

# HERITAGE IMPACT ASSESSMENT: PROPOSED GAMMA GRIDLINE CORRIDOR, WESTERN AND NORTHERN CAPE

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

HWC Case No.: 22072913SB0729E  
SAHRA Case ID: TBC

*Report for:*

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1<sup>st</sup> draft: 19 August 2022  
2<sup>nd</sup> draft: 2 November 2022  
Final report: 5 January 2023

# SUMMARY

## 1. Site Name

Gamma gridline corridor

## 2. Location

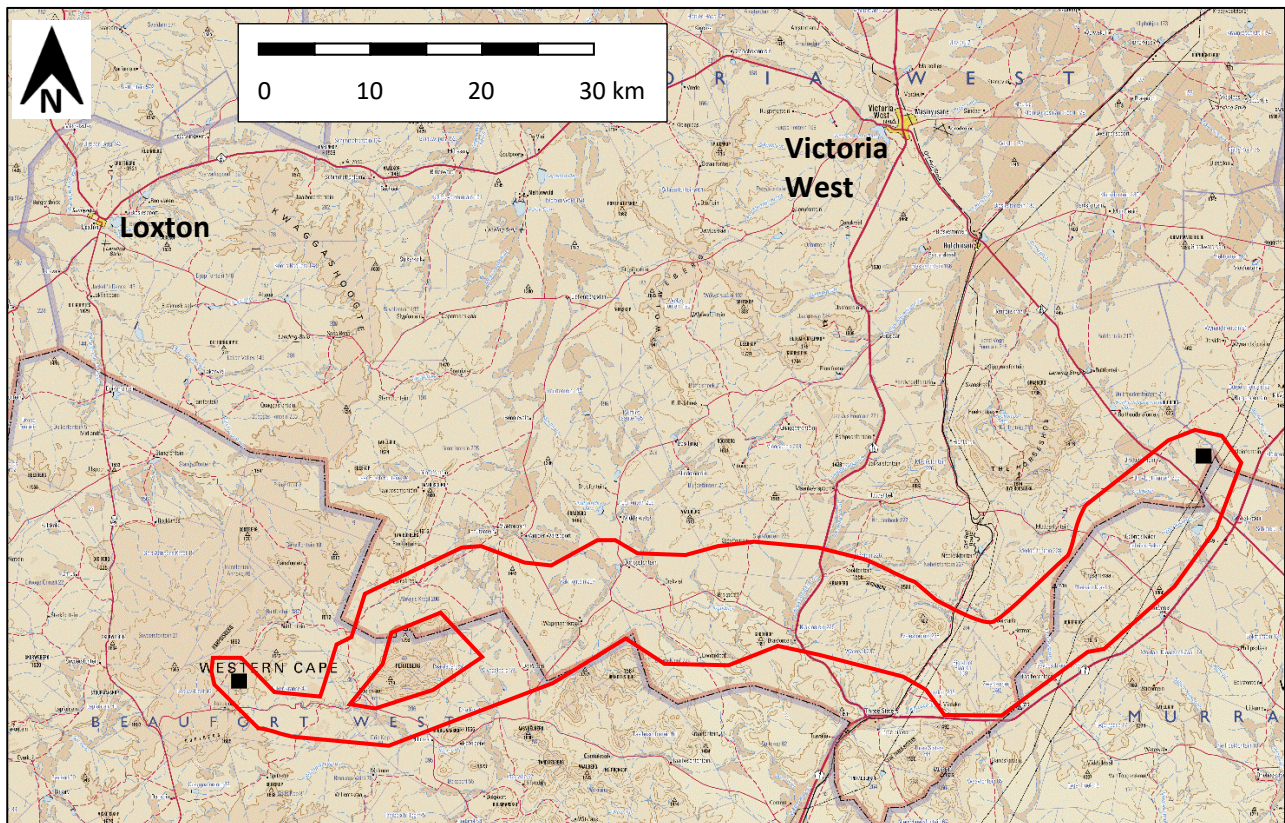
Off N1 and R63

Located across a large number of farms northwest and northeast of Three Sisters.

End points located at:

- Approved Nuweveld Collector Substation in the West: S31° 51' 21.6" E22° 28' 38.5"; and
- Existing Gamma Substation in the east: S31° 40' 51.0" E23° 24' 46.3".

## 3. Locality Plan



## 4. Description of Proposed Development

A 400 kV gridline would be developed within a servitude of  $\leq 55\text{m}$  wide, which would also accommodate access tracks needed for construction and maintenance. Pylon heights will mostly be 27 m to 42 m but in one area adjacent to the N12 in Northern Cape 50 m high towers will be needed to span and avoid a sensitive habitat.

Lattice type pylons will be used for the project with different types being dependent on the topography and span characteristics. Most pylons will be cross-rope suspension towers, with self-supporting towers being used at turn points, at steep slopes or where a very large distance needs to be spanned. All pylon types would attach to concrete plinths and foundations of varying sizes

depending on pylon type. Guy wires with concrete anchor blocks will also be required for providing additional support and to stabilise some of the pylons.

The footprints of the 400 kV towers are conservatively assumed to be 100 m<sup>2</sup> each. The average span of the 400 kV line will be 400 m.

Temporary laydown areas totalling up to 5 ha will be identified along the powerline route, with the main equipment and construction yards being based in one of the surrounding towns.

Existing access roads and tracks (upgraded to about 2-4 m wide where needed) will be used as far as possible and new access tracks would be established, where needed, outside of specialist identified No-Go areas – these would be 2-4 m wide (wider than 2m when side drains are needed or due to the topography).

## **5. Heritage Resources Identified**

The survey for the project was relatively limited due to the very large size of the study area and the fact that a final alignment was not yet decided. The aims of the survey were to confirm the desktop findings in terms of the types of heritage resources expected to occur in the corridor, to establish the expected significance of finds and determine how easy it would be to avoid them through micro-siting during the pre-construction phase. The following resource types were identified:

- Fossils are likely to occur sporadically;
- Stone Age and historical archaeological sites are likely to occur sporadically but with a greater likelihood along dolerite dykes – where engravings may be found – and close to water sources;
- Graves occur but almost exclusively in association with farmsteads;
- Farmsteads occur throughout the area but are widely dispersed. They include mature trees and fields that together form cultural landscapes. Isolated structures away from farmsteads tend to not occur in this area; and
- The wider Karoo region is an important cultural landscape and includes specific areas such as Karoo National Park, the escarpment edge and the well-known Three Sisters hills. The visual study notes the dolerite hills, river features and scenic sections of district roads as the most visually sensitive parts of the landscape.

## **6. Anticipated Impacts on Heritage Resources**

Specific impacts on fossils and archaeological sites cannot be readily determined at this stage because no final alignment is available. These impacts can only be determined and dealt with through implementation of a pre-construction survey. The expected density of sites, however, means that impacts should be very easily minimised with a pre-construction survey. Impacts to the cultural landscape can be better considered now because areas to avoid are easier to determine. There is a scattering of farmsteads including the highly significant Wagenaarskraal (in Northern Cape). These should all be avoided by the development since there are very large spaces through which the line can be routed. Visually sensitive parts of the landscape have been identified by the visual consultants and cognisance will need to be taken of their recommendations during design of the final route. The larger landscape issues (Karoo National Park, Great Escarpment, Three Sisters)

are all beyond the viewshed mapped for the pre-negotiated alignment<sup>1</sup>, are of no concern. The visual specialists note that most sensitive receptors have been avoided by the pre-negotiated alignment.

## 7. Recommendations

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

- Very high palaeontological sensitivity areas must be avoided;
- A pre-construction palaeontological survey should be carried out focusing on sensitive areas as identified by the palaeontologist;
- The Fossil Chance Finds Procedure should be included in the project EMPr for the Construction Phase;
- A pre-construction archaeological survey should be carried out along the entire alignment, including new access roads and construction camps;
- Sensitive ridges, hills, river valleys and steep slopes as indicated by the visual consultants must be avoided;
- Existing roads must be used for construction and operation as much as possible;
- Construction laydown areas must be located in areas of low visual sensitivity as identified by the visual consultants;
- All disturbed areas not required during operation must be rehabilitated; 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.

Note that these recommendations apply equally to both the Western and Northern Cape Provinces.

## 8. Author/s and Date

Heritage Impact Assessment: Jayson Orton, ASHA Consulting (Pty) Ltd, 05 January 2023

Archaeological specialist study: Jayson Orton, ASHA Consulting (Pty) Ltd, 02 November 2022

Palaeontological specialist study: John Almond, Natura Viva cc, October 2022

Visual impact assessment: Quinton Lawson and Bernie Oberholzer, November 2022

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<sup>1</sup> Note that the pre-negotiated route was provided to the visual specialists purely to allow the construction of a viewshed map. All impact assessments deal with the whole corridor.



## 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.

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

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

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

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

## Abbreviations

**APHP:** Association of Professional Heritage Practitioners

**ASAPA:** Association of Southern African Professional Archaeologists

**BA:** Basic Assessment

**CRM:** Cultural Resources Management

**DFFE:** Department of Forestry, Fisheries and the Environment

**ECO:** Environmental Control Officer

**EGI:** Electricity Grid Infrastructure

**EMPr:** Environmental Management Program

**ESA:** Early Stone Age

**GP:** General Protection

**GPS:** global positioning system

**HIA:** Heritage Impact Assessment

**HWC:** Heritage Western Cape

**LSA:** Later Stone Age

**MSA:** Middle Stone Age

**NBKB:** Ngwao-Boswa Ya Kapa Bokoni

**NCW:** Not Conservation Worthy

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

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

**NID:** Notification of Intent to Develop

**PPP:** Public Participation Process

**REDZ:** Renewable Energy Development Zone

**SAHRA:** South African Heritage Resources Agency

**SAHRIS:** South African Heritage Resources Information System

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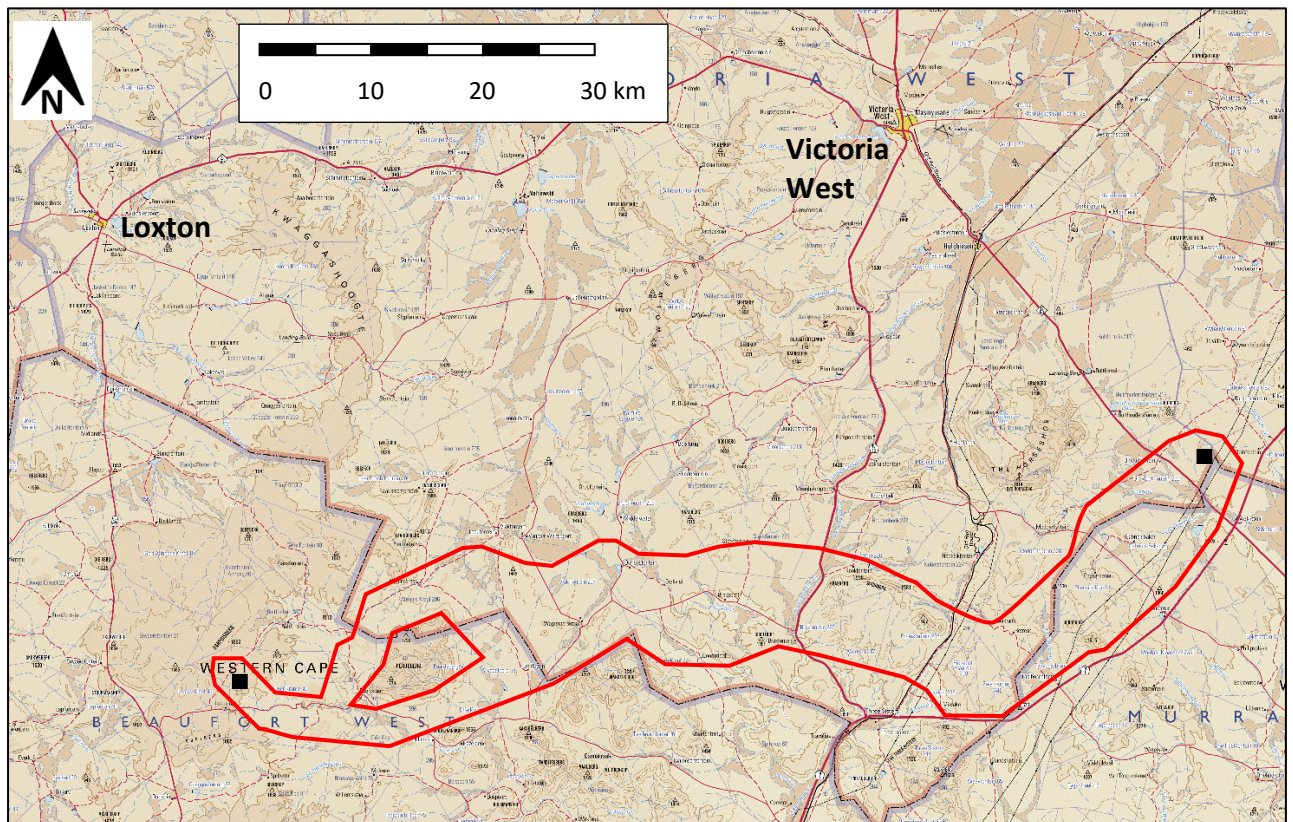
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# 1. INTRODUCTION

ASHA Consulting (Pty) Ltd was appointed by Nuweveld North (Pty) Ltd to conduct a heritage screening study for a proposed powerline linking the approved Nuweveld Collector Substation with the existing Gamma Substation located about 90 km east of the wind farm collector substation (Figures 1 & 2). The proposed project will be constructed over many farms and those included either wholly or partly within the corridor are listed in Appendix 2. The project end points are as follows:

- Nuweveld Collector Substation in the West: S31° 51' 21.6" E22° 28' 38.5"; and
- Gamma Substation in the east: S31° 40' 51.0" E23° 24' 46.3".



**Figure 1:** Extract from 1:250 000 topographic map 3122 (dated 2005) showing the location of the corridor (red outline). Source of basemap: Chief Directorate: National Geo-Spatial Information. Website: [www.ngi.gov.za](http://www.ngi.gov.za).

## 1.1. The proposed project

### 1.1.1. Project description

The 400 kV gridline would have a  $\leq 55$  m wide servitude, which may be kept clear of taller vegetation (trees) and, where required and feasible, accommodate access tracks needed for construction and maintenance.



Lattice type pylons will be used for the project. Different lattice type pylon will be required along the gridline depending on the topography and span characteristics. Most of the pylons will be cross-rope suspension towers of 27 m to 42 m height, with self-supporting towers being used at turn points, at steep slopes or where a very large distance needs to be spanned. An exception to this is in an area up to 2 km west of, and 500 m east of the N12 where pylons of up to 50 m in height will be required to span and avoid a sensitive habitat. The technical characteristics of these pylon types are briefly described below.

All pylon types would attach to concrete plinths and foundations of varying sizes depending on pylon type. Guy wires with concrete anchor blocks will also be required for providing additional support and to stabilise some of the pylons/ towers.

The footprints of the 400 kV towers are conservatively assumed to be 100 m<sup>2</sup> each. The average span of the 400 kV line will be 400 m.

Temporary laydown areas will be identified along the powerline route, with the main equipment and construction yards being based in one of the surrounding towns. It is anticipated that the total area required for the temporary laydown areas is up to 5 ha.

Existing access roads and tracks (upgraded to  $\pm$  2-4m wide where needed) will be used as far as possible and new access tracks would be established, where needed, outside of specialist identified No-Go areas – these would be 2-4 m wide (wider than 2m when side drains are needed or due to the topography). For this assessment, Red Cap conservatively assumes that 4 m wide access tracks will be required for the length of the line with an additional 5 km allowance for deviations from the gridline route<sup>2</sup>.

#### 1.1.2. Project Location

The Nuweveld Collector Substation is located north of Beaufort West in the Western Cape Province. The Gamma Substation is located ~90 km to the east of the Nuweveld Collector Substation.

Although the gridline starts in the Western Cape (Central Karoo District Municipality and Beaufort West Local Municipality), portions of the line would traverse land in the Northern Cape (Pixley ka Seme District Municipality and Ubuntu Local Municipality).

The current land use along the corridor is characterised by large agricultural holdings with mostly low-density livestock and game grazing being the main land use. Dry climatic conditions are such that cropping is very limited and is restricted to valley bottoms often near or around farmsteads. The landscape character of the corridor is typical of Great Karoo and comprises sections of plains and open valleys with dispersed drainage systems and rougher terrain including mesas (table type mountains/hills), koppies, rocky ridges and outcrops and plateaus.

#### 1.1.3. Routing of Corridor

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<sup>2</sup> For example, if the line is 110 km long (+ 5km allowance for any deviation), the disturbance footprint (in ha) assumed for access tracks will be ((0.004 km x 115 km) x 100 = 46 ha

Electricity will be stepped-up to 400 kV at the Nuweveld Collector Substation for evacuation via the ~110 km Gamma Gridline to the expansion area of the existing Gamma Substation (as well as via an approved gridline between the Nuweveld Collector Substation and the Droërivier Substation in the south). The new gridline will form part of the national grid.

The route of the line must be pre-negotiated with the respective landowners, which includes obtaining in-principle agreements from the landowners that the line may go over their land. While every effort will be made to stick to the provisional route, deviations from the route are possible outside of No-Go areas identified by specialists and following post-authorisation specialist micro-siting.

Following an initial specialist assessment and landowner negotiations, a refined grid connection corridor, within which the line will be built, has been established – see Figure 2. This report deals specifically with impacts on archaeological/cultural heritage resources within the refined Corridor to enable the identification of a preferred servitude and gridline route.

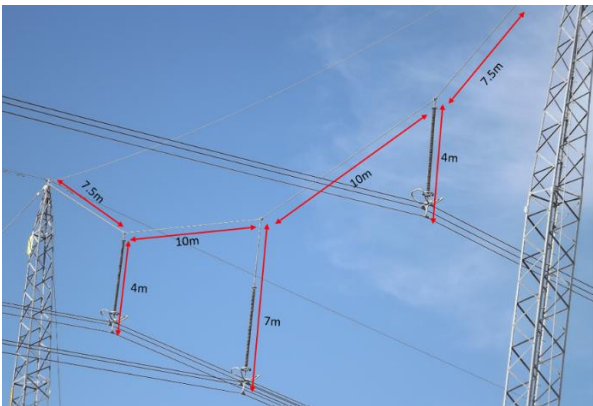
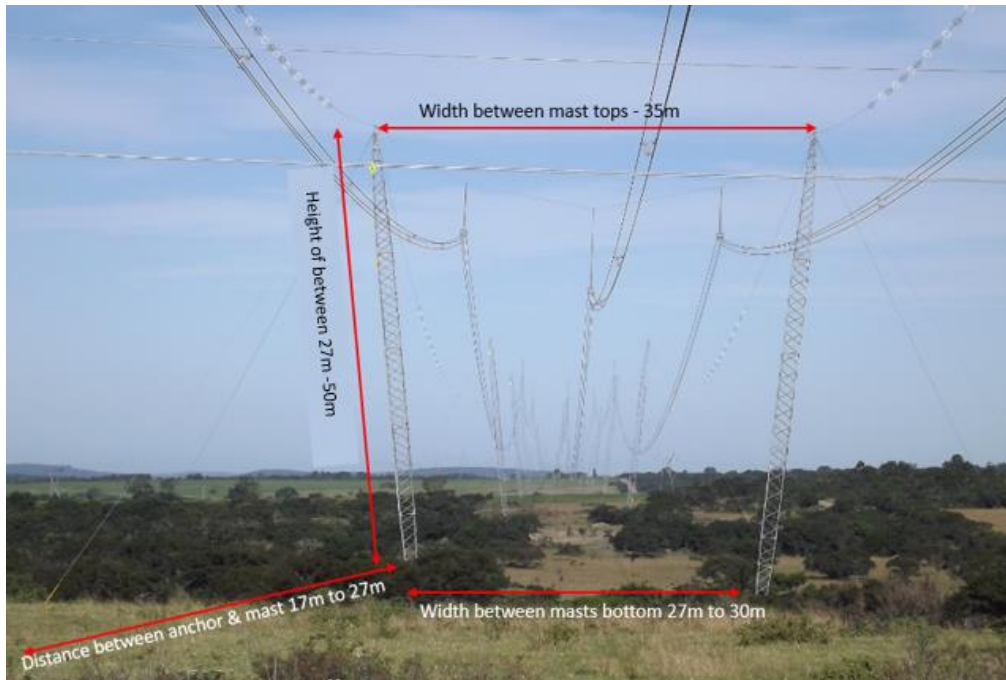


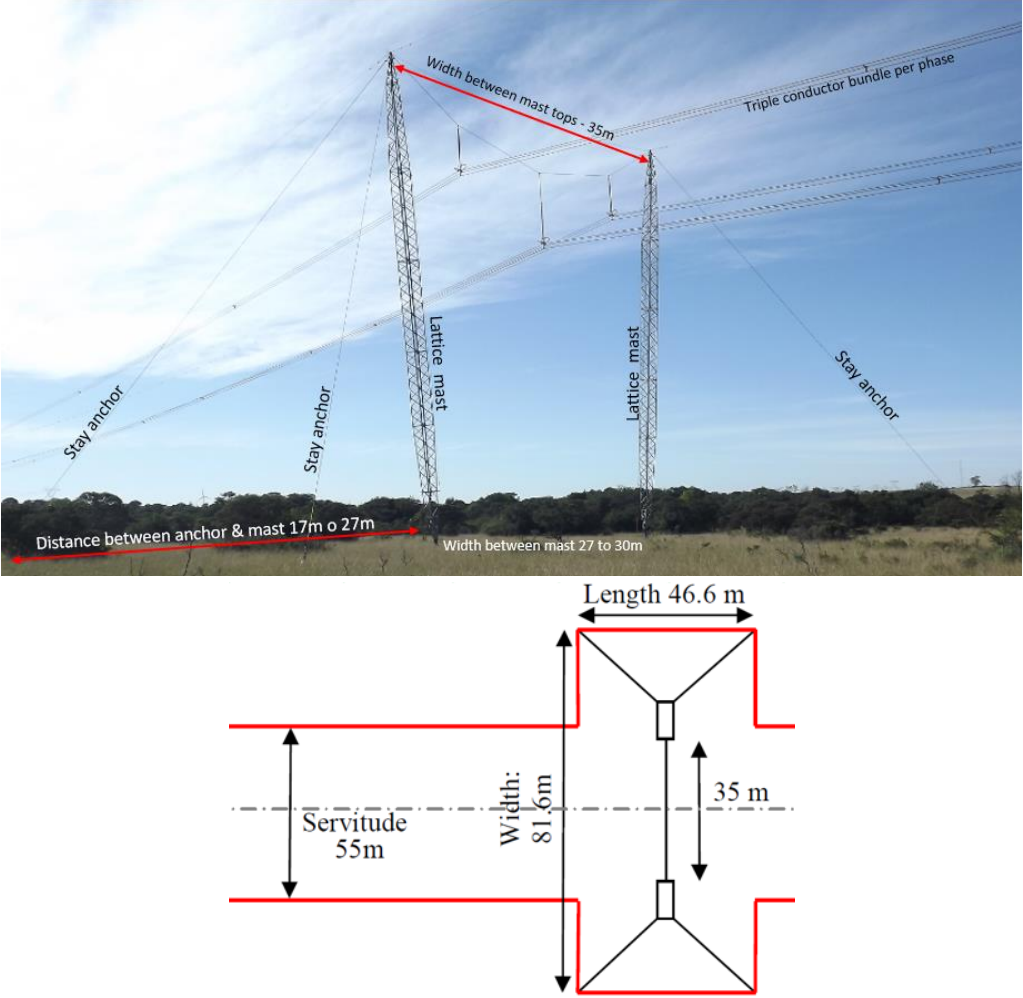
**Figure 2:** Proposed corridor for Gamma Grid Connection.

#### 1.1.4. Pylon Types


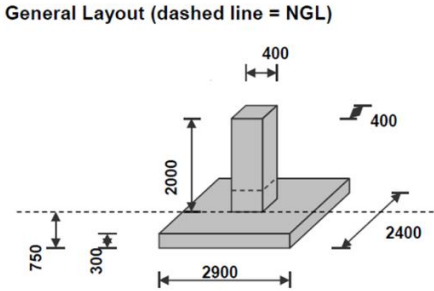

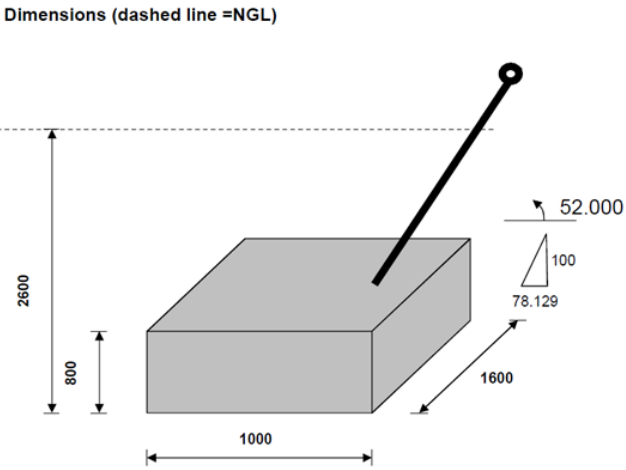
Lattice type pylons are required for the overhead line. Different pylon types will be required at different areas depending on the topography and span characteristics. Table 1 below provides a description of the types being considered with the majority likely to be the Cross-Rope Suspension Tower, with self-supporting towers only being used at turn points in the alignment.

**Table 1 (overleaf):** Description of the proposed powerline infrastructure.

	Tower Type	Description and purpose	Illustration
1	400kV Intermediate or Suspension Tower.  <b>Option 1:</b> Cross-Rope Suspension Tower	<p>The tower consists of two main lattice supports with a steel cross rope between the tower tops. The two main lattice supports are supported each with 2 x guyed anchors. The structure is design to support the conductor weight as well as the wind loading specifications.</p> <p>The conductors are supported on insulators from the steel cross rope support as illustrated below:</p>  <p>This tower type is for general use as an intermediate/suspension tower between angle strain points along the alignment and it is also the preferred option due to the smaller size and cost effectiveness.</p> <p>This structure will also be the most common structure used at an estimated 70% to 80% of the total number of structures on the line.</p>	<p><b>Front View of the tower:</b></p>  <p><b>Side View of the tower:</b></p>

Tower Type	Description and purpose	Illustration
<p><b>Option 1:</b> Cross-Rope Suspension Tower (Continue)</p>	<p>Tower heights: 27m to 50 m Tower width: 28m to 35m</p> <p>Tower footprint: The footprint of the tower is determined by the distances between the outer anchors supporting the structure – in general the stays positioned 17m to 27m from the tower masts at an angle. This forms a square with estimated distances as per the illustration.</p> <p>Typical Foundation sizes:</p> <p>1) Typical Tower mast foundation</p>	 <p>The illustration consists of a photograph and a technical diagram. The photograph shows a cross-roped suspension tower with two lattice masts. Stay anchors are positioned at an angle from the masts. Red arrows and text labels indicate key dimensions: 'Width between mast tops - 35m', 'Distance between anchor &amp; mast 17m o 27m', and 'Width between mast 27 to 30m'. The diagram below the photograph shows a cross-section of the tower footprint. It is a rectangular shape with a width of 81.6m and a length of 46.6m. A horizontal dashed line indicates a 'Servitude 55m'. A vertical dimension of 35m is shown for the upper section of the tower.</p>

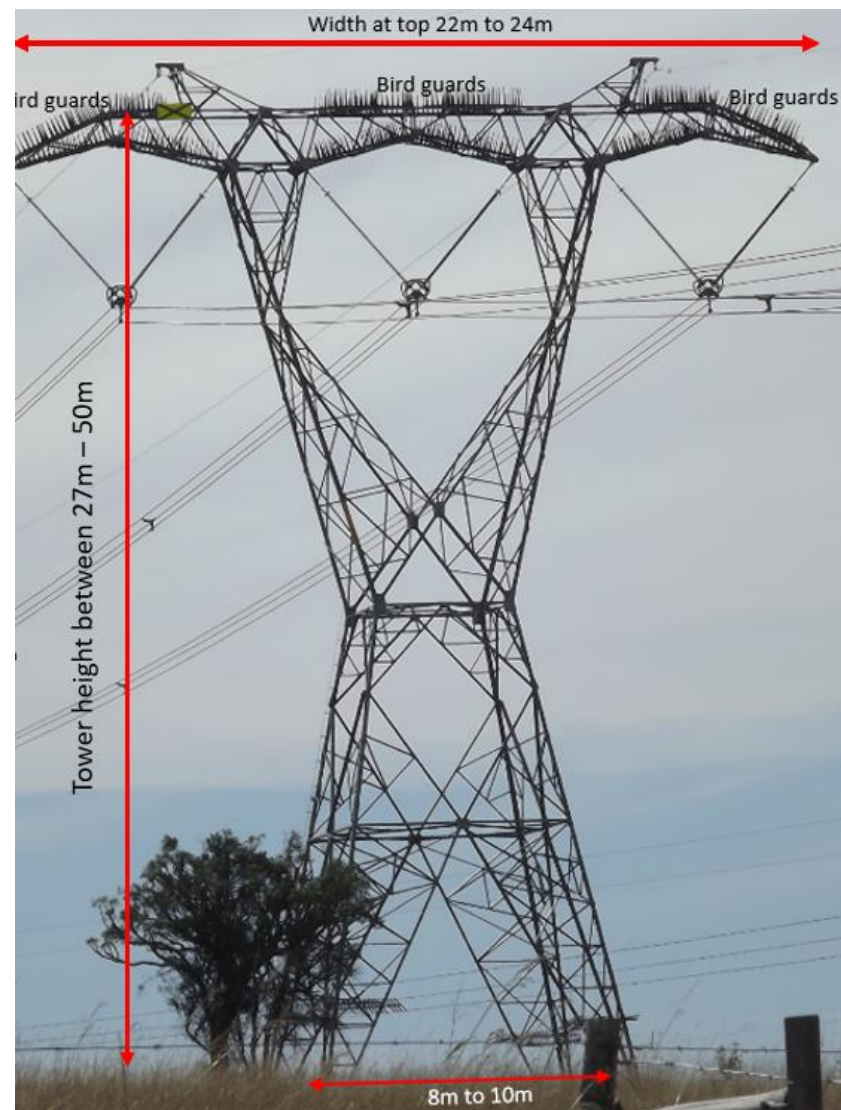


	Tower Type	Description and purpose	Illustration
		<p>2) Typical Anchor or Stay foundation</p>	<div data-bbox="1144 240 1317 619">  </div> <div data-bbox="1480 304 1912 596"> <p>General Layout (dashed line = NGL)</p>  </div> <div data-bbox="1079 711 1261 1198">  </div> <div data-bbox="1350 727 1973 1198"> <p>Dimensions (dashed line = NGL)</p>  </div>



2	400kV Intermediate or Suspension Tower.	<p>The tower consists of a self-supporting lattice structure design with 4 x tower legs. The insulators are supported from a steel lattice cross-arm as indicated in the illustration.</p> <p>The tower is fully supported by the 4 x leg foundations and do not have any guyed anchors.</p> <p>The structure is design to support the conductor weight as well as the wind loading specifications.</p>
	<b>Option 2:</b> Self-Supporting Suspension Tower.	

