

HERITAGE IMPACT ASSESSMENT: PROPOSED LOXTON WIND ENERGY FACILITY 1, CARNARVON AND VICTORIA WEST MAGISTERIAL DISTRICTS, NORTHERN CAPE

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

SAHRA Case ID: 20116

Report for:

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On behalf of:

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CONTENTS OF THE SPECIALIST REPORT – CHECKLIST

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;	
(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;	3.1
(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; Appendix 3
(g) an identification of any areas to be avoided, including buffers;	5.7; Appendix 3
(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;	Appendix 3
(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;	5.8
(k) any mitigation measures for inclusion in the EMPr;	7
(l) any conditions for inclusion in the environmental authorisation;	9
(m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;	7;9
(n) a reasoned opinion— i. as to whether the proposed activity, activities or portions thereof should be authorised; iA. Regarding the acceptability of the proposed activity or activities; and ii. if the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr or Environmental Authorization, and where applicable, the closure plan;	8.1;9
(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
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.	Part A of the Assessment Protocols published in Government Notice No. 320 on 20 March 2020 is applicable

SUMMARY

ASHA Consulting (Pty) Ltd was appointed by Loxton Wind Facility 1 (Pty) Ltd to conduct an assessment of the potential impacts to heritage resources that might occur through the proposed construction of a wind energy facility (WEF) on a site to the north of Loxton, Northern Cape Province. The project would be located on Portion 12 of Rietfontein 572, the Remainder of Springfontein 573, the Remainder of Saaidam 574 and the Remainder of Farm 582, all in the Carnarvon Registration Division. An approximate centre point for the study area is S31° 16' 50" E22° 23' 20".

The site is comprised of long, low sandstone hills with intervening river valleys. Occasional dolerite outcrops occur and vegetation tends to be sparse and very low. Ground visibility was thus excellent. Farmsteads occur in places and the only infrastructure on the site is related to farming (e.g. tracks, fences, dams, wind pumps).

Archaeological resources were found to be very rare in the areas targeted for development, with most sites being in river valleys, although these were generally not searched. Rare artefact scatters from the MSA and LSA were seen, while historical resources included ruins of houses, kraals and other features along with some artefactual debris. The farmsteads and surrounding arable lands are pockets of cultural landscape, while the broader landscape also has cultural significance.

Impacts to most heritage resources are likely to be minimal because most sites occur in the valleys. The landscape, however, will be impacted and, due to the size of the turbines, there is little that can be done to reduce impacts. However, these impacts can be reversed with rehabilitation and the project will result in socio-economic benefits which makes the landscape impacts acceptable.

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

- Existing roads should be reused where possible and if any surfacing is required then high contrast materials should be avoided;
- Where existing roads pass through sensitive areas this is preferred over making new roads but the alignments should ensure the integrity of any specific resources in those sensitive areas. In this regard, No-go signage will need to be put in place and the sites monitored at waypoints 003, 004, 1229, 1230);
- The archaeological site at waypoint 1238 will need to be avoided through micro-siting the access road or else excavated, sampled and recorded as necessary prior to construction. If it is avoided then No-Go signage must be installed and the site monitored;
- No stones or other materials may be removed from any historical sites;
- If all other factors are equal and there are more turbine positions than required, then preference should be given to dropping number 26 due to its proximity to a farmstead;
- Make use of an early warning system that can switch on navigation lights only when they are needed (if such a system is available and approved at the time of construction);
- A pre-construction survey of all parts of the layout that have not yet been surveyed must be undertaken, including the locations of all ancillary infrastructure; and
- If any archaeological material or human burials are uncovered during the course of development then work in the immediate area (within 30 m) should be halted. The find would need to be reported to the heritage authorities and may require inspection by an archaeologist. Such heritage is the property of the state and may require excavation and curation in an approved institution.

Glossary

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

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.

Patina: The weathered surface of an artefact which has changed colour and/or texture (patinated, patination).

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

BA: Basic Assessment

CRM: Cultural Resources Management

DEA&DP: Department of Environmental Affairs and Development Planning

DFFE: Department of Forestry, Fisheries and the Environment

DMRE: Department of Mineral Resources and Energy

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

HWC: Heritage Western Cape

LSA: Later Stone Age

MSA: Middle Stone Age

NBKB: Ngwao-Boswa Ya Kapa Bokoni

NCW: Not Conservation Worthy

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

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

NID: Notification of Intent to Develop

PPP: Public Participation Process

REDZ: Renewable Energy Development Zone

SAHRA: South African Heritage Resources Agency

SAHRIS: South African Heritage Resources Information System

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1. INTRODUCTION

ASHA Consulting (Pty) Ltd was appointed by Loxton Wind Facility 1 (Pty) Ltd to conduct an assessment of the potential impacts to heritage resources that might occur through the proposed construction of a wind energy facility (WEF) on a site located north of Loxton in the Northern Cape Province (Figures 1 & 2). An approximate centre point for the study area is S31° 16' 50" E22° 23' 20".

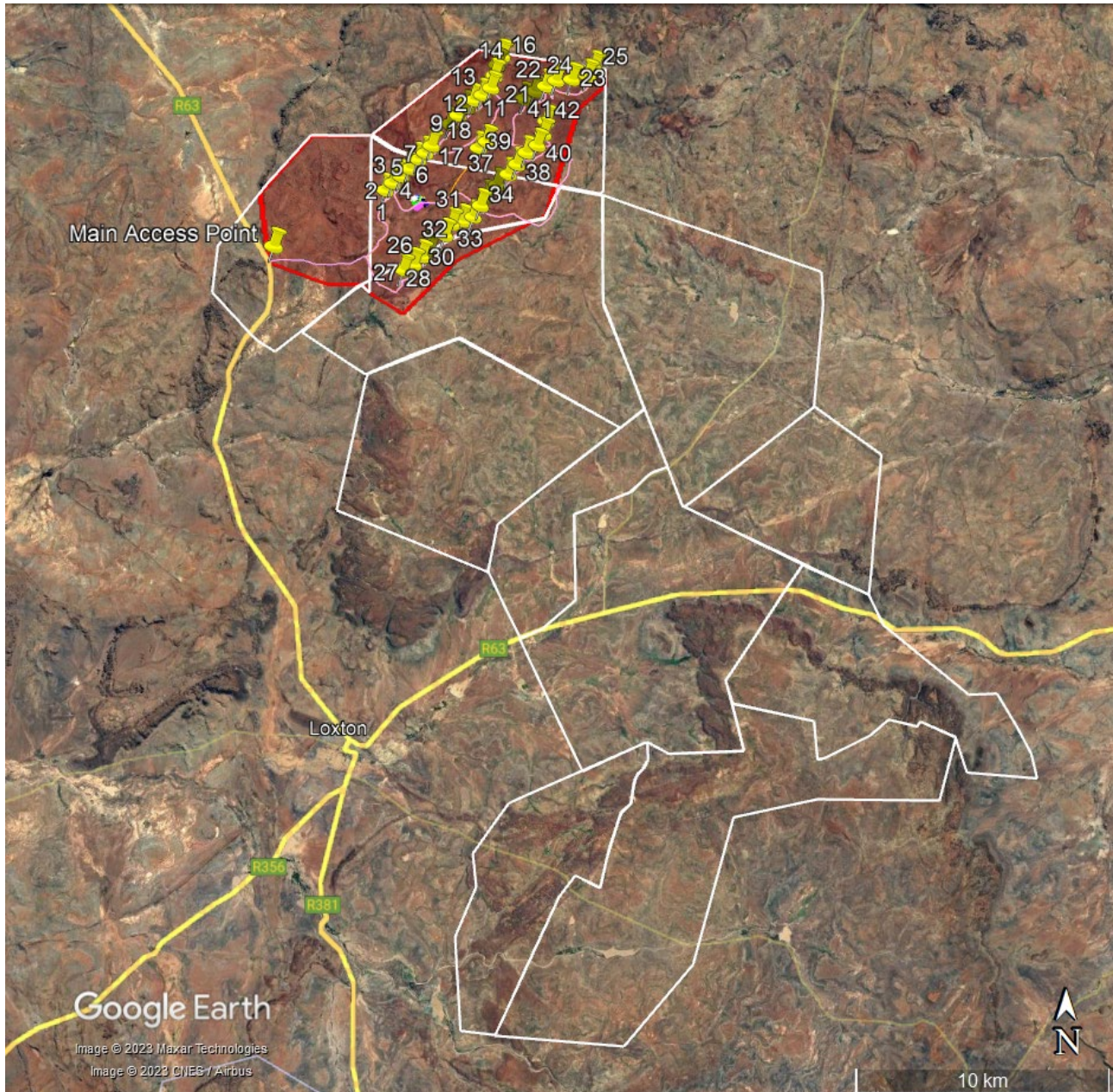


Figure 1: Aerial view showing the location of the broader study area (white polygons are farm portions) and Loxton WEF 1 site (red shaded polygon with yellow pins denoting turbines) relative to Loxton and local roads.

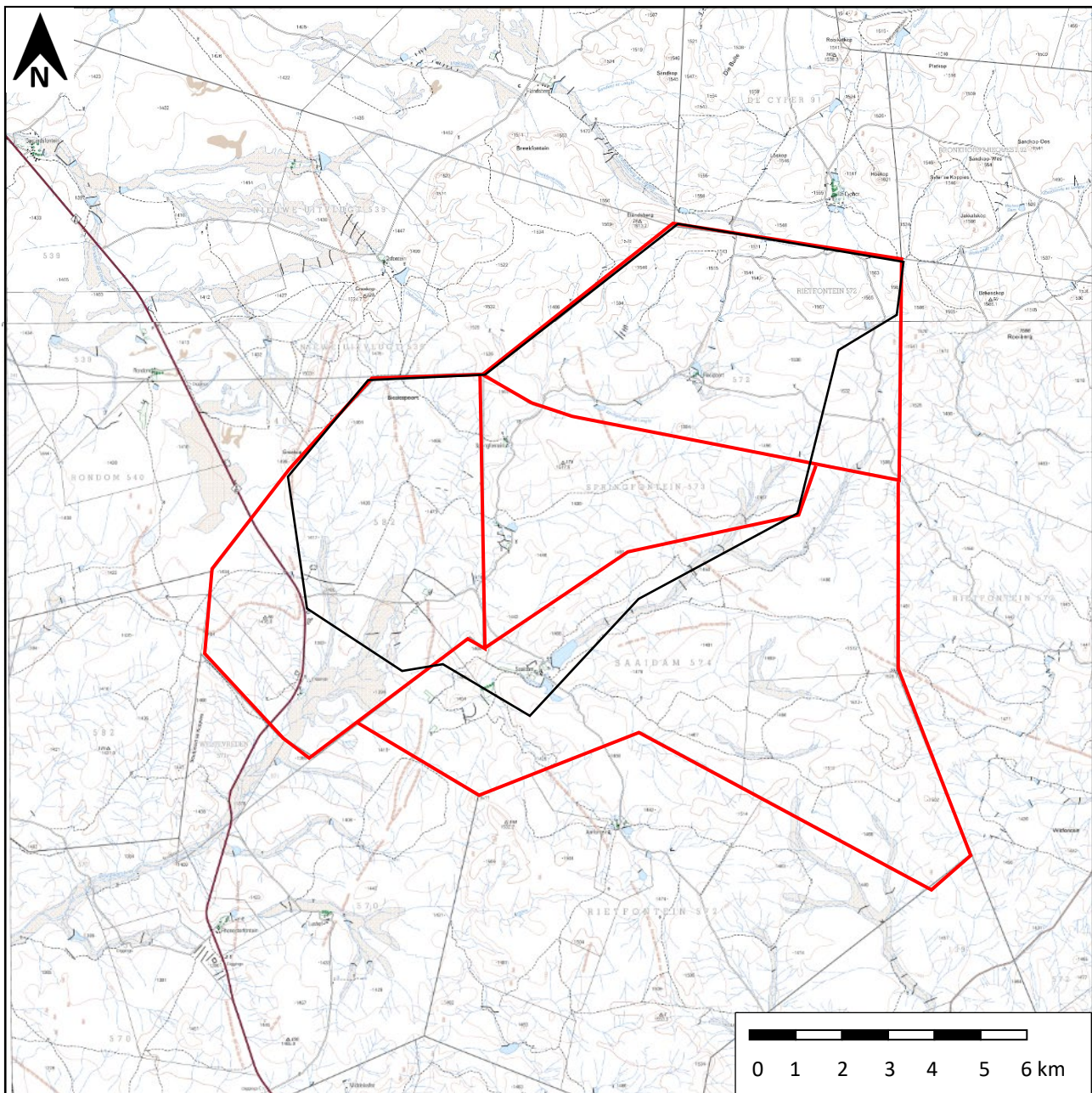


Figure 1: Extract from 1:50 000 topographic map 3122AB & AD (dated 2008) showing the location of the site (red polygons are farm portions, black polygon is the project site). Source of basemap: Chief Directorate: National Geo-Spatial Information. Website: www.ngi.gov.za.

1.1. The proposed project

1.1.1. Project description

The applicant **Loxton Wind Facility 1** (Pty) Ltd is proposing the development of a commercial Wind Energy Facility (WEF) and associated infrastructure on a site located approximately 30 km North of Loxton within the Ubuntu Local Municipality and the Pixley Ka Seme District Municipality in the Northern Cape Province.

Two additional WEFs are concurrently being considered on the surrounding properties and are assessed by way of separate impact assessment processes contained in the 2014 Environmental Impact Assessment Regulations (GN No. R982, as amended) for listed activities contained in Listing Notices 1, 2 and 3 (GN R983, R984 and R985, as amended). These projects are known as Loxton WEF 2 and Loxton WEF 3.

A preferred project site with an extent of approximately 52 000 ha was identified as a technically suitable area for the development of the three WEF projects. Loxton WEF 1 will comprise of up to 38 turbines, Loxton WEF 2 up to 62 turbines and Loxton WEF 3 up to 42 turbines. Loxton WEF 1 and Loxton WEF 3 will each have a contracted capacity of up to 240MW with a permanent footprint of up to 65 ha whereas Loxton WEF 2 will have a contracted capacity of up to 480 MW and a permanent footprint of up to 110 ha.

The Loxton WEF 1 project site covers approximately 7 200 ha and comprises the following farm portions, all in the Carnarvon Registration Division:

- Portion 12 of the Farm Rietfontein 572;
- Remaining Extent of Farm 582
- Remaining Extent of the Farm Saaidam No. 574;
- Remaining Extent of the Farm Springfontein No. 573

The Loxton 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 240 MW:

- Up to 38 wind turbines with a maximum hub height of up to 160 m and a rotor diameter of up to 200 m;
- A transformer at the base of each turbine;
- Concrete turbine foundations with a permanent footprint of up to 5.5 ha;
- Each turbine will have a crane hardstand of 70 m x 45 m. The permanent footprint for turbine hardstands will be up to 12ha.
- Each turbine will have a temporary blade hardstand of 80 m x 45 m. The temporary footprint for blade hardstands will be up to 14 ha.
- Temporary laydown areas (with a combined footprint of up to 23 ha) which will accommodate the boom erection, storage and assembly area;
- Battery Energy Storage System (with a footprint of up to 5 ha);
- Medium voltage (33 kV) cables/powerlines running from wind turbines to the facility substations. The routing will follow existing/proposed access roads and will be buried where possible.
- One on-site substation of up to 2 ha in extent to facilitate the connection between the wind farm and the electricity grid;
- Access roads to the site and between project components inclusive of stormwater infrastructure. A 15 m road corridor may be temporarily impacted upon during construction and rehabilitated to 8m wide after construction. The WEF will have a total road network of up to 50 km;
- One temporary site camp establishment and concrete batching plants (with a combined footprint of up to 2 ha); and

- Operation and Maintenance buildings (with a combined footprint of up to 2 ha) including a gate house, security building, control centre, offices, warehouses, parking bays, a workshop and a storage area.

The project layout is shown in Figure 3.

