



# PGS HERITAGE

**Part 2 Amendment Application for the Existing 765kV Gamma Substation and Associated Powerline Turn-in Infrastructure, located on Farms Uit Vlucht Fontein No.265 and Schietkuil No.3, Western and Northern Cape Provinces.**

## Heritage Impact Assessment

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**REVISION HISTORY**

<b>Version</b>	<b>Issue Date</b>	<b>Description of Changes</b>
001	20 January 2023	First draft
002	30 January 2023	Second Draft – Minor Amendments
003	27 March 2023	Third Draft – Minor Amendment to Map Legends

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#### Declaration of Independence

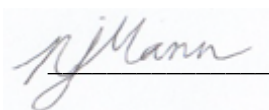
- I, Nikki Mann, declare that –
- General declaration:
- I act as the independent heritage practitioner in this application
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting heritage impact assessments, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I will take into account, to the extent possible, the matters listed in section 38 of the NHRA when preparing the application and any report relating to the application;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- I will ensure that information containing all relevant facts in respect of the application is distributed or made available to interested and affected parties and the public and that participation by interested and affected parties is facilitated in such a manner that all interested and affected parties will be provided with a reasonable opportunity to participate and to provide comments on documents that are produced to support the application;
- I will provide the competent authority with access to all information at my disposal regarding the application, whether such information is favourable to the applicant or not
- All the particulars furnished by me in this form are true and correct;
- I will perform all other obligations as expected from a heritage practitioner in terms of the Act and the constitutions of my affiliated professional bodies; and
- I realise that a false declaration is an offence in terms of regulation 71 of the Regulations and is punishable in terms of section 24F of the NEMA.

#### Disclosure of Vested Interest

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

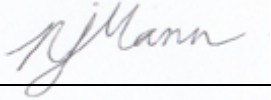


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**ACKNOWLEDGEMENT OF RECEIPT**

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<b>Report Title</b>	<b>Part 2 Amendment Application For the Existing 765kV Gamma Substation and Associated Powerline Turn-in Infrastructure, located on Farms Uit Vlucht Fontein No.265 and Schietkuil No.3, Western and Northern Cape Provinces.</b>		
<b>Control</b>	<b>Name</b>	<b>Signature</b>	<b>Designation</b>
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<b>Co-Author/Reviewer</b>	Wouter Fourie		PGS Heritage – Director/ Principal Heritage Specialist
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## EXECUTIVE SUMMARY

PGS Heritage (Pty) Ltd (PGS) was appointed by Nala Environmental (Nala) on behalf of Eskom Holdings SOC Limited to undertake a Heritage Impact Assessment (HIA) for the proposed Part 2 Amendment Application for the existing 765kV Gamma Substation and Associated Powerline Turn-in Infrastructure, located on Farms Uit Vlugt Fontein No.265 and Schietkuil No.3, in the Western and Northern Cape Provinces (Latest Environmental Authorisation (EA): 12/12/20/873/AM2).

### Location

The approved development is located approximately 44km north-west of Murraysburg in the Western and Northern Cape Provinces. It is within the Beaufort West, Ubuntu Local Municipalities, Central Karoo, and Pixely Ka Seme District Municipalities.

The study area incorporates the following farms:

- Portion 1 of the Farm Uitvlugfontein No.265
- The Farm Schietkuil No.3

### Aims

The study aims to assess the proposed amendments to the already approved Gamma Substation as it relates to heritage resources as contemplated in s3 and s38 of the National Heritage Resources Act of 1999 (Act 25 of 1999)(NHRA).

### Description of the Project

The construction of the Eskom Gamma Substation was authorised by the Department of Environmental Affairs in 2007. The approval was for constructing the complete Gamma substation. However, it was noted that individual components would be constructed in a phased approach as determined by the electricity demand over several years.

As such, the first construction phase of the Gamma substation commenced during the original validity period of the EA and was completed in 2013 (**Figure**).

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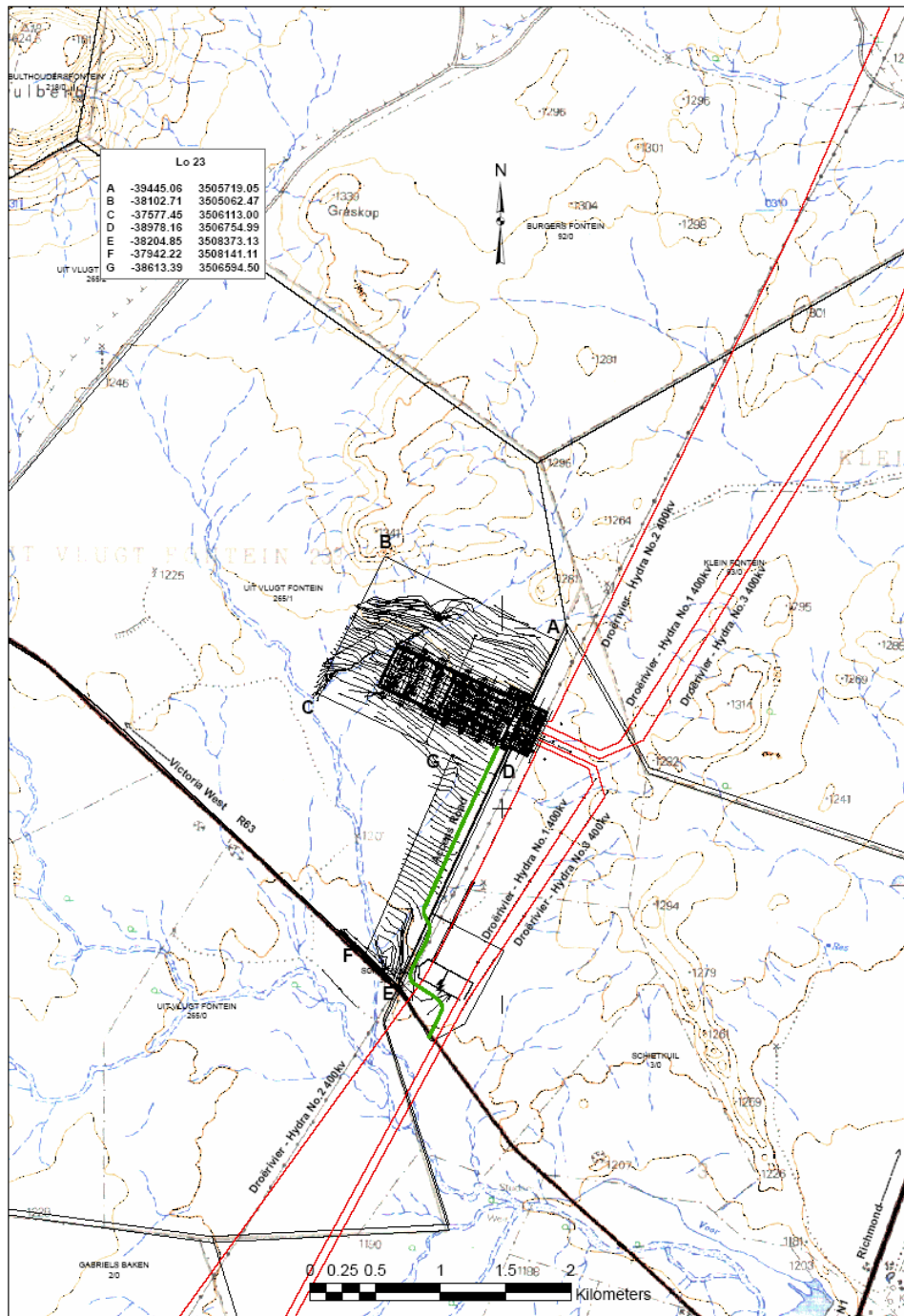


Figure 1 - As per the Final Environmental Impact Report (FEIR) (2007) indicating the layout of the 765kV Gamma Substation as authorised.

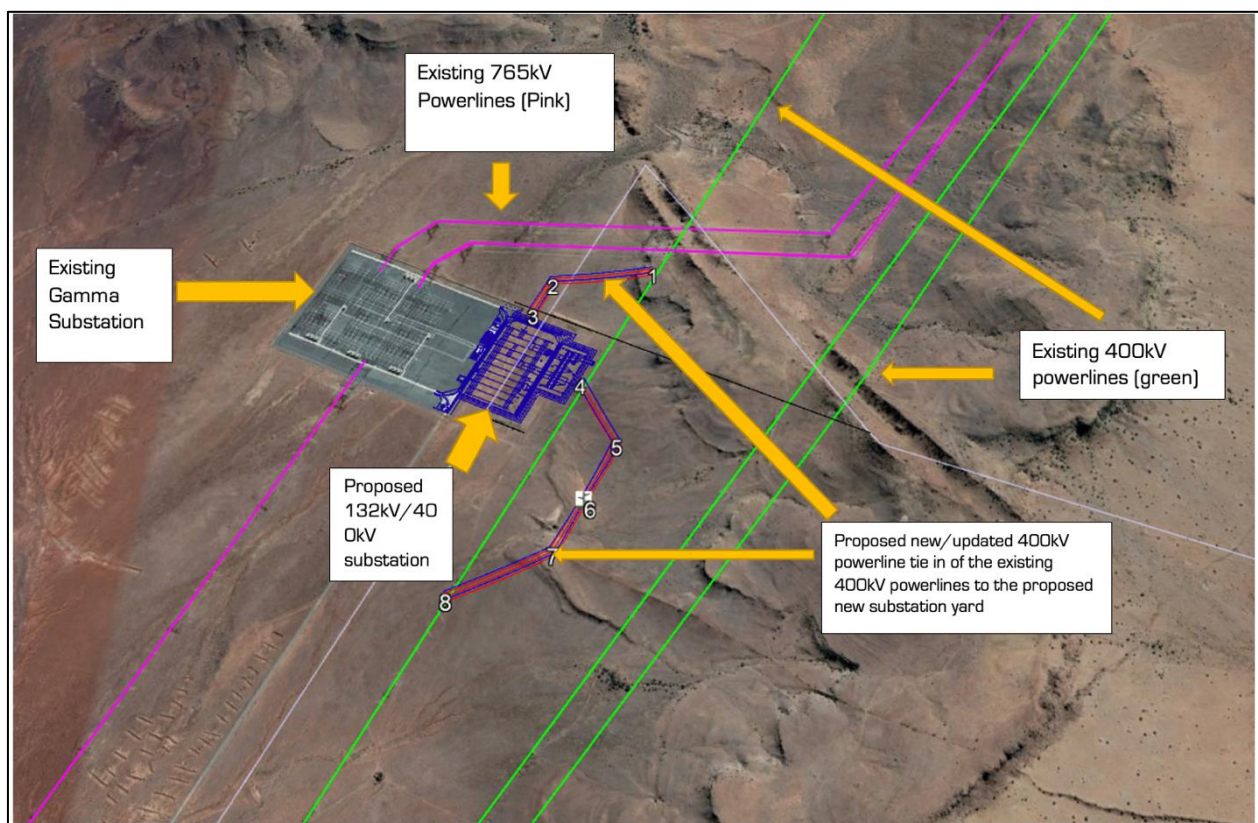
#### Proposed Second Phase

The holder of the EA proposes to commence construction of the second phase of the authorised substation development, specifically the development of a 132/400kV yard at the existing MTS and OHL turn-in of the existing 400kV Droer-Hydra 2 Overhead Powerline into the substation yard, as provided for in the current EA.

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The next phase of construction activities associated with the EA is directly linked to the increased demand for grid infrastructure which is linked to upcoming Renewable Energy projects in the Northern and Western Cape Provinces. Notably, the 132kV/400kV yard and 400kV OHL turn-ins are needed to enable the connection of the authorised Umsinde Emoyeni Wind Farm (DFFE Ref: 14/12/16/3/3/2/686) with has been registered as Strategic Integrated Project (SIP).

The proposed 132kV/400kV yard and 400kV OHL turn-ins fall within the scope of the current EA. However – based on further technical analysis and design – it has been identified that the layout of the authorised infrastructure will need to be updated to reflect the updated configuration proposed (i.e., the 132kV/400kV substation yard and 400kV turn-in) to be implemented. The updated layout falls within the scope and footprint of what was originally assessed in the original EIA process, however for the avoidance of doubt the holder wishes to have the updated layout approved by DFFE prior to implementation thereof.



*Figure 2 - Proposed Updated Layout depicting the existing Gamma Substation with the next phase of the authorised development now proposed for implementation (new proposed 132kV/400kV Substation yard and new reconfigured turn-in and turn-out of the existing 400kV powerline).*

### Heritage Resources Identified

The original application was subject to an HIA completed by van Schalkwyk and Wahl from eThembeni Cultural Heritage in 2007<sup>1</sup>. The original study noted:

<sup>1</sup> van Schalkwyk and Wahl, 2007.

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“...the presence of mi miscellaneous Middle Stone Age stone knapping debris some 50 metres north of a windmill, at S31. 41.400; E23 24.620. Artefacts are water washed and weathered, on patinated shale, and are part of colluvial down slope wash.

Another concentration of archaeological material is present immediately to the west of the existing entrance gate to the property, at S31 41.950; E23 24.325. Here very weathered Early Stone Age flakes and cores are mixed with Middle Stone Age knapping detritus. It appears that episodes of soil deflation and pedogenesis have caused the two temporally disparate traditions to mix. Artefacts are eroding open, exposed by down slope wash, and are mixed with other colluvial debris.

These sites have **low heritage significance** for their scientific value and, as is the case for all heritage resources, a permit from SAHRA is required for any alteration to them.”<sup>2</sup>

### Comments on status quo

A site visit was conducted by an archaeologist from PGS (Henk Steyn) between 20th – 21st July 2022 to assess the landscape of the study area. During the field work, no further archaeological sites, structures or burial grounds and graves were identified.

### *Cultural Landscape*

The creation of the REDZ and the ensuing applications for WEFs in this area has resulted in several HIAs having been compiled for the region since 2011. These reports have addressed the region’s archaeological and palaeontological heritage, with very few addressing issues and impacts related to the cultural landscape of the area. Presently, the research done by Winter (2021a, 2021b) for the Modderfontein WEF and Great Karoo Renewable Energy WEF, Solar Energy Facility and Grid Connection presents the only available report documenting the historical and cultural research, in terms of the cultural landscape for the area.

The study area forms part of the Central Karoo Region characterised by an extensive semi-arid landscape. In general, because of the climatic conditions of the area, the region has historically been sparsely occupied. For the most part, the only anthropogenic features observed within the study area are farm tracks, windmills and fences. The region possesses heritage value (i.e. historical, aesthetic, architectural, social, scientific). The occasional homestead and the further afield small town represent distinct landscape elements of an otherwise pristine uncultivated cultural landscape.

The closest settlements to the study area are the towns of Victoria West (40km north-west of the site), Richmond (56km north-east of the site), Three Sisters (36km south-west of the site) and Murraysburg (41km south-east of the site). The site is also in proximity of the N1 and the R63 (considered a scenic route).

The scenic qualities of the area, more specifically local geological features, relate to its dolerite “koppies”. The general landscape of the proposed development area comprised of mountains, cliffs, ridges, hills, rock

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<sup>2</sup> Ibid.



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outcrops, gorges, gullies and flat alluvial plains that were mostly covered in moderate to sparse vegetation. The hilly terrain and flat plains have undergone extensive erosion with the development of scree slopes and rocky gullies.

Given the diverse topography of the study area, the vegetation varies from “unpalatable” sour grass and fynbos in the mountains to typical Karoo vegetation (karooveld) across most of the region. Thorn trees (*Acacia karoo*) and other scrubs grow along watercourses. Small stock farming and game farming occur in the region.

The archaeological cultural landscape consists of precolonial finds (i.e. stone tool surface scatters) and historical finds (i.e. stone structures such as kraals), that typically occur near dolerite outcrops due to the presence of underground water (Winter and Oberholzer, 2013).

The study area possesses several landscape qualities which are representative of the Great Karoo Cultural Landscape. The cultural resources include archaeological, palaeontological and historic features (incl. individual structures, towns, farms, scenic landscapes).

Although the site does not possess the necessary heritage significance characteristics that would justify formal protection (i.e., provincial or national), there are three visually sensitive aspects worth highlighting:

- The site’s location in relation to the national (N1) and regional roads (R63) has significance.
- Tall hills and mountains within the wider study area add to the scenic quality of the region and the general ‘sense of place’.

## Impact Statement

### *Archaeology*

This study considered the original assessment in relation to the proposed second phase of construction for the approved substation and associated infrastructure. The original study found that most archaeological finds were out of context and that the impact on heritage resources was **LOW negative rating pre- and post-mitigation**.

Considering that no further heritage resources were identified, **no impact is expected from the second phase of the construction project on heritage**. Therefore, the impact calculation shows a **LOW negative rating pre- and post-mitigation**.

### *Cultural Landscape*

The possible pre-construction impacts calculated on the cultural landscape is overall **MODERATE NEGATIVE** rating but with the implementation of the recommended management guidelines will be reduced to a **LOW NEGATIVE** impact.

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### *Cumulative Impacts*

Considering the development of other renewable facilities in and around the Beaufort West REDZ, the cumulative unmitigated impacts on heritage resources and cultural landscape consist of a medium negative impact mostly confined to the construction phase of the project. This could potentially result in an unacceptable loss of cultural heritage resources. **However, by implementing the mitigation measures as listed in this report the cumulative impacts can be managed to low negative.**

### **Mitigation measures**

This study has considered the original HIA and has recommended additional mitigations measures. The implementation of a chance finds procedure (**Section 9**), will mitigate possible impacts on unidentified heritage resources. The following mitigation measures are listed in **Table 1**.