**Front View of the tower:**

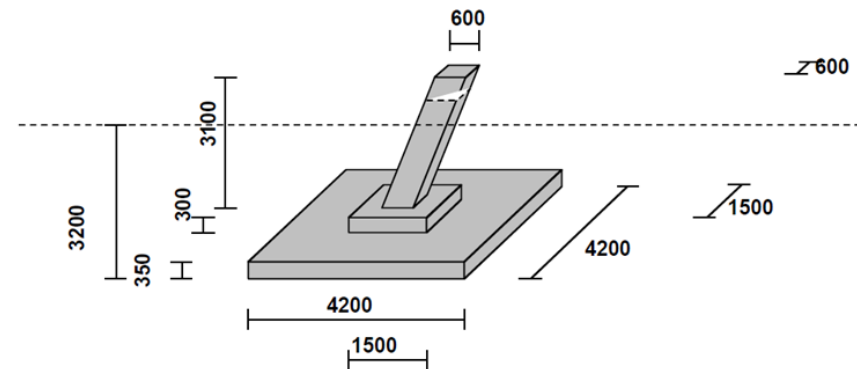


Self-Supporting  
Suspension  
Tower.  
(Continue)

Typical Tower Leg foundation size:

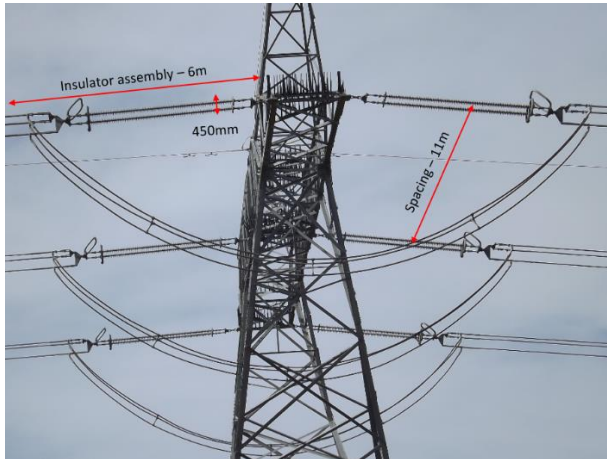


**General Layout (dashed line = NGL)**



3 400kV Inline  
and Angle  
Strain Self-  
Supporting  
Tower

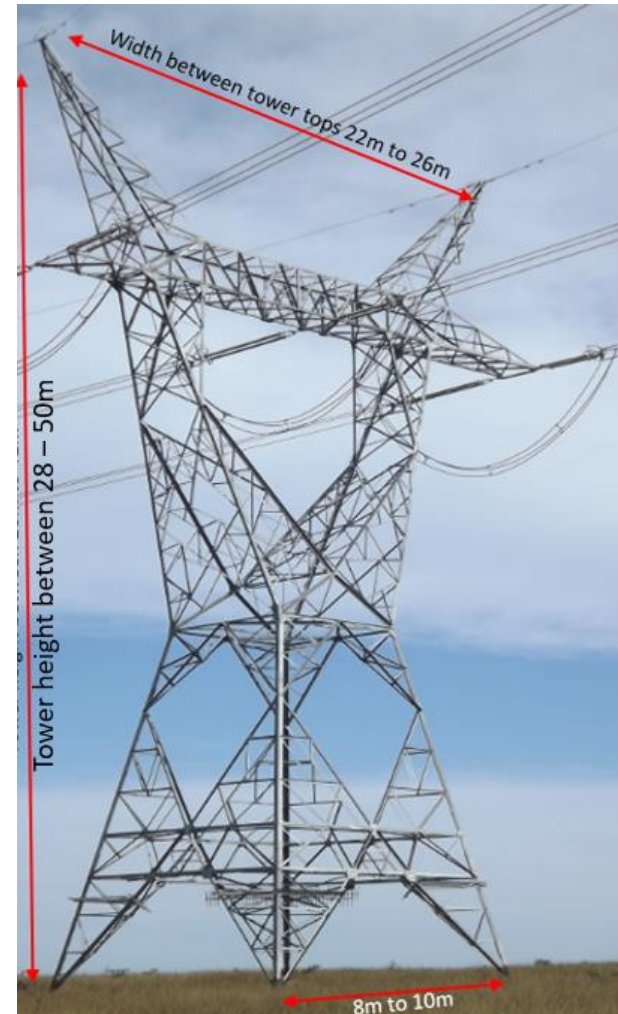
The tower consists of a self-supporting lattice structure design with 4 x tower legs. The insulators are supported from a steel lattice cross-arm as indicated below:



The tower is fully supported by the 4 x leg foundations and do not have any guyed anchors.

The structure is design to support the conductor tensions associated with the conductor weight and span lengths as well as the wind loading specifications.

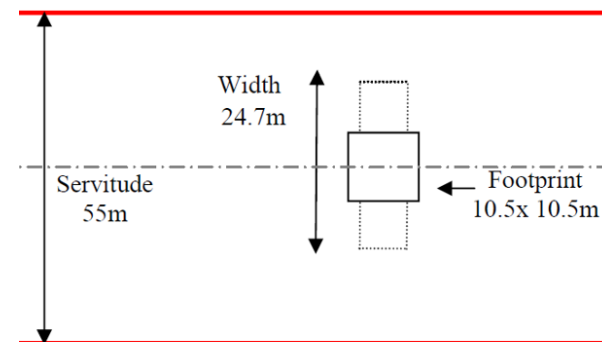
Front View of the tower:



400kV Inline  
and Angle  
Strain Self-  
Supporting  
Tower  
(continue)

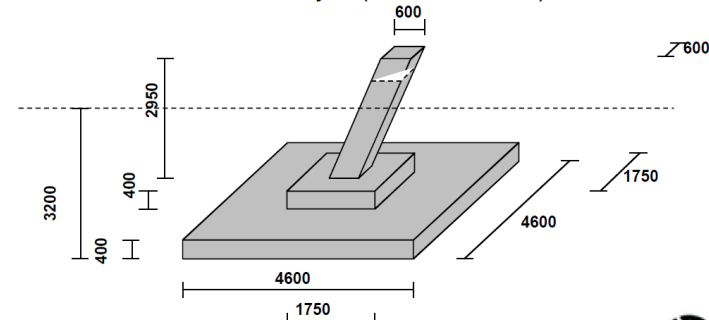
Average Tower footprint size: The footprint of the tower is determined by the distances between the outer legs on the ground which are supporting the strain tower.

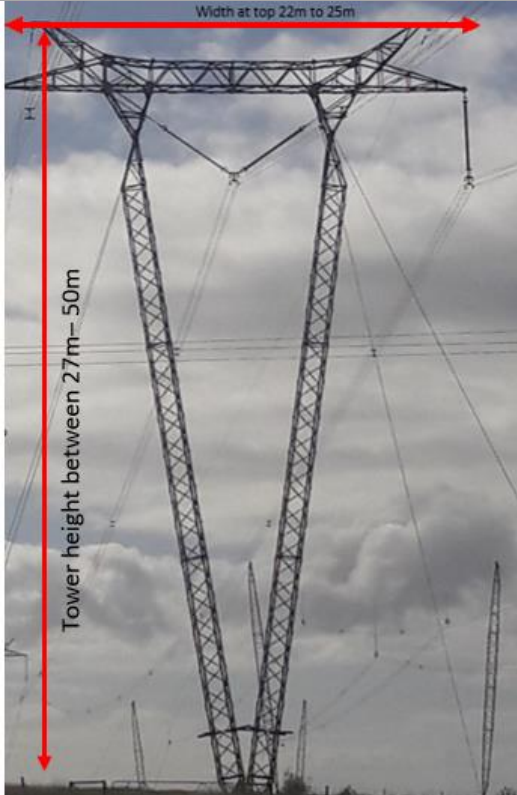
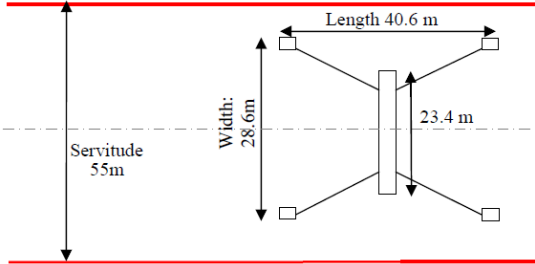
Typical Tower Leg foundation size:



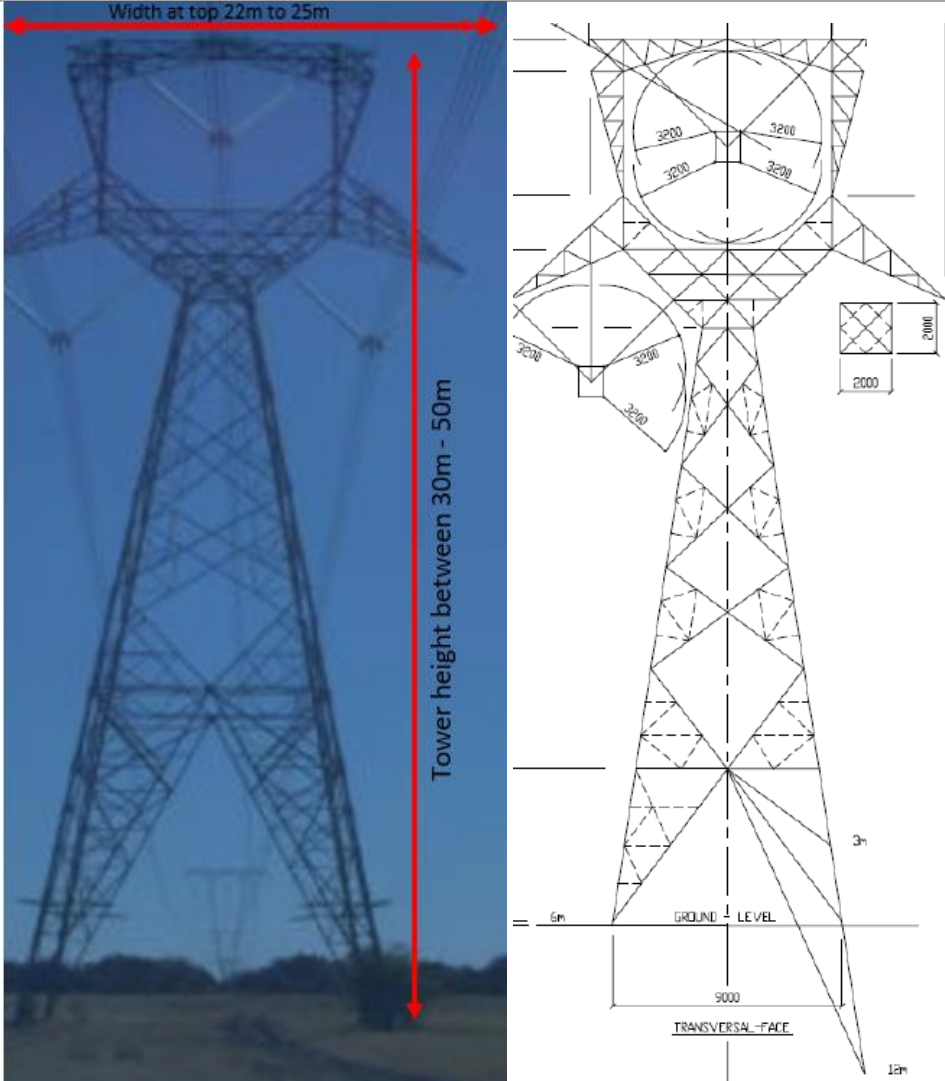
Plan View

General Layout (dashed line = NGL)



4	<p>400kV Intermediate or Suspension Tower.</p> <p>Guyed V-Type Tower</p>	<p>The tower consists of a main lattice triangle shape steel support tower that is installed on a centre foundation and supported by 4 x guyed anchors on the side.</p> <p>The structure is design to support heavier conductor weights and can be used where longer spans are required. Also have a smaller footprint than the intermediate cross rope tower.</p> <p>Tower centre foundations and 4 x guy anchor foundations similar to the cross rope tower foundations illustrated under Item 1.</p>	 
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5	<p>Transposition Tower.</p> <p>Required in the case where phasing needs to be swopped along the line.</p>	<p>The tower consists of a self-supporting lattice structure with 4 x tower legs. The insulators are supported from a steel lattice delta type cross-arm/beam as indicated in the illustration. The tower is supported by the 4 x legs with foundations and do not have any guyed anchors.</p> <p>The tower is only used in the case where conductor phasing needs to be swopped around. Normally maximum of 3 x towers required across a distance &gt;100km.</p> <p>Tower foundations similar to the strain lattice tower foundations illustrated under Item 3 above.</p>	 <p>The image consists of two parts. On the left is a photograph of a transposition tower, a self-supporting lattice structure with four legs. Red dimension lines are overlaid on the photo, indicating a 'Width at top 22m to 25m' and a 'Tower height between 30m - 50m'. On the right is a technical cross-section diagram of the tower. It shows a lattice structure with a top width of 22m to 25m and a height of 30m to 50m. The diagram includes a ground level line and a transversal face. Dimensions shown in the diagram include 3200, 3200, 3200, 3200, 2000, 2000, 3000, 9000, and 12m.</p>
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#### 1.1.5. Access

The site can be accessed via the well-established existing road network in the area. Access to the west would be via Beaufort West or Loxton using the R381, and access to the central and eastern portions of the corridor would be from the N1 and N12 via Three Sisters. **Error! Reference source not found.** shows the existing road network in the area. The existing access roads and tracks (upgraded to  $\pm 2-4$  m wide where needed) will be used for construction and maintenance as far as possible and new access tracks would also be  $\pm 2-4$  m wide. These tracks would avoid steep areas and drainage lines and rather use existing roads/tracks to cross these features as far as possible.

Access tracks would be upgraded or 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 a 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.

It is conservatively assumed that the total area required for the access tracks is up to 46 ha (i.e. assuming the new tracks are required for the entire route of the powerline, which is highly unlikely due to the existing road and access track network in the corridor).

#### 1.1.6. Temporary areas

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

#### 1.1.7. Gamma substation expansion

A 300 m x 300 m expansion to the Gamma Substation (including transformers and other standard substation infrastructure) and access tracks for construction and maintenance of the line will also be required and form components of the project.

#### 1.1.8. Summary of components and disturbance footprints

Table 1 below sets out the total disturbance footprint for the project.

**Table 1:** Summary of the components and approximate areas of impact within the Gamma Grid Connection Corridor.

Component	Description	Ha
Substation Infrastructure	300 m x 300 m expansion to the Gamma Substation (including transformers and other standard substation infrastructure)	9 ha (permanent)
Overhead lines and pylons	There will be a 400 kV overhead line supported by mostly lattice structure pylons. The spans (distance between pylons) on the pylons are on average 400 m. Each pylon is conservatively assumed to have a footprint of 100 m <sup>2</sup>	110 km 2.75 ha (permanent)
Access roads and tracks	Existing access roads and tracks (upgraded to $\pm 2-4$ m wide where needed) will be used as far as possible and new	46 ha (permanent)

Component	Description	Ha
	access tracks would be created where needed ( $\pm 2$ -4 m wide).	
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. It is anticipated that the total area required for the temporary laydown areas is up to 5 ha.	5 ha (temporary)
<b>Total disturbance footprint: Temporary</b>		<b>5 ha</b>
<b>Total disturbance footprint: Permanent</b>		<b>57.75 ha</b>

#### 1.1.9. Identification of alternatives

Due to the comprehensive iterative design process that has been undertaken to inform the location of the refined grid connection corridor, no site or layout alternatives will be assessed. Based on specialist identification of no-go areas within the refined Corridor, a pre-negotiated alignment for the Gridline will be identified in the Basic Assessment Report.

However, the development of a powerline within the refined corridor (outside of No-Go areas) is assessed against the 'No-Go' alternative. The 'No-Go' alternative is the option of not constructing the project where the status quo would prevail.

#### 1.1.10. 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 compile a heritage impact assessment (HIA) that met the requirements of both the South African Heritage Resources Agency (SAHRA) and Heritage Western Cape (HWC) as the project is located within the Western and Northern Cape. The assessment was to include at least the following aspects:

- Describe the receiving environment;
- Conduct a field survey to search for sensitive areas and sites of heritage significance;
- Map sensitive features according to their sensitivity (grade);
- Assess (identify and rate) the potential impacts on the environment;
- Identify relevant legislation and legal requirements; and
- Provide recommendations on possible mitigation and management measures as may be required.

For the Western Cape portion of the project a Notification of Intent to Develop (NID) was submitted to HWC on 29<sup>th</sup> July 2022. A response was received from HWC on xxx as follows:

Our Ref: HM / CENTRAL KARRO / BEAUFORT WEST / GAMMA GRID ON VARIOUS FARMS  
Case No.: 22072913SB0729E  
Enquiries: Stephanie Barnardt  
E-mail: Stepahnie.Barnardt@westerncape.gov.za  
Tel: 021 483 5959



Jayson Orton  
jayson@asha-consulting.co.za

**RESPONSE TO NOTIFICATION OF INTENT TO DEVELOP: HIA REQUIRED**  
**In terms of Section 38(8) of the National Heritage Resources Act (Act 25 of 1999) and the Western Cape**  
**Provincial Gazette 6061, Notice 298 of 2003**

**NOTIFICATION OF INTENT TO DEVELOP: PROPOSED GAMMA GRID CONNECTION CORRIDOR POWERLINE IN VICTORIA WEST, BEAUFORT WEST, AND MURRAYSBURG DISTRICT, SUBMITTED IN TERMS OF SECTION 38(1) OF THE NATIONAL HERITAGE RESOURCES ACT (ACT 25 OF 1999)**

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 16 August 2022.

You are hereby notified that, since there is reason to believe that the proposed Gamma Grid Connection Corridor Powerline in Victoria West, Beaufort West, And Murraysburg District 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 on the cultural landscape
- Archaeological Impact Assessment
- Palaeontological Impact Assessment

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.

PAGE 2 OF 2

**Our Ref:** HM / CENTRAL KARRO / BEAUFORT WEST / GAMMA GRID ON VARIOUS FARMS  
**Case No.:** 22072913SB0729E  
**Enquiries:** Stephanie Barnardt  
**E-mail:** Stepahnie.Barnardt@westerncape.gov.za  
**Tel:** 021 483 5959



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.

.....  
Nuraan Vallie  
Acting Deputy Director



### 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 the National Department of Forestry, Fisheries and Environment (DFFE) who will review the Basic Assessment (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. The author

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



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

### **1.5. Declaration of independence**

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

## **2. LEGISLATIVE CONTEXT**

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

The NHRA protects a variety of heritage resources as follows:

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

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

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

government”; or b) “which were paid for by public subscription, government funds, or a public-spirited or military organisation, and are on land belonging to any private individual.”

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

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

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

## **2.2. Approvals and permits**

### **2.2.1. Assessment Phase**

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

### **2.2.2. Construction Phase**

If archaeological or palaeontological mitigation is required prior to construction, then the appointed archaeologist or palaeontologist would need to obtain a permit (in the case of a site falling in Northern Cape) or workplan approval (in the case of a site falling in Western Cape) from SAHRA or

HWC respectively. This would be issued in their name. This is so that the heritage authority can ensure that the appointed practitioner has proposed an appropriate methodology that will result in the mitigation being done properly. In Northern Cape, a built environment permit, if demolition or alteration of a historical structure is required, would need to be obtained from the Ngwao-Boswa Ya Kapa Bokoni (Heritage Northern Cape).

### 2.3. Guidelines

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

- Heritage Western Cape. 2016. Grading: purpose and management implications.
- Heritage Western Cape. 2019. Public consultation guidelines.
- Heritage Western Cape. 2021. Guide for Minimum Standards for Archaeology and Palaeontology reports submitted to Heritage Western Cape.
- Heritage Western Cape. 2021. Notification of Intent to Develop, Heritage Impact Assessment, (Pre-Application) Basic Assessment Reports, Scoping Reports and Environmental Impact Assessments, Guidelines for submission to Heritage Western Cape.
- Winter, S. & Baumann, N. 2005. Guideline for involving heritage specialists in EIA processes: Edition 1. CSIR Report No ENV-S-C 2005 053 E. Republic of South Africa, Provincial Government of the Western Cape, Department of Environmental Affairs & Development Planning, Cape Town.
- SAHRA. 2007. Minimum Standards: archaeological and palaeontological components of impact assessment reports. Document produced by the South African Heritage Resources Agency, May 2007.

### 2.4. Application timeline

The application to DFFE under NEMA is currently in the pre-application phase with submission estimated to be around 24 October 2022.

## 3. METHODS

### 3.1. Literature survey and information sources

A survey of available literature was carried out to assess the general heritage context into which the development would be set. The information sources used in this report are presented in Table 1 with relevant dates of each source referenced in the text as needed. Data were also collected via a field survey. The data quality is suitable for the purpose of informing this report, and complies with the Site Sensitivity Verification report requirements, and Appendix 6 of the EIA Regulations.

**Table 1:** *Information sources used in this assessment.*

Data / Information	Source	Date	Type	Description
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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 ( <a href="http://gis.elsenburg.com/apps/cfm/#">http://gis.elsenburg.com/apps/cfm/#</a> )	Current	Spatial	Cadastral boundaries, extents and aerial photography (Western Cape only)
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.
Screening Tool maps	DFFE	Current	Spatial	Potential sensitivity of the study area

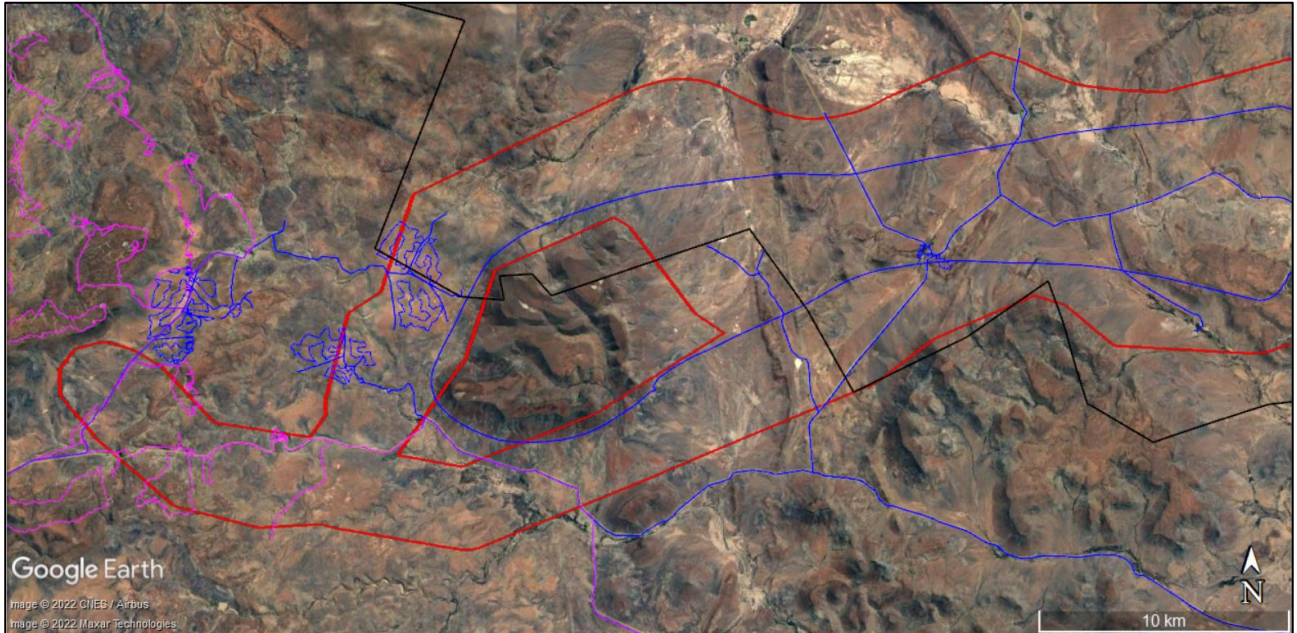
### 3.2. Field survey

The site was examined on 11<sup>th</sup> to 14<sup>th</sup> July 2022. Because of the great extent of the overall study area it was not possible to do a comprehensive field survey. Instead all accessible roads were driven and the landscape was examined from these roads, often using binoculars. In addition, a helicopter flyover was conducted to look for further sites. Sites recorded from a distance had their co-ordinates adjusted from aerial photography in order to ensure their accuracy. In addition, the westernmost part of the corridor was covered during the assessment for the Nuweveld East Wind Farm (Orton 2021b), with surveys on 6<sup>th</sup> April 2019, 13<sup>th</sup> May 201 and 18<sup>th</sup> September 2019 all including some land within the corridor. The surveys were during various seasons but, in this very dry area, the season makes no meaningful difference to vegetation covering and hence the ground visibility for the archaeological survey. Other heritage resources are not affected by seasonality. During the survey the positions of finds and survey tracks were recorded on a hand-held Garmin Global Positioning System (GPS) receiver set to the WGS84 datum (Figure 3). Photographs were taken at



times in order to capture representative samples of both the affected heritage and the landscape setting of the proposed development.

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



**Figure 3:** Aerial view of the western half of the study area (red polygon) showing the survey tracks (2019 [Nuweveld] = pink lines; 2022 = blue lines).



**Figure 4:** Aerial view of the western half of the study area (red polygon) showing the survey tracks (blue lines).

### **3.3. Specialist studies**

Following the requirements of HWC, the HIA includes specialist assessments of archaeology (Dr Jayson Orton), palaeontology (Dr John Almond of Natura Viva cc) and visual impacts (Bernie Oberholzer and Quinton Lawson). While the former is included within the body of the HIA, the latter two are only summarised in the HIA but their full reports are appended.

### **3.4. Impact assessment**

For consistency among specialist studies, the impact assessment was conducted through application of a methodology supplied by Red Cap and adapted from Zutari (2021).

### **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. Because the project lies across two provinces, the grading system relevant in each province has been used as appropriate.

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).

