HERITAGE IMPACT ASSESSMENT: PROPOSED HOOGLAND NORTHERN GRID CONNECTION, BEAUFORT WEST MAGISTERIAL DISTRICT, WESTERN CAPE

Required under Section 38(8) of the National Heritage Resources Act (No. 25 of 1999)
as part of a Heritage Impact Assessment.

HWC Case Number: 21070803SB0818E

Report for:

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On behalf of:

Red Cap Energy (Pty) Ltd

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1st draft: 29 January 2022
2nd draft: 15 March 2022
Final report: 01 July 2022

SUMMARY

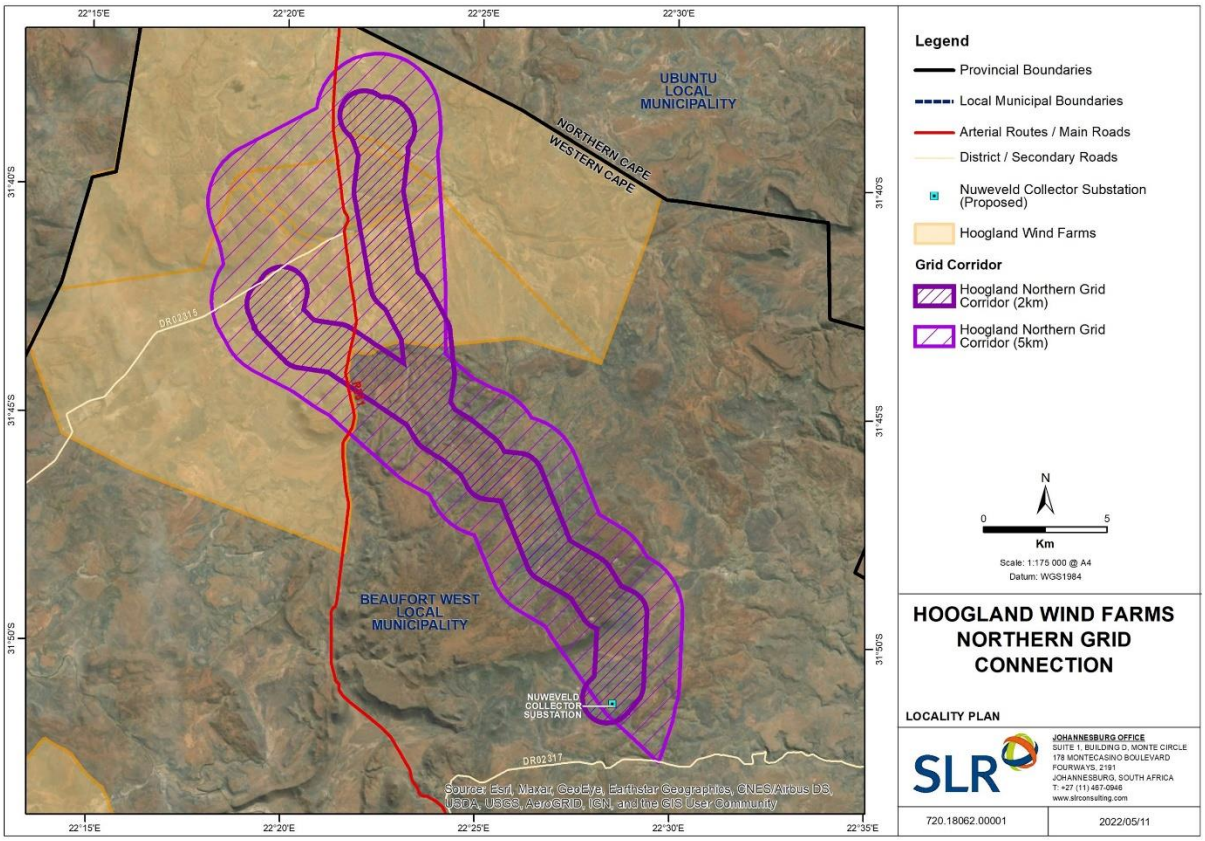
1. **Site Name**

Hoogland Northern Grid Connection

2. **Location**

Off	R381
Erven	Remainder of Duikerfontein 5 Remainder of Portion 1 of Duikerfontein 5 Remainder of Slange Fontein 6 Remainder of Portion 1 of Slange Fontein 6 Portion 7 of Slange Fontein 6 Remainder of Farm 7 Portion 1 of Farm 7 Portion 2 of Farm 7 Bultfontein 13 Annex Bultfontein 14 Annex Bultfontein 17 Remainder of Gert Adriaans Kraal 18 Portion 2 of Gert Adriaans Kraal 18 Portion 1 of Snydersfonein 21 Remainder of Portion 1 of Drooge Onrust 22 Drooge Onrust 23 Leeuw Kloof 43 Portion 4 of Duiker Kranse 45
North points	S31° 38’ 32.6” E22° 22’ 15.2” (between the HL01 Switching Stations) S31° 42' 22.4” E22° 19' 34.6" (between the HL02 Switching Stations)
South point	S31° 51’ 17.1” E22° 28’ 32.2”

3. Locality Plan



The dark purple polygon shows the area covered by the present report.

4. Description of Proposed Development

It is proposed to develop a 132 kV powerline up to 40 km long as well as four switching stations, two of which would be adjacent to each of the proposed Hoogland 1 and Hoogland 2 Wind Farm substations. The line would supported by 32 m high pylons and would also require the development of a service track of about 2-4 m wide.

5. Heritage Resources Identified

Large numbers of heritage resources occur in the area with the majority being historical archaeological sites. These include ruined stone-walled and brick structures of varying types and functions, ash and rubbish middens and other features related to historical occupation. Other resources include fossils, Stone Age artefact scatters (mostly LSA but also some MSA), historical and Stone Age rock engravings, graves and graveyards, buildings, the cultural landscape and places associated with living heritage (the latter are recent engraving sites).

6. Anticipated Impacts on Heritage Resources

Due to the corridor approach being followed, very few heritage resources are expected to be impacted. Because no final alignment is known, the actual impacts cannot yet be determined. It is anticipated that most heritage resources will be easily avoidable with appropriate buffers but that it may not be possible to shift the line far enough to avoid grade IIIA engravings by as much as the

recommended 200 m. Required 30 m buffers should be easily achievable though. Very few such engravings are expected though.

7. Recommendations

It is recommended that the proposed project be approved but subject to the following recommendations which must be captured in the EA, should one be issued:

- A pre-construction survey of the entire final alignment (powerline and service tracks) must be undertaken in order to determine whether any archaeological sites may need mitigation or protection through micrositing (if possible);
- The final alignment (powerline and service tracks) must be evaluated by a palaeontologist to determine which areas, if any, need a pre-construction survey. These will be previously unsurveyed and potentially sensitive areas;
- If necessary, and subject to the agreement of Heritage Western Cape, a Workplan application should be submitted prior to the palaeontological survey to allow for sample collection during the survey;
- A palaeontological chance finds procedure must be incorporated into the EMPr;
- All heritage structures must be avoided by the powerline by at least 50 m whether occupied or not;
- Landscape scarring must be minimised during construction;
- If road surfacing is required then low contrast materials such as concrete with brown exposed aggregate should be used, where possible;
- All areas not required during operation must be fully rehabilitated in accordance with the Rehabilitation and Revegetation Plan;
- Visually sensitive skylines, rock outcrops and steep slopes must be avoided as per the recommendations of the visual impact assessment;
- Switching stations and temporary laydown areas should be located away from scenic features, farmsteads and public roads; and
- If any archaeological material or human burials are uncovered during the course of development then work in the immediate area should be halted. The find would need to be reported to the heritage authorities and may require inspection by an archaeologist. Such heritage is the property of the state and may require excavation and curation in an approved institution.

8. Author/s and Date

Heritage Impact Assessment: Jayson Orton, ASHA Consulting (Pty) Ltd, 23 June 2022
Archaeological specialist study: 23 June 2022
Palaeontological specialist study: June 2022
Visual Impact Assessment: 10 June 2022

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

Regulation GNR 326 of 4 December 2014, as amended 7 April 2017, Appendix 6	**Section of Report**
1. (1) A specialist report prepared in terms of these Regulations must contain- a) details of- i. the specialist who prepared the report; and ii. the expertise of that specialist to compile a specialist report including a curriculum vitae;	1.4 Appendix 1
b) a declaration that the specialist is independent in a form as may be specified by the competent authority;	vi
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;	n/a
(cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	7.6 7.8 7.8
d) the date and season of the site investigation and the relevance of the season to the outcome of the assessment;	3.2
e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;	3
f) details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives;	1.1.4
g) an identification of any areas to be avoided, including buffers;	6
h) a map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;	6
i) a description of any assumptions made and any uncertainties or gaps in knowledge;	3.7
j) a description of the findings and potential implications of such findings on the impact of the proposed activity, (including identified alternatives on the environment) or activities;	5 7
k) any mitigation measures for inclusion in the EMPr;	8
l) any conditions for inclusion in the environmental authorisation;	11
m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;	8 11
n) a reasoned opinion- i. (as to) whether the proposed activity, activities or portions thereof should be authorised; (iA) regarding the acceptability of the proposed activity or activities; and ii. if the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan;	10.1 11
o) a description of any consultation process that was undertaken during the course of preparing the specialist report;	9
p) a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	9
q) any other information requested by the competent authority.	n/a
2) Where a government notice *gazetted* by the Minister provides for any protocol or minimum information requirement to be applied to a specialist report, the requirements as indicated in such notice will apply.	n/a

SPECIALIST DECLARATION

See separate document

GLOSSARY

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

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

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.

Leiwater: an irrigation channel.

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

Patination: Colour and/or texture changes on the surface of an artefact or rock art as a result of physical and chemical weathering of the substrate.

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

CA: Competent Authority

CRM: Cultural Resources Management

DFFE: Department of Forestry, Fisheries and the Environment

EA: Environmental Authorisation

ECO: Environmental Control Officer

EGI: Electricity Grid Infrastructure

EIA: Environmental Impact Assessment

EMPr: Environmental Management Program

ESA: Early Stone Age

GPS: global positioning system

HIA: Heritage Impact Assessment

HWC: Heritage Western Cape

KNP: Karoo National Park

LSA: Later Stone Age

MSA: Middle Stone Age

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

VoC: Dutch East India Company

CONTENTS

TABLES

FIGURES

1. INTRODUCTION

ASHA Consulting (Pty) Ltd has been appointed by SLR South Africa Consulting (Pty) Ltd, on behalf of Red Cap Energy (Pty) Ltd and their affiliate companies (Red Cap Hoogland 1 (Pty) Ltd, Red Cap Hoogland 2 (Pty) Ltd, Red Cap Hoogland 3 (Pty) Ltd and Red Cap Hoogland 4 (Pty) Ltd), hereafter referred to as "Red Cap", to undertake a Heritage Impact Assessment (HIA) for the proposed construction of four wind farms and associated grid connections (together known as the Hoogland Projects) in an area located between Loxton and Beaufort West in the Western Cape Province (**Figure 1-1**).

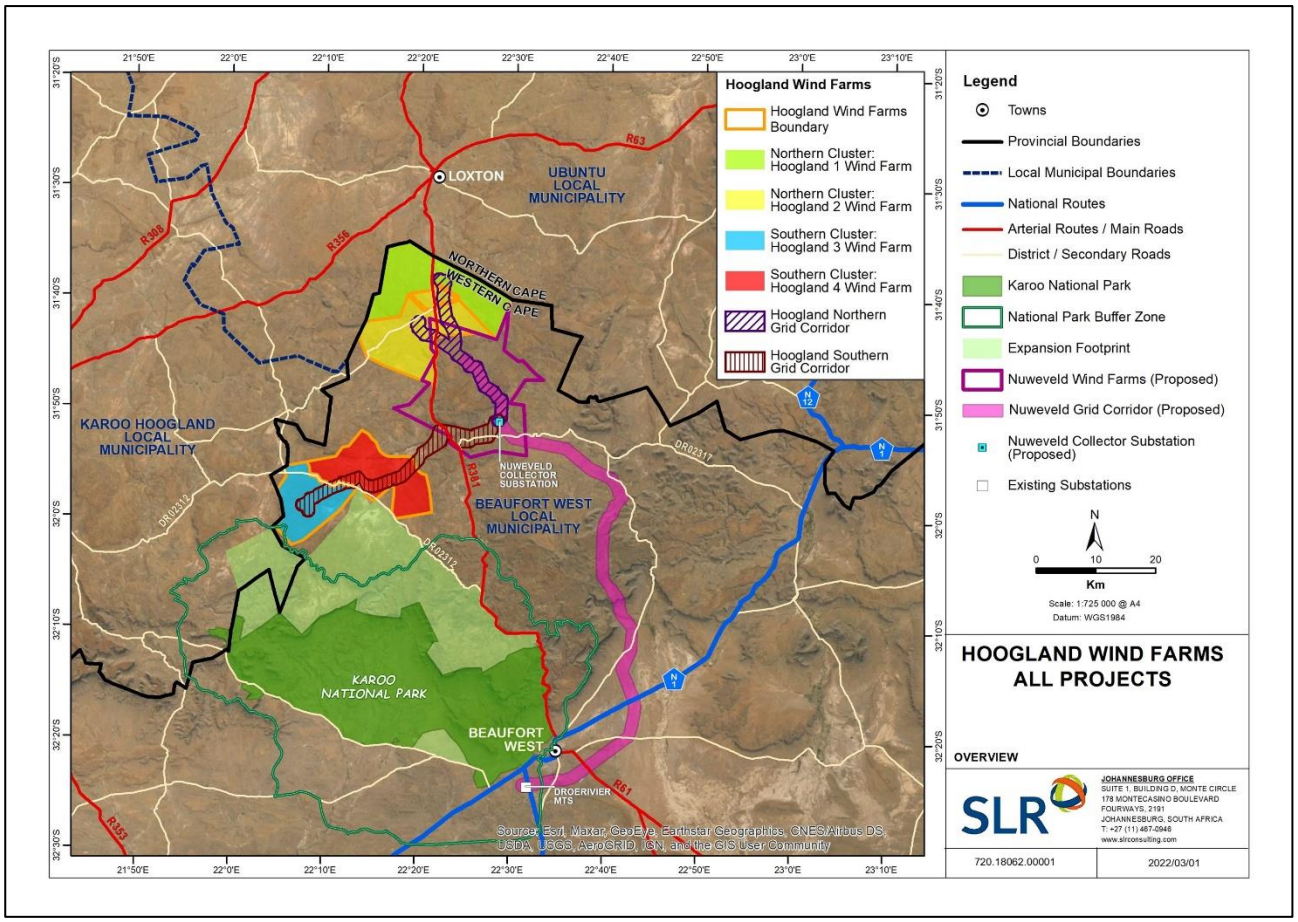


Figure 1-1: Regional Map showing the project sites in relation to Loxton, Beaufort West and Karoo National Park.

Hoogland 1 Wind Farm (HL01) and Hoogland 2 Wind Farm (HL02) are located to the north closer to Loxton and form the Northern Cluster of wind farms which will share a grid connection, named the Hoogland Northern Grid Connection. Hoogland 3 Wind Farm and Hoogland 4 Wind Farm are located closer to Beaufort West and comprise the Southern Cluster which will similarly share a separate grid connection, named the Hoogland Southern Grid Connection. The two Grid Connections are each in the form of 132 kV overhead power lines and will connect the Hoogland Wind Farms to the Nuweveld Collector Substation on Red Cap's adjacent Nuweveld Wind Farms Project.

In terms of the Environmental Impact Assessment (EIA) Regulations various aspects of the proposed development may have an impact on the environment and are considered to be listed activities.

These activities require authorisation from the National Competent Authority (CA), namely the Department of Forestry, Fisheries and the Environment (DFFE), prior to the commencement thereof. Specialist studies have been commissioned to verify the sensitivity and assess the impacts of the wind farms under the Gazetted specialist protocols (GN R 320 and GN R 1150 of 2020).

The scope of this report is the Hoogland Northern Grid Connection. Approximate end points for the corridor under consideration (Figure 1-2) are as follows:

- North (between the Hoogland 1 switching stations): S31° 38’ 32.6” E22° 22’ 15.2” (between the Hoogland 2 switching stations): S31° 42' 22.4” E22° 19' 34.6"; and
- South (at Nuweveld Collector Station): S31° 51’ 17.10” E22° 28’ 32.20”.

The farm portions included within the corridor are as follows:

- Remainder of Duikerfontein 5
- Remainder of Portion 1 of Duikerfontein 5
- Remainder of Slange Fontein 6
- Remainder of Portion 1 of Slange Fontein 6
- Portion 7 of Slange Fontein 6
- Remainder of Farm 7
- Portion 1 of Farm 7
- Portion 2 of Farm 7
- Bultfontein 13
- Annex Bultfontein 14
- Annex Bultfontein 17
- Remainder of Gert Adriaans Kraal 18
- Portion 2 of Gert Adriaans Kraal 18
- Portion 1 of Snydersfonein 21
- Remainder of Portion 1 of Drooge Onrust 22
- Drooge Onrust 23
- Leeuw Kloof 43
- Portion 4 of Duiker Kranse 45

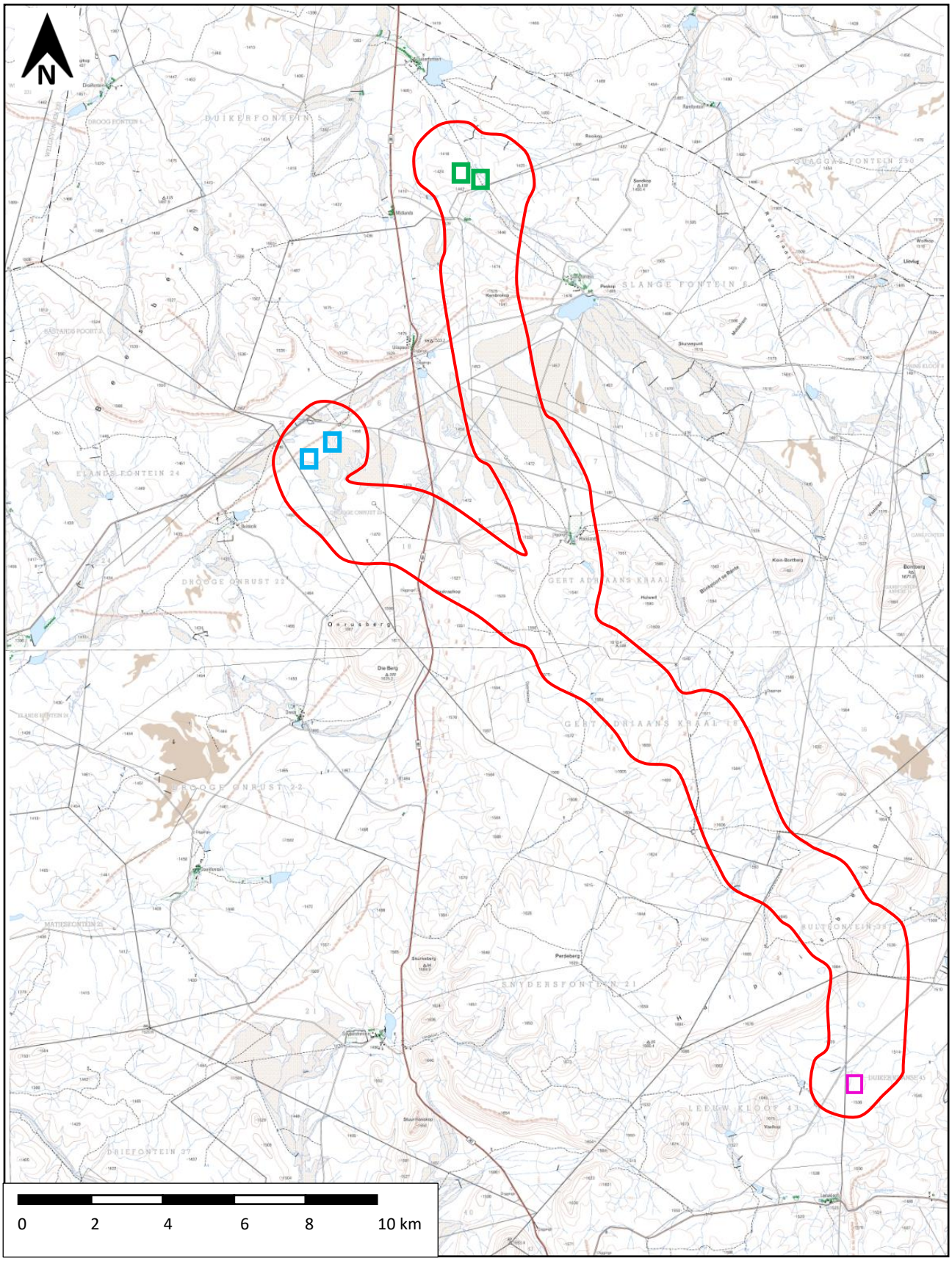


Figure 1-2: **Extract from 1:50 000 mapsheets 3122cb &cd showing the location of the Hoogland Northern Grid Connection corridor (red polygon) relative to the R381 road that links Beaufort West and Loxton (running north-south through centre of map). The green squares show the**

Hoogland 1 switching station locations, while the turquoise squares show the Hoogland 2 switching stations. The pink square is the Nuweveld Collector Substation which does not form part of this application. Source of basemap: Chief Directorate: National Geo-Spatial Information. Website: www.ngi.gov.za.

1.1. Project description

1.1.1. Routing of Corridor

To allow efficient transmission, the electricity generated by the turbines undergoes a voltage "step-up" process that occurs at each wind turbine where power is stepped up to a maximum of 66 kV (either in the turbine or in a transformer container next to the turbine), and again at the wind farm substation where power is stepped up to 132 kV. These components are part of the respective Wind Farm infrastructure and applications (Figure 1-3).

The power is then transferred through a switching station (next to each of the Wind Farm substations) along a 132 kV line to the proposed Nuweveld Collector Substation and there it will be stepped up to 400 kV for evacuation to the national grid. The Nuweveld Collector Substation is not part of this project and has already been granted environmental authorisation.

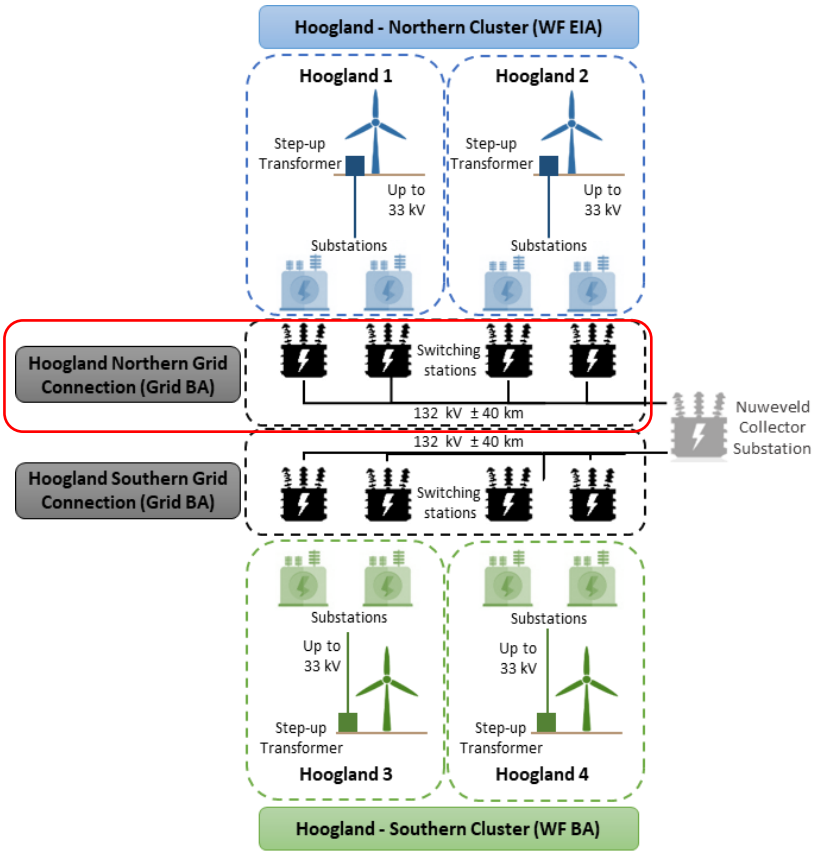


Figure 1-3: Power transmission - Wind farm and grid connection interface (Hoogland Northern Grid Connection shown in red block).