*Table 1 - Heritage management recommendations.*

Area and site no.	Mitigation measures
<b>General project area</b>	<ul style="list-style-type: none"> <li>▪ Implement a chance to find procedures in cases where possible heritage finds are uncovered.</li> </ul>
<b>Cultural Landscape</b>	<ul style="list-style-type: none"> <li>▪ Refer to <b>Table 8</b>.</li> </ul>

### **Conclusion**

It is the considered opinion of the authors of this report that the overall impact of the proposed construction Phase 2 on heritage resources will be **Low**. Provided that the general recommendations and mitigation measures outlined in this report are implemented, the impact would be acceptably **Low** or could be totally mitigated to the degree that the proposed phase 2 amendment could be approved from a heritage perspective. The management and mitigation measures as described in **Section 9** of this report have been developed to minimise the project impact on heritage resources.

### **AUTHORS**

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**Refer to Appendix B for CVs specialist**

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## **TERMINOLOGY AND ABBREVIATIONS**

### **Archaeological resources**

This includes:

- material remains resulting from human activity which are in a state of disuse and are in or on land and which are older than 100 years including artefacts, human and hominid remains and artificial features and structures;
- rock art, being any form of painting, engraving or other graphic representation on a fixed rock surface or loose rock or stone, which was executed by human agency, and which is older than 100 years, including any area within 10m of such representation;
- wrecks, being any vessel or aircraft, or any part thereof, which was wrecked in South Africa, whether on land, in the internal waters, the territorial waters or in the maritime culture zone of the republic as defined in the Maritimes Zones Act, and any cargo, debris or artefacts found or associated therewith, which is older than 60 years or which SAHRA considers to be worthy of conservation;
- features, structures and artefacts associated with military history which are older than 75 years and the site on which they are found.

### **Cultural significance**

This means aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance

### **Development**

This means any physical intervention, excavation, or action, other than those caused by natural forces, which may in the opinion of the heritage authority in any way result in a change to the nature, appearance or physical nature of a place or influence its stability and future well-being, including:

- construction, alteration, demolition, removal or change in use of a place or a structure at a place;
- carrying out any works on or over or under a place;
- subdivision or consolidation of land comprising a place, including the structures or airspace of a place;
- constructing or putting up for display signs or boards;
- any change to the natural or existing condition or topography of land; and
- any removal or destruction of trees, or removal of vegetation or topsoil

### **Early Stone Age**

The archaeology of the Stone Age between 700 000 and 2 500 000 years ago.

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### **Fossil**

Mineralised bones of animals, shellfish, plants and marine animals. A trace fossil is the track or footprint of a fossil animal that is preserved in stone or consolidated sediment.

### **Heritage**

That which is inherited and forms part of the National Estate (historical places, objects, fossils as defined by the National Heritage Resources Act 25 of 1999).

### **Heritage resources**

This means any place or object of cultural significance and can include (but not limited to) as stated under Section 3 of the NHRA,

- places, buildings, structures and equipment of cultural significance;
- places to which oral traditions are attached or which are associated with living heritage;
- historical settlements and townscapes;
- landscapes and natural features of cultural significance;
- geological sites of scientific or cultural importance;
- archaeological and palaeontological sites;
- graves and burial grounds, and
- sites of significance relating to the history of slavery in South Africa;

### **Holocene**

The most recent geological time period which commenced 10 000 years ago.

### **Late Stone Age**

The archaeology of the last 30 000 years associated with fully modern people.

### **Late Iron Age (Early Farming Communities)**

The archaeology of the last 1000 years up to the 1800's, associated with iron-working and farming activities such as herding and agriculture.

### **Middle Stone Age**

The archaeology of the Stone Age between 30 000-300 000 years ago, associated with early modern humans.

### **Palaeontology**

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.



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Abbreviations	Description
AIA	Archaeological Impact Assessment
ASAPA	Association of South African Professional Archaeologists
CRM	Cultural Resource Management
DFFE	Department of Forestry, Fisheries and the Environment
EA	Environmental Authorisation
ECO	Environmental Control Officer
EIA practitioner	Environmental Impact Assessment Practitioner
EIA	Environmental Impact Assessment
ESA	Early Stone Age
FEIR	Final Environmental Impact Report
GN	Government Notice
GPS	Global Positioning System
HIA	Heritage Impact Assessment
HWC	Heritage Western Cape
I&AP	Interested & Affected Party
LIA	Late Iron Age
LCTs	Large Cutting Tools
LSA	Late Stone Age
MSA	Middle Stone Age
MIA	Middle Iron Age
MTS	Main Transmission System
Nala	Nala Environmental
NEMA	National Environmental Management Act
NHRA	National Heritage Resources Act
PGS	PGS Heritage (Pty) Ltd
PHRA	Provincial Heritage Resources Authority
PHS	Provincial Heritage Site
PIA	Palaeontological Impact Assessment
PSSA	Palaeontological Society of South Africa
SADC	Southern African Development Community
SAHRA	South African Heritage Resources Agency
SAHRIS	South African Heritage Resources Information System

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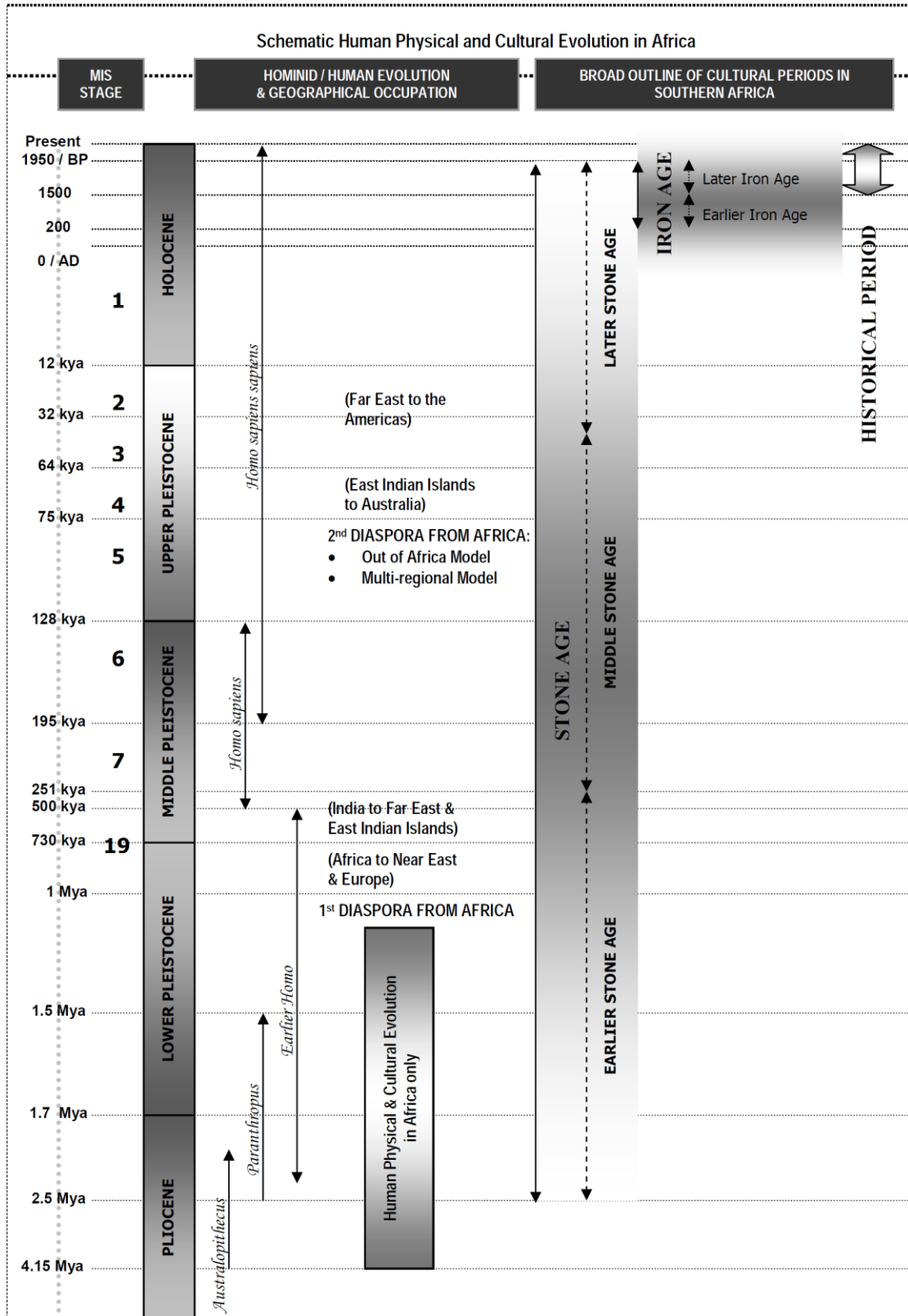


Figure 3 – Human and Cultural Timeline in Africa

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## 1 INTRODUCTION

PGS Heritage (Pty) Ltd (PGS) was appointed by Nala Environmental (Nala) on behalf of Eskom Holdings SOC Limited to undertake a Heritage Impact Assessment (HIA) for the proposed Part 2 Amendment Application for the existing 765kV Gamma Substation and Associated Powerline Turn-in Infrastructure, located on Farms Uit Vlucht Fontein No.265 and Schietkuil No.3, in the Western and Northern Cape Provinces (Latest Environmental Authorisation (EA): 12/12/20/873/AM2).

### 1.1 Scope of the Study

The study aims to assess the proposed amendments to the already approved Gamma Substation as it relates to heritage resources as contemplated in s3 and s38 of the National Heritage Resources Act of 1999 (Act 25 of 1999) (NHRA).

### 1.2 Specialist Qualifications

This HIA Report was compiled by PGS Heritage (PGS).

The staff at PGS have a combined experience of nearly 90 years in the heritage consulting industry. PGS and its staff have extensive experience in managing HIA processes. PGS will only undertake heritage assessment work where they have the relevant expertise and experience to undertake that work competently.

Nikki Mann, the author of this report, graduated with her Master's degree (MSc) in Archaeology and is registered as a Professional Archaeologist with ASAPA.

Wouter Fourie, the Project Coordinator, is registered with the ASAPA as a Professional Archaeologist and is accredited as a Principal Investigator; he is further an Accredited Professional Heritage Practitioner with the Association of Professional Heritage Practitioners (APHP).

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### 1.3 Assumptions and Limitations

This HIA assessed the proposed changes to the already approved Gamma Substation. The assessment is based on the findings of the original HIA completed by van Schalkwyk and Wahl from eThembeni Cultural Heritage in 2007<sup>3</sup>.

### 1.4 Legislative Context

The identification, evaluation and assessment of any cultural heritage site, artefact or find in the South African context is required and governed by the following legislation:

- National Heritage Resources Act (NHRA), Act 25 of 1999

#### 1.4.1 *The National Heritage Resources Act*

- National Heritage Resources Act (NHRA) Act 25 of 1999
  - Heritage Resources Management – Section 38

## 2 TECHNICAL DETAILS OF THE PROJECT

### 2.1 Locality

The approved development is situated on Farms Uit Vlucht Fontein No.265 and Schietkuil No.3 (Latest Environmental Authorisation (EA): 12/12/20/873/AM2), located approximately 44km north-west of Murraysburg in the Western and Northern Cape Provinces. It is within the Beaufort West and Ubuntu Local Municipalities and Central Karoo and Pixely Ka Seme District Municipalities.

The footprint of the original layout is still aligned with the updated February 2023 layout submitted with this amendment application and makes provision for the substation yard that encroaches onto the Farm Schietkuil No.3.

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<sup>3</sup> van Schalkwyk and Wahl, 2007.

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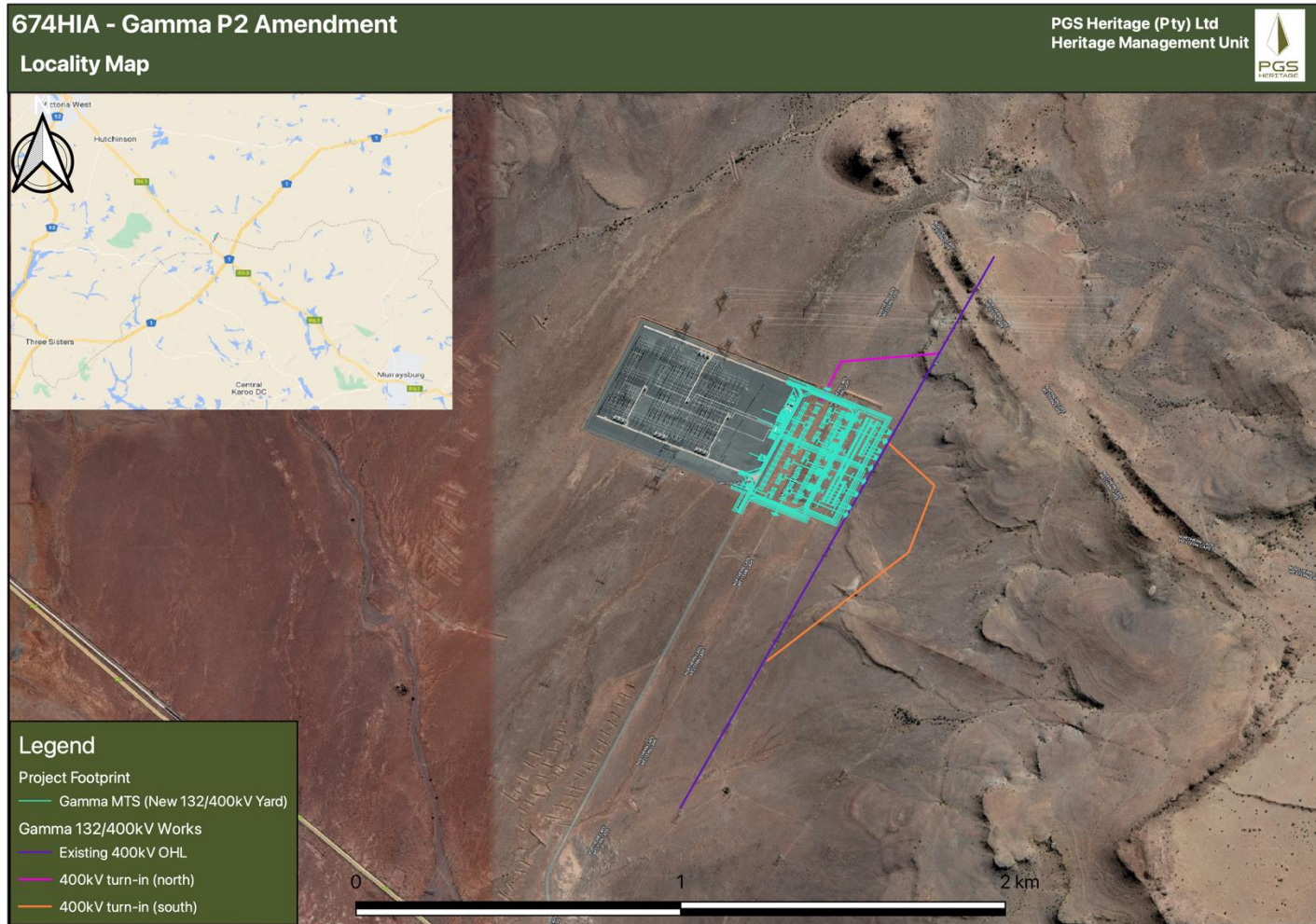


Figure 4 - Locality map of study area.

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## 2.2 Technical Project Description

The construction of the Eskom Gamma Substation was authorised by the Department of Environmental Affairs in 2007 (Latest EA: 12/12/20/873/AM2). The approval was for the construction of the complete Gamma substation, although it was noted that individual components would be constructed in a phased approach as determined by the electricity demand over several years.

As such, the first construction phase of the Gamma substation commenced during the original validity period of the EA and was completed in 2013 (**Figure 5**).

### Footprint of the Authorised Gamma Substation:

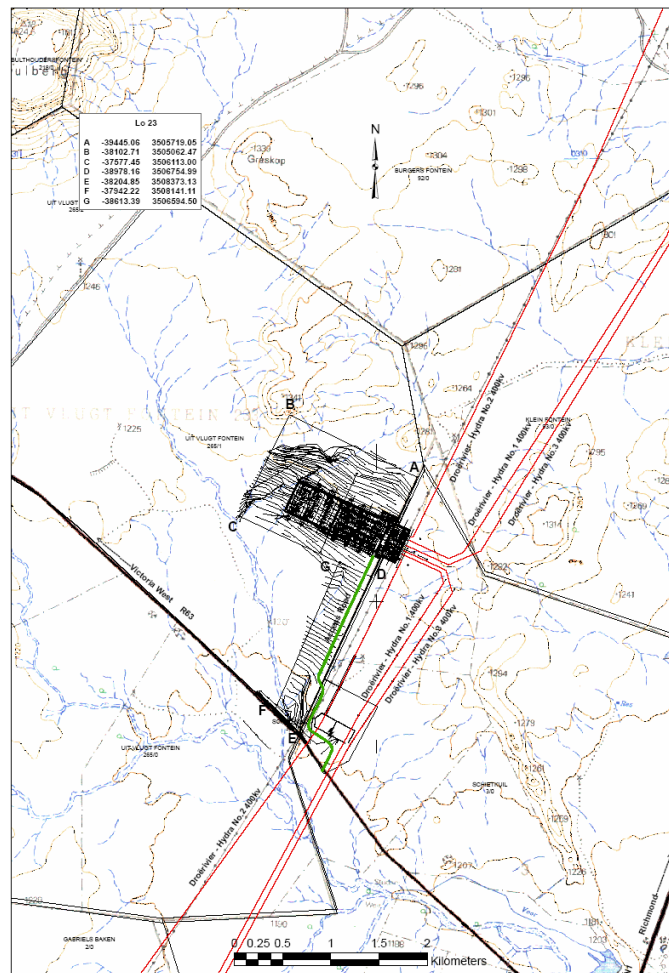


Figure 5 - As per the Final Environmental Impact Report (FEIR) (2007) indicating the layout of the 765kV Gamma Substation as authorised.

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According to the FEIR (2007), Page 16, “When finally completed, the substation itself will cover about 1 290m x 465m (approximately 60ha) (when measured in terms of the outer perimeter lines of the terraces and security fence).”