SAHRA (2007) has formulated its own system<sup>3</sup> for use in provinces where it has commenting authority (including Northern Cape). In this system sites of high local significance are given Grade IIIA (with the implication that the site should be preserved in its entirety) and Grade IIIB (with the implication that part of the site could be mitigated and part preserved as appropriate) while sites of lesser significance are referred to as having 'General Protection' (GP) and rated as GP A (high/medium significance, requires mitigation), GP B (medium significance, requires recording) or GP C (low significance, requires no further action).

### **3.6. Consultation**

The 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.

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<sup>3</sup> The system is intended for use on archaeological and palaeontological sites only.



### 3.7. Assumptions and limitations

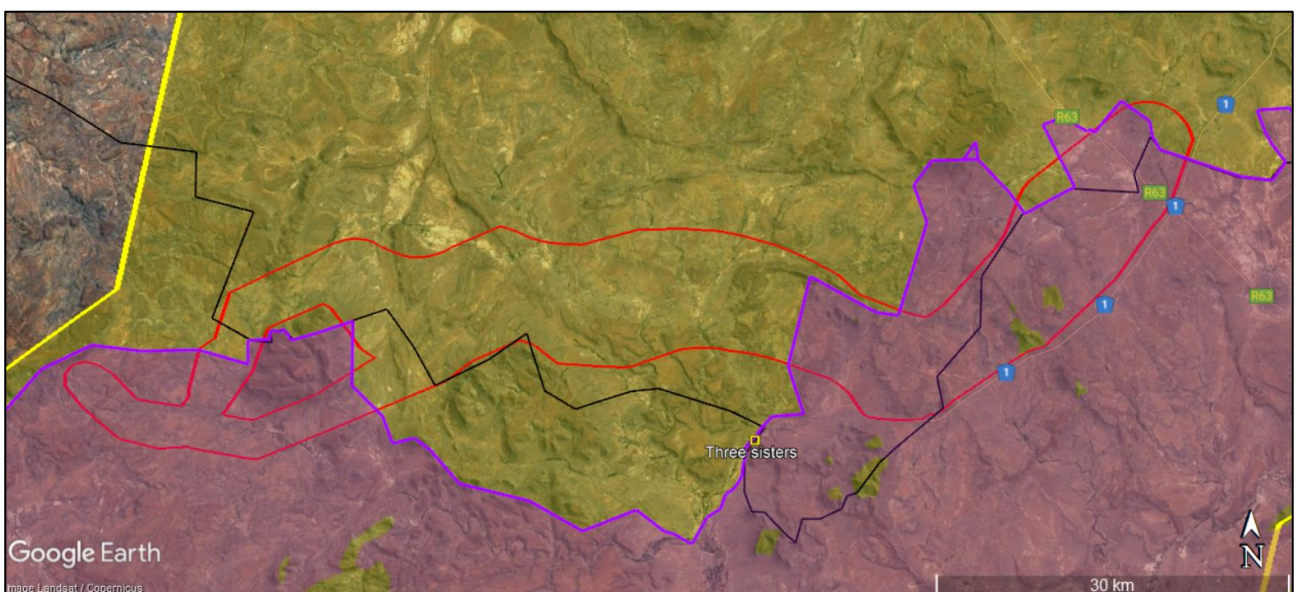
The field study was carried out at the surface only and hence any completely buried archaeological sites would not be readily located. Similarly, it is not always possible to determine the depth of archaeological material visible at the surface. The site is large and, as a result, the survey achieved only very low density coverage. However, it attempted to identify all obvious heritage resources visible from roads and the air so as to create a record of the types of heritage that definitely occur in the area. This record would then be used to support the desktop research. This is still limited by the lack of detailed field survey but it is assumed that the findings of other proximate surveys would be indicative of the overall pattern on the landscape. In combination with the specialist's general knowledge of the broader area, the data were deemed to be sufficient to enable a fair assessment of the potential impacts.

Cumulative impacts are difficult to assess due to the variable site conditions that would have been experienced in different areas and in different seasons. Survey quality is thus likely to be variable. As such, some assumptions need to be made in terms of what and how much heritage might be impacted by other developments in the broader area.

## 4. PHYSICAL ENVIRONMENTAL CONTEXT

### 4.1. Site context

The powerline corridor is located in a rural/natural context used for livestock (sheep and cattle) and game rearing. All local roads are gravel, but the N12 and R63 tar roads cross the study area from north to south. The N1 lies adjacent to the southern edge of the corridor in its eastern part. Farm complexes are few and far between, and human modification of the environment, aside from roads and occasional farm complexes, some of which have associated agricultural lands, is limited to wind pumps, small reservoirs and farm fences. The corridor lies wholly within the Central Electricity Grid Infrastructure (EGI) Corridor and partly within the Beaufort West Renewable Energy Development Zone (REDZ).



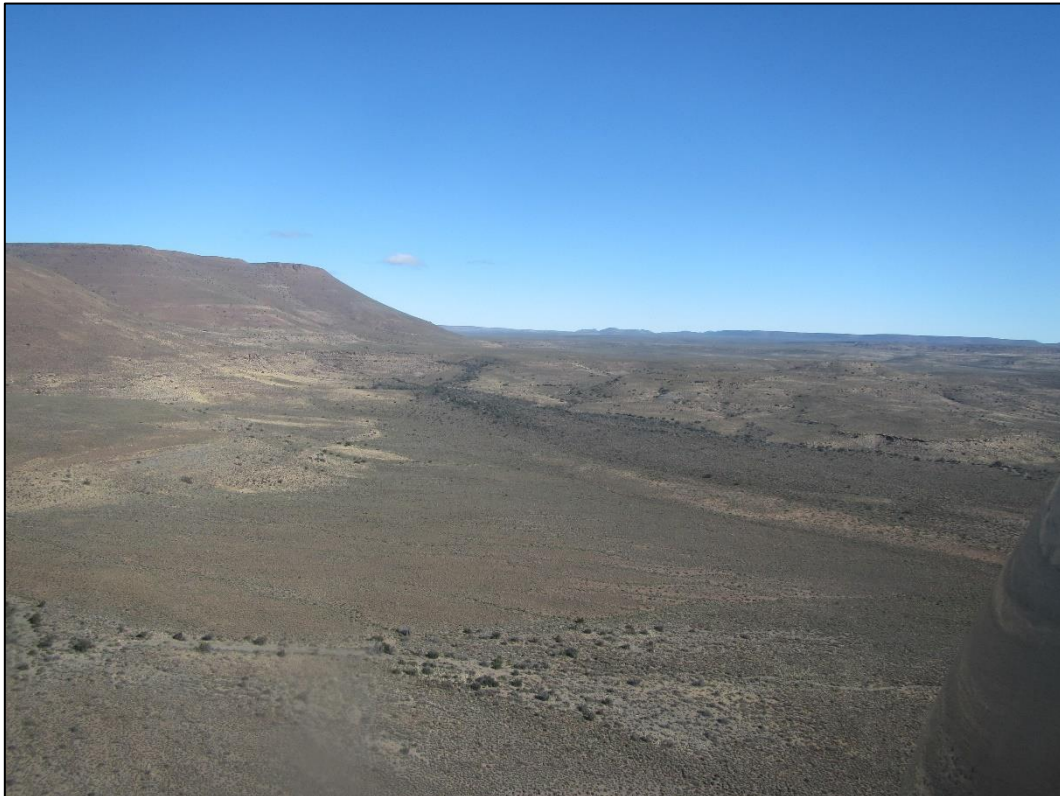
**Figure 5:** Aerial view showing the proposed corridor in relation to the Central EGI Corridor (yellow) and the Beaufort West REDZ (purple).

#### 4.2. Site description

The site is located in a rural context dominated by dolerite mountains in the west and by plains with dolerite ridges in the east. Vegetation is low, but trees occur along the river courses and occasionally associated with the dolerite. Rock outcrops are generally limited to the dolerite areas with the intervening spaces being flat plains. Figures 6 to 19 illustrate the nature of the landscape from west to east. Most images were taken from the air, but some ground level photographs provide a better idea of the local vegetation.

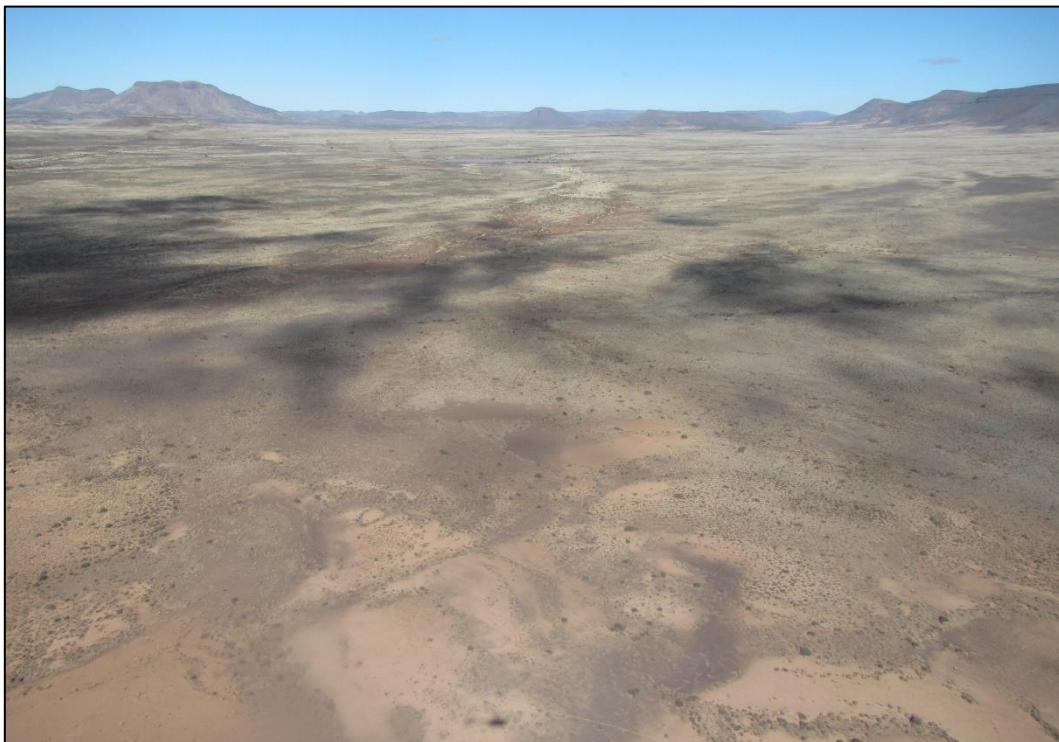


**Figure 6:** Looking west across a flat plain in the western part of the corridor.





**Figure 7:** Looking west along the northern edge of the Perdeberg massif (visible at left; this massif is the small 'island' omitted from the corridor) in the western part of the corridor.



**Figure 8:** Looking south across a plain in the western part of the corridor. Perdeberg lies in the upper right hand corner of this view.

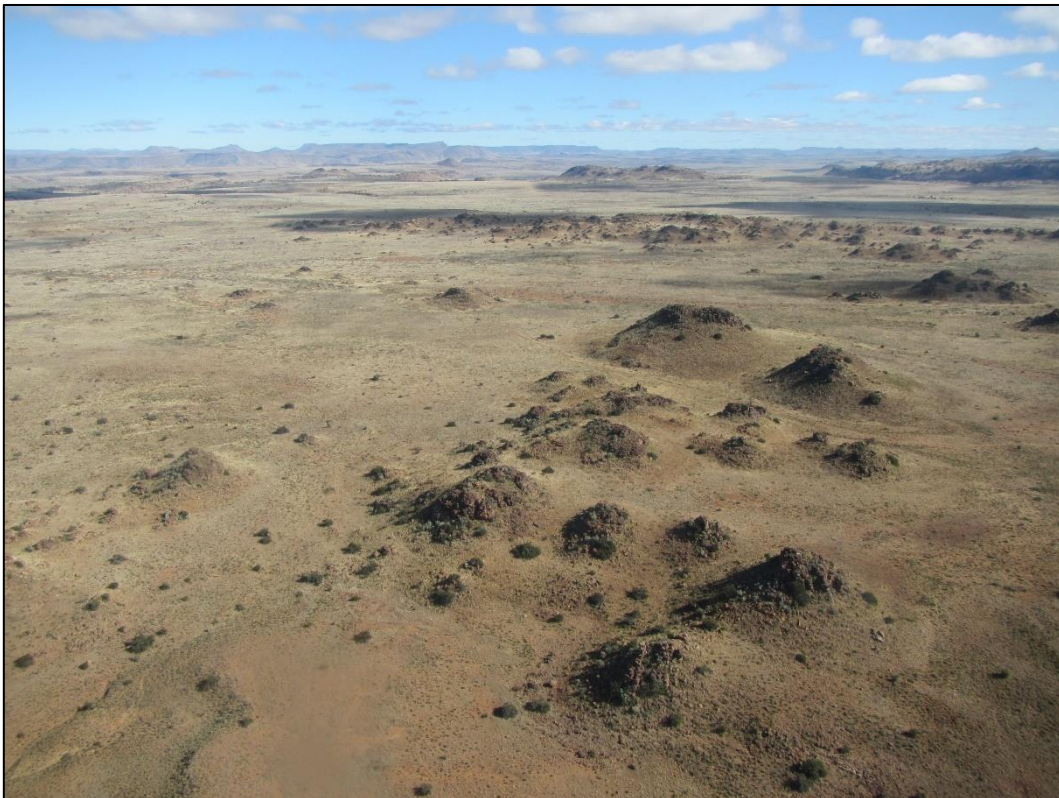




**Figure 9:** Looking southwest across a plain towards the large Perdeberg massif in the background.



**Figure 10:** Looking north along the N12 cutting through the central part of the corridor.

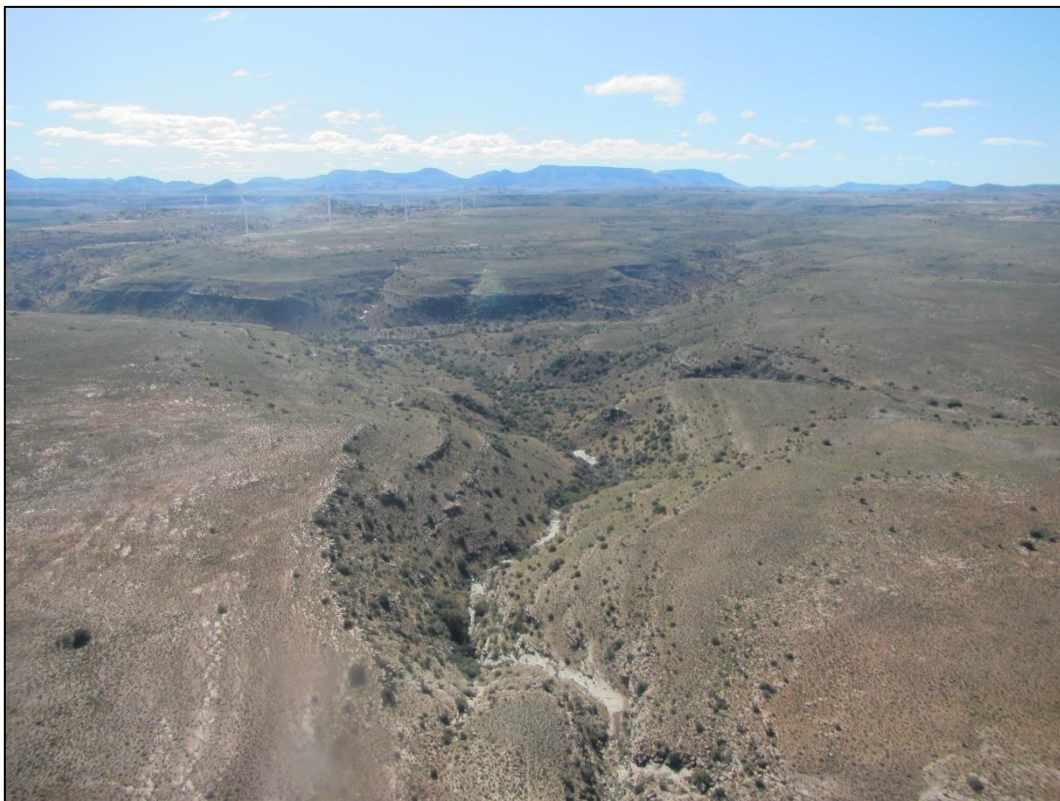


**Figure 11:** Looking west over a cluster of small dolerite intrusions in the central part of the corridor.





**Figure 12:** Looking southwest along the railway line in the central part of the corridor.



**Figure 13:** Looking north towards the Noblesfontein Wind Farm in the eastern part of the corridor. The wind farm falls partly within but mostly outside of the corridor.





**Figure 14:** Looking northeast through the eastern part of the corridor.



**Figure 15:** Looking northwest along a dolerite dyke that cuts through the eastern part of the corridor.





**Figure 16:** Looking southwest across a plain and towards a dolerite dyke in the eastern part of the corridor.



**Figure 17:** Looking west along a stream in the eastern part of the corridor.





**Figure 18:** Looking north across a flat plain in the eastern part of the corridor.



**Figure 19:** Looking northwest from the N1 across a flat plain at the eastern end of the corridor.

## 5. FINDINGS OF THE HERITAGE STUDY

This section describes the heritage resources recorded in the study area during the course of the project. Heritage resources recorded during the survey are listed in Table 2 and mapped in Appendix 3. Note that other finds from the Nuweveld Wind Farms in the far western end of the corridor are mapped and considered in this report but only new finds are listed and described below.

**Table 2:** List of finds from the heritage survey.

Waypoint	Province	Location	Description	Significance Grade
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1330	NC	S31 42 54.1 E23 10 59.1	Biesiespoort railway station. There are some 20 <sup>th</sup> century (1940s and later) buildings but it is evident that other parts of the original station have been demolished. <i>Located outside corridor.</i>	Medium ---
1331	WC	S31 47 37.7 E23 23 11.5	Stone-walled kraal. Not visited, but looks from a distance as though it is in poor condition. It is built on the side of a small hill on a plain. <i>Located outside corridor.</i>	Very low IIIC
1332	NC	S31 43 30.4 E23 21 48.8	Farm complex with a 19 <sup>th</sup> century house that has some additions to it, a larger early 20 <sup>th</sup> century house and a small barn. Stretching towards the southeast is a line of labourers' cottages.	High ---
1333	NC	S31 40 14.1 E23 21 53.7	A drystone-walled kraal ruin very close to a road. It was probably partly demolished during building of the road.	Very low GPC
1334	WC	S31 43 13.3 E23 26 29.7	The Schietkuil farmstead. The main house looks like a 19 <sup>th</sup> century house with a steep pitched roof and loft and an added Victorian verandah. The house is very well maintained. There are several other historical structures in the farmstead but they were not visited. <i>Located outside corridor.</i>	High IIIA
1335	WC	S31 49 27.0 E23 20 10.7	A point along what seems to be an earlier alignment of the N1. <i>Located outside corridor.</i>	Very low NCW
1336	WC	S31 50 02.6 E23 19 25.0	A point along what seems to be an earlier alignment of the N1. <i>Located outside corridor.</i>	Very low NCW
1337	NC	S31 49 15.3 E23 01 02.3	Farmstead. Not visited but it looks to have a number of historical structures.	High IIIA
1338	NC	S31 47 15.9 E22 55 04.8	Stone-walled ruin seen in the distance.	Medium GPA
1339	NC	S31 49 50.7 E22 55 12.3	A farm labourers' graveyard that lies alongside a road. The road reserve fence cuts through the graveyard with about three graves in the road reserve. There appear to be at least 31 graves present with only two having what looked like cement headstones. The rest only had stones packed over them.	High IIIA
1340	NC	S31 50 00.5 E22 55 22.6	A stone foundation of what must have been a small house. There are some red bricks in the small amount of surrounding rubble.	Medium GPA

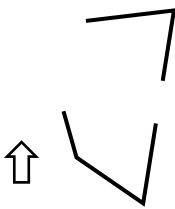
1341	NC	S31 50 00.2 E22 55 23.2	A dump with 19 <sup>th</sup> and early 29 <sup>th</sup> century glass, ceramics and metal. There is a wide variety of glass colours and ceramic types.	Medium GPA
1342	NC	S31 50 08.2 E22 55 13.5	An early 20 <sup>th</sup> century barn with a lean to-style verandah section on the east side and a large door to the south.	Medium ---
1343	NC	S31 50 09.8 E22 55 16.3	A stone and cement kraal that is not in very good condition.	Low GPB
1344	NC	S31 48 23.1 E22 48 32.6	Wagenaarskraal farmstead. There are many mature gum and pepper trees and the structures cannot be seen from the road. The place seems very historic.	High ---
1345	NC	S31 48 19.1 E22 48 25.5	A brick house ruin. Not visited but only a small portion of walling is still standing.	Low GPB
1346	NC	S31 47 45.6 E23 16 45.5	A stone-walled kraal and house ruin seen from the air. The kraal could be measured on aerial photography as being 11 m by 49 m but the associated house ruin was not readily enough discernible.	Medium GPA
1347	NC	S31 45 55.2 E22 59 39.5	A brick house ruin seen from the air. It has no roof, some joinery is present and one wall has partially collapsed. There are no internal walls.	Medium GPA
1348	NC	S31 46 34.0 E22 53 37.0	Farmstead with dam and fields (cultural landscape).	High ---
1349	NC	S31 52 01.5 E22 35 53.7	Farmstead with dam and fields (cultural landscape).	High ---
1350	WC	S31 51 23.3 E22 41 37.7	Two stone-walled ruined structures seen from the air. One is circular and the other square/rectangular.	Medium GPA
1351	NC	S31 48 44.7 E22 57 52.8	Several stone-walled ruins including a large kraal occur near a dam in this area. They were seen from the air. The kraal measures about 35 m by 33 m on aerial photography.	Medium GPA
1352	NC	S31 45 42.7 E23 02 13.8	Stone-walled house ruin with no roof. Seen from a distance.	Medium GPA
1353	NC	S31 48 33.4 E22 48 42.8	Several dolerite boulders here have modern scratches on them.	Very Low GPC
1354	NC	S31 48 33.7 E22 48 43.2	Dolerite boulder with modern scratches including "G MacRoberts"	Very Low GPC
1355	NC	S31 48 33.3 E22 48 44.7	Partial/incomplete possible animal made with many scratches. Probably historical, although some degree of weathering is present.	Low GPB
1356	NC	S31 48 32.3 E22 48 46.2	A circular stone-walled enclosure of c. 1.5 m diameter with walls about 0.4 m high and opening towards the east.	Low GPB



1357	NC	S31 48 32.2 E22 48 47.9	A circular stone-walled enclosure of c. 3.0 m diameter with walls about 0.4 m high and opening towards the east. A single tin was present inside it.	Low GPB
1358	NC	S31 48 32.6 E22 48 48.1	An oval-shaped stone-walled enclosure of c. 2 m by 3 m with walls about 0.4 m high and opening towards the east.	Low GPB
1359	NC	S31 48 36.6 E22 48 47.9	Two dolerite boulders here have modern scratches on them.	Very Low GPC
1360	NC	S31 48 36.9 E22 48 50.6	A faint stone circle of about 5 m diameter. It is located among dolerite rocks and the floor is crumbling dolerite. The stones have just been cleared to the edge and very loosely piled into vague walls. This could be a Stone Age kraal feature, but this is impossible to confirm.	Low GPB
1361	NC	S31 48 36.6 E22 48 52.8	Several dolerite boulders here have slightly weathered scratches on them. The age of these scratches is unknown but they could be pre-colonial.	Low GPB
1362	NC	S31 48 37.5 E22 48 56.2	Several dolerite boulders here have modern scratches on them.	Very Low GPC
1363	NC	S31 48 39.1 E22 49 01.4	A boulder with historical scratched writing and a human figure that was made with a circle for the head, another circle for the body and lines for arms and legs. Another boulder has "V MACROBERT", "DIANNE", "NF" and "JF".	Very Low GPC
1364	NC	S31 48 40.0 E22 49 02.0	Dolerite boulder with historical writing on it. "F. JOHNSON" and "John MacRobert" are the main text.	Very Low GPC
1365	NC	S31 48 47.2 E22 49 06.2	A dolerite boulder with some weathered scratches on it. Possibly precolonial.	Very Low GPC
1366	NC	S31 48 47.4 E22 49 05.7	A dolerite boulder with a modern scratched ostrich.	Very Low GPC
1367	NC	S31 48 50.7 E22 48 57.8	A dolerite boulder with scratches of variable age as evidenced by variable weathering.	Very Low GPC
1368	NC	S31 48 48.1 E22 48 49.3	A dolerite boulder with a number of symbols/letters on it.	Very Low GPC
1369	NC	S31 48 31.5 E22 48 41.2	A dolerite boulder with some weathered scratches on it. Possibly precolonial.	Very Low GPC
1370	NC	S31 48 31.5 E22 48 34.9	A dolerite boulder with some weathered scratches and some more recent scratches on it. The older ones are possibly precolonial. The remains of a stone-walled kraal are visible on aerial photography just	Very Low GPC

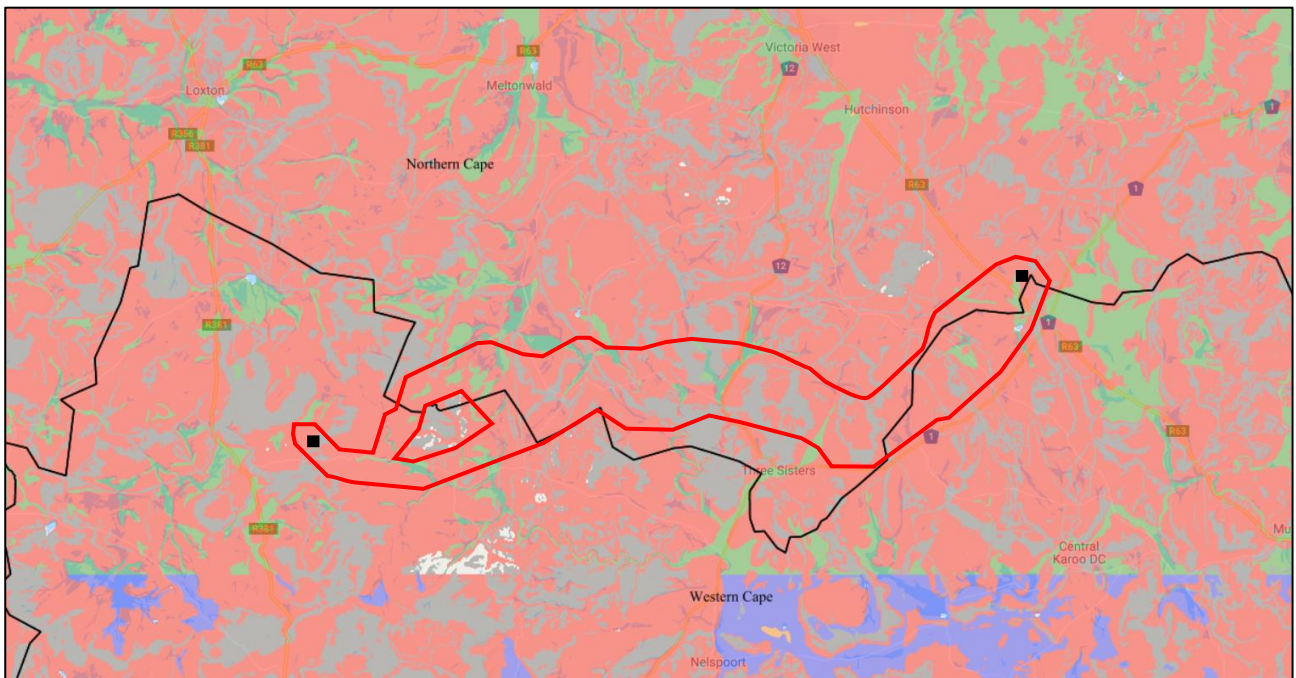
			to the southeast but the site was not visited in the field.	
1371	NC	S31 48 32.2 E22 48 33.0	A dolerite boulder with some weathered scratches on it. Possibly precolonial.	Very Low GPC
1372	NC	S31 48 31.8 E22 48 32.5	A dolerite boulder with some weathered scratches on it. Possibly precolonial.	Very Low GPC
1373	NC	S31 48 31.9 E22 48 32.2	A dolerite boulder with some weathered scratches and some more recent scratches on it. The older ones are possibly precolonial.	Very Low GPC
1374	NC	S31 48 32.0 E22 48 26.7	A stone, cement and concrete dam.	Medium ---
1375	NC	S31 48 29.7 E22 48 27.4	About seven dolerite boulders with some weathered scratches and some more recent scratches and names on them. The older ones are possibly precolonial. Included in the recent markings are "JMO" and "Johannes .....", and "H:T:OTTO DEN 11 MAART 1836" (last two numbers are unclear). There is also a low stone-walled kraal here which has probably had most of its stones robbed.	Medium GPA
1376	NC	S31 48 29.8 E22 48 30.7	The remnants of the base of a stone-walled kraal. Most rocks have been robbed.	Very Low GPC
1377	NC	S31 48 29.9 E22 48 32.6	A dolerite boulder with some weathered scratches and some more recent scratches on it. The older ones are possibly precolonial.	Very Low GPC
1378	NC	S31 48 21.7 E22 48 23.5	A large stone-walled kraal of about 35 m by 45 m and located on a dolerite ridge.	Medium GPA
1379	NC	S31 48 30.2 E22 48 17.5	A faint stone circle measuring about 15 m diameter. It might be precolonial. It lies atop the hill known locally as "The Visitors' Book".	Medium GPA
1380	NC	S31 48 27.0 E22 48 17.9	There are many dolerite boulders on a hill overlooking the farm dam and known locally as "The Visitors' Book" because visitors to the farm have been inscribing their names on the rocks there for many years. The practice continues to this day with the newest date seen being 2001. The assigned grade is for all historical engravings across the entire hill (i.e. sites 1380, 1382, 1383). At this point (1380) there are some historical scratches and engravings as well as some older weathered scratches. Amongst the historical marks are the name "CIASSINA	High IIIA