1.1.2. Grid Connection Components

Switching stations

Each switching station will be located alongside the respective Wind Farm substation. There will be a physical barrier between the two in the form of a ±2.4 m high perimeter fence (Figure 1-4 shows an example). The Eskom switching stations on each Hoogland Wind Farm will each have a total footprint of approximately 150 x 75 m (11 250 m^2). The switching station area will include all the standard switching station electrical equipment/components, such as bus bars, metering equipment, switchgear, and will also house control, operational, workshop and storage buildings/areas. The four Northern Grid Connection switching stations will collectively have a total footprint of 4.5 ha.

Figure 1-4: **Example of an Eskom switching station (left) and adjoining Wind Farm substation (right) on the Kouga Wind Farm.**

132 kV Line and pylons

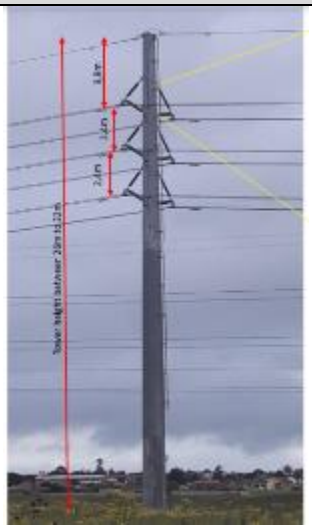
The proposed 132 kV transmission line will be largely supported by monopole pylons approximately 32 m in height. The spans (distance between pylons) on the monopole pylons (without stays) are on average 260 m. Some much larger spans may be required depending on the terrain and also to avoid areas potentially sensitive to pylon placement. On this basis, variations of pylons may be used which includes lattice pylons but only for these technically challenging areas. Table 1-1 shows the potential types of pylon options to be used.

A 5 km corridor for this infrastructure was originally assessed during the Pre-application phase and this has been refined and reduced to approximately 2 km for this Basic Assessment phase. In

addition, within this corridor, a provisional alignment for the 132kV line, that avoids no-go areas, has also been presented on the maps. The ±2 km corridor is the subject of the application for environmental authorisation and this assessment.

The Northern Grid Connection is ± 35 km in length, and assuming each pylon is spaced every 260 m and has a footprint of 80 m^2, the respective pylon footprint is 1.08 ha.

Table 1-1: **Potential pylon options.**

	Tower Type	Description and purpose	Illustration
1.	132kV Intermediate **Self-Supporting** Single Circuit Monopole	Self-supporting galvanised steel monopole intermediate or suspension structure with no stays/anchors. The monopole is designed to support a double electrical circuit with a twin conductor arrangement. This structure will be used as intermediate structures between inline strain or angle strain points. **This structure will also be the most common structure used for a double circuit line** at an estimated 60% to 80% of the total number of structures. Monopole Height: Between 26 m and 32 m. Pole top diameter: 380 mm to 450 mm Pole Base diameter: 1.2 m to 1.5 m	
2.	132kV Inline or Angle Strain **Self-Supporting** Double Circuit Monopole	Self-supporting galvanised steel monopole inline or angle strain structure with no stays/anchors. the monopole is designed to support a double electrical circuit with a twin conductor arrangement. The number of inline or angle strain points estimated in the order of 20% to 40% of the total number of structures. Monopole Height: Between 26m and 32m. Pole top diameter: 380mm to 450mm Pole Base diameter: 1.8m to 2.5m	

	Tower Type	Description and purpose	Illustration
3.	132kV Inline or Angle Strain **Guyed** Double Circuit Monopole	Galvanised steel monopole inline or angle strain structure with anchors/stays for additional structure support. This monopole is similar to the self-supporting monopole but with additional anchor support for conditions where longer span lengths is required with higher conductor tensions. The monopole with anchors is design to support the conductor tensions associated with the conductor weight and longer span lengths. Monopole Height: Between 26 m and 32 m. Pole top diameter: 380 mm to 450 mm Pole Base diameter: 1.8 m to 2.5 m Anchors/Stays: Depending on the angle strain point up to 4 x anchors.	
4.	132kV Inline or Angle Strain **Lattice** Steel Tower for double circuit line	Galvanised steel inline or angle strain lattice tower for conditions where longer span lengths across valley in exceptional cases is required with higher conductor tensions. (500 m to 800 m spans) Tower Height: Between 31 m and 38 m. Foundations: 4 x concrete foundations for 4 x legs of the tower. Base of the tower with 4 legs in general 15 m x 15 m area.	
5.	**Triple pole** structure 2 x Single circuit with up to Twin Tern Conductor	For long spans (>350 m to 500 m) across valleys and rivers. Strain structure with three single monopoles per circuit. 5-9 stays per triple pole structure depending on angle configuration. Height: Typically 18 to 16 m. In a **double circuit** configuration, it will be a triple pole structure per circuit place at 10 m-15 m apart (see figure).	

	Tower Type	Description and purpose	Illustration
6.	132kV Suspension **Self-Supporting** Single Circuit Monopole with single conductor	Self-supporting galvanised steel monopole suspension structure with no stays/anchors. The monopole is designed to support a single electrical circuit with a single conductor arrangement. This structure will be used as an intermediate structure between inline strain or angle strain points. **This structure will also be the most common structure used for a single circuit line**, at an estimated 50% to 70% of the total number of structures. The structure is designed to support the conductor weight as well as the wind loading specifications. Monopole Height: Between 22 m and 26 m. Pole top diameter: 230 mm Pole Base diameter: 650 mm	
7.	132kV Inline or Angle Strain **Self-Supporting** Single Circuit Monopole with single conductor	Self-supporting galvanised steel monopole inline or angle strain structure with no stays/anchors. The monopole is designed to support a single electrical circuit with a single conductor arrangement, This structure will be used as a strain structure and will be positioned at the angle points along the line or as an inline position where a strain point is required due to the ground elevation. The number of inline or angle strain points estimated in the order of 30% to 40% of the total number of structures. Monopole Height: Between 24 m and 30 m. Pole top diameter: 380 mm Pole Base diameter: 1 m to 1.2 m	
8.	**Triple pole** structure 1 x Single circuit with up to Twin Tern Conductor	For long spans (>350 m to 500 m) across valleys and rivers. Strain structure with three single monopoles. 5-9 stays per triple pole structure depending on angle configuration. Height: Typically 18 to 16 m.	

<u>Access</u>

The site can be accessed via the well-established existing road network in the area. The main access would be via Beaufort West or Loxton using the R381. The Grid Corridor traverses the Hoogland and

Nuweveld Wind Farm areas and therefore the wind farm access and service road network within these wind farm areas will be utilised to access the servitude.

To access the remaining areas, existing access roads and tracks (upgraded to ±2-4 m wide where needed) will be used as far as possible and new access tracks would also be ±2-4m wide. These tracks would avoid steep areas and drainage lines and rather use existing roads/tracks to cross these features as far as possible.

A track is also proposed to run along each Grid Connection line as far as possible and would be established during the construction phase to enable access for the construction of the pylons and stringing of the lines. In certain areas, such as when the line spans over a sensitive watercourse, goes up very steep slopes, or spans an ecologically sensitive area, the service track will not run parallel to the line but will be routed to access the specific pylons (where possible). These tracks would not be rehabilitated as they would continue to provide access for maintenance and management purposes and will be maintained throughout the life of the project.

For the Northern Grid Connection, it is anticipated that the total area required for the new access tracks is up to 16 ha.

Temporary areas

During construction, temporary laydown areas will be identified along the alignment, with the main equipment and construction yards being located along the alignment or being based in one of the surrounding towns or on one of the wind farms. It is anticipated that the total area required for the temporary laydown areas is up to 5 ha.

Summary of components and disturbance footprints

Table 1-2 summarises the project description.

Table 1-2: **Summary of the components and approximate areas of impact within each of the Hoogland Grid Connection Corridors.**

Project Components	Description	Hoogland Northern Grid Connection
Locations	Switching station centre point (Hoogland 1A):	31° 38' 34.051" S 22° 22' 27.326" E
	Switching station centre point (Hoogland 1B):	31° 38' 26.758" S 22° 21' 56.399" E
	Switching station centre point (Hoogland 2A):	31° 42' 35.857" S 22° 19' 37.022" E
	Switching station centre point (Hoogland 2B):	31° 42' 18. 861" S 22° 19' 55.055" E
Switching stations	There will be two Eskom switching stations on each wind farm with a footprint of approximately 150 x 7 m (11,250 m^2). Each grid connection will therefore have four switching stations in total. The switching station	5 ha (permanent)

Project Components	Description	Hoogland Northern Grid Connection
	area will include all the standard switching station electrical equipment/components, such as bus bars, metering equipment, switchgear, and will also house control, operational, workshop and storage buildings/areas. Total area for four switching stations:	
Overhead lines and pylons	There will be a 132 kV overhead line supported by mostly monopole pylons approximately 32 m in height. The spans (distance between pylons) on the monopole pylons (without stays) are on average 260 m. Other types of pylons will be used where necessary. The distance of each line, and respective pylon footprint is as follows:	35 km 1.08 ha (permanent)
Access roads and tracks	Existing access roads and tracks (upgraded to ± 2-4 m wide where needed) will be used as far as possible and new access tracks will also be ±2-4 m wide. These are required for all project phases.	16 ha (permanent)
Temporary areas	Temporary laydown areas will be identified along the alignment, with the main equipment and construction yards being located along the alignment or based in one of the surrounding towns or on one of the wind farms. It is anticipated that the total area required for the temporary laydown areas is up to 5 ha.	5 ha (temporary)
Total disturbance footprint:	**Temporary**	**5 ha**
Total disturbance footprint:	**Permanent**	**21.58 ha**

Timeframes

The proposed timeframes of the Hoogland Northern Grid Connection will align with the development of the Hoogland 1 and 2 Wind Farms and the proposed timeframes of the Hoogland Southern Grid Connection will align with the Hoogland 3 and 4 Wind Farms respectively. Following the formal EIA process, which typically takes 1 to 2 years to complete, and if authorised, the developer / applicant would then prepare the project for submission to the REIPPPP during a forthcoming bidding window. It is currently unknown when the future bidding windows will be. It must be noted that with the energy market in South Africa being deregulated and there is also a possibility the wind farms will be developed for private off-take (energy sold to private entities).

Should the project be selected and given “preferred bidder” status the project would then move into the next phase which includes obtaining other permits, licenses, including Water Use Licences, Rezoning permission, and other consents before reaching financial close which is normally less than 1 year after preferred bidder status is announced. Thus, construction is likely to commence no earlier than about 1 to 1.5 years after the issuing of an EA, but this is all dependent on how soon after obtaining the EA the next bidding window is and what the requirements are in the bidding round.

The construction period for each Grid Connection would take between 18 – 24 months. On completion each Grid Connection would be ceded to Eskom and become part of the National Grid infrastructure, thus it is unlikely that it would be decommissioned, even if the Wind Farms eventually are.

1.1.3. Alternatives

A comprehensive iterative design process has been undertaken to inform the respective Wind Farm layouts and associated Grid Connection infrastructure for the Hoogland Projects.

By integrating the screening and assessment of environmental and social constraints alongside the technical components of the project, early in a project lifecycle, allowed for the reduction in risks to the project and supports the application of the mitigation hierarchy by demonstrating the avoidance and minimisation of impacts. This integrated design approach negates the need for an alternative's assessment in the detailed Basic Assessment (BA) process (as per NEMA) as due to the thorough process entailed, it is unlikely that there will any fatal flaws to prevent the project proceeding.

However, the preferred layouts of the Hoogland Wind Farms, and respective Grid Corridors, will each be assessed against the 'no-go' alternative. The 'no-go' alternative is the option of not constructing the Project where the status quo of the current farming activities on the site would prevail.

1.1.4. Aspects of the project relevant to the heritage study

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

1.2. Terms of reference

ASHA Consulting was asked to conduct desktop research and a field assessment of the study area to identify heritage sites. All sites were to be recorded with spatial data provided to the developer to facilitate the design of a sensitive layout. Subsequent deliverables include:

- Screening study (whole project)
- Site Sensitivity Verification reports (one per cluster and one per grid connection);
- Pre-application assessment reports (one per cluster and one per grid connection); and
- Final impact assessment reports (one per cluster and one per grid connection).

NID applications were submitted for each of the six projects. The response for the Hoogland Northern Grid Connection is shown below.

NOTIFICATION OF INTENT TO DEVELOP: PROPOSED TO DEVELOP A 132 KV POWERLINE AND ASSOCIATED ELECTRICAL INFRASTRUCTURE TO CONNECT THE HOOGLAND 1 AND HOOGLAND 2 WIND FARMS TO THE NATIONAL ELECTRICITY GRID VIA THE NUWEVELD COLLECTOR SUBSTATION (NORTH GRID) HOOGLAND NORTH GRID CONNECTION BEAUFORT WEST , SUBMITTED IN TERMS OF SECTION 38(1) OF THE NATIONAL HERITAGE RESOURCES ACT (ACT 25 OF 1999)

CASE NUMBER: 21070803SB0818E

The matter above has reference.
Heritage Western Cape is in receipt of your application for the above matter received. This matter was discussed at the Heritage Officers Meeting held on 30 August 2021.

You are hereby notified that, since there is reason to believe that the proposed to develop a 132 kV powerline and associated electrical infrastructure to connect the Hoogland 1 and Hoogland 2 Wind Farms to the national electricity grid via the Nuweveld Collector Substation (North Grid) Hoogland North grid connection Beaufort West will impact on heritage resources, HWC requires that a Heritage Impact Assessment (HIA) that satisfies the provisions of Section 38(3) of the NHRA be submitted. Section 38(3) of the NHRA provides

(3) *The responsible heritage resources authority must specify the information to be provided in a report required in terms of subsection (2)(a)*: ***Provided that the following must be included:***

(a) The identification and mapping of all heritage resources in the area affected;
(b) an assessment of the significance of such resources in terms of the heritage assessment criteria set out in section 6(2) or prescribed under section 7;
(c) an assessment of the impact of the development on such heritage resources;
(d) an evaluation of the impact of the development on heritage resources relative to the sustainable social and economic benefits to be derived from the development;
(e) the results of consultation with communities affected by the proposed development and other interested parties regarding the impact of the development on heritage resources;
(f) if heritage resources will be adversely affected by the proposed development, The consideration of alternatives; and
(g) plans for mitigation of any adverse effects during and after the completion of the proposed development.

(Our emphasis)
This HIA must in addition have specific reference to the following:

- Visual impact assessment study
- Archaeology impact assessment study
- Palaeontological impact assessment study

The HIA must have an overall assessment of the impacts to heritage resources which are not limited to the specific studies referenced above.

The required HIA must have an integrated set of recommendations.

The comments of relevant registered conservation bodies; all Interested and Affected parties; and the relevant Municipality must be requested and included in the HIA where provided. Proof of these requests must be supplied.

Please note, should you require the HIA to be submitted as a Phased HIA, a written request must be submitted to HWC prior to submission. HWC reserves the right to determine whether a phased HIA is acceptable on a case-by-case basis.

If applicable, applicants are strongly advised to review and adhere to the time limits contained the Standard Operational Procedure (SOP) between DEADP and HWC. The SOP can be found using the following link http://www.hwc.org.za/node/293

Kindly take note of the HWC meeting dates and associated agenda closure date in order to ensure that comments are provided within as Reasonable time and that these times are factored into the project timeframes.

HWC reserves the right to request additional information as required.
Should you have any further queries, please contact the official above and quote the case number.

.....
Michael Janse van Rensburg
Chief Executive Officer: Heritage Western Cape

Heritage Western Cape
Erfenis Wes-Kaap
ILifa leMveli leNtshona Koloni

27 SEPT 2021

1.3. Scope and purpose of the report

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

1.4. Specialist credentials

Dr Jayson Orton has an MA (UCT, 2004) and a D.Phil (Oxford, UK, 2013), both in archaeology, and has been conducting Heritage Impact Assessments and archaeological specialist studies in South Africa (primarily in the Western Cape and Northern Cape provinces) since 2004 (please see curriculum vitae included as Appendix 1). He has also conducted research on aspects of the Later

Stone Age in these provinces and published widely on the topic. He is an accredited heritage practitioner with the Association of Professional Heritage Practitioners (APHP; Member #43) and also holds archaeological accreditation with the Association of Southern African Professional Archaeologists (ASAPA) CRM section (Member #233) as follows:

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

1.5. Declaration of independence

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

2. 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.

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 a Basic Assessment (BA). The present report provides the heritage component. HWC is required to provide comment on the proposed project in order to facilitate final decision making by the DFFE.

2.2. Application timeline

The application to DFFE under NEMA is currently in the Basic Assessment (BA) phase with circulation of the Draft BA report estimated to be in August 2022.

3. APPROACH

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 3-1. Data were also collected via a field survey.

Table 3-1: **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	CapeFarmMapper (http://gis.elsenburg.com/apps/cfm/#)	Current	Spatial	Cadastral boundaries, extents and aerial photography
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

A large part of the study area was well-covered during the fieldwork for the adjacent Nuweveld projects (Orton 2021a, 2021b, 2021c, 2021d). Days in which the present corridor was visited were 16, 17 and 18 March, 7, 8 and 9 April, 14 and 17 May and 19 September 2019. The site was subjected to further survey for the Hoogland project on 2 April, 17 May, 10 September 2021 and 22 February

2022. Some days had two archaeologists (Anja Huisamen and the author) on site, but most had one. A helicopter flight around the broader study area was also undertaken to familiarise specialists with the landscape. The surveys were during various seasons but, in this dry area, the season makes no meaningful difference to vegetation covering and hence the ground visibility for the archaeological survey. Other heritage resources are not affected by seasonality. During the survey the positions of finds and survey tracks were recorded on a hand-held Global Positioning System (GPS) receiver set to the WGS84 datum (Figure 3-1). Photographs were taken at times in order to capture representative samples of both the affected heritage and the landscape setting of the proposed development.

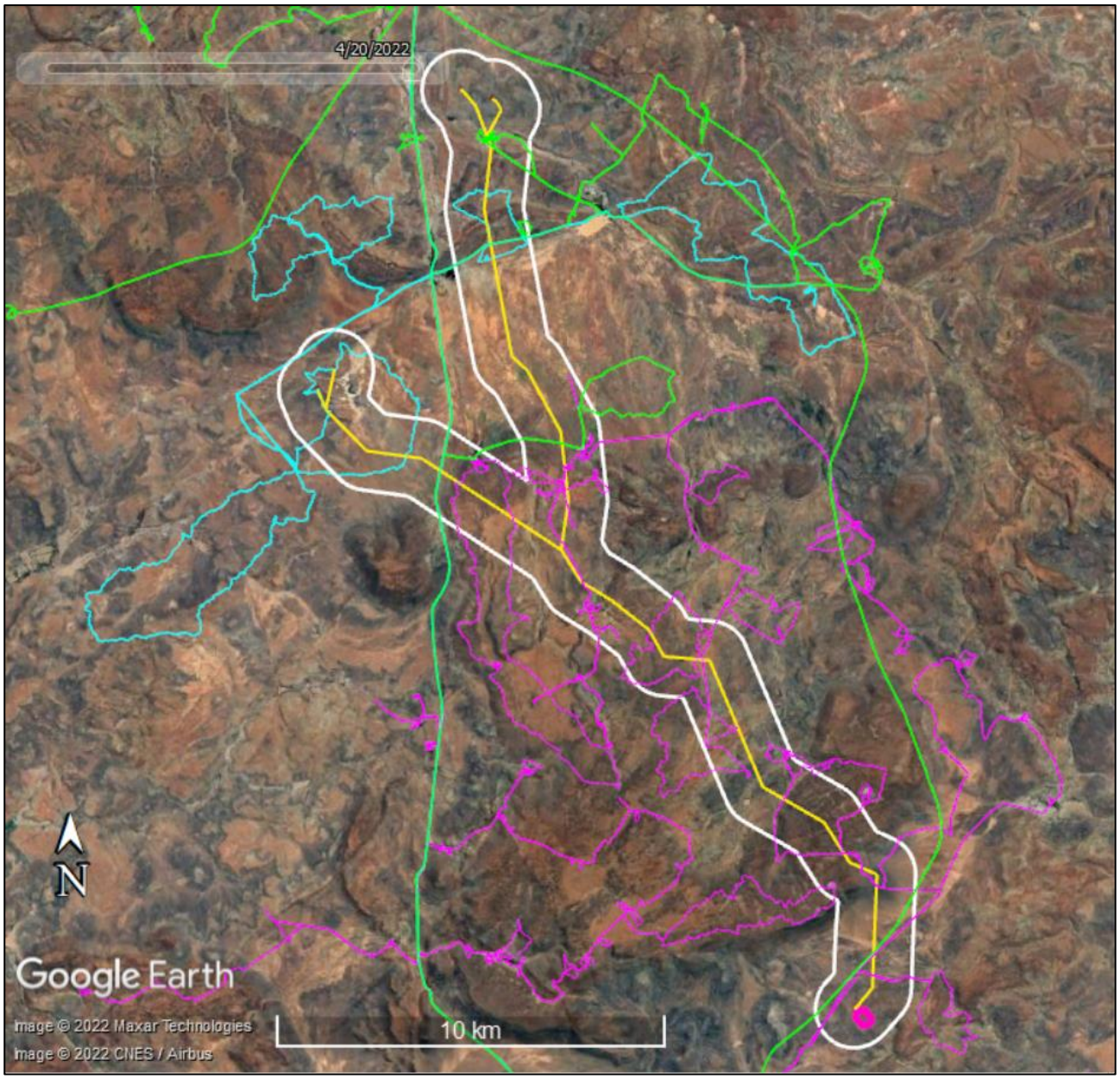


Figure 3-1: **Aerial view of the study area (white polygon) showing the survey tracks (turquoise [2022], green [2021] and pink [2019] lines).**

Early surveys aimed to document as many heritage resources as possible so as to be able to produce the required sensitivity data for screening purposes. Subsequent surveys aimed to fill in any gaps in coverage in areas favourable for development but focused largely on the wind farms. Survey coverage was generally less dense on the open plains because they were found to be less sensitive than the hilly areas and valleys.

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

3.3. Specialist studies

As per the HWC NID response, each of the projects required specialist studies of archaeology, palaeontology and visual impacts. While the former is conducted by the present author and included within the body of the HIA, palaeontology is being considered by Dr John Almond of Natura Viva cc and visual impacts are assessed by Bernie Oberholzer and Quinton Lawson.

3.4. Impact assessment

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

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. Heritage Western Cape (2016), however, uses a system in which resources of local significance are divided into Grade IIIA, IIIB and IIIC. These approximately equate to high, medium and low local significance, while sites of very low or no significance (and generally not requiring mitigation or other interventions) are referred to as Not Conservation Worthy (NCW).

3.6. Consultation

The draft HIA was submitted to relevant interested and affected parties as required by HWC in their response to the NID application (Section 1.2). The report was also included in the main public participation process (PPP) required under NEMA as part of the BA.

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 is very extensive and a comprehensive survey

was impossible. Nevertheless, it is assumed that the adopted survey methodology (as described in Section 3.2) has recorded a good sample of the area's heritage and allowed for a reliable assessment of the potential impacts of the development. It is assumed that the corridor approach will allow enough flexibility to avoid the majority of – or more likely all – significant heritage sites in the final design phase.

4. PHYSICAL ENVIRONMENTAL CONTEXT

4.1. Site context

The study area is located in a rural/natural context used for livestock (sheep and cattle) and game rearing, although small patches of land either are cultivated or have been cultivated at some point in the last several decades. All local roads are gravel and farm complexes are few and far between. Human modification of the environment, aside from roads and occasional farm complexes, some of which have associated agricultural lands, is limited to wind pumps, reservoirs, dams and farm fences. The corridor falls party within the recently gazetted Beaufort West REDZ (DFFE 2021) and partly within the Central Electricity Grid Infrastructure (EGI) corridor (Figure 4-1).