### **Second Phase**

The holder of the EA proposes to commence construction of the second phase of the authorised substation development, specifically the development of a 132/400kV yard at the MTS and 400kV OHL turn-in of the existing Hydra- Droerivier 2 Overhead Powerline, as provided for in the current EA.

The next phase of construction activities associated with the EA is directly linked to the increased demand for grid infrastructure which is linked to upcoming Renewable Energy projects in the Northern and Western Cape Provinces. Importantly, the 132kV/400kV yard and 400kV OHL turn-ins are needed to enable the connection of the authorised Umsinde Emoyeni Wind Farm (DFFE Ref: 14/12/16/3/3/2/686).

The proposed 132kV/400kV yard and 400kV OHL turn-ins fall within the scope of the current EA. However – based on further technical analysis and design – it has been identified that the layout of the authorised infrastructure will need to be updated to reflect the updated configuration proposed to be implemented. The updated layout falls within the scope and footprint of what was originally assessed in the original EIA process, however for the avoidance of doubt the holder wishes to have the updated layout approved by DFFE prior to implementation thereof.

The footprint of the already constructed first phase of the existing Gamma Substation is approximately 28 ha. The 132kV/400kV yard that will now be implemented is approximately 14ha, within the already authorised Gamma substation footprint (**Figure 6**).



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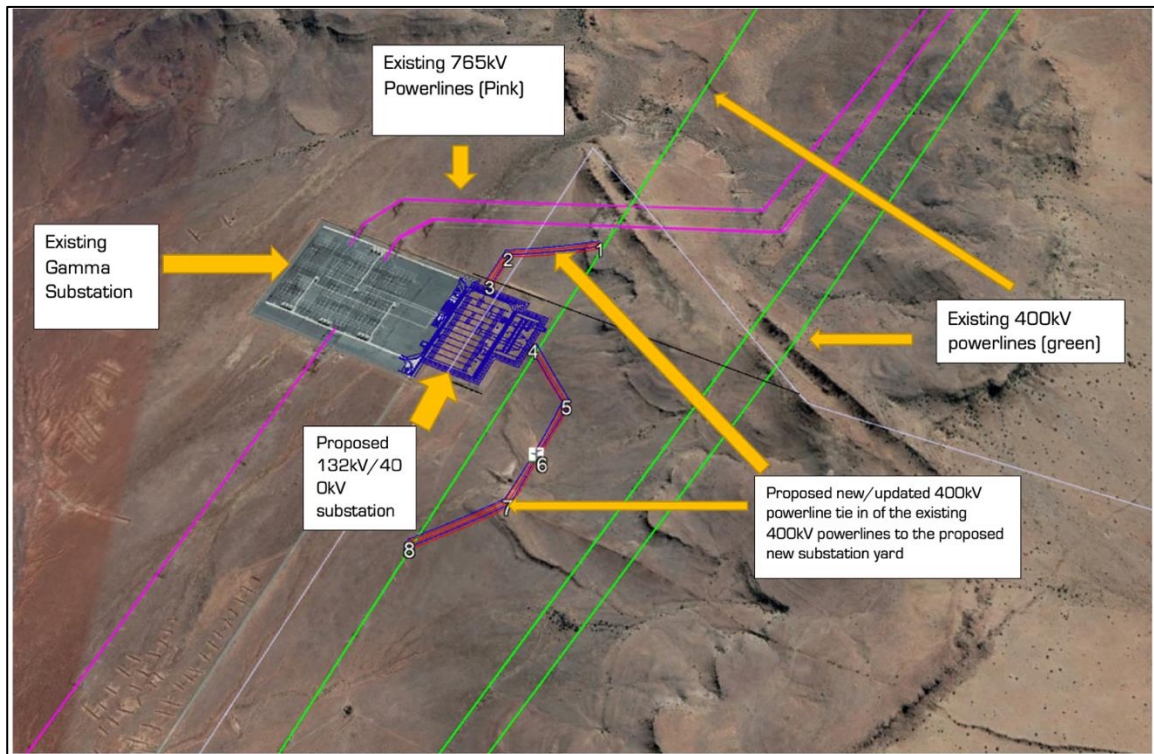


Figure 6 - Proposed Updated Layout depicting the existing Gamma Substation with the next phase of the authorised development now proposed for implementation (new proposed 132kV/400kV Substation yard and new reconfigured turn-in and turn-out of the existing 400kV powerline).

To demonstrate that the updated layout (April 2023) and the originally approved layout (FEIR 2007) are aligned and have been fully assessed and that the Updated Layout (2023) falls within the scope of EA, the following table has been established:

	Approved Layout (FEIR, 2007)	Existing/Constructed Gamma Substation	Updated Layout (April 2023)
<b>Footprint</b>	60 ha	~28 ha	~42 ha
<b>Properties Assessed</b>	<ul style="list-style-type: none"> <li>▪ Portion 1 of the Farm Uitvlugtfontein No.265</li> <li>▪ The Farm Schietkuil No.3</li> </ul>	<ul style="list-style-type: none"> <li>▪ Portion 1 of the Farm Uitvlugtfontein No.265</li> <li>▪ The Farm Schietkuil No.3</li> </ul>	<ul style="list-style-type: none"> <li>▪ Portion 1 of the Farm Uitvlugtfontein No.265</li> <li>▪ The Farm Schietkuil No.3</li> </ul>
<b>Incoming and outgoing powerlines (765kV):</b>	X5 765kV Power lines	X3 existing lines (Hydra, Perseus and Kappa)	X3 existing lines (Hydra, Perseus and Kappa), no new 765kV power lines
<b>Transformers</b>	X2 EHV transformers	No transformers currently installed	X1 transformer to be installed



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<b>Turn-in lines</b>	X6 400kV incoming/out going lines (turn-in and turn-out lines)	No 400kV turn-in lines	Existing 400kV Hydra-Droerivier 2 OHL to be reconfigured to turn-in to the new 400kV/132kV yard.
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- The updated layout falls within the authorised footprint of the originally assessed layout in the FEIR (2007) and still falls within the authorised properties i.e., Portion 1 of the Farm Uit Vlugt Fontein No.265 and The Farm Schietkuil No.3;
- No new additional infrastructure has been included within the Updated Layout (2023) that will trigger the requirement for new listed activities, or a change in the scope of the EA. All approved infrastructure as indicated in the table above indicates that the updated layout is in compliance with the EA and FEIR (2007);
- The updated layout is aligned with FEIR (2007) in that it had been envisioned that development would be undertaken in phases based on the demand in the future.
- The 400kV OHL turn-in of the existing 400kV Droerivier-Hydra No. 2 OHL remains within Eskom's existing servitude rights on the property.

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### 3 CURRENT STATUS QUO

#### 3.1 Site description

A site visit was conducted by an archaeologist from PGS in July 2022. The general vicinity of the study area was assessed. The study area is located approximately 44km north-west of the town of Murraysburg in the Western Cape and Northern Cape Provinces. It is located within an arid and sparsely to moderately vegetated region of the Karoo.

The study area can be accessed via the N1, R63 and informal roads. Portions of the study area, have been disturbed by the construction of farm roads, grazing and natural erosion. Existing infrastructure includes fences.

The study area is in a rural area where much of the farmland is used for grazing by sheep, goats, cattle and game. The general landscape of the proposed development area comprised of ridges, hills, rock outcrops and flat alluvial plains that were mostly covered in moderate to sparse vegetation. The soils were predominately sandy with gravel and large rock fragments. In terms of the climate, the region experiences summers that are hot and winters that are cold and windy. The yearly rainfall in the region differs from as high as 500mm in the eastern mountain regions (Sneeuberge) to as little as 200mm in the western parts. Snow occurs on the mountains in the wintertime.

The Vegetation type is classified as Eastern Upper Karoo (Mucina & Rutherford, 2006; Sanbi, 2022).

**Eastern Upper Karoo** vegetation is characterised by “*Flats and gently sloping plains (interspersed with hills and rocky areas of Upper Karoo Hardeveld in the west, Besemkaree Koppies Shrubland in the northeast and Tarkastad Montane Shrubland in the southeast), dominated by dwarf microphyllous shrubs, with ‘white’ grasses of the genera Aristida and Eragrostis (these become prominent especially in the early autumn months after good summer rains). The grass cover increases along a gradient from southwest to northeast*” (Mucina & Rutherford, 2006; Sanbi, 2022).

In terms of geology and soils, the area is characterised by Middleton Formation (Brownish-red and greenish-grey mudstone, subordinate siltstone and sandstone)(Council of Geoscience, 2022). The photographs below provide general views and landscape features of the proposed development area.

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*Figure 7 – Typical sparse vegetation.*



*Figure 8 – View of gravel plain.*



*Figure 9 - View towards the existing Gamma Substation.*

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## 4 ASSESSMENT METHODOLOGY

The section below outlines the assessment methodologies utilised in the HIA study.

### 4.1 Methodology for Assessing Heritage Site significance

This HIA report was compiled by PGS for the proposed Phase 2 Amendment of the existing Gamma Substation and associated powerlines. The applicable maps, tables and figures are included, as stipulated in the NHRA (no 25 of 1999) and the National Environmental Management Act (NEMA) (No. 107 of 1998). The HIA process consists of three steps:

Step I – Literature Review and initial site analysis: The background information to the field survey relies greatly on the Heritage Background Research which was undertaken through archival research and evaluation of satellite imagery and topographical maps of the study area.

Step II – Physical Survey: A physical survey was conducted by one qualified heritage specialist (between 20 and 21 July 2022), aimed at verifying the status quo of the study area in relation to the original HIA.

Step III – The final step involved the assessment of original findings and potential change in impact on the heritage resources as it relates to the proposed amendments to the approved development.

#### 4.1.1 Site Significance

Site significance classification standards use is based on update classification and rating system as developed by Heritage Western Cape (2021) is implemented in this report

Site significance classification standards prescribed by the Heritage Western Cape Guideline (2016), were used for the purpose of this report (**Table 2** and **Table 3**).

*Table 2: Rating system for archaeological resources*

Grading	Description of Resource	Examples of Possible Management Strategies	Heritage Significance
I	Heritage resources with qualities so exceptional that they are of special national significance. Current examples: Langebaanweg (West Coast Fossil Park), Cradle of Humankind	May be declared as a National Heritage Site managed by SAHRA. Specific mitigation and scientific investigation can be permitted in certain circumstances with sufficient motivation.	Highest Significance

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Grading	Description of Resource	Examples of Possible Management Strategies	Heritage Significance
II	Heritage resources with special qualities which make them significant, but do not fulfil the criteria for Grade I status. Current examples: Blombos, Paternoster Midden.	May be declared as a Provincial Heritage Site managed by Provincial Heritage Authority. Specific mitigation and scientific investigation can be permitted in certain circumstances with sufficient motivation.	Exceptionally High Significance
III	Heritage resources that contribute to the environmental quality or cultural significance of a larger area and fulfils one of the criteria set out in section 3(3) of the Act but that does not fulfil the criteria for Grade II status. Grade III sites may be formally protected by placement on the Heritage Register.		
IIIA	Such a resource must be an excellent example of its kind or must be sufficiently rare. Current examples: Varschedrift; Peers Cave; Brobartia Road Midden at Bettys Bay	Resource must be retained. Specific mitigation and scientific investigation can be permitted in certain circumstances with sufficient motivation.	High Significance
IIIB	Such a resource might have similar significances to those of a Grade III A resource, but to a lesser degree.	Resource must be retained where possible where not possible it must be fully investigated and/or mitigated.	Medium Significance
IIIC	Such a resource is of contributing significance.	Resource must be satisfactorily studied before impact. If the recording already done (such as in an HIA or permit application) is not sufficient, further recording or even mitigation may be required.	Low Significance
NCW	A resource that, after appropriate investigation, has been determined to not have enough heritage significance to be retained as part of the National Estate.	No further actions under the NHRA are required. This must be motivated by the applicant or the consultant and approved by the authority.	No research potential or other cultural significance

*Table 3: Rating system for built environment resources*

Grading	Description of Resource	Examples of Possible Management Strategies	Heritage Significance
I	Heritage resources with qualities so exceptional that they are of special national significance. Current examples: Robben Island	May be declared as a National Heritage Site managed by SAHRA.	Highest Significance
II	Heritage resources with special qualities which make them significant in the context of a province or region, but do not fulfil the criteria for Grade I status. Current examples: St George's Cathedral, Community House	May be declared as a Provincial Heritage Site managed by Provincial Heritage Authority.	Exceptionally High Significance

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Grading	Description of Resource	Examples of Possible Management Strategies	Heritage Significance
II	Such a resource contributes to the environmental quality or cultural significance of a larger area and fulfils one of the criteria set out in section 3(3) of the Act but that does not fulfil the criteria for Grade II status. Grade III sites may be formally protected by placement on the Heritage Register.		
IIIA	Such a resource must be an excellent example of its kind or must be sufficiently rare. These are heritage resources which are significant in the context of an area.	This grading is applied to buildings and sites that have sufficient intrinsic significance to be regarded as local heritage resources; and are significant enough to warrant that any alteration, both internal and external, is regulated. Such buildings and sites may be representative, being excellent examples of their kind, or may be rare. In either case, they should receive maximum protection at local level.	High Significance
IIIB	Such a resource might have similar significances to those of a Grade III A resource, but to a lesser degree. These are heritage resources which are significant in the context of a townscape, neighbourhood, settlement or community.	Like Grade IIIA buildings and sites, such buildings and sites may be representative, being excellent examples of their kind, or may be rare, but less so than Grade IIIA examples. They would receive less stringent protection than Grade IIIA buildings and sites at local level.	Medium Significance
IIIC	Such a resource is of contributing significance to the environs. These are heritage resources which are significant in the context of a streetscape or direct neighbourhood.	This grading is applied to buildings and/or sites whose significance is contextual, i.e., in large part due to its contribution to the character or significance of the environs. These buildings and sites should, as a consequence, only be regulated if the significance of the environs is sufficient to warrant protective measures, regardless of whether the site falls within a Conservation or Heritage Area. Internal alterations should not necessarily be regulated.	Low Significance
NCW	A resource that, after appropriate investigation, has been determined to not have enough heritage significance to be retained as part of the National Estate.	No further actions under the NHRA are required. This must be motivated by the applicant and approved by the authority. Section 34 can even be lifted by HWC for structures in this category if they are older than 60 years.	No research potential or other cultural significance

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#### **4.2 Methodology used in determining the significance of environmental impacts**

The methodology used to determine the environmental impact significance was provided by Nala and is explained in **Appendix A**.

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## 5 OVERVIEW OF STUDY AREA AND SURROUNDING LANDSCAPE

The high-level archival research focused on available information sources that were used to compile a general background history of the study area and surrounds.

### 5.1 Archaeological and Historical Overview

*Table 4 - Summary of archival data found on the general area*



DATE	DESCRIPTION
<b>2.5 million to 250 000 years ago</b>	<p>The Earlier Stone Age (ESA) is the first phase identified in South Africa's archaeological history and comprises two technological phases. The earliest of these is known as Oldowan and is associated with crude flakes and hammerstones. It dates to approximately 2 million years ago. The second technological phase is the Acheulian and comprises more refined and better-made stone artefacts such as the cleaver and bifacial hand axe. The Acheulian dates to approximately 1.5 million years ago.</p> <p>Victoria West lends its name of the "Victoria West Stone Tool Industry", a component of the ESA period, of which distinctively prepared cores are the most recognisable element (Inskeep 1978 in Mitchell 2002). The Victoria West prepared core industry site was first identified by the Magistrate of Victoria West, F.J Jansen in 1915. The site is close to the current day Victoria West (Smith, 1919). Reginald A. Smith referred to the "peculiar" stone artefacts, that were plentiful within the Victoria West district, as hand-axes and tortoise-cores (Smith, 1919). During the 1920's. A.H.J. Goodwin (1926, 1946), identified the Victoria West stone artefact industry, found within the district, the wider Karoo region, as well as along the Vaal River. The industry comprised mainly of stone tools that had been manufactured using a prepared core technique and were regarded as being transitional between the ESA and MSA. Recent research has established that the Victoria West cores were the "evolutionary step" towards the Levallois prepared core industry, indicating an outward spread of this technological change (Lycett 2009).</p> <p>Sparsely distributed ESA scatters predominantly manufactured from hornfels have been documented in previous studies done within the Karoo area (Morris 2006, 2007).</p>
<b>250 000 to 40 000 years ago</b>	<p>The Middle Stone Age (MSA) is the second oldest phase identified in South Africa's archaeological history. This phase is associated with flakes, points and blades manufactured by means of the so-called 'prepared core' technique.</p> <p>No Middle Stone Age sites, only surface scatters, are known in the Karoo area (Morris 2006, 2007). However, this is probably due to a lack of research on the surroundings of the study area rather than a lack of sites.</p>
<b>40 000 years ago, to the historic past</b>	<p>The Later Stone Age (LSA) is the third archaeological phase identified and is associated with an abundance of very small artefacts known as microliths. It is also associated with the archaeology of San hunter-gatherers and rock art (paintings and engravings – from last 5000 years).</p> <p>Most of the archaeological rock shelter and cave sites associated with San hunter-gatherers, that have been identified in the vicinity of the study area, date from the past 10 000 years. Unfortunately, open-air archaeological sites are not as easily identified and are mostly poorly preserved and therefore not always dateable (Deacon and Deacon, 1999). There is documentation from</p>



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DATE	DESCRIPTION
	<p>latter half of the 1800s of interactions with San hunter-gatherers in the surrounding Victoria West regions (Green, 1955; Rosenthal, 1959).</p> <p>About 2000 years ago, Khoekhoen pastoralists were living in small settlements in the region. They introduced domesticated sheep, goat and cattle and ceramic vessels to southern Africa. These archaeological sites are often found near the banks of large streams and rivers. This is where large freshwater mussel shell middens and other cultural materials can be identified. Human remains may also be buried within these middens (Deacon and Deacon, 1999).</p> <p>Various studies (Beaumont &amp; Vogel 1984, Morris &amp; Beaumont 1990, Parkington et al. 2008, Sampson 1985), have shown that the general area surrounding the proposed study area, is rich in archaeological sites and rock art.</p> <p>Smith (2008) refers to studies conducted by Sampson (1986a) as part of the Seacow River Valley Project that studied the entire catchment of the Seacow River approximately 140 kilometres to the north-east of Victoria West. The study identified 16,000 sites most relating to pastoral sites. The study indicates that some sites of pastoral origin were found in the Victoria West / Beaufort West areas.</p> <p>Therefore, it's possible that LSA stone artefacts and Khoekhoen pastoral archaeological material would occur in the study area as the surface scatters around the rocky outcrops. Caves and rock shelters (incl. rock paintings) that were inhabited by pre-colonial groups may also be encountered. It is possible that there are also rock engravings on boulders.</p>
<b>Last 500 years</b>	The historical period is when European settlers and colonialism entered southern Africa. In the early period of colonialism, the harsh environment of the Karoo was yet to be explored.
<b>18<sup>th</sup> – 19<sup>th</sup> century</b>	Europeans settled in the region of Murraysburg before the town had been established.
<b>1795</b>	<p>The grandfather of Barend Jacobus Johannes Burger acquired merino sheep in 1795.</p> <p>Eventually, Murraysburg would be established as a regional agricultural centre, and its farmers would play an important role in development of the wool industry.</p>
<b>1855</b>	Murraysburg was founded in December 1855 when the Dutch Reformed Church acquired the Farm Eenzaamheid (Schoeman, 2013). Barend Jacobus Johannes Burger, of Vleiplaats Farm, led the negotiations to buy the farm which would be used to establish the new parish.