			PRETORIUS 1954". A group of three animals may be historical or precolonial; it is not clear from the weathering what their age is.	
1381	NC	S31 48 26.8 E22 48 18.4	An irregular-shaped stone-walled enclosure of about 15 m diameter. It may be precolonial. It lies atop the hill known locally as "The Visitors' Book".	Medium GPA
1382	NC	S31 48 26.0 E22 48 19.7	Various dolerite boulders with scratched names and dates occur in this area. Included is the name "HAIG MacROBERT 2007".	High IIIA
1383	NC	S31 48 25.9 E22 48 20.3	Various dolerite boulders with scratched names and dates occur in this area. Included are "M.D. Radford" "CJ JOUBERT" "ELNIC Willem SCHALK 5/9/82" "27-06-1997 DANIËL DU TOIT" "JK" "PJL" "20-4-2010 D.O.B. 18-01-83 Stephen Collins" "AV Cloete 1929" "JOHN MACROBERT 1927" (J is reversed) "P.M. MacRobert 1947"	High IIIA
1384	NC	S31 48 20.4 E22 48 19.2	Farm graveyard from before the MacRobert ownership. There are about 20 graves, all except two of which are aligned north-south. The other two are east-west. Most graves are stone-packed mounds but a few headstones occur. MARGARETT WILHELMINA STANBRIDGE 02/11/1833-08/01/1856 MARY HENRIETTA STANBRIDGE 14-10-1581-03/09/1852 RICHARD LIGHT TRILL 06/06/1875 37 years	High IIIA
1385	WC	S31 50 46.7 E22 45 25.1	The remains of a stone-walled ruin with a kraal (20 m by 25 m) lying just to its south. Not examined up close.	Medium GPA
1386	WC	S31 50 43.2 E22 45 25.5	A stone house ruin. Not examined up close but there seems to be only a small part that is above foundation level.	Medium GPA
1387	WC	S31 50 43.3 E22 45 23.4	The remnants of a stone-walled kraal. Almost all rocks have been robbed.	Very Low GPC

1388	WC	S31 52 54.0 E22 37 43.6	The remains of a stone-walled kraal. Previously recorded as waypoints 1792 and 1971.	Very Low GPC
1389	WC	S31 51 50.9 E22 35 48.4	A small brick house that is in a state of disuse. It has a corrugated iron roof and window openings have been bricked up. Part of farmstead previously recorded as waypoint 1794.	Low ---
1390	WC	S31 51 18.6 E22 35 03.9	An old agricultural implement of some sort. It would be considered a heritage object.	Medium ---
1391	WC	S31 51 10.7 E22 34 43.9	A small square stone-walled ruin of about 2 m by 2 m and with its door opening towards the east. It is right adjacent to the road and one corner has been damaged or possibly deliberately removed to make way for the road.	Very Low GPC
1395	WC	S31 50 48.4 E22 33 55.4	A stone beacon that lies very close to the intersection of three farm portions.	Medium IIIB
1398	WC	S31 49 36.9 E22 36 23.9	A scatter of just nine large stone artefacts on a well-cemented sandstone. These may be from the ESA but do not appear to be very weathered.	Very Low NCW
1399	WC	S31 49 54.4 E22 35 36.3	An unusually-shaped stone-walled enclosure with a small opening towards the east and a large one towards the west. The walling is only about 0.3 m high and the feature measured some 2 m by 4 m. There were no associated artefacts present.  	Low IIIC
1400	WC	S31 49 16.2 E22 36 03.3	A small accumulation of rocks that is clearly anthropogenic but has no obvious function.	Very Low NCW
1401	NC	S31 47 33.5 E22 36 32.8	A stone-walled ruin, probably a house but not visited. It lies close to a river which has a dam in it.	Medium GPA
1402	NC	S31 47 59.4 E22 36 04.4	A stone-walled house ruin that was not visited as it lay deep in a small valley.	Medium GPA
1406	WC	S31°50'55.40" E 22°36'2.45"	Dolerite boulder with some scruffy engravings on it. Found and recorded by Madelon Tusenius during the palaeontological fieldwork. There are other boulders along the base of Perdeberg that might also be engraved.	Medium GPB

## 5.1. Palaeontology

The SAHRIS Palaeosensitivity Map (Figure 20) shows the country rocks of the study corridor to be of largely very high sensitivity but with many patches of zero sensitivity where dolerite intrusions occur. Small areas are rated as medium sensitivity. The corridor “is underlain by (1) fossiliferous continental sediments of the Teekloof Formation (Lower Beaufort Group, Karoo Supergroup) of Middle to Late Permian age as well as by (2) a range of Late Caenozoic superficial sediments, most of which – with the possible exception of consolidated older alluvial deposits – are, at most, sparsely fossiliferous” (Almond 2022:1). On the basis of surveys for neighbouring projects and a brief largely vehicle-based survey of the present corridor, Almond (2022) considers the majority of the study area to be of low palaeontological sensitivity. This is because of “(1) extensive cover by unfossiliferous superficial sediments, (2) intense regional dolerite intrusion and (3) near-surface weathering” (Almond 2022:i). No fossil sites were recorded during the drive-through survey done specifically for this project but the survey was able to confirm that the expected regional geology held true. One No-Go area of very high sensitivity has been identified overlapping the western end of the corridor.



**Figure 20:** Extract from the SAHRIS Palaeosensitivity Map showing the proposed corridor (red polygon with end point substations shown as black squares) to be of largely very high (red shading) and zero (grey shading) sensitivity. Small areas are shown as of medium sensitivity (green shading).

## 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, LSA



archaeological sites are well-known to be focused most strongly on water sources. This pattern was well demonstrated at the western end of the proposed corridor by Orton (2021a, 2021b, 2021c, 2021d), but the density of sites was found to be 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, with even rock shelters only having light artefact scatters inside them).

In the central part of the corridor, Binneman *et al.* (2011) found MSA and LSA artefacts in various places. Pottery was seen at one site, while ostrich eggshell fragments were more common and associated with LSA sites, including painted rock shelters. To the northeast of the corridor, the Seacow River Valley is one of the best studied parts of South Africa. There, Sampson (1984, 2010; Sampson *et al.* 2015) recorded vast numbers of Stone Age sites with many of them being Kheokhoe sites, including kraals. ESA and MSA sites were also found to occur. Hart's (2016) study to the southeast located many LSA sites but found ESA and MSA occurrences to be very rare. The LSA sites were mostly stone artefact scatters but some included pottery and a few circular stone-walled features were also recorded.

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, to the southeast and northeast of the present study area respectively, but Orton (2021b) recorded two further examples in the Nuweveld just beyond the western end of the powerline corridor, 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 several engraved 'fine line' tradition sites on record from the Nuweveld in Western Cape (Orton 2021a, 2021b, 2021c, 2021d, 2022a, 2022b). Similar sites were recorded by Binneman *et al.* (2011) in the central part of the corridor in Northern Cape and by Hart (2016) some 45 km southeast of the eastern end of the corridor in Western Cape. One of Hart's (2016) sites was considered as being of provincial significance due to the layering of imagery on the shelter wall and the very unusual inclusion of engravings. He also saw sites with human and animal imagery. A site with graves, stone artefacts and engravings occurs in the south-western end of the corridor and is likely one of the most important archaeological sites in the area. Figures 21 to 33 show archaeological features from this site which falls in Western Cape. Geometric tradition art is thought to have been produced by the Khoekhoen and the Nuweveld records expand the known distribution of this tradition in the area (Figure ). Hart (2016) considered 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. 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 well to the northeast around the Kimberley region.



**Figure 21:** Hornfels artefacts from Waypoint 1809.  
Scale in cm.



**Figure 22:** A lower grindstone from Waypoint 1835.  
Scale in cm.



**Figure 23:** A dolerite coble exhibiting flake removals from Waypoint 1830.



**Figure 24:** An anvil stone from Waypoint 1835.  
Scale in cm.



**Figure 25:** A scratched rock from Waypoint 1810.  
Scale in cm.



**Figure 26:** A scratched rock from Waypoint 1811.  
Scale in cm.





**Figure 27:** A scratched and/or rubbed rock from Waypoint 1816. Scale in cm.



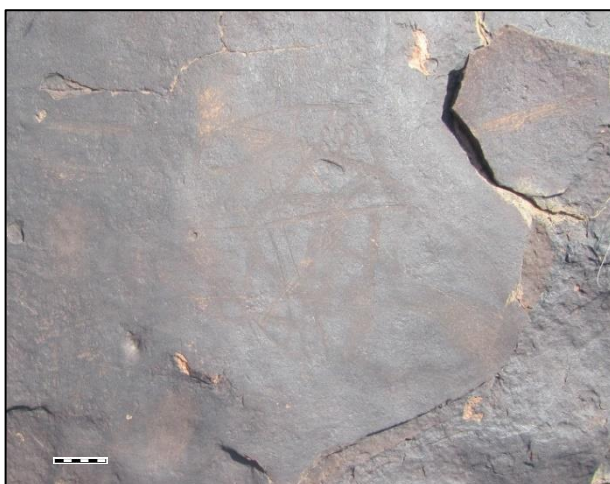
**Figure 28:** A scratched rock from Waypoint 1819. The lower slab in this view is about 65 cm across.



**Figure 29:** A scratched rock from Waypoint 1822. Scale in cm.



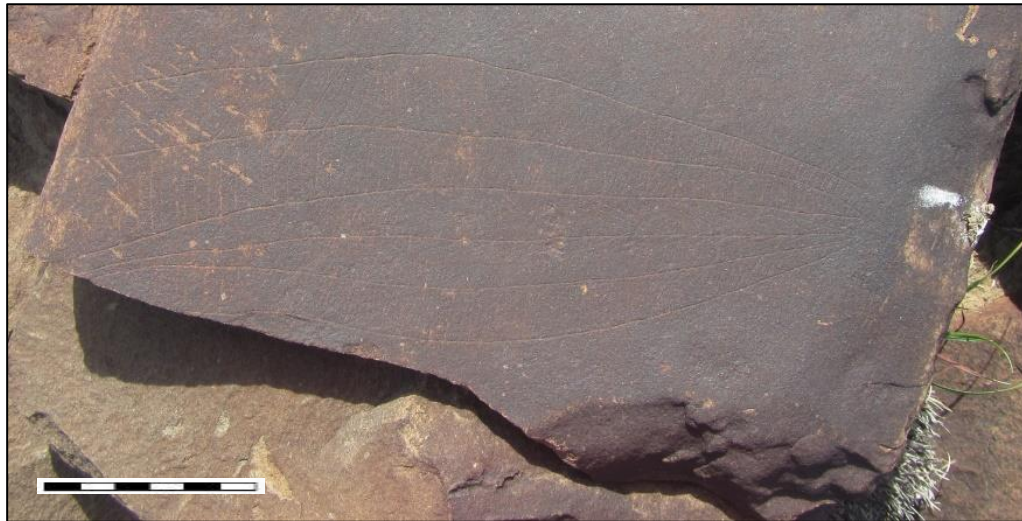
**Figure 30:** Another scratched rock from Waypoint 1822. Scale in cm.



**Figure 31:** Another scratched rock from Waypoint 1822. Scale in cm.



**Figure 32:** A scratched eland engraving from Waypoint 1825. Scale in cm.



**Figure 33:** A scratched rock from Waypoint 1823. Scale in cm.

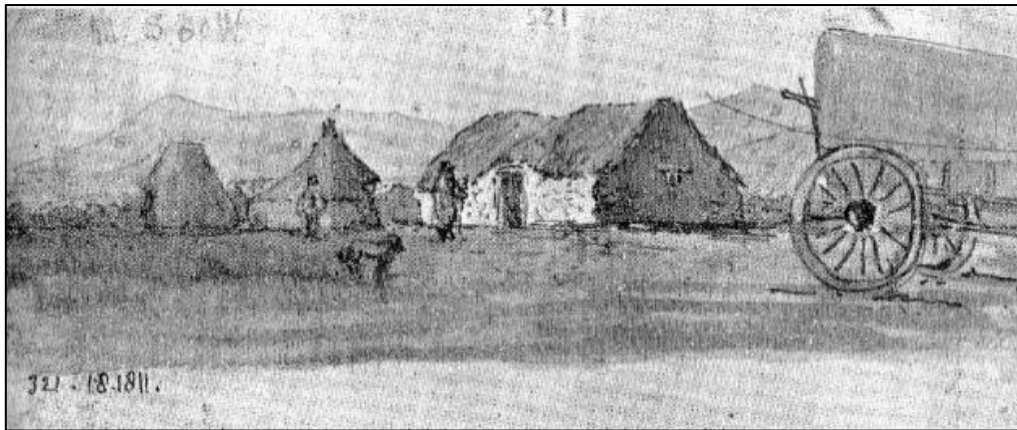


**Figure 34:** Extract from a map showing the distribution of geometric tradition rock art. Source: Smith & Ouzman (2004: fig. 9). The present study area is in the red oval, while Hart’s (2016) study area lies just to the southeast of the oval.

Until Orton’s (2021a, 2021b, 2021c, 2021d, 2022a, 2022b) recent surveys in the area, historical archaeological resources, too, were little known from the immediate Nuweveld area. These surveys showed that 19<sup>th</sup> 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 KNP, Kaplan (2005, 2006) recorded several similar historical sites. 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). Binneman *et al.* (2011) and Hart (2016) report similar finds from further east.



These early packed stone structures are invariably collapsed reducing them to archaeological sites in terms of the NHRA definitions. While some with taller walls may have had a formal or informal and/or temporary roof over them, others may have been hartebeeshuise with A-frame-type roofs made of branches and reeds placed above low stone or mud walls. Governor van Plettenberg, during his travels east to inspect the Colony, noted near the Sneeuwberg Mountains that the houses of the colonists consisted only of one room structures with low walls and straw roofs (Theal 1896-1911 cited in Böeseken 1975). In 1811 William Burchell illustrated a trekboer farmhouse (Van Zyl 1975), while Schoeman (2013) shows an image of such a historical stone dwelling still in use in the early 20th century (Figures 35 & 36).



**Figure 35:** Drawing of an early 19th century trekboer farmhouse by William Burchell. Source: Van Zyl (1975:103).



**Figure 36:** 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, with Orton (2022b) having documented a very high density of such sites in the western Nuweveld. Binneman *et al.* (2011) also recorded engravings inside the central part of



the proposed corridor. 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 20<sup>th</sup> century. He also notes the inclusion of wagons and human figures in western clothing. Orton's (2022b) survey also revealed several Nine Men's Morris boards as well as a Morris Minor and an engraving with a date of '34 presumably indicating the extension of the engraving tradition into the early decades of the 20<sup>th</sup> century.

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 the Seacow River valley some 75-130 km northeast of the eastern end of the present study corridor. 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

Perhaps partly due to the limited amount of foot survey, just one site with stone artefacts was recorded (waypoint 1398 in Western Cape). This was an unusual scatter in that it was comprised of just nine artefacts, all of them quite large and thus likely to be from the ESA (Figure 37). Stone artefact scatters are known to be rare in the wider area with most being LSA and associated with watercourses.



**Figure 37:** *Stone artefacts from the scatter at waypoint 1398 in Western Cape. Scale in cm.*

One potential example of a Stone Age stone-walled enclosure was seen at waypoint 1360 in Northern Cape (Figure 38). It was very 'informal' in appearance and this could be due to its walling having tumbled over time. Alternatively, it was simply made by moving stones to the side to create a clearing rather than a walled enclosure. Without any associated finds it is not possible to be sure whether this is a Stone Age or historical feature.



**Figure 38:** A faint, 5 m diameter stone-walled enclosure at waypoint 1360 in Northern Cape. The walling is very ephemeral and seems more like it was created purely by moving stones to the edge of the circle.

Historical sites are generally far more visible and, from the desktop review, are expected to be common. Many were recorded, despite the brevity of the survey. These were a range of features including stone-walled livestock enclosures (*kraals*), ruined houses in brick or stone and sometimes with an associated ash dump, smaller stone-walled dwellings, other small indeterminate features with very low stone walls, and a stone boundary beacon. These features lay in both the Western and Northern Cape provinces and are illustrated and described in Figures 39 to 51. Just one ash dump was recorded and this was associated with the feature at waypoint 1340 in Northern Cape. The feature was likely a house foundation and the dump is at waypoint 1341. These ashy features are unusually good sources of historical data because they often contain many broken bottles and ceramic items as well as scraps of metal and other discarded objects (Figures 47 & 48). Amongst the ceramics, this dump included lined industrial, transfer-printed, sponge-printed and hand-painted wares. The glass included clear, blue, turquoise, green and brown fragments.





**Figure 39:** Stone-walled kraal seen from the air at waypoint 1346 in Western Cape. It is unusually long. A small house ruin is visible alongside it.



**Figure 40:** A brick house ruin seen from the air at waypoint 1347 in Northern Cape.



**Figure 41:** Two stone-walled features seen from the air at waypoint 1350 in Northern Cape.



**Figure 42:** A stone-walled kraal complex seen from the air at waypoint 1351 in Northern Cape.



**Figure 43:** A stone-walled kraal at waypoint 1331 in Western Cape. It is built on an isolated hill on an otherwise flat plain.



**Figure 44:** A poorly preserved stone-walled enclosure (possibly a kraal) at waypoint 1332 in Northern Cape.





**Figure 45:** A stone-walled kraal that is still in use at waypoint 1343 in Northern Cape.



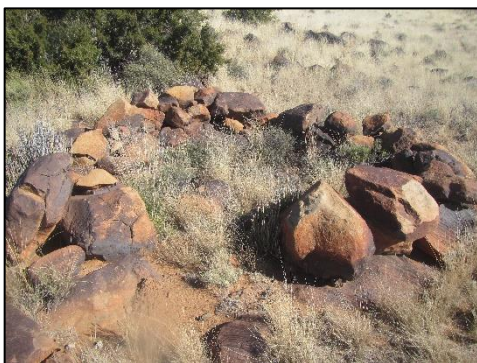
**Figure 46:** The foundation of what is assumed to have been a house at waypoint 1340 in Northern Cape.



**Figure 47:** Ceramic and glass artefacts from an ash and rubbish dump at waypoint 1341 in Northern Cape.



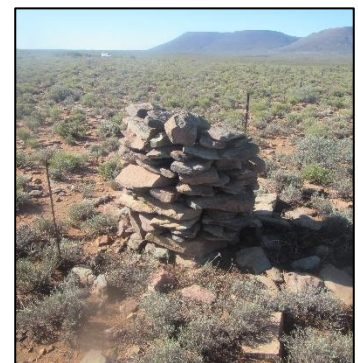
**Figure 48:** Glass fragments from an ash and rubbish dump at waypoint 1341 in Northern Cape.



**Figure 49:** A small stone enclosure of unknown function at waypoint 1357 in Northern Cape.



**Figure 50:** A small stone-walled feature of unknown function at waypoint 1399 in Western Cape.



**Figure 51:** A stone boundary beacon at waypoint 1395 in Western Cape.



While no definitive Stone Age engravings were found, historical engravings were found in three areas on the farm Wagenaarskraal in Northern Cape. Many of these are likely to be less than 100 years of age and thus not archaeological, but they do nonetheless represent a continuation of a long-standing Stone Age tradition in the central Karoo. The first area was a low density 'cluster' of largely scratched engravings spread over a number of low dolerite outcrops some 500 m to 1.1 km to the south of the farmstead. Figures 52 to 55 show examples of the imagery and writing found in this area. The general lack of patination supports a recent age for these, as do the peoples' names. Among the latter are John MacRobert and F. Johnson at waypoint 1364 (Figure 54). Another cluster of scratched engravings lay on a small hill about 350 m south of the homestead and just behind the farm workers' village. Most were just scratches, but in this area a number of them were patinated suggesting the possibility of a precolonial age. Among the recent markings were some initials and names and a date of 11 Maart 1836 but with the '36' not being clear.



**Figure 52:** A recent scratched animal motif on a dolerite boulder at waypoint 1355 in Northern Cape. Scale = 20 cm.



**Figure 53:** Recent scratches on a dolerite boulder at waypoint 1359 in Northern Cape. Scale = 20 cm.



**Figure 54:** 1364 in Northern Cape.



**Figure 55:** 1366 in Northern Cape. Scale = 20 cm.

The third and most important area with engravings is on a small but prominent dolerite hill some 400 m southwest of the farmstead. This hill is known locally as "The Visitor's Book" because visitors



to the farm have been engraving their names there for more than 150 years. The practice continues today with dates into the 2000s having been seen. Figure 56 shows a selection of images from this hill which is represented by waypoints 1380, 1382 and 1383. Included in this area are some animal engravings, but none of them are patinated to a degree that they can be confidently ascribed to either the historical or precolonial periods.



**Figure 56:** Engraved names and images from “The Visitors’ Book” located at waypoints 1380, 1382 and 1383 in Northern Cape. Scales = 20 cm.



### 5.3. Graves

#### 5.3.1. Desktop study

Graves can be encountered in most areas but, overall, the chances of encountering them are very small. Farm graveyards are obvious and generally located close to the farmsteads which would mean they would almost certainly be avoided. The main concern here is isolated, unmarked precolonial graves. Such graves are very rarely found away from coastal sand dunes but a grave washed out of a river bank to the south of Beaufort West a few years ago (A. September, pers. comm. 2019) and a very unusual find of an LSA occupation site with some engraved rocks and three graves with packed stone mounds over them (Figures 57 to 60) was found within the south-western end of the proposed grid corridor in Western Cape (waypoints 1819-1843 in Orton 2021b). Binneman *et al.* (2011) located what appeared to be an informal burial ground for railway workers in the central part of the study area.



**Figure 57:** A stone-packed grave at Waypoint 1837 in Western Cape.



**Figure 58:** A stone-packed grave at Waypoint 1838 in Western Cape.



**Figure 59:** A stone-packed grave at Waypoint 1841 in Western Cape.



**Figure 60:** The lower grindstone built into the grave at Waypoint 1841 in Western Cape.

#### 5.3.2. Site visit



Graveyards were found on two farms in Northern Cape, but many more are expected to occur in association with farmsteads. One was alongside a gravel road at waypoint 1339 in Northern Cape. The farm fence alongside the road ran through the graves (Figure 61). The graves varied in style with some being simple stone mounds and others including a formal headstone. They were not in regular rows. The graveyard is assumed to be a farm workers' graveyard.



**Figure 61:** A farm graveyard at waypoint 1339 in Northern Cape. Visible graves are arrowed.

Another graveyard was recorded at waypoint 1384 on Wagenaarskraal in Northern Cape (Figure 62). This graveyard contains graves related to the previous family to own the farm before it was acquired by the MacRoberts family in 1870. It lies 380 m west of the farmstead and is in relatively poor condition having not been used at all since 1875. Presumably the last burial relates to someone who used to live on the farm and whose body was returned there for burial. The other two dated graves are from 1852 and 1856. Also on the farm and located just east of the house is the current family graveyard. It was not visited.





**Figure 62:** *An old farm graveyard at waypoint 1384 on the farm Wagenaar's Kraal in Northern Cape.*

## **5.4. Historical aspects and the Built environment**

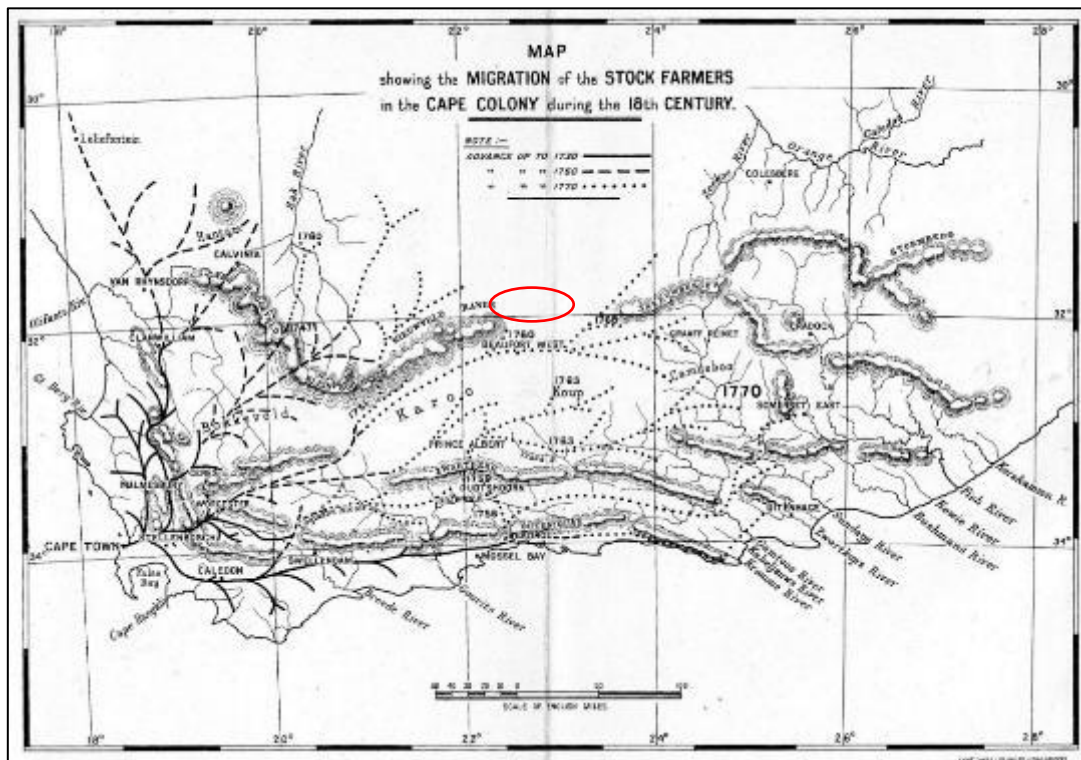
### **5.4.1. Desktop study**

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 18<sup>th</sup> 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 Nuweveld area (

Figure ). This, then, along with the Nuweveld Mountains just east of the Roggeveld constituted the mid-18<sup>th</sup> 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 ).



**Figure 63:** Map showing the mid-18<sup>th</sup> century trekboer expansion in the Karoo. Source: Botha (1926: opposite preface). The powerline study area is approximately indicated by the red oval.





**Figure 64:** Map showing the extent of the Cape Colony by 1798. Source: Walker (1928:201). The powerline study area is approximately indicated by the red oval.