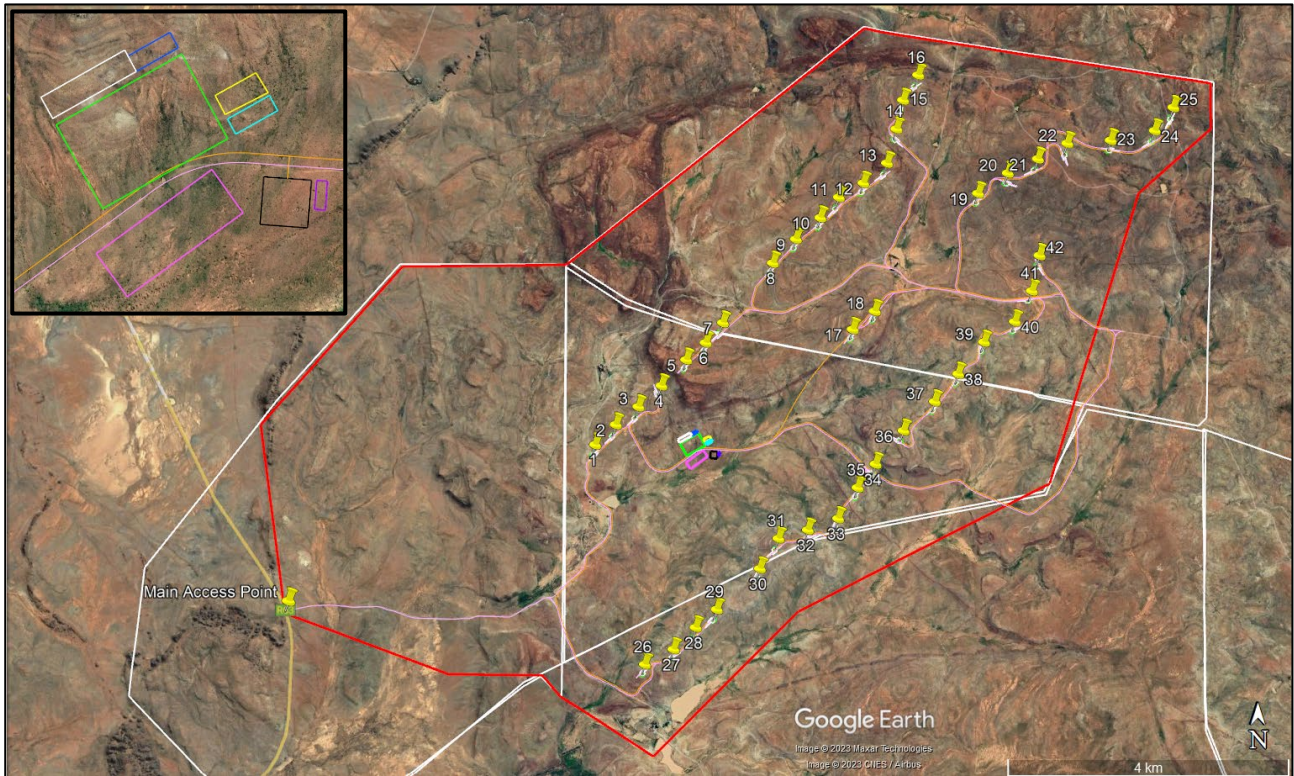


Figure 3: Aerial view showing the project site (red polygon), farm portions (white polygons), wind turbines (yellow numbered pins) linked by roads (pink lines) and cables (orange lines), laydown area (green), batching plant (white), storage area (blue), site camp (yellow), O&M building (pink), substation (black), parking bays (turquoise) and BESS (purple).

1.1.2. Identification of alternatives

No location alternatives for the overall project are under consideration as this site has been chosen for the quality of the wind resource. No layout alternatives are being assessed since the project design has been iterative and has sought to minimise impacts through refining the layout after the field surveys. As such, the only alternative considered by this assessment is the No-Go alternative.

1.1.3. Aspects of the project relevant to the heritage study

All aspects of the proposed Loxton WEF 1 development are relevant, since excavations for foundations and/or services may impact on archaeological and/or palaeontological remains, while all above-ground aspects create potential visual (contextual) impacts to the cultural landscape and any significant heritage sites that might be visually sensitive.

1.2. Terms of reference

ASHA Consulting was asked to:

- Describe regional and local features of the receiving environment;
- Conduct a field survey to search for sensitive areas and sites of heritage significance;
- Map sensitive features and provide spatial data to inform the final project layout;
- Assess the potential impacts on identified heritage resources in an impact assessment report that complied with the requirements of both the NHRA and Appendix 6 of the NEMA EIA regulations;
- Identify relevant legislation and legal requirements; and
- Provide recommendations on possible mitigation measures and management guidelines.

1.3. Scope and purpose of the report

A heritage impact assessment (HIA) is a means of identifying any significant heritage resources before development begins so that these can be managed in such a way as to allow the development to proceed (if appropriate) without undue negative 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. The author

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. LEGISLATIVE CONTEXT

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

The NHRA protects a variety of heritage resources as follows:

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

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

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

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

- a) its importance in the community, or pattern of South Africa’s history;
- b) its possession of uncommon, rare or endangered aspects of South Africa’s natural or cultural heritage;
- c) its potential to yield information that will contribute to an understanding of South Africa’s natural or cultural heritage;

- d) its importance in demonstrating the principal characteristics of a particular class of South Africa's natural or cultural places or objects;
- e) its importance in exhibiting particular aesthetic characteristics valued by a community or cultural group;
- f) its importance in demonstrating a high degree of creative or technical achievement at a particular period;
- g) its strong or special association with a particular community or cultural group for social, cultural or spiritual reasons;
- h) its strong or special association with the life or work of a person, group or organisation of importance in the history of South Africa; and
- i) sites of significance relating to the history of slavery in South Africa.

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

2.2. Approvals and permits

2.2.1. Assessment Phase

Section 38(8) of the NHRA states that if an impact assessment is required under any legislation other than the NHRA then it must include a heritage component that satisfies the requirements of S.38(3). Furthermore, the comments of the relevant heritage authority must be sought and considered by the consenting authority prior to the issuing of a decision. Under the National Environmental Management Act (No. 107 of 1998; NEMA), as amended, the project is subject to an EIA. The present report provides the heritage component. The Development Applications Unit of the South African Heritage Resources Agency (SAHRA) is 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. This would be issued in their name. This is so that the heritage authority can ensure that the appointed practitioner has proposed an appropriate methodology that will result in the mitigation being done properly. A built environment permit, if required, would need to be obtained from the PHRA.

2.3. Guidelines

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

- Winter, S. & Baumann, N. 2005. Guideline for involving heritage specialists in EIA processes: Edition 1. CSIR Report No ENV-S-C 2005 053 E. Republic of South Africa, Provincial

Government of the Western Cape, Department of Environmental Affairs & Development Planning, Cape Town.

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

3. METHODS

3.1. Literature survey and information sources

A survey of available literature was carried out to assess the general heritage context into which the development would be set. The information sources used in this report are presented in Table 1 with relevant dates of each source referenced in the text as needed. Data were also collected via a field survey. The data quality is suitable for the purpose of informing this report.

Table 1: *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 preliminary turbine layout was subjected to a detailed foot survey on 25 June 2022 by two archaeologists (Dr Jayson Orton and Gail Euston-Brown). This was during winter 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 Garmin Global Positioning System (GPS) receiver set to the WGS84 datum (Figure 4). Photographs were taken at times in order to capture representative samples of both the affected heritage and the landscape setting of the proposed development.

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

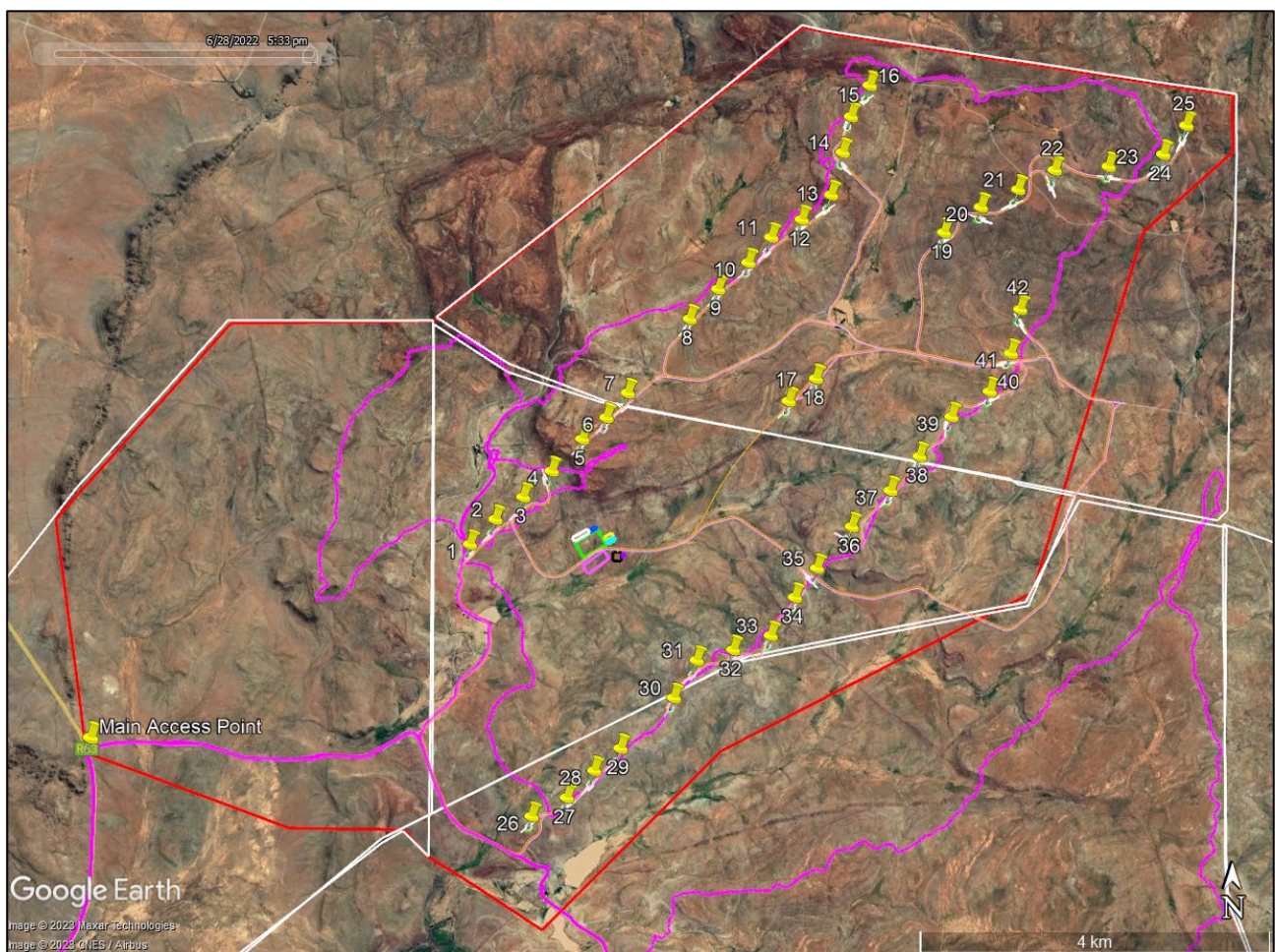


Figure 4: Aerial view of the study area (red polygon) showing the survey tracks (pink lines) relative to the project layout. Key as per Figure 3.

3.3. Specialist studies

A separate palaeontological specialist study has been compiled by Dr John Almond and is submitted with this HIA.

3.4. Impact assessment

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

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 system¹ for use in provinces where it has commenting authority. In this system sites of high local significance are given Grade IIIA (with the implication that the site should be preserved in its entirety) and Grade IIIB (with the implication that part of the site could be mitigated and part preserved as appropriate) while sites of lesser significance are referred to as having 'General Protection' (GP) and rated as GP A (high/medium significance, requires mitigation), GP B (medium significance, requires recording) or GP C (low significance, requires no further action).

3.6. Consultation

The NHRA requires consultation as part of an HIA but, since the present study falls within the context of an EIA which includes a public participation process (PPP), no dedicated consultation was undertaken as part of the HIA. Interested and affected parties would have the opportunity to provide comment on the heritage aspects of the project during the DEIR 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 large, but, because a preliminary layout was available for assessment, the survey focused on the areas in which turbines would be placed. In this way the survey was most likely to cover the areas being targeted for development. After the survey, the layout was altered slightly to avoid sensitivities identified by the specialists. No road layout was provided for assessment in either the preliminary or final scoping layouts. This meant that potentially sensitive areas (for example where roads might cross river valleys) could not be specifically checked but long sections of farm roads proposed for reuse were also used during the survey and were therefore covered. Google Earth was used to identify obvious sites that were not visited and these have been included in the report.

Cumulative impacts are difficult to assess due to the variable site conditions that would have been experienced in different areas and in different seasons. Survey quality is thus likely to be variable.

¹ The system is intended for use on archaeological and palaeontological sites only. However, in Appendix 2 all resources are given a grade for comparative and mapping purposes.

As such, some assumptions need to be made in terms of what and how much heritage might be impacted by other developments in the broader area.

4. PHYSICAL ENVIRONMENTAL CONTEXT

4.1. Site context

The site is in a rural area used primarily for small stock grazing. No operational renewable energy facilities are present nearby, although others have been proposed some distance to the south (see Section 6.4 for details). The study area is not within a Renewable Energy Development Zone (REDZ) or an Electricity Grid Infrastructure (EGI) Corridor. Existing infrastructure in the area is limited to that required for farming and includes sparse farmsteads, tracks, fences and wind pumps. The imprint of these features is light with the result that the site is in a largely natural context.

4.2. Site description

The site is generally gently undulating with long, low, broad ridges separated by shallow valleys. The substrate varies with some areas being sandy and others gravelly. Bedrock is exposed in places but, aside from some dolerite ridges in the northern part, usually only in small patches. Vegetation is characterised by low shrubs and grasses but with plenty of substrate visible in between the plants. Figures 5 to 11 illustrate the study area.



Figure 5: Looking north along a river valley and dolerite ridge in the north-western part of the WEF site.



Figure 6: Looking towards the northeast along the turbine row in the northern part of the WEF site showing a sandy substrate.



Figure 7: Looking towards the southeast through the northern part of the WEF site showing a dolerite outcrop.



Figure 8: Looking towards the southwest from the north-eastern corner of the WEF site and showing a sandy substrate.

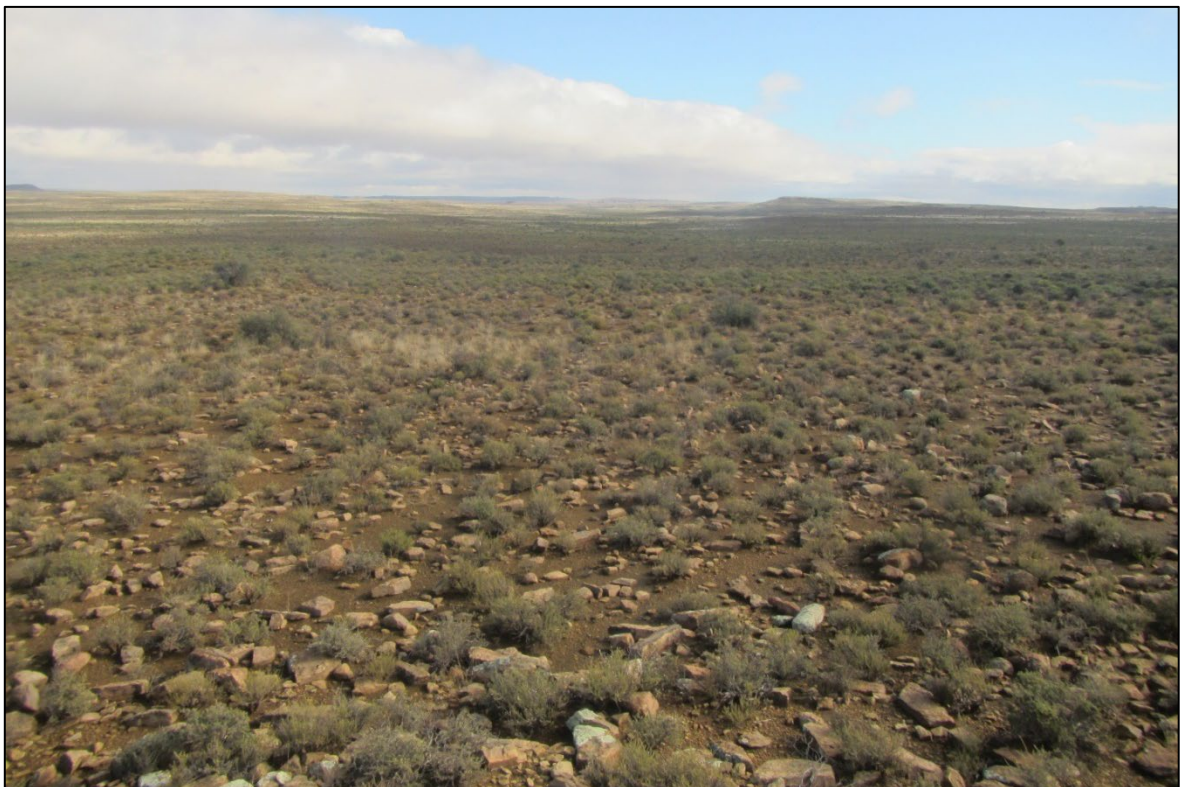


Figure 9: Looking towards the southwest along a turbine row in the south-eastern part of the WEF site and showing a rocky substrate.



Figure 10: Looking towards the southwest along a turbine row in the southern part of the WEF site and showing the gently undulating terrain that characterises much of the area.

