPC
556	3	Grid	S29 19 20.8 E19 45 55.2	Gravel exposure on red sand with ESA flakes and cores. Also some ostrich eggshell fragments here.	GPC
557	3		S29 19 04.1 E19 46 05.0	Gravel exposure on red sand with ESA flakes and cores. Also one handaxe here.	GPC
558	3		S29 19 05.2 E19 46 50.1	Gravel exposure on red sand with ESA flakes and cores. Several quartz artefacts here. A handaxe was seen here.	GPC
559	3		S29 19 06.1 E19 46 56.4	Gravel exposure on red sand with ESA flakes and cores. A handaxe was seen here.	GPC

Waypoint	WEF	Grid	Co-ordinates	Description	Grade
560	3		S29 19 04.3 E19 46 59.4	Gravel exposure on red sand with ESA flakes and cores.	GPC
561	3		S29 19 40.5 E19 48 24.1	Gravel exposure on red sand with ESA flakes and cores near a pan. Also one handaxe here.	GPC
562	2		S29 17 50.4 E19 44 34.2	Gravel exposure on red sand with ESA flakes and cores.	GPC
563	2		S29 17 38.7 E19 42 20.5	An isolated lower grindstone with a deep groove on one side (found face up). Some flaking along one edge.	GPC
564	2	Grid	S29 18 59.8 E19 44 41.7	Gravel exposure on red sand with ESA flakes and cores.	GPC
565	1		S29 16 42.9 E19 42 00.7	A small scatter of ostrich eggshell fragments. No apparently associated artefacts.	GPC
566	1		S29 16 41.8 E19 41 59.8	A very low earth-walled dam with stone walling on each end.	GPC
567	1		S29 16 45.6 E19 39 43.0	A dense cluster of ostrich eggshell on a quartzite outcrop. No sign of a flask mouth or any obviously associated artefacts. One piece of clear glass nearby.	GPC

APPENDIX 3 – Mapping

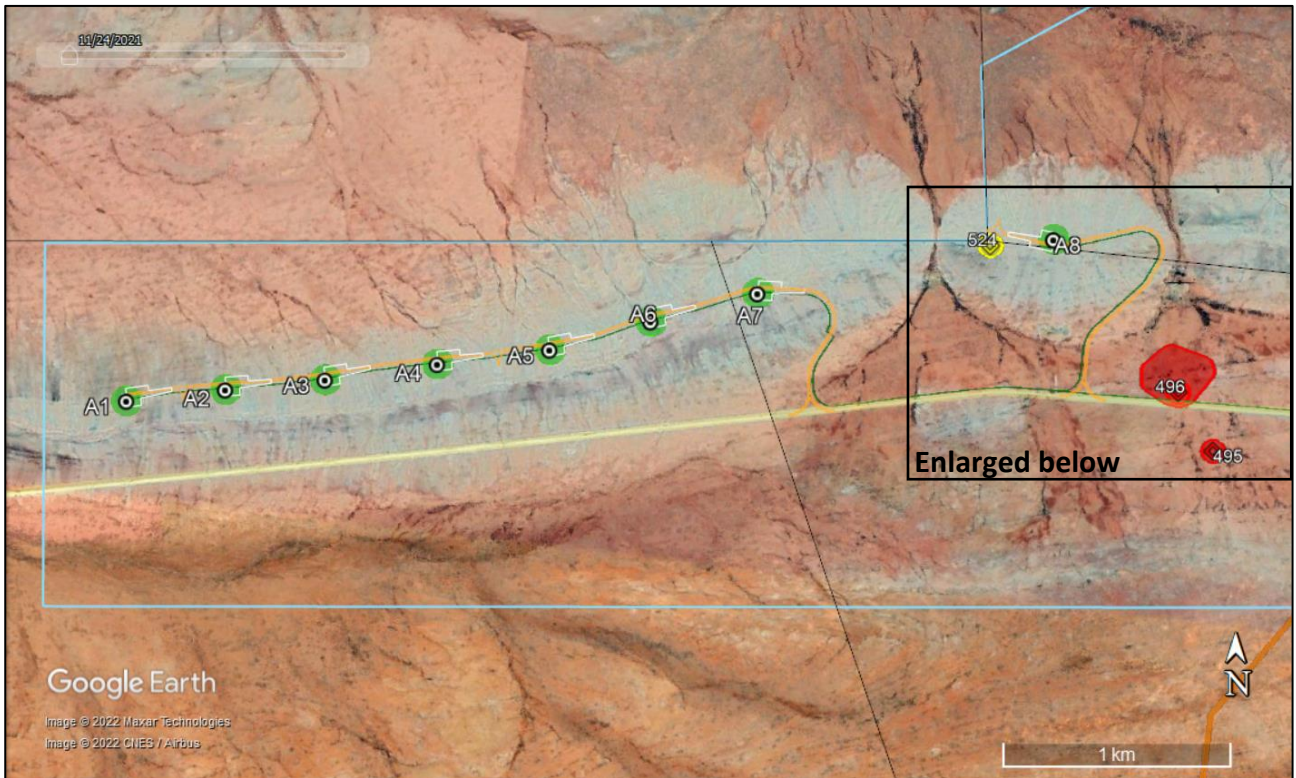
The locations of all finds are mapped here.