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DATE	DESCRIPTION
	 <p><i>Figure 10 - Barend Jacobus Johannes Burger &amp; Mrs Burger</i></p> <p>The town's name originates from the combination of the surnames of Reverend Andrew Murray and Barend Jacobus Johannes Burger. Murray was a Scottish missionary who was appointed to the parish of Graaff-Reinet. He played an important role in the Dutch Reformed Church community.</p> <p>Murraysburg was one of a cluster of church towns (Aberdeen, Richmond) that developed in the area. The nearby town Aberdeen was named after Murray's hometown in Scotland (Schoeman, 2013).</p>
<b>1856</b>	<p>Murraysburg village was flourishing and became a municipality in 1856. By this stage, thirty houses had been built, numerous shops had opened, and the church had been declared sacred (Schoeman, 2013).</p>  <p><i>Figure 11 - NG Kerk Murraysburg (1917).</i></p>

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DATE	DESCRIPTION
<b>1859</b>	<p>The magisterial district was created in 1859, with the appointment of the first magistrate, Alix Henderson. By this time, a court and temporary jail had also been built.</p> <p>Barend Burger became the first mayor of Murraysburg (Schoeman, 2013).</p>
<b>1895</b>	In 1895, the first divisional council was constituted.
<b>2<sup>nd</sup> Boer War (1 October 1899 – 31 May 1902)</b>	<p>The residents of Murraysburg were technically subjects of Britain, however when the Anglo-Boer War broke out, their sympathy lay with the two Boer republics. The colonial government tried to form a town guard to offset Boer attacks but there were not enough men residing in Murraysburg to form such a guard.</p> <p>The local General Wynand Malan was quoted as saying that the town was considered a rebel town. The residents assisted the Boers with supplies such as medicine and weapons. They also relayed information and provided medical assistance to the Boers. At the time, the local medical practitioner was Dr Martin Heinrich (Schoeman, 2013).</p> <div data-bbox="715 878 1155 1496" data-label="Image"> </div> <p><i>Figure 12 - General Wynand Malan (Source: <a href="http://samilitaryhistory.org/vol162sw.html">http://samilitaryhistory.org/vol162sw.html</a>)</i></p> <p>During the first six months of 1901, Boer commandos were able to move freely through the district.</p> <p>On 6 July 1901, Gideon Scheepers and his soldiers burnt down property belonging to the Colonial Government (magistrates' offices, the post office, the police station) and the English residents of Murraysburg. Two days later, they burnt down the Vleiplaats homestead. This destruction of property was carried out in retaliation to the burning of farms in the Transvaal and the Orange Free State by the British Military (Schoeman, 2013). Eventually, the British apprehended Scheepers, and he was executed in Graaff-Reinet.</p>

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DATE	DESCRIPTION
	 <p style="text-align: center;"><i>Figure 13 - Commandant Gideon Scheepers.</i></p>
<b>8 June 1949</b>	The town remained church property until 8 June 1949, when the council bought it.

## 5.2 Regional Background

The Karoo has been an area that has historically been sparsely occupied. Karoo is a Khoesan word, that can be translated to mean “*the place of great dryness*” (Raper, 2004; Rusch, 2016). Before pre-colonial farmers (at around 2000 years ago) and colonial settlers from the Cape (at around 500 years ago) moved into the region, the area was occupied by groups of hunters and gatherers. Evidence of their presence within the area can be seen on the various rock engravings scattered around the region (Rusch, 2010). The /Xam, a hunter and gather group, occupied the Karoo region (Rusch, 2010). With the movement of pre-colonial farmers and later the Cape Colonists the /Xam groups in the Karoo were displaced and forcefully incorporated into the dominant cultural groups that moved into the region (Rusch, 2010). According to Orton et al., (2016) within the southern African landscape, the unique sense of place of the Karoo region derives from the “*expansiveness, remoteness and endless horizons*” characterised by undulating mountains and ridges surrounded by grassy plains.

Before the occupation of the area by the pre-colonial farmers and colonial settlers, the area was characterised by herds of antelope and other game species, which the /Xam hunted (Schoeman, 2013; Winter, 2021). With the occupation of the area by pre-colonial farmers, sheep replaced many



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of the game species found in the area. A marked change in vegetation also followed as grass receded (Winter et al 2009; Winter & Oberholzer 2013 in Winter, 2021).

By the 1700s pre-colonial farmers or Trekboers moved into the Karoo area (Schoeman, 2013).

As more people settled in the area, small towns and infrastructure developed in the area. By the mid-nineteenth century, the Cape railway line was extended from Worcester into the Karoo (Schoeman, 2013).

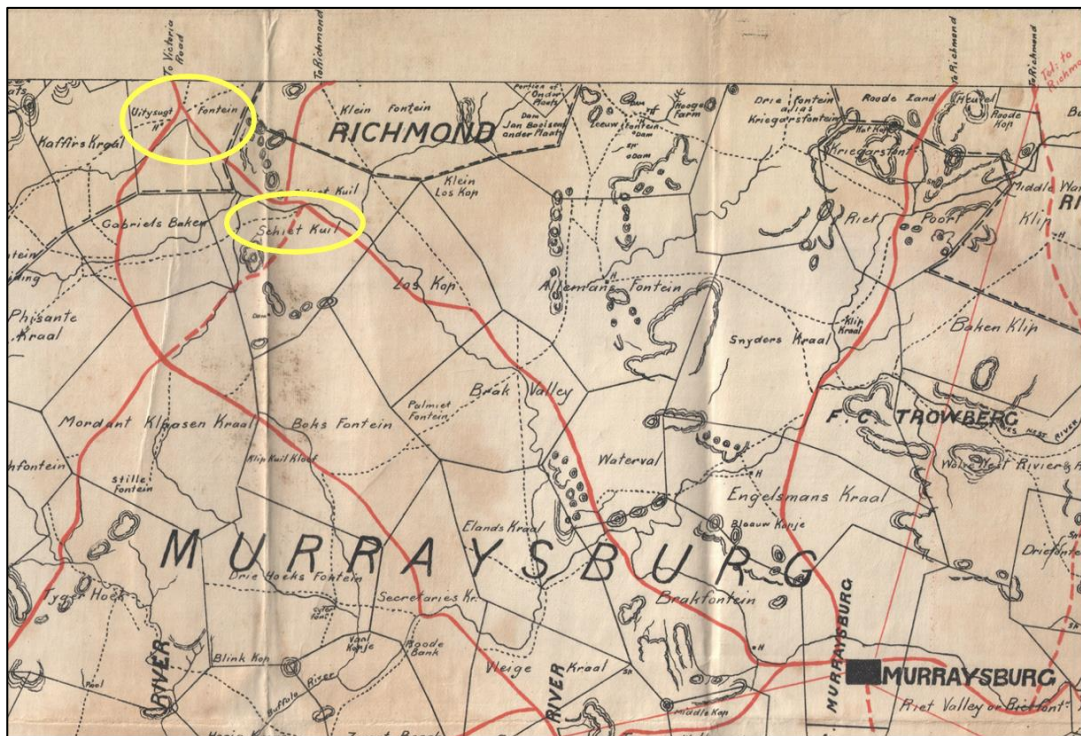
### 5.3 Archival/historical maps

Historical maps (1900 and 1912) and Topographic maps (1:50 000) for various years (1973, 2005), were available for utilisation in the background study. These maps were assessed to observe the development of the area, as well as the location of possible historical structures and burial grounds. The study area was overlain on the map sheets to identify structures or graves situated within or immediately adjacent to the study area that could possibly be older than 60 years and thus protected under Section 34 and 36 of the NHRA.

#### 5.3.1 Imperial Map of South Africa –Murraysburg.

The Imperial Map of South Africa was compiled from farm survey data by the Field Intelligence Department of Cape Town in April 1900 under John Wood.

Farms Schietkuil and Uitvlugfontein can be seen on the map (**Figure 14**). Small farms roads are depicted on the map connecting the various Farmsteads to the main roads leading to Murraysburg.







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No structures were identified within the study area.

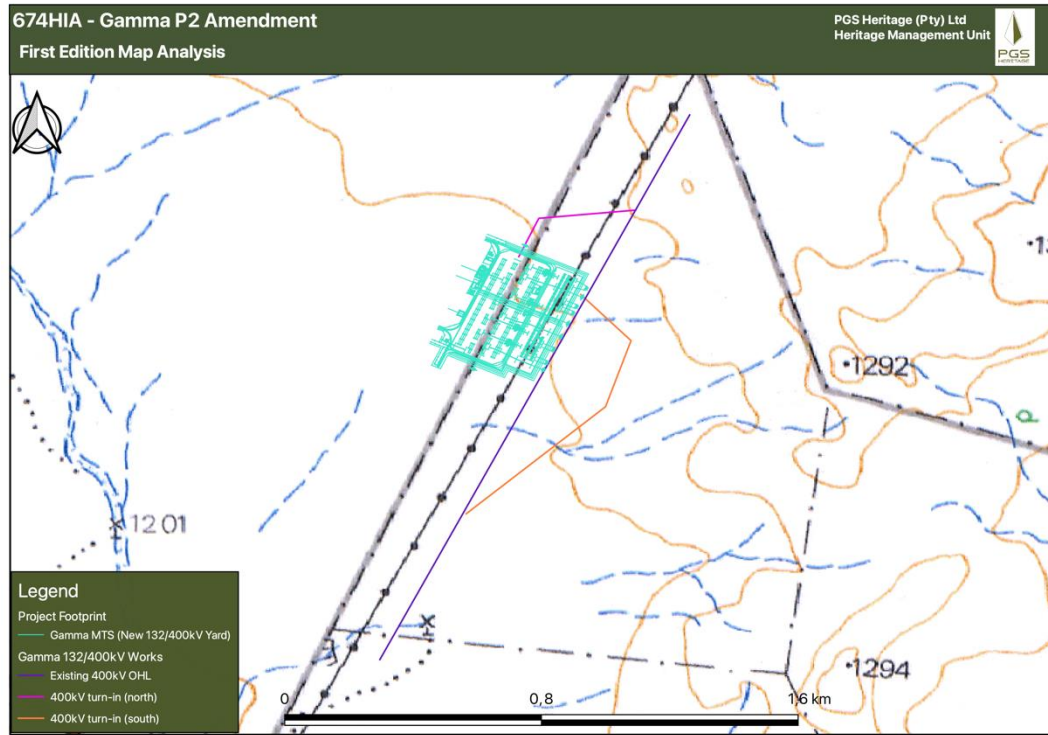


Figure 16 - Enlarged section of 3123CB Ed 1 1973 sheet.

#### 5.4 Previous Archaeological and Heritage Studies in and around area the Study Area

A search on the SAHRIS has identified HIAs conducted in and around the wider study area. Previous studies of the areas surrounding the region have shown a rich archaeological and historical history.

The creation of the REDZ and the ensuing applications for WEFs in this area has resulted in several HIAs having been compiled for the region since 2011. These reports have addressed the region's archaeological and palaeontological heritage, with very few addressing issues and impacts related to the cultural landscape of the area. Presently, the research done by Winter (2021) for the Modderfontein WEF presents the only available report documenting the historical and cultural research, in terms of the cultural landscape for the area.

- **ACO Associates cc. 2021. Heritage environmental authorisation amendment report: Ishwati Emoyeni wind energy facility, near Murraysburg, Western Cape provinces.**

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A single rock painting site was identified (on the farm Driefontein), although Halkett (2014:19) reports that “Mr D. Morris (pers com 2013) revealed that he had seen some ochre finger painting in a small shelter above the river where the Khoisan burial was recovered on Leeuwenfontein”. A number of rock engraving sites were found in the study area, including engravings that appear to be ancient and colonial graffiti. The engravings were all on dolerite “pavements” or on blocks of dolerite which are mostly patinated to a black–brown colour by wind and sun, with varying levels of polish. Most engravings were described as patches of ‘scratches’, often accompanied by geometric designs, incised lines and cross hatching that could only have been executed by human beings. Most dolerite pavements searched during the field assessment contained these kinds of engravings. Representations of animals, colonial writing and feather/leaf designs were noted.

- **Aurecon South Africa (Pty) Ltd. 2015. Heritage Impact Assessment for an Existing Borrow Pit Located Along MR 599 Approximately km 26 southwest of Murraysburg in Central Karoo District Municipality, Western Cape.**

*The near absence of archaeological remains indicated that the proposed site was of low archaeological significance.*

- **Aurecon South Africa (Pty) Ltd. 2015. Heritage Impact Assessment for a Proposed Borrow Pit Located Along DR 2403 Approximately km 44.5 southeast of Murraysburg in Central Karoo District Municipality, Western Cape.**

*The near absence of archaeological remains indicated that the proposed site was of low archaeological significance.*

- **BANDAMA, F and CHIRIKURE, S. 2014. An archaeological Scoping and Assessment report for the proposed Gamma (Victoria West, Northern Cape) – Kappa (Ceres – Western Cape) 765Kv (2) Eskom power transmission line. Nzumbululo HS (Pty) Ltd, on behalf of Eskom Holdings contracted Siyathembana Trading 293 (Pty) Ltd to carry out a Scoping Archaeological Impact Assessment. The Victoria West portion hosted poorly known 19<sup>th</sup> century Xhosa settlements.**

- **BINNEMAN, J, BOOTH, C. and HIGGITT, 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, Modderfontein 228, Noblesfontein 227, Annex Noblesfontein 234, Ezelsfontein 235, and Rietkloofplaaten 239. Binneman, J, Booth, C and Higgitt, N were appointed by Savannah Environmental (Pty) Ltd to conduct an AIA. The proposed study area was situated approximately 34km south of Victoria West. Occurrences of MSA and LSA stone artefacts were observed within the open exposed areas, flood plains and at the base of rocky outcrops and ridges. Stone artefacts (flakes, broken flakes, blades, scrapers, cores, rejuvenated cores, faceted platforms flakes) were manufactured from shale, hornfels, quartz and silcrete. Three possible knapping sites were also identified. Khoekhoen pottery**



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sherd were also identified. Broken ostrich eggshells were observed amongst scatters of mainly LSA artefacts and within rock shelters (contained rock paintings). Rock paintings (red ochre finger paintings – human figures, geometric and abstract paintings) and rock engravings (colonial images, animal figures, abstract patterns and cross-hatching) on boulders were noted. Stone-wall structures (large stone wall complex: large rectangular kraals, smaller circular pens), foundations of historical dwellings and animal traps also occurred within the study area. Some of the stone-wall structures and the area around the ruins of a farmhouse, contained waste middens of rusted tin, metal and historical ceramic-wares and glass. Human remains were exposed along the side of a high river donga and in the side of another donga. A possible source for some of the MSA artefacts was a purple mudstone quarry that was identified next to a river and small rocky outcrop.