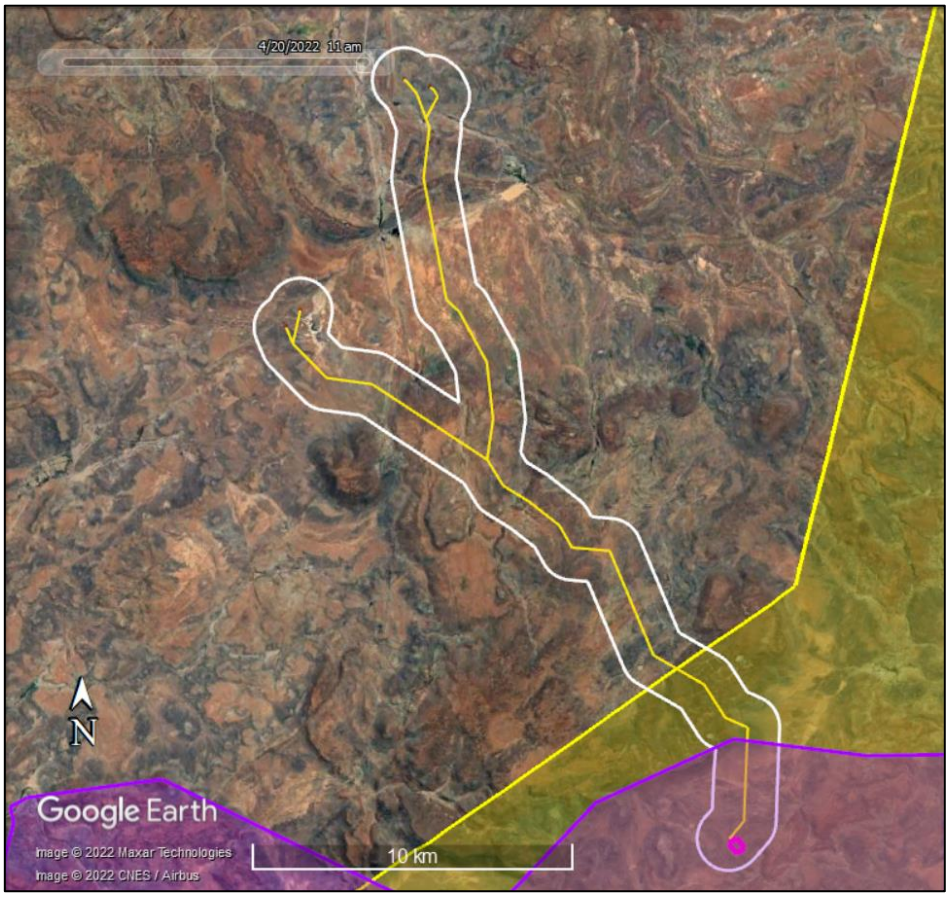


Figure 4-1: **Aerial view of the study area showing the location of the Beaufort West REDZ (purple shaded polygon) and the Central EGI corridor (yellow shaded polygon).**

4.2. Site description

The grid corridor is located north of the highest part of the Great Escarpment on land varying in elevation from 1400 m above mean sea level (amsl) to 1660 m amsl. The study area varies in nature with some parts being hilly or even mountainous and others being flat. Notably, a wide flat plain occurs just north of the central part and a flat-topped dolerite mountain occurs in the south. Other areas have smaller dolerite hills formed by dolerite dykes and sills, and low sandstone scarps occur at times. In places shale is visible on the surface but this is largely limited to riverbeds. The majority of rocks in the area do not form cliffs but break into pieces through erosion and weathering. The exception is the occasional bands of sandstone which are more resistant to weathering. These create low cliffs (in the order to 1 to 5 m high) and sometimes result in the formation of rock shelters. Narrow, incised valleys with well-defined rivers are rare. Vegetation tends to be relatively sparse due variably to the elevation and exposure, limited rainfall and sometimes very rocky substrates. Figure *4-2* to Figure 4-10 provide a series of views across the study area to show the general character of the landscape.

Figure 4-2: Looking towards the east in the northern part of the corridor.

Figure 4-3: Looking towards the northeast across the northern part of the corridor. The Midlands farmstead is in view and the Hoogland 1 switching stations would be in the background well behind the farm.

Figure 4-4: Looking west across the flat plain in the northern half of the corridor.

Figure 4-5: Looking southeast across the flat plain in the northern half of the corridor.

Figure 4-6: Looking north from a dolerite hill just outside the south-western part of the corridor with the R381 visible in the background.

Figure 4-7: Dolerite geology in the central part of the corridor.

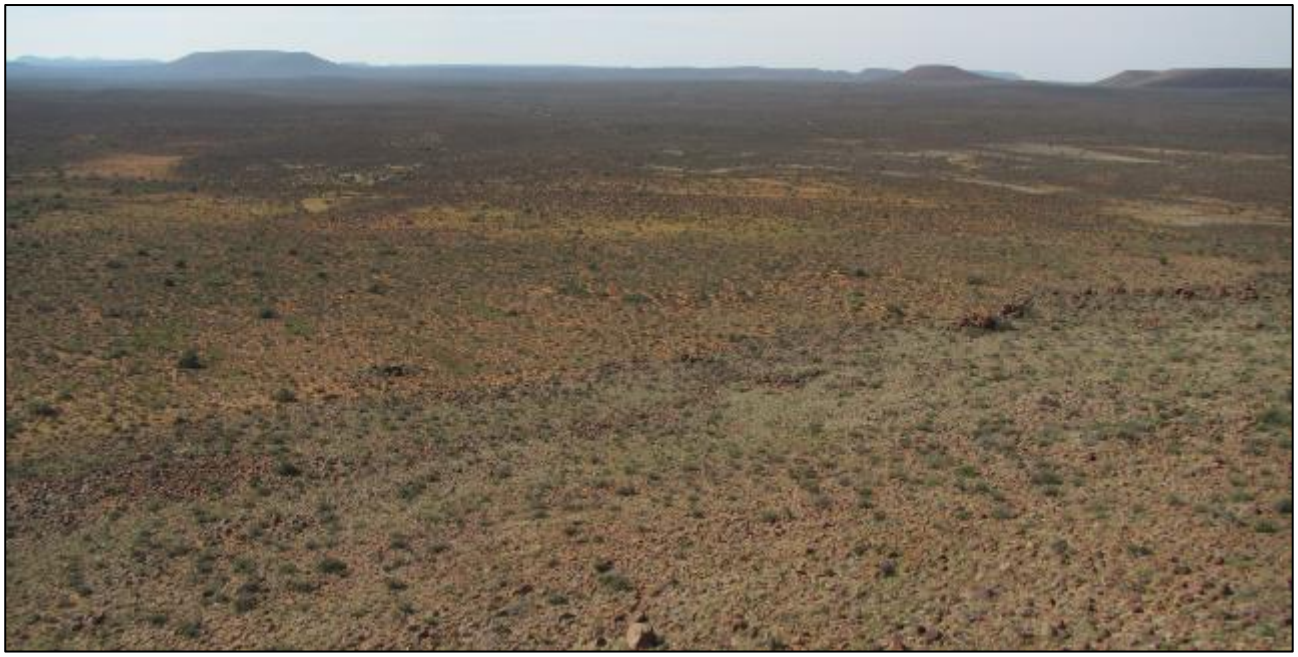


Figure 4-8: Looking towards the northeast from a hill in the central part of the corridor.

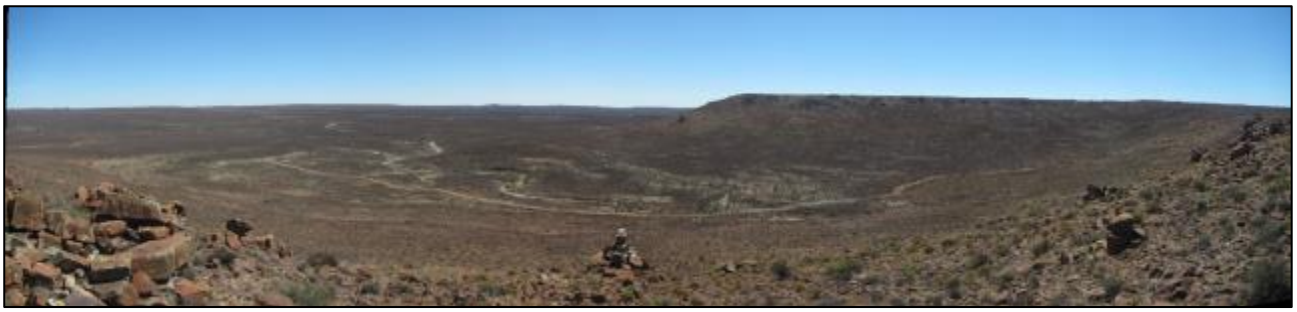


Figure 4-9: Looking northwest from the mountain in the southern part of the corridor.

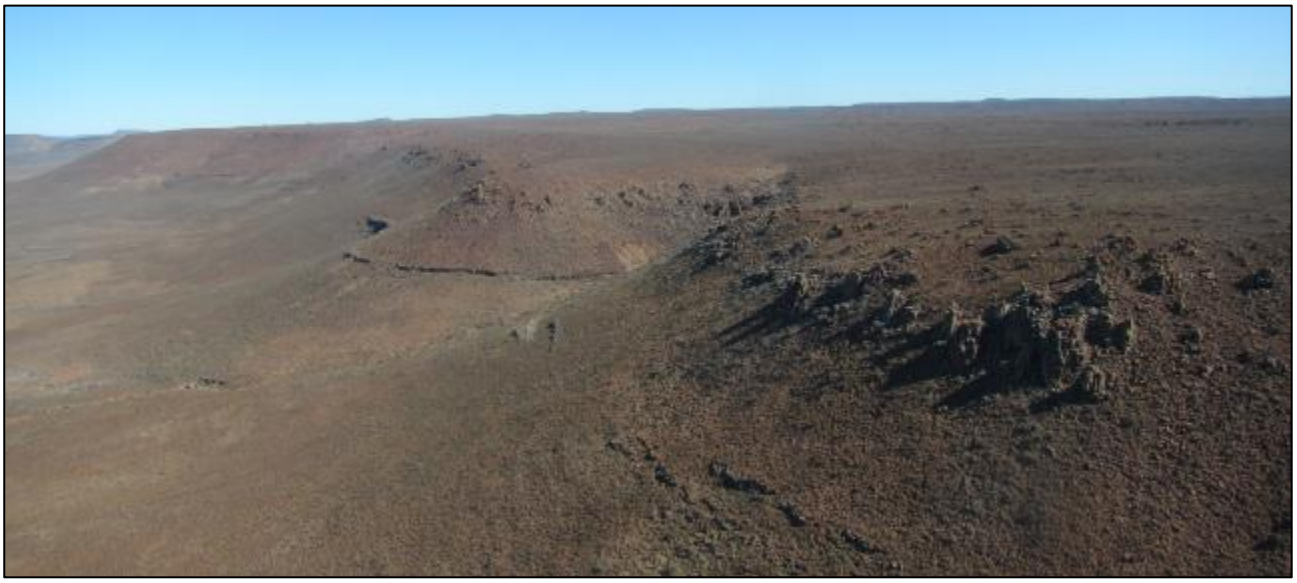


Figure 4-10: Aerial view looking towards the southwest along the south-eastern edge of the mountain in the southern part of the corridor. The corridor crosses the mountain in the far distance.

5. FINDINGS OF THE HERITAGE STUDY

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

5.1. Palaeontology

The SAHRIS Palaeosensitivity map shows the study area to be of largely very high sensitivity but with patches of moderate and zero sensitivity (Figure *5-1*).

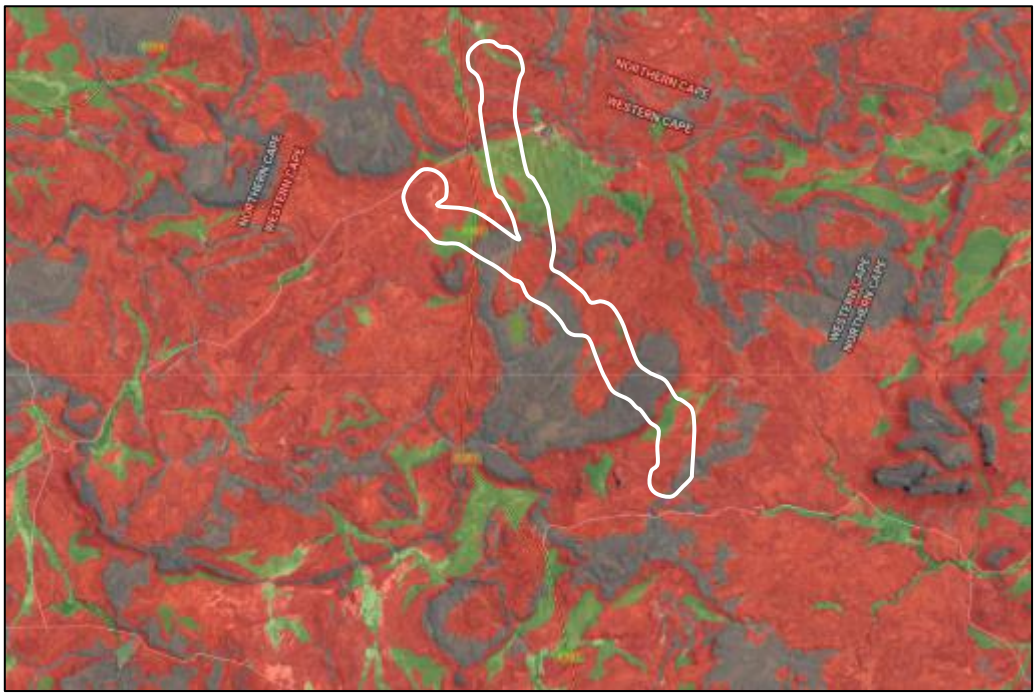


Figure 5-1*:* Extract from the SAHRIS Palaeosensitivity map showing the study area to be of very high, moderate and zero palaeontological sensitivity (red, green and grey shading respectively).

Almond (2022:i) found that the study area "is underlain by continental sediments of the Lower Beaufort Group (Karoo Supergroup) of Middle to Late Permian age." He notes that existing records of fossil sites are rare from the area and that his surveys produced relatively few new sites. Finds included several tetrapod skulls and post-cranial skeletal remains with these being mostly "small-bodied therapsids such as dicynodonts and therocephalians, numerous tetrapod burrow casts, as well as low diversity trace fossil assemblages but only rare, poorly-preserved fossil wood with no other plant material."

He concludes that "that well-preserved fossils of scientific and conservation interest are remarkably rare within the project area as a whole. This is attributed to (a) poor levels of bedrock exposure associated with generally low relief and pervasive cover by largely unfossiliferous superficial sediments; (b) extensive dolerite intrusion which has "sterilized" large volumes of potentially fossiliferous bedrocks through thermal metamorphism, leaching and secondary mineralisation, while the large dolerite outcrop areas in the uplands are completely fossil-free; (c) highly impoverished fossil biotas within the Poortjie Member (lowermost Teekloof Formation) stratigraphic interval that are associated with the catastrophic end Middle Permian Mass Extinction Event of ~260 Ma."

5.2. Archaeology

5.2.1. Desktop study

The broader Karoo region generally contains sparse archaeological traces from the Early (ESA), Middle (MSA) and Later Stone Ages (LSA). The vast majority of material tends to be what is referred to as background scatter. This can be defined as "widespread isolated artefacts whose distribution

results from either primary or secondary causes" (Orton 2016:121). In this dry landscape, Stone Age archaeological sites are well-known to be focused most strongly on water sources. This pattern was well demonstrated locally by Orton (2021a, 2021b, 2021c, 2021d), but the density of sites found was quite low. These sites are usually scatters of stone artefacts, often accompanied by ostrich eggshell fragments and sometimes pottery, but may also include fragments of bone and even archaeological deposits (the latter are unknown from the Nuweveld area though).

The Roggeveld Mountains in the Komsberg REDZ, some 150 km along the escarpment to the southwest, have been extensively studied and also show a very limited amount of Stone Age archaeology. Van der Walt (2016) found an area just above the escarpment to have very few stone artefacts. Hart (2015), working just south of the escarpment edge, noted in his study that precolonial remains were entirely absent and cited the lack of suitable stone for artefact manufacture as the main reason. Orton (2017) working both above and below the escarpment (north and east of Hart's (2015) study area) also noted a remarkable paucity of Stone Age materials but did record a very impressive precolonial kraal complex with minimal associated LSA materials on high ground above the escarpment, and one small geometric tradition rock painting at the base of the escarpment closer to Merweville. 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 70 km northeast of the present study area, Halkett and Webley (2011) noted fairly widespread background scatter artefacts all of which they attributed to the MSA. Further east, Hart (2016) found Stone Age traces (other than rock art) to be generally quite rare and generally limited to artefact scatters close to rivers.

An interesting aspect of Karoo archaeology is rock gongs. These are (usually) dolerite rocks that are naturally perched in such a way that when struck they release a ringing musical note. The gongs are identified by heavily worn patches where they have been repeatedly struck. Parkington *et al.* (2008) have studied a number of gongs from Nelspoort and Vosburg, some 65 km to the southeast and 135 km to the north-northeast of the present study area respectively, but Orton (2021b) recorded two further examples in the Nuweveld, both of which were surrounded by extensive stone artefact scatters indicating occupation of the area.

Rock art sites occur in low density through the wider area, with three painted 'geometric tradition' sites and three engraved 'fine line' tradition sites on record from the Nuweveld (Orton 2021a, 2021b, 2021c, 2021d). Geometric tradition art is thought to have been produced by the Khoekhoen and the new records expand the known distribution of this tradition in the area (Figure *5-2*). Van der Walt (2016) found a rock shelter with fineline paintings at the head of a river valley leading off the escarpment in the Komsberg. About 100 km east of the present study area, Hart (2016) noted that hundreds, if not thousands, of rock art sites occurred in his study area. Most were engravings on dolerite outcrops with many of them being heavily patinated. However, younger images extending into the recent historical past were also documented. He also found an exceptional painted site that was layered with paintings of various ages. Unusually, this site also included engravings on its walls. Parkington *et al.* (2008) have documented many engravings in the Karoo region. They do not map their work but do provide a historical map of engraving distribution which shows the densest concentration being to the northeast around the Kimberley region.

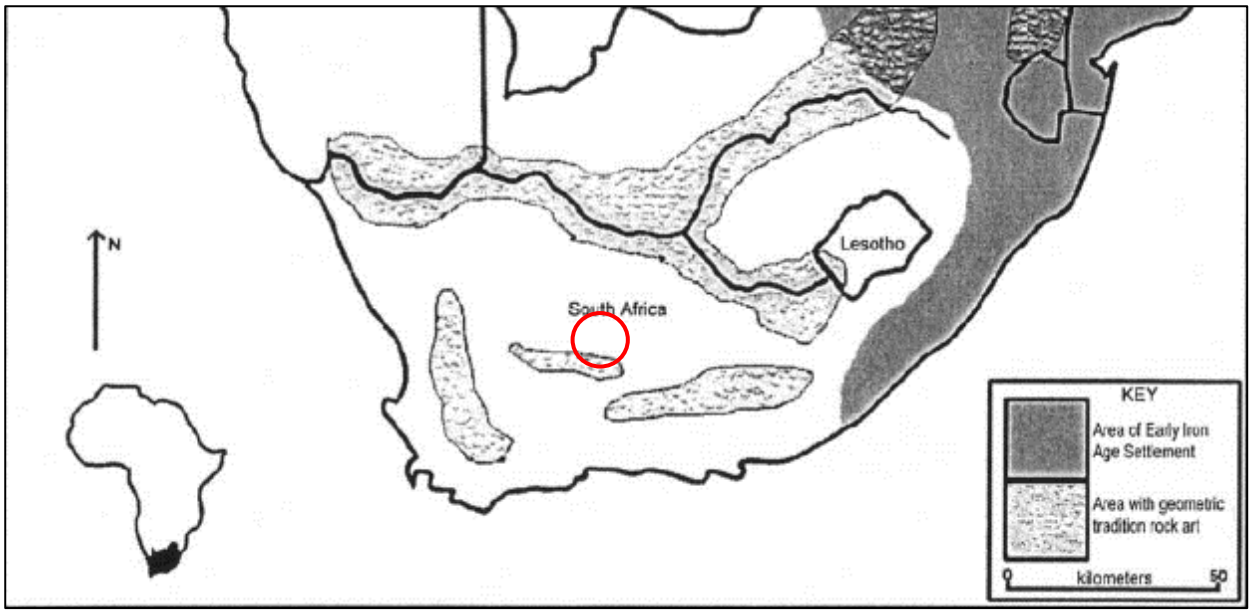


Figure 5-2: Extract from a map showing the distribution of geometric tradition rock art. Source: Smith & Ouzman (2004: fig. 9). The present study area is in the red circle, while Hart's (2016) observation lies to the east of the circle.

Until Orton's (2021a, 2021b, 2021c, 2021d) recent surveys in the area, historical archaeological resources, too, were little known from the Nuweveld area. These surveys showed that 19th century occupation of the area was widespread with many small abandoned and ruined stone-walled farmsteads scattered along the water courses of the area. The structures included houses (both formal rectangular flat roofed houses and lobed dwellings that might have had temporary roofs), kraals, and various small outbuildings of unknown function but likely including storage spaces and chicken coops. At the southern end of the Nuweveld Mountains, in the Karoo National Park (KNP), Kaplan (2005, 2006) recorded several small ruined stone structures which were said to be kraals, a homestead and shepherd's huts. One of them had a small scatter of late 19th to early 20th century historical artefacts associated with it. A stone-built lime kiln and some animal traps are also on record there (SANParks 2017). Other stone walled ruins are known from the KNP and, according to Anonymous (2016) some were demolished in order to reuse the stone to build the Klipspringer Pass. This pass was built from 1986 to 1992 (Goetze 1993). To the west, in the Komsberg REDZ, Hart (2015) found the remains of stone ruins to be very common. He attributed these to the Trekboers who colonised the area in the 18th and 19th centuries. He noted kraals, stockposts and occasional farmsteads. Also in that area, Van der Walt (2016) found very few ruins but some were the remains of Anglo-Boer War fortifications. Not far to the east, Orton (2017) recorded stone-built ruined structures including two small farm complexes at the foot of the escarpment and a few other indeterminate small structures that were likely shepherd's huts both above and below the escarpment.

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 (Figure *5-3* & Figure 5-4).

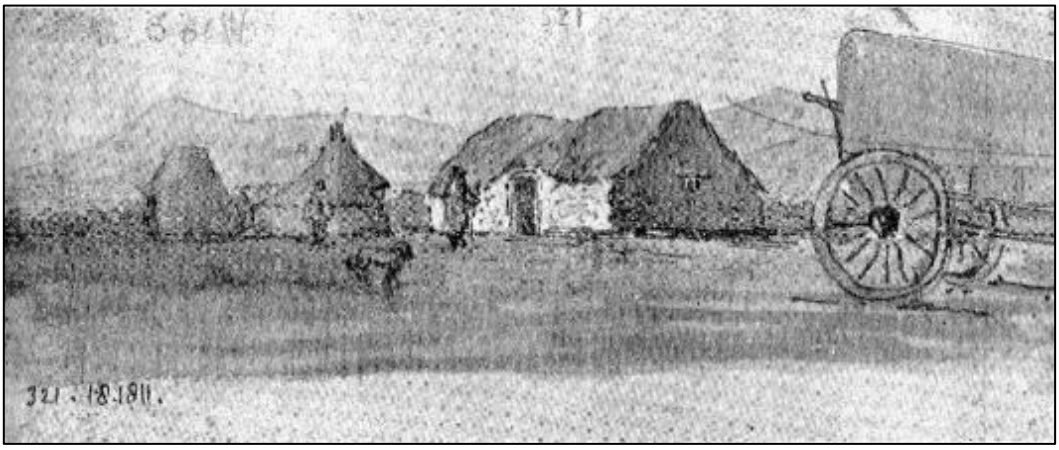


Figure 5-3: Drawing of an early 19th century trekboer farmhouse by William Burchell. Source: Van Zyl (1975:103)

Figure 5-4: 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).