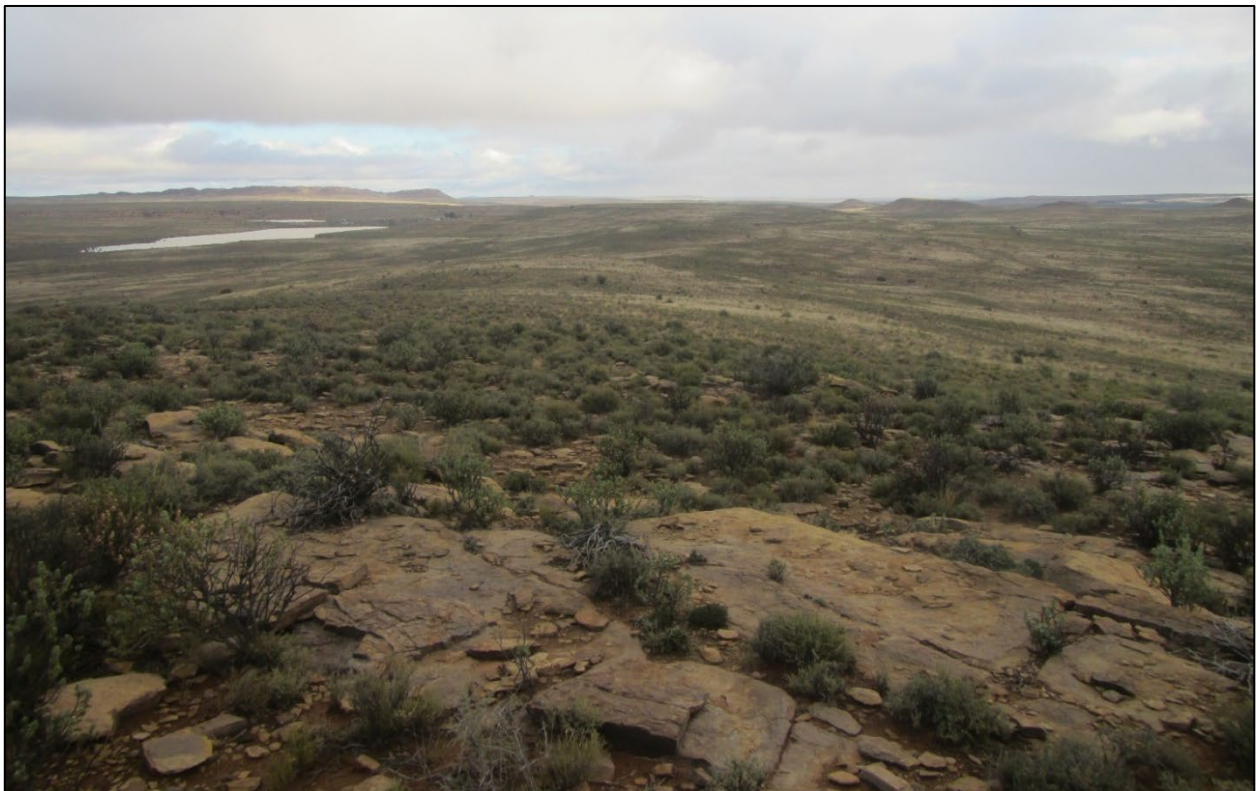


Figure 11: Looking towards the southwest along a turbine row in the southern part of the WEF site and showing exposed bedrock in the foreground with a farm dam in the distance.

5. FINDINGS OF THE HERITAGE STUDY

This section describes the heritage resources recorded in the study area during the course of the project. The full list of finds is presented in Appendix 2 with mapping in Appendix 3.

5.1. Palaeontology

The Karoo sediments are well known for the diversity of fossils they contain. The SAHRIS Palaeosensitivity Map shows the site to be of mostly very high sensitivity and a separate palaeontological study has thus been carried out for this aspect of heritage.

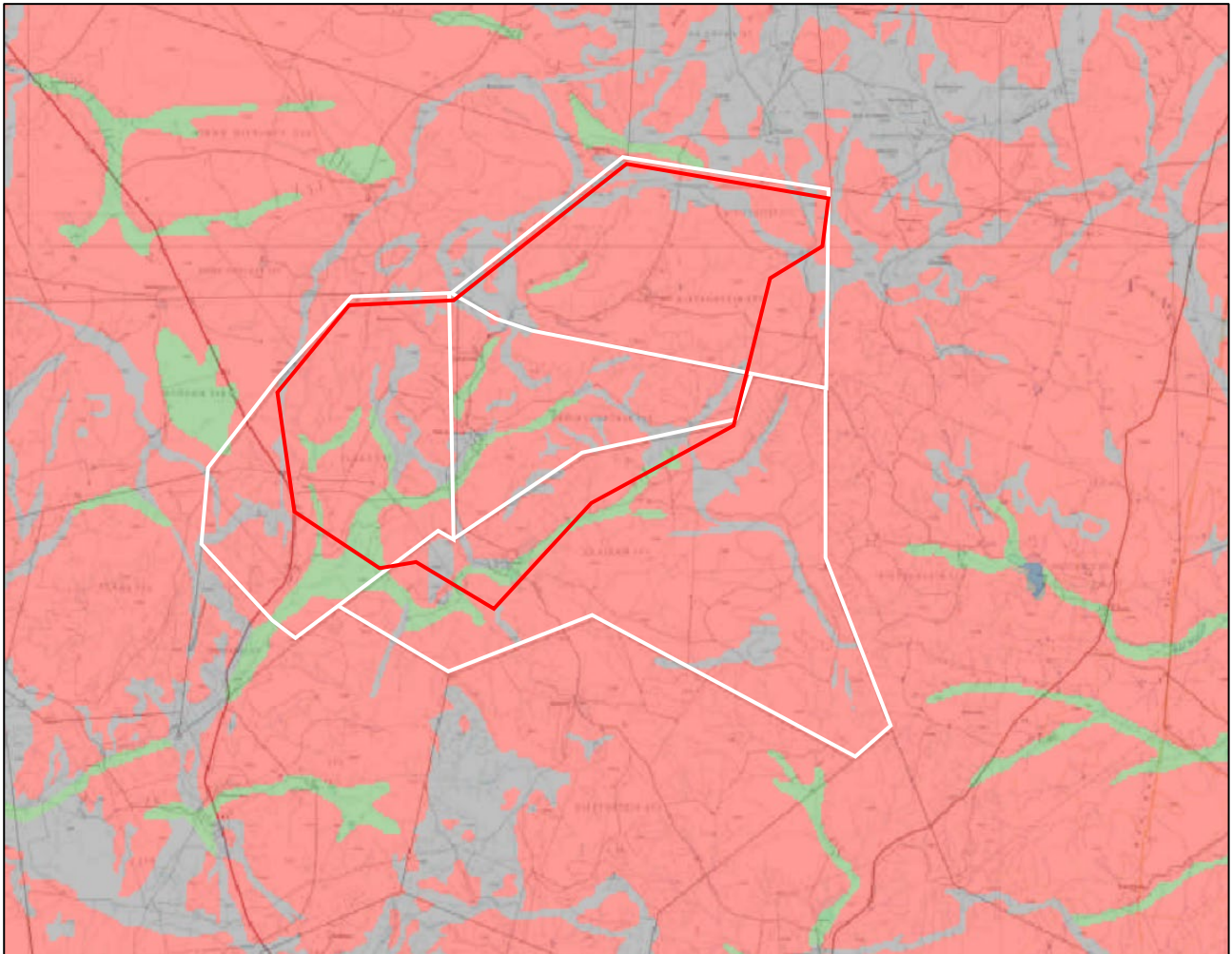


Figure 12: Extract from the SAHRIS Palaeosensitivity Map showing the site to be of mostly very high sensitivity (red shading) but with some areas of moderate (green) and zero (grey) sensitivity.

5.2. Archaeology

5.2.1. Desktop study

Very little archaeological work seems to have been done in the vicinity of Loxton. This desktop review therefore, of necessity, has to be a broader review of central Karoo archaeology, but with a great many observations drawn from the vicinity of the Nuweveld Mountains some 30 km to 50 km

south of the current study area where much survey has been done. The Nuweveld, however, is a mountainous environment which differs markedly from the majority of the Karoo which is far flatter.

Archaeological materials are commonly encountered across the Karoo and are often highly visible on the eroding landscape. These residues include material from the Early (ESA), Middle (MSA) and Late (LSA) Stone Ages, as well as from the contact and historical periods. ESA material is uncommon as exemplified by Orton's (2021a, 2021b, 2021c, 2022a, 2022b) surveys in the Nuweveld where only a very small number of ephemeral scatters including possible ESA artefacts were seen among many hundreds of observations. MSA materials are generally very commonly seen in any areas where there is erosion and/or deflation. The distribution of such materials is more often related to natural forces than human ones. This means they are seen predominantly as background scatter artefacts which can be defined as "widespread isolated artefacts whose distribution results from either primary or secondary causes" (Orton 2016:121). Despite how often they are seen in some areas, the Nuweveld again produced very few MSA artefacts but one site was identified (Orton 2022a).

The Later Stone Age (LSA) is far better represented in terms of sites and this is no doubt largely because the sites are relatively recent and have not been so affected by erosion and deflation. Such sites are almost always associated with water sources, whether rivers or the margins of pans. This relationship holds true throughout the Karoo. Many LSA sites were found in the Nuweveld Mountains. Among these were two large scatters near rivers each with a dolerite rock gong in its centre (Orton 2021b). These widely occurring but generally rare musical instruments are an unusual component of Karoo LSA archaeology and have been of interest for many years (Fock 1972; Goodwin 1957; Parkington *et al.* 2008) and recently their role in ritual has been considered (Rifkin 2009). A rock gong is known from just west of the R63 to the southwest of the Loxton WEF 1 site (John Gribble, pers. comm. 2022).

An important component of Karoo archaeology is rock art. Painted sites are rare due to the general scarcity of suitable surfaces on which to paint, but a few were recorded in the Nuweveld (Orton 2021b). Engravings, however, while very unevenly distributed, are quite common. There are three main historical groups of engraving, two precolonial and one historical, all of which have been recorded in the Nuweveld, though the third dominates strongly.

The first and oldest are those created by the San and which may be up to several thousand years old. The oldest – as revealed by their patina – are incised fineline engravings characterised by outlined imagery, while scraped engravings ('coloured in' through the application of many incised lines inside the outlined forms) tend to be younger (Morris 1988). Also part of this group are designs created by pecking the rock surface with another stone to chip out the required designs. Most common amongst these engravings are representational images with animals being about 6.5 times more common than humans (Butzer *et al.* 1979). Pecked animal engravings are known from the Loxton area (John Gribble, pers. comm. 2022). A portion of the body of engravings are geometric images which vary in form. Morris (1988) described some important observations in the geometrics noting that (1) they were both fine-line and pecked with the latter type lacking sunburst motifs and having far fewer curvilinear motifs and (2) geometric engravings were overwhelmingly located close to water sources. Later research, focused on rock art, has determined that there is a body of geometric art that is ascribable to the Khoekhoen people and is different to the entoptic geometrics painted and engraved by the San (Eastwood & Smith 2005; Smith & Ouzman 2004). Khoekhoe rock art forms the second historical grouping.

The third group were made in historical times and are generally engraved with fine lines. These images are strongly dominated by horses, but other colonial imagery such as humans in western clothing, ox wagons, horse carts, Nine Men's Morris gameboards, occasional inscriptions and dates and even cars are known (Morris 1988; Orton 2022b). These images mostly occur in clusters and were probably made by the employees of particular farms.

Outside of the Nuweveld Mountains, Stone Age observations in the vicinity of Loxton tend to be sparse. Webley and Hart (2010) examined a site to the east of Loxton and located just two flakes that they considered to be of MSA origin. Some 85 km southeast of the present study area, Halkett and Webley (2011) noted fairly widespread background scatter artefacts all of which they attributed to the MSA. Working just south of Loxton, Dreyer (2014) found no archaeology.

Historical archaeology also occurs widely in the Karoo but was little known from the Nuweveld area until recently (Orton 2021a, 2021b, 2021c, 2022a, 2022b). Nineteenth century occupation of the Nuweveld Mountains was widespread with many small abandoned and ruined stone-walled farmsteads scattered along the water courses of the area. Many ruined farmsteads were found with these including residential houses (both formal rectangular flat roofed houses and lobed dwellings that might have had temporary roofs) and various other small outbuildings of unknown function, livestock enclosures (*kraals*), chicken coops, stone walls around fields and ash and rubbish middens. The colonial period archaeological sites would have been made by the trekboers who colonised the southern Karoo region during the 18th and 19th centuries.

These early packed stone structures are invariably collapsed reducing them to archaeological sites in terms of the NHRA definitions. While some with taller walls may have had a formal or informal and/or temporary roof over them, others may have been hartebeeshuise with A-frame-type roofs made of branches and reeds placed above low stone or mud walls. Governor van Plettenberg, during his travels east to inspect the Colony, noted near the Sneeuwberg Mountains that the houses of the colonists consisted only of one room structures with low walls and straw roofs (Theal 1896-1911 cited in Böeseken 1975). In 1811 William Burchell illustrated a trekboer farmhouse (Van Zyl 1975), while Schoeman (2013) shows an image of such a historical stone dwelling still in use in the early 20th century (Figures 13 & 14).

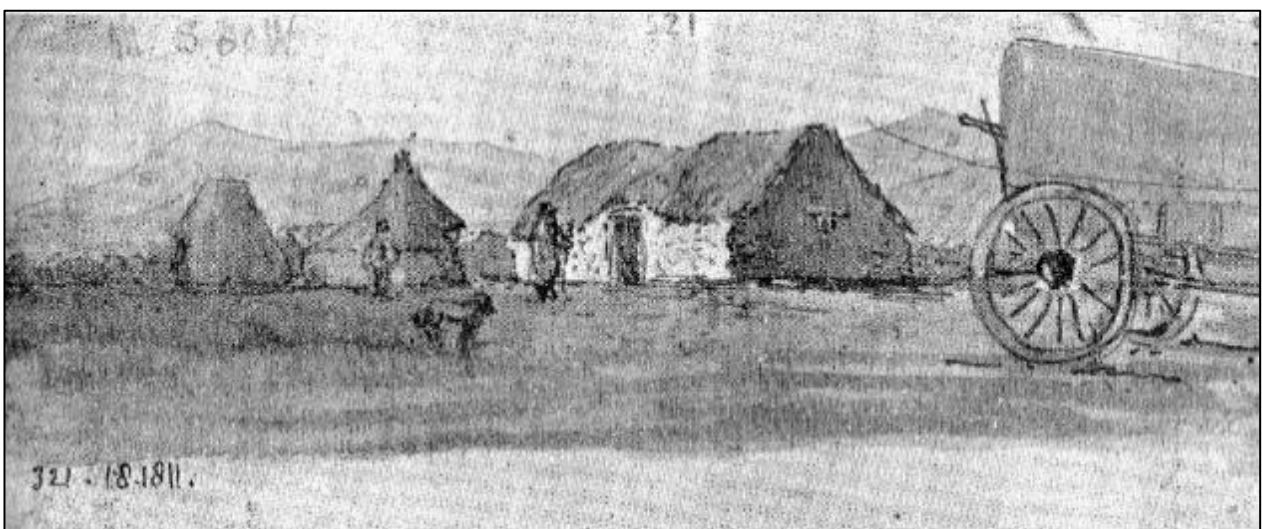


Figure 13: Drawing of an early 19th century trekboer farmhouse by William Burchell. Source: Van Zyl (1975:103).



Figure 14: A shepherd's hut photographed near Beaufort West in the early 20th century. Note the low, narrow doorway and informal roof structure. Source: Schoeman (2013:48).

5.2.2. Site visit

Stone Age materials were found in a few places but were generally not common. No ESA artefacts were seen and just one site was ascribed to the MSA. This was a scatter of well-patinated artefacts on hornfels at waypoint 1982. No formal tools were noted but the scar pattern on the dorsal surfaces of some flakes suggests that they date to the MSA (Figure 15). Three LSA sites were found. The largest was at waypoint 1981 which, surprisingly, lay on high ground far from any obvious source of water. The artefacts were almost all on dolerite, with a chert flake being the exception (Figure 16). A few pieces of ostrich eggshell were present, while a single glass fragment may be a chance inclusion or might indicate that the site is very late. An adze and an endscraper were seen on the small scatter at waypoint 1226 along with some ostrich eggshell fragments (Figure 17).



Figure 15: Weathered and patinated stone artefacts from waypoint 1982. Scale in cm.



Figure 16: Stone artefacts with very little patina from waypoint 1981. Scale in cm.



Figure 17: Stone artefacts and ostrich eggshell fragments from waypoint 1226. Scale in 5 cm intervals.

A few historical archaeological sites were also found. Although the Springfontein farmstead (waypoint 007) itself was not visited, the eastern part of the broader werf was examined and a number of archaeological features were seen. These included a stone-walled house ruin with two rooms and a scatter of historical debris around it (waypoint 1980; Figures 18 to 20), a low density dump of 19th and 20th century artefacts (waypoint 1214; Figure 21), two very well-preserved stone kraals (waypoints 1216 & 1217; Figures 22 & 23) and the remains of a circular feature assumed to have been a threshing floor (waypoint 1228; Figure 24).



Figure 18: *Stone-walled house ruin at waypoint 1980.*



Figure 19: *The interior of the north-eastern room in the ruin at waypoint 1980.*



Figure 20: *Stone feature outside the ruin at waypoint 1980.*

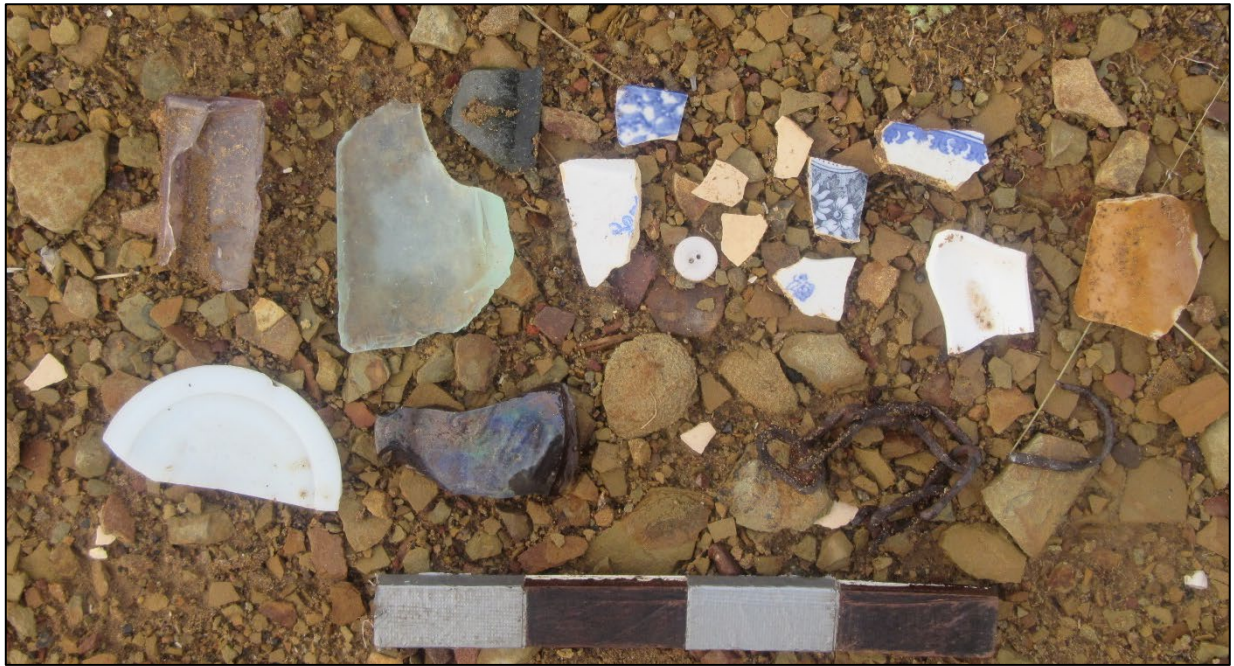


Figure 21: Historical artefacts from the scatter at waypoint 1214. Scale in 5 cm intervals.