- **BINNEMAN, J, BOOTH, C and HIGGITT, N. 2010. Phase 1 Archaeological Impact Assessment (AIA) for the proposed Skietkuil Quarries 1 and 2 on the farm Skietkuil No. 3, Victoria West, Central Karoo District, Western Cape Province.** *Binneman, J, Booth, C and Higgitt, N were appointed by Acer (Africa) Environmental Management Consultants to conduct an AIA. The proposed study areas were located approximately 50km south-east on the R63 from Victoria West and 3.5-4km north-west from the N1 on the R63. No archaeological materials, sites or features were observed around the Quarry 1 area. Occasional and mostly isolated incidences of LSA hornfels and silcrete stone artefacts (flakes, formal tools: scrapers), lower grindstones and one piece of pottery were documented within the Quarry 2 area, near a small rocky outcrop.*
- **BOOTH, C. and SANKER, S. 2012. An Archaeological Ground-truthing walk-through for the proposed substation and associated overhead power line for the Noblesfontein Wind Energy Facility situated on a site south of Victoria West on the farm Noblesfontein 227, Northern Cape Province.** *Booth, C and Sanker, S were appointed by Savannah Environmental (Pty) Ltd to conduct an archaeological walkthrough. The study area was situated approximately 34km south of Victoria West. Occurrences of MSA were observed within the open exposed areas, flood plains and at the base of rocky outcrops and ridges. The stone artefacts were mainly manufactured on shale and hornfels raw materials and included weathered flakes and a core. One stone-wall structure was documented. Several historical artefacts (late 1920s/early 1930s) were documented along the base of a ridge.*
- **BOOTH, C. 2012. A Phase 1 Archaeological Impact Assessment for the proposed 75 MW Brakfontein photovoltaic solar farm, Victoria West, Northern Cape Province.** *Booth, C was appointed by SRK Consulting to conduct a phase 1 AIA. The study area is approximately 30km east of Victoria West. Surface scatters of weathered and patinated MSA artefacts which comprised of hornfels flakes and blades with some edge-damage and secondary retouch. Denser scatters of MSA artefacts were also observed. LSA artefacts,*

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*worked glass and four circular dry packed stone features were identified on a koppie. The remains of a dry stone packed corbelled building, dry packed stone walling, broken glass, metal fragments and ceramics (incl. European ceramic wares: stoneware, transfer print and willow pattern ceramic types) were also noted.*

- **DREYER, C. 2014. First Phase Archaeological and Heritage Assessment of the proposed solid waste disposal site at Victoria West, Northern Cape.** *Dreyer, C was appointed by MDA Environmental Consultants on behalf of the Ubuntu Local Municipality to conduct a first phase archaeological and heritage impact assessment. The study area covered approximately 2 hectares of Municipal land 1km outside of town. A small scatter of patinated stone flakes were identified in a disturbed area on the surface inside the quarry. The flakes and single core were described as Middle or Later Stone Age material.*
- **FOURIE, W. 2010. Gamma Kappa Transmission Line, Archaeological Walk-down. Completed for Eskom.** *Numerous herder sites dating to the LSA were discovered in the low ridges to the south of the Victoria West Wind Farm. On the farm Modderfontein, numerous rock engravings associated with herder as well as colonial era inhabitants were also discovered.*
- **FOURIE, W. 2016. Heritage Impact Assessment: Basic Assessment for the proposed construction of supporting electrical infrastructure for the Victoria West Wind Farm, Victoria West, Northern Cape Province.** *PGS Heritage (Pty) Ltd was appointed by CSIR-Environmental Management Services to conduct and HIA. The study area was situated 25-35km east of Victoria West. A farmstead and Stone Age find were identified. The farmstead consisted of a main house, shed, barn (waenhuis) and associated stock pens. The find spot, which was situated on a flat sandy plain, 280m from a river, consisted of a medium density scatter of lithics. The heavily patinated MSA stone tools consisted of hornfels blades, side scrapers, cores and debitage.*
- **HALKETT, D and WEBLEY, L. 2011. Heritage Impact Assessment: Proposed Victoria West Mini Renewable Energy Facility on the Farm Bultfontein 217, Northern Cape Province.** *ACO Associates was appointed by ERM on the behalf of Mainstream Renewable Power South Africa to conduct an HIA. The study area was located approximately 28km south-east of Victoria West. Both isolated and more dense scatters of MSA stone artefacts were identified. Mostly grey to dark black banded hornfels flakes, blades, chunks and cores were observed with retouch only present in a few cases. Patinated (brown to red/orange patina) and unpatinated material was also noted.*
- **HART, T. 2015. Heritage Impact Assessment for the proposed Umsinde Emoyeni Wind Energy Facility.** *Occasional open-air scatters, several rock shelters and San rock painting sites were recorded. The spatial patterning of the heritage sites indicated that they were associated*

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*with sources of water (watercourses that had some form of perennial water or springs). Valley bottoms and sides thus proved to be the most sensitive areas.*

*Rock engraving sites were found to be common throughout the study area, including some that appear to be ancient. The range of engravings includes very complex patterns, animal forms and mere scribbles. They also recorded rock engravings on dolerite surfaces and boulders. Historical farm complexes consisting of farmhouses and other structures of interest were observed within the study area. These were 19<sup>th</sup> century farmhouses and barns that were graded between 3A (incl. cemeteries) and 3B. Numerous stone kraals and lesser stone features, including pre-colonial kraals typical of this area of the Karoo, were noted in many areas.*

- **LAVIN, J. 2021a. Proposed part 2 amendment to the existing Environmental Authorisation for the Modderfontein WEF, near Victoria West located in both the Northern and Western Cape.** *CTS Heritage was appointed to conduct an HIA for the proposed amendment to the layout of the authorised Modderfontein WEF. A total of 85 additional observations were made during the field assessment and these were dominated by MSA open-air artefact scatters. The MSA artefacts were predominantly derived from local hornfels and quarries at the base of the ridges and small hills were observed where exposures of rock were readily available. A few built environment structures were found such as the ruined shepherd's building at site MDF 002 and the beautiful stonework found at the kraal and dipping pen at site MDF 020.*
- **MORRIS, D. 2012. Specialist input for the Environmental Impact Assessment for the proposed Davidskraal Karoo PV Solar Energy Project, near Victoria West, Northern Cape Province.** *The study area is situated about 30km north-east of Victoria West. A very low density of highly dispersed Stone Age artefacts were located on nearly flat plains away from dolerite hills. Heavily patinated hornfels artefacts were mostly observed. A ruin of a stone dwelling and remnant of an ash-heap with porcelain, glass and metal objects were also identified. The remnants of a small dry-stone fortification (possibly part of the blockhouse line developed to defend the railway during the Anglo-Boer War) was situated against a dolerite ridge*
- **MORRIS, D. 2006. Revised archaeological specialist input for the proposed Hydra-Gamma 765kV transmission lines along the (existing) 400kV corridor near De Aar and Victoria West, Northern Cape Province.** *Several Stone Age sites, surface assemblages, rock engravings and painted sites were identified in the area.*
- **MURIMBIKA, MC E. 2015. Proposed Gamma-Kappa 2<sup>nd</sup> 765kV Eskom Transmission Powerline and Substations Upgrade Development in Western Cape- Executive Summary for Phase 1 Heritage Impact Assessment Study Report.** *Murimbika, Mc E. was appointed by Nzumbululo Heritage Solutions to conduct a Phase 1 HIA. The powerline servitude covered multiple districts, including Victoria West in the Northern Cape. It was*

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*noted that archaeological research is generally sparse in the area but that 19<sup>th</sup> century Xhosa settlements may be in the area.*

- **TUSENIUS, M. Natura Viva CC. 2012. Archaeological impact assessment of two proposed borrow pits near Murraysburg, Central Karoo DMA, Western Cape.**

*Sparse surface scatters of LSA artefacts and a few isolated MSA blade fragments were observed. The material was not in a primary context and was of low archaeological significance. A stone kraal and stone farm buildings (older than 60 years) as well as a cemetery of unmarked farm workers' graves was also recorded.*

- **VIDAMEMORIA HERITAGE CONSULTANTS. 2014. Heritage Impact Assessment: DR 2404 Central Karoo Murraysburg – Central Karoo District Municipality, Western Cape.**

*No archaeological remains of any sort were observed during the survey.*

- **WINTER, S. 2021. HIA Cultural Landscape Assessment - Proposed Part 2 Amendment to the Existing Environmental Authorisation for the Modderfontein WEF, near Victoria West located in both the Northern and Western Cape.** *Winter (2021) was appointed by the Terramanzi Group to conduct a CLA for the proposed amendment to the authorised layout of the Modderfontein WEF. The CLA found that the development falls within the broader cultural landscape of the Great Karoo region which has heritage significance in terms of its historical, aesthetic, architectural, social, scientific characteristics. However, the site of the proposed amendment does not possess any significant heritage characteristics.*

## 5.5 Findings of the Historical Desktop Study

The findings can be compiled as follows and have been combined to produce a heritage sensitivity map for the project based on the desktop assessment.

### 5.5.1 Heritage sensitivity

Analysis of maps and satellite imagery enabled the identification of possible heritage sensitive areas. By superimposition and analysis, it was possible to rate these structures according to age and thus their level of protection under NHRA. **Table 5** lists the possible tangible heritage sites identified in the vicinity of the study area and the relevant legislative protection.

*Table 5: Tangible heritage site in the study area.*

Name	Description	Legislative protection
Archaeology	Older than 100 years	NHRA Sections 3 and 35

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Structures	Possibly older than 60 years	NHRA Sections 3 and 34
Burial grounds	Graves	NHRA Sections 3 and 36 and MP Graves Act

### 5.5.2 Possible Heritage Finds

The evaluation of satellite imagery and the analysis of the studies previously undertaken in the area has indicated that certain areas may be sensitive from a heritage perspective. Archaeological surveys and studies in the Karoo have shown rocky outcrops, dry riverbeds, riverbanks and confluence to be prime localities for archaeological finds and specifically Stone Age sites (Orton, 2012; Fourie, 2015). This combined analysis of satellite imagery and previous heritage studies has assisted in the development of the following landform type to heritage find matrix (**Table 6**).

*Table 6 - Landform type to heritage find matrix*

Landform Type	Heritage Type
Crest and foot hill	LSA and MSA scatters
Crest of small hills	Small LSA sites – scatters of stone artefacts, ostrich eggshell, pottery and beads
Pans	Dense LSA sites
Dunes	Dense LSA sites
Outcrops	Occupation sites dating to LSA
Farmsteads	Historical archaeological material

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

#### **Drainage lines/ Dry water course**

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

#### **Ridges/Outcrops**

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

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## 5.6 Original Study and Findings

The original application was subject to an HIA completed by van Schalkwyk and Wahl from eThembeni Cultural Heritage in 2007<sup>4</sup>. The original study noted:

“...the presence of miscellaneous Middle Stone Age stone knapping debris some 50 metres north of a windmill, at S31. 41.400; E23 24.620. Artefacts are water washed and weathered, on patinated shale, and are part of colluvial down slope wash.

Another concentration of archaeological material is present immediately to the west of the existing entrance gate to the property, at S31 41.950; E23 24.325. Here very weathered Early Stone Age flakes and cores are mixed with Middle Stone Age knapping detritus. It appears that episodes of soil deflation and pedogenesis have caused the two temporally disparate traditions to mix. Artefacts are eroding open, exposed by down slope wash, and are mixed with other colluvial debris.

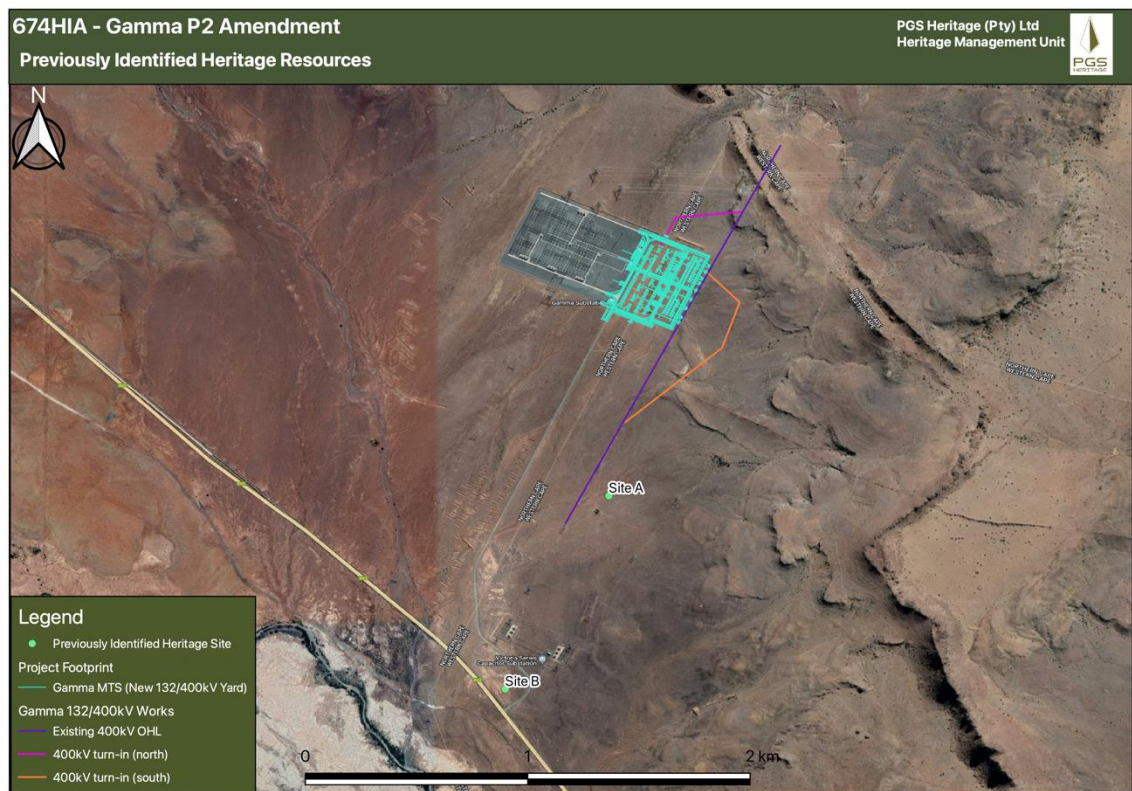
These sites have low heritage significance for their scientific value and, as is the case for all heritage resources, a permit from SAHRA is required for any alteration to them.”<sup>5</sup>

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<sup>4</sup> van Schalkwyk and Wahl, 2007.

<sup>5</sup> Ibid.

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*Figure 17 - Illustrates the heritage sites that had been recorded by van Schalkwyk and Wahl (2007) in relation to the phase 2 amendment study area.*

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## 6 FIELDWORK FINDINGS

A site visit was conducted by an archaeologist from PGS (Henk Steyn) between 20th – 21st July 2022 to assess the landscape of the study area. During the field work, no further archaeological sites, structures or burial grounds and graves were identified (**Figure 18**).



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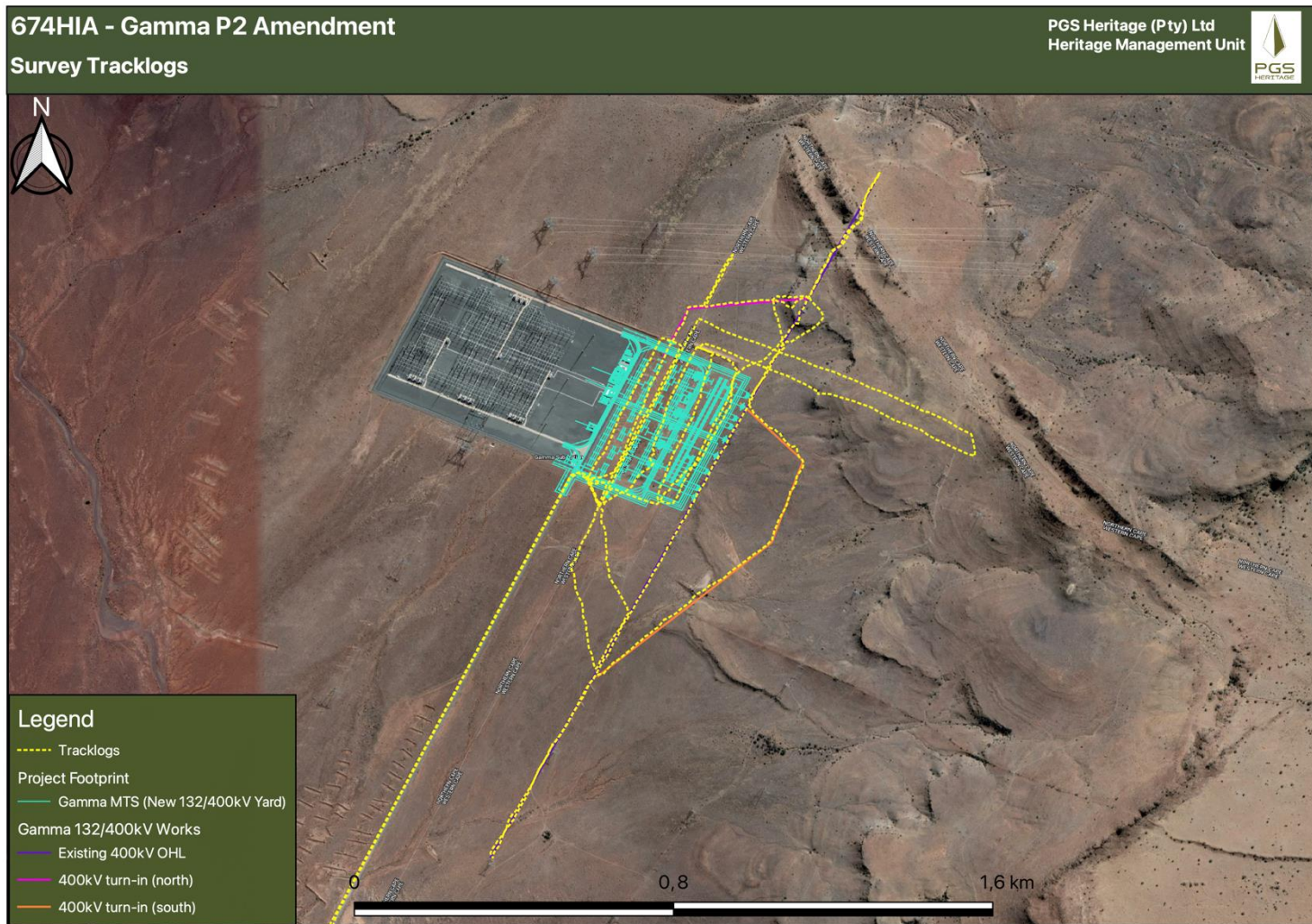


Figure 18 - Fieldwork tracklogs.

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## 7 CULTURAL LANDSCAPE

### 7.1 Introduction

The creation of the REDZ and the ensuing applications for WEFs in this area has resulted in several HIAs having been compiled for the region since 2011. These reports have addressed the region's archaeological and palaeontological heritage, with very few addressing issues and impacts related to the cultural landscape of the area. Presently, the research done by Winter (2021a, 2021b) for the Modderfontein WEF and Great Karoo Renewable Energy WEF, Solar Energy Facility and Grid Connection presents the only available report documenting the historical and cultural research, in terms of the cultural landscape for the area.