The engraving tradition in the Karoo continued beyond the Stone Age as testified to by the many recent 'scratched' engravings that are known to occur. Horses are an extremely common subject in these recent engravings (Figure 5-5 & Figure 5-6). Morris (1988) has reviewed the engravings of the Karoo and notes that they have been attributed by Battiss (1948) to Europeans and Griquas and by Fock (1979) to 'Hottentots'. Morris (1988) suggests that some were almost certainly made by early Baster and Trekboer immigrants and that the tradition continued into the 20th century. He also notes the inclusion of wagons and human figures in western clothing.

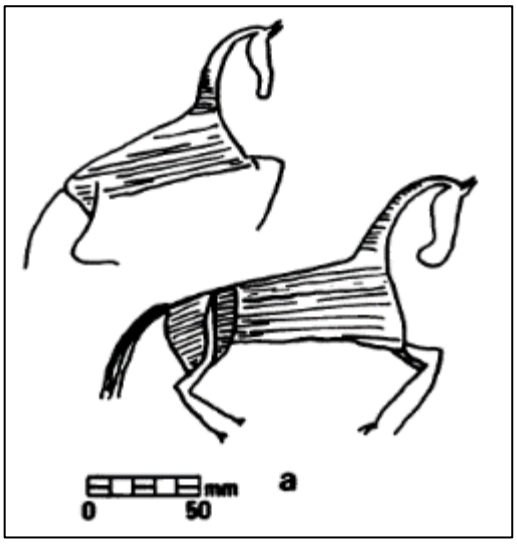


Figure 5-5: Horse engravings from the Beaufort West area. Source: Morris (1988: fig. 3a).

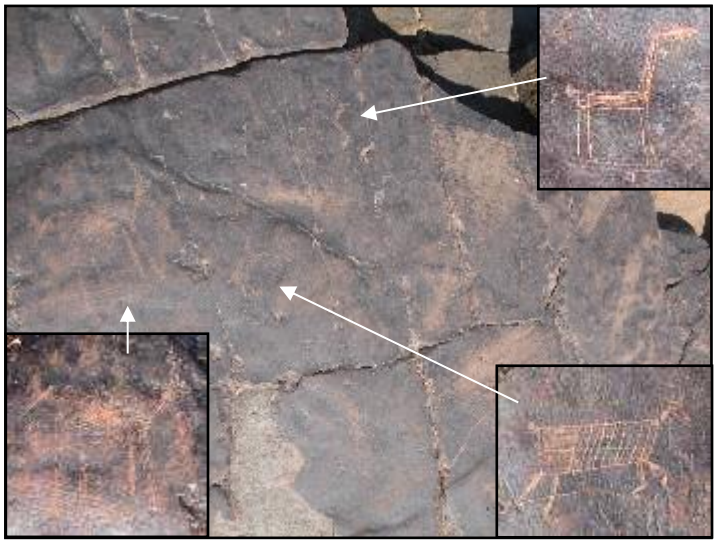


Figure 5-6: Horse engravings from east of Beaufort West. Source: Orton (2010: fig. 44).

The Karoo has been a highly contested landscape at various times in the past. The Khoekhoen first migrated into South Africa about 2000 years ago. That they lived in the Karoo in precolonial times is testified to by the presence of geometric tradition rock art and precolonial kraals, while many historical records of their presence also exist. The only study to attempt to date the Khoekhoe occupation was by Sampson (2010) in an area about 160 km northeast of the Hoogland study area. Through dating potsherds associated with kraals he determined that the kraals – and by implication herding – dated to between about AD 1000 and AD 1750, shortly before the arrival of the Trekboers. Sampson (2010:847) suggests that there would have been tension between the indigenous San and the incoming Khoekhoen but considers that their interactions resulted in "a millennium of (probably uneasy) space-sharing with the locals."

5.2.2. Site visit

The study area has been found to be rich in archaeology, but with sites being in clusters that are often quite far apart. The vast majority of the recorded archaeology dates to the colonial period but Stone Age sites were also present. Appendix 2 lists and describes all the finds with the highlights being presented and illustrated in this section[1].

The vast majority of the Stone Age finds were from the LSA, although occasional finds of older stone artefacts were also noted. One such scatter was near a dolerite scarp outside the northern part of the corridor with the heavy patination on the artefacts indicating their relatively great age – the artefacts are no doubt from the MSA (waypoint HL059; Figure 5-7). Background scatter artefacts (essentially precolonial litter) were generally uncommon, but when such artefacts were found they tended to be in areas with a light gravel covering and were very ephemeral. These materials are all

[1] Note that all waypoint numbers are prefixed with either NV (Nuweveld) or HL (Hoogland) so as to differentiate those found by Orton (2021a, 2021b, 2021c, 2021d) during the Nuweveld fieldwork and those recorded during the present Hoogland project. Lists of both sets of finds are provided in Appendix 2.

likely to be of Pleistocene age and, because of their small numbers, are of no consequence. No Early Stone Age (ESA) material was seen.

Figure 5-7: Collection of very well-patinated hornfels flaked stone artefacts dating to the MSA (waypoint HL059). Scale = 5 cm.

A few proper LSA occupation sites were found, but all were surface scatters. One was an extensive artefact scatter on the southern side of a river in the northern part of the corridor (waypoint HL1703; Figure *5-8* & Figure *5-9*). Most artefacts are in hornfels but some are in wacke. There are also many ostrich eggshell fragments. Many other LSA sites occurred but most were ephemeral to light scatters of stone artefacts, sometimes including ostrich eggshell fragments. They tend to focus on river terraces with the widespread scatter at waypoints HL061, HL062, HL070 and HL071 being a good example. Waypoint HL062 represents a half-buried isolated lower grindstone, while the other three points are areas of concentration of artefacts. Interestingly, two lightly ground patches were found on a nearby dolerite outcrop as well. Further very dense scatters were found associated with the rock gongs at NV1380 and NV1681 (the former lies within the corridor). These have been described and illustrated in Orton 2021c.

Figure 5-8: The location of the dense LSA artefact scatter at waypoint 1703.

Figure 5-9: Stone artefacts and ostrich eggshell at waypoint 1703. Scale in cm.

LSA engraved sites also occur but just two have been found in the vicinity of the present study area, both towards the south of the corridor (note that although both were within the originally assessed 5 km corridor, they both now fall just outside of the refined 2 km corridor). One of these is a scraped

eland located on a black slab on the lip of a large dolerite sill and overlooking a wide valley (waypoint NV1437; Figure 5-10). This is a typical location, although rocks suited to engraving were found to be rare in the area. Another eland engraving, this time incised, was found in an extremely unusual location alongide a small dolerite 'koppie' just a few meters high (waypoint NV1674; Figure *5-11* & Figure *5-12*).

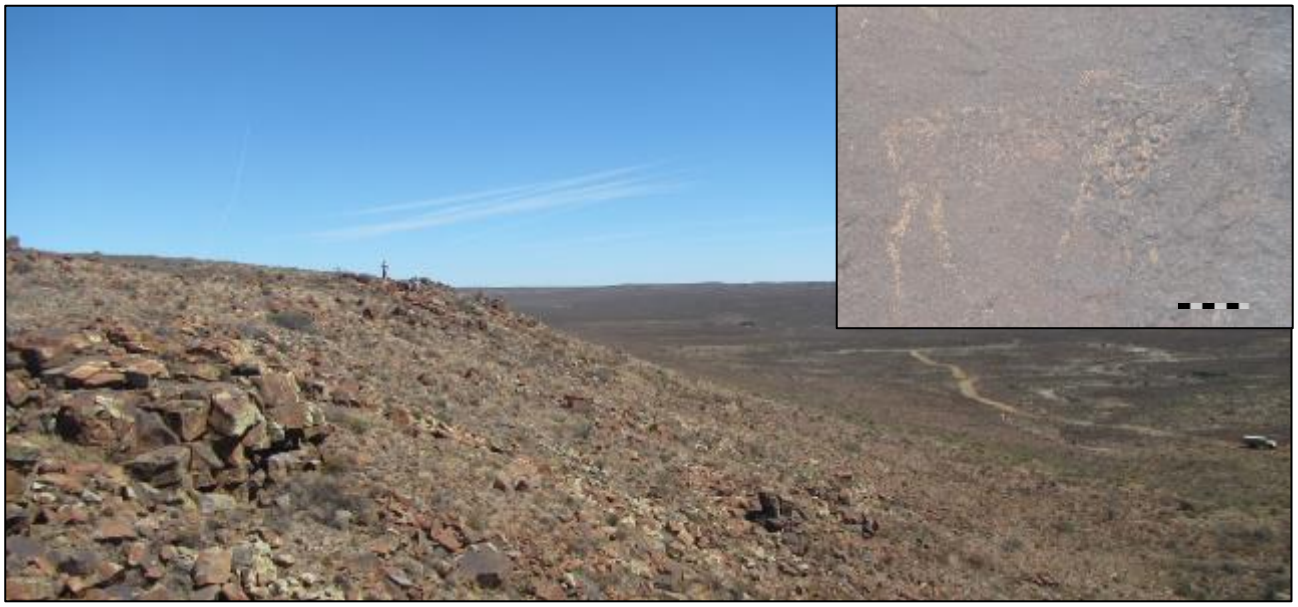


Figure 5-10: **An LSA engraving of an eland occurs on the lip of a wide, high-lying dolerite sill at the spot where the person is standing (waypoint NV1437). Scale in cm.**

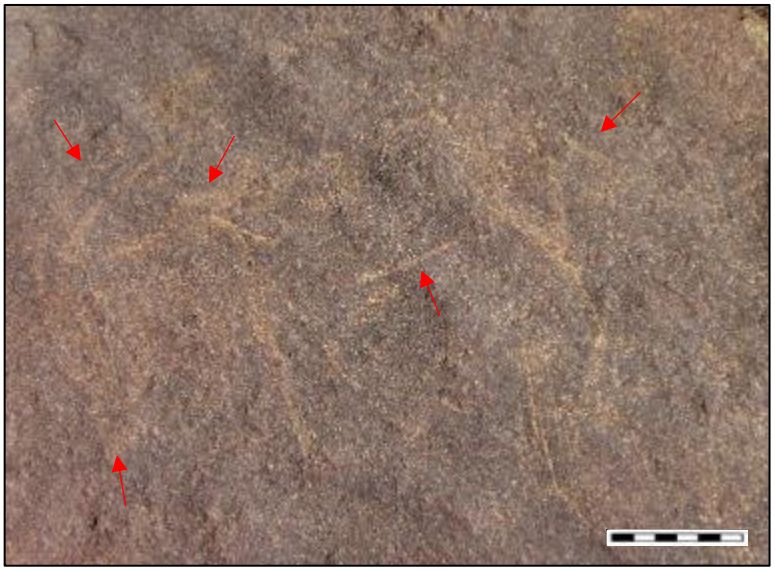


Figure 5-11: Scratched eland engraving with (clockwise from lower left) the muzzle, horns, hump, tail, and stomach arrowed (waypoint NV1674). Scale in cm.

Figure 5-12: The location of the eland engraving in Figure 28. It lies on the slab at lower left (arrowed).

The colonial period archaeological sites would have been made by the trekboers who colonised this area during the 18th and 19th centuries but evidence of occupation of these sites into the early 20th century was also found in a few instances. These sites are stone-built farm complexes with livestock enclosures (kraals), houses, cooking shelters (kookskerms), rare threshing floors (trapvloere), various other unidentifiable stone structures and graves. Importantly, they sometimes have associated ash and rubbish dumps which contain extensive material evidence relating to day-to-day life during occupation of these sites. These sites are invariably located along rivers and, for this reason, should largely be protected from harm through avoidance recommended by other specialists. Figure 5-4 above shows an example of a stone-built house photographed in the early 20th century while still in use. The roof would have been of poles, branches, sacking, sheepskins, or other suitable materials. This is probably what many of the less formal stone houses in the area looked like. More formal rectangular houses would have had flat roofs, brakdak during earlier times with corrugated iron coming later.

One such complex is located at Bulskolk just outside the north-western part of the corridor at waypoints HL098 to HL112 and serves well to illustrate a number of the types of features expected on these sites. This complex actually contains older, derelict and ruined 19th century (or possibly older) components as well as more recent components dating to the early and mid-20th century and that, although derelict, can still be regarded as built structures. Figure *5-13* shows a small cottage ruin at waypoint HL098. It is located to the north of the main part of the complex and was probably a labourer's cottage. Figure *5-14* to Figure *5-16* show views of what seems to have been the main house. It was added to many times with different materials and, interestingly, even included sun dried bricks made from what must have been riverbank mud that had an LSA site on it – the bricks contain stone artefacts, ostrich eggshell fragments and bones. Figure 5-17 shows a kraal complex probably used to house young animals and/or their mothers (waypoint HL110). Plans of the main house and kraal are shown in Figure *5-18* and **Figure 5-19**. A further large kraal also occurs in the complex (waypoint HL099; Figure *5-20*) as does a threshing floor which is probably fairly recent (waypoint 108; Figure *5-21*).

Figure 5-13: Ruined structure at waypoint HL098.

Figure 5-14:Part of a house at waypoint HL112.

Figure 5-15: Part of a house at waypoint HL112 showing sun-dried bricks, stone walls and a filled in doorway.

Figure 5-16: Part of a house at waypoint HL112 showing stone walling and a remnant of a brakdak.

Figure 5-17: A stone-walled structure that looks to have been a set of kraals (waypoint *HL*110).

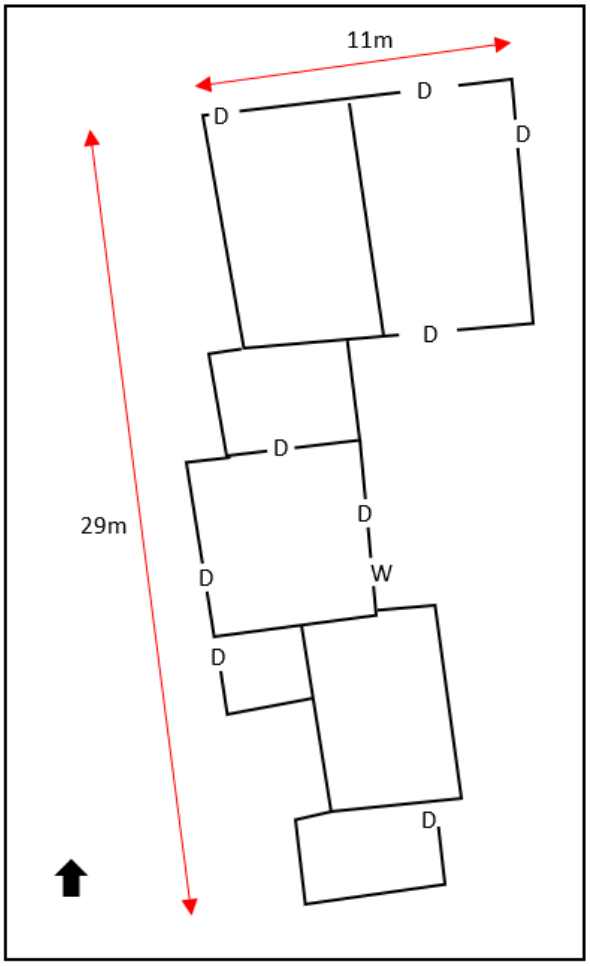


Figure 5-18: Plan of the house at waypoint HL112.

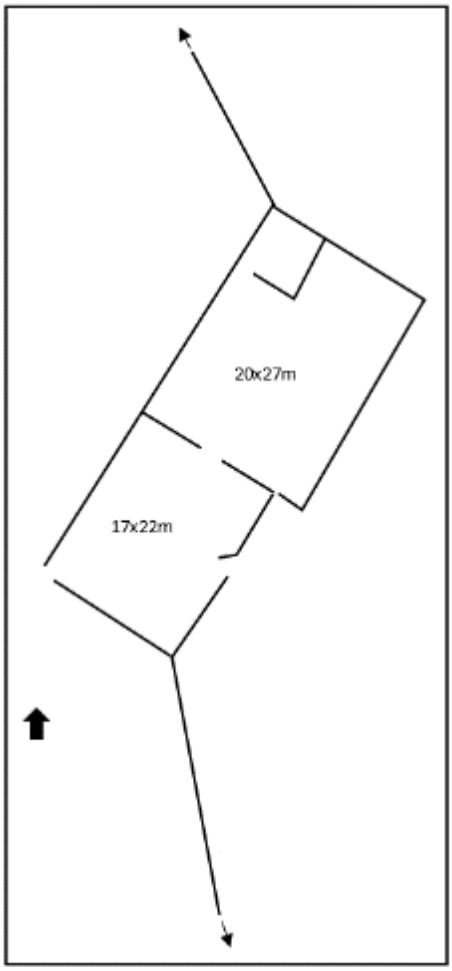


Figure 5-19: Plan of the kraal at waypoint HL110.

Figure 5-20: A large stone kraal, undoubtedly the primary kraal for the farm (waypoint HL099).

Figure 5-21: The threshing floor and 20th century ruined structure at waypoint HL108.

Related features include an extensive stone wall stretching towards the south and then turning west and which was not examined or mapped in detail and infrastructure related to the control and distribution of water. A large stone-lined farm dam occurs at waypoint HL100 and smaller *leiwater* features lie below the dam wall (Figure *5-22*). The large dam has a metal outlet pipe controlled by a valve with "HEATON HALIFAX" embossed on it. Heaton is a company that started manufacturing valves in Halifax, England, in 1943 which indicates this dam to date no earlier than the mid-20th century. The dam shows the continuation of traditional building methods, no doubt to save money. While a modern metal pipe and valve were necessities, the wall was made of earth and rock and rather than piping the water away from the dam it was led via *leiwater* channels.

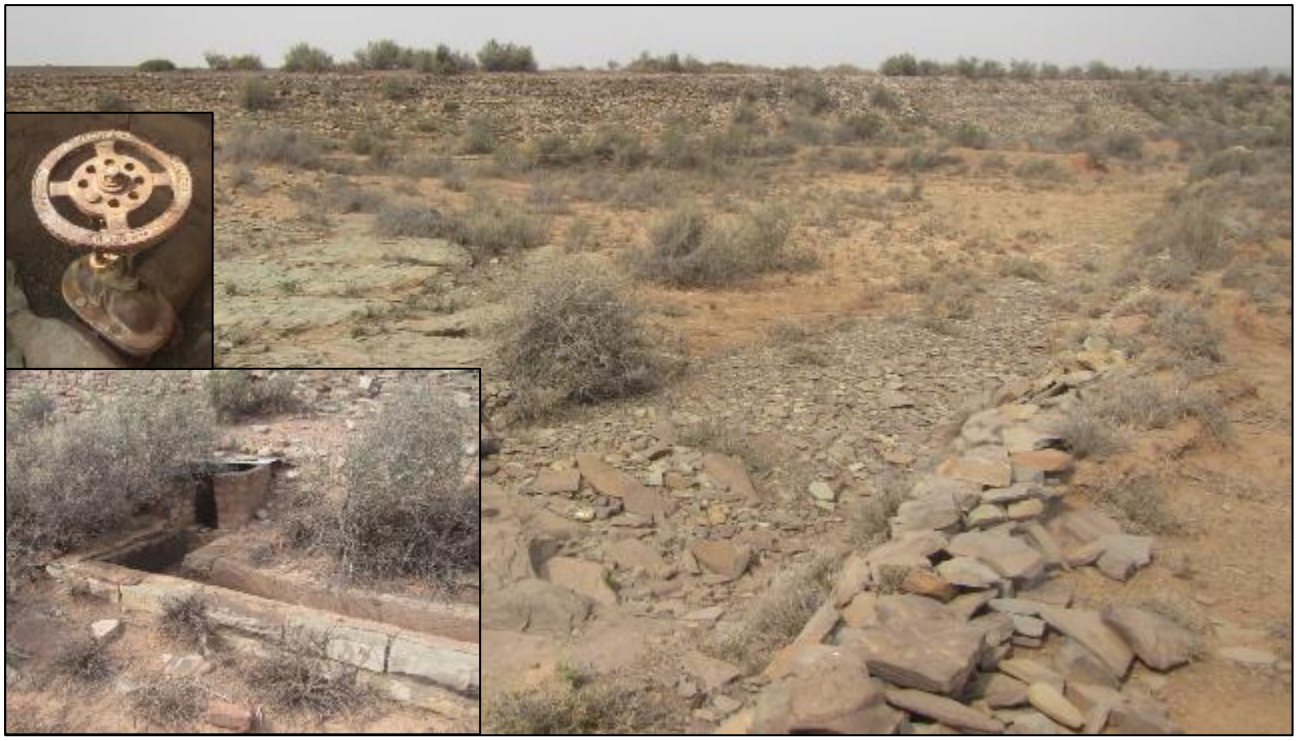


Figure 5-22: View of the large dam at waypoint HL100 with the insets showing the outlet valve and associated leiwater.

Figure *5-23* and Figure *5-24* show two more ruined stone-walled structures just to illustrate the variation in preservation.

Figure 5-23: Poorly preserved stone house foundation at waypoint HL1704. It is likely that the stones have been robbed for reuse elsewhere leaving only the foundation stones.

Figure 5-24: Ruined stone-walled house at waypoint HL1707. The inset shows a stone shelf preserved in one of the inside corners of the house.

A particularly important part of the farm complex described above is the ash and rubbish dumps that occur at waypoints HL105, HL107 and HL111. The first is the largest (Figure *5-25*) and contains

a multitude of historical glass and ceramic artefacts (**Figure 5-26**). Most artefacts seem to be of the types expected for mid-late 19th century occupations. Other dumps in the rea showed similar sorts of materials

Figure 5-25: An enormous stone-lined ash and rubbish dump (middle ground) with an associated small stone feature (foreground) at waypoint HL105.

Figure 5-26: Close up of the surface of the ash and rubbish dump at waypoint HL105. Scale in 1 and 5 cm intervals.

Another aspect of historical archaeology is the scratched engravings found in clusters in various places. Just two poorly preserved examples are thus far known from the present corridor. Figure 5-27 shows the better preserved of the two which is from waypoint NV1878.

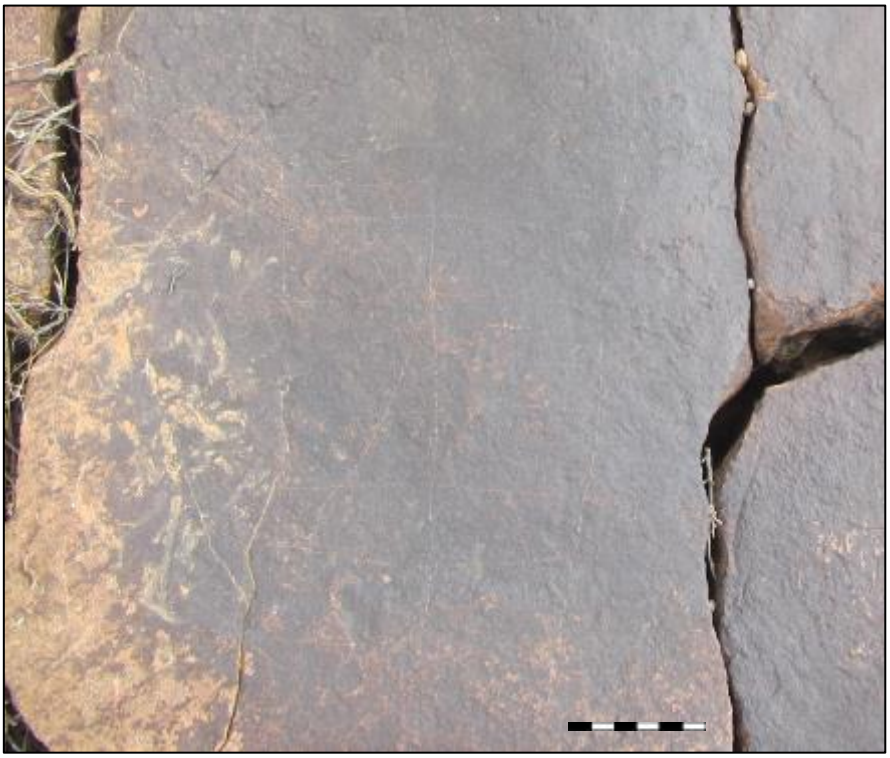


Figure 5-27: Historical scratched geometric motif from waypoint NV1878. Scale in 2 cm intervals.