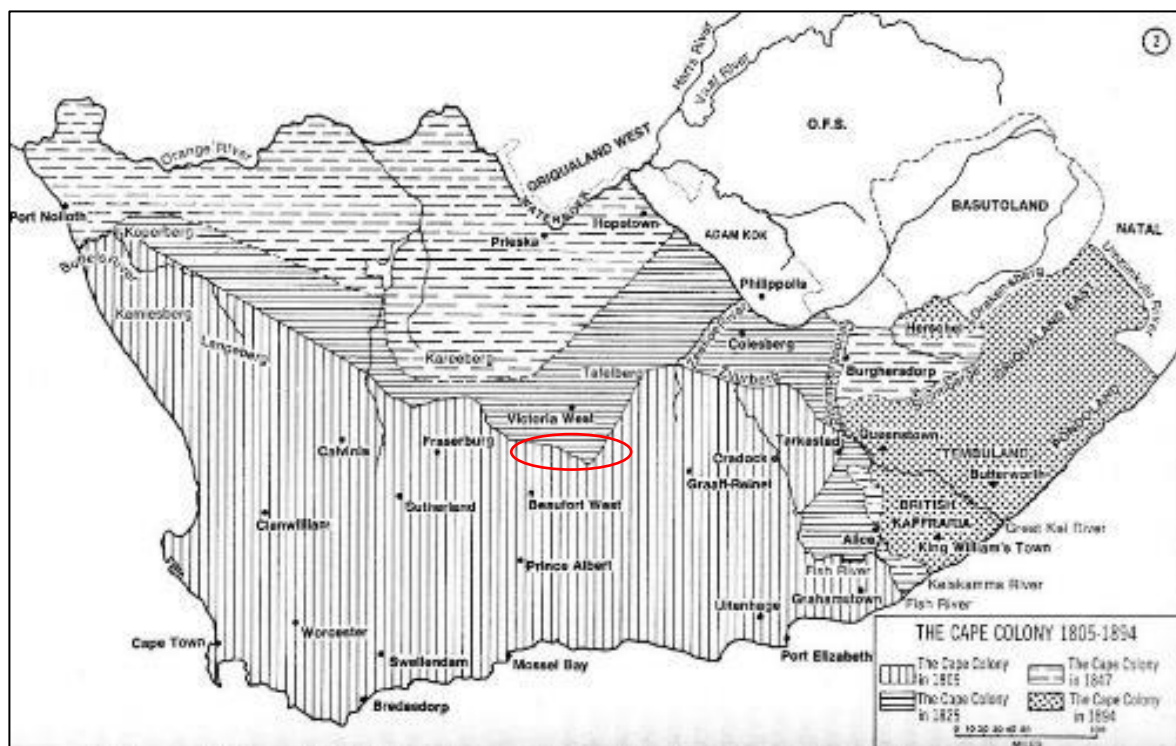
The Nuweveld Mountains and adjacent areas to the east were actually within the summer rainfall area which made occupation slightly more tenuous because trekking west into the winter rainfall Roggeveld Mountains meant moving into areas already occupied by other trekboers. The Nuweveld area was thus never properly occupied by colonists during the 18<sup>th</sup> 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 65 with the study area fully incorporated by 1825. The first survey and transfer dates of the various farms illustrates this with the earliest date found being 1827.



**Figure 65:** Map showing the expanding boundaries of the Cape Colony under British Rule. Source: Van Zyl (1975:102). The powerline study area is indicated by the red oval.

Willis (2021) notes that a wagon and post coach route linking Cape Town with the Kimberley diamond fields used to run through this area. The farm Wagenaarskraal was a busy stopping point along this route from where travellers could buy provisions, have their wagons repaired and stay overnight. A Scot, John MacRobert, ran the shop but by September 1870 he was able to use his earnings to buy the farm from then owner Mr Stanbridge. An unusual feature in the area is that a nearby hill was used as a “visitor’s book”. John’s wife, Ann, encouraged guests to inscribe their names and dates on the dolerite boulders of the hill, although the earliest date, 5 September 1859, was from before the arrival of the MacRoberts (this hill was recorded in the field and has been described in Section 5.2.2 above). Olive Schreiner also lived on this farm for a short period from February to June 1900.

Wagenaarskraal also served as a post office and, once the railway line reached Three Sisters, mail carts were sent to collect mail from the trains. It was sorted at the farm and then sent off to its recipients. Once the railway line proceeded on to Kimberly then the post office only serviced the local area (Willis 2021).

There appears to have been limited action in the Nuweveld area during the Second South African War (Anglo-Boer War). However, a skirmish occurred near the farm Oorlogsfontein (adjacent to Wagenaarskraal and within the corridor) on 17 February 1902. This resulted in the wounding of the distinguished 25 year old Commandant Henry Hugo who was then captured and died the next day (Willis 2021). No other information about this event could be found. Another fight took place at Utispanfontein (Watt 2013), 26 km southwest of the western end of the corridor but is less relevant here. The nearest Anglo-Boer War fort lies 7 km south of the corridor edge, to the southwest of Three Sisters (Green 2022).

Historical buildings occur widely across the Karoo with most dating to the 19<sup>th</sup> 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 northwest of the present study area (none are known within the corridor) 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 west of the study area but none are known from within the corridor. 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. This was notable in the Nuweveld (Orton 2021a, 2021b, 2021c, 2021d, 2022a, 2022b) as well as to the east (Hart 2016). These unoccupied buildings deteriorate faster due to the lack of maintenance and are usually encountered as archaeological sites.

The Molteno Pass, which lies along the R381 between Beaufort West and Loxton, serves as the primary access to the area above the escarpment. It was built by Thomas Bain from 1875 to 1880. Another section through a steep valley – also built by Bain – is referred to as the Roseberg Pass. These passes lie well south of the study area. The route is known to have been in use since 1830 when it was just a path. In 1837 local farmers improved the route to allow for the passage of wagons

(Willis 1994 cited in Ross 2013). Storrar (1984) suggests that the entire route was originally called Rose's Berg Pass. The R381 has had a number of sections realigned during modern upgrades but the steepest section through the Molteno Pass is almost unchanged – just one obvious short realignment is evident. De Jager's Pass lies along the DR2311 further to the east. It too was built by Thomas Bain with completion in 1880 and was known as Wagenaar's Kloof until 1899 when it was reconstructed and renamed. It had its origins in an early wagon track into the interior, also dating back to about 1830 (Ross 2013), and is presumably the route by which travellers and wagons reached Wagenaarskraal. It also gives access to the western end of the corridor.

#### 5.4.2. Site visit

Farmsteads occur throughout the area but tend to be very far apart. The two most significant ones seen were those at Schietkuil and Wagenaarskraal. The Schietkuil farmstead lies to the southeast of the N1 and just outside the study corridor at waypoint 1334 in Western Cape. It has a Victorian farmhouse that appears to be in very good condition. Outbuildings of varying age surround it. Wagenaarskraal has a long and colourful history associated with it and it lies right in the middle of the corridor at waypoint 1344 in Northern Cape. The main house faces northeast and has been added to over the years, especially at its southeast end. Despite the alterations, it is clear that this is a 19<sup>th</sup> century house and presumably was present when the first MacRobert bought the farm in 1870. The north-western gable is shown in Figure 66. This end is significant because the room contained therein is a registered local museum that houses a large collection of historical rifles as well as various artefacts and documents related to the history of the farm (Figure 67).



**Figure 66:** The north-western gable of the main house at Wagenaarskraal at waypoint 1344 in Northern Cape.



**Figure 67:** The Wagenaarskraal Museum in the northwest end of the farmhouse at waypoint 1344 in Northern Cape.

Many other historical buildings occur in the area, but seemingly always associated with farmsteads. A few examples are shown in Figures 68 to 70.





**Figure 68:** Farmstead at Uitvlugfontein at waypoint 1332 in Northern Cape.



**Figure 69:** Farm shed at Doornkloof at waypoint 1342 in Northern Cape.

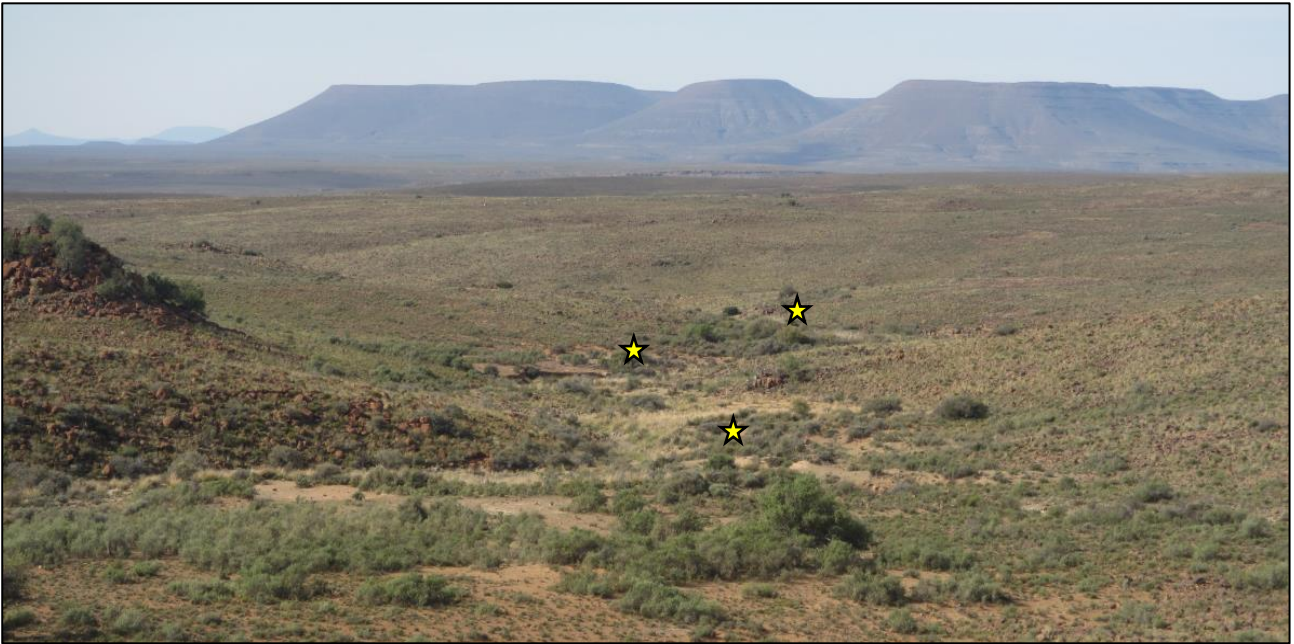


**Figure 70:** Disused cottage at Booiskraal at waypoint 1389 in Western Cape,

## 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 four aspects that require discussion here.

The oldest is the landscape inhabited for thousands of years by the indigenous Bushmen hunter-gatherers and more recent Khoekhoe herders who left little trace of their passing but did mark the landscape with engravings, paintings, rock gongs, and graves (these aspects of the archaeological landscape have been discussed in Section 5.2 and 5.3 above). This precolonial archaeological landscape is essentially a natural or primeval landscape because it has experienced so little human modification. A very significant part of this landscape is located in a remote valley in the dolerite hills at the south-western edge of the corridor. This is the site with engravings and burials discussed in Section 5.2.2 and the area has clearly been identified as significant by its precolonial inhabitants. Figure 71 shows an overview of the valley looking across the three main sites.



**Figure 71:** View towards the east over the LSA sites located at Waypoints 1809 to 1843. The fourth site lies along a tributary stream out of view towards the right.

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. This is again essentially an archaeological cultural landscape. These early farmers also fitted into the natural landscape but created small enclaves of “domesticated space” where they chose to place their farm complexes. 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 farm complexes in the region are marked by the presence of small forests of grey poplar (*Populus x canescens*) and other trees. The fast-growing poplars were grown for their branches which were used for poles in construction. None of these groves occur in the present corridor, although trees are often plentiful around farmsteads. Wagenaarskraal is a prime example (Figures 72 & 73), although historical aerial photography suggests that the vast majority of the growth is quite recent (Figure 74).

The third aspect is the variably historical to modern cultural landscape of livestock and game farming. 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 sometimes patches of agricultural lands.





**Figure 72:** The current entrance to Wagenaarskraal at waypoint 1344 in Northern Cape.



**Figure 73:** Aerial view of Wagenaarskraal (waypoint 1344 in Northern Cape) looking towards the northeast.



**Figure 74:** 1959 (434\_015\_06183) and modern (Google Earth) view of the Wagenaarskraal farmstead (waypoint 1344, Northern Cape) showing the amount of tree growth that has occurred in the last 60 years.

The fourth aspect is those parts of the landscape that have high visual sensitivity. These are principally the escarpment edge (minimum 21 km distant), Karoo National Park (minimum 30 km distant) and mountain passes (minimum 18 km distant) of the area. All of these features are too far away from the study area to be relevant, but the small Perdeberg massif in the western part of the study area (but excluded from the actual corridor) is also indicated by Winter and Oberholzer (2013) as being sensitive. They have rated the Molteno Pass section of the R381 as being a locally significant route but this significance can certainly be extended to the rest of this road for its scenic value. It seems more appropriate, however, to refer to the R381 as a local road rather than as a tourist route.

Part of all the above is the relatively undisturbed wilderness atmosphere that pervades the wider Karoo region. Driving its public roads leaves one marvelling at the tremendous sense of wide open space and, away from the hills of the escarpment, the endless Karoo plains punctuated by dolerite dykes and koppies. The plains dominate more strongly in the east with the west being more mountainous. The mountains and valleys of the Nuweveld area and surrounds are generally quite scenic, but most notably along the edge of the escarpment (outside of the corridor) where the dolerite cliffs are spectacular. The dolerite dykes and boulders with their dark orange colouring provide visual interest in the landscape. De Jager's Pass (again, outside of the corridor) provides views along the escarpment but then above the escarpment the road traverses some very scenic countryside with the most scenic section being through a winding valley some 8 km south of the southern edge of the corridor (Orton 2021e). The corridor is crossed by the N12 from north to south, and the N1 skirts along its south-eastern edge. The three small dolerite hills commonly known as 'The Three Sisters' lie just south of the N1, just over 1 km outside the southern edge of the study corridor (Figure 75). These hills are a prominent and well-known visual landmark in the central Karoo area.





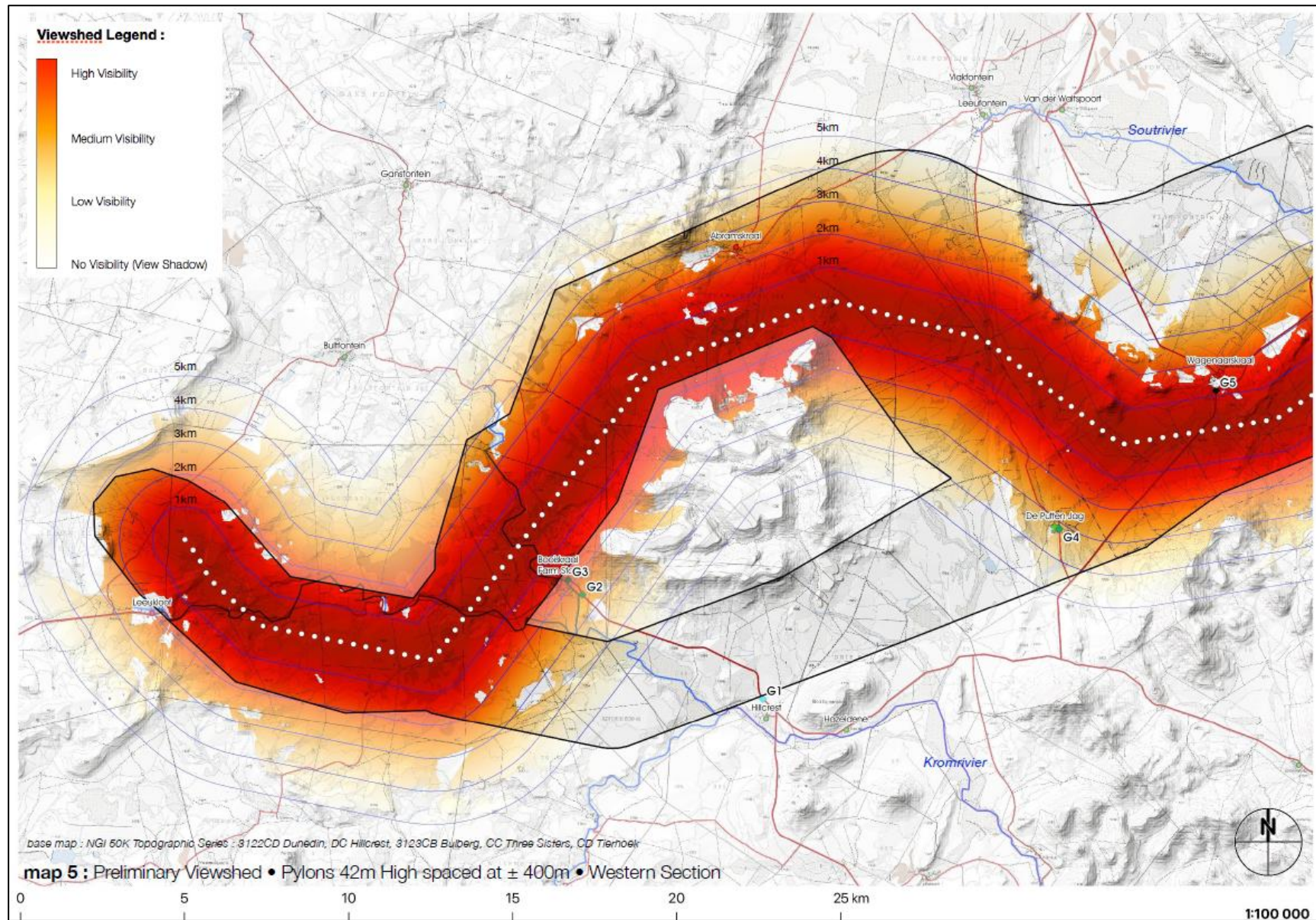
**Figure 75:** View towards the southwest along the N1 towards the famous Three Sisters in Northern Cape.

## 5.6. Visual Impact Assessment

The visual specialists were provided with a pre-negotiated alignment within the corridor<sup>4</sup> in order to be able to construct an accurate viewshed map (Lawson & Oberholzer 2022). The viewshed for the proposed powerline is shown in Figures 76 to 78. The maps indicate that some large obstructions – dolerite hills – do occur and block views in some places, but the majority of the powerline will be openly visible in the landscape. They note the dolerite hills, river features and scenic sections of district roads as being the most visually sensitive parts of the study area, although a number of farmsteads are located quite close to the line. Important among the latter from a heritage point of view is Wagenaarskraal which is noted to be 1.17 km south of the line and which would experience marginal visibility. The landscape integrity is far higher in the western part of the corridor because in the east a number of existing high voltage powerlines and the Eskom Gamma Substation have already compromised the landscape. There is also an existing WEF just north of the corridor in that area. The overall intensity of visual impacts to these resources is estimated to be medium. Lawson and Oberholzer's (2022) impact assessment finds the construction and decommissioning impacts to be of low significance, while the operation phase impacts are of medium significance due to their longer duration. They note that ratings before and after mitigation are unchanged throughout because the powerline cannot be screened which means that mitigation measures will not have a large impact on significance.

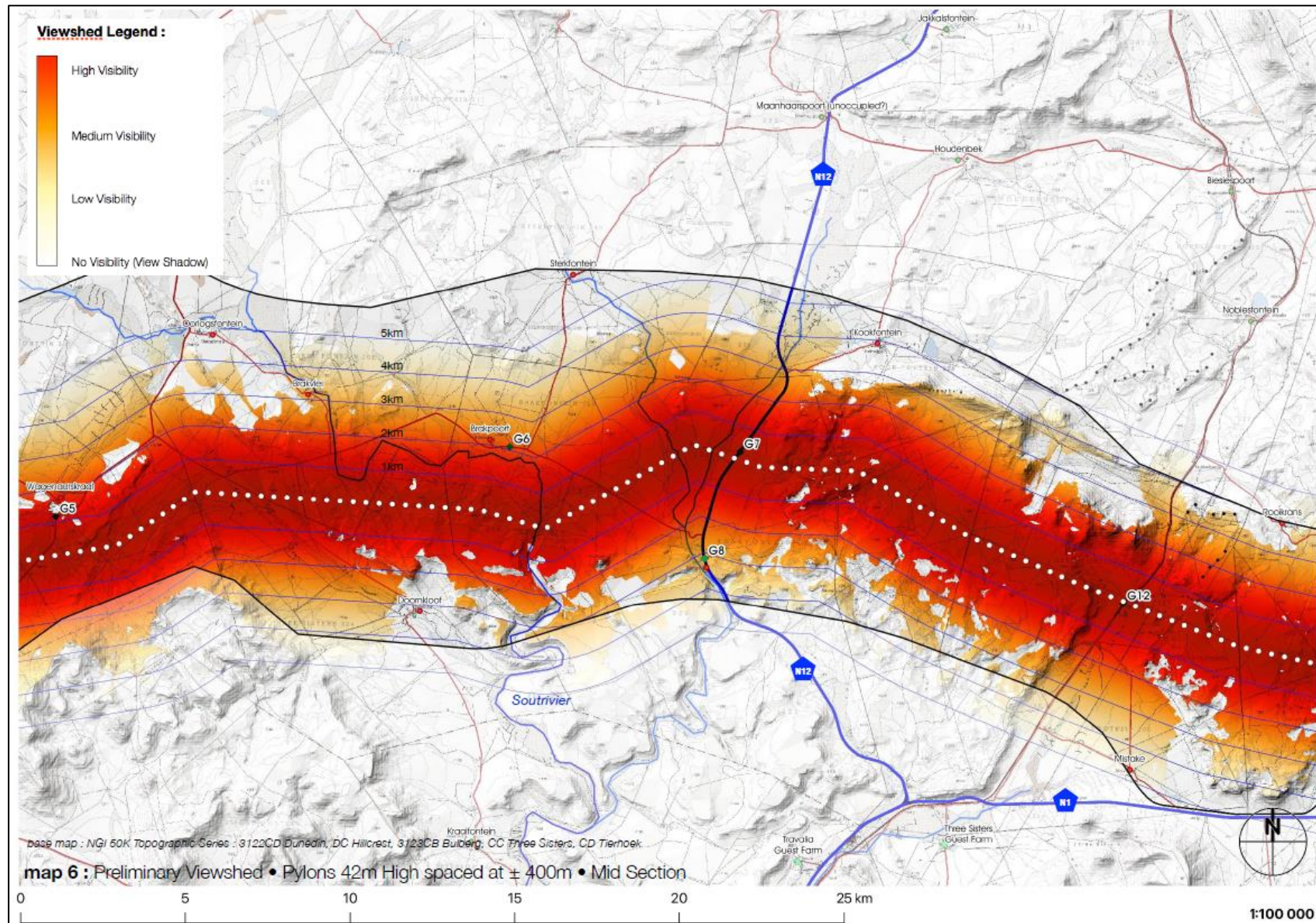
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<sup>4</sup> Note that all impact assessments pertain to the entire corridor and not to the pre-negotiated alignment.



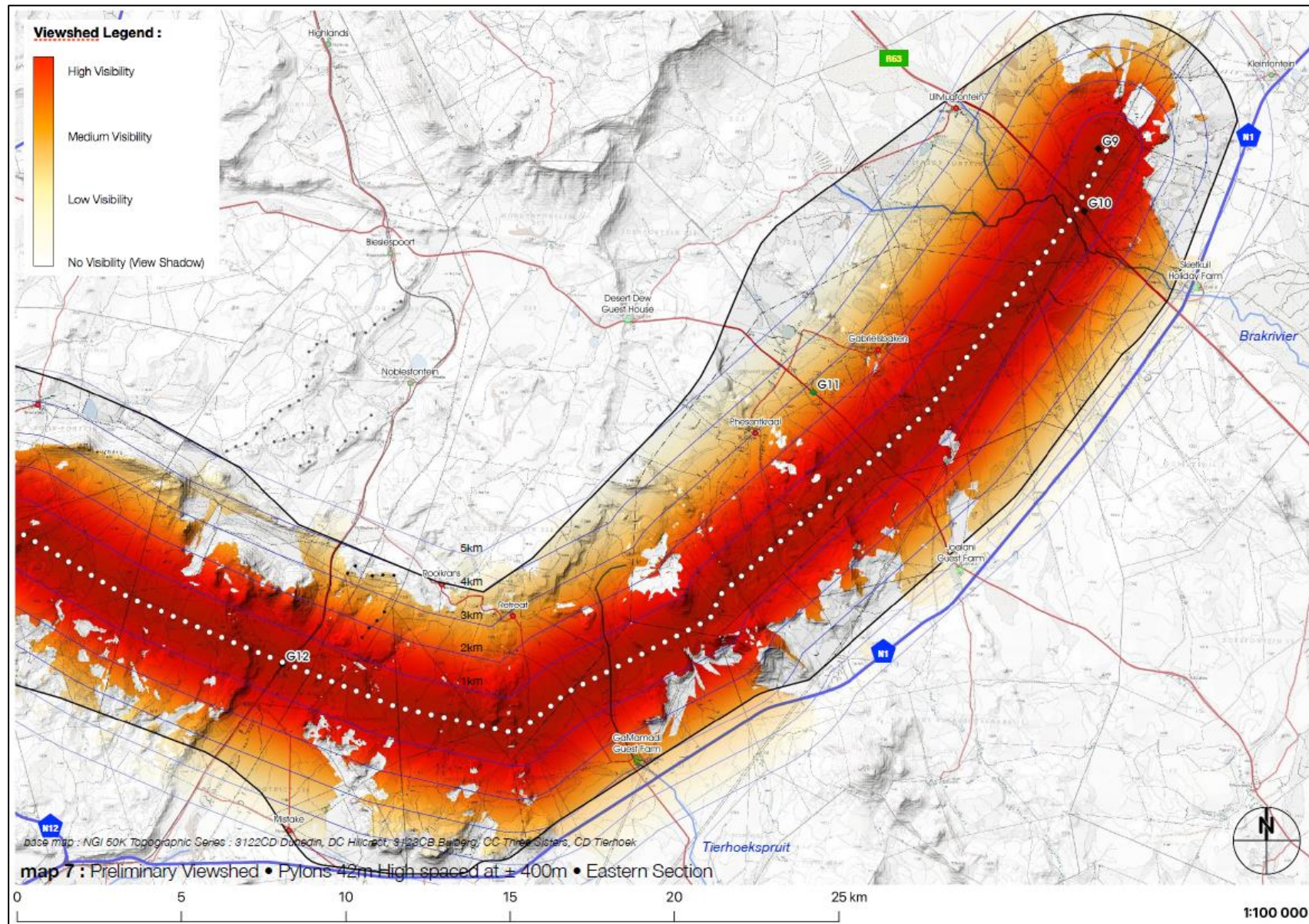
**Figure 76:** Viewshed map for the western section of the proposed powerline. Source: Lawson & Oberholzer 2022: map 5.





**Figure 77:** Viewshed map for the western section of the proposed powerline. Source: Lawson & Oberholzer 2022: map 6.





**Figure 78:** Viewshed map for the eastern section of the proposed powerline. Source: Lawson & Oberholzer 2022: map 7.

## 5.7. 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 known and expected archaeological resources in the area are of variable cultural significance at the local level for their historical, scientific and social values. Many would be of very low to low significance and graded NCW or IIIC respectively for Western Cape, and GPC or GPB for Northern Cape. Others are, or are expected to be, of medium to high significance and can be graded IIIB or IIIA for Western Cape and GPA, IIIB or IIIA for Northern Cape.

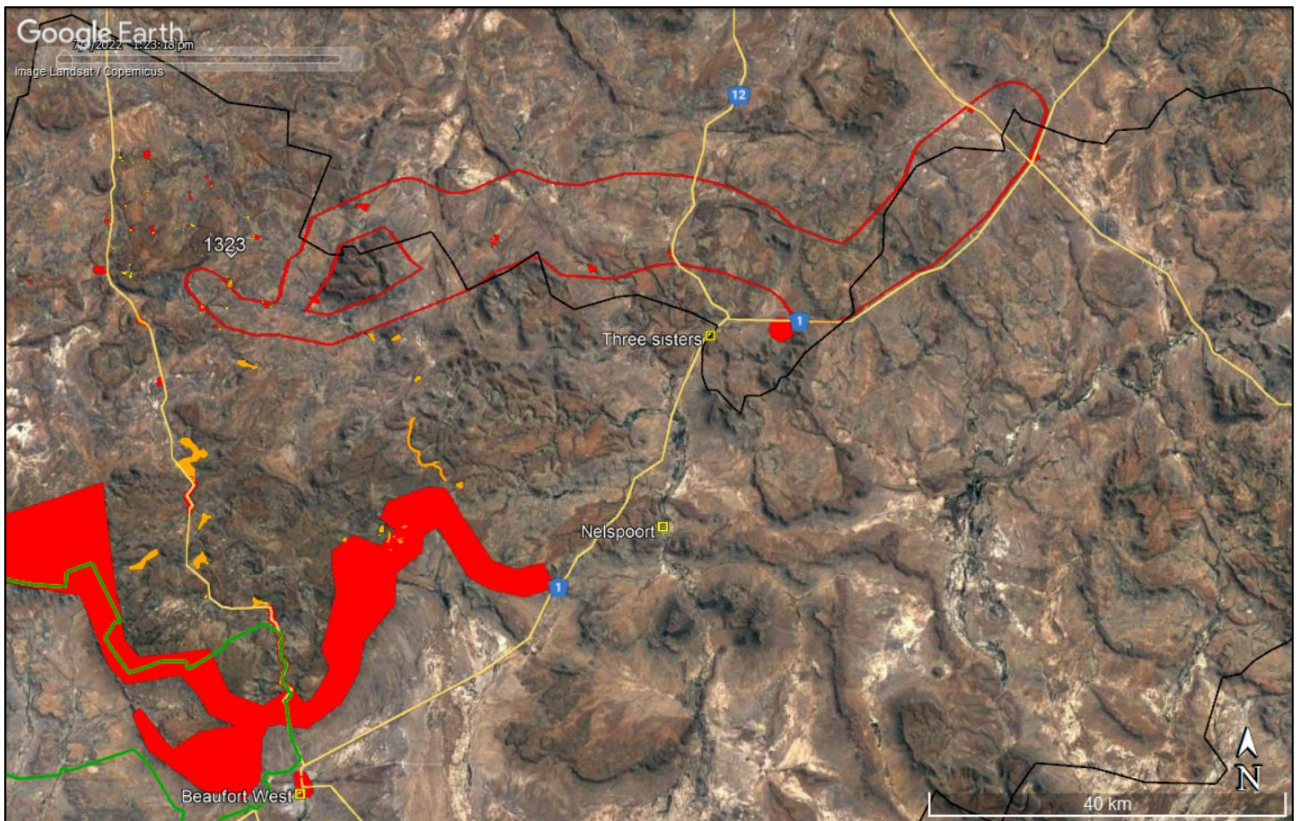
Graves are deemed to have high cultural significance at the local level for their social value. Where present, they are allocated a grade of IIIA in both provinces.