#### 7.1.1 Regional Context

The study area forms part of the Central Karoo Region characterised by an extensive semi-arid landscape. In general, because of the climatic conditions of the area, the region has historically been sparsely occupied. For the most part, the only anthropogenic features observed within the study area are farm tracks, windmills and fences. The region possesses heritage value (i.e. historical, aesthetic, architectural, social, scientific). The occasional homestead and the further afield small town represent distinct landscape elements of an otherwise pristine uncultivated cultural landscape.

The general landscape of the wider study area comprises of mountains, cliffs, ridges, hills, rock outcrops, gorges, gullies and flat alluvial plains that are mostly covered in moderate to sparse vegetation. The scenic qualities of the area, more specifically local geological features, relate to its dolerite "koppies". The hilly terrain and flat plains have undergone extensive erosion with the development of scree slopes and rocky gullies.

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*Figure 19 - View of the existing powerline in the region.*

### *7.1.2 Cultural landscapes in a REDZ Zone*

It should be noted that the study area is located within the gazetted Zone 11 (Beaufort-West) Renewable Energy Development Zones (REDZ) and Central Transmission Corridor.

The Beaufort West REDZ are specifically designated for large-scale wind and solar energy facilities. With the development of WEF and Solar PV Facilities within the REDZ zone it is expected that the “*cultural landscape of an area will be changed to be dominated, or at least heavily altered, by renewable energy development*” (Lavin, 2021). Several WEFs, powerlines and substations have been developed in the broader region. These modern developments do constitute a transformation of the cultural landscape, through the addition of another layer of human intervention. According to Lavin (2021) the creation of an additional layer onto the Cultural landscape (CL) of an area, within a REDZ is acceptable. However, the negative impact (the destruction of older archaeological or historical layers, as well as sections of the natural) of the CL should not be ignored.



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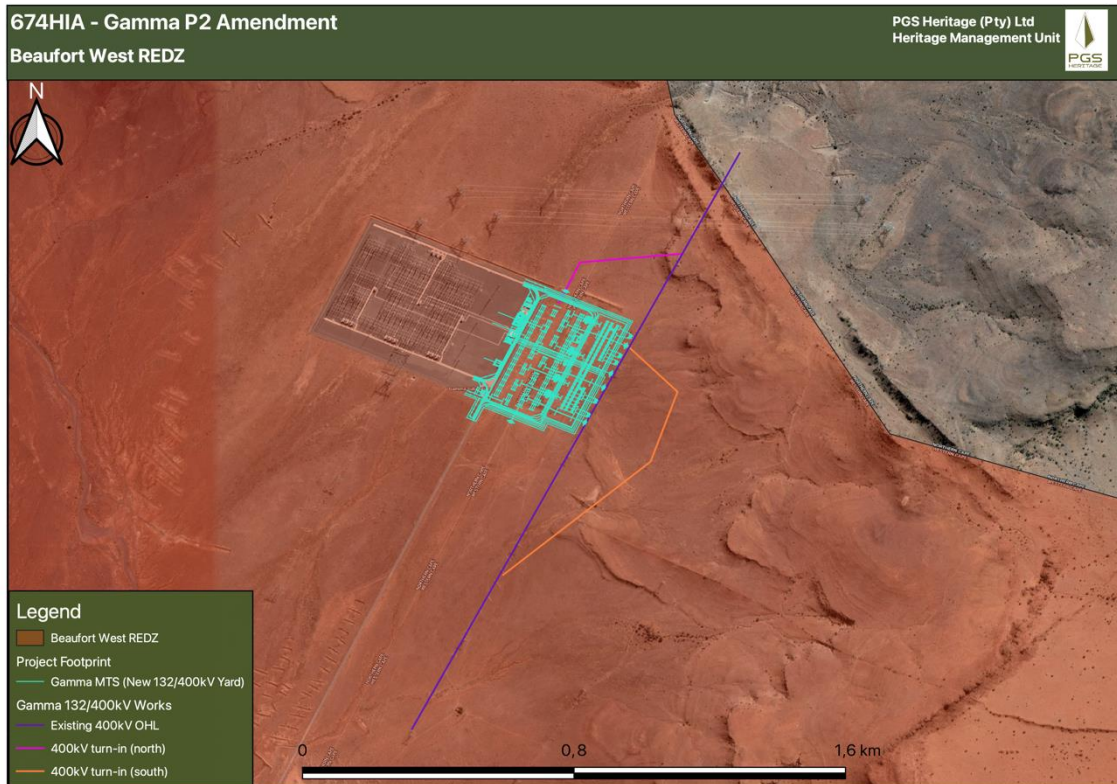


Figure 20 – Map indicating the proposed development in the Beaufort West REDZ.

### 7.1.3 Land Use

Farm residences can be located within the wider landscape. These homesteads are generally located at great distances from each other (i.e. more than 3km apart). Bigger population groups appear to have settled within the smaller towns found through the region including Beaufort West, Victoria West, Three Sisters, Richmond and Murraysburg.

Generally agriculture in the region is restricted to sheep and game farming (Winter & Oberholzer, 2013).

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*Figure 21 - View towards the existing Gamma Substation.*

#### 7.1.4 Vegetation

Given the diverse topography of the study area, the vegetation varies from “unpalatable” sour grass and fynbos in the mountains to typical Karoo vegetation (karooveld) across most of the region. Thorn trees (*Acacia karoo*) and other scrubs grow along watercourses.



*Figure 22 - General view of the vegetation in the region.*



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### 7.1.5 Riverine corridors

The Snyderskraal Rivier (Farm Klipplaat 109) is the only perennial river in the wider study area. Besides the Snyderskraal Rivier there are a number of non-perennial drainage lines and farm dams.



Figure 23 – General view towards the Snyderskraal Rivier.

### 7.1.6 Conservation areas

The Karoo National Park near Beaufort West is a protected landscape incorporating the Great Escarpment (Winter & Oberholzer, 2013).

## 7.2 Cultural Elements

The anthropogenic and natural heritage resources interacting with the above characteristic landscape types are classified as either Tangible or Intangible resources. According to Rössler (2006) and Taylor (2009) tangible and intangible heritage resources are manifestations of the various communities and people that occupied and moved within the natural environment. These resources significantly contribute to people's memory and “sense of place” of a specific location.

### 7.2.1 Tangible Heritage Resources

The tangible resources found within the region illustrates the various groups that migrated through and/or settled within the region. These resources also allow us to glimpse into the contact and influence these groups had on each other and the environment in which they occupied. A summary of the various tangible resources found within the region, as documented in previous heritage

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surveys, is discussed below. The aim is to highlight the types of cultural material that is generally found within the region as well as to provide a baseline of the potential artefacts that could be exposed during the construction activities of the proposed powerline and associated infrastructure.

#### 7.2.1.1 *Archaeology and Palaeontology*

Throughout the Karoo region, the cultural remains of the groups that once settled and migrated through the area are discovered throughout. Evidence of ESA, MSA and LSA occupation is evident through the various background scatters and find spots recorded on the numerous farms where heritage studies have been conducted. Within the broader region, several archaeological sites and find spots have been identified. Nelspoort, near Beaufort West is one such important archaeological site (Winter & Oberholzer, 2013). In addition, MSA artefacts have also been found exposed near river valleys near Noupoot (Bousman, 1991) and along the Seacow River (Sampson, 1968). Binneman et al., (2011) noted the scatter of MSA and LSA tools within exposed areas, flood plains and bases of rocky outcrops of the Farms Phaisantkraal1, Modderfontein 228, Nobelsfontein 227, Annex Nobelsfontein 234, Ezelsfontein 235 and rietkloofplaten 239. Within the development footprint of their study Binneman et al., (2011) also identified three possible knapping/production sites. Several shale and hornfels flakes were identified on the farm Nobelsfontein 227 by Booth & Sanker (2012).

LSA sites on the other hand are more frequently located near available water sources, such as pans, stream beds or springs (Orton et al., 2016). Apart from stone tool artefacts found within LSA contexts, other cultural materials recorded include ostrich eggshell, grinding stones, animal bones and pottery (Orton et al., 2016). Khoekhoen pottery, most likely from the LSA was found on the farm Nobelsfontein 227 (Binneman et al., 2011). Booth & Sanker (2012) found fragments of ceramic and glass on the farm Nobelsfontein 227. One of the ceramic pieces even contained an image of the South African Coat of Arms that dates to after 1932.

Rock engravings are found widespread within the Karoo landscape (Booth & Higgitt, 2010). From Bushmanland to the central Karoo rock engravings occur more frequently on dolerite outcrops and are often pecked or scraped, while painted rock art is mostly found on the steeper rocks of the escarpment and other mountains (Orton et al., 2016). Rock paintings mainly consist of brush paintings or finger paintings (Binneman et al., 2011). Two distinctive rock art traditions are also recorded within the region. The first type consists of the fine-line tradition of the indigenous San people, which is associated with deep connections to the spiritual realm and symbolism. The second type consists of geometric shaped art that associated with Khoekhoen groups (Orton et al., 2016). With the migration of Colonial Europeans through the region, there are depictions of wagons, oxen, horses and colonial soldiers within the rock art. Another layer of 'history' that was added to rock art panels consisted of "historical graffiti", left by travellers migrating through the region. Examples of "historical graffiti" have been found near Noupoot (Orton et al., 2016).

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According to the Butler (2022) the area is of great palaeontological interest (fossils). The Karoo region has one of the longest and most complete fossil records in the world (Orton et al., 2016). Fossils have been collected from the Beaufort-West region since the 1820s (Orton et al., 2016). The discovery and study of Karoo fossils have played a big role in our understanding of the origins and evolution of terrestrial vertebrates, including amphibians, tortoises, early dinosaurs and mammals (Orton et al., 2016). The Discovery of fossil plant material from the ancient Karoo assemblages have also been significant within the area. Sediments and fossils found within Karoo Supergroup geological layer have provided significant information on how the first complex terrestrial and freshwater ecosystems developed and functioned (Orton et al., 2016). The Beaufort Group rocks of the Main Karoo Basin presents palaeontologist with the best-preserved evidence of the ever-changing wildlife that was found in the ancient Karoo (Orton et al., 2016). Because of the abundance of fossils that can be found within the Beaufort Group, the geological layer has been deemed to have very high sensitivity in terms of palaeontological resources by SAHRIS Palaeo map (Butler, 2022).

#### 7.2.1.2 *Historic farmsteads*

Due to the harsh weather conditions and a lack of natural resources, a unique vernacular tradition was developed by groups settling in the Karoo region (Orton et al., 2016).

‘Karoostyle’ houses, as described by Marinowitz (2006), typically incorporate flat roofs and parapets above a simple rectangular house. Several examples of ‘Karoo style’ houses can be found in the larger landscape. Although the majority of the Farmsteads fall outside of the project development footprint, they do form part of the broader landscape character and history of the area.

Binneman et al., (2011) also identified several stonewalled structures and kraals within the broader area. The ruins of a farmhouse, constructed of what appears to be sundried brick was identified on the Farm Phaisantkraal 1 (Binneman et al., 2011).

#### 7.2.1.3 *Burial Grounds and Graves*

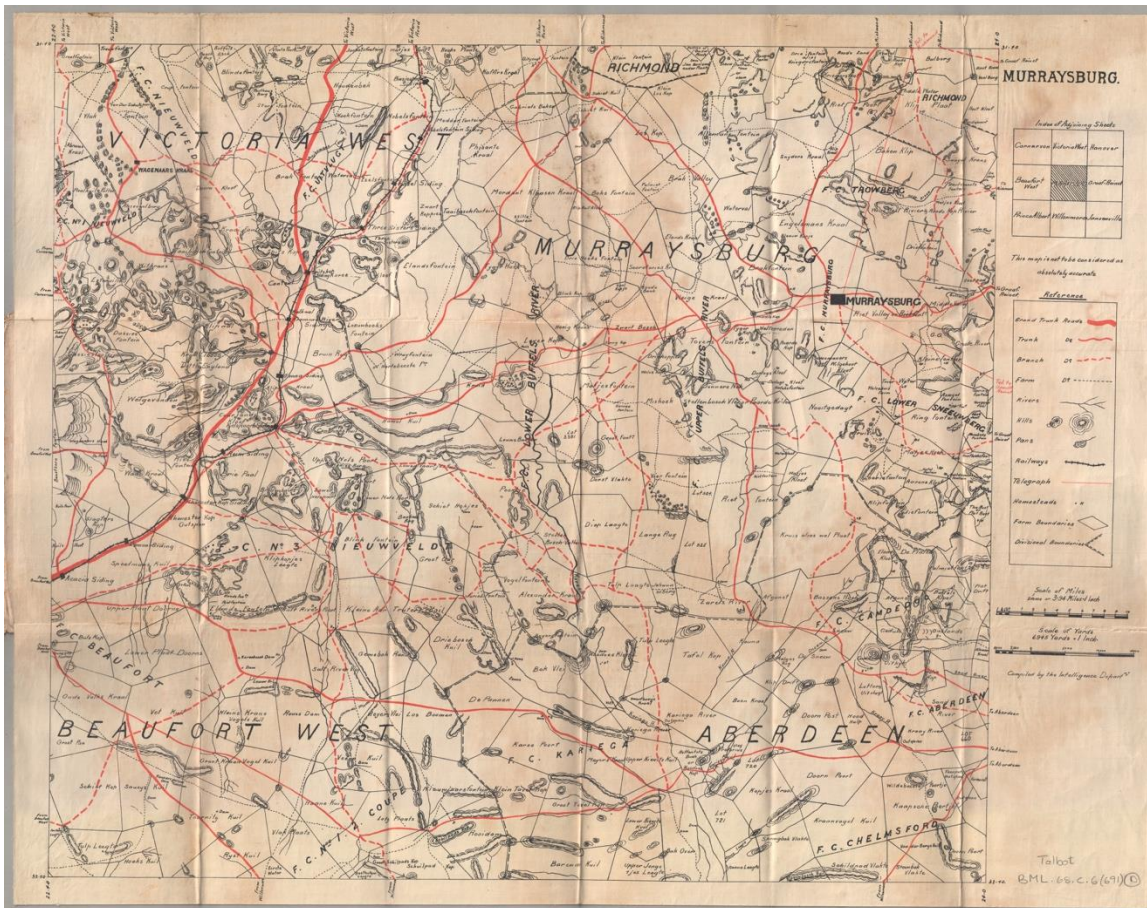
Within Cultural landscapes, burials and graves have personal and spiritual significance for communities and should be read as a historical text about the cultural landscape. Historically they also provide evidence of the movement and settlement of groups within landscapes. Burial grounds form important links to the conservation of memory within cultural landscapes. Burial grounds within the broader region also provide evidence of the Anglo-Boer War in the early 1900s in the form of gravesites and blockhouses that are found along the railway line and within the smaller towns (Winter & Oberholzer, 2013). Many of the Colonial settlers were buried near the cemeteries of the smaller towns or next to farmsteads in fenced family cemeteries (Orton et al, 2016). Graves associated with farm labour and poorer families are often also unmarked and consists of packed stone dressings. These graves are located on the edges of farmsteads. Precolonial graves on the other hand are not distinctively marked throughout the landscape and are often overlooked.



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#### 7.2.1.4 Historic routes and gateways

Due to the mountainous and hilly topography of the region several scenic routes, many originating as early cattle and wagon routes, are found throughout the area. These old routes were used to connect the people to the small but bustling towns that developed to the north and west of the project area. Several historic routes cross the farms to neighbouring farmsteads and towns. Many of the roads were used to link the various towns to the Railway line from Cape Town (see **Figure 24**). Many of the old transport infrastructures, such as the bridges, culverts, retaining walls, mountain passes date to the late 19th and early 20<sup>th</sup> century and have become part of the broader Karoo region's built heritage (Orton et al., 2016). The railway line that connected the Cape Colony to the Karoo Towns remains one of the region's tangible remains that can be linked to the various conflicts that took place.



**Figure 24 - Imperial Map of South Africa – Murraysburg dating to 1900 (Source UCT Digital Collections). The map shows grand trunk roads, trunk roads, branch roads, farm roads, rivers, hills, pans, railways, telegraph lines, homesteads, farm names, farm boundaries and divisional boundaries in the Murraysburg area.**

The N1 that connects the region to Richmond and Beaufort West, is located adjacent to the Farm Schietkuil 3. The R63, considered a scenic route, that connects the region to Victoria-West (in the

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north-west) and Murraysburg and Graaf-Reinet (in the south-east), is located to the south of the project area.

## 7.2.2 *Intangible Heritage Resources*

### 7.2.2.1 *Place Names*

Place names are also an aspect of living heritage (Orton et al., 2016). The naming of places is rooted in deep history, as it can evoke strong memories of events and individuals that made an impact on a community and/or environment. Within the regions, certain words are used to refer to particular aspects of the natural landscape, such as “*climate (Karoo), animals (Leeu-Gamka), and places where food can be obtained (Hantam)*” (Orton et al., 2016). The mountainous ridges of the Three Sisters are located southwest of the study area. The town of Three Sisters was named after the three distinctively shaped hills (Erasmus, 2004). Within the smaller towns that developed through the region, streets were named after important people or buildings that framed the street (Eg Church Street) (Orton et al., 2016).

Within archaeological terminology, the Victoria West Industry, an ESA stone tool period characterised by prepared core technology, derives its name from the town of Victoria West (Halkett & Webley, 2011). The town itself was named after Queen Victoria in the 1840’s (Halkett & Webley, 2011).

### 7.2.2.2 *Indigenous Knowledge Systems*

During the 1860s and 1870s Bleek and Lloyd (1911) recorded the myths, traditions, and customs of the Bushman people. This documentation of local Indigenous Knowledge Systems has assisted in the interpretation and understanding of many rock art and rock engraving sites within the Karoo region, and broader southern African landscape (Orton et al., 2016).