Figure 22: The entrance of the very well-preserved stone-walled kraal at waypoint 1216.



Figure 23: Aerial view of the two kraals at waypoints 1216 and 1217.



Figure 24: The remnants of what seems to have been a threshing floor at waypoint 1228.

North of Springfontein the river emerges from a dolerite poort. To the north of this poort is the aptly named Rooipoort complex. It is in ruin and abandoned and, although not visited, many stone-walled kraals can be seen on aerial photography (waypoint 001; Figure 25).



Figure 25: Aerial view of the Rooipoort farm complex at waypoint 001 showing many stone-walled kraals. Note the one to the west alongside the river.

5.3. Graves

No graves were seen during the survey. One suspicious collection of stones at waypoint 1221 was on sandy substrate alongside a fence. The collection was far too small to be a grave covering.

5.4. Historical aspects and the Built environment

5.4.1. Desktop study

Early European settlement in the Nuweveld occurred from about the 1770s (Figure 26) but the study area was still well outside the colonial boundary by the turn of the 19th century (Figure 27). By the time the British took control of the Cape, the trekboers “had already acquired the characteristics of an embryo nation” (Van Zyl 1975:125). This was because the VoC had largely left them to look after themselves which resulted in them becoming quite independent of the Company and its rather weak rule. Due to various changes implemented under British rule, a growing unease developed amongst the colonists and this eventually led to a large-scale migration of farmers further north and east, beyond the borders of the Colony; this was the so-called ‘Great Trek’ of 1834 to 1854 (Muller 1975). Walker (1928), however, comments that this event could actually be seen merely as an acceleration of a process that had long been underway. The Cape Colony meanwhile expanded as shown in Figure ff with the study area fully incorporated by 1825.

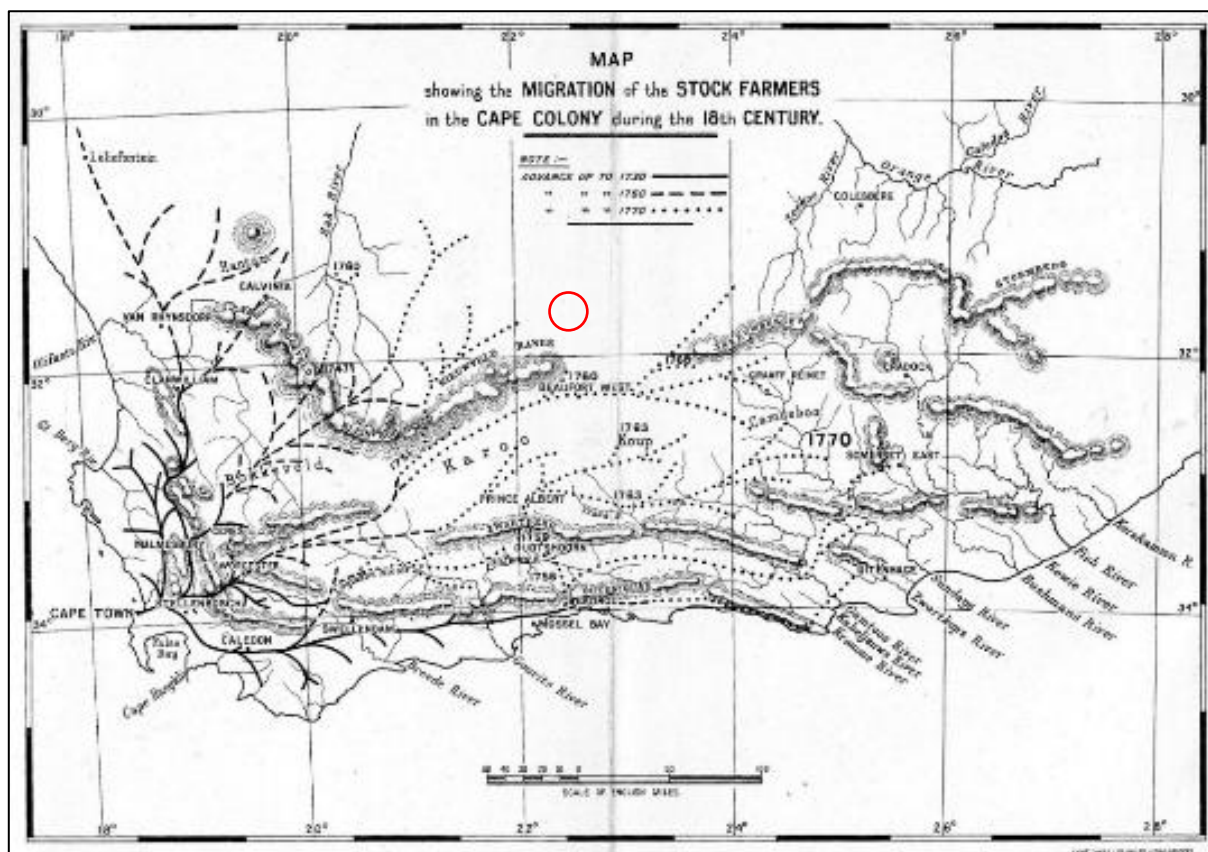


Figure 26: Map showing the mid-18th century trekboer expansion in the Karoo. Source: Botha (1926: opposite preface). The wind farm study area is indicated approximately by the red circle.

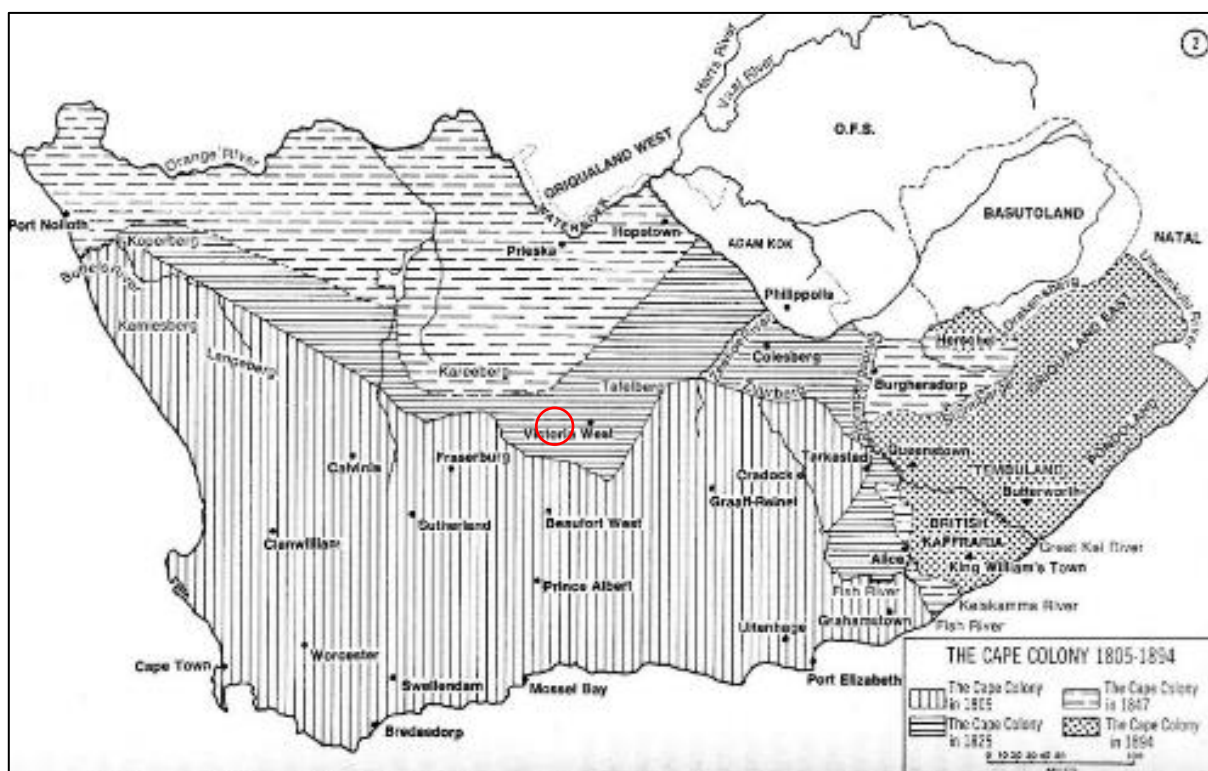


Figure 27: Map showing the expanding boundaries of the Cape Colony under British Rule. Source: Van Zyl (1975:102). The wind farm study area is indicated approximately by the red circle.

An important aspect of the history of the area is the construction of corbelled stone houses. This building tradition has been extensively studied by Kramer (2012) who notes that corbelled structures were built from the 1820s to the 1870s. She considers the lack of mention of them by Burchell, who made detailed notes of almost anything he saw, as a certain indication that none existed at the time of his travels through the relevant area in 1811. They occur in a discrete area of the western Karoo with Loxton being within the eastern part of the overall distribution. Considering the pre-1820 traveler reports, Kramer (2012:40) notes that “since there is no mention of corbelled buildings, which one assumes would have stood out from the humble reed houses, we can only assume that these came later when a commitment had been made to one spot which would warrant the labour required to build a stone building.”

Several corbeled houses are mapped in the area around the Loxton WEF 1 site but none occur within it. The main reasons for their distribution are the lack of suitable trees for timber and the abundance of good building stone in the area. These are not the only reasons for their existence though. Kramer (2012) reports that the Trekboers consisted of a range of people including Europeans of varying nationality (and who might well have had exposure to corbelled architecture in Europe) and Bastards (mixed race people born from white men and Khoekhoe women due to a predominance of men in the Colony [Ross 1975 and Van der Merwe 1995 cited in Kramer 2012]). She also points out that during the Difaqane of the 1820s and 1830s the Trekboers had contact with displaced Sotho people who had knowledge of corbelling.

Loxton was established in 1899 on the farm Phezantefontein and was named after A.E. Loxton, the last owner of the farm (Raper n.d.). The town was given municipal status in 1905 and the first town dam was built in 1912 (Schoeman 2013). The town is quite famously associated with Deon Meyer, the well-known South African crime novelist.

There does not seem to have been any significant Anglo-Boer War action in the vicinity of Loxton. The name Loxton does not appear in Pakenham (1993) or Grobler (2004), but since the town was only established and named on the eve of the war this might be unsurprising.

5.4.2. Site visit

Historical and built heritage resources all occur along river valleys and they are generally few and far between. Only one farmstead was visited during the survey but it is largely modern (Figure 28). Nonetheless, it has historical components and contributes to the cultural landscape (discussed below). To the north is another farming area with two structures. Both predate 1959 and likely date to sometime in the first half of the 20th century (Figure 29). Further north again is the Springfontein farmstead which has many historical aspects to it, a number of them archaeological (all the historical archaeology illustrated in Figures 18 to 24 is from this complex).



Figure 28: Aerial views of the Saaidam farmstead from 1959 (434_003_03033) and recent (Google Earth) showing just one house and one kraal in the older image. The two large dams also pre-date 1959 but the diversion canal from the southern dam is newer.



Figure 29: The farm buildings at waypoint 1212.

5.5. Cultural landscapes and scenic routes

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

The landscape of the study area is largely a natural landscape but with many pockets of cultivation and other anthropogenic features. These are farm complexes (as described above) that lie along the rivers. Although it is true that the entire Karoo is a cultural landscape, the smaller cultural landscape features are more important to the present assessment. As already noted, these farmsteads all lie along the rivers. Some are abandoned while others continue to be occupied. Key elements of these

agricultural landscapes are the many in-stream dams that have been built over the years. Many of them have been breached.

Part of the significance of the Karoo landscape is the general lack of lights which makes for very dark skies in which stars are readily visible. This gives a special character to the night-time landscape.

The study area lies east of the R63 which, as one of the main roads through the area, can be regarded as a scenic route. It links Victoria West to the east with Loxton and the proceeds north to Carnarvon, and west to Williston and Calvinia. As such, it is probably the most important route through the western Karoo.

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 variably very low (Grade GPC) to high (Grade IIIB) cultural significance at the local level for their scientific value in the case of Stone Age finds and historical, architectural and social significance in the case of historical archaeological resources.

Graves are deemed to have high cultural significance at the local level for their social value. If present they would be allocated a grade of IIIA.

The cultural landscape is largely a natural landscape with aesthetic value and is rated as having medium cultural significance at the local level. However, within the broader landscape, the pockets of more highly developed cultural landscape at the farm complexes are of high local significance.

Figure 30 shows a map of all heritage resources by grade. Buffers of 50 m have been allocated but are only visible on the larger sites (cultural landscapes).

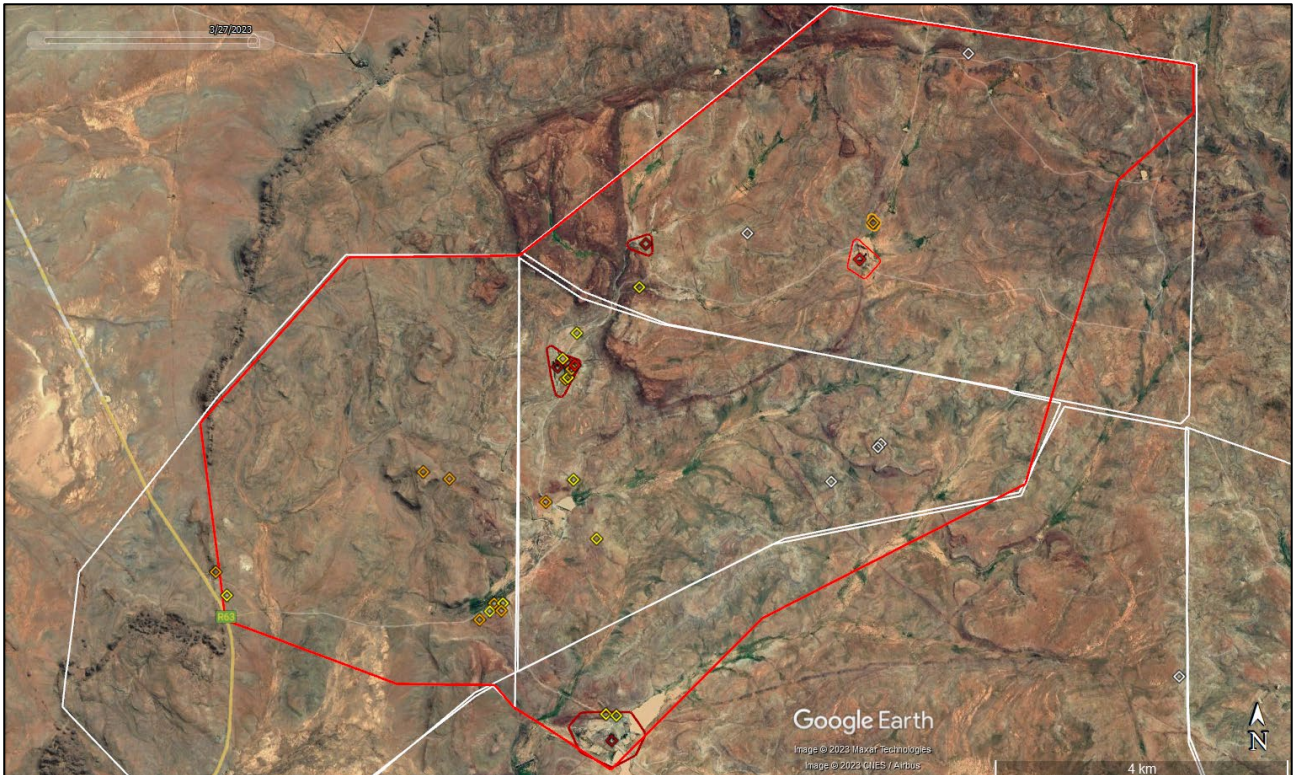


Figure 30: Grade map of heritage resources in the WEF 1 study area (red polygon) and surrounds. Dark red = IIIA, red = IIIB, orange = GPA, yellow = GPB, white = GPC.