5.3. Graves

Many graves were seen throughout the study area. Some of them are formal graveyards associated with currently occupied farm complexes. One of these (now located just outside of the refined 2 km wide corridor) is rather less formal than expected and appears to be associated with a farmstead located over a dolerite dyke. Most graves are informal but two have formal headstones and grave surrounds. There is no surrounding wall or fence, but one grave has its own fence. Only one bears a date (1934; waypoint HL076; Figure *5-28*). Another small graveyard with just three graves lay close to a ruined farm complex in the north of the corridor. These graves were affected by erosion with just one retaining all the usual features of a grave (waypoint HL1713; Figure *5-29*). Many other graves are located in remote areas, sometimes very close to historical sites such as the graveyard at waypoint HL097 (now outside the refined 2 km corridor (Figure *5-30*) and a single grave at waypoint HL1711 (Figure *5-31*).

Figure 5-28: Graveyard at waypoint HL076.

Figure 5-29: Two fairly clear graves at waypoint HL1713.

Figure 5-30: A poorly preserved, informal graveyard at waypoint HL097 in a farm complex.

Figure 5-31: Single grave at waypoint HL1711.

5.4. Historical aspects and the Built environment

5.4.1. Desktop study

For various reasons including changes to the structure of the Cape Colony, and the desire to seek new grazing and independence from Dutch East India Company (VoC) rule, farmers started to leave the Cape Colony during the 18th century. This process ultimately had its beginnings with the creation of a class of farmers referred to as free burghers who moved into the region surrounding Cape Town (e.g. Wellington, Paarl, Stellenbosch and Franschhoek). Willem Adriaan van der Stel, governor of the Colony from 1699 to 1707, abused his power as governor by favouring his own farming activities when supplying ships with food, thereby making the free burgher farmers unhappy. The Colonists were also initially not allowed to trade with the Khoekhoen but this rule was changed in February 1700. Around this time Van der Stel gave grazing licences further from the Colony in order to increase pastoral production (Penn 2005). These factors were the ultimate start of Colonial expansion after the Colony had remained confined to the Cape Town area for the first several decades and in fact perpetuated it during the following decades.

The colonists soon realised that the best way to survive in the relatively arid interior was to be as close to the year-round rainfall zone as possible. This allowed for seasonal movement into the summer rainfall region to the northeast or the winter rainfall region to the southwest. In this way they could maximise the availability of water and grazing for their livestock. The mountains lying within this zone – essentially the escarpment edge – were also better watered due to their elevated rainfall and more frequent permanent springs. Between about 1740 and 1770 there was a rapid expansion into this zone which extended from the Kamiesberg of Namaqualand, through the Onder Bokkeveld and the Hantam, to the Roggeveld Mountains, but possibly not yet as far northeast as the Hoogland study area (Figure 5-32). This, then, along with the Nuweveld Mountains just east of the Roggeveld constituted the mid-18th century northern frontier zone. The Nuweveld saw 75 farms being granted in this 30-year period (Penn 2005). According to Botha (1926), the Nuweveld was so named because it was a new area to be colonised. Note also that the limits of the area under discussion are unknown. It seems likely, though, that it did not extend very much beyond (north of)

the crest of the escarpment. Walker (1928) maps the 1798 colonial boundary as being just north of the crest of the escarpment (Figure 5-33).

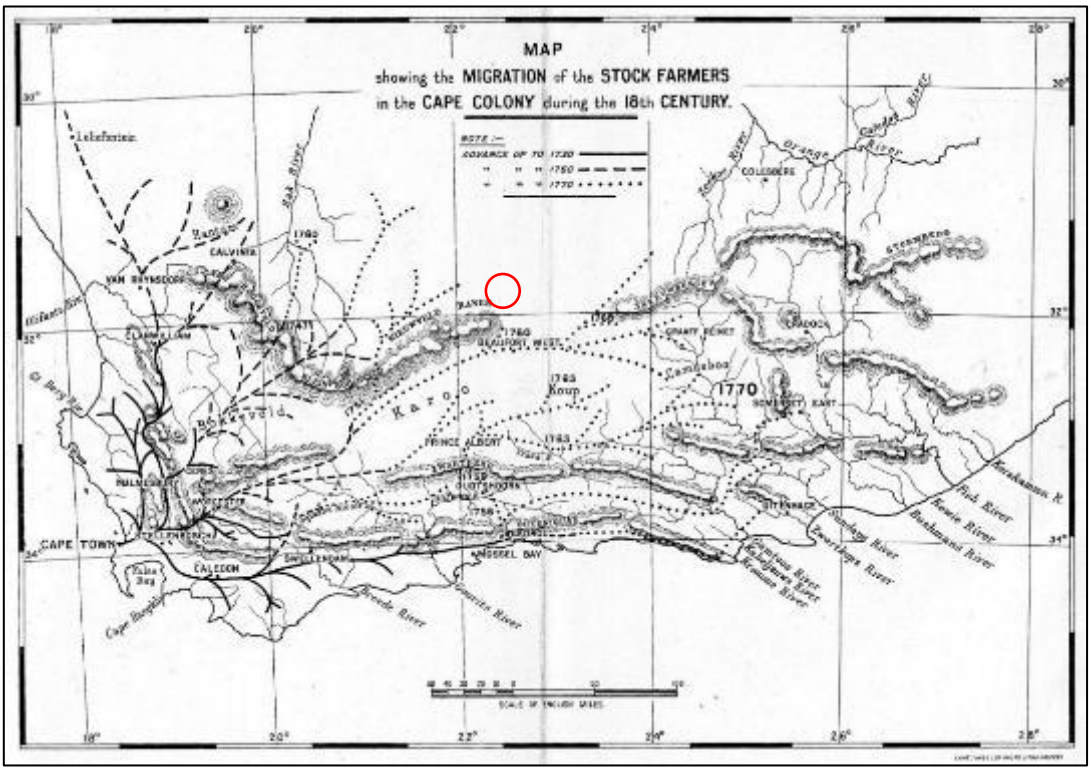


Figure 5-32: **Map showing the mid-18th century trekboer expansion in the Karoo. Source: Botha (1926: opposite preface). The wind farm study area is indicated by the red circle.**

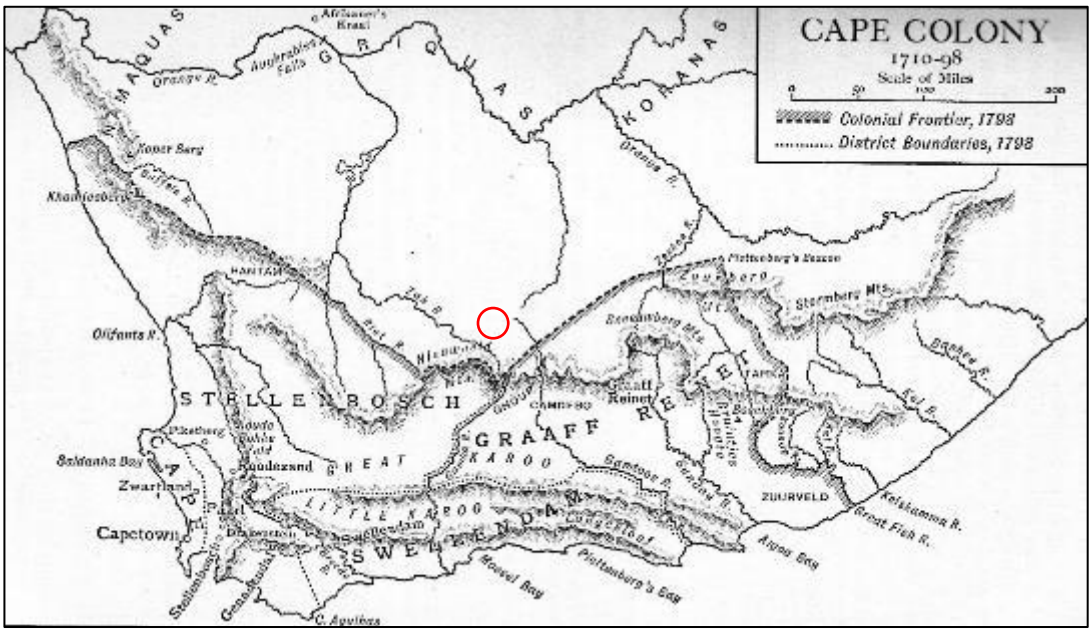


Figure 5-33: **Map showing the extent of the Cape Colony by 1798. Source: Walker (1928:201). The wind farm study area is indicated by the red circle.**

The Nuweveld Mountains were actually within the summer rainfall area which made occupation slightly more tenuous because trekking west into the winter rainfall Roggeveld Mountains meant moving into areas already occupied by other trekboers. The Nuweveld area was thus never properly occupied by colonists during the 18th century with the local San and Khoekhoen frequently stealing livestock from the colonists. A series of robberies in December 1775 and January 1776 in the Camdeboo and Swartruggens areas (some 200 km southeast of the present study area) resulted in a vicious commando being led against the San and Khoekhoen. Forty-five people were killed and thirty-six prisoners taken by the commando. This attack resulted in the passing of a resolution by the landdrost that no further commandos be undertaken without his express permission. Soon afterwards, many hostile San and Khoekhoen began assembling in the Koup, Sak River and Nuweveld areas, protecting themselves in fortified rock shelters. Although a request was made to mount a commando, the Nuweveld farmers could not await the outcome but found their small commando to be too weak to make any impact. A commando from the Sneeuwberg came to their assistance and the two together killed 111 San and Khoekhoen. Despite this success, many farmers vacated the Nuweveld area (Penn 2005).

In July of 1779 a group of twelve farmers decided to risk moving back into the Nuweveld area. The result was an increased intensity of San raids and commando activity that resulted in many deaths. This fighting continued and by September 1781 the farmers had too few cattle left to be able to sell to the VoC butchers. Commando activity also ceased because of a shortage of ammunition. By 1786 drought and San resistance resulted in the colonists once again vacating the Nuweveld and leaving it almost completely free of trekboers until 1793 (Penn 2005).

In June 1792 a large group of about 300 people – described as San by the colonists – attacked the Van Reenen brothers (who had the contract to deliver livestock to Cape Town) and stole about 600 sheep and 253 cattle. This act finally prompted the Government to take more serious action and two very well organised commandos were raised under the direction of two proven local leaders (N. Smit & J. van der Walt) and sent to the Nuweveld region where they killed more than 500 San. Owing to the lack of surface water, the area was still seen as marginal and could not support sufficient farmers to withstand or expel the San and/or Khoekhoen. In 1793 Van der Walt was permitted to move into the Nuweveld and was given two farms rent-free and the power to send out commandos as he saw fit (Penn 2005).

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 5-34with the study area fully incorporated by 1825.

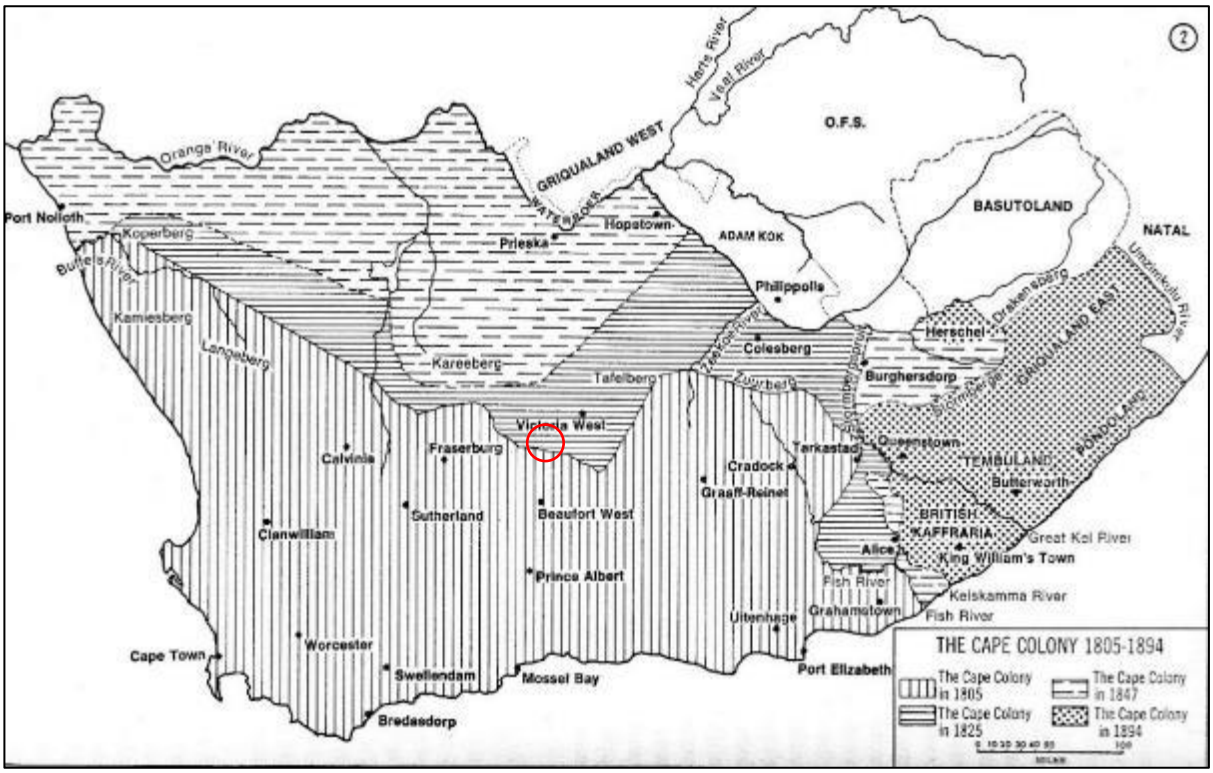


Figure 5-34: Map showing the expanding boundaries of the Cape Colony under British Rule. Source: Van Zyl (1975:102). The wind farm study area is indicated by the red circle.

There appears to have been limited action in the Nuweveld area during the Second South African War (Anglo-Boer War). Lieutenant-Colonel EMS Crabbe made use of a farm called Waterval along the R381 and just north of the crest of the escarpment. On 5th February 1902 he moved west to join Major H.W.G. Crofton at Uitspannen but found that Crofton had been killed by the Boers and his force captured (Watt 2013). This action occurred some 20 km southwest of the study area.

Historical buildings occur widely across the Karoo with most dating to the 19th century. *Orton et al.* (2016:15-8) noted the following:

> "In the harsh, resource-scarce Karoo environment with its restricted range of materials, necessity often was the mother of invention when it came to constructing shelter, resulting in a unique regional vernacular building tradition that displays the creative and technical achievement required to fashion an existence there. This relied on both traditional and conventional artisanal skills since buildings were hand-crafted from sun-baked bricks, locally occurring timber and quarried or collected stone. The result was a variety of local styles that we refer to collectively as Karoo vernacular."

This varied architecture is evident not only in the towns but also in remote areas. Two building traditions are unique to the Karoo. Corbelled buildings, which mainly occur to the north and west of the present study area and date between about 1813 and 1870, evolved from the need to build roofs without wooden beams (Kramer 2012). Isolated examples are mapped in the KNP and just to the south of the present study area but none are known from within it. The second tradition is known as Karoostyle and has been described by Marincowitz (2006). These buildings are typically simple rectangular structures with flat roofs and parapets. Flat roofs were often of the type referred to as 'brakdak' which consists of beams overlaid by sticks, reeds and then mud mixed with other materials such as manure or vegetation (Fagan 2008).

In rural areas buildings tend to be clustered into farm complexes with relatively few isolated structures. The complexes can include a variety of styles, while isolated structures are often small Karoostyle labourer's cottages. Due to the consolidation of farms into larger holdings in order to increase commercial viability, there are far fewer occupied farmsteads today than would have been the case in the past.

The R381 crosses the corridor but in this area has no formally built components (e.g. stone retaining walls, bridges), unlike further south where the Molteno Pass and Roseberg Pass provide access to the area above the escarpment. They were built by Thomas Bain from 1875 to 1880 but will not be affected by the proposed powerline.

5.4.2. Site visit

The corridor only includes one set of historical buildings. This is the Rocklands farm complex which has been described in Orton (2021c). Two others lie just outside the northern part of the refined 2 km corridor, with one Midlands being entirely unoccupied. The other (Uilspoort) was not visited. Midlands also has ruined stone-walled structures in the area, suggesting that the standing buildings were replacement structures. The complex lies adjacent to the R381 with the structures being a house (waypoint HL1770), a labourer's cottage (waypoint 1769) and, right next to the cottage, a reservoir (waypoint 1769). While the house likely dates to about the early-mid-20th century (Figure *5-35*), the cottage has an older stone section and a newer brick and mud mortar section (Figure *5-36*). The latter has two chimneys and has an oven and an open hearth inside it. The square reservoir is of stone and cement (Figure *5-37*). Uilspoort also lies along the R381 at the point where a river (and the R381) cuts though a long dolerite dyke.

Figure 5-35: House at waypoint *HL1770*

Figure 5-36: Labourer's cottage at waypoint HL1769. The right hand (rear) section is older.

Figure 5-37: Stone and cement water reservoir at waypoint HL1769.

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". There are several aspects that require discussion here.

The oldest is the landscape inhabited by the indigenous Bushmen hunter-gatherers and Khoekhoen who left little trace of their passing but did mark the landscape with paintings, engravings and rock gongs. This landscape is essentially a natural or primeval landscape whose components are considered under archaeology.

The second aspect is the Trekboer landscape which includes somewhat more permanent traces in the form of stone-built residential and farming structures (now in ruin) along with related features like threshing floors and graves. The historical engravings of the area are also a component of this landscape, although it seems from engravings found in other parts of the wider Hoogland study area that an unknown proportion of them are less than 100 years old. They nonetheless demonstrate the continuity of the engraving tradition in the area. These early farmers also fitted into the natural landscape but created small enclaves of "domesticated space" where they chose to place their farm complexes. Some of these complexes, or at least their agricultural lands, are surrounded by stone walls. The earliest trekboers probably left very little trace at all since they would have lived in their ox wagons before eventually settling down and building the stone structures that characterise this aspect of the cultural landscape. Some of these farm complexes are marked by the presence of small forests of grey poplar (*Populus x canescens*). These fast-growing trees were grown for their branches which were used for poles in construction. Once more, this landscape is essentially archaeological and its components have been discussed under archaeology.

The third aspect is the modern cultural landscape of agriculture, livestock and game farming, although in many places the agricultural component is largely disused as a result of the reduction in rainfall that has occurred over several decades. This landscape is comprised of widely spaced farm complexes, and a network of farm fences and tracks. The farm complexes are generally marked by

the presence of many trees and some agricultural lands (Figure *5-38*). They often contain different layers of heritage and can be thought of as areas of higher density of heritage resources. The varying age of structures and ruins in the Midlands complex has already been noted. Figure *5-39* shows the Uilspoort complex where trees have come to dominate along the river where the agricultural lands have fallen into disuse.

Figure 5-38: 1960 (449_008_03557) and modern aerial view of the Midlands werf showing the main change to be that there are less trees now, although one row is now much larger. Source: CapeFarmMapper.

Figure 5-39: 1960 (449_008_03557) and modern aerial view of the Uilspoort werf showing the agricultural lands along the river to have fallen into disuse. The R381 used to run through the complex but had already been deviated to the east by 1960. Source: CapeFarmMapper.

Part of all the above is the relatively undisturbed wilderness atmosphere that pervades the region – this includes the darkness of the night-time sky. Driving its main roads, in this case the R381 which passes through the study area, leaves one marvelling at the tremendous sense of wide open space and, away from the hills of the escarpment, the endless Karoo plains. Winter and Oberholzer (2013) have rated the Molteno Pass section of the R381 which goes up the escarpment as being a locally significant route. This rating can certainly be extended to the rest of this road for its scenic value, although it must be noted that parts of the R381 pass through the Beaufort West REDZ and three other wind farms and their grid connection have been approved by HWC in the area. The KNP lies some 33 km south of the southern end of the corridor. It is a significant landscape and offers formal protection to a section of the highly scenic escarpment. The KNP and escarpment are both too far south to be affected by the proposed powerline.

5.6. Places associated with living heritage

As noted above, the historical engravings of the area demonstrate continuity in the tradition of engraving. This signature is minimal in the study area with just poorly preserved two sites known in the grid corridor. What is perhaps of greatest interest is that the engraving tradition appears to have continued even longer than expected as evidenced by an engraving dated 1934 from elsewhere in the wider study area.

5.7. Visual impact assessment

Lawson and Oberholzer (2022) note the project setting to be an expansive semi-arid landscape. Flat-topped hills are seen as a characteristic feature of what is an otherwise fairly featureless landscape. Figure 5-40 shows a viewshed map for the 2 km wide powerline corridor. This grossly inflates the potential visibility because in reality only a single linear powerline will be constructed. It is notable that the entire corridor falls within either the presently proposed Hoogland 1 and 2 Wind Farms or the already approved Nuweveld North, West and East Wind Farms.

The site is noted to have a high level of integrity with relatively undisturbed and uncluttered rural and natural landscapes. Aside from the cultural features of the landscape, the natural components regarded as visually sensitive are the dolerite dykes, hills and outcrops.

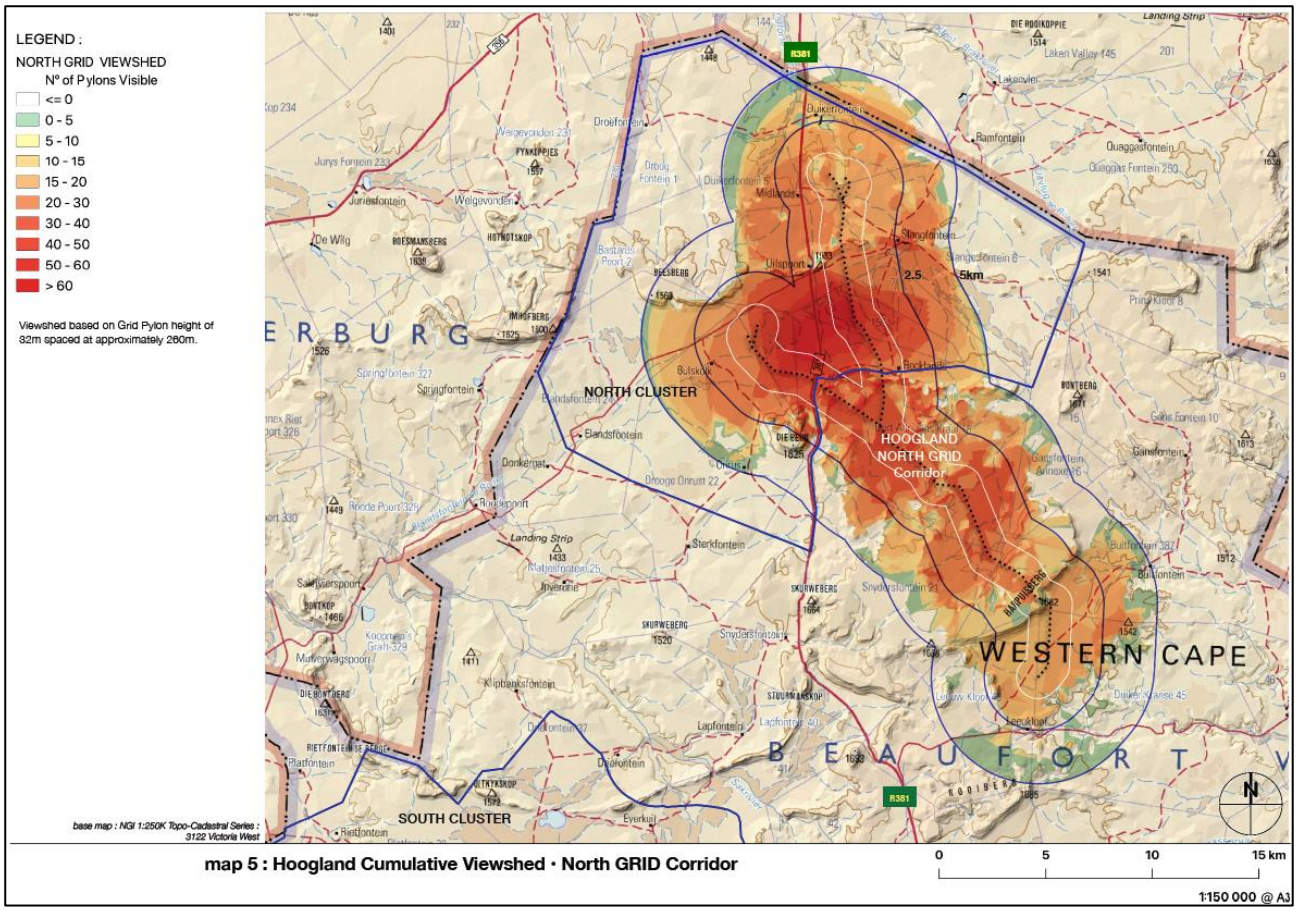


Figure 5-40: Viewshed map of the study area. Source: Lawson & Oberholzer (2022: Map 5).