### 7.2.2.3 *Khoekhoen and /Xam - Heritage of conflict with the Cape Colonial Settlers*

Before the arrival of the colonial settlers, the area was occupied by the Khoekhoen and /Xam people. With the movement of the Cape Colonial settlers, many of these indigenous groups of people were displaced and a large part of their lifeways, land-use practices, language, identity and culture was lost. The cultural landscape of the region also serves as a memory of contact and conflict between colonial settlers from the Cape and indigenous peoples, resulting in the displacement of the San and Khoekhoe peoples (Winter and Oberholzer, 2013). Many of the indigenous groups were hunted or traded into slavery to become farm labourers by the colonial settlers. As the colonial settlers took control of the land the frontier became characterised by conflict and wars (Orton et al., 2016).

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### 7.3 Conclusion

The study area possesses several landscape qualities which are representative of the Great Karoo Cultural Landscape. The cultural resources include archaeological, palaeontological and historic features (incl. individual structures, towns, farms, scenic landscapes).

Although the site does not possess the required heritage significance “characteristics” that would justify formal protection (i.e., provincial or national), there are three visually sensitive aspects worth highlighting:

- The site’s location in relation to the national (N1) and regional roads (R63: ‘scenic route’) has significance.
- Tall hills and mountains and dolerite ‘koppies’ within the wider study area add to the scenic quality of the region and the general ‘sense of place’.

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## 8 IMPACT ASSESSMENT

The impact assessment rating is based on the rating scale as contained in **Appendix A**. The following section considers the original assessment in relation to the new proposed layout to the approved Gamma substation.

The original study found that most archaeological finds were out of context. The original assessment of the potential impacts on cultural heritage resources is provided below.

Nature of Impact	Impact Status	Extent	Duration	Intensity	Frequency	Probability	Legal	Significance	Confidence
Without Mitigation and/or Management									
Cultural heritage artefacts	-	Immediate	Permanent	Low	Continuous	Definite	Heritage Resources Management Act	Low	High
With Mitigation and/or Management									
Cultural heritage artefacts	-	Immediate	Permanent	Low	Continuous	Definite	Heritage Resources Management Act	Low	High

Figure 25 - Previous impact assessment without and with the implantation of mitigation measures.

The following general observations will apply for the impact assessment undertaken in this report:

- No additional heritage resources were identified. Despite an intensive walkthrough of the footprint area, no evidence for any archaeological or heritage sites could be identified. As a result, **no impact is expected from the proposed Phase 2 amendment on heritage**.
- It is necessary to realise that the heritage resources located during the fieldwork do not necessarily represent all the possible heritage resources present within the area. Various factors account for this, including the size of the study area and the subterranean nature of some heritage sites. The impact assessment conducted for heritage sites assumes the possibility of finding heritage resources during the project life and has been conducted as such.

Table 7 - Assessment of the Impact of the proposed Phase 2 Amendment on unidentified heritage resources

<b>Nature:</b>		
Damage to unidentified heritage resources within the proposed development area.		
	Without mitigation	With mitigation
<b>Extent</b>	2	1
<b>Duration</b>	5	5
<b>Magnitude</b>	4	2
<b>Probability</b>	2	1

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Significance	Low (22)	Low (8)
Status (positive or negative)	Negative	Negative
Reversibility	Very Low (irreversible)	Very Low (irreversible)
Irreplaceable loss of resources?	Yes (Complete loss of resources)	Yes
Can impacts be mitigated?	Yes	
<b>Mitigation:</b>		
During the construction phase, it is important to recognize any significant material being unearthed, making the correct judgment on which actions should be taken. It is recommended that the chance find procedure ( <b>Section 9</b> ) should be implemented.		
<b>Residual Impacts:</b>		
Considering the nature of the site identified in the present study, the residual risk will be low.		

The impact calculation shows a **LOW negative rating pre and post-mitigation.**

*Table 8 - Assessment of the Impact of the proposed Phase 2 Amendment on the Cultural Landscape*

<b>Nature:</b>		
During the construction phase, the possibility of impacting on the cultural landscape within the proposed development area is considered lower since the phase 1 of the Gamma substation project has already been completed.		
	Without mitigation	With mitigation
Extent	Local (2)	Local (2)
Duration	Permanent (5)	Permanent (5)
Magnitude	Low (3)	Low (2)
Probability	Probable (3)	Improbable (2)
Significance	<b>Medium (30)</b>	<b>Low (18)</b>
Status (positive or negative)	Negative	Negative
Reversibility	Very Low (irreversible)	Very Low (irreversible)
Irreplaceable loss of resources?	Yes (Complete loss of resources)	Yes
Can impacts be mitigated?	Yes	
<b>Mitigation:</b>		
Mitigation measures as stated within this report, will reduce the impact of this facility on the overall load. However, it should be noted that even with the implementation of the mitigation measures, the negative visual impact on the broader cultural landscape, will remain unchanged.		
The mitigation measures proposed for heritage resources will reduce the negative cumulative impact on the cultural landscape and should be implemented as recommended.		
The following general mitigation measures are proposed:		
Planning:		
<ul style="list-style-type: none"> <li>▪ Retain/re-establish and maintain natural vegetation immediately adjacent to the development footprint/servitude.</li> </ul>		
Operations:		

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<ul style="list-style-type: none"> <li>▪ Maintain the general appearance of the development as a whole.</li> </ul> <p>Decommissioning:</p> <ul style="list-style-type: none"> <li>▪ Remove infrastructure not required for the post-decommissioning use.</li> <li>▪ Rehabilitate all affected areas. Consult an ecologist regarding rehabilitation specifications</li> </ul>
<b>Residual Impacts:</b>
Considering the nature of the site identified in the present study, the residual risk will be moderate and possibly permanent.

## 8.1 Cumulative Impacts

This section evaluates the possible cumulative impacts (IC) on heritage resources with the addition of the new proposed layout to the approved Gamma substation.

The following must be considered in the analysis of the cumulative effect of development on heritage resources:

- **Fixed datum or dataset:** There is no comprehensive heritage data set for the Beaufort West region and thus we cannot quantify how much of a specific cultural heritage element is present in the region. The region has never been covered by a heritage resources study that can account for all heritage resources. Further to this none of the heritage studies conducted can with certainty state that all heritage resources within the study area has been identified and evaluated;
- **Defined thresholds:** The value judgement on the significance of a heritage site will vary from individual to individual and between interest groups. Thus, implicating that heritage resources' significance can and does change over time. And so, will the tipping threshold for impacts on a certain type of heritage resource;
- **Threshold crossing:** In the absence of a comprehensive dataset or heritage inventory of the entire region we will never be able to quantify or set a threshold to determine at what stage the impact from developments on heritage resources has reached or is reaching the danger level or excludes the new development on this basis. (Godwin, 2011).

Presently, the research done by Winter (2021a, 2021b) for the Modderfontein WEF and Great Karoo Renewable Energy WEF, Solar Energy Facility and Grid Connection presents the only available report documenting the historical and cultural research, in terms of the cultural landscape for the area. Without a regional database of this information, it is impossible to offer a true cumulative impact of the addition of the new proposed layout to the approved Gamma substation. Cumulative impact assessment on cultural landscapes for the area is therefore based on minimal information and assumptions drawn from the general information of the area and the limited local cultural landscapes assessments that have been done for other proposed WEF facilities in the Karoo region where the cultural landscape is most similar.

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**Table 9 - Table 10** provide an analysis of the projected cumulative impact this project will add to impact on heritage resources and cultural landscape.

*Table 9 – Cumulative Impact Table for heritage resources*

<b>Nature:</b> The extent that the addition of this project will have on the overall impact of developments in the region on heritage resources.  Cumulative impacts to heritage resources would occur during the construction and operation phase when the ground surface is cleared for the power pylons and service roads are excavated.		
	<b>Overall impact of the proposed project considered in isolation</b>	<b>Cumulative impact of the project and other projects in the area</b>
<b>Extent</b>	Low (1)	High (3)
<b>Duration</b>	Long-term (4)	Long-term (4)
<b>Magnitude</b>	Low (4)	Moderate (6)
<b>Probability</b>	Unlikely (2)	Unlikely (2)
<b>Significance</b>	<b>Low (18)</b>	<b>Low (26)</b>
<b>Status (positive or negative)</b>	Negative	Negative
<b>Reversibility</b>	Low	Low
<b>Irreplaceable loss of resources?</b>	Yes	Yes
<b>Can impacts be mitigated?</b>	Yes	Yes
<b>Mitigation:</b> It can clearly be noted that the wider study area in general is abundant with Stone Age and historical remains. However, until a regional detailed study is commissioned by HWC or SAHRA, no further mitigations measures can be proposed other than those already recommended for the site-specific mitigation of sites in this report.		
<b>Residual Impacts:</b> Considering the nature of the site identified in the present study, the residual risk will be moderate.		

*Table 10 – Cumulative Impact Table for cultural landscape*

<b>Nature:</b> The extent that the addition of this project will have on the overall impact of developments in the region on the cultural landscape.  Cumulative impacts to the cultural landscape would occur during the construction and operation phase when the ground surface is cleared for the power pylons and service roads are excavated.		
	<b>Overall impact of the proposed project considered in isolation</b>	<b>Cumulative impact of the project and other projects in the area</b>
<b>Extent</b>	Low (1)	High (3)
<b>Duration</b>	Long-term (4)	Long-term (4)
<b>Magnitude</b>	Low (4)	Moderate (6)
<b>Probability</b>	Unlikely (2)	Unlikely (2)
<b>Significance</b>	<b>Low (18)</b>	<b>Low (26)</b>
<b>Status (positive or negative)</b>	Negative	Negative

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<b>Reversibility</b>	Low	Low
<b>Irreplaceable loss of resources?</b>	Yes	Yes
<b>Can impacts be mitigated?</b>	Yes	Yes
<b>Mitigation:</b> It can clearly be noted that the wider study area in general is abundant with heritage resources. However, until a regional detailed cultural landscape study is commissioned by HWC or SAHRA, no further mitigations measures can be proposed other than those already recommended for the site-specific mitigation of sites in this report.		
<b>Residual Impacts:</b> Considering the nature of the site identified in the present study, the residual risk will be moderate.		

## 8.2 Overall Impact Rating

It is the author's considered opinion that this additional load on the overall impact on heritage resources will be **low**. With a detailed and comprehensive regional dataset this rating could possibly be adjusted and more accurate, however the current assessment is based on best available information currently available to the authors.



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## 9 MANAGEMENT RECOMMENDATIONS AND GUIDELINES

This study has considered the original HIA and has recommended additional mitigations measures.

### 9.1.1 Construction Phase

The project will encompass a range of activities during the construction phase, including vegetation clearance, excavations and infrastructure development associated with the project.

It is possible that cultural material will be exposed during construction and may be recoverable, keeping in mind delays can be costly during construction and as such must be minimised. Development surrounding infrastructure and construction of facilities results in significant disturbance, however, foundation holes do offer a window into the past and it thus may be possible to rescue some of the data and materials.

It is also possible that substantial alterations will be implemented during this phase of the project, and these must be catered for. Temporary infrastructure developments are often changed or added to the project as required. In general, these are low impact developments as they are superficial, resulting in little alteration of the land surface, but still need to be catered for.

During the construction phase, it is important to recognize any significant material being unearthed, making the correct judgment on which actions should be taken. It is recommended that the following chance find procedure should be implemented.

### 9.1.2 Chance Find Procedure

- An appropriately qualified heritage practitioner/archaeologist must be identified to be called upon if any possible heritage resources or artefacts are identified.
- Should an archaeological site or cultural material be discovered during construction (or operation), the area should be demarcated, and construction activities that may impact the find must be halted.
- The qualified heritage practitioner/archaeologist will then need to determine if he/she must come out to the site and evaluate the Heritage resources and make the necessary recommendations for mitigating the find and the impact on the heritage resource.
- The contractor therefore should have some sort of contingency plan so that operations could move elsewhere temporarily while the materials and data are recovered.
- Construction can commence as soon as the site has been cleared and signed off by the heritage practitioner/archaeologist.

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### 9.1.3 Possible finds during Construction

The study area occurs within a greater historical and the archaeological site as identified during the desktop and fieldwork phase. Soil clearance for infrastructure as well as the proposed reclamation activities could uncover the following:

- High density concentrations of stone artefacts
- Unmarked graves

## 9.2 TIMEFRAMES

It must be kept in mind that mitigation and monitoring of heritage resources discovered during construction activity will require permitting for collection or excavation of heritage resources and lead times must be worked into the construction time frames. **Table 11** gives guidelines for lead times on permitting.

*Table 11 - Lead times for permitting and mobilisation*

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

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### 9.3 Heritage Management Plan for EMPr implementation

Table 12: Heritage Management Plan for EMPr implementation

Area and site no.	Mitigation measures	Phase	Timeframe	The responsible party for implementation	Monitoring Party (frequency)	Target	Performance indicators (Monitoring tool)
General project area	Implement chance find procedures in case where possible heritage finds are uncovered.	Construction and operation	During construction and operation	Applicant ECO Heritage Specialist	ECO (monthly / as or when required)	Ensure compliance with relevant legislation and recommendations from SAHRA under Section 34-36 and 38 of NHRA	ECO Monthly Checklist/Report
Cultural Landscape	<p>The following general mitigation measures are proposed:</p> <p>Planning:</p> <ul style="list-style-type: none"> <li>▪ Retain/re-establish and maintain natural vegetation immediately adjacent to the development footprint/servitude.</li> </ul> <p>Operations:</p> <ul style="list-style-type: none"> <li>▪ Maintain the general appearance of the development as a whole.</li> </ul> <p>Decommissioning:</p> <ul style="list-style-type: none"> <li>▪ Remove infrastructure not required for the post-decommissioning use.</li> <li>▪ Rehabilitate all affected areas. Consult an ecologist regarding rehabilitation specifications.</li> </ul>	Construction	During Construction	Applicant EO Heritage Specialist	EO (monthly / as or when required)	Ensure compliance with relevant legislation and recommendations from ECPHRA under Section 36 and 38 of NHRA	EO Monthly Checklist/Report

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## 10 CONCLUSIONS AND RECOMMENDATIONS

The evaluation of the original HIA has shown that the status quo of the Gamma Substation project area has primarily stayed the same and no significant changes from a heritage resources perspective was identified.

### Impact Statement

#### *Archaeology*

As contemplated in **section 7** of this report, the impact assessment and ratings have shown that the impact rating has stayed the same. This study considered the original assessment in relation to the proposed second phase of construction for the approved substation and associated infrastructure. The original study found that most archaeological finds were out of context and that the impact on heritage resources was **LOW negative rating pre- and post-mitigation**.

Considering that no further heritage resources were identified, **no impact is expected from the second phase of the construction project on heritage**. Therefore, the impact calculation shows a LOW negative rating pre and post-mitigation.

#### *Cultural Landscape*

The possible pre-construction impacts calculated on the cultural landscape is overall **MODERATE NEGATIVE** rating but with the implementation of the recommended management guidelines will be reduced to a **LOW NEGATIVE** impact.

#### *Cumulative Impacts*

Considering the development of other renewable facilities in and around the Beaufort West REDZ, the cumulative unmitigated impacts on heritage resources and cultural landscape consist of a medium negative impact mostly confined to the construction phase of the project. This could potentially result in an unacceptable loss of cultural heritage resources. **However, by implementing the mitigation measures as listed in this report the cumulative impacts can be managed to low negative.**

**Section 9** of this report makes additional recommendations regarding mitigation and management measures to reduce post-mitigation impacts.

It is the considered opinion of the authors of this report that the overall impact of the proposed Phase 2 amendment on heritage resources will be **Low**. Provided that the general recommendations and mitigation measures outlined in this report are implemented, the impact would be acceptably Low or could be totally mitigated to the degree that the project amendment could be approved from a heritage perspective.

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## 11.1 Internet

CDNGI GEOSPATIAL PORTAL

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[www.sanbi.org](http://www.sanbi.org)



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[www.wikipedia.org](http://www.wikipedia.org)

## 11.2 Google Earth

All the aerial depictions and overlays used in this report are from Google Earth.

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## APPENDIX A

### TERMS OF REFERENCE AND ENVIRONMENTAL IMPACT METHODOLOGY

#### TERMS OF REFERENCE:

The report amendment report must reflect:

- An assessment of all impacts related to the proposed changes;
- Advantages and disadvantages associated with the changes;
- Comparative assessment of the impacts before the changes and after the changes; and
- Measures to ensure avoidance, management and mitigation of impacts associated with such proposed changes, and any changes to the EMPr.

The assessment must be clear on whether each of the proposed changes to the EA will:

- Increase the significance of impacts originally identified in the EIA report or lead to any additional impacts; or
- Have a zero or negligible effect on the significance of impacts identified in the EIA report; or
- Lead to a reduction in any of the identified impacts in the EIA report.

Please take note that should there be no change to impacts and their significance ratings as identified in the EIA process (as the corridor has already been assessed), no impact tables will be necessary to include. Should there be an increase or decrease in significance or additional impacts not identified within the EIA process, the Impact Assessment Methodology and table format should be used and additional mitigation measures, if any, should be included.

#### ENVIRONMENTAL IMPACT METHODOLOGY:

The impact significance rating methodology, as provided by Nala, is guided by the requirements of the NEMA EIA Regulations 2014 (as amended).