5.7. Summary of heritage indicators

- Indicator: Uncontrolled damage to fossils should be minimised as far as possible.
- Indicator: Direct damage to archaeological sites should be avoided as far as possible and, where some damage to significant sites is unavoidable, scientific/historical data should be rescued.
- Indicator: Buffers of at least 30 m should be maintained around known archaeological sites as far as possible.
- Indicator: Buffers of at least 200 m should be maintained around the most significant sites (i.e. grade IIIA) as far as possible.
- Indicator: Buffers of at least 30 m should be maintained around all built elements, but where existing roads are upgraded this distance can be reduced as needed but should still guarantee the integrity of the resource.
- Indicator: The wind farm, when seen from the R63, should not dominate views in multiple directions.
- Indicator: Clustering of turbines is preferred rather than having them spread out in a linear fashion. No turbines should exist as outliers.
- Indicator: Powerlines should be buried as far as possible.
- Indicator: Road surfacing, where required, should avoid high contrast materials.
- Indicator: Related infrastructure (substation, battery storage facility, buildings) should be in areas of low visibility (especially from the R63).

6. ASSESSMENT OF IMPACTS

Impacts to palaeontology (construction phase), archaeology (construction phase) and the cultural landscape (all phases) are expected to occur and require assessment. Impacts on graves are theoretically possible but owing to the largely rocky substrate no impacts are expected. Impacts to built heritage resources are not expected. Palaeontological impacts are assessed in the separate palaeontological specialist study.

6.1. Construction Phase

6.1.1. Impacts to archaeological resources

Direct impacts to archaeological resources would occur during the construction phase when construction begins. With one exception, no archaeological resources occur within the areas where project infrastructure would be placed. The exception is the access road from the west which will directly impact an archaeological site (waypoint 1238, grade GPB) which means that the expected impacts are **high negative** (Table 2). If it cannot be avoided, the site at waypoint 1238 will need to be excavated and described in detail prior to construction and a pre-construction survey will be needed to identify any further areas along the final road alignment where avoidance (through micro-siting) or mitigation might still be required. After mitigation the significance calculates to **low negative**.

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

Table 2: Assessment of archaeological impacts.

Impact Phase: Construction					
Nature of the impact: Damage to or destruction of archaeological resources					
Description of Impact: Archaeological resources may be impacted during construction when equipment is brought onto site and excavations for foundations, services and roads commence.					
Impact Status: Negative					
	E	D	R	M	P
Without Mitigation	Site	Permanent	Irreversible	Low	Definite
Score	1	5	5	2	5
With Mitigation	Site	Permanent	Irreversible	Very Low	Low Probability
Score	1	5	5	1	2
Significance Calculation	Without Mitigation			With Mitigation	
S=(E+D+R+M)*P	High Negative Impact (65)			Low Negative Impact (24)	
Was public comment received?	No.				
Has public comment been included in mitigation measures?	n/a				
Mitigation measures to reduce residual risk or enhance opportunities: Avoid the ruin at wavpoint 1238 or else conduct archaeological excavation and documentation of the site.					

<i>Conduct pre-construction survey of the full layout, including all ancillary infrastructure. This survey will make specific recommendations for any further mitigation (avoidance or sampling) that might be required.</i>	
Residual impact	<i>There will still be isolated finds of very low cultural significance that might not be found during a survey. These are of no consequence.</i>

6.1.2. Impacts to the cultural landscape

Direct impacts to the cultural landscape would occur throughout the construction phase due to the presence of construction equipment and industrial-type structures in the rural/natural landscape. Impacts could be of fairly high magnitude but are rated moderate due to the distance between the project and public viewpoints. The significance calculates to **moderate negative** (Table 3). Mitigation will make very little difference because it is not possible to hide the activity and turbines and after mitigation the significance remains **moderate negative**.

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

Table 3: Assessment of impacts to the cultural landscape.

Impact Phase: Construction					
Nature of the impact: Impacts to the cultural landscape					
Description of Impact: The cultural landscape will be negatively affected through the visual intrusion of all the construction equipment and activity and the introduction of the large wind turbines as these are erected.					
Impact Status: Neutral					
	E	D	R	M	P
Without Mitigation	Regional	Short Term	Recoverable	Moderate	Definite
Score	3	2	3	3	5
With Mitigation	Regional	Short Term	Recoverable	Low	Definite
Score	3	2	3	2	5
Significance Calculation	Without Mitigation		With Mitigation		
S=(E+D+R+M)*P	Moderate (55)		Moderate (50)		
Was public comment received?	No				
Has public comment been included in mitigation measures?	n/a				
Mitigation measures to reduce residual risk or enhance opportunities: <i>Keep construction period as short as possible.</i> <i>Minimise landscape scarring by minimizing cut and fill and ensuring rehabilitation of all areas not required during operation.</i> <i>Use low contrast materials for road surfacing where required.</i> <i>Place ancillary infrastructure (substations, offices, etc) in low visibility areas.</i> <i>Follow visual mitigation measures.</i>					
Residual impact	No matter what measures are applied, nothing can screen the development due to its size and there will always be impacts.				

6.2. Operation Phase

6.2.1. Impacts to the cultural landscape

Direct impacts to the cultural landscape would occur during the operation phase through the presence of the facility in what is otherwise a rural/natural landscape. The red navigation lights would alter the night-time sense of place. Although the extent and magnitude are likely to be limited, the long term duration means that the significance calculates to **high negative** (Table 4). Mitigation will slightly reduce the magnitude and after mitigation the significance is **moderate negative**.

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

Table 4: Assessment of impacts to the cultural landscape.

Impact Phase: Operation					
Nature of the impact: Impacts to the cultural landscape					
Description of Impact: The cultural landscape will be negatively affected through the visual intrusion of the large wind turbines and related infrastructure in the landscape.					
Impact Status: Negative					
	E	D	R	M	P
Without Mitigation	Regional	Long Term	Recoverable	Moderate	Definite
Score	3	4	3	3	5
With Mitigation	Regional	Long Term	Recoverable	Low	Definite
Score	3	4	3	2	5
Significance Calculation	Without Mitigation			With Mitigation	
S=(E+D+R+M)*P	High (65)			Moderate (60)	
Was public comment received?	No				
Has public comment been included in mitigation measures?	n/a				
Mitigation measures to reduce residual risk or enhance opportunities: <i>Ensure that all maintenance operations remain within designated areas.</i> <i>Ensure that visual recommendations with regards to lighting are followed.</i> <i>Make use of an early warning system that can switch on navigation lights only when they are needed (if such a system is available and approved at the time of construction).</i>					
Residual impact	<i>No matter what measures are applied, nothing can screen the development due to its size and there will always be impacts.</i>				

6.3. Decommissioning Phase

Direct impacts to the cultural landscape would occur throughout the decommissioning phase due to the presence of construction equipment and activity and industrial-type structures (which would become less with time) in the rural/natural landscape. Impacts would be of fairly high intensity but because of the short duration of the decommissioning period the significance calculates to

moderate negative (Table 3). Mitigation will make very little difference because it is not possible to hide the activity and equipment and after mitigation the significance remains **moderate negative**.

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

Table 5: Assessment of impacts to the cultural landscape.

Impact Phase: Decommissioning					
Nature of the impact: Impacts to the cultural landscape					
Description of Impact: The cultural landscape will be negatively affected through the visual intrusion of all the construction equipment and activity while the turbines and related infrastructure are being removed.					
Impact Status: Negative					
	E	D	R	M	P
Without Mitigation	Regional	Short Term	Recoverable	High	Definite
Score	3	2	3	4	5
With Mitigation	Regional	Short Term	Recoverable	Low	Definite
Score	3	2	3	2	5
Significance Calculation	Without Mitigation		With Mitigation		
S=(E+D+R+M)*P	Moderate (60)		Moderate (50)		
Was public comment received?	No				
Has public comment been included in mitigation measures?	n/a				
Mitigation measures to reduce residual risk or enhance opportunities: Keep decommissioning period as short as possible. Ensure effective rehabilitation of all areas following advice of the relevant specialist.					
Residual impact	Minimal landscape scarring will still be visible but will reduce over time as the rehabilitated areas return to normal.				

6.4. Cumulative impacts

In relation to an activity, cumulative impact means “the past, current and reasonably foreseeable future impact of an activity, considered together with the impact of activities associated with that activity, that in itself may not be significant, but may be significant when added to the existing and reasonably foreseeable impacts eventuating from similar or diverse activities” (NEMA EIA Reg GN R982 of 2014). Although impacts can result from diverse activities, Figure 31 shows the locations of other renewable energy projects within 35 km of the present study area. Table 6 presents an ‘average’ cumulative impact on heritage resources from these and other potential activities in the area. The impacts relate largely to the landscape, since specific heritage sites are almost entirely avoided.

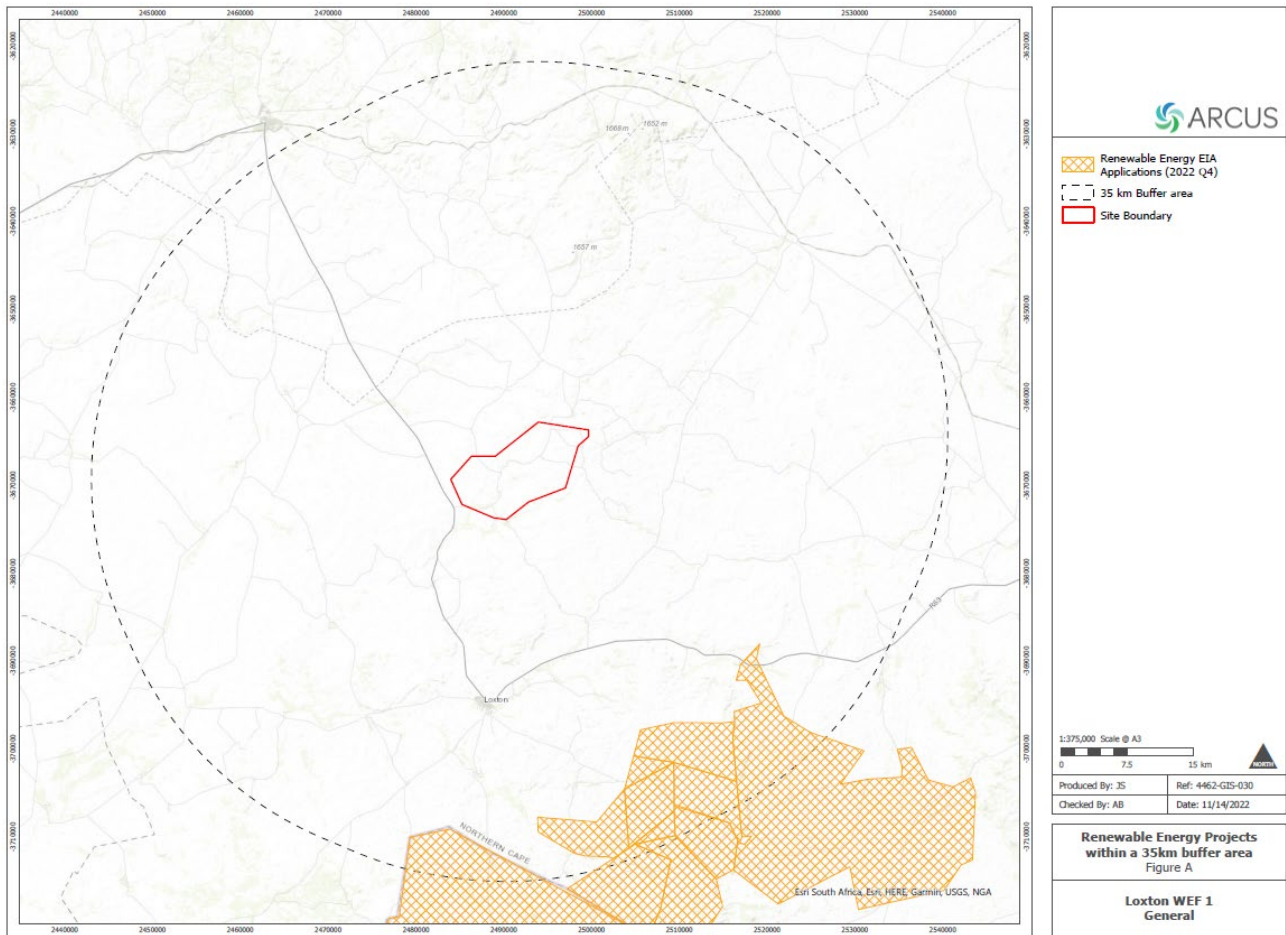


Figure 31: Map showing other renewable energy applications within 35 km of the Loxton 1 study area.

Table 6: Assessment of cumulative impacts to heritage resources.

Cumulative Impact: Cumulative impacts to all heritage resources					
Description of Cumulative Impact: Impacts to archaeology, graves, buildings and the cultural landscape through destruction and/or visual intrusion					
Impact Status: Negative					
	E	D	R	M	P
Without Enhancement	Regional	Long term	Recoverable	High	Definite
Score	3	4	3	4	5
With Enhancement	Regional	Long term	Recoverable	Low	Probable
Score	3	4	3	2	3
Significance Calculation	Without Enhancement		With Enhancement		
S=(E+D+R+M)*P	High (70)		Moderate (36)		
Can Impacts be Enhanced?	There are no positive impacts to enhance but negative impacts can be reduced through the application of the stipulated mitigation measures.				
Enhancement/Mitigation: Apply all relevant mitigation measures as recommended for each project. Pre-construction surveys are an important component of this.					

Residual impact	<i>It is never possible to locate every heritage resource and some impacts will always occur. Through pre-construction surveys, however, the significance of these impacts should be minimised. It is also not possible to hide most developments and visual impacts to the landscape will always occur.</i>
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6.5. 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 will result in construction period jobs as well as a small number of operation phase jobs. However, the biggest benefit to society is in the provision of electricity to the national grid which will assist in stabilising electricity supply and, in general, improve economic activity. These are clear economic and social benefits and, if mitigation is applied as suggested above, then the socio-economic benefits outweigh the residual impacts.

6.6. Existing impacts to heritage resources

There are currently no obvious threats to heritage resources on the site aside from the natural degradation, weathering and erosion that will affect archaeological materials. Trampling from grazing animals and/or farm/other vehicles could also occur. These impacts would be of **negligible negative** significance. There are no threats to the cultural landscape.

6.7. The No-Go alternative

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

6.8. Levels of acceptable change

Any impact to an archaeological or palaeontological resource or a grave is deemed unacceptable until such time as the resource has been inspected and studied further if necessary. Impacts to the landscape are difficult to quantify but in general a development that visually dominates the landscape from many publicly accessible vantage points is undesirable. Because of the height of the proposed development, such an impact may well occur but due to the socio-economic benefits the impact is considered acceptable.

7. INPUT TO THE ENVIRONMENTAL MANAGEMENT PROGRAM

The actions recorded in Table 7 should be included in the environmental management program (EMPr) for the project.

Table 7: Heritage considerations for inclusion in the EMPr.

Impact	Mitigation / management objectives & outcomes	Mitigation / management actions	Monitoring		
			Methodology	Frequency	Responsibility
Impacts to archaeology and graves					
Damage or destruction of archaeological sites or graves	Avoid impacts (preferred) or locate and sample or rescue sites/burials before disturbance	Pre-construction survey, micro-siting of infrastructure, make recommendations for mitigation.	Appoint archaeologist to conduct survey well before construction	Once-off	Project developer
Damage or destruction of archaeological sites or graves	Rescue information, artefacts or burials before extensive damage occurs	Reporting chance finds as early as possible, protect <i>in situ</i> and stop work in immediate area.	Inform staff to be vigilant and carry out inspections of new excavations (construction period only)	Ongoing basis	Construction Manager or Contractor
				Whenever on site (at least weekly)	ECO
Damage or destruction of any known sites	Avoid impacts	Place No-Go signage at identified sensitive locations.	Monitoring of No-Go areas (construction period only)	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

Table 8 provides project responses to the heritage indicators with mapping shown in Figures 32 to 34 where needed. The main concern relates to the site at waypoint 1238 which would require avoidance or mitigation as noted in Table 8. In other places where existing roads are being reused the heritage resources can be protected through clear No-Go signage and monitoring.

Table 8: Heritage indicators and project responses. Note that farmsteads are also considered archaeological because some archaeological features occur at each of them.

Indicator	Project Response
Uncontrolled damage to fossils should be minimised as far as possible.	Addressed in the palaeontological study.
Direct damage to archaeological sites should be avoided as far as possible and, where some damage to significant sites is unavoidable, scientific/historical data should be rescued.	To be confirmed during a pre-construction survey of the final layout, inclusive of all ancillary infrastructure. The only site potentially directly affected is the house ruin at waypoint 1238. This will require either avoidance or archaeological

	mitigation and will be addressed through a recommendation.
Buffers of at least 30 m should be maintained around known archaeological sites as far as possible.	With five exceptions this has been done. The exceptions are: • Waypoint 003 – this is acceptable as an existing road will be reused (but will require straightening). Due to the minimum distance to heritage features being about 5 m, this will require careful management; • Waypoint 004 – this is acceptable as an existing road will be reused and the minimum distance to heritage features is 20 m (between cable and feature); • Waypoint 1229 – this is acceptable as an existing road will be reused and the minimum distance to heritage features is 15 m; • Waypoint 1230 – this is acceptable as an existing road will be reused and the minimum distance to heritage features is 23 m; and • Waypoint 1238 – see above.
Buffers of at least 200 m should be maintained around the most significant sites (i.e. grade IIIA) as far as possible.	This has been done.
Buffers of at least 30 m should be maintained around all built elements, but where existing roads are upgraded this distance can be reduced as needed but should still guarantee the integrity of the resource.	This has been done except at waypoint 003 where a reused road passes within 17 m of a building (No-Go signage will be required).
The wind farm, when seen from the R63, should not dominate views in multiple directions.	The entire project will be located on one side of the R63 and the nearest turbine is 4.8 km from the road.
Clustering of turbines is preferred rather than having them spread out in a linear fashion. No turbines should exist as outliers.	This has been done.
Powerlines should be buried as far as possible.	This has been included in the project description, although it is noted that there are large areas of bedrock on the site which might mean that overhead lines are more feasible in places. Given the remoteness and that turbines would be present anyway, this is acceptable.
Road surfacing, where required, should avoid high contrast materials.	This will be a recommendation.
Related infrastructure (substation, battery storage facility, buildings) should be in areas of low visibility (especially from the R63).	This has been done.