Built environment resources are expected to be largely confined to farm complexes and, based on those seen during the field study, are expected to have variable cultural significance from very low to medium-high for their architectural, historical and social values. In Western Cape they would likely vary from NCW to about IIIB. The one known exception is the Wagenaarskraal farmstead (in Northern Cape) which has high local significance for historical reasons.

The cultural landscape is largely a natural landscape with aesthetic value and is rated as having medium cultural significance at the local level. It can be graded IIIB on the Western Cape system.

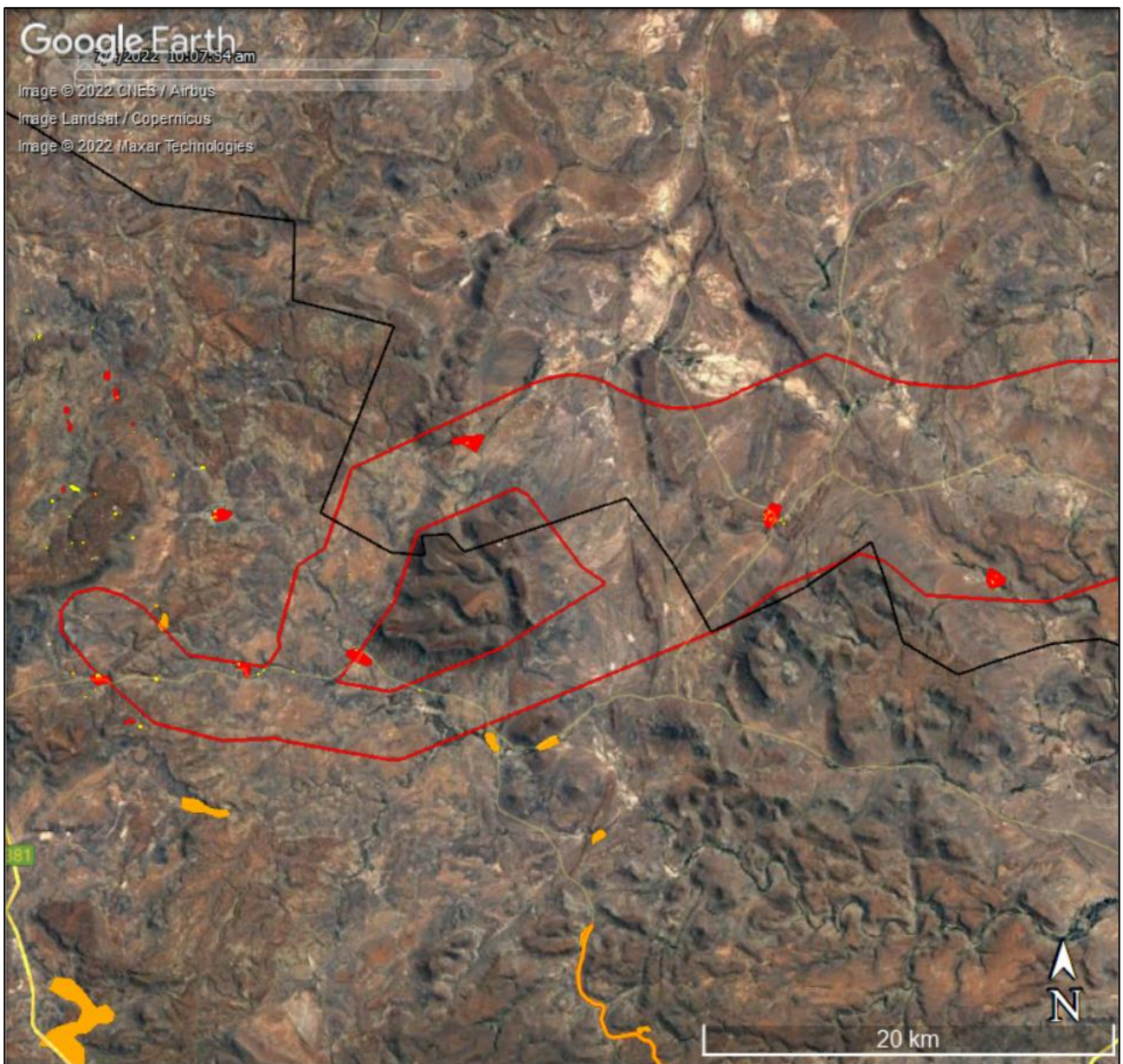
The various heritage resources on record have been allocated grades and are mapped in Figures 79 to 81.





**Figure 79:** Aerial view showing the wider region with heritage resources mapped. Red = IIIA, Orange = IIIB, Yellow = IIIC. The KNP is outlined in green.





**Figure 80:** Aerial view showing heritage resources mapped. Red = IIIA, Orange = IIIB, Yellow = IIIC.





**Figure 81:** Aerial view showing heritage resources mapped. Red = IIIA, Orange = IIIB, Yellow = IIIC.

## 5.8. Summary of heritage indicators

The indicators below are ideal but it is acknowledged that it is not possible to determine whether they have been complied with until the final authorised alignment is available for study. They are thus presented partly to guide the layout design, but mainly to guide the formulation of mitigation measures after the pre-construction survey. More general design principles are outlined in the conclusion (Section 9).

- Indicator: Uncontrolled damage to fossils should be minimised as far as possible.
- Indicator: Buffers of at least 30 m should be maintained around 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.
- Indicator: The laydown areas should be away from public view unless these are located in urban areas / small towns outside of the corridor.
- Indicator: Farm complexes should be avoided by at least 200 m and isolated structures by 50 m.

## 6. ASSESSMENT OF IMPACTS

Construction phase impacts include impacts to palaeontology (see separate specialist study), archaeology, graves and the cultural landscape. Operation and decommissioning phase impacts would be limited to impacts to the cultural landscape.

### 6.1. Construction Phase

#### 6.1.1. Impacts to archaeological resources and graves

Direct impacts to archaeological resources and/or graves would occur during the construction phase when earthmoving occurs. Because of the relatively low likelihood of actually impacting archaeological sites or graves – because of their generally low density on the landscape – the impact significance calculates to **low negative** even without mitigation (Table 3). Mitigation can be easily implemented and will involve conducting a preconstruction survey of the final alignment in order to identify any sites that need to be avoided through micrositing of pylons or possibly archaeological mitigation. Recommendations for infrastructure siting will need to be made after the survey. These actions will reduce the impact significance to **very low negative** because it is likely to be easy to accomplish suitable avoidance. There are no fatal flaws in terms of construction phase impacts to archaeology.

**Table 3:** *Assessment of construction phase impacts to archaeology and graves.*



Project phase	Construction			
Impact	Archaeology and graves			
Description of impact	Potential damage to or destruction of archaeological sites and/or graves			
Mitigatability	High	Mitigation exists and will considerably reduce the significance of impacts		
Potential mitigation	Pre-construction survey, mitigation as may be required			
Assessment	Without mitigation		With mitigation	
Nature	Negative		Negative	
Duration	Permanent	Impact may be permanent, or in excess of 20	Permanent	Impact may be permanent, or in excess of 20
Extent	Very limited	Limited to specific isolated parts of the site	Very limited	Limited to specific isolated parts of the site
Intensity	High	Natural and/ or social functions and/ or processes are notably altered	Very low	Natural and/ or social functions and/ or processes are slightly altered
Probability	Probable	The impact has occurred here or elsewhere and could therefore occur	Rare / improbable	Conceivable, but only in extreme circumstances, and/or might occur for this
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	Low	The affected environment will not be able to recover from the impact - permanently modified	Low	The affected environment will not be able to recover from the impact - permanently modified
Resource irreplaceability	High	The resource is irreparably damaged and is not represented elsewhere	High	The resource is irreparably damaged and is not represented elsewhere
Significance	Low - negative		Very Low - negative	
Comment on significance	Significance is low because archaeological sites are widely dispersed and avoidance should be easily achieved. Mitigation is generally easily implemented, reducing significance to very low.			

### 6.1.2. Impacts to the cultural landscape

Direct impacts to the cultural landscape would occur during the construction phase when construction equipment and powerlines are introduced to the landscape. This changes the rural/natural character to a more industrial one. The impact will last only as long as construction and, in the context of the wider landscape, will be reasonably limited in extent. The impact significance calculates to **low negative**, largely because of the short duration of the construction period (Table 4). Mitigation entails keeping the construction duration as short as possible and ensuring that all areas not needed during operation are successfully rehabilitated. This will have very little effect on the significance which remains **low negative** after mitigation. There are no fatal flaws in terms of construction phase impacts to the cultural landscape.

**Table 4:** Assessment of construction phase impacts to the cultural landscape.

Project phase	Construction			
Impact	Cultural landscape			
Description of impact	Potential impacts to the cultural landscape through visual intrusion when construction equipment and powerlines are introduced to the site, altering the generally rural/natural sense of place to a more industrial character.			
Mitigatability	Low	Mitigation does not exist; or mitigation will slightly reduce the significance of impacts		
Potential mitigation	Keep construction duration as short as possible and ensure rehabilitation of all areas not required during operation.			
Assessment	Without mitigation		With mitigation	
Nature	Negative		Negative	
Duration	Short term	impact will last between 1 and 5 years	Short term	impact will last between 1 and 5 years
Extent	Local	Extending across the site and to nearby settlements	Local	Extending across the site and to nearby settlements
Intensity	Low	Natural and/ or social functions and/ or processes are somewhat altered	Very low	Natural and/ or social functions and/ or processes are slightly altered
Probability	Certain / definite	There are sound scientific reasons to expect that the impact will definitely occur	Certain / definite	There are sound scientific reasons to expect that the impact will definitely occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	High	The affected environmental will be able to recover from the impact	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	Low - negative		Low - negative	
Comment on significance	The main reason for the low significance is the short duration of the construction period. Mitigation will only very slightly reduce the intensity of impacts, but not enough to reduce the significance rating.			

## 6.2. Operation Phase

### 6.2.1. Impacts to the cultural landscape

Direct impacts to the cultural landscape would occur during the operation phase through the visual intrusion created by the presence of the powerlines in the landscape. The impact will be long term and certain to occur which results in a significance rating of **medium negative** (Table 5). Mitigation will make virtually no difference to the rating but, nonetheless, it is important that maintenance vehicles remain on designated tracks and do not cause new landscape scarring. With mitigation the significance remains **medium negative**. It is noted that with time the powerline would become an accepted part of the landscape. Also, it would not be built if the associated wind farms are not built. If they are built, then all of these electrical installations together would result in a new electrical 'layer' to the cultural landscape. There are no fatal flaws in terms of operation phase impacts to the cultural landscape.

**Table 5: Assessment of operation phase impacts to the cultural landscape.**

Project phase	Operation			
Impact	Cultural landscape			
Description of impact	Visual intrusion from the presence of powerlines in the rural/natural landscape.			
Mitigatability	Low	Mitigation does not exist; or mitigation will slightly reduce the significance of impacts		
Potential mitigation	Ensure that maintenance vehicles remain in designated areas.			
Assessment	Without mitigation		With mitigation	
Nature	Negative		Negative	
Duration	Permanent	Impact may be permanent, or in excess of 20 years	Permanent	Impact may be permanent, or in excess of 20 years
Extent	Local	Extending across the site and to nearby settlements	Local	Extending across the site and to nearby settlements
Intensity	Low	Natural and/ or social functions and/ or processes are somewhat altered	Low	Natural and/ or social functions and/ or processes are somewhat altered
Probability	Certain / definite	There are sound scientific reasons to expect that the impact will definitely occur	Certain / definite	There are sound scientific reasons to expect that the impact will definitely occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	High	The affected environmental will be able to recover from the impact	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	Medium - negative		Medium - negative	
Comment on significance	The long duration of the impact drives the significance rating but in time the powerline will become an accepted part of the landscape and the eventual impact might be etter seen as low negative.			

## 6.3. Decommissioning Phase

These impacts are similar to the construction phase and also relate to the activity in the landscape. The significance calculates to **low negative** (Table 6). The main difference from the construction phase is that at the end, and with mitigation, the site would be rehabilitated which reduces the

impact intensity, but not enough to drop the significance which remains **low negative**. There are no fatal flaws in terms of decommissioning phase impacts to the cultural landscape.

**Table 6: Assessment of decommissioning phase impacts to the cultural landscape.**

Project phase	Decommissioning				
Impact	Cultural landscape				
Description of impact	Potential impacts to the cultural landscape through visual intrusion when construction equipment enters the area to dismantle the powerlines, altering the generally rural/natural sense of place to a more industrial character.				
Mitigatability	High	Mitigation exists and will considerably reduce the significance of impacts			
Potential mitigation	Keep decommissioning duration as short as possible and ensure full rehabilitation of the area.				
Assessment	Without mitigation			With mitigation	
Nature	Negative			Negative	
Duration	Brief	Impact will not last longer than 1 year		Brief	Impact will not last longer than 1 year
Extent	Local	Extending across the site and to nearby settlements		Local	Extending across the site and to nearby settlements
Intensity	Low	Natural and/ or social functions and/ or processes are somewhat altered		Very low	Natural and/ or social functions and/ or processes are slightly altered
Probability	Certain / definite	There are sound scientific reasons to expect that the impact will definitely occur		Certain / definite	There are sound scientific reasons to expect that the impact will definitely occur
Confidence	High	Substantive supportive data exists to verify the assessment		High	Substantive supportive data exists to verify the assessment
Reversibility	High	The affected environmental will be able to recover from the impact		High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce		Low	The resource is not damaged irreparably or is not scarce
Significance	Low - negative			Low - negative	
Comment on significance	Mitigation measures will make very little difference overall but will reduce intensity. This is not sufficient to reduce the significance though.				

## 6.4. Cumulative impacts

The cumulative impact assessment considers all projects located within 30 km of the corridor under study. These are listed below with the renewable energy projects mapped in Figure 82.

1. Existing power lines:
  - a. One 132 kV line linking Droërvier Substation and Nobelsfontein Wind Energy Facility (WEF) passing through eastern half of the Gamma Grid Connection Corridor;
  - b. Three 400 kV lines between Droërvier Substation and Gamma Substation passing through east of the Gamma Grid Connection Corridor; and
  - c. One 765 kV line between Droërvier Substation and Gamma Substation passing through east of the Gamma Grid Connection Corridor.
2. Existing Renewable Energy (RE) facility:
  - a. Nobelsfontein:
    - i. WEF of up to 44 turbines with a generating capacity of up to 123 MW – 41 turbines have been constructed.
3. Approved power lines:
  - a. One 400 kV line between approved Nuweveld Collector Substation and existing Droërvier Substation;
  - b. One 132 kV line running from the Nuweveld North Substation to Nuweveld West Substation to the Collector Substation; and
  - c. Various shorter 132 kV lines linking approved but not yet constructed RE facilities in the region (see below).



4. RE facilities with valid environmental approvals:

a. Nuweveld Wind Farms:

i. Three WEFs:

1. Nuweveld East with a maximum of 35 wind turbines, up to the contracted capacity of 280 MW
2. Nuweveld North with a maximum of 35 wind turbines, up to the contracted capacity of 280 MW
3. Nuweveld West with a maximum of 35 wind turbines, up to the contracted capacity of 280 MW

b. Umsinde Emoyeni Wind Farms:

- i. Two WEF development phases each with a maximum of 98 wind turbines, up to the contracted capacity of 140 MW.
- ii. Both facilities have 132 kV transmission lines to the Gamma Substation.

c. Ishwati Emoyeni Wind Farm:

- i. WEF with up to 65 individual wind turbines with an approximate generation capacity of between 1.8 and 3.3 MW each and a total generation capacity of 140 MW.

d. Mainstream Wind and Solar Energy Facility at Victoria West:

- i. 95 MW WEF (37 turbines) approved in 2011 (validity successfully extended in 2014) – appears that 2016 application to increase to 140 MW was unsuccessful.
- ii. Some documentation refers to “wind and solar”, however no evidence of approved solar facility could be found.
- iii. Includes a 132 kV transmission line to Gamma Substation.

e. Poortjie West Cluster:

- i. Six solar PV facilities with a total capacity of 710 MW – includes short 132 kV grid connections.

f. Brakpoort Solar PV Facility:

- i. 75 MW Solar PV Facility in the Ubuntu Local Municipality authorised in March 2013. Project includes a new 132 kV overhead line (less than 1 km in length) from the step-up substation to the Brakpoort Eskom Substation (attached to the existing Beaufort West to De Aar electric rail line).
- ii. Project Status: Unknown – in 2013 an application to amend the EA to include additional listed activities was rejected by the DFFE.

g. Biesjesfontein:

- i. According to DFFE, a 19 MW Solar PV Plant – no further information could be found on this project.

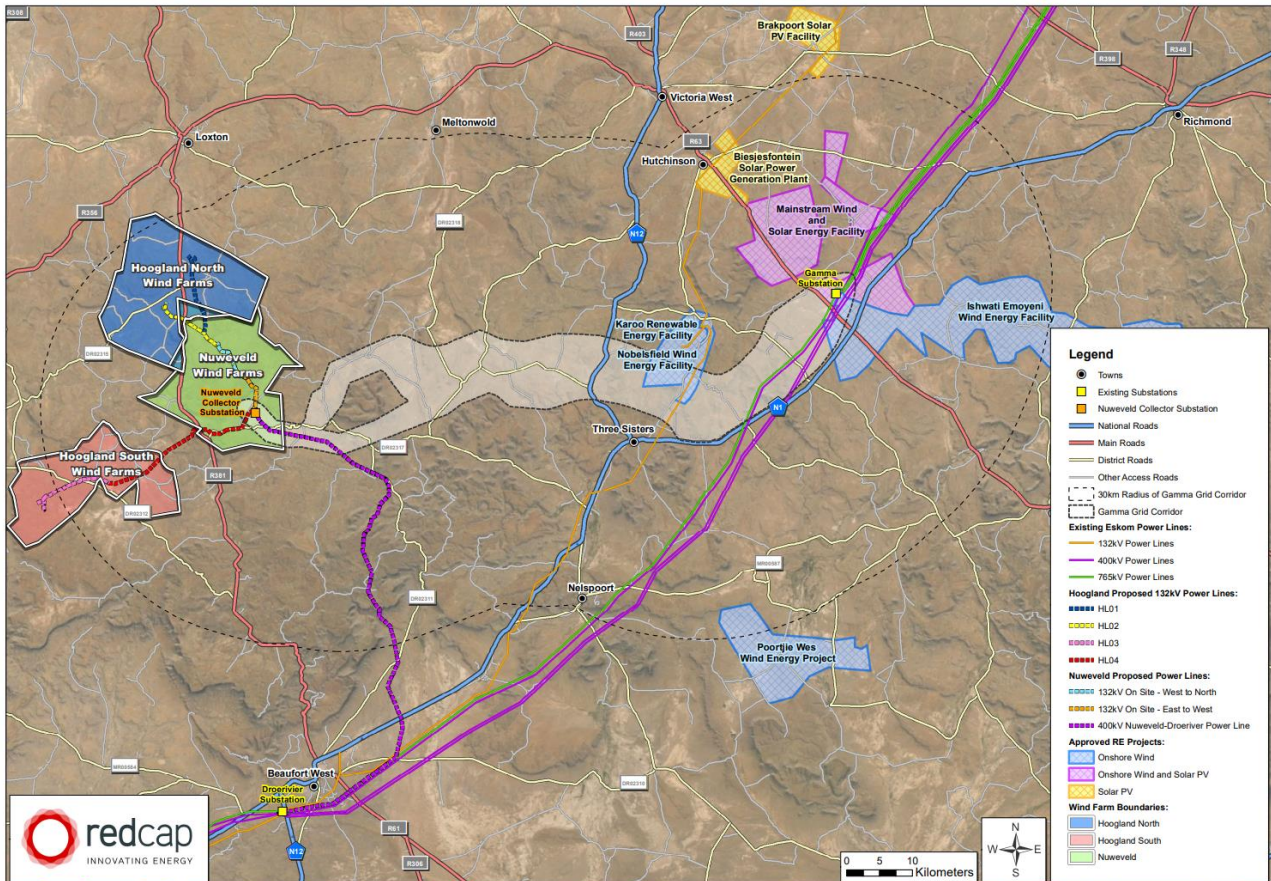
5. Proposed RE facilities:

a. Hoogland WEFs:

- i. Four WEFs each with 60 turbines and a targeted nameplate generation capacity of up to a maximum of 420 MW including four 132 kV power lines linking the four Hoogland projects to the approved Nuweveld Collector Substation.

b. Great Karoo Renewable Energy Cluster:

- i. Three Solar PV facilities, two WEFs and grid connection infrastructure comprising a 132 kV central collector substation and a 132 kV power line to enable the connection of the five renewable energy facilities to the national grid at the Gamma Substation.
- ii. Located approximately 35km South-West of Richmond along the N1 and approximately 80km South-East of Victoria West along the R63 in the Northern Cape Province, within the Ubuntu Local Municipality.



**Figure 82:** Map showing approved renewable energy projects in the area and that are used as the basis for the cumulative impact assessment.

At present there are very few electrical facilities in the area. However, as can be seen above, there is the potential for many more, especially at the west and east ends of the proposed powerline corridor. The nature of electrical projects is that impacts are generally avoided and, for the most part, micro-siting of infrastructure is feasible; although this is less the case with solar energy. Cumulative impacts to archaeology, palaeontology and graves are of little concern because pre-construction surveys generally reveal such finds and micro-siting results in reduction or avoidance of impacts. Mitigation is also often readily implementable. However, impacts to the cultural landscape will get progressively worse as more and more electrical facilities are constructed. These are visual impacts on the cultural landscape and, because of the size and extent of the infrastructure concerned, they cannot be meaningfully reduced through mitigation. Adhering to visual mitigation measures will generally result in visually sensitive parts of the landscape being avoided but visual clutter will still accrue. As such, the cumulative assessment is largely examining impacts to the cultural landscape.

Electrical facilities are expected to be present for long periods of time and, as a result, the impact has calculated to **high negative** (Table 7). This may be somewhat higher than what the true significance would be but, nonetheless, with mitigation the impact significance calculates to **medium negative** which does seem appropriate. It must also be noted that electrical infrastructure should be expected in the area due to its falling within a REDZ and EGI corridor.

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

Project phase	Operation			
Impact	Cumulative impacts			
Description of impact	The impact of multiple electrical facilities on heritage resources			
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts		
Potential mitigation	As per the individual impacts above			
Assessment	Without mitigation		With mitigation	
Nature	Negative		Negative	
Duration	Permanent	Impact may be permanent, or in excess of 20 years	Permanent	Impact may be permanent, or in excess of 20 years
Extent	Municipal area	Impacts felt at a municipal level	Municipal area	Impacts felt at a municipal level
Intensity	High	Natural and/ or social functions and/ or processes are notably altered	Moderate	Natural and/ or social functions and/ or processes are moderately altered
Probability	Certain / definite	There are sound scientific reasons to expect that the impact will definitely occur	Certain / definite	There are sound scientific reasons to expect that the impact will definitely occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	Medium	The affected environment will only recover from the impact with significant intervention
Resource irreplaceability	Medium	The resource is damaged irreparably but is represented elsewhere	Medium	The resource is damaged irreparably but is represented elsewhere
Significance	High - negative		Medium - negative	
Comment on significance	Because this assessment combines different types of heritage, the ratings are higher which results in a high significance rating. An overall medium rating may be better, especially given that electrical development in the area has already commenced and, with nearby REDZs and an EGI corridor, such developments will be expected to occur.			

## 6.5. Evaluation of impacts relative to sustainable social and economic benefits

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

While the powerline itself does not directly result in much socio-economic benefit aside from construction phase jobs, the important factor is that it will assist with getting more electricity into the national electricity grid. The project will only be built if at least some of the associated wind farms at its western end are built and, therefore, its socio-economic value lies in the provision of electricity from these wind farms. The South African economy is in dire need of a larger and more stable electricity supply. The knock-on effects of this will be considerable as the economy will be better able to grow. These are clear economic and social benefits and, if mitigation is applied as suggested above, then the socio-economic benefits outweigh the residual impacts.

## 6.6. Existing impacts to heritage resources

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



impact on the wider cultural landscape is limited. This impact can be considered to be of **low negative** significance.

## 6.7. The No-Go alternative

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

## 6.8. Levels of acceptable change

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

# 7. INPUT TO THE ENVIRONMENTAL MANAGEMENT PROGRAM

The actions recorded in Table 8 should be included in the environmental management program (EMPr) for the project.

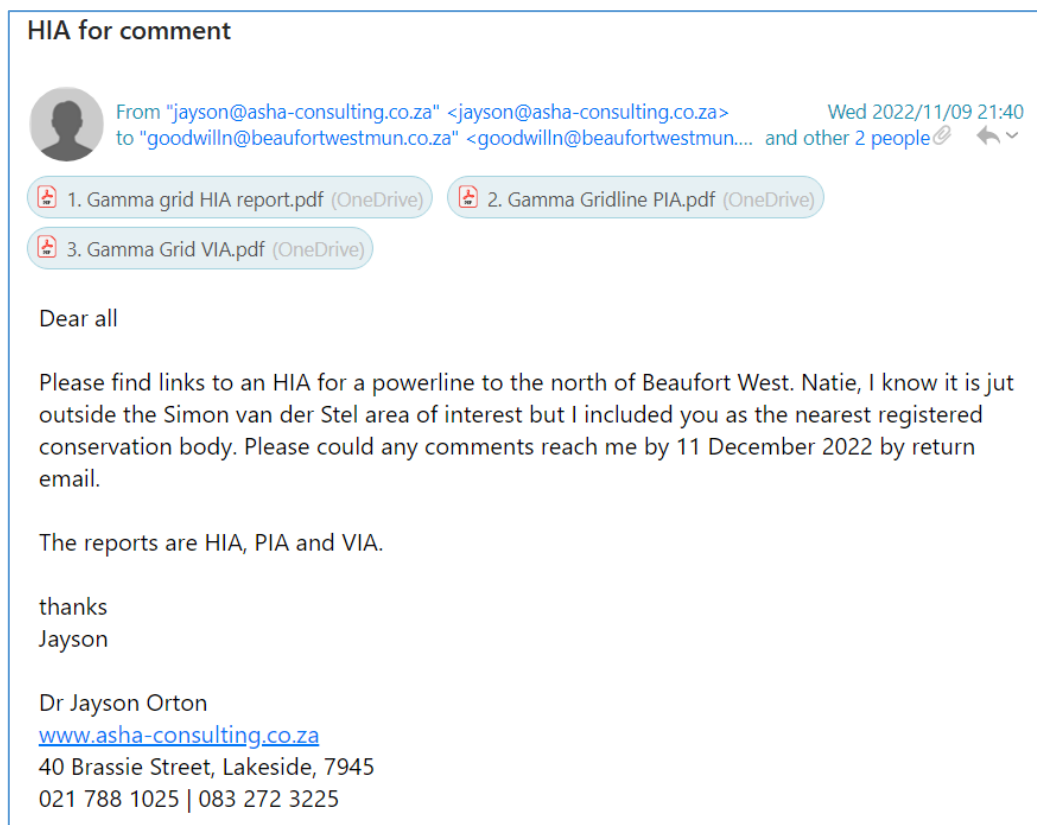
**Table 8:** *Heritage considerations for inclusion in the EMPr.*

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

## 8. CONSULTATION WITH HERITAGE CONSERVATION BODIES

HWC requires consultation with municipalities and heritage conservation bodies. The proposed corridor falls within the Victoria West (Northern Cape) and Beaufort West (Western Cape) Municipalities. There are no heritage conservation bodies listed for this area but the Simon van der Stel Foundation Southern Cape has been included in the consultation as the nearest registered body.