Red symbols = Grade IIIA / High sensitivity

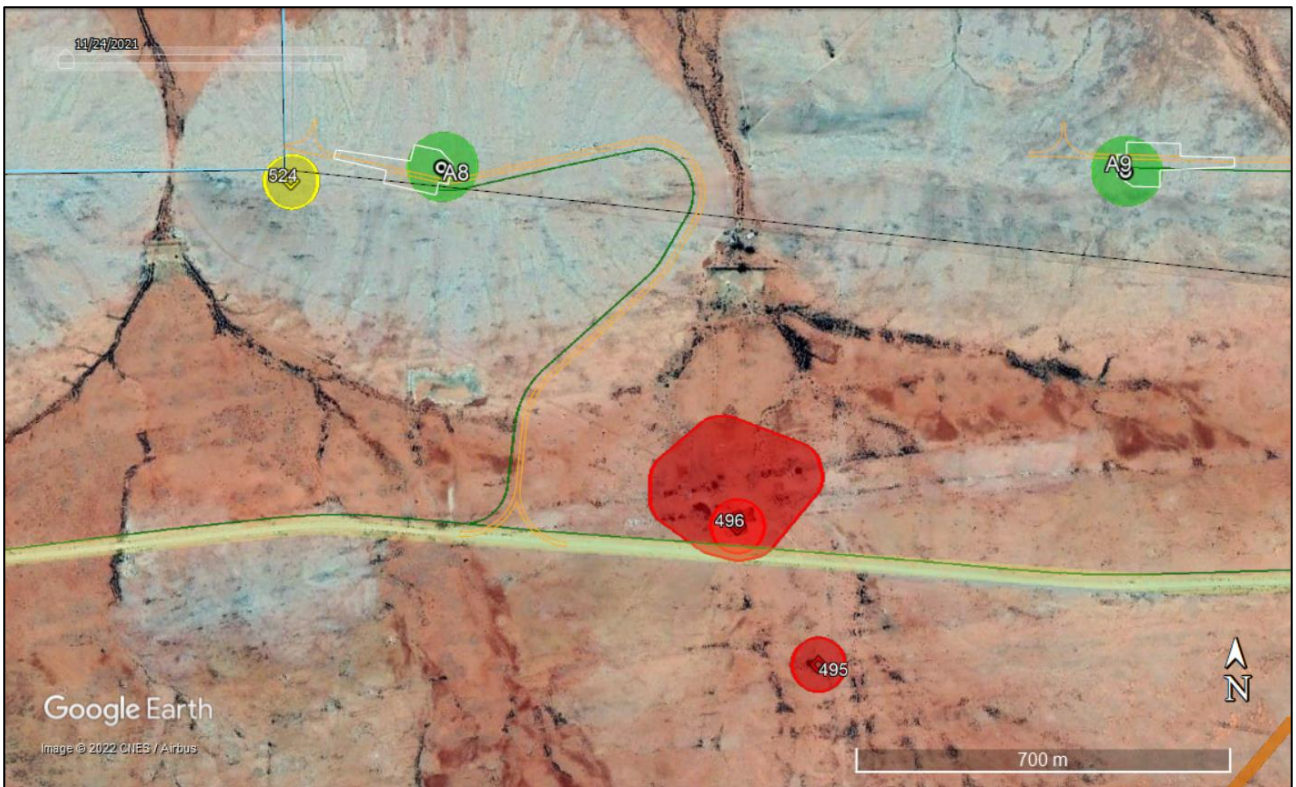
Orange symbols = Grade IIIB / Medium sensitivity