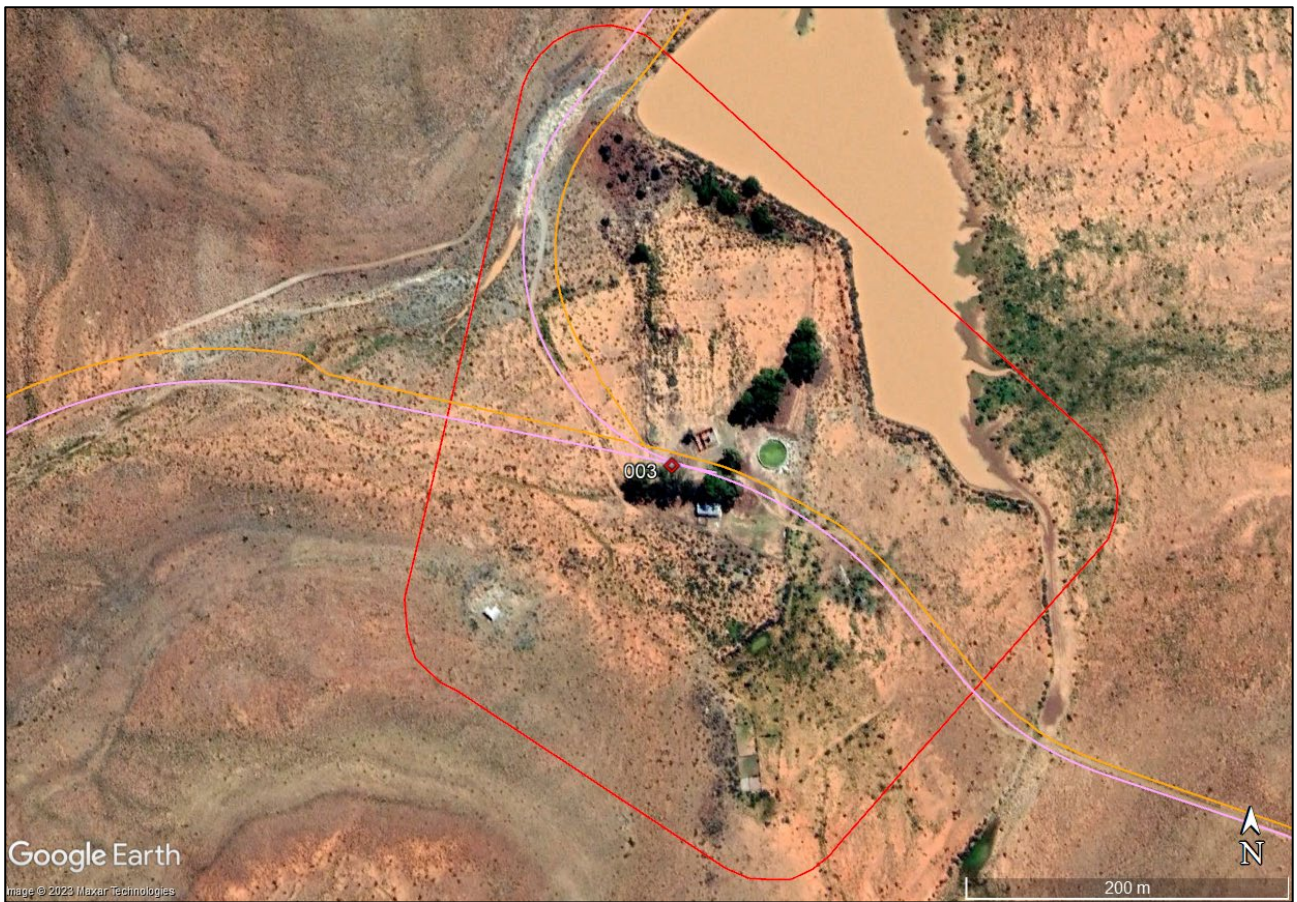


Figure 32: Aerial view showing a project road (pink) and cable (orange) passing though the site at waypoint 003.



Figure 33: Aerial view showing a project road (pink) and cable (orange) passing the site at waypoint 004.

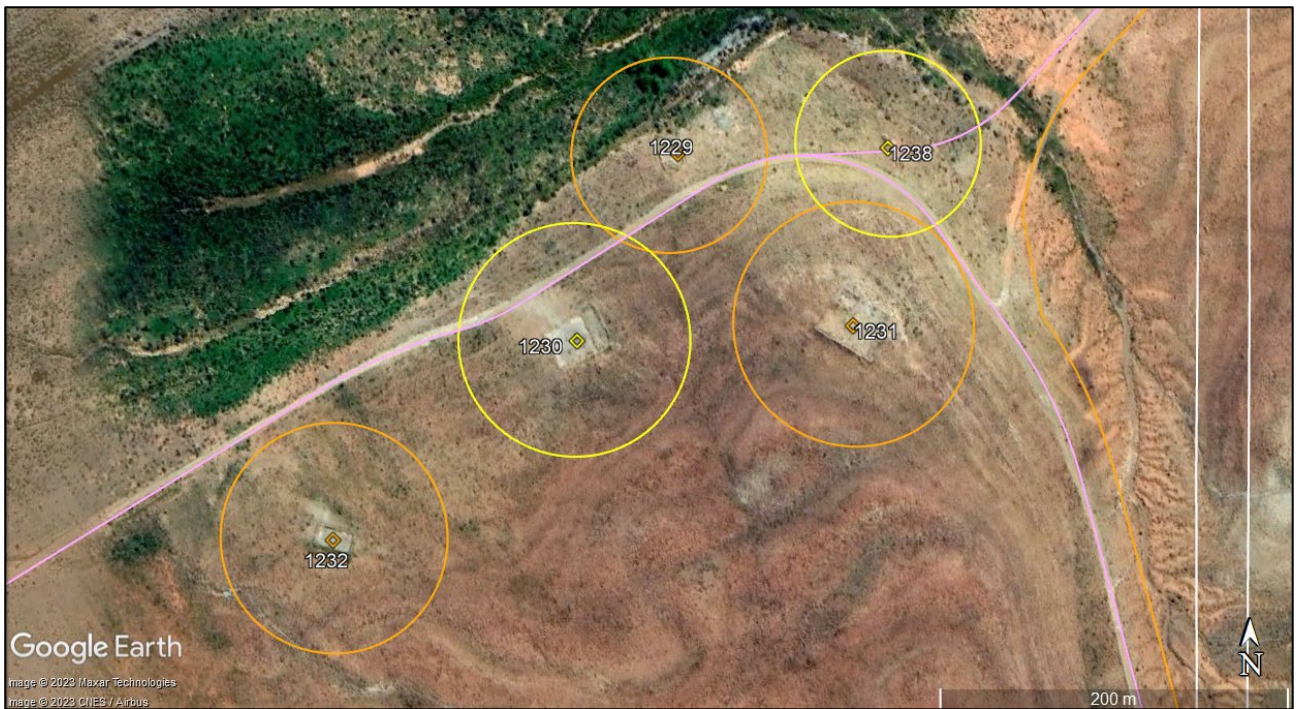


Figure 34: Aerial view showing a project road (pink) and cable (orange) passing the sites at waypoints 1229, 1230 and 1238.

With mitigation, impacts to the broader cultural landscape may be of moderate significance. Importantly, the ancillary infrastructure has been placed in a low area that is almost entirely screened from the R63 by topography and is located 6.2 km away from it. In time the facility will become an accepted component of the landscape and the perceived impact will diminish. Also, if multiple similar facilities are constructed in the area, then a new electrical ‘layer’ will develop and become part of the landscape. At the smaller scale, the agricultural landscapes around the historical farmsteads will not be directly affected aside from upgrades and/or realignment of existing farm tracks, although they will, at times, be overshadowed by turbines placed on hills within a few hundred meters of the 50 m buffers around the outside of these landscapes. Although large parts of the final road layout have not been surveyed, field experience shows that sites requiring *in situ* conservation are not expected to be found in the kinds of areas proposed for development, and it is expected that any conservation-worthy sites will be very easily sampled in advance of development should avoidance by micro-siting not be possible.

8.1. Reasoned opinion of the specialist

There are no heritage impacts that are unacceptable and any direct impacts that may still be unavoidable in the construction phase are expected to be easily mitigated. Places where the project roads and/or cables come close to heritage resources are expected to be manageable with No-Go signage and monitoring. As such, it is the opinion of the heritage specialist that the Loxton WEF 1 project should be authorised in its entirety.

9. RECOMMENDATIONS

It is recommended that the proposed Loxton WEF 1 should be authorised but with the following recommendations which should be included as conditions of authorisation:

- Existing roads should be reused where possible and if any surfacing is required then high contrast materials should be avoided;
- Where existing roads pass through sensitive areas this is preferred over making new roads but the alignments should ensure the integrity of any specific resources in those sensitive areas. In this regard, No-go signage will need to be put in place and the sites monitored at waypoints 003, 004, 1229, 1230;
- The archaeological site at waypoint 1238 will need to be avoided through micro-siting the access road or else excavated, sampled and recorded as necessary prior to construction. If it is avoided then No-Go signage must be installed and the site monitored;
- No stones or other materials may be removed from any historical sites;
- If all other factors are equal and there are more turbine positions than required, then preference should be given to dropping number 26 due to its proximity to a farmstead;
- Make use of an early warning system that can switch on navigation lights only when they are needed (if such a system is available and approved at the time of construction);
- A pre-construction survey of all parts of the layout that have not yet been surveyed must be undertaken, including the locations of all ancillary infrastructure; and
- If any archaeological material or human burials are uncovered during the course of development then work in the immediate area (within 30 m) should be halted. The find would need to be reported to the heritage authorities and may require inspection by an archaeologist. Such heritage is the property of the state and may require excavation and curation in an approved institution.

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APPENDIX 1 – Curriculum Vitae



Curriculum Vitae

Jayson David John Orton

ARCHAEOLOGIST AND HERITAGE CONSULTANT

Contact Details and personal information:

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Cell Phone: 083 272 3225
Email: jayson@asha-consulting.co.za

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

Education:

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

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

Employment History:

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

Professional Accreditation:

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

CRM Section member with the following accreditation:

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

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

- Accredited Professional Heritage Practitioner

➤ **Memberships and affiliations:**

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

Fieldwork and project experience:

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

Feasibility studies:

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

Phase 1 surveys and impact assessments:

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

Phase 2 mitigation and research excavations:

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

Awards:

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

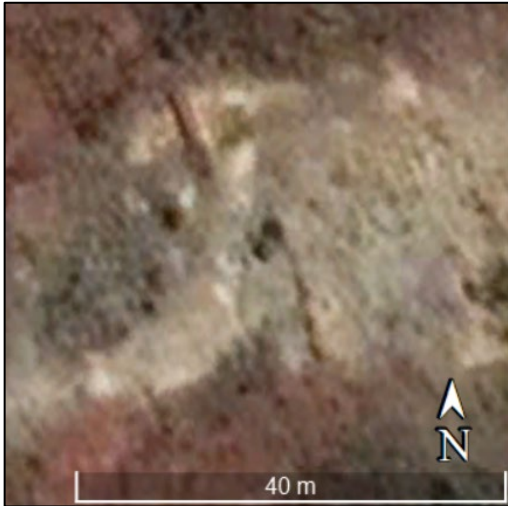
APPENDIX 2 – List of Finds

WEF project area	WEF access road	Waypoint	Location	Description	Significance	Grade
1		1980	S31 16 33.4 E22 21 57.8	Stone-walled house ruin built with mud mortar. Central doorway facing northwest with two rooms. Northeast room has two fireplaces in the east and west corners and a small window in the southeast side. The southwest room has a window in the southwest (gable) wall, and a filled in doorway facing northwest. An internal opening links the rooms through the central wall. The ruin is a maximum of about 3 meters in height and seems to have had low gables and a pitched roof which is now gone, although some corrugated iron lies inside the ruin. It measures approximately 7 m by 4 m. Some grey cement patching has been done in places. There are artefacts all around the house up till a distance of about 15 m away from it. The material consists of 19th and 20th century artefacts - metal (including lots of tins), glass and ceramics (one piece of lined industrial ware). To the west of the house is another small stone feature/building. One side of it is a low wall, and the other side is circular.	Medium	GPA
1		1981	S31 17 14.0 E22 20 44.9	An LSA scatter located on the side of a small koppie which in turn is on a big hill. The scatter stretches over about 20 m right to the top of the koppie. The top of the koppie had a rough circle of small boulders, in the middle of which were more artefacts. The scatter is fairly dense (artefacts c. 10 cm apart) and included flakes, chips, bladelets, and a core made on hornfels, as well as one flake on chert. There was also some ostrich eggshell, an upper grindstone, and a piece of light green glass (maybe retouched).	Medium	GPA
1		1982	S31 17 17.1 E22 20 58.2	At the bottom of a hill on a flat plain, was a wide scatter of heavily patinated MSA flakes. There was a flake about every 10 to 15 cm, covering a radius of about 35 to 40 m.	Medium	GPA
		1983	S31 21 59.6 E22 22 01.3	A small semi-circle of dolerite rocks built up against a boulder to create a shelter. The stones are up to a height of between 30 and 50 cm. The width is 1.5 meters, and the length is 2 meters. The opening faces NE. No artefacts were visible. The shelter is amongst a large number of dolerite outcrops.	Very low	GPC
3		1984	S31 29 38.4 E22 27 58.5	A late 19th, early 20th century artefact scatter in a flat area between a number of dolerite outcrops, and next to an endoreic feature filled with water. The area is about 50m in diameter and the artefacts are spaced about every meter or two.	Low	GPB

WEF project area	WEF access road	Waypoint	Location	Description	Significance	Grade
				There is metal, glass (cobalt blue, green), ceramic (mostly plain white but one recent-looking one with black transfer-printed decoration), some ostrich eggshell and a few tuff flakes.		
3		1985	S31 29 39.6 E22 27 57.1	About 40 m away from the waypoint 1984 scatter and around the corner of a dolerite outcrop is a small ruin. It is a roughly built stone ruin about 5 x 5 meters. It is roughly 1 meter high at highest point. There is also quite a lot of artefactual material scattered around it including stoneware, hand-painted refined white earthenware (sponge-printed), the handle of a silver fork or spoon, some clear and light green glass and a metal bolt. Waypoint 1984 is most likely a continuation of the scatter.	Medium	GPA
3		1986	S31 30 25.9 E22 27 06.1	A thin scatter of LSA stone artefacts across an area of about 20 m in diameter and with maybe one artefact every meter. The site is on a flat open area surrounded by dolerite outcrops, and hills. The artefacts are on hornfels, and cores and an endscraper. About 25 m away from the site was an upper grindstone/hammerstone.	Low	GPB
3		1987	S31 30 31.4 E22 27 05.8	A circular area of exposed and fractured dolerite with smooth upper surfaces. The outcrop is about 2.5 m in diameter. The surfaces of at least five rocks have scratches, lines, and cross-hatching engraved on them. The variable patination suggests the scratches were made at different times.	Medium	GPA
2		1988	S31 24 10.7 E22 27 32.9	A small 10 x 15 m site, surrounded on three sides by small dolerite outcrops. The fourth side is on the edge of a hill and looks out over the flat plains. It is a light scatter of LSA flakes and chunks on hornfels and chert as well as plenty of ostrich eggshell. One bladelet with possible retouch was seen. Density possibly about 4/m ² . There are some more artefacts and ostrich eggshell fragments on the other side of the rocks to the NE.	Low	GPB
1	2	1210	S31 19 01.0 E22 22 23.7	A rock shelter with stone walling making two semi-circular rooms. There is an opening between the shelter wall and a tall standing stone in the waling but the rest of the walling is quite tumbled. Some glass fragments and a refined white earthenware fragment were seen along with some metal fragments and two hornfels flakes. There I also some stone walling along the top of the scarp to the west of the shelter.	Low	GPB

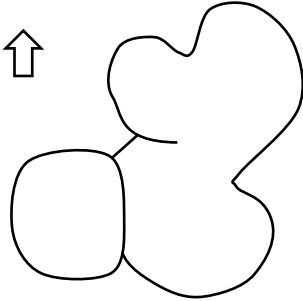
WEF project area	WEF access road	Waypoint	Location	Description	Significance	Grade
1	2	1211	S31 19 00.4 E22 22 18.3	Two stone features were seen on the slope here but were not visited as they are far from any impact areas. It was clear that the walling is badly tumbled. There is a stone wall that extends to the southwest from here around part of the valley.	Low	GPB
1	2	1212	S31 17 27.3 E22 21 47.6	Farm shed and storeroom. The latter was likely once a labourer's cottage. There are arable lands to the south but this is not a farmstead. It is not marked on the 1913 map of the area.	Medium	---
1		1213	S31 16 32.8 E22 21 59.0	A stone-walled feature of about 5 m across but which has had its southwestern end removed by a farm road. This is very close to the cottage ruin at waypoint 1980.	Low	GPB
1		1214	S31 16 29.0 E22 22 01.0	A widely scattered dump of historical materials that look largely late 19 th to early 20 th century. They are spread over an area of about 10 m by 10 m. They include refined white earthenware (transfer ware and sponge print), stoneware (German salt glaze), coarse porcelain (ginger jar), glass (green, brown, clear, pink and white), a white glass two-holed button, and some metal including a few links of a chain.	Medium-low	GPA
1		1215	S31 16 29.2 E22 22 00.6	Ephemeral remains of a stone-walled feature. The stones have been almost all removed and the circular section is visible only as a slightly raised berm and there is a short section still with a few stones sticking out towards the east from the southern edge of the circle.	Very low	GPC
1		1216	S31 16 27.4 E22 22 02.6	A beautifully preserved stone-walled kraal measuring 30 m north-south and 34 m east west. It has an opening in the southern (downslope) wall.	High	IIIB