The reports were sent out by email on 9<sup>th</sup> November 2022 to the Simon van der Stel Foundation Southern Cape and the Beaufort West Municipality as shown below. Consultation was scheduled to end on 11<sup>th</sup> December 2022.



As of 5<sup>th</sup> January 2023 no responses were received.

## 9. CONCLUSIONS

The heritage indicators are not listed here since, without a final alignment, it is not possible to evaluate whether they have been or will be complied with. Instead this discussion points out that heritage resources are generally quite widely dispersed on the flat, open plains but more tightly clustered in valleys and along dolerite outcrops. For this reason wide plains are preferred for development over tighter valleys and rocky areas. Because the spans will be in the region of 400 m, it is likely that physical impacts on the ground will be very limited. In some circumstances (e.g. where cultural significance is low) it may be acceptable for powerlines to span over archaeological sites but it will be important that access roads and pylons avoid them, preferably with a 30 m buffer. Farmsteads should be avoided by as far as possible to reduce contextual impacts to them and their

enclosing cultural landscapes. Wagernaarskraal (in the Northern Cape), with its long and regionally significant history, is especially important in this regard. From the point of view of the wider landscape there is very little that can be done to avoid impacts but their severity may be reduced by following the recommendations of the visual specialists. The major cultural landscape concerns for the area – the escarpment and KNP – are more than 17 km from the nearest edge of the corridor and are of no concern.

In conclusion, it is expected that the project will be able to satisfy the heritage indicators, since there tend to be wide spaces between heritage resources, or clusters of resources, and they should be easily avoided through micro-siting of pylons where necessary. There are reasons other than heritage to avoid farmsteads and the developer has indicated that all will be avoided by at least 200 m.

### **9.1. Reasoned opinion of the specialist**

The application for a corridor is supported because this will afford the opportunity to micro-site the project infrastructure to avoid or reduce impacts. A pre-construction survey of the final authorised alignment will be crucial to realising the mitigation aims. With such a survey and adherence to any recommendations stemming from its results, the impacts to heritage resources are expected to be acceptable. As such, it is the opinion of the heritage specialist that the proposed powerline may be authorised in its entirety.

## **10. RECOMMENDATIONS**

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

- Very high palaeontological sensitivity areas must be avoided;
- A pre-construction palaeontological survey should be carried out focusing on sensitive areas as identified by the palaeontologist;
- The Fossil Chance Finds Procedure should be included in the project EMP for the Construction Phase;
- A pre-construction archaeological survey should be carried out along the entire alignment, including new access roads and construction camps;
- Sensitive ridges, hills, river valleys and steep slopes as indicated by the visual consultants must be avoided;
- Existing roads must be used for construction and operation as much as possible;
- Construction laydown areas must be located in areas of low visual sensitivity as identified by the visual consultants;
- All disturbed areas not required during operation must be rehabilitated; 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.

Note that these recommendations apply equally to both the Western and Northern Cape Provinces.



## 11. REFERENCES

- Almond, J. 2022. Proposed Gamma 400 kV Gridline Project: Palaeontological Heritage. Report prepared for Red Cap Energy (Pty) Ltd. Cape Town: Natura Viva cc.
- Anonymous. 2016. Embark on a historic journey to the Karoo National Park. Website visited on 24 April 2019 at: <https://lowvelder.co.za/352763/embark-on-a-historic-journey-to-the-karoo-national-park/>.
- Battiss, W.W. 1948. *The artists of the rocks*. Pretoria: Red Fawn Press
- Binneman, J., Booth, C. & Higgit, N. 2011. A Phase 1 Archaeological Impact Assessment (AIA) for the proposed Karoo Renewable Energy Facility on a site south of Victoria West, Northern and Western Cape Province on the farms Phaisantkraal 1, Modederfontein 228, Nobelsfontein 227, Annex Nobelsfontein 234, Ezelsfontein 235, and Rietkloofplaaten 239. Report prepared for Savanah Environmental (Pty) Ltd. Grahamstown: Department of Archaeology, Albany Museum.
- Böeseken, A.J. 1975. The Company and its subjects. In: Muller, C.F.J. (ed) *500 Years: a history of South Africa*: 63-79. Pretoria and Cape Town: Academica.
- Botha, C.G. 1926. *Place names in the Cape Province*. Cape Town & Johannesburg: Juta & Co. Ltd.
- Fagan, G. 2008. *Brakdak: flatroofs in the Karoo*. Cape Town: Breestraat Publikasies.
- Fock, G.J. 1979. Felsbilder in Sudafrica, Teil 1: Die Gravierungen auf Klipfontein, Kapprovinz. Köln: Böhlau Verlag.
- Goetze, T.M. 1993. Thomas Bain, Road Building and the Zwartberg Pass: with particular emphasis on socio-economic and civil engineering aspects in the Southern Cape, c. 1843-1962. Unpublished Masters Dissertation, University of Stellenbosch.
- Green, S. 2022. Anglo-Boer War Blockhouses: a field guide. Johannesburg: Porcupine Press.
- Hart, T. 2016. Heritage Impact Assessment for the proposed Umsinde Emoyeni Wind Energy Facility. Unpublished report prepared for Arcus Consulting (Pty) Ltd. Diep River: ACO Associates cc.
- Heritage Western Cape. 2016. Grading: purpose and management implications. Document produced by Heritage Western Cape, 16 March 2016.
- Kaplan, J. 2005. Archaeological and Heritage scoping proposed upgrading and construction of new roads Karoo National Park. Unpublished report prepared for Ecobound Environmental. Riebeek West: Agency for Cultural Resource Management.
- Kaplan, J. 2006 Phase 1 Archaeological Impact Assessment proposed Klavervlei powerline Karoo National Park. Unpublished report prepared for Enviroafrica. Riebeek West: Agency for Cultural Resource Management.

- Kramer, P. 2012. The history, form and context of the 19th century corbelled buildings of the Karoo. MPhil dissertation. Rondebosch: University of Cape Town.
- Lawson, Q. & Oberholzer, B. 2022. Proposed Gamma Gridline Corridor Western Cape and Northern Cape Provinces Red Cap Energy (Pty) Ltd Draft Visual Impact Report. Report prepared for Red Cap Energy (Pty) Ltd. Quinton Lawson Architect & Bernard Oberholzer Landscape Architect.
- Marincowitz, H. 2006. *Karoostyle: Folk architecture of Prince Albert and its environs*. Prince Albert: Fransie Pienaar Museum.
- Morris, D. 1988. Engraved in Place and Time: A Review of Variability in the Rock Art of the Northern Cape and Karoo. *South African Archaeological Bulletin* 43: 109-120.
- Muller, C.F.J. 1975. The period of the Great Trek, 1834 – 1854. In: Muller, C.F.J. (ed) 500 Years: a history of South Africa: 146-182. Pretoria and Cape Town: Academica.
- Orton, J. 2016. Prehistoric cultural landscapes in South Africa: a typology and discussion. *South African Archaeological Bulletin* 71: 119-129.
- Orton, J. 2021a. Heritage Impact Assessment: proposed 132 kV/400 kV Power Line, Beaufort West Magisterial District, Western Cape. Report prepared for Red Cap Nuweveld North (Pty) Ltd. Muizenberg: ASHA Consulting (Pty) Ltd.
- Orton, J. 2021b. Heritage Impact Assessment: proposed Nuweveld East Wind Farm, Beaufort West Magisterial District, Western Cape. Report prepared for Red Cap Nuweveld East (Pty) Ltd. Muizenberg: ASHA Consulting (Pty) Ltd.
- Orton, J. 2021c. Heritage Impact Assessment: proposed Nuweveld North Wind Farm, Beaufort West Magisterial District, Western Cape. Report prepared for Red Cap Nuweveld North (Pty) Ltd. Muizenberg: ASHA Consulting (Pty) Ltd.
- Orton, J. 2021d. Heritage Impact Assessment: proposed Nuweveld West Wind Farm, Beaufort West Magisterial District, Western Cape. Report prepared for Red Cap Nuweveld West (Pty) Ltd. Muizenberg: ASHA Consulting (Pty) Ltd.
- Orton, J. 2021e. Heritage Impact Assessment: proposed 132 kV/400 kV Power Line, Beaufort West Magisterial District, Western Cape. Report prepared for Red Cap Nuweveld North (Pty) Ltd. Muizenberg: ASHA Consulting (Pty) Ltd.
- Orton, J. 2022a. Heritage Impact Assessment: Proposed Hoogland 1 Wind Farm and Hoogland 2 Wind Farm, Beaufort West Magisterial District, Western Cape and Fraserburg Magisterial District, Northern Cape. Report prepared for Red Cap Energy (Pty) Ltd. Muizenberg: ASHA Consulting (Pty) Ltd.
- Orton, J. 2022b. Heritage Impact Assessment: Proposed Hoogland 3 Wind Farm and Hoogland 4 Wind Farm, Beaufort West Magisterial District, Western Cape and Fraserburg Magisterial

District, Northern Cape. Report prepared for Red Cap Energy (Pty) Ltd. Muizenberg: ASHA Consulting (Pty) Ltd.

- Orton, J., Almond, J., Clarke, N., Fisher, R., Hall, S., Kramer, P., Malan, A., Maguire, J. and Jansen, L. 2016. Impacts on Heritage. In Scholes, R., Lochner, P., Schreiner, G., Snyman- Van der Walt, L. and de Jager, M. (eds.). 2016. Shale Gas Development in the Central Karoo: A Scientific Assessment of the Opportunities and Risks. CSIR/IU/021MH/EXP/2016/003/A, ISBN 978-0-7988-5631-7, Pretoria: CSIR.
- Parkington, J., Morris, D and Rusch, N. 2008. Karoo Rock Engravings. Cape Town: Creda Communications.
- Penn, N. 2005. The Forgotten Frontier: Colonist and Khoisan on the Cape's Northern Frontier in the 18th Century. Athens: Ohio University Press and Cape Town: Double Storey Books.
- Ross, G.L.D. 2013. Mountain passes, roads & transportation in the Cape: a guide to research. 5th Edition. Accessed online on 25th April 2019 at: [https://www.researchgate.net/publication/258376061\\_Mountain\\_Passes\\_Roads\\_and\\_Transportation\\_in\\_the\\_Cape\\_-\\_a\\_Guide\\_to\\_Research\\_Fifth\\_edition\\_June\\_2013\\_767\\_pages](https://www.researchgate.net/publication/258376061_Mountain_Passes_Roads_and_Transportation_in_the_Cape_-_a_Guide_to_Research_Fifth_edition_June_2013_767_pages).
- Sampson, C.G. 1984. A prehistoric pastoralist frontier in the upper Zeekoe Valley, South Africa. In: Hall, M., Avery, G., Avery, D.M., Wilson, M.L. & Humphreys, A.J.B. (eds) Frontiers: southern African archaeology today: 96-110. Oxford: British Archaeological Reports.
- Sampson, C.G. 2010. Chronology and dynamics of Later Stone Age herders in the upper Seacow River valley, South Africa. *Journal of Arid Environments* 74:842-848.
- Sampson, C.G., Moore, V., Bousman, C.B., Stafford, B., Giordano, A. & Willis, M. 2015. A GIS Analysis of the Zeekoe Valley Stone Age Archaeological Record in South Africa. *Journal of African Archaeology* 2015: 167-185.
- SANParks. 2017. Karoo National Park: Park Management Plan for the period 2017-2027. Website visited on 24 April 2019 at: [https://www.sanparks.org/assets/docs/conservation/park\\_man/karoo-draft-plan.pdf](https://www.sanparks.org/assets/docs/conservation/park_man/karoo-draft-plan.pdf).
- Sauer, C.O. 1925. The Morphology of Landscape. *University of California Publications on Geography* 2(2): 19-54.
- Schoeman, C. 2013. The Historical Karoo: traces of the past in South Africa's arid interior. Cape Town: Zebra Press.
- Storror, P. 1984. *A Colossus of Roads*. Murray & Roberts/Concor.
- Smith, B.W. & Ouzman, S. 2004. Taking stock: identifying Khoekhoen herder rock art in southern Africa. *Current Anthropology* 45: 499-526.
- Van Zyl, M.C. 1975. Transition, 1795-1806. In: Muller, C.F.J. (ed) 500 Years: a history of South Africa: 101-116. Pretoria and Cape Town: Academica.



- Walker, E.A. 1928. A History of South Africa. London: Longmans, Green and Company Ltd.
- Watt, S. 2013. Uitspanfontein, De Pannen 5 February 1902. *Military History Journal* 16(2). Available online at: <http://samilitaryhistory.org/vol162sw.html>.
- Willis, R. 2021. Three Sisters: a Landmark Cast in Stone. Karoo Cameos Series, Hosted by the Karoo Development Foundation. Available online at: <https://karoofoundation.co.za/wp-content/uploads/2021/06/Three-Sisters-Cameo.pdf>.
- Winter, S. & Oberholzer, B. 2013. Heritage and Scenic Resources: Inventory and Policy Framework for the Western Cape. Report prepared for the Provincial Government of the Western Cape Department of Environmental Affairs and Development Planning. Sarah Winter Heritage Planner, and Bernard Oberholzer Landscape Architect / Environmental Planner, in association with Setplan.
- Zutari. 2021. Final Environmental Impact Assessment Report: Nuweveld East Wind Farm (REV2). Zutari Project Number 505811

## APPENDIX 1 – Curriculum Vitae



### *Curriculum Vitae*

**Jayson David John Orton**

ARCHAEOLOGIST AND HERITAGE CONSULTANT

#### Contact Details and personal information:

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**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.



Farms which are partly or wholly covered by the corridor. These are all farms, falling in both Western Cape (shaded blue) and Northern Cape (unshaded).

Name	Farm	LPI	OWNER_EN_1	Hectares	Province
FARM 396	396	C00900000000039600000	BOOISKRAAL TRUST	2546.730082	Western Cape
ADJ DRIEKOP	RE/48	C00900000000004800000	BOOISKRAAL TRUST	373.2655759	Western Cape
PAARDEBERG	3/49	C00900000000004900003	BOOISKRAAL TRUST	41.1818752	Western Cape
DUIKER KRANSE	RE/45	C00900000000004500000	JACK DAVID ROBERT LINTON	1009.202581	Western Cape
DUIKER KRANSE	3/45	C00900000000004500003	JACK DAVID ROBERT LINTON	3835.833326	Western Cape
SNEEUW KRAAL	46	C00900000000004600000	BOOISKRAAL TRUST	1981.417602	Western Cape
SNEEUW KRAAL	47	C00900000000004700000	BOOISKRAAL TRUST	158.3925242	Western Cape
AASVOGELBERG	RE/59	C00900000000005900000	WAGENAARSKRAAL TRUST	657.6550138	Western Cape
VLAK FONTEIN	1/207	C08000000000020700001	WAGENAARSKRAAL TRUST	4920.246531	Northern Cape
VLAK FONTEIN	4/207	C08000000000020700004	VAN DER WALTSPOORT TRUST	6538.332566	Northern Cape
EZELSFONTEIN	RE/235	C08000000000023500000	HAMMAN NICOLAAS JOHANNES ID4007285024007	2006.459707	Northern Cape
EZELSFONTEIN	RE/235	C08000000000023500000	HAMMAN NICOLAAS JOHANNES ID4007285024007	207.328655	Northern Cape
GROOTKLIP	RE/238	C08000000000023800000	HAMMAN NICOLAAS JOHANNES ID4007285024007	2399.292465	Northern Cape
RIETKLOOF PLAATEN	RE/239	C08000000000023900000	HAMMAN NICOLAAS JOHANNES ID4007285024007	690.3038033	Northern Cape
GROOTKLIP	RE/238	C08000000000023800000	HAMMAN NICOLAAS JOHANNES ID4007285024007	445.8557091	Northern Cape
WATERVAL	RE/237	C08000000000023700000	HAMMAN NICOLAAS JOHANNES ID4007285024007	3670.807124	Northern Cape
FARM 242	RE/242	C08000000000024200000	HAMMAN NICOLAAS JOHANNES ID4007285024007	395.4857727	Northern Cape
AASVOGELBERG	4/59	C00900000000005900004	BARNARD WILLIE	2955.733139	Western Cape
AASVOGELBERG	2/59	C00900000000005900002	BARNARD WILLIE	2744.882772	Western Cape
MODDERFONTEIN	3/228	C08000000000022800003	WIAAN BARNARD TRUST	2384.022005	Northern Cape
MODDERFONTEIN	4/228	C08000000000022800004	WIAAN BARNARD TRUST	2046.876367	Northern Cape

ZWARTKOPJES	1/240	C08000000000024000001	WIAAN BARNARD TRUST	133.5158122	Northern Cape
ZWARTKOPJES	2/240	C08000000000024000002	WIAAN BARNARD TRUST	495.3997278	Northern Cape
DRIE KOP	1/53	C00900000000005300001	KAROO FARM CO PTY LTD	2844.799912	Western Cape
FARM 395	395	C009000000000039500000	KAROO FARM CO PTY LTD	1936.517827	Western Cape
STERKFORTEIN	249	C08000000000024900000	NO INFO	6066.783532	Northern Cape
MURRAYSBURG RD	RE/176	C052000000000017600000	C H DU PLESSIS PTY LTD	2317.373025	Western Cape
TAAYBOSCHFONTEIN	RE/15	C05200000000001500000	DB MARAIS FAMILIE TRUST	2345.040055	Western Cape
UIT VLUGT FONTEIN	2/265	C08000000000026500002	HUGO DANIEL PIETER	740.4254984	Northern Cape
UIT VLUGT FONTEIN	265	C08000000000026500000	ESKOM HOLDINGS LTD	2937.144804	Northern Cape
FARM 232	232	C08000000000023200000	ESKOM HOLDINGS LTD	3948.420459	Northern Cape
SCHIETKUIL	1/3	C0520000000000300001	ESKOM HOLDINGS LTD	44.1157086	Western Cape
DOORN KLOOF	RE/224	C08000000000022400000	VINKNES BELEGGINGS PTY LTD 1969/012421/07	6089.483744	Northern Cape
AANGRESEND ABRAMS KRAAL	11	C00900000000001100000	8 MILE INV 434 PTY LTD	903.8576833	Western Cape
BULTFONTEIN	13	C00900000000001300000	8 MILE INV 434 PTY LTD	3844.633696	Western Cape
BULTFONTEIN	12	C00900000000001200000	8 MILE INV 434 PTY LTD	2161.24185	Western Cape
PHAISANT KRAAL	1	C0520000000000100000	MARAIS HENDRIK SCHALK ID 6705015103086	4061.173825	Western Cape
MODDERFONTEIN	RE/228	C08000000000022800000	MARATHON FAMILY TRUST	6622.68198	Northern Cape
KOOK FONTEIN	RE/226	C08000000000022600000	SCHOEMAN FAMILIETRUST NR 3	4058.549574	Northern Cape
KOOK FONTEIN	RE/226	C08000000000022600000	SCHOEMAN FAMILIETRUST NR 3	871.9041897	Northern Cape
KLEINFONTEIN	RE/93	C06300000000009300000	KLEINFONTEIN BOERDERY TRUST (NO.764/98)	2561.479079	Northern Cape
SCHIETKUIL	3	C0520000000000300000	ROOIKOP TRUST	2865.840983	Western Cape
WAAYFONTEIN	3/65	C05200000000006500003	MERWE JAN HENDRIK VAN DER ID7011225039080	70.10192482	Western Cape
TAAYBOSCHFONTEIN	RE/1/15	C05200000000001500001	MERWE JAN HENDRIK VAN DER ID7011225039080	358.8181898	Western Cape
ZWARTKOPJES	RE/240	C08000000000024000000	MERWE JAN HENDRIK VAN DER ID7011225039080	1332.397486	Northern Cape
FARM 241	RE/241	C08000000000024100000	MERWE JAN HENDRIK VAN DER ID7011225039080	450.3503574	Northern Cape

MODDERFONTEIN	1/228	C08000000000022800001	MERWE JAN HENDRIK VAN DER ID7011225039080	49.06989928	Northern Cape
MORDANT KLAASSENSKRAAL	RE/11/14	C05200000000001400011	KLERK OSWALD GOUS DE	1874.212163	Western Cape
UIT VLUGT FONTEIN	1/265	C08000000000026500001	KLEINFONTEIN BOERDERY TRUST (764/98)	1486.157853	Northern Cape
NOBELSFONTEIN	RE/248	C08000000000024800000	MAY ALSO BE OWNED BY FRANCOIS ROUX TBC	4619.099128	Northern Cape
DRUPFONTEIN	1/208	C08000000000020800001	BRACKVLEI BOERDERY TRUST	4974.946423	Northern Cape
ANNEX NOBELS FONTEIN	1/234	C08000000000023400001	NO INFO	146.6602689	Northern Cape
PAARDEBERG	2/49	C00900000000004900002	ABRAHAMSKRAAL TRUST	686.6806167	Western Cape
AASVOGELBERG	1/59	C00900000000005900001	ABRAHAMSKRAAL TRUST	93.12201139	Western Cape
PAARDEBERG	1/49	C00900000000004900001	ABRAHAMSKRAAL TRUST	881.1410228	Western Cape
PAARDEBERG	RE/50	C00900000000005000000	ABRAHAMSKRAAL TRUST	776.8952378	Western Cape
ABRAMS KRAAL	RE/206	C08000000000020600000	WIEHAHN TRUST (4608/95)	8102.792178	Northern Cape
DRUPFONTEIN	2/208	C08000000000020800002	ANJALI BELEGGINGS C C (200710005523)	1906.062965	Northern Cape
DRUPFONTEIN	RE/208	C08000000000020800000	ANJALI BELEGGINGS C C (200710005523)	5438.617968	Northern Cape
VLAK FONTEIN	3/207	C08000000000020700003	BOETMAR TRUST (128/2005)	3200.893943	Northern Cape
GABRIELS BAKEN	2	C05200000000002000000	STEENKAMP PETRUS JOHANNES WILLEM	4441.738205	Western Cape
BURGERSFONTEIN	RE/92	C06300000000009200000	DANNY HUGO	6218.945456	Northern Cape
DUIKER KRANSE	4/45	C00900000000004500004	GANSFONTEIN TRUST	3888.742101	Western Cape
LEEUEW KLOOF	43	C00900000000004300000	GANSFONTEIN TRUST	4811.214785	Western Cape
BRACKFONTEIN	1/225	C08000000000022500001	SMOKEY GROVE TRUST	2663.71217	Northern Cape
BRACKFONTEIN	1/225	C08000000000022500001	SMOKEY GROVE TRUST	5394.518461	Northern Cape
EZELSFONTEIN	2/235	C08000000000023500002	ROUX FRANCOIS DU TOIT	1281.201203	Northern Cape
EZELSFONTEIN	2/235	C08000000000023500002	ROUX FRANCOIS DU TOIT	88.12694324	Northern Cape
EZELSFONTEIN	3/235	C08000000000023500003	ROUX FRANCOIS DU TOIT	725.7236027	Northern Cape
EZELSFONTEIN	4/235	C08000000000023500004	ROUX FRANCOIS DU TOIT	262.2877061	Northern Cape
RIETKLOOF PLAATEN	1/239	C08000000000023900001	ROUX FRANCOIS DU TOIT	244.6833335	Northern Cape
NOBELSFONTEIN	3/248	C08000000000024800003	ROUX FRANCOIS DU TOIT	1983.282148	Northern Cape
ANNEX NOBELS FONTEIN	RE/234	C08000000000023400000	ROUX FRANCOIS DU TOIT	82.24633305	Northern Cape



ADJ DRIEKOP	2/48	C00900000000004800002	GOVERNMENT Dept Rural Development & Land Reform	360.5831602	Western Cape
BRONKERS VALEI	RE/76	C00900000000007600000	GOVERNMENT Dept Rural Development & Land Reform	1875.096791	Western Cape
NOBELSFONTEIN	4/248	C08000000000024800004	TRANSNET LTD (199000090006)	94.51132662	Northern Cape
EZELSFONTEIN	5/235	C08000000000023500005	TRANSNET LTD (199000090006)	0.209625744	Northern Cape
EZELSFONTEIN	1/235	C08000000000023500001	TRANSNET LTD (199000090006)	19.17659367	Northern Cape
NOBELSFONTEIN	7/248	C08000000000024800007	TRANSNET LTD (199000090006)	5.56058994	Northern Cape
GROOTKLIP	1/238	C08000000000023800001	TRANSNET LTD (199000090006)	43.24702427	Northern Cape
NOBELSFONTEIN	7/248	C08000000000024800007	TRANSNET LTD (199000090006)	5.56058994	Northern Cape
BRAKFONTein	RE/225	C08000000000022500000	HENTIQ 1329 PTY LTD (NO.98/13257/07)	4172.541034	Northern Cape

## APPENDIX 2 – Site Sensitivity Verification

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

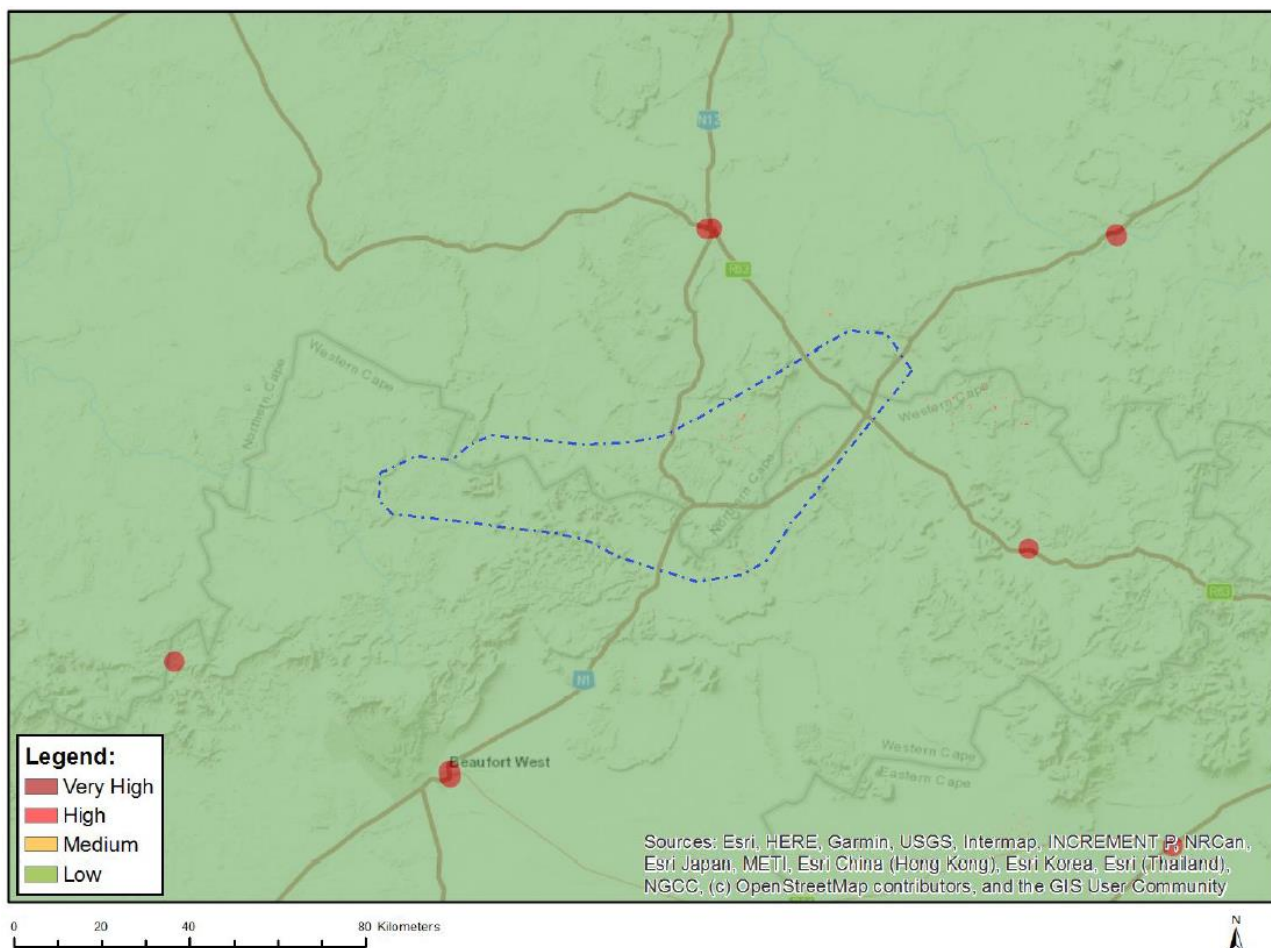
<b><i>Date of Site Visit</i></b>	11-14 July 2022
<b><i>Specialist Name</i></b>	Dr Jayson Orton
<b><i>Professional Registration Number</i></b>	ASAPA: 233; APHP: 043
<b><i>Specialist Affiliation / Company</i></b>	ASHA Consulting (Pty) Ltd

### Method of the Site Sensitivity Verification

Initial work was carried out using satellite aerial photography. A low density field survey was used to supplement the desktop research. The author's accumulated knowledge of the local landscape was also considered. This was used to provide sensitivity data which, in turn, will inform the layout design. The findings are presented in the report (Section 5).