5.8. 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 palaeontological resources of the study area are variable in their distribution but, although very small areas may be of high cultural significance at the local level for the scientific value of the fossils, the vast majority of the area is considered in practice to be of low significance. The most important areas should be regarded as up to Grade IIIB, although the possibility does exist for Grade IIIA fossils to occur in the study area. The majority of individual fossils outside of these areas are, however, likely to be Not Conservation Worthy (NCW) or Grade IIIC.

The archaeological resources have highly variable significance with most being very low to low (NCW or Grade IIIC). However, there are many sites of high cultural significance at the local level for their scientific, historical and social values. These most important sites are assigned Grade IIIA. Despite the wealth of archaeology, there is nothing of provincial significance in the study area.

Graves are deemed to have high cultural significance at the local level for their social value. They are Grade IIIA.

The broader cultural landscape in the vicinity of the powerline corridor has medium cultural significance at the local level for its aesthetic value and is considered to be Grade IIIB, while the escarpment edge and Karoo National Park are considered to have high significance for the same reason and are assigned Grade IIIA.

Places associated with living heritage are archaeological in nature (despite their apparently recent age) and follow the archaeological gradings.

Grading maps of heritage resources are shown in Section 6.

5.9. Summary of heritage indicators

Palaeontological resources are patchily distributed across the study area and will be impacted by the proposed wind farm. Due to their nature (i.e. buried in hard rock), it is accepted that not all fossils can be rescued but a representative sample should be retained from the study area, whether *in situ* or in an institutional collection.

- Indicator: Uncontrolled damage to fossils should be minimised as far as possible.

LSA and particularly historical archaeological sites occur widely across the study area. Engravings (including historical and recent ones indicating living heritage) are less common. All such sites and graves should be avoided by at least 30 m, although it is acceptable that power lines span above such sites if required. If existing roads and jeep tracks run close to such sites then these can be reused rather than building another new road nearby. Because engraving sites are visual in nature, significant examples should be avoided by wider margins. Historical sites are generally more difficult and/or time-consuming to mitigate which makes it strongly desirable to avoid direct impacts.

- Indicator: Buffers of at least 30 m should be maintained around known archaeological sites as far as possible.
- Indicator: As an ideal, buffers of at least 200 m should be maintained around the most significant rock art sites (i.e. grade IIIA) *as far as possible* but lower significance sites should be buffered by at least 30 m.
- 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: Direct impacts to graves must be avoided completely with a 30 m buffer.

The cultural landscape will be impacted and, because of the nature and scale of the proposed development, reducing impacts is generally difficult. The landscape views from the R381 are considered to be the most significant because of their accessibility. Determination of appropriate buffers can be guided by the visual recommendations that stipulate wider visual buffers in areas of higher scenic value, as well as for farmsteads. No indictor is proposed for the Switching Station since its location is determined by the locations of the associated wind farm infrastructure and, in the case of the southern end of the corridor, by the already approved Nuweveld Collector Substation.

- Indicator: The powerline should preferably avoid crossing the R381.
- Indicator: The powerline should be placed far enough away from the R381 to ensure that one's appreciation of the landscape is not significantly diminished.
- Indicator: The switching stations and laydown area should be away from public view.
- Indicator: Road surfacing, where required, should avoid high contrast materials.

Built heritage resources also exist in the study area but are uncommon.

- Indicator: Buildings should be avoided by at least 50 m.

6. SENSITIVITY MAPPING

Table 6-1 shows the way in which heritage sensitivity was determined. This information, together with the graded heritage resource map provided to the developer, will be used in the development of the final alignment which will be within the corridor shown in Figure *6-1* and Figure *6-2*. Note that heritage is just one of many specialists to have provided sensitivity mapping. The maps show high, medium and low sensitivity buffers. Note that full mapping of archaeological heritage resources is presented in Appendix 3, while palaeontological mapping is contained in the specialist study in Appendix 4. The entire area is regarded as a cultural landscape, although the Karoo National Park and escarpment are the most important parts. These are too far from the study area to require mapping in relation to the potential impacts. The R381 in this area is a local route with lesser significance due to being away from the major topographic landscape features. At Beaufort West there is one area of low sensitivity that has been avoided by the proposed bypass road (but does fall partly within the studied corridor), although the majority of the alignment has not been specifically surveyed.

Table *6-1:* Relationship between heritage grades, sensitivity ratings and *wind farm and grid connection* project components as developed during the early part of the project (see *Figure* 6-1 and *Figure 6-2*).

Project component	IIIA		IIIB		IIIC		NCW
	Feature	Buffer	Feature	Buffer	Feature	Buffer	Feature
Turbines	No-go	No-go	High	Medium	Medium	Low	Neutral
Substations, buildings	No-go	No-go	High	Medium	Medium	Low	Neutral
New roads and jeep tracks for upgrade	No-go	No-go	High	Medium	Medium	Low	Neutral
Existing proper gravel roads (not jeep tracks) for upgrade	No-go	High	Medium	Low	Low	Low	Neutral
Pylons	No-go	No-go	High	Medium	Medium	Low	Neutral
Overhead lines (spanning)	No-go	High	Medium	Low	Low	Low	Neutral

- Sensitivity classes are designed to be in line with the HWC grading scheme, since the gradings MUST be used in all HIAs. Although NCW is low sensitivity (the lowest rating in the Red Cap scheme), they are coloured black and called 'neutral' to distinguish low heritage sensitivity from NCW.
- Note that existing roads would obviously not go over point sites but they may pass through larger multi-component sites.
    - Existing roads to be widened/upgraded get a lower level of sensitivity as they are already present and it is more desirable to upgrade than to build a second road nearby.

- Occasionally very small 'twee-spoor' jeep tracks can pass very close to heritage sites and create minimal existing impacts. For this reason, their upgrades are best treated like building new roads.

Overhead lines spanning over sites also get lower ratings because there would be no physical damage. BUT there is still a chance of damage during construction so spanning lines are only one sensitivity level lower.

Allocation of protective buffers is as follows:

- <u>Scenic passes, roads and cultural landscapes</u>
  - Buffer to be determined by visual specialist for Grade IIIB linear features.
  - Buffer 50 m around Grades IIIA and IIIB cultural landscapes. Agricultural landscapes were delineated by including all arable lands clearly visible on aerial photography. Note that these are really visual issues and hence different buffers may be proposed by the visual practitioners. The 50 m buffer suggested here should be treated as a minimum.
- <u>Archaeology, Built environment, Graves</u>
  - Buffer 50 m around waypoints for small, single component sites (Grades IIIA to IIIC)
  - Buffer 50 m around outer edge of larger, multi-component sites (Grades IIIA to IIIC)
  - Note that, in line with the relevant heritage indicator and although it may not always be possible due to the multitude of other limitations on grid alignment, buffers of up to 200 m are encouraged for IIIA rock art sites

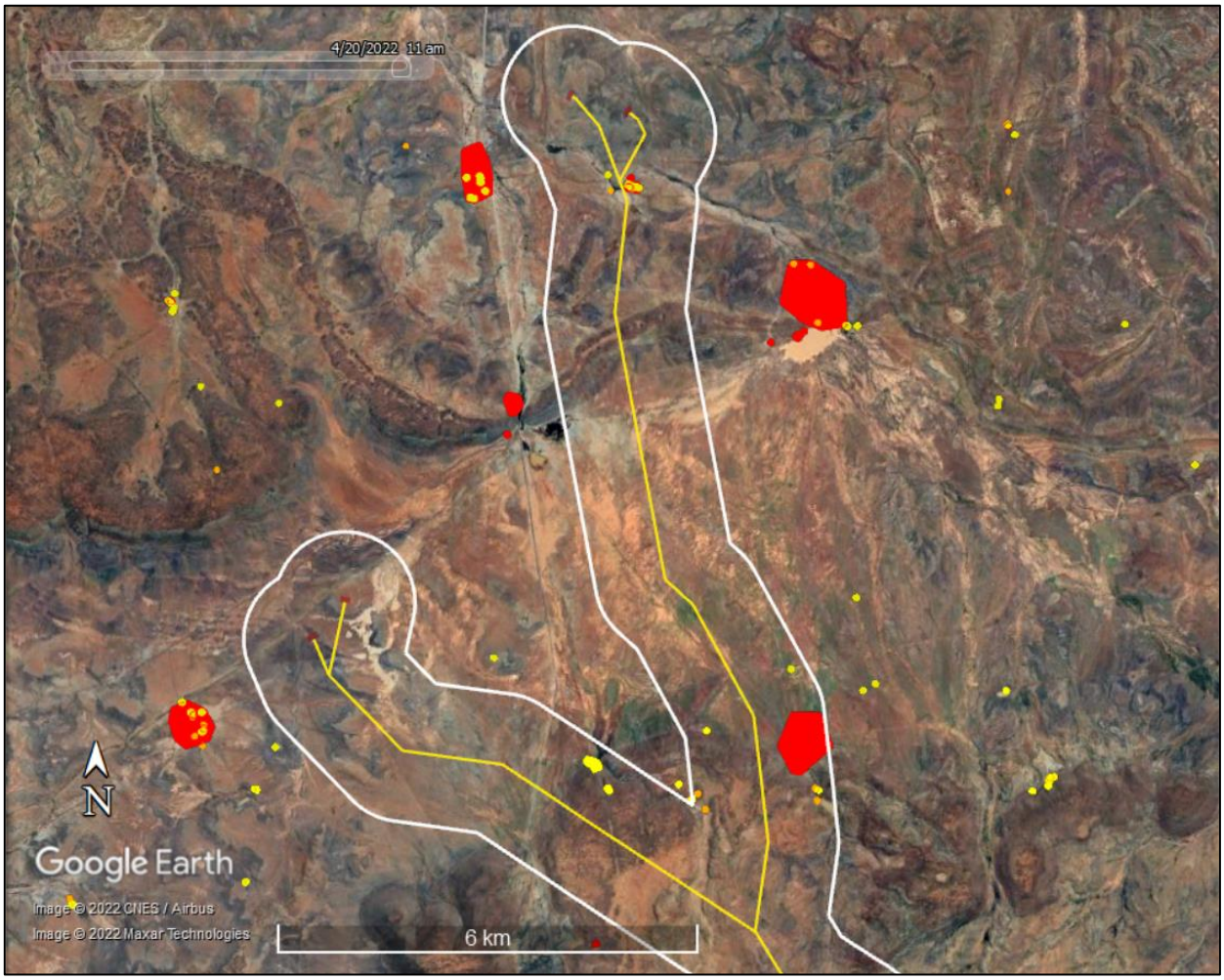


Figure 6-1: Sensitivity map of the northern half of the grid corridor. Red, orange and yellow shaded areas are high, medium and low sensitivity respectively.

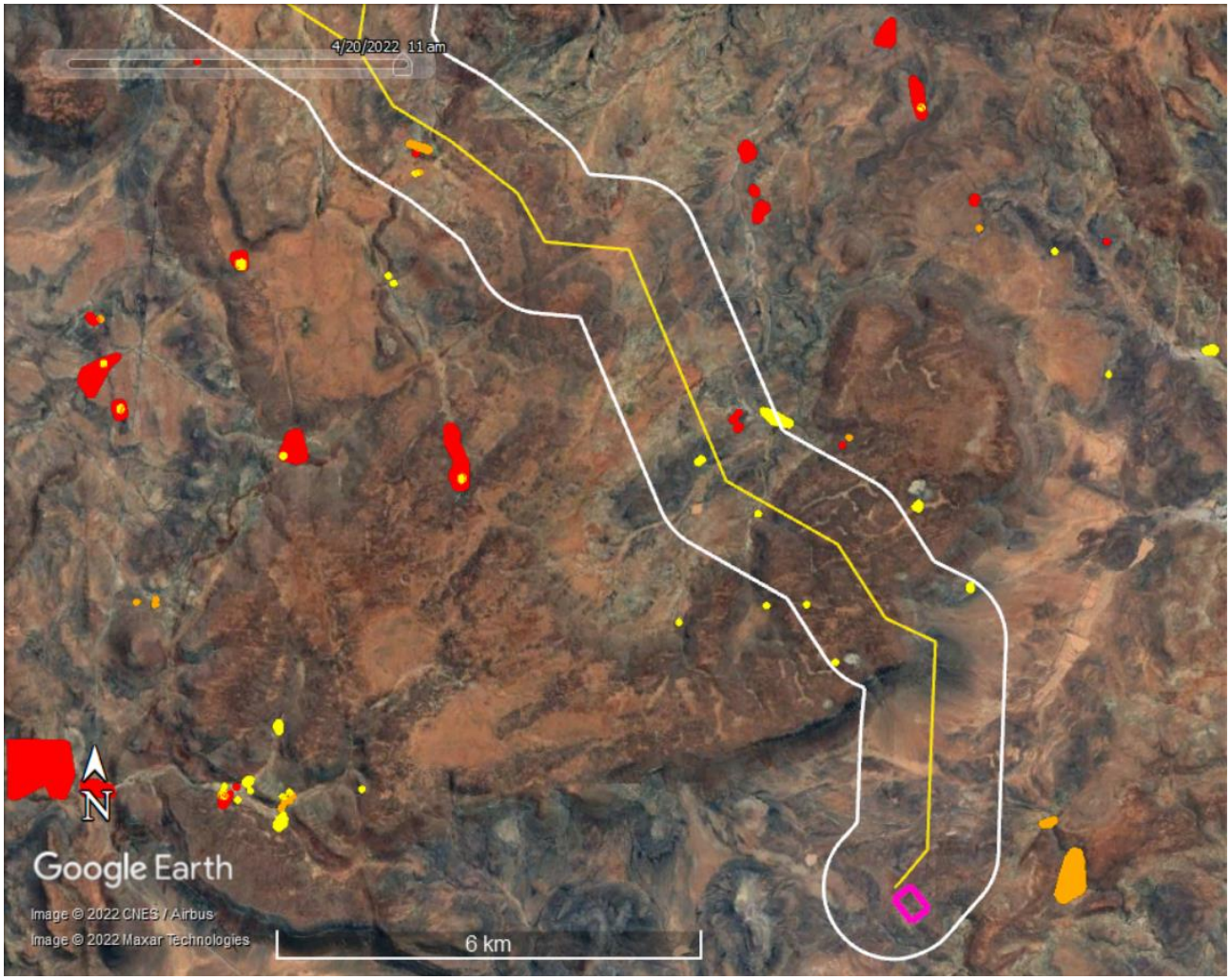


Figure 6-2: Sensitivity map of the southern half of the grid corridor. Red, orange and yellow shaded areas are high, medium and low sensitivity respectively.

7. ASSESSMENT OF IMPACTS

The main impacts identified are as follows:

- Impacts to palaeontology
- Impacts to archaeology (including places associated with living heritage); and
- Impacts to the cultural landscape (including visual impacts to historical structures).

Each of these impacts will be assessed in turn below by project phase.

7.1. Construction Phase

7.1.1. Impacts to palaeontological resources

Formal assessment of impacts to fossils is contained in the palaeontological specialist study (Almond 2021). It is noted that the impact significance was found to be **medium negative** and **very low negative** before and after mitigation respectively and that pre-construction analysis, survey and fossil collection as necessary were suggested measures to reduce impacts.

7.1.2. Impacts to archaeological resources

Direct impacts to archaeology would occur during the construction phase only, since further impacts will not occur once the powerline and service tracks have been established. Since there is no fixed alignment within the corridor this assessment proceeds on the assumption that some archaeology could be found along the proposed alignment. While most occurrences are likely to be of low to very low cultural significance, there is a chance that more significant finds could be revealed. An intensity of medium has thus been predicted. Because of the reasonably small chance of significant heritage resources being found, the impact significance calculates to **low negative** (Table 7-1). Mitigation will entail commissioning a pre-construction survey to locate any as yet undiscovered archaeology within the footprint. Any sites found that require further attention could then either be avoided through micrositing or else mitigated through recording, mapping and collection as necessary under an approved Workplan issued by HWC. The post-mitigation impact significance is **very low negative**. There are no fatal flaws in terms of construction phase impacts to archaeology.

Table 7-1: Assessment of archaeological impacts.

Issue	Impacts to archaeological resources	
Description of Impact		
Archaeological materials can be damaged or destroyed during grubbing of the track and excavation of pylon foundations.		
Type of Impact	Direct	
Nature of Impact	Negative	
Phases	Construction	
Criteria	**Without Mitigation**	**With Mitigation**
Intensity	Medium	Very Low
Duration	Permanent	Permanent
Extent	Site	Site
Consequence	Medium	Low
Probability	Conceivable	Conceivable
Significance	Low -	Very Low -
Degree to which impact can be reversed	Low. Heritage resources cannot be replaced or recreated.	
Degree to which impact may cause irreplaceable loss of resources	High. Heritage resources are unique and irreplaceable.	
Degree to which impact can be mitigated	High. Archaeological heritage can very easily be sampled and/or mapped as needed, although in the case of historical sites this can be more time-consuming.	

Mitigation actions		
The following measures are recommended:	Pre-construction survey of the alignment (powerline and service track) followed by micrositing or mitigation as appropriate or possible.	
Monitoring		
The following monitoring is recommended:	ECO to ensure that construction activities remain in approved footprint.	
Cumulative impacts		
Nature of cumulative impacts	Negative	
Rating of cumulative impacts	**Without Mitigation**	**With Mitigation**
	Low -	Very Low -

7.1.3. Impacts to the cultural landscape

Direct impacts to the cultural landscape will occur during construction when large vehicles and equipment are brought into the rural landscape, altering it to one with a more industrial character. The activity, dust and noise will also disturb the sense of place. These impacts are rated as being of low intensity since they would generally only occur in one area at a time. Their duration will be relatively short, depending on the duration of the construction phase. The pre-mitigation impact significance calculates to **low negative** (Table 7-2). Mitigation measures will entail minimising the duration of the construction period and minimising and/or reducing the visual disruption to the landscape. Because of the scale of the equipment and structures involved and the fact that one crossing over the R381 will be needed, these measures are unlikely to affect the significance rating enough to drop it a level. The post-mitigation significance thus remains at the **low negative** level. There are no fatal flaws in terms of construction phase impacts to the cultural landscape.

Table 7-2: Assessment of construction phase impacts to the cultural landscape.

Issue	Visual intrusion into the cultural landscape and disturbance of the setting and context of heritage resources.	
Description of Impact		
Intrusion into the rural landscape of industrial equipment and powerlines.		
Type of Impact	Direct	
Nature of Impact	Negative	
Phases	Construction	
Criteria	**Without Mitigation**	**With Mitigation**
Intensity	Low	Low
Duration	Short-term	Short-term
Extent	Site	Site
Consequence	Low	Low
Probability	Definite / Continuous	Definite / Continuous
Significance	Low -	Low -
Degree to which impact can be reversed	Medium. Once construction is complete all the equipment would be removed but the pylons and access roads would remain present. However, almost all noise and activity would cease.	
Degree to which impact may cause irreplaceable loss of resources	Medium. Every landscape setting is unique but similar landscapes do occur widely in the central interior of South Africa.	

Degree to which impact can be mitigated	Low, since concealing the activity and structures is not feasible.	
Mitigation actions		
The following measures are recommended:	Design the layout to minimise the number of crossings over the R381. Keep construction duration as short as possible. Minimise landscape scarring. Rehabilitate any areas not required during operation in accordance with the rehabilitation plan. Where road surfacing is required use low contrast materials.	
Monitoring		
The following monitoring is recommended:	ECO to ensure that construction activities remain in approved footprint.	
Cumulative impacts		
Nature of cumulative impacts	Negative	
Rating of cumulative impacts	**Without Mitigation**	**With Mitigation**
	Low -	Low -

7.2. Operation Phase

7.2.1. Impacts to the cultural landscape

Direct impacts to the cultural landscape will occur during operation as a result of the presence of the powerline and associated infrastructure in the landscape. They will result in an industrial character being introduced but are not highly visible from great distances. These impacts are rated as being of very low intensity and it is likely that, in time, the powerline would gradually become an acceptable component of the local landscape. The impact duration will be long term, depending on the duration of the operation phase. The pre-mitigation impact significance calculates to **low negative** (Table 7-3). No feasible mitigation measures for reducing visual intrusion exist. One best practice mitigation measure suggested is to ensure that all maintenance activities remain in the authorised footprint and that vehicles remain on the approved roads and tacks. This is unlikely to affect the significance rating enough to reduce impacts. The post-mitigation significance thus remains at the **low negative** level. There are no fatal flaws in terms of operational phase impacts to the cultural landscape.

Table 7-3: Assessment of operation phase impacts to the cultural landscape.

Issue	Visual intrusion into the cultural landscape and disturbance of the setting and context of heritage resources.	
Description of Impact		
Intrusion into the rural landscape of powerlines.		
Type of Impact	Direct	
Nature of Impact	Negative	
Phases	Operation	
Criteria	**Without Mitigation**	**With Mitigation**
Intensity	Very Low	Very Low
Duration	Long-term	Long-term
Extent	Local	Local
Consequence	Low	Low

Probability	Definite / Continuous	Definite / Continuous
Significance	Low -	Low -
Degree to which impact can be reversed	High. Once the powerline is decommissioned and the land rehabilitated, the impacts would be almost entirely gone.	
Degree to which impact may cause irreplaceable loss of resources	Medium. Every landscape setting is unique but similar landscapes do occur widely in the central interior of South Africa. With decommissioning the landscape could be restored.	
Degree to which impact can be mitigated	Low, since concealing the activity and structures is not feasible.	
Mitigation actions		
The following measures are recommended:	No regular maintenance activities to take place outside of the authorised footprint and all vehicles to remain on authorised roads and tracks.	
Monitoring		
The following monitoring is recommended:	No specific monitoring other than to ensure the above measure is complied with.	
Cumulative impacts		
Nature of cumulative impacts	Negative	
Rating of cumulative impacts	**Without Mitigation**	**With Mitigation**
	Very Low -	Very Low -

7.3. Decommissioning Phase

7.3.1. Impacts to the cultural landscape

Direct impacts to the cultural landscape will occur during decommissioning when large vehicles and equipment are brought into the rural landscape, altering it to one with a more industrial character. The activity, dust and noise will also disturb the sense of place. These impacts are rated as being of low intensity but their duration will be relatively short, depending on the duration of the decommissioning period. The pre-mitigation impact significance calculates to **low negative** (Table 7-4). Mitigation measures will entail minimising the duration of the decommissioning period and minimising and/or reducing the visual disruption to the landscape. Because of the scale of the equipment and structures involved, these measures are unlikely to affect the significance rating enough to drop it a level. The post-mitigation significance thus remains at the **low negative** level. There are no fatal flaws in terms of decommissioning phase impacts to the cultural landscape.

Table 7-4: Assessment of decommissioning phase impacts to the cultural landscape.