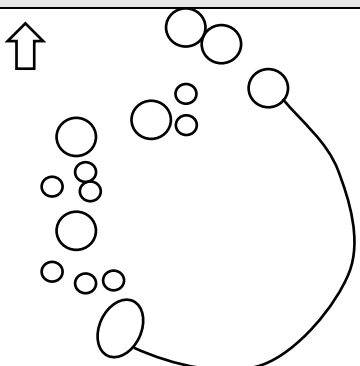
WEF project area	WEF access road	Waypoint	Location	Description	Significance	Grade
						
1		1217	S31 16 26.8 E22 21 59.7	A three-roomed kraal built below a scarp and incorporating the scarp as the back wall of the one room. There are a few small sections that have tumbled, but the rest is otherwise quite well preserved. 	High	IIIB

WEF project area	WEF access road	Waypoint	Location	Description	Significance	Grade
1		1218	S31 16 13.3 E22 22 03.7	A large dam wall with stone-packed sections. The centre of the wall is breached. The wall is approximately 100 m long.	Low	GPB
1		1219	S31 16 09.6 E22 22 20.6	Some recent lettering scratched on a dolerite boulder. "FJDT...". Unlikely to be 100 years thus not heritage.	---	---
1		1220	S31 15 53.3 E22 22 35.8	A pair of small stone walls forming low weirs in a stream bed. It is unclear if they were once linked to form a single structure as they are offset from one another. The stream flow is from right to left in the aerial view below. 	Low	GPB
1		1221	S31 15 29.9 E22 23 31.0	A small collection of stones on sandy substrate alongside a fence. It is clear that the stones have been placed there but their function is unknown. Far too small to be a grave.	Very low	GPC
1		1222	S31 14 11.8 E22 25 23.7	Very poorly preserved stone walling on a dolerite outcrop. The preservation is so poor as to not be able to determine the original shape of the feature, but it is clear the stones have been placed there.	Very low	GPC
1		1223	S31 17 01.8 E22 24 39.4	An ephemeral scatter of LSA hornfels artefacts. There are unlikely to be more than about 15-20 artefacts in total over an area of about 5 m diameter.	Very low	GPC
1		1224	S31 17 03.4 E22 24 37.8	An ephemeral stone circle about 4 m in diameter on a sandy substrate. Looks like the weights that would have been placed around the edges of a matjieshuis. No	Very low	GPC

WEF project area	WEF access road	Waypoint	Location	Description	Significance	Grade
				associated artefacts but the site is about 60 m southwest of the stone circle at waypoint 1223.		
1		1225	S31 17 18.4 E22 24 13.9	A few short sections of very roughly piled stone walling located on the edge of a scarp and incorporating some bedrock pieces. Its function is unknown but it does not seem like anything that could have been occupied as it is only about 1-1.5 m in size and located on uneven rocks.	Very low	GPC
1		1226	S31 17 43.4 E22 22 13.6	An ephemeral scatter of LSA hornfels artefacts. There are unlikely to be more than about 20-25 artefacts in total over an area of about 5 m diameter. Included are an adze and an endscraper as well as some ostrich eggshell fragments.	Low	GPB
1		1227	S31 17 17.5 E22 22 01.8	A small cottage made of home-made brick and mud mortar. It is probably two separate rooms inside, each with an east-facing door and a west-facing window. The doors and frames are wood, but the window frames were metal but with a wood lintol. Likely built as an original room with the second one added on later (but very soon as the materials are the same).	Low	---
1		1228	S31 16 24.5 E22 21 56.4	The remnants of what looks like a threshing floor, although the substrate is very muddy here (may be very different during dry weather). The feature is represented by just four tall standing stones and there is a fifth one lying down. There are also some other stones lying about the site. The rest of the stones have likely been removed for reuse elsewhere.	Low	GPB
1	2	1229	S31 18 11.8 E22 21 20.9	A stone-walled kraal of about 14 m by 12 m. It was not visited. It looked fairly well preserved but some tumbling does seem to have occurred.	Medium-low	GPA
1	2	1230	S31 18 14.3 E22 21 14.9	A stone-walled kraal of about 25 m by 33 m. It was not visited but seems poorly preserved with lots of the walling having tumbled. There is a narrow room to the east and a broader one to the west. It is likely that stones have been removed for reuse elsewhere as the kraal is accessible from the road and the side nearest the road is most poorly preserved.	Low	GPB
1	2	1231	S31 18 15.0 E22 21 24.6	A stone-walled kraal of 28 m by 32 m. It was not visited or seen on site and so its condition is unknown. It has a small room inside the northern corner.	Medium-low	GPA
1	2	1232	S31 18 19.0 E22 21 13.4	A stone-walled kraal of 11 m by 22 m. It was not visited or seen on site and so its condition is unknown.	Medium-low	GPA
2		1233	S31 20 19.9 E22 23 35.2	A single fragment of willow pattern transfer-printed ware that has been trimmed around three sides to form a game counter. There were no other associated finds.	Very low	GPC

WEF project area	WEF access road	Waypoint	Location	Description	Significance	Grade
2		1234	S31 20 29.7 E22 24 07.1	Many fragments of a brown bottle were found here scattered over an area of some 5 m by 15 m.	Very low	GPC
2		1235	S31 20 32.5 E22 24 14.8	In this area there were a few standing stones as well as a few lying down that must have been part of a fence or an enclosure of sorts. There was also a piece of metal that must have come from some sort of farm equipment. These finds were over an area of about 10 m by 30 m. There is a cement farm dam here and it looks like a wind pump used to stand alongside the dam but it has been completely removed.	Very low	GPC
2		1236	S31 20 40.2 E22 25 29.6	Many fragments of a brown bottle were found here scattered over an area of some 5 m by 5 m. "WERIES" is embossed on one fragment and this is almost certainly Olsson's Cape Breweries.	Very low	GPC
2		1237	S31 18 43.6 E22 27 11.8	An ephemeral and very small semi-circular stone feature built against a low scarp. The walling is very poorly preserved and barely identifiable. There were no associated artefacts.	Very low	GPC
1	2	1238	S31 18 11.7 E22 21 25.4	This is the foundation and a tiny piece of walling standing about 0.5 m high of a structure that measured some 5 m by 15 m. It is right alongside the local farm access road and has no doubt had its rocks removed for reuse elsewhere. A few red brick fragments also occur there. The site was recorded in the dark so the surrounding area could not be searched for artefacts.	Low	GPB
3		1239	S31 25 33.1 E22 29 59.5	A scatter of ostrich eggshell fragments, with two burnt ones indicting anthropogenic involvement.	Very low	GPC
3		1240	S31 27 51.7 E22 29 52.6	A set of small scratches on a dolerite rock.	Very low	GPC
3		1241	S31 27 01.6 E22 30 17.1	An ephemeral scatter of LSA hornfels artefacts. There are unlikely to be more than about 10-15 artefacts in total over an area of about 5 m diameter.	Very low	GPC
3		1242	S31 26 26.8 E22 29 51.5	A lightly used lower grindstone with a single flake in tuff nearby.	Very low	GPC
3		1243	S31 28 54.5 E22 29 44.0	An ephemeral scatter of hornfels, dolerite and tuff artefacts and ostrich eggshell. The scatter lies in an area about 20 m in diameter.	Very low	GPC
3		1244	S31 28 53.4 E22 29 45.3	An ephemeral scatter of hornfels and tuff artefacts and ostrich eggshell. There are also two lower grindstone fragments and one piece of pink glass. The glass likely originates from the stone-walled ruin at waypoint 1245. The scatter lies in an area about 20 m in diameter.	Very low	GPC

WEF project area	WEF access road	Waypoint	Location	Description	Significance	Grade
3		1245	S31 28 53.5 E22 29 45.9	A circular ruin of piled dolerite blocks but built with two skins and a rubble fill. It is about 2 m in diameter and its opening faces towards the south. There is an extra straight section of walling outside the north-western edge of the circle. There might be another opening in the circle behind this wall but it is not possible to be sure due to collapse.	Low	GPB
3		1246	S31 28 49.5 E22 29 54.2	A widespread but ephemeral scatter of hornfels artefacts (one CCS seen) with many bladelets. There was a slight concentration at the waypoint.	Very low	GPC
3		1247	S31 28 48.5 E22 29 56.6	A semi-circular stone-walled feature built against a slope with some boulders on it (but not a continuous natural wall). The width of the feature was 8 m and its depth was about 7 m. It faces towards the north (i.e. slope side is to the south). The walls are built with double skins and rubble fill. There were no associated artefacts.	Low	GPB
3		1248	S31 28 47.4 E22 29 57.3	An ephemeral stone-walled feature that has three linked enclosures. The enclosures are small, each measuring between about 2 m and 2.5 m across and the walls are piled and very low. Due to the poor preservation it was not possible to determine where entrances were. There were no associated artefacts. 	Low	GPB
3		1249	S31 28 47.0 E22 29 57.6	A single stone-walled enclosure built of piled dolerite blocks and using the double skin and rubble fill method. It is a semi-circular feature with many natural boulders along the slope to the west completing the circle. The walling is quite well-preserved and stands about 0.75 m high. The site lies on a hill with a fairly good view out towards the west. There are no associated artefacts.	Medium	GPA

WEF project area	WEF access road	Waypoint	Location	Description	Significance	Grade
						
3		1250	S31 28 46.8 E22 29 59.8	This site lies in a natural amphitheatre created between dolerite koppies. The site is a wide scatter of ostrich eggshell fragments and some artefacts. Most artefacts are in hornfels but a few in tuff were also seen. Formal tools were present with three adzes (one on an unidentified material), one sidescraper and one thumbnail scraper seen. The scatter covers an area of some 50 m by 50 m. Two refined white earthenware fragments were seen (one lined industrial and one hand-painted) but these may originate from the adjacent historical stone-walled sites. A vehicle turning circle has recently been bulldozed through the site. The three waypoints approximately define the distribution of the site.	Medium	GPA
3		1251	S31 28 45.7 E22 29 59.6			
3		1252	S31 28 46.0 E22 30 00.5			
3		1253	S31 28 47.7 E22 30 01.6	A low stone-walled feature that is roughly oval/kidney-shaped and with the western half having low walls (0.3 m high) and the eastern half just a single row of stones on the ground. There are no associated artefacts.	Low	GPB
3		1254	S31 28 42.7 E22 29 58.6	An ephemeral scatter of hornfels flaked artefacts and ostrich eggshell fragments over an area of about 20 m diameter.	Very low	GPC
3		1255	S31 28 42.3 E22 29 59.8	An ephemeral scatter of hornfels flaked artefacts over an area of about 10 m diameter.	Very low	GPC
3		1256	S31 28 41.1 E22 29 57.5	A light scatter of hornfels flaked artefacts over an area of about 20 m diameter. There are rare ostrich eggshell fragments as well.	Low	GPB
3		1257	S31 28 40.6 E22 29 56.0	An ephemeral scatter of hornfels flaked artefacts over an area of about 20 m diameter. Also one lower grindstone. One MSA blade core with two blade removal scars on hornfels was also seen here.	Very low	GPC

WEF project area	WEF access road	Waypoint	Location	Description	Significance	Grade
3		1258	S31 28 37.2 E22 30 07.0	A moderate density scatter of hornfels artefacts and ostrich eggshell fragments over an area of about 10 m by 20 m. There are also some artefacts in tuff and a good amount of pottery. The pottery is fibre-tempered ware. One body sherd was ochred on the outside. A rim was seen with an everted neck and a tapered to simple round rim. There was also one spout fragment. An unusual find was a large, rectangular blade in sandstone and which has been extensively rubbed/abraded. The site lies on a sandy platform between dolerite outcrops and probably has a lot more present than what is readily visible on the surface.	High	IIIB
3		1259	S31 29 53.9 E22 29 58.0	A single dolerite boulder with some historical scratched engravings on it. There is a grid as well as various other indeterminate markings. They may well be quite recent.	Low	GPB
3		1260	S31 32 35.5 E22 29 15.4	A small, square stone foundation about 2 m across. It is tumbled and its function is unknown. It lies just below the scarp that waypoint 1261 sits on top of.	Low	GPB
3		1261	S31 32 34.2 E22 29 15.5	An oval stone-walled ruin of about 3 m by 2 m and with a door facing towards the east and located on the northeast corner. There is a vestibule of about 2 m diameter on the eastern end. Artefacts are present but very few. They include some fragments of rubber, refined white earthenware (one each of hand-painted, transfer printed and pearlware), glass (clear, green, brown, cobalt blue) and one piece of metal. The finds are scattered about the area with some inside the vestibule area. The site lies on top of a scarp.	Medium	GPA
3		1262	S31 32 35.8 E22 29 16.3	A line of badly tumbled walling leading down the hill from the same scarp mentioned above. The function of the walling cannot be determined.	Very low	GPC
3		1263	S31 32 36.7 E22 29 17.4	A small stone-walled feature that has very little space inside it. It is built against the same scarp as above.	Very low	GPC
2		1264	S31 24 21.9 E22 27 08.0	The Yzervarkpoort farmstead as shown on 1913 map. There are several buildings in the complex including a corbelled house (recorded as waypoint 1265), a graveyard (waypoint 1281) and, at the present co-ordinates, a stone-walled kraal complex that has been plastered and white-washed.	High	IIIA
2		1265	S31 24 27.9 E22 27 08.7	A square corbelled house with a plastered and painted roof dome. It has modern joinery in it. Already on record as Ystervarkspoort 1 (Kramer 2012:264).	High	IIIA
		1266	S31 24 24.5 E22 26 10.0	An ephemeral scatter of hornfels and CCS LSA artefacts including a double-sided adze on a CCS bladelet. The site lies along a dolerite dyke.	Very low	GPC

WEF project area	WEF access road	Waypoint	Location	Description	Significance	Grade
		1267	S31 24 25.1 E22 26 07.8	A dense scatter of ostrich eggshell fragments along with some artefacts in hornfels and crypto-crystalline silica and some grass-tempered pottery.	Low	GPB
		1268	S31 24 27.2 E22 26 04.3	The remnants of a stone-walled kraal. It seems like most of the rocks have been removed, possibly during construction of the adjacent dam. The kraal was 38 m north-south and only about 18 m of the west-east dimension is preserved. All walls are at or immediately above foundation level. No doubt related to the corbelled house at 1269.	Very low	GPC
		1269	S31 24 28.5 E22 26 04.6			
		1270	S31 24 28.6 E22 26 03.2	A square corbelled house that is still intact but in danger of collapse due to the front door lintol being broken and one of the roof slabs looking like it will cave in soon. The structure is built of stones with mud mortar. The door faces east but a second door was present in the north wall and has been filled in. A window in the west wall has also been filled in. A corner shelf is built into the south-eastern corner, while several slabs of rock protrude from the base of the dome in the western wall and form small shelves. Two wooden blocks with wooden pegs through them have been built into the north wall and are joined by wire. A smaller square flat-roofed addition has been built onto the southern wall. It has an east-facing door adjacent to the corbelled house and a window in its western wall. The roof is missing. Already on record as Ystervarkspoort 2 (Kramer 2012:264).	High	IIIA
2		1271	S31 22 32.6 E22 25 52.3	A light scatter of hornfels and crypto-crystalline silica LSA artefacts and some ostrich eggshell fragments. The site lies on a sandy area at the eastern foot of a sandstone scarp.	Very low	GPC
2		1272	S31 22 30.6 E22 25 51.6	A square stone-walled ruin of 2 m by 2 m with door opening towards the south. A circular 3 m diameter vestibule is built onto the southern side and appears to have three openings in it, although this might be partially due to collapse. There are very few associated artefacts with some metal (a piece of a potjie lid and an enamel bowl), some glass (cobalt blue fragment and a black glass bottle base) and a fragment of plain refined white earthenware.	Medium	GPA
2		1273	S31 22 30.1 E22 25 48.6	A square stone-walled ruin of about 3.5 m by 3.5 m against an east-facing scarp. The entrance is in the eastern wall. It is quite tumbled.	Low	GPB
2		1274	S31 22 10.2 E22 25 36.2	A square stone-walled ruin of about 2 m by 2 m and which is badly collapsed.	Low	GPB