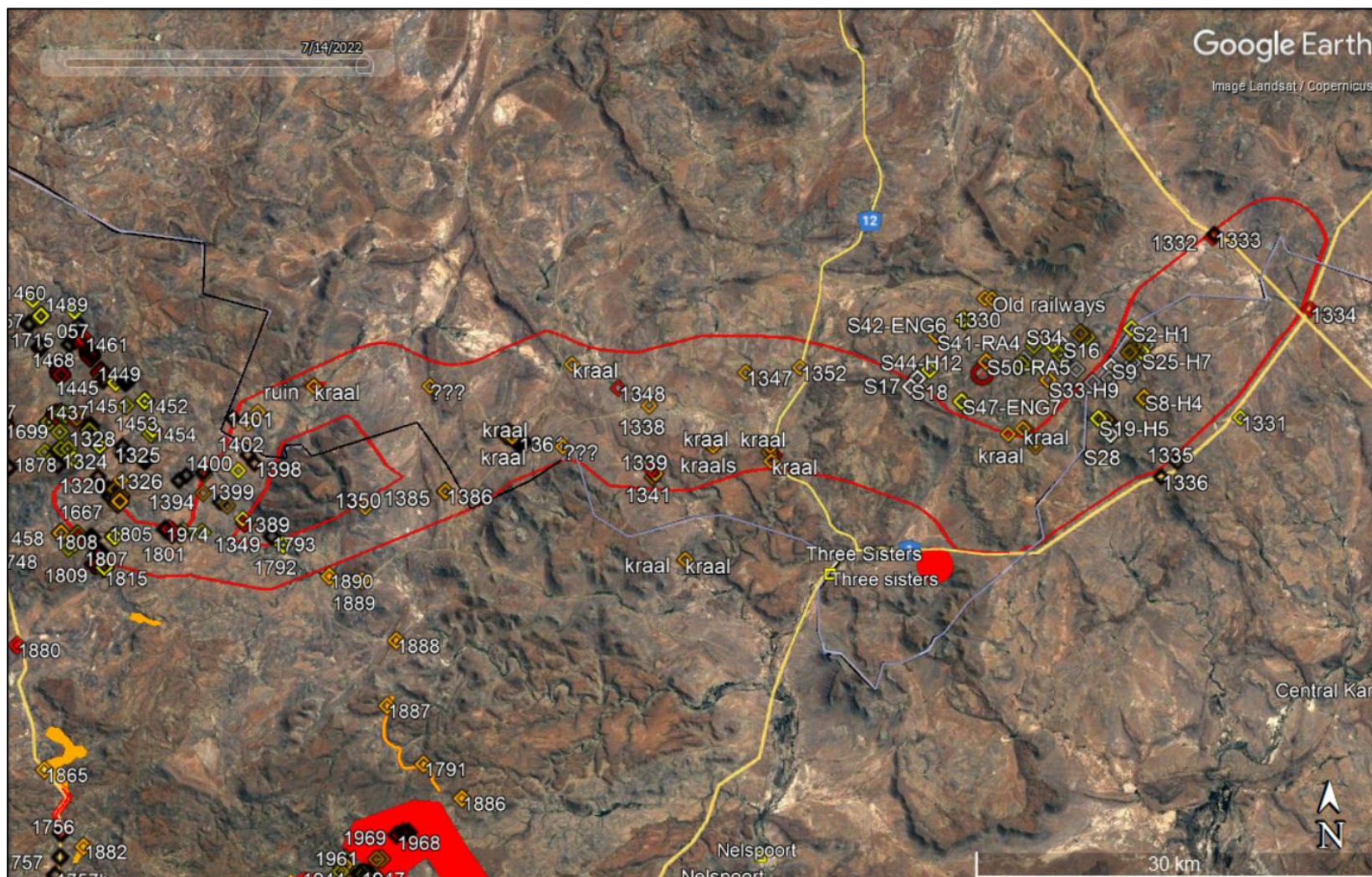
### Outcome

The map below is extracted from the screening tool report and shows the archaeological and heritage sensitivity to be low throughout the proposed corridor. The site visit showed that in fact the majority of the site is of low sensitivity, but several pockets of high sensitivity do occur. Many other smaller high and medium sensitivity sites are expected to occur throughout the area, but focused on dolerite outcrops and water courses. Figures 79 to 81 (in the main report) show the areas considered to be sensitive from an archaeological and cultural heritage point of view. A photographic record and description of the relevant heritage resource is contained within the impact assessment report.



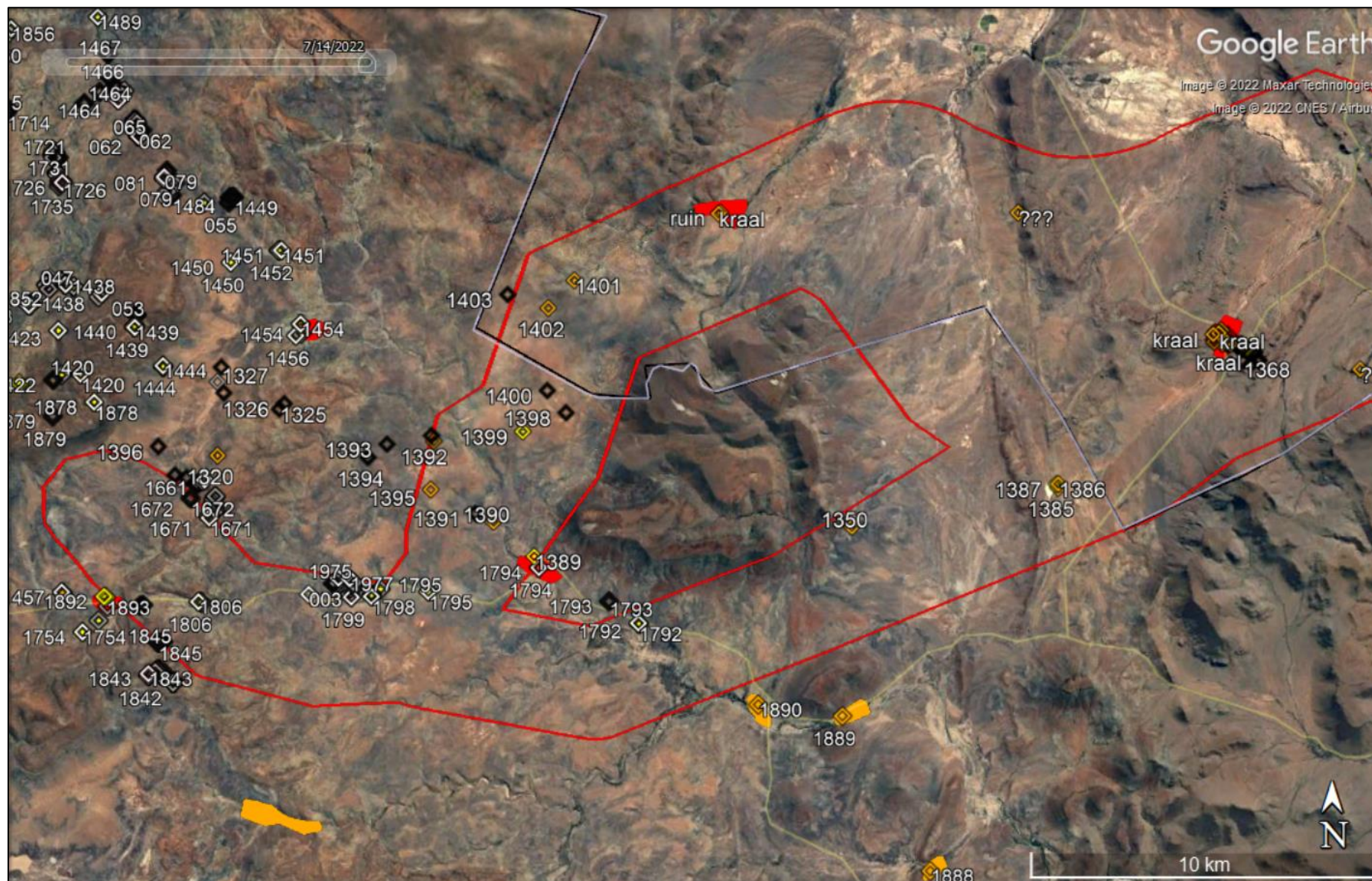


## APPENDIX 3 – Mapping

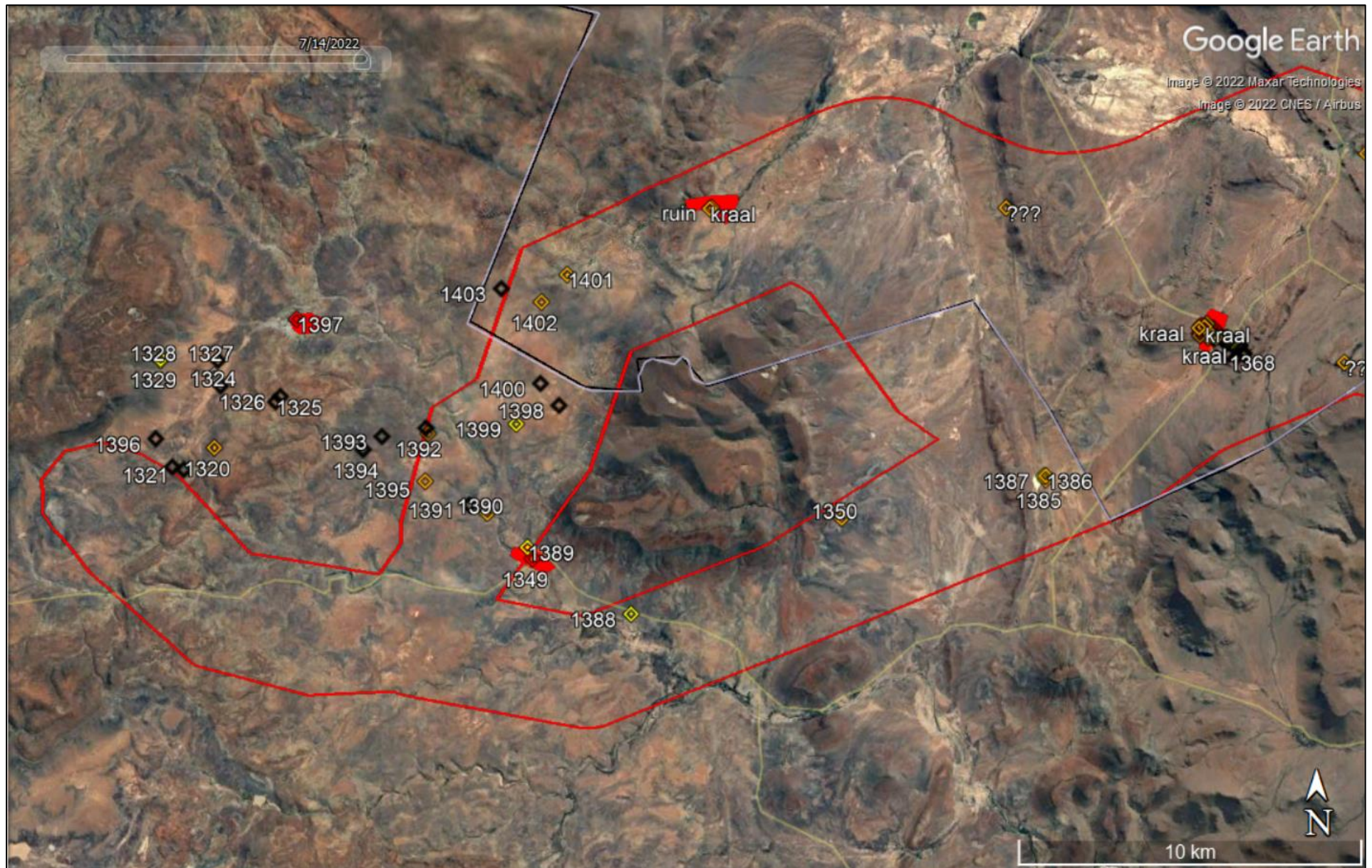


**Figure A3.1:** Gamma Corridor showing heritage resources. Sites with alpha-numeric names to the east were recorded by Binneman et al. (2011) and are mapped by sensitivity as assigned by the present author (Red = high, Orange = medium, Yellow = low). They were not graded. All other sites were recorded by this author and are mapped by grade (Red = IIIA, Orange = IIIB/GPA, Yellow = IIIC, Black = NCW/GPC).



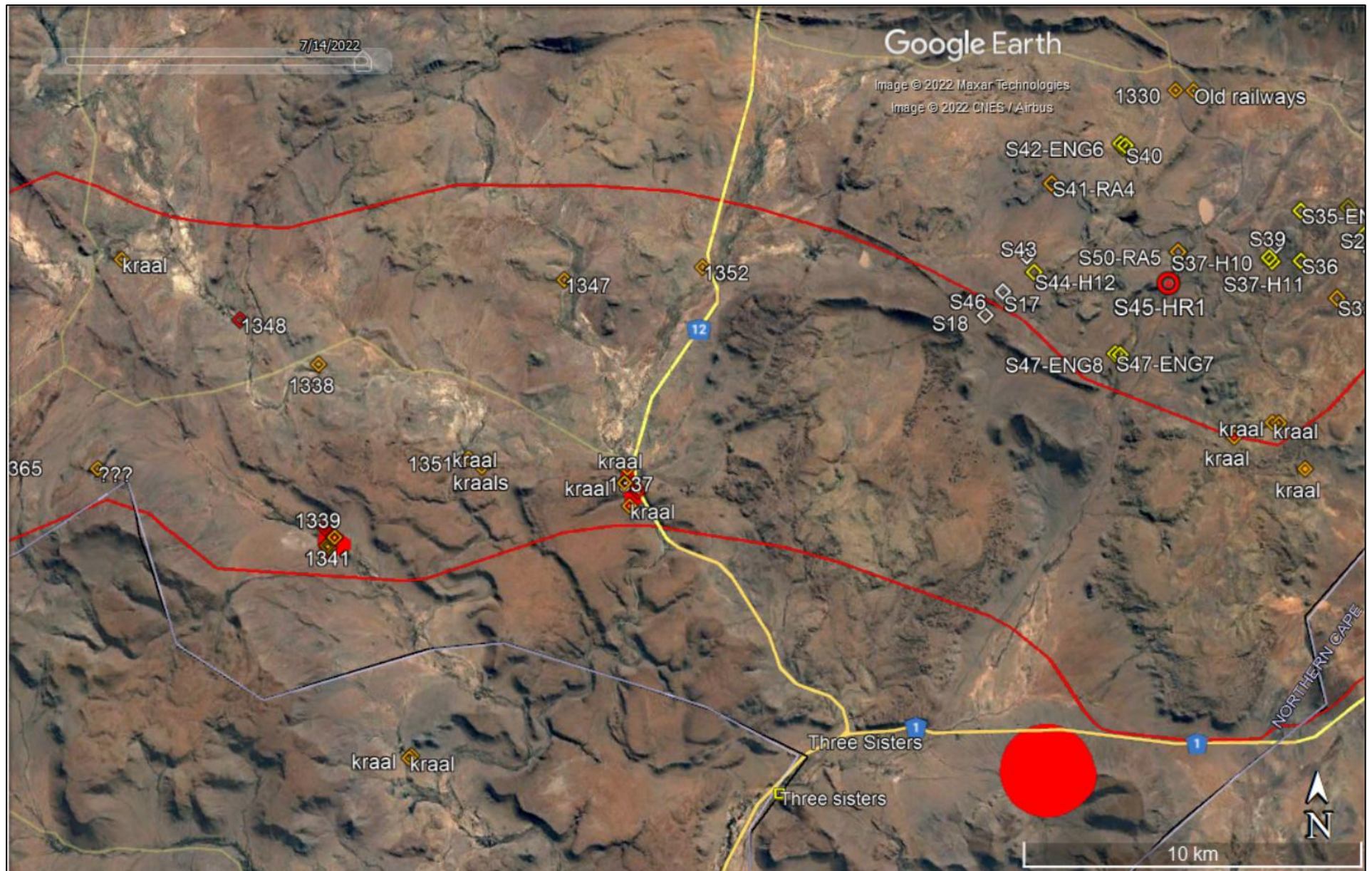






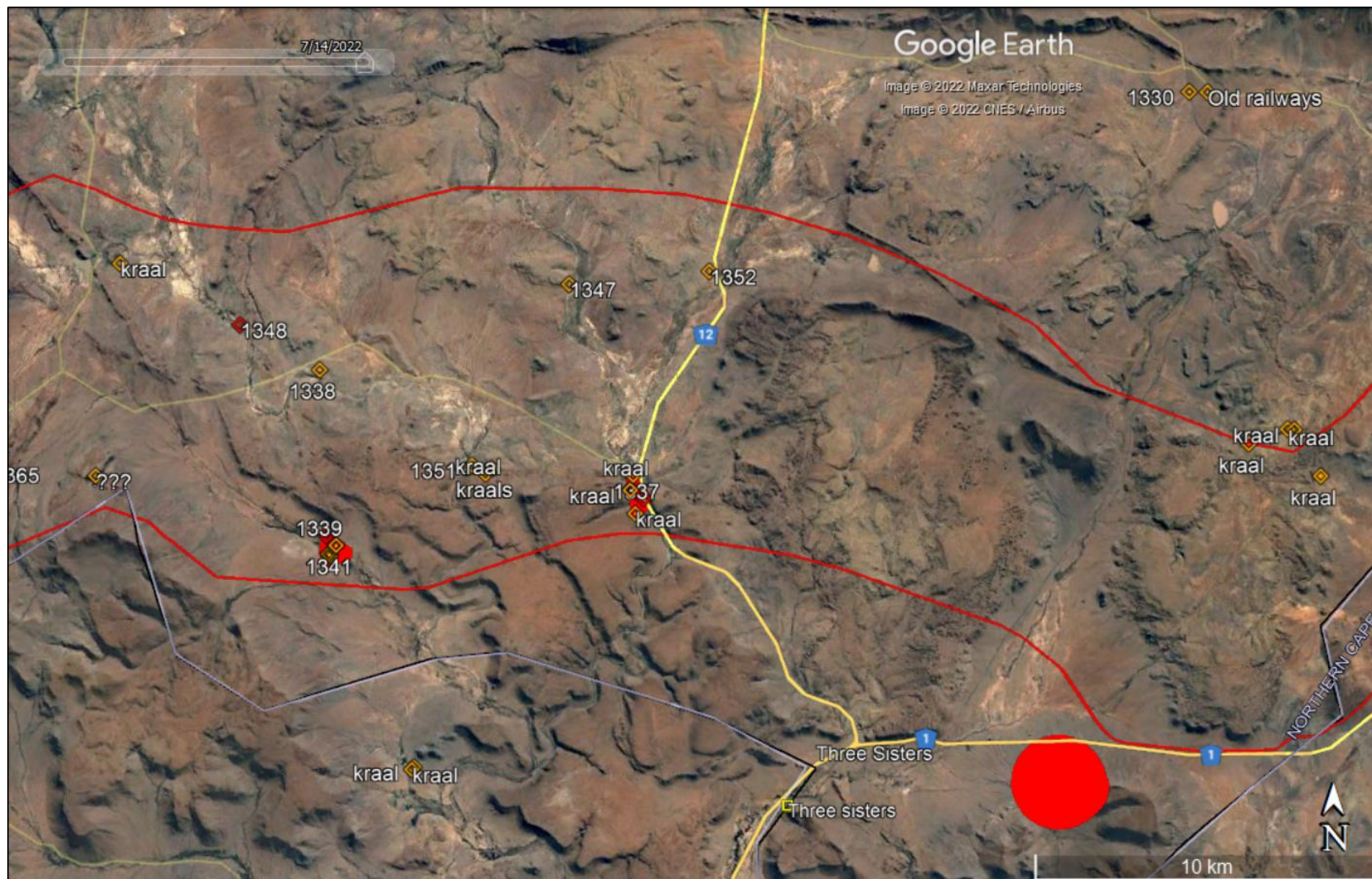
**Figure A3.3:** As per Fig. A3.2 but with only sites recorded in this assessment mapped.





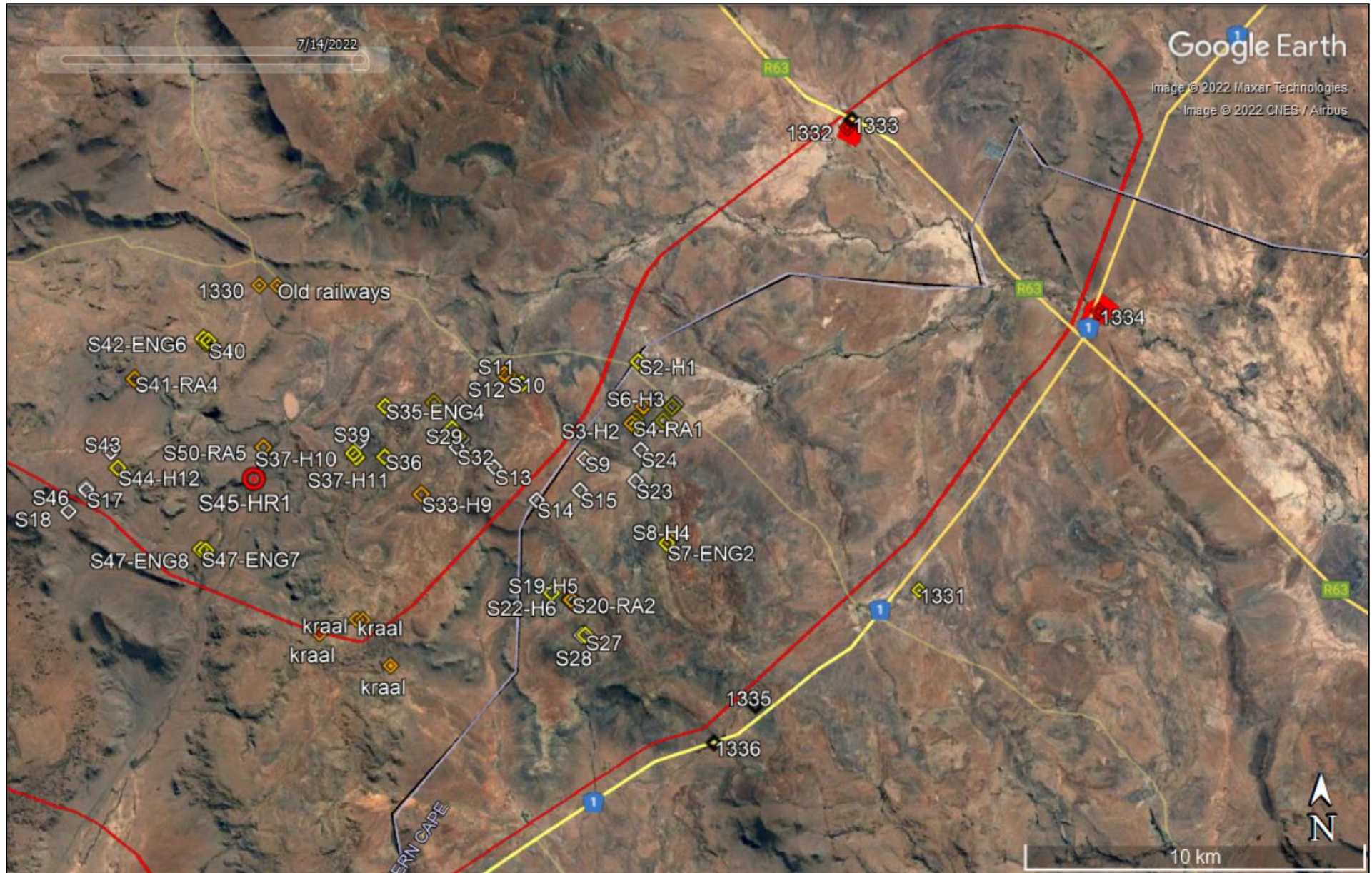
**Figure A3.4:** Central part of the corridor. Key as above. All heritage resources on record are shown.





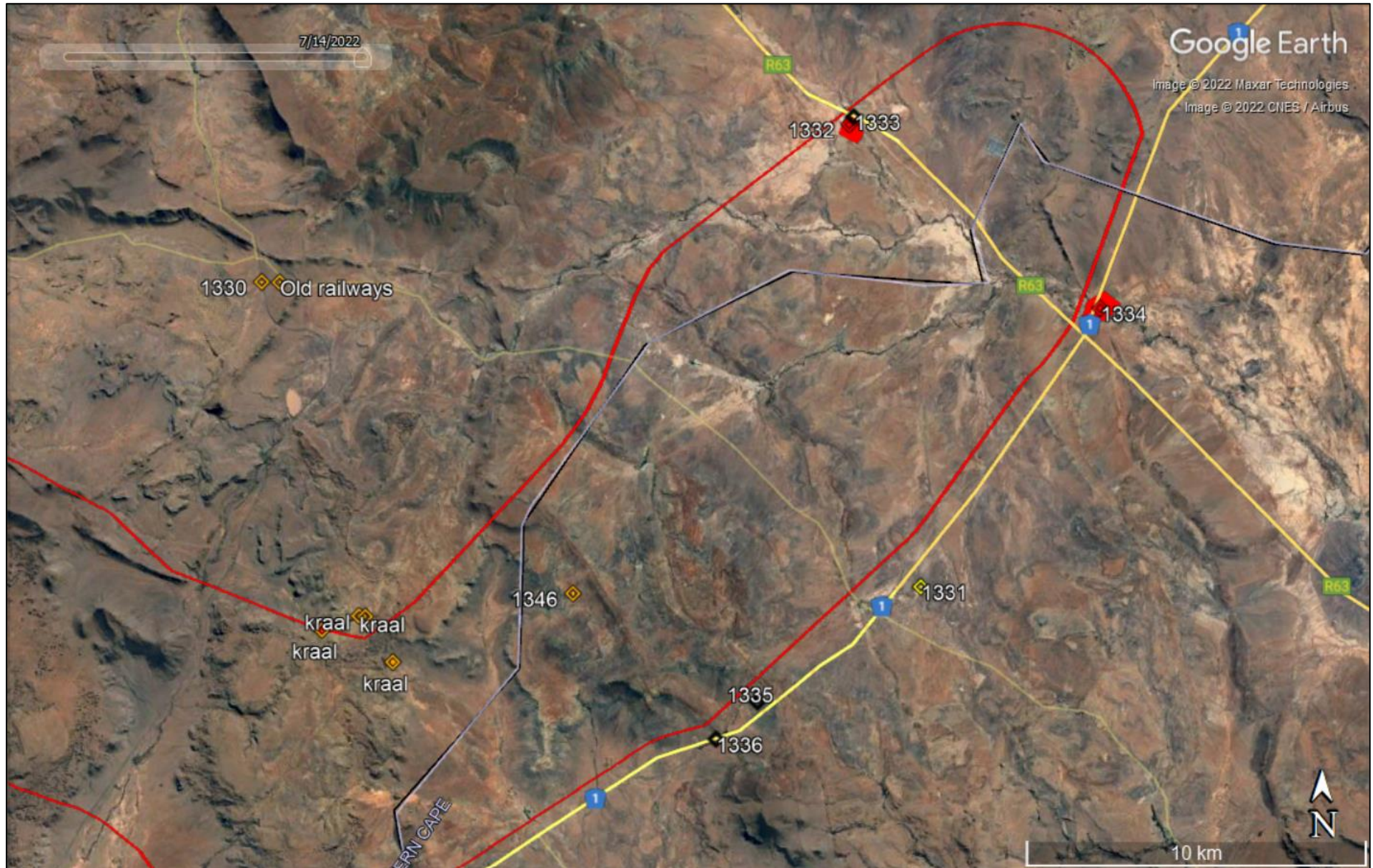
**Figure A3.5:** As per Fig. A3.4 but with only sites recorded in this assessment mapped.





**Figure A3.6:** Eastern part of the corridor. Key as above. All heritage resources on record are shown.





**Figure A3.7:** As per Fig. A3.6 but with only sites recorded in this assessment mapped.

## **APPENDIX 4 – Palaeontological specialist study**

**APPENDIX 5 – Visual Impact Assessment**