Yellow symbols = Grade GPB / Low sensitivity

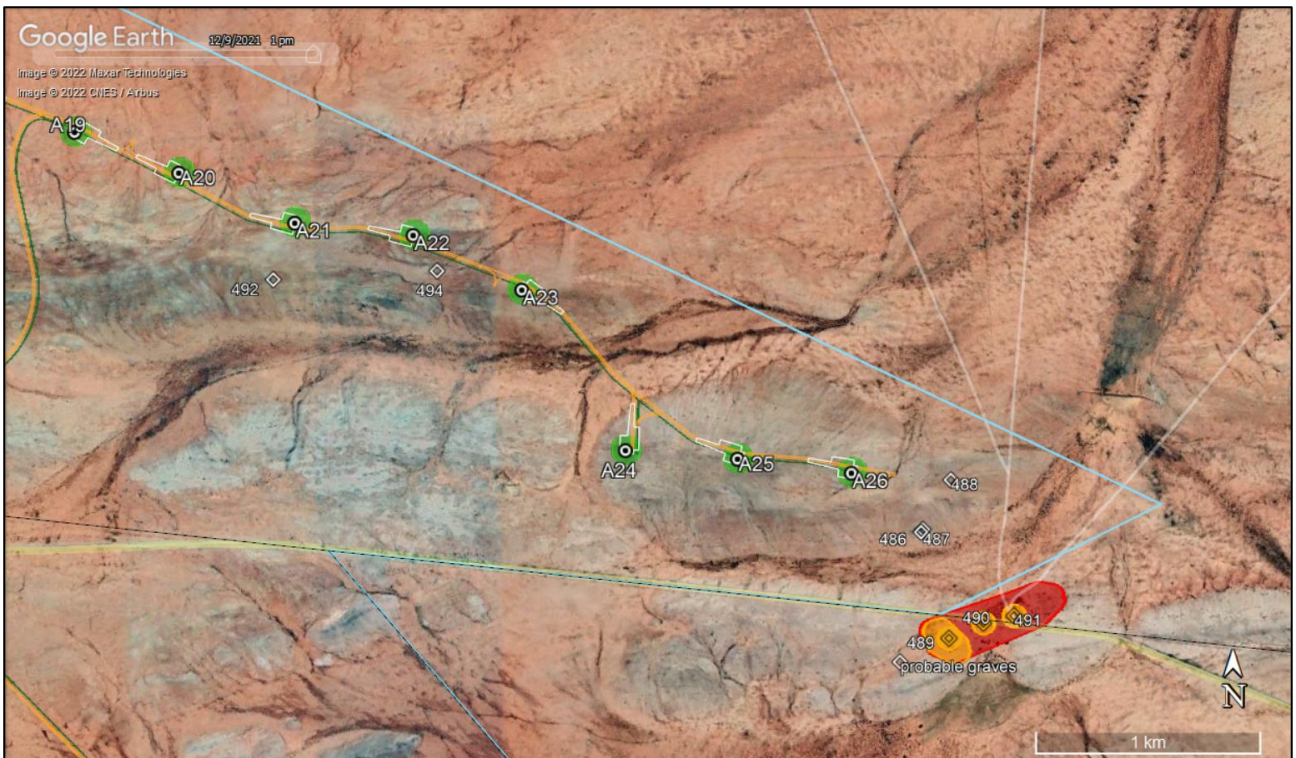
White Symbols – Grade GPC / Very low sensitivity



Western part of study area.



Northeast part of study area.



Eastern part of study area.



Southern part of study area.

APPENDIX 4 – Site Sensitivity Verification

Introduction

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 Pofadder WEF 1 project area as identified by the National Web-Based Environmental Screening Tool (Screening Tool). The details of the site sensitivity verification are noted below:

<i>Date of Site Visit</i>	22-24 November 2021
<i>Specialist Name</i>	Dr Jayson Orton
<i>Professional Registration Number</i>	ASAPA: 233; APHP: 043
<i>Specialist Affiliation / Company</i>	ASHA Consulting (Pty) Ltd

Method of the Site Sensitivity Verification

Initial work was carried out using satellite aerial photography in combination with the author's accumulated knowledge of the local landscape. This was used to identify potentially sensitive areas. Subsequent fieldwork served to ground truth the site, including areas identified as potentially sensitive. Desktop research was also used to inform on the heritage context of the area. This information is presented in the report (Section 5).

Outcome of the Site Sensitivity Verification

As expected, the site visit showed that the majority of the site is of low sensitivity but with several small pockets (where archaeological resources were found) considered to be of higher sensitivity. Figures 31 to 34 in the impact assessment report show the various areas considered to be archaeologically sensitive. In heritage terms, the sensitivity ranges from low-medium (Grade GPB) to high (Grade IIIA). A photographic record and description of the relevant heritage resources are contained within the impact assessment report.

National Environmental Screening Tool

The map below is extracted from the screening tool report and shows the archaeological and heritage sensitivity to be low. This is generally true but, because the survey has revealed that areas of higher sensitivity do occur in this landscape as noted above, the specialist disputes the sensitivity indicated by the screening tool.

Conclusion

This site sensitivity verification has verified the expected sensitivity as being generally low but with a number of small areas of higher sensitivity ranging from low-medium to high.