WEF project area	WEF access road	Waypoint	Location	Description	Significance	Grade
2		1275	S31 22 05.7 E22 25 34.8	A small, collapsed stone feature on top of a scarp. Its function is indeterminate but it was probably about 1 m across.	Very low	GPC
2		1276	S31 21 47.3 E22 26 25.1	A circular stone feature of about 2 m diameter that is totally collapsed in on itself. Its function is indeterminate.	Very low	GPC
2		1277	S31 21 51.6 E22 27 07.6	A 240 m long earth dam wall with some stone lining the inner face. There is also a stone wall at the spillway in the north (waypoint 1278). The dam wall has been breached.	Low	GPB
2		1278	S31 21 47.1 E22 27 13.9			
2		1279	S31 21 32.0 E22 28 07.4	A small pile of about 8 or 9 stones forming a small cairn above a scarp.	Very low	GPC
2		1280	S31 23 28.6 E22 26 40.5	A small square stone feature of about 1 m by 1 m above a scarp. Its function is unknown.	Very low	GPC
2		1281	S31 24 21.9 E22 27 17.5	A graveyard with 15 graves in it. Those with named headstones (about 7) were all KEMPEN and all died in the last two decades of the 19 th century.	High	IIIA
2		1282	S31 24 19.7 E22 27 16.8	A stone foundation of indeterminate function.	Very low	GPC
		1283	S31 19 57.2 E22 31 38.8	An elongated walled area alongside a river that must have had crops in it. There is a kraal built onto the northern end of the walling.	Medium	GPA
		1284	S31 19 44.2 E22 31 39.6	A stone kraal that lies immediately adjacent to the public road.	Medium	GPA
		1285	S31 19 31.3 E22 31 45.0	A very badly tumbled kraal that as probably had most of its rocks removed for reuse elsewhere.	Very low	GPC
		1286	S31 25 15.4 E22 27 15.1	A stone-walled ruin of about 3-4 m diameter. It was seen from a distance and not visited but it looked fairly well preserved.	Medium	GPA
1		001	31 S15 34.3 E22 22 39.1	Rooipoort farmstead as marked on 1913 map. Fully ruined and abandoned. Not visited but seen on aerial photography. The complex includes several stone kraals, a likely house ruin and what looks like a dump situated to the north of the house. Another kraal is visible 200 m to the west close to the river.	High	IIIA
		002	S31 27 26.9 E22 25 11.3	Stone kraal. Not visited but seen on aerial photography. It is about 26 m by 37 m and looks very well preserved.	High	IIIB

WEF project area	WEF access road	Waypoint	Location	Description	Significance	Grade
1	2	003	S31 15 41.26 E22 24 28.4	A small farmstead with a large dam to its north. It looks like some houses are still in use (but probably not residential use). Not visited but seen on aerial photography.	High	IIIB
1		004	31 15 25.3 E22 24 35.3	Several stone kraals related to the farmstead at 003. Not visited but seen on aerial photography.	Medium	GPA
1		005	S31 17 57.9 E22 18 57.7	A stone kraal on the east side of a dolerite ridge. It measures about 15 m by 30 m and may have additions to its western end. A large dam wall lies just to its south. Not visited but seen on aerial photography.	Medium	GPA
1		006	S31 18 08.2 E22 19 03.3	Stone kraal that looks like it is very poorly preserved. It measures about 18 m by 15 m. What is likely a small house ruin lies 85 m to the northwest. Not visited but seen on aerial photography.	Low	GPB
1		007	S31 16 28.1 E22 21 53.7	Springfontein farmstead as marked on 1913 map. The farmstead was not visited but many archaeological features were recorded in the area to its east.	High	IIIA
2		008	S31 21 01.4 E22 23 17.8	Aarfontein farmstead as marked on 1913 map. Many structures and features can be seen. Not visited but seen on aerial photography. Main homestead is in Cape Vernacular style and is an east-facing T-shape with four gables and a lean-to added to the north of the tail.	High	IIIA
3		009	S31 27 14.5 E22 33 07.2	Taaiboschfontein farmstead as marked on 1913 map. Many structures and features can be seen. Not visited but seen on aerial photography.	High	IIIA
3		010	S31 28 18.3 E22 28 31.6	Vaalhoek corbelled house as recorded by Kramer (2012). Not visited but seen on aerial photography.	High	IIIA
1	2	011	S31 19 12.1 E22 22 21.2	Saaidam farmstead. Not marked on 1913 map but has elements older than 60 years.	High	IIIA
		012	S31 19 49.2 E22 31 35.6	Rietfontein farmstead. Not visited, but some features recorded from the road (waypoints 1283 & 1284),	High	IIIA
2		013	S31 20 46.2 E22 22 45.2	Stone-walled garden area measuring 35 m by 130 m. It is built immediately adjacent and parallel to a river a short distance west of the Aarfontein farmstead. Not visited but seen on aerial photography.	Medium	GPA
2		014	S31 20 44.8 E22 23 8.6	A pair of large stone-walled enclosure on the north side of a river a short distance west of the Aarfontein farmstead. Not visited but seen on aerial photography. The four sides of the main enclosure measure about 220m, 200m, 240m and 250. A smaller enclosure measuring about 270 m by 85 m runs off to the west and is	Medium	GPA

WEF project area	WEF access road	Waypoint	Location	Description	Significance	Grade
				undoubtedly a garden area as it is on river silt. There seems to be another small enclosure at the southern end of the main one but this is not clear.		

APPENDIX 3 – Mapping

Heritage resources

Dark red (with 50 m buffers) = Grade IIIA

Red (with 50 m buffers) = Grade IIIB

Orange (with 50 m buffers) = Grade GPA

Yellow (with 50 m buffers) = Grade GPB

White (with no buffers) = Grade GPC

Project elements

Red polygon = project site

Yellow numbered pins wind turbines

Pink lines = roads

Orange lines = cables

Green polygon = laydown area

White polygon = batching plant

Blue polygon = storage area

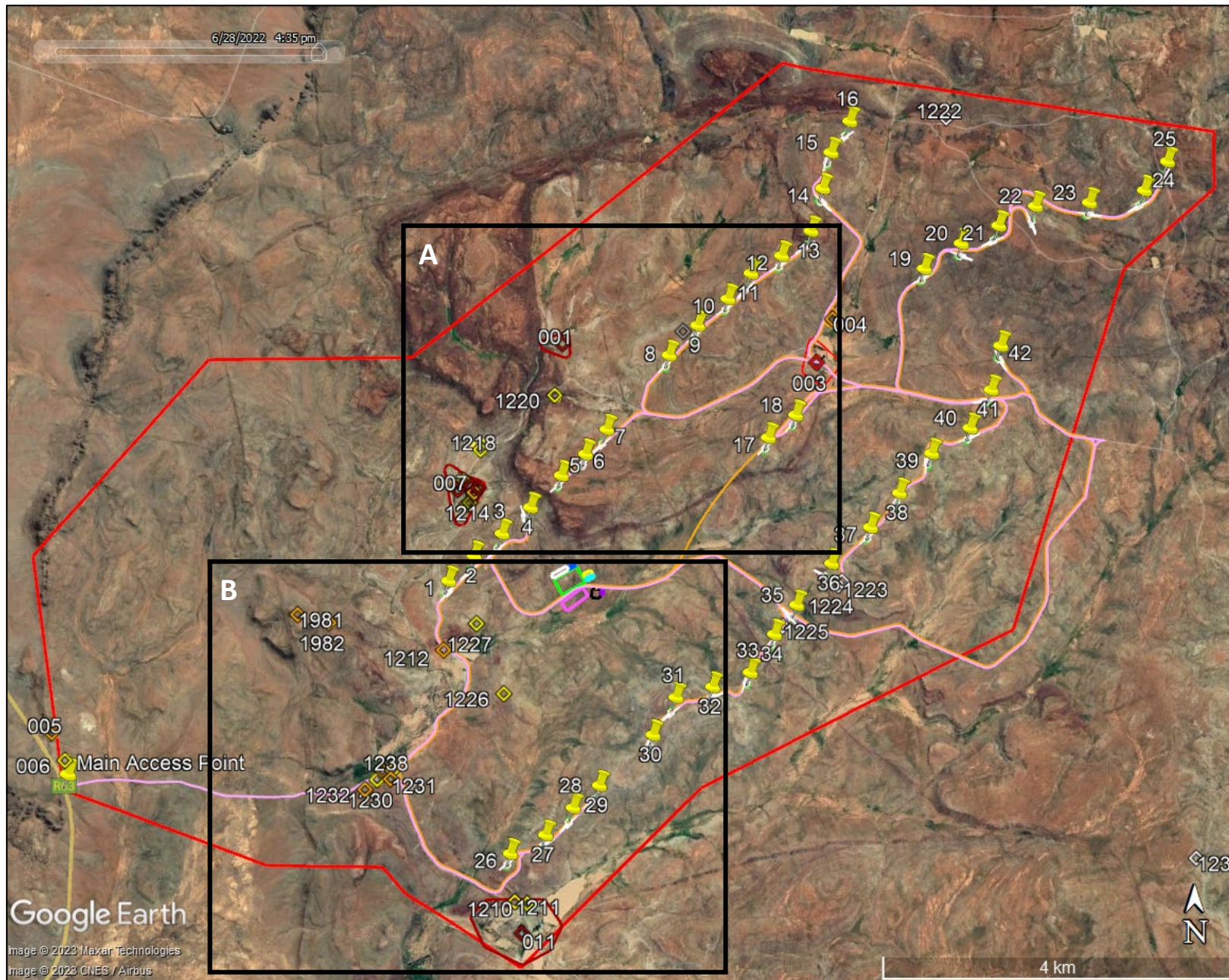
Yellow polygon = site camp

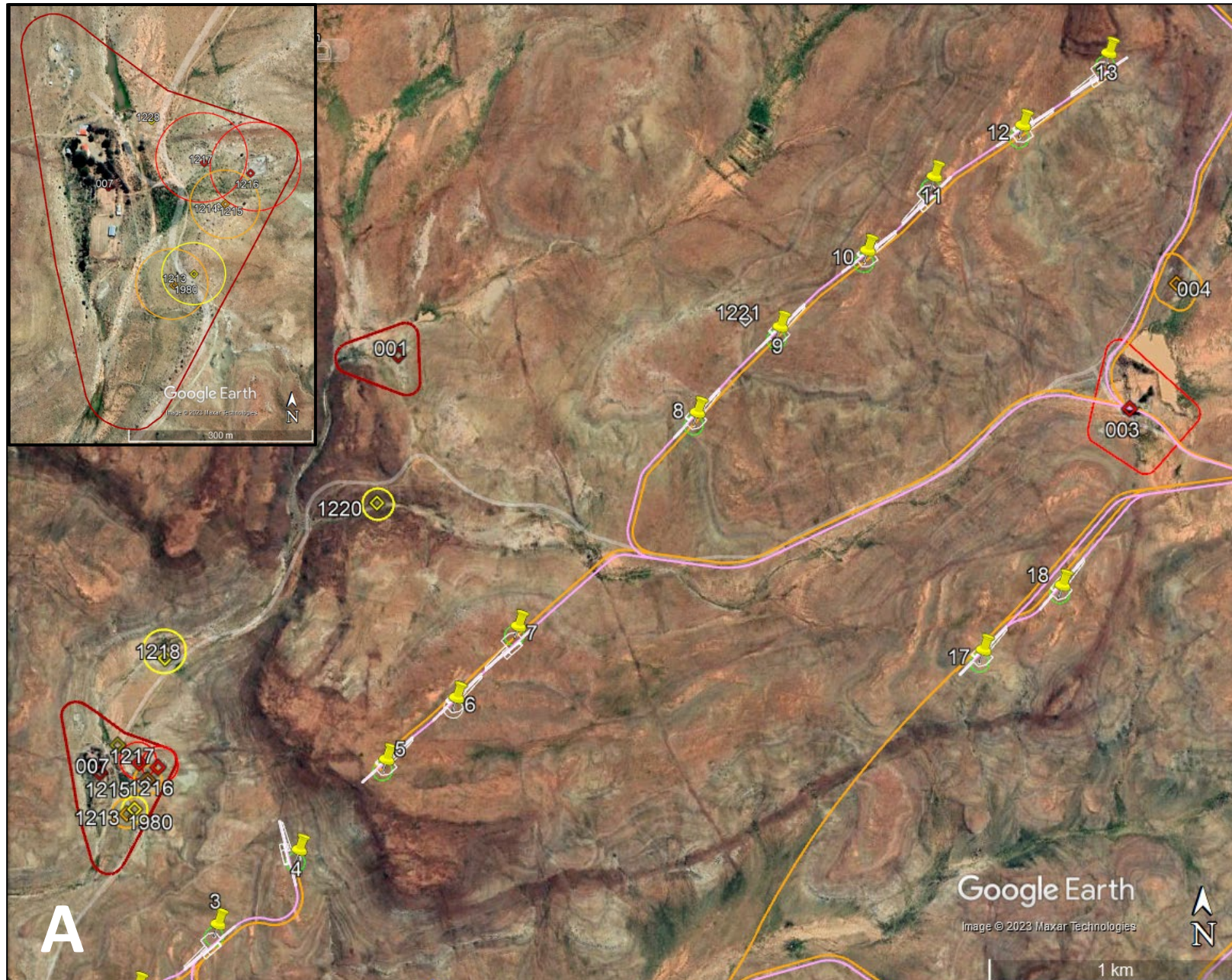
Pink polygon = O&M building

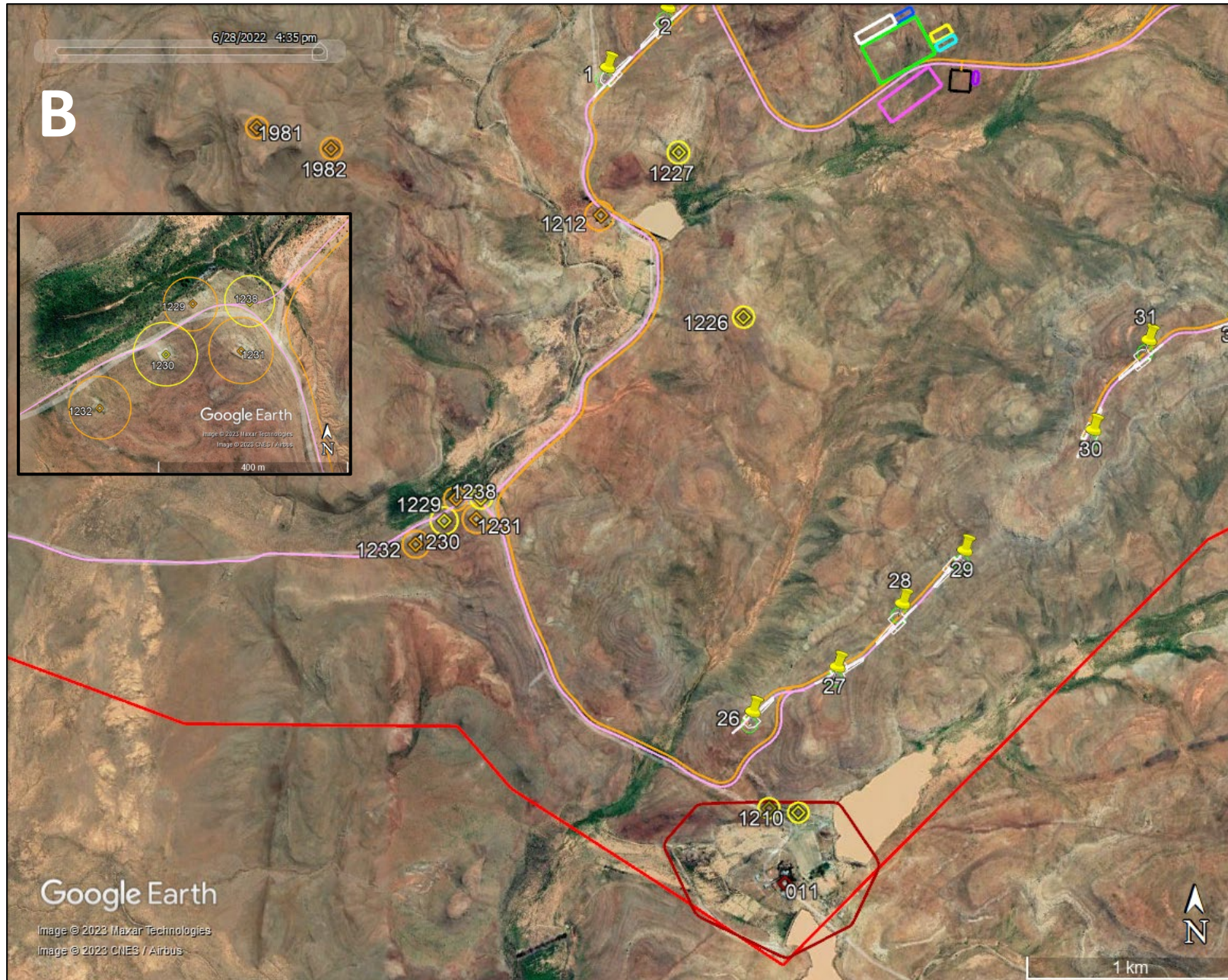
Black polygon = substation

Turquoise polygon = parking bays

Purple polygon = BESS







APPENDIX 4 – Site Sensitivity Verification

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

<i>Date of Site Visit</i>	25 June 2022
<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 locate areas that might be sensitive. Subsequent fieldwork served to ground truth the site, including areas identified as potentially sensitive. It should be noted, however, that only turbine positions were supplied for the field assessment and the surveys focused on these areas. Desktop research was also used to inform on the heritage context of the area. This information is presented in the report (Sections 5.2.1 and 5.4.1).

Outcome

The map below is extracted from the screening tool report and shows the archaeological and heritage sensitivity to be low throughout the study area. The site visit showed that in fact the majority of the site is of low sensitivity with only small pockets (where heritage resources occur) considered to be of higher sensitivity. Figure 30 (in the HIA above) shows the areas considered to be sensitive from a heritage point of view. The main concerns are the farm complexes (inhabited and abandoned) since these have high densities of heritage resources and are considered locally significant cultural landscapes. These tend to be in river valleys, while the ridges targeted for development have almost no traces of heritage. A photographic record and description of the relevant heritage resource is contained within the impact assessment report. The heritage specialist thus disputes the uniform low sensitivity, noting that several pockets of medium to high sensitivity are also present in the area.