Issue	Visual intrusion into the cultural landscape and disturbance of the setting and context of heritage resources.
Description of Impact	
Intrusion into the rural landscape of industrial equipment and powerlines.	
Type of Impact	Direct
Nature of Impact	Negative
Phases	Decommissioning

Criteria	Without Mitigation	With Mitigation
Intensity	Low	Low
Duration	Short-term	Short-term
Extent	Site	Site
Consequence	Low	Low
Probability	Definite / Continuous	Definite / Continuous
Significance	Low -	Low -
Degree to which impact can be reversed	Medium. Once decommissioning is complete all the equipment would be removed and almost all noise and activity would cease. Rehabilitation of well-established tracks may be difficult to fully accomplish.	
Degree to which impact may cause irreplaceable loss of resources	Low. Every landscape setting is unique but similar landscapes do occur widely in the central interior of South Africa. With decommissioning the landscape could be restored.	
Degree to which impact can be mitigated	Low, since concealing the activity and structures is not feasible, but their removal is, in effect, a form of mitigation.	
Mitigation actions		
The following measures are recommended:	Keep decommissioning duration as short as possible. Ensure effective rehabilitation of all areas.	
Monitoring		
The following monitoring is recommended:	ECO to ensure that decommissioning activities remain in approved footprint.	
Cumulative impacts		
Nature of cumulative impacts	Negative	
Rating of cumulative impacts	**Without Mitigation**	**With Mitigation**
	Low -	Low -

7.4. 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).

Other than the proposed Nuweveld Grid Connection, there are currently no approved or existing high voltage powerlines in the area within a 30 km radius of the project site (Figure *7-1*). The nearest operational wind farm from the site is the Noblesfontein Wind Farm located approximately 65 km to the east. In addition, the South African Renewable Energy EIA Application Database (REEA) ("REEA_OR_2021_Q4") shows several renewable energy projects (solar) authorised close to Beaufort West. Further research confirmed that none of these projects are going ahead/have a valid EA. The cumulative impact assessed will therefore be the collective impact of the four Hoogland Wind Farms and Grid Connection applications with the three Nuweveld Wind Farm and Gridline applications (Figure *7-1*). The low voltage lines supplying the local farms result in negligible impacts to the landscape and are not taken into consideration in the assessment of cumulative impacts.

The project is seeking the authorisation of a corridor rather than a specific alignment. One reason for this is to allow for micrositing during the pre-construction phase so that impacts to heritage resources, among other things, can be minimised. Cumulative impacts to archaeological heritage

are expected to be of **low negative** significance before mitigation (Table 7-1) and would occur during the construction phase of the various projects, since there is the possibility that some archaeological resources could still be present within the final authorised footprints. A pre-construction survey will be required to determine whether any sites require avoidance through micrositing or else archaeological mitigation. Post-mitigation impact significance is expected to be **very low negative**.

Impacts to the cultural landscape are largely visual and relate to the intrusion of industrial-type structures and equipment in the cultural landscape. These impacts will occur during all phases and are rated as **low negative** for construction and decommissioning because of the associated equipment, vehicles and activity. The operation phase impacts are rated **very low negative**. There is no mitigation that can make a meaningful difference to these ratings since the powerline is far too large to hide. Measures that are suggested anyway are as listed in Table 7-2 to Table 7-4. With mitigation the ratings remain at **low negative** and **very low negative** as above.

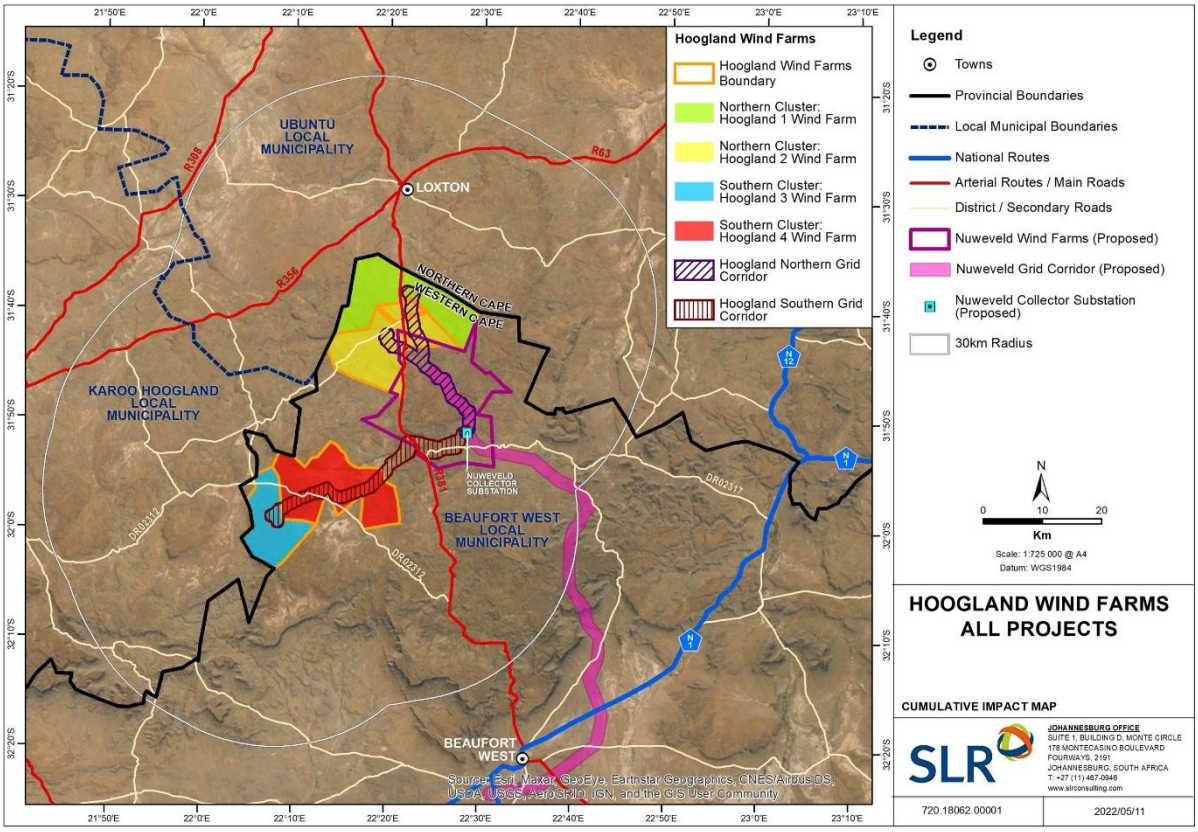


Figure 7-1: Cumulative Map indicating renewable energy facilities within the 30km buffer of the Hoogland Wind Farms and Grid Connection.

7.5. 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 proposed WEFs that the proposed powerline is intended to support would generate and feed electricity into the national grid. This is something very much needed for economic development in South Africa due to the historical and ongoing problems associated with electricity supply. Economic

development has knock-on effects throughout society, but it is also noted that construction and operation phase jobs would be created. This provides a socio-economic benefit. The expected impacts to heritage resources from the development are generally low and are thus outweighed by the potential benefits to be derived.

7.6. Existing impacts to heritage resources

Aside from the natural degradation, weathering and erosion that will affect fossils, archaeological materials and buildings, the only obvious threat to heritage resources on the site is the robbing and reuse of stones and possibly bricks from historical sites. Trampling from grazing animals and/or farm/other vehicles could also occur. Some of the buildings are unoccupied and unmaintained which is also resulting in accelerated natural degradation. The impacts to archaeological sites from the removal of building materials is considered to be of **low negative** significance, since these sites are, in any case, likely to be in a ruinous state before being raided. Other existing impacts are generally **insignificant** or **very low negative**. There are no existing impacts to the landscape.

7.7. The No-Go alternative

Due to the corridor approach being taken, no alignment alternatives will be assessed. However, it is required that the 'no-go' alternative be assessed. The 'no-go' alternative is the option of not constructing the project where the status quo of the current farming activities on the site would prevail.

Not constructing the powerline means that the study area would remain undeveloped and the status quo (as per Section 7.6) would be retained. The associated wind farms would also not be constructed since there would be no means of evacuating the power. The impacts that would occur would be as per the existing impacts described above. Importantly, electricity generation would not take place, which means that this benefit would be lost to society. 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.

7.8. 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. Any uncontrolled impacts to standing heritage structures are unacceptable. 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.

8. MITIGATION AND EMPR REQUIREMENTS

The primary mitigation measure that needs to be complied with is to have the final authorised alignment surveyed well before construction starts. This should occur at least six and preferably eight months before construction to allow time for the following sequence of activities:

- Pre-construction survey;
- Survey report;
- Workplan application to HWC for any archaeological sites that require excavation;

- Consideration, approval and issuing of the Workplan approval;
- Mitigation excavations as needed;
- Reporting; and
- Final approval by HWC.

The actions recorded in Table 8-1should be included in the environmental management program (EMPr) for the project. Note that palaeontological considerations are contained in the relevant specialist report.

Table 8-1: **Heritage considerations for inclusion in the EMPr.**

Impact	Mitigation / management objectives	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, micrositing of infrastructure where possible	Appoint archaeologist to conduct survey c. 6 months before construction to allow for approval of survey report and workplan application, conducting of mitigation and approval of mitigation report	Once-off	Project developer
		Archaeological excavation and sampling of significant sites that cannot be avoided	Appoint archaeologist to conduct excavations 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 *in situ* and stop work in immediate area	Inform staff and carry out inspections of excavations	Ongoing basis	Construction Manager or Contractor
				Whenever on site (at least weekly)	ECO
Impacts to built heritage					
Damage or destruction of buildings	Avoid impacts	Ensure all structures on site are no-go areas using signage if close enough to be at risk	Inform staff and carry out inspections	Ongoing basis	Construction Manager or Contractor
				Whenever on site (at least weekly)	ECO
Impacts to the cultural landscape					
	Minimise landscape scarring	Ensure disturbance is kept to a minimum and	Monitoring of surface clearance	Ongoing basis	Construction Manager or Contractor

Impact	Mitigation / management objectives	Mitigation / management actions	Monitoring		
			Methodology	Frequency	Responsibility
Visible landscape scarring		does not exceed project requirements. Rehabilitate areas not needed during operation in accordance with the revegetation and rehabilitation plan.	relative to approved layout	As required	ECO

9. CONSULTATION WITH HERITAGE CONSERVATION BODIES

As per the HWC requirements (see 1.2 above), the final HIA was sent to the local municipality and registered (with HWC) heritage conservation bodies for 30 days of consultation prior to submission.

A separate letter with the results will be submitted to HWC with the HIA.

10. CONCLUSIONS

In general, the corridor approach being followed is expected to result in few, if any, impacts to heritage resources, aside from the unavoidable impacts to the wider cultural landscape. Because only a provisional alignment is available for assessment, which is not yet final, mitigation will largely be applied in the pre-construction phase. Significant impacts are however not expected to occur. Table 10-1 lists the project responses to the heritage indicators.

Table 10-1: **Heritage indicators and project responses.**

Indicator	Project Response
Uncontrolled damage to fossils should be minimised as far as possible.	With no final alignment yet available, this indicator will need to be met during the pre-construction phase but this is expected to be easily accomplishable.
Buffers of at least 30 m should be maintained around known archaeological sites as far as possible.	With no final alignment yet available, this indicator will need to be met during the pre-construction phase but this is expected to be easily accomplishable.
Buffers of at least 200 m should be maintained around the most significant rock art sites (i.e. grade IIIA) as far as possible but lower significance sites should be buffered by at least 30 m.	With no final alignment yet available, this indicator will need to be met during the pre-construction phase but this is expected to be easily accomplishable, although in the case of grade IIIA sites being found it may not be possible to shift the line as much as 200 m.
Direct damage to archaeological sites should be avoided as far as possible and, where some	With no final alignment yet available, this indicator will need to be met during the pre-

Indicator	Project Response
damage to significant sites is unavoidable, scientific/historical data should be rescued.	construction phase but this is expected to be easily accomplishable.
Direct impacts to graves must be avoided completely with a 30 m buffer.	With no final alignment yet available, this indicator will need to be met during the pre-construction phase but this is expected to be easily accomplishable.
The powerline should preferably avoid crossing the R381.	One crossing will be required due to the location of the wind farm substations on either side of the R381 and because the project sites straddle this road.
The powerline should be placed far enough away from the R381 to ensure that one's appreciation of the landscape is not significantly diminished.	The alignment is provisional and has not been finalised but the VIA notes areas within 100 m of the R381 as No-Go for the pylons (high sensitivity is up to 150 m away). Placing of pylons will need to be considered during the design phase.
The switching stations and laydown area should be away from public view.	At HL01 this has been done. At HL02 the switching stations will be less than 1 km from a public road (DR02315) over relatively flat terrain, but the site has been approved by the visual consultants.
Road surfacing, where required, should avoid high contrast materials.	This will be a recommendation, since it is not known yet whether any surfacing will be required.
Structures should be avoided by at least 50 m.	This indicator will need to be met during the pre-construction phase but this is expected to be easily accomplishable.

10.1. Reasoned opinion of the specialist

Given that the site lies partly inside a REDZ and a powerline corridor and that wind farms have already been approved in the area, the proposed land use is deemed acceptable because electrical infrastructure is to be expected in the future. The various other individual impacts highlighted above can easily be dealt with through micrositing or archaeological mitigation as appropriate. It is therefore the opinion of the heritage specialist that the proposed development should be authorised in full, but subject to the recommendations listed below.

11. RECOMMENDATIONS

It is recommended that the proposed project be approved but subject to the following recommendations which must be captured in the EA, should one be issued:

- A pre-construction survey of the entire final alignment (powerline and service tracks) must be undertaken in order to determine whether any archaeological sites may need mitigation or protection through micrositing (if possible);

- The final alignment (powerline and service tracks) must be evaluated by a palaeontologist to determine which areas, if any, need a pre-construction survey. These will be previously unsurveyed and potentially sensitive areas;
- If necessary, and subject to the agreement of Heritage Western Cape, a Workplan application should be submitted prior to the palaeontological survey to allow for sample collection during the survey;
- A palaeontological chance finds procedure must be incorporated into the EMPr;
- All heritage structures must be avoided by the powerline by at least 50 m whether occupied or not;
- Landscape scarring must be minimised during construction;
- If road surfacing is required then low contrast materials such as concrete with brown exposed aggregate should be used, where possible;
- All areas not required during operation must be fully rehabilitated in accordance with the Rehabilitation and Revegetation Plan;
- Visually sensitive skylines, rock outcrops and steep slopes must be avoided as per the recommendations of the visual impact assessment;
- Switching stations and temporary laydown areas should be located away from scenic features, farmsteads and public roads; and
- If any archaeological material or human burials are uncovered during the course of development then work in the immediate area should be halted. The find would need to be reported to the heritage authorities and may require inspection by an archaeologist. Such heritage is the property of the state and may require excavation and curation in an approved institution.

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APPENDIX 1 – Curriculum Vitae

Curriculum Vitae

Jayson David John Orton

ARCHAEOLOGIST AND HERITAGE CONSULTANT

Contact Details and personal information:

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

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

Education:

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

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

Employment History:

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

Professional Accreditation:

Association of Southern African Professional Archaeologists (ASAPA) membership number: 233
CRM Section member with the following accreditation:

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

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

- Accredited Professional Heritage Practitioner

➢ *Memberships and affiliations:*

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

Fieldwork and project experience:

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

Feasibility studies:

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

Phase 1 surveys and impact assessments:

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

Phase 2 mitigation and research excavations:

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

Awards:

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

APPENDIX 2 – List of finds

Two lists are presented here. The first shows all sites within the Hoogland Northern Grid corridor that were recorded during the 2021/2022 fieldwork for the Hoogland projects. The second shows those sites in the corridor that were recorded during the 2019 fieldwork for the Nuweveld projects. Due to some overlaps in the waypoint numbers, the project abbreviation is used in the report with the waypoint to differentiate them.

Project	Waypoint	Co-ordinates	Description	Grade
HL	1703	S31 39 10.6 E22 22 18.4	A large LSA scatter of hornfels and wacke flaked artefacts on a river bank. Also ostrich eggshell fragments and some sandstone flakes. Extends about 30 m south and 30 m northwest of the waypoint and is bisected by a farm track.	IIIB
HL	1704	S31 39 08.2 E22 22 28.0	A house plinth with all walls removed. It is 3.5 m wide and 10 m long. There is a hearth foundation of 1x1 m on the south-eastern end of the house. There are three cross walls with the second room from the northwest being the largest. The other three are all about the same size. There is a light scattering of glass, ceramics and metal lying about.	IIIC
HL	1705	S31 39 07.7 E22 22 28.0	A small stone foundation of 2x3 m. There is black and green glass and some ceramics (coarse porcelain, transfer printed, hand-painted), ostrich eggshell and bone scattered about.	IIIC
HL	1706	S31 39 09.1 E22 22 28.7	An ash heap with plenty of bone, glass (black, light and dark green, clear, purple, blue, aqua), ceramics (transfer-printed, hand-painted, lined industrial ware, stoneware), metal, a dolerite upper grindstone, a horseshoe and a copper lid and chain. Within the ash heap there are also two small stone features/structures of 1x1 m and 1.5x1.5 m.	IIIA
HL	1707	S31 39 09.2 E22 22 29.8	A small northeast-facing house with two square rooms and a stoep. The house is badly tumbled but both main rooms have doors facing northeast and a shelf sits in the southern corner of the south-eastern room. There is a light scatter of glass, ceramics and metal in the vicinity. Also a dolerite cobble upper grindstone.	IIIC
HL	1708	S31 39 08.7 E22 22 29.8	A small ash and rubbish heap with a stone cluster in it that looks like, but presumably is not, a grave.	IIIC
HL	1709	S31 39 09.0 E22 22 31.9	Two single room stone kraals with other walling partially linking them. The northern kraal also has two smaller structures built onto its southern and eastern corners. The northern kraal is far better preserved than the southern one with the latter having been removed to ground level. There is a 4 m wide entrance on the north side of the northern kraal. A 1 m diameter circular feature occurs in the middle of the eastern part of the southern kraal.	IIIC
HL	1710	S31 39 09.4 E22 22 33.6	This is the southern point of the 1709 kraal complex.	
HL	1711	S31 39 09.2 E22 22 27.7	A single grave with head and foot stones about 1.3 m apart.	IIIA
HL	1712	S31 39 04.0 E22 22 29.7	A collection of stone slabs lying on a river terrace. Their function cannot be determined.	NCW
HL	1713	S31 39 04.8 E22 22 29.4	Probably three graves with the stone coverings of two of them having been affected by erosion. Only one grave is clear and has a head/foot stone on its eastern end. The three align west-east and are parallel to one another supporting all three being graves.	IIIA

Project	Waypoint	Co-ordinates	Description	Grade
HL	1714	S31 39 02.2 E22 22 29.3	A place where building blocks have been sourced along the river. Unclear whether any formal quarrying happened since it looks as though the rock layer just breaks up on its own.	NCW
HL	1715	S31 39 06.6 E22 22 21.9	A stone cluster and a small stone cairn on a hilltop overlooking a river. There is also an ephemeral LSA hornfels artefact scatter on this hilltop.	NCW
HL	1716	S31 39 03.4 E22 22 16.8	Stone walling that seems to have surrounded part of the river valley. In this area it is running from SE to NW. It then turns SW across the river and runs back towards the SE again. Seems variably preserved.	IIIC
HL	1717	S31 39 02.6 E22 22 17.6	A circular stone-walled structure of about 3 m diameter.	NCW
HL	1718	S31 39 00.1 E22 22 15.7	A stone structure that was inaccessible due to a fence but looks very similar in size and preservation to 1717.	NCW
HL	1719	S31 39 07.5 E22 22 13.6	An ephemeral scatter of LSA hornfels flaked artefacts.	NCW
HL	1720	S31 39 02.9 E22 22 47.0	A concrete dam with an associated concrete leiwater leading water from another stream into the dam.	NCW
HL	1776	S31 42 50.5 E22 23 55.8	A stone dam and wind pump.	IIIC
HL	114	S31 41 56.0 E22 19 38.9	An earthen-walled dam packed with stones.	NCW
HL	707	S31 40 20.6 E22 22 24.2	A cluster of small manuported stones on dolerite soil with one of them being a large chopper. One end is flaked from use and the other crushed.	NCW

Project	Waypoint	GPS co-ordinate	Description	Grade
NV	029	S31 44 02.0 E22 23 12.0	Stone Alignment from the base of a now-removed fence.	NCW
NV	030	S31 43 48.6 E22 24 09.6	Quarry for hornfels building blocks.	NCW
NV	031	S31 43 46.9 E22 24 11.0	Small scatter of hornfels artefacts and a ceramic fragment on rocky slope.	NCW
NV	032	S31 43 46.6 E22 24 10.8	Scatter of glass and ceramic fragments, OES and flaked hornfels.	NCW
NV	033	S31 43 45.7 E22 24 10.5	Scatter of LSA material – hornfels artefacts, OES – eroded on the alluvium.	IIIC
NV	034	S31 43 44.8 E22 24 10.9	Small stone wall, approx. 1.5m long.	NCW
NV	037	S31 45 46.6 E22 24 07.1	Stone kraal, roughly rectangular in shape, made of single large dolerite boulders. Approx. 6x9m.	IIIC
NV	1367	S31 43 33.2 E22 22 08.7	Stone kraal.	IIIC
NV	1368	S31 43 32.9 E22 22 06.5	Stone kraal.	
NV	1369	S31 43 33.8 E22 22 09.7	Low density historical artefact scatter.	
NV	025	S31 43 34.2 E22 22 11.0	Part of a stone wall, possibly at the edge of a dump. Slight concentration of historical cultural material next to it.	
NV	026	S31 43 34.7 E22 22 10.3	Rectangular stone structure mostly made of large single boulders, approx. 4-5x10m. Divided by wall into larger part (with two small sections of wall on S wall) and smaller part.	
NV	1370	S31 43 36.3 E22 22 09.6	Dense scatter of hornfels artefacts and ostrich eggshell fragments on the slope of a dolerite hill.	IIIC

Project	Waypoint	GPS co-ordinate	Description	Grade
NV	1371	S31 43 25.9 E22 23 52.5	Two cleared strips of ground with the dolerite cobbles pushed to the edges. Function unknown.	IIIA
NV	1372	S31 43 29.6 E22 23 58.6	Stone walling, possibly a kraal, on a dolerite hill.	
NV	1373	S31 43 35.8 E22 23 58.3	Stone walling including a kraal.	
NV	1490	S31 43 28.7 E22 24 05.2	The Rocklands farmstead contains a variety of structures. There is a vernacular labourers' cottage at this waypoint and a stone ruin very nearby. There are many stone walls in the farm complex as well. The main house may be Victorian in age originally but has been much modified and added to over the years, although an adjoining structure retains more of its original features.	
NV	1396	S31 43 23.1 E22 23 59.5	A circular stone feature that looks like a threshing floor (truncated by adjoining gravel track but with a smaller stone circular stone feature inside it.	
NV	1397	S31 43 12.1 E22 24 05.6	Various stone walls occur in the area to the west and northwest of this point.	
NV	1398	S31 43 28.3 E22 24 00.0	There is much stone walling within the farm complex around this point. Note that the farmhouse has been heavily renovated and lacks historical qualities. Other outbuildings in the complex were not specifically recorded, though no significant historical structures were noticed during our brief visit.	
NV	1713	S31 43 23.0 E22 24 12.6	Set of labourers' cottages to the northeast of the farm complex. The two on the northeast end of the row are the youngest. Aerial photography reveals that only the two on the southwest end predate 1959.	
NV	027	S31 43 25.1 E22 23 52.6	Possible old brick kiln with rejected bricks and slag.	
NV	1374	S31 43 45.3 E22 23 08.4	Stone alignment from the base of an old fence running north-south that has been removed. This feature went for a long distance and was only recorded here.	NCW
NV	1375	S31 43 47.3 E22 23 05.5	C-shaped LSA stone-walled feature with hornfels artefacts and ostrich eggshell fragments inside and alongside it.	IIIB
NV	1378	S31 43 49.8 E22 23 02.2	An approximately 20 m diameter scatter of LSA hornfels artefacts in an open area between the dolerite koppie with the stone-walled enclosure (1375) and the river. There was also one flake of possible volcanic chert or quartzite. The scatter is of moderate density.	IIIC
NV	1379	S31 43 52.8 E22 23 05.8	Widespread low density LSA hornfels artefacts scatter along the river. No obvious concentrations.	NCW
NV	1380	S31 43 54.5 E22 23 09.4	A dolerite outcrop with four rock gongs. The top of the outcrop is fractured and four of the corner points on the pieces have been heavily battered from ringing them. They make four different notes. There was also low density hornfels artefacts and ostrich eggshell scatter around about.	IIIB
NV	1381	S31 43 50.8 E22 24 03.9	Two stone piles/cairns, one on either side of the track.	NCW
NV	1382	S31 43 50.4 E22 24 09.7	Large formally constructed stone-walled dam. It is heavily silted up. Must have held a lot of water originally. The full supply level extends at least 400 m upstream. A small cottage just south of the dam wall is shown on historical aerial photographs to be older than 60 years but was not recorded on site because recent	IIIB

Project	Waypoint	GPS co-ordinate	Description	Grade
			modification suggested t=it to be modern. The grade here applies to the dam with the cottage being NCW.	
NV	1383	S31 43 46.3 E22 24 09.9	Small stone feature. It is unlikely to be a grave.	NCW
NV	1384	S31 43 44.7 E22 24 09.0	Stone walling on a steep hill above a river. It is U-shaped with the arms pointing down to the river.	NCW
NV	1385	S31 43 45.0 E22 24 08.5	Rock outcrops with stone walling in front of them and an extremely dense scatter of ostrich eggshell fragments with some LSA hornfels artefacts. It is on the crest of a hill overlooking a river.	IIIB
NV	1386	S31 45 37.7 E22 24 07.3	Dolerite outcrop with an overhanging wall facing towards the south. There are many hornfels artefacts and ostrich eggshell fragments in the shelter and also one mineral-tempered pottery fragment. There is also some bone that almost certainly belongs with the LSA material but some recent tortoise bones clearly originate from birds of prey dropping young tortoises on the outcrop. Below the shelter there is a rock step and below this there is an outcrop kraal built up against the step.	IIIA
NV	1387	S31 45 33.3 E22 24 04.4	Small stone house ruin overlooking a watercourse. It has an east-facing doorway and some collapsed walling forming two more rooms on its east side. There are a few glass, ceramic and metal artefacts scattered about the area that seem likely to be early 20th century.	IIIB
NV	035	S31 45 35.4 E22 24 12.1	Semi-circular kraal of dolerite blocks, approx. 4x4m.	
NV	036	S31 45 36.0 E22 24 14.1	Rectangular stone kraal made of dolerite boulders, approximately 7 x 9m.	
NV	1388	S31 45 38.9 E22 23 56.2	An isolated LSA lower grindstone.	NCW
NV	1389	S31 45 46.1 E22 24 09.0	A historical stone-walled kraal built up against the south side of a dolerite outcrop. Although it has the look of an LSA kraal, it seems to be better built suggesting it is relatively recent.	IIIB
NV	1395	S31 43 22.9 E22 23 58.5	The grave of Johanna Hope who died in 1916. There is no graveyard or actual grave covering (only a headstone) and the grave is overgrown.	IIIA
NV	1399	S31 43 11.0 E22 23 58.1	An isolated LSA lower grindstone.	
NV	1400	S31 43 40.2 E22 22 20.3	A small northeast-facing rock shelter in a dolerite cliff with many ostrich eggshell fragments in front of it. There is also some modern white painted graffiti on this outcrop (several crosses, 'HUMO' and 'B.P.').	NCW
NV	1401	S31 43 45.8 E22 22 17.5	An LSA hornfels artefact scatter on the dolerite ridge between two river valleys. There was also one flake of possible volcanic chert or quartzite. The scatter is of low-moderate density.	IIIC
NV	1402	S31 43 45.0 E22 22 16.9	More of the above scatter but it is of moderate density here. A hornfels adze and a scraper/core on possible volcanic chert or quartzite were also seen.	
NV	1420	S31 49 01.0 E22 27 34.8	A small ruined stone-walled structure of indeterminate function.	IIIC
NV	1423	S31 48 20.4 E22 27 09.5	A small ruined stone-walled structure of indeterminate function.	IIIC
NV	1424	S31 47 41.8 E22 26 58.8	Well-built and well-preserved (only the north wall has collapsed) stone house with a 3 m by 4 m rectangular main room and an irregular shaped voorkamer-type room extending 3 m further east. House faces east with voorkamer entrance facing	IIIA

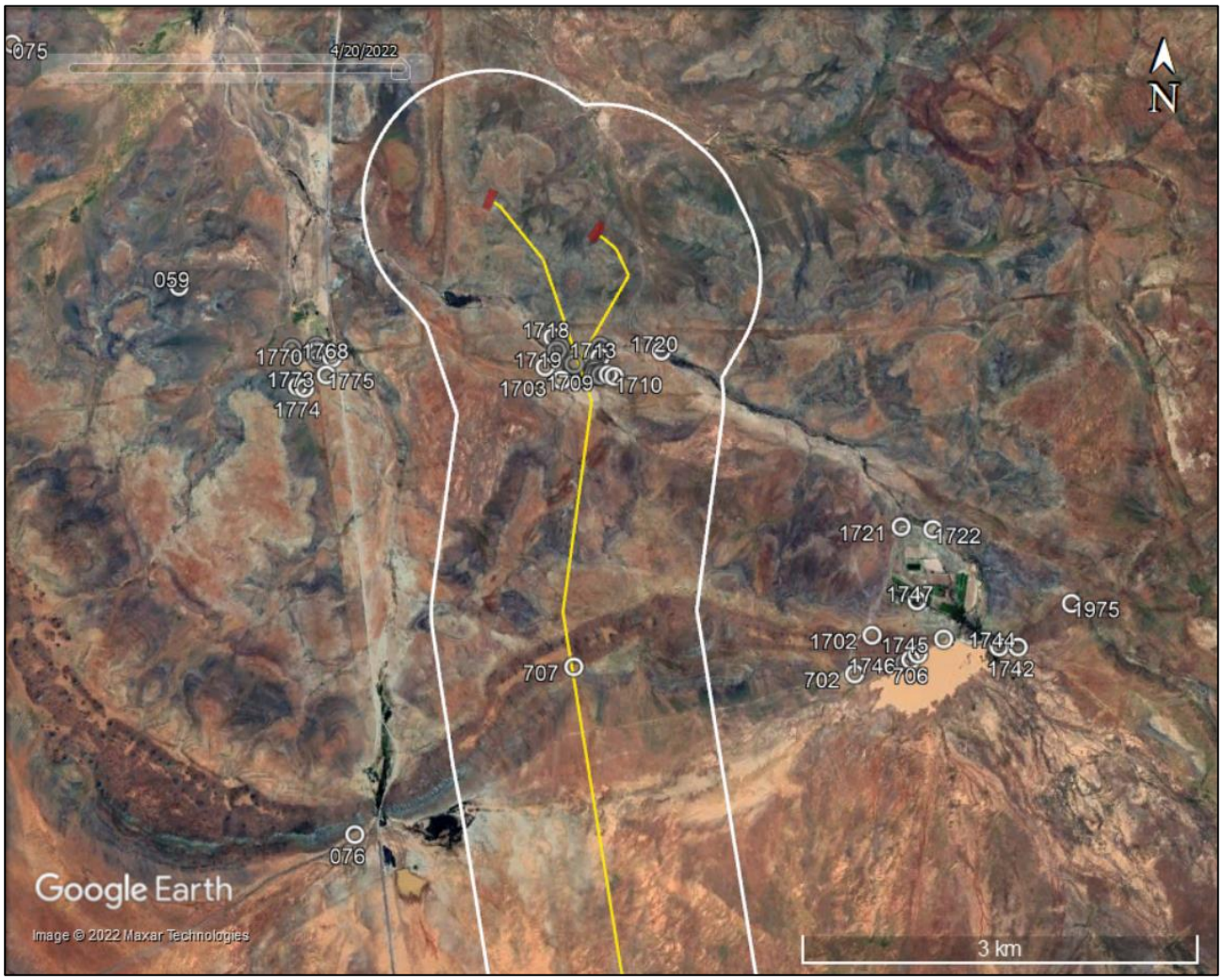
Project	Waypoint	GPS co-ordinate	Description	Grade
			northeast. The main room has a door to the east, a window to the west and a muurkas in the southern wall. There is a circular structure facing east built 3 m away to the east-northeast. It has an opening to the east and is probably a kookskerm.	
NV	1425	S31 47 41.1 E22 26 59.4	A badly collapsed stone kraal of about 9 m by 14 m built against the rock outcrop below 1424.	
NV	1426	S31 47 38.0 E22 26 56.1	A small (1 m diameter) collapsed stone structure of indeterminate function.	
NV	1427	S31 47 37.4 E22 26 56.7	A second east-facing house with the same plan as 1424 but with no muurkas. The east side of the structure has totally collapsed.	
NV	1428	S31 47 37.3 E22 26 57.1	A small, collapsed stone feature with a scatter of glass, ceramics, metal, ostrich eggshell and bone next to it.	
NV	1429	S31 47 34.7 E22 26 59.1	A single grave aligned east-west but with just one gravestone on the east end) possibly this was a footstone). There may have been two originally with the headstone having collapsed.	
NV	1430	S31 47 31.5 E22 26 59.9	A fossil.	See App.5
NV	1431	S31 47 33.9 E22 27 12.3	A collapsed stone house with an ephemeral glass and ceramic scatter alongside it.	IIIC
NV	1432	S31 47 34.7 E22 27 12.9	A small collapsed stone structure of indeterminate function. A semi-circle of stones is visible amongst the collapsed stones.	
NV	047	S31 47 37.7 E22 27 17.3	Old dam wall built of earth and then lined with stone. Dam has burst. Main section of wall is 2-5 m in height.	
NV	049	S31 47 35.2 E22 27 13.6	Semi-circular kraal with lammerhok on E side and rock wall of scarp to north.	
NV	1433	S31 47 37.3 E22 27 15.3	A fossil.	See App.5
NV	1434	S31 47 37.6 E22 27 16.5	A fossil.	See App.5
NV	1435	S31 47 37.4 E22 27 16.3	A fossil.	See App.5
NV	1436	S31 47 38.1 E22 27 16.9	A fossil.	See App.5
NV	1443	S31 48 54.4 E22 29 03.1	A small stone kraal built against a sandstone outcrop.	IIIC
NV	1444	S31 48 53.0 E22 29 02.9	A 2-roomed stone ruin with a single piece of glass alongside it.	
NV	1673	S31 43 35.5 E22 22 12.2	A light scatter of LSA hornfels artefacts including a very thin adze.	IIIC
NV	1737	S31 43 18.7 E22 23 10.2	A line of stone fence poles runs along the north side of the farm access road. To the east they are not used but to the west they are still in use.	IIIC
NV	1852	S31 47 56.9 E22 26 37.0	L-shaped walling that is badly collapsed. The long end runs towards the north wall of the adjoining ruin but does not meet it.	IIIC
NV	1853	S31 47 57.1 E22 26 38.1	A rectangular structure that has badly collapsed. It is about 4 m by 7 m. There are rare glass, ceramic and metal artefacts around it.	
NV	1854	S31 47 55.9 E22 26 39.8	A very low density rubbish dump with surprisingly few artefacts on it. There is no ash evident but the usual finely fragmented shale gravel is present. Although a dump is present, the site has been graded IIIC due to the very limited information contained in the dump.	
NV	1855	S31 47 55.6 E22 26 39.2	A house ruin with two rooms and measuring 8 m by 3 m. It is badly collapsed and no windows or doors are evident but a	

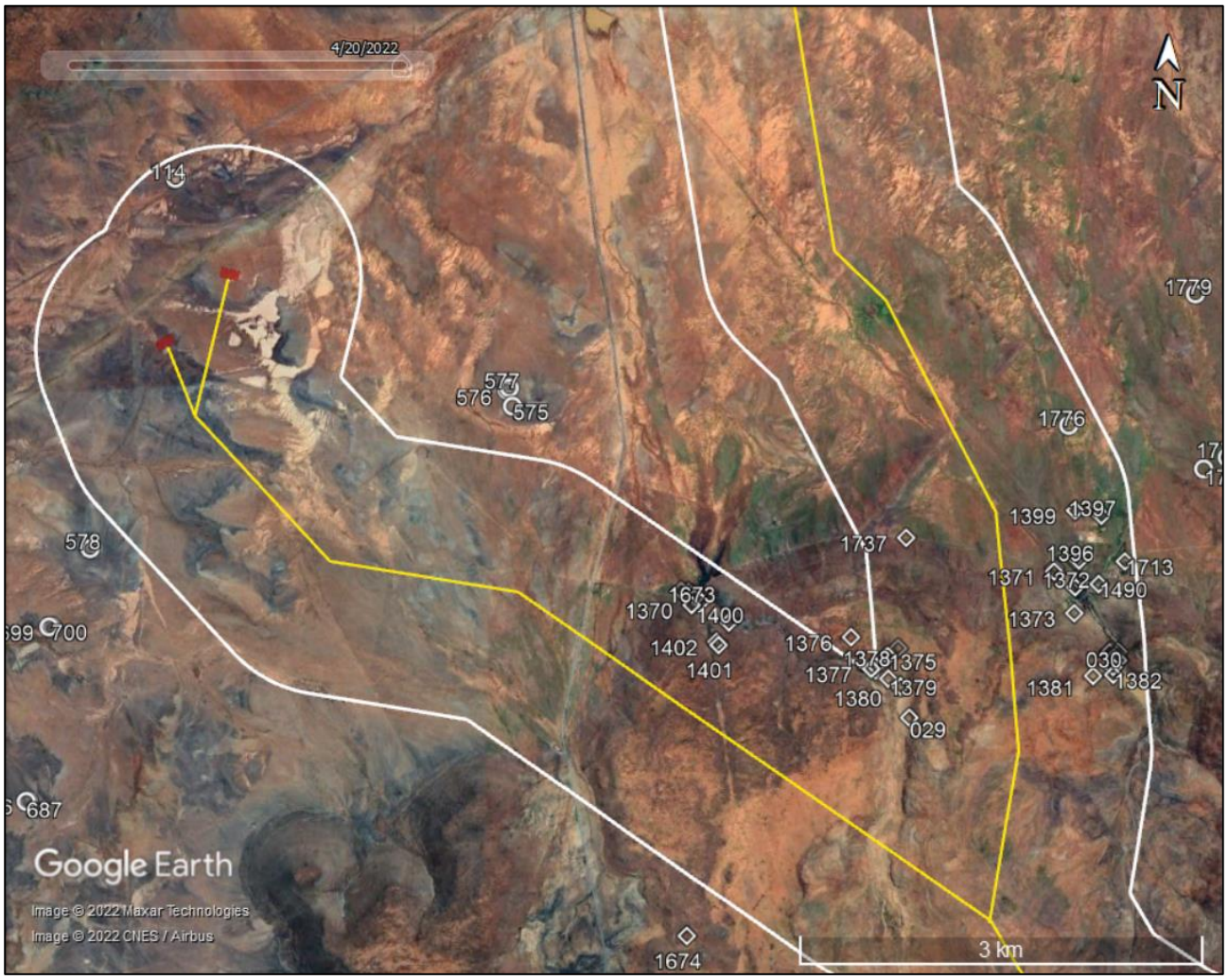
Project	Waypoint	GPS co-ordinate	Description	Grade
			standing section of the north wall contains two muurkaste. There is a sandstone chopping block on the north side of the house and there are glass, ceramic and metal artefacts scattered about and also some bones.	
NV	1878	S31 49 26.9 E22 27 50.0	A scratched geometric engraving that looks quite recent. It is a rectangle with eleven lines crossing its interior parallel to the short sides and an X meeting the corners of the rectangle. It is on a flat rock overlooking a pan on top of a mountain.	IIIC

APPENDIX 3: Mapping

All waypoints recorded for the present applications are shown as circles on the maps below. All waypoint recoded for the Nuweveld projects are shown as diamonds. All the finds within the corridor are listed in Appendix 2, but those outside the corridor are reported within the relevant wind farm reports (Hoogland: Orton in prep; Nuweveld: Orton 2021a, 2021b, 2021c, 2021d).

<u>Key to maps:</u>
White polygon: powerline corridor for authorisation
Yellow line: current provisional alignment
Red polygons: Hoogland 1 Switching Stations as shown in first map (1A to the east; 1B to the west); Hoogland 2 Switching Stations as shown in the second map B (2A to the west; 2B to the north-east)
Pink polygon: Nuweveld Collector Substation (not part of this application)

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Google Earth
Image © 2022 Maxar Technologies
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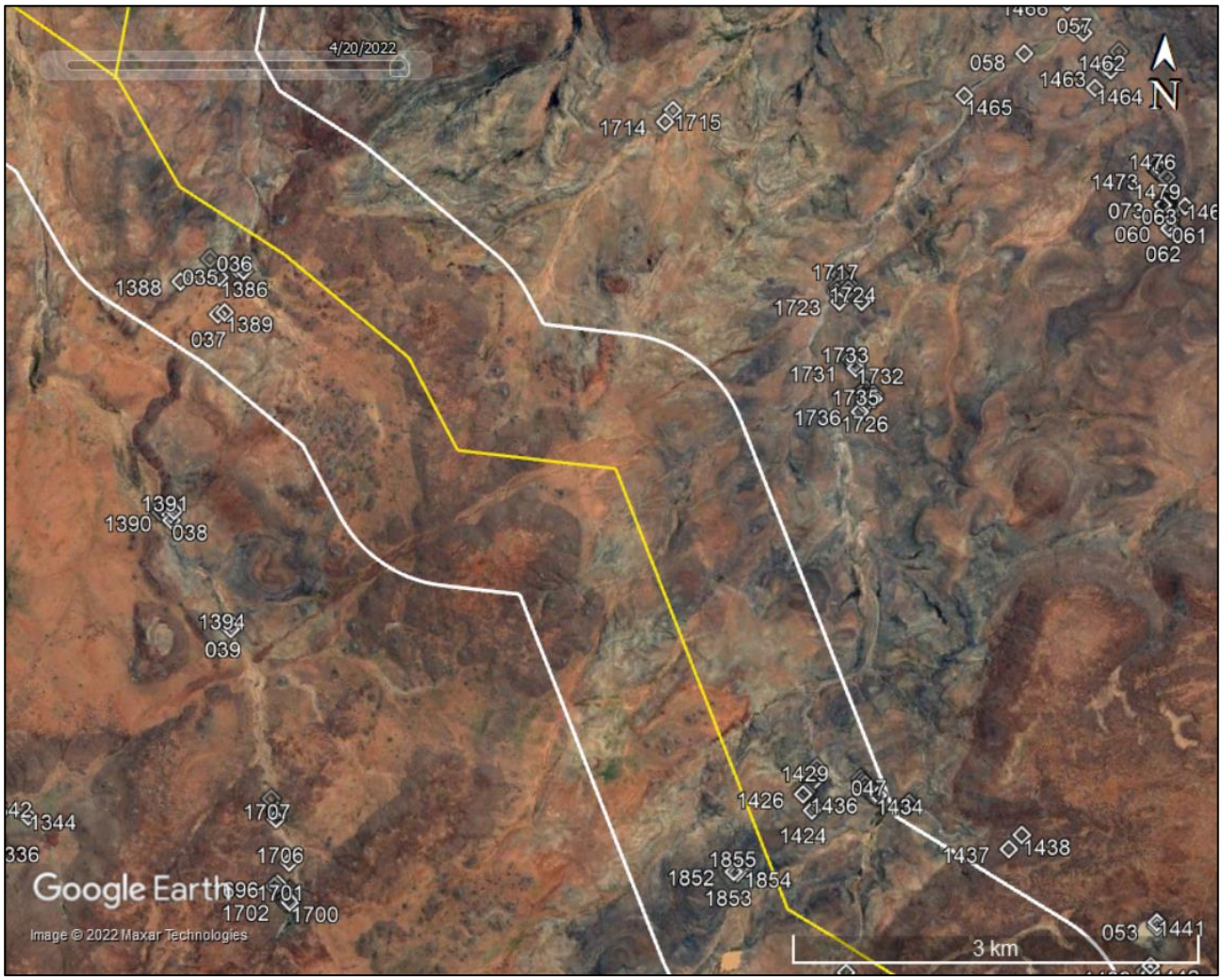
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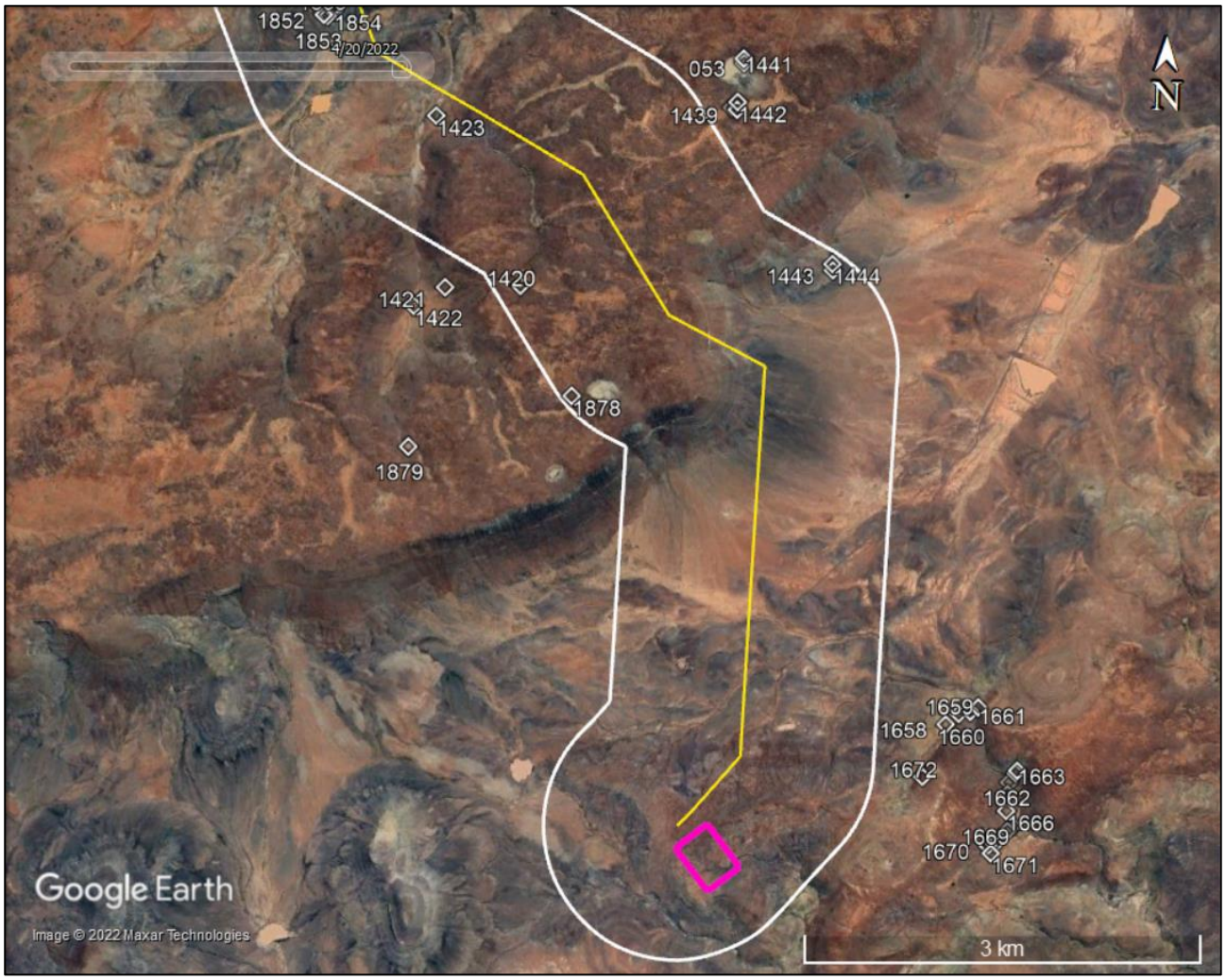
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Image © 2022 Maxar Technologies
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APPENDIX 4: Palaeontological Study

APPENDIX 5: Visual Impact Assessment