Direct, indirect and cumulative impacts associated with the projects must be assessed in terms of the following criteria:

- » The **nature**, which shall include a description of what causes the effect, what will be affected and how it will be affected.
- » The **extent**, wherein it will be indicated whether the impact will be local (limited to the immediate area or site of development) or regional, and a value between 1 and 5 will be assigned as appropriate (with 1 being low and 5 being high):
- » The **duration**, wherein it will be indicated whether:
  - \* the lifetime of the impact will be of a very short duration (0–1 years) – assigned a score of 1;
  - \* the lifetime of the impact will be of a short duration (2-5 years) - assigned a score of 2;

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- \* medium-term (5–15 years) – assigned a score of 3;
- \* long term (> 15 years) - assigned a score of 4; or
- \* permanent - assigned a score of 5;
- » The **magnitude**, quantified on a scale from 0-10, where 0 is small and will have no effect on the environment, 2 is minor and will not result in an impact on processes, 4 is low and will cause a slight impact on processes, 6 is moderate and will result in processes continuing but in a modified way, 8 is high (processes are altered to the extent that they temporarily cease), and 10 is very high and results in complete destruction of patterns and permanent cessation of processes.
- » The **probability of occurrence**, which shall describe the likelihood of the impact actually occurring. Probability will be estimated on a scale of 1–5, where 1 is very improbable (probably will not happen), 2 is improbable (some possibility, but low likelihood), 3 is probable (distinct possibility), 4 is highly probable (most likely) and 5 is definite (impact will occur regardless of any prevention measures).
- » the **significance**, which shall be determined through a synthesis of the characteristics described above and can be assessed as low, medium or high; and
- » the **status**, which will be described as either positive, negative or neutral.
- » the degree to which the impact can be reversed.
- » the degree to which the impact may cause irreplaceable loss of resources.
- » the *degree* to which the impact can be *mitigated*.

The **significance** is calculated by combining the criteria in the following formula:

$$S = (E+D+M) P$$

S = Significance weighting

E = Extent

D = Duration

M = Magnitude

P = Probability

The **significance weightings** for each potential impact are as follows:

- » < 30 points: Low (i.e., where this impact would not have a direct influence on the decision to develop in the area),
- » 30-60 points: Medium (i.e., where the impact could influence the decision to develop in the area unless it is effectively mitigated),
- » > 60 points: High (i.e., where the impact must have an influence on the decision process to develop in the area).

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**Example of Impact table summarising the significance of impacts (with and without mitigation)**

<b>Nature:</b>		
<b>[Outline and describe fully the impact anticipated as per the assessment undertaken]</b>		
	<b>Without mitigation</b>	<b>With mitigation</b>
<b>Extent</b>	High (3)	Low (1)
<b>Duration</b>	Medium-term (3)	Medium-term (3)
<b>Magnitude</b>	Moderate (6)	Low (4)
<b>Probability</b>	Probable (3)	Probable (3)
<b>Significance</b>	<b>Medium (36)</b>	<b>Low (24)</b>
<b>Status (positive or negative)</b>	Negative	Negative
<b>Reversibility</b>	Low	Low
<b>Irreplaceable loss of resources?</b>	Yes	No
<b>Can impacts be mitigated?</b>	Yes	
<b>Mitigation:</b>		
<p>“Mitigation“, means to anticipate and prevent negative impacts and risks, then to minimise them, rehabilitate or repair impacts to the extent feasible. Provide a description of how these mitigation measures will be undertaken keeping the above definition in mind</p>		
<b>Residual Impacts:</b>		
<p>“Residual Risk“, means the risk that will remain after all the recommended measures have been undertaken to mitigate the impact associated with the activity (Green Leaves III, 2014).</p>		

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**APPENDIX B**  
**PGS TEAM CVS**

**WOUTER FOURIE**

**Professional Heritage Specialist and Professional Archaeologist and Director PGS Heritage**

**Summary of Experience**

Specialised expertise in Archaeological Mitigation and excavations, Cultural Resource Management and Heritage Impact Assessment Management, Archaeology, Anthropology, Applicable survey methods, Fieldwork and project management, Geographic Information Systems, including *inter alia* -

Involvement in various grave relocation projects (some of which relocated up to 1000 graves) and grave “rescue” excavations in the various provinces of South Africa

Involvement with various Heritage Impact Assessments, within South Africa, including -

- Archaeological Walkdowns for various projects
- Phase 2 Heritage Impact Assessments and EMPs for various projects
- Heritage Impact Assessments for various projects
- Iron Age Mitigation Work for various projects, including archaeological excavations and monitoring
- Involvement with various Heritage Impact Assessments, outside South Africa, including -
- Archaeological Studies in Democratic Republic of Congo
- Heritage Impact Assessments in Mozambique, Botswana and DRC
- Grave Relocation project in DRC

**Key Qualifications**

BA [Hons] (Cum laude) - Archaeology and Geography - 1997

BA - Archaeology, Geography and Anthropology - 1996

Professional Archaeologist - Association of Southern African Professional Archaeologists (ASAPA) - Professional Member

Accredited Professional Heritage Specialist – Association of Professional Heritage Practitioners (APHP)

CRM Accreditation (ASAPA) -

- Principal Investigator - Grave Relocations
- Field Director – Iron Age
- Field Supervisor – Colonial Period and Stone Age
- Accredited with Amafa KZN

**Key Work Experience**

2003- current - Director – Professional Grave Solutions (Pty) Ltd

2007 – 2008 - Project Manager – Matakoma-ARM, Heritage Contracts Unit, University of the Witwatersrand

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2005-2007 - Director – Matakoma Heritage Consultants (Pty) Ltd

2000-2004 - CEO– Matakoma Consultants

1998-2000 - Environmental Coordinator – Randfontein Estates Limited. Randfontein, Gauteng

1997-1998 - Environmental Officer – Department of Minerals and Energy. Johannesburg, Gauteng

Worked on various heritage projects in the SADC region including, Botswana, Mauritius, Malawi, Zambia, Mozambique, and the Democratic Republic of the Congo

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## PROFESSIONAL CURRICULUM VITAE FOR NIKKI MANN

### Professional Archaeologist for PGS Heritage

**Name:** Nikki Mann  
**Profession:** Archaeologist  
**Date of birth:** 1992-10-13  
**Parent Firm:** PGS Heritage (Pty) Ltd  
**Position at Firm:** Archaeologist  
**Years with firm:** 2  
**Years of experience:** 7  
**Nationality:** South African  
**HDI Status:** White

#### EDUCATION:

**Name of University or Institution** : University of Cape Town  
**Degree obtained** : BSc  
**Major subjects** : Archaeology, Environmental and Geographical Sciences  
**Year** : 2013

**Name of University or Institution** : University of Cape Town  
**Degree obtained** : BSc [Hons]  
**Major subjects** : Archaeology  
**Year** : 2014

**Name of University or Institution** : University of Cape Town  
**Certificate obtained** : MSc – Archaeology (phytolith analysis)  
**Year** : 2017

#### Professional Qualifications:

Professional Archaeologist - Association of Southern African Professional Archaeologists -  
 Professional Member – No 472

#### Languages:

English  
 French

#### KEY QUALIFICATIONS

- 3 years of work in the heritage consulting field;

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- 7 years working experience in archaeological excavations;
- Proven experience in report writing and report deliverables;

## HERITAGE IMPACT ASSESSMENTS

### *South African*

2021- Current – Archaeologist – PGS Heritage (Pty) Ltd

HMPs for the Khangela and Umsinde WEFs and associated grid infrastructure, near Murraysburg, Western Cape. Nala Environmental. **Position:** Heritage Specialist.

Proposed new 132kV grid connection for the authorised Emoyeni WEF, near Murraysburg, Western Cape. Nala Environmental. **Position:** Heritage Specialist.

Proposed Apollo PV Plant, near Atlantis, Western Cape – Desktop study. TerraManzi. **Position:** Heritage Specialist.

Proposed Eskom Witkop-Pietersburg 132kV Powerline, Limpopo. Polokwane. Acer. **Position:** Heritage Specialist.

Proposed deviations to Eskom Nhlavuko-Tshebela 132kV Powerlines, Limpopo. Polokwane. Acer. **Position:** Heritage Specialist.

Proposed Tetra4 Cluster 2 gas production project, near Welkom. EIMS. **Position:** Heritage Specialist.

Kathu Tyre Management Plant HIA. Kathu. EXM. **Position:** Heritage Specialist.

Kathu Borrow Pit Screening. Kathu. EXM. **Position:** Heritage Specialist.

Kolomela Mine Expansion. Postmasburg. EXM. **Position:** Heritage Specialist.

Kudumane HIA update. Hotazel. SRK. **Position:** Heritage Specialist.

Victoria West Pipeline project. Victoria West. iXEng. **Position:** Heritage Specialist.

10MW Chelsea Solar PV. Gqeberha, Eastern Cape. SLR. **Position:** Heritage Specialist.

Koup 1 and Koup 2 WEF. Beaufort West, Western Cape. SiVEST. **Position:** Heritage Specialist.

Victoria West Pipelines. Victoria West, Northern Cape. iXEng. – **Position:** Heritage Specialist.

East Orchards Poultry Farm Project. Delmas, Mpumalanga. EcoSphere. – **Position:** Heritage Specialist.

Gunstfontein WEF and OHL. Sutherland, Northern Cape. Savannah– **Position:** Heritage Specialist.

Overhead power line for Oya PV Facility. Sutherland, Northern Cape. SiVEST– **Position:** Heritage Specialist.

Infrastructure for Kudusberg WEF. Sutherland, Northern Cape. SiVEST– **Position:** Heritage Specialist.

Proposed SKA fibre optic cable, between Beaufort West and Carnarvon, Northern and Western Cape. **Position:** Heritage Specialist.

Proposed SANSA Space Operations. Matjiesfontein, Western Cape. **Position:** Heritage Specialist

Piensaarspoort WEF 1 and 2. North-west of Matjiesfontein, Western Cape. Savannah- **Position:** Heritage Specialist.

Swellendam WEF. Swellendam, Western Cape. – **Position:** Heritage Specialist.

Matjiesfontein Road Extension Project. Matjiesfontein, Western Cape. **Position:** Heritage Specialist.



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## MITIGATION WORK

2020 – Coega Zone 10, Coega IDZ, Eastern Cape Province. Colonial Period Phase 2 Mitigation Archaeological Excavation. **Archaeologist.**

2019 – 2020 - **Lesotho Highland Development Authority – Polihali Dam Project - Heritage Management Plan development and Implementation.** Mokhotlong, Kingdom of Lesotho. **Archaeologist.**

2018- Proposed development of boreholes and associated pipelines for the Langebaan Aquifer within the Hopefield Private Nature Reserve, Hopefield, Western Cape. **Archaeologist.**

## POSITIONS HELD

**2021 – current:** Archaeologist - PGS (Pty) Ltd

**2019 – 2020:** Archaeologist - PGS (Pty) Ltd Lesotho

**2018 – 2020:** Contract Archaeologist – CTS Heritage

## REFERENCES

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**SITE SENSITIVITY VERIFICATION REPORT**



**PGS**  
HERITAGE

**HERITAGE: SITE SENSITIVITY VERIFICATION**

**CONTENTS**

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## **1. INTRODUCTION**

The approved development is situated on Farms Uit Vlucht Fontein No.265 and Schietkuil No.3 (Latest Environmental Authorisation (EA): 12/12/20/873/AM2), located approximately 44km north-west of Murraysburg in the Western and Northern Cape Provinces. It is within the Beaufort West and Ubuntu Local Municipalities and Central Karoo and Pixely Ka Seme District Municipalities.

The footprint of the original layout is still aligned with the updated February 2023 layout submitted with this amendment application and makes provision for the substation yard that encroaches onto the Farm Schietkuil No.3.

### **11.3 Technical Project Description**

The construction of the Eskom Gamma Substation was authorised by the Department of Environmental Affairs in 2007 (Latest EA: 12/12/20/873/AM2). The approval was for the construction of the complete Gamma substation, although it was noted that individual components would be constructed in a phased approach as determined by the electricity demand over several years.

As such, the first construction phase of the Gamma substation commenced during the original validity period of the EA and was completed in 2013 (**Figure 5**).

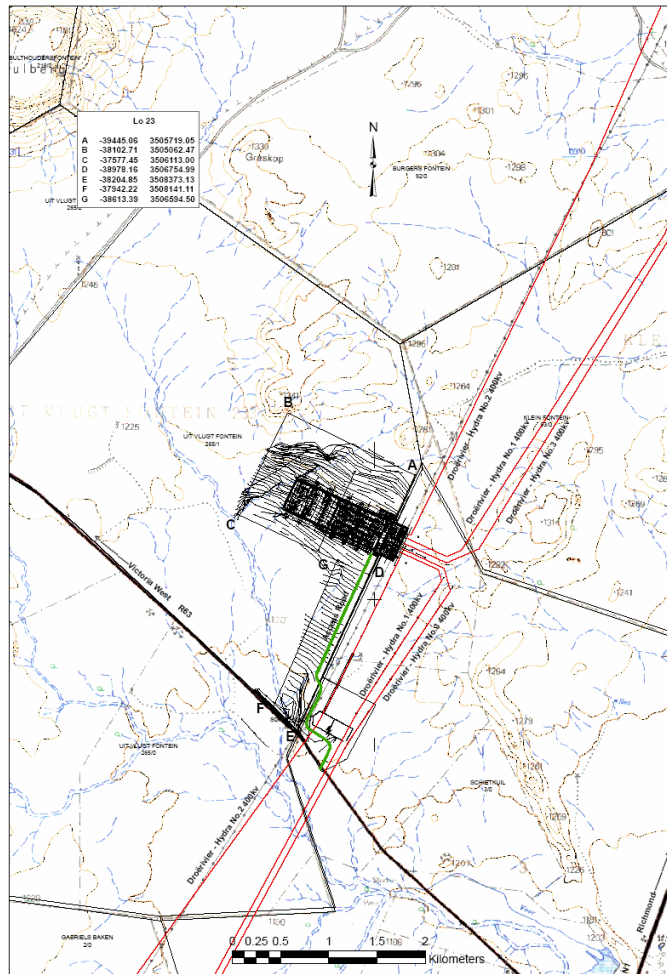


Figure 26 - As per the Final Environmental Impact Report (FEIR) (2007) indicating the layout of the 765kV Gamma Substation as authorised.

According to the FEIR (2007), Page 16, “When finally completed, the substation itself will cover about 1 290m x 465m (approximately 60ha) (when measured in terms of the outer perimeter lines of the terraces and security fence).”

### Second Phase

The holder of the EA proposes to commence construction of the second phase of the authorised substation development, specifically the development of a 132/400kV yard at the MTS and 400kV OHL turn-in of the existing Hydra- Droerivier 2 Overhead Powerline, as provided for in the current EA.

The next phase of construction activities associated with the EA is directly linked to the increased demand for grid infrastructure which is linked to upcoming Renewable Energy projects in the Northern and Western Cape Provinces. Importantly, the 132kV/400kV yard and 400kV OHL turn-ins are needed to enable the connection of the authorised Umsinde Emoyeni Wind Farm (DFFE Ref: 14/12/16/3/3/2/686).

The proposed 132kV/400kV yard and 400kV OHL turn-ins fall within the scope of the current EA. However – based on further technical analysis and design – it has been identified that the layout of the authorised infrastructure will need to be updated to reflect the updated configuration proposed to be implemented. The updated layout falls within the scope and footprint of what was originally assessed in the original EIA process, however for the avoidance of doubt the holder wishes to have the updated layout approved by DFFE prior to implementation thereof.

The footprint of the already constructed first phase of the existing Gamma Substation is approximately 28 ha. The 132kV/400kV yard that will now be implemented is approximately 14ha, within the already authorised Gamma substation footprint (**Figure 6**).

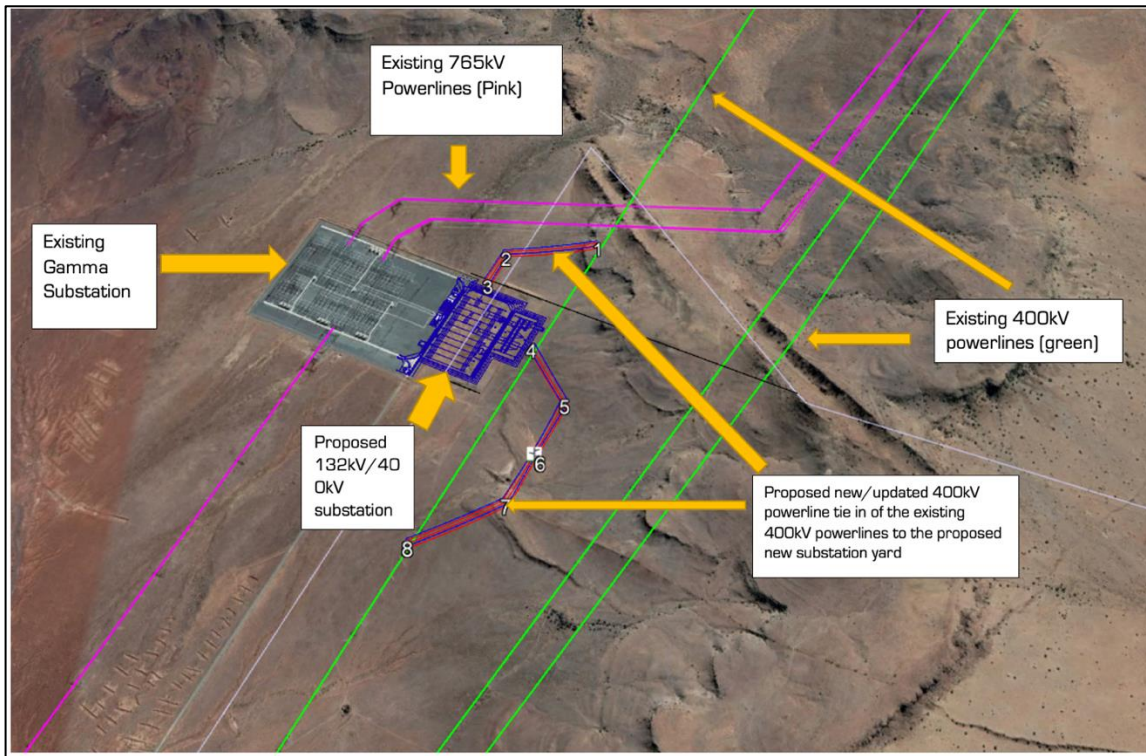


Figure 27 - Proposed Updated Layout depicting the existing Gamma Substation with the next phase of the authorised development now proposed for implementation (new proposed 132kV/400kV Substation yard and new reconfigured turn-in and turn-out of the existing 400kV powerline).

To demonstrate that the updated layout (April 2023) and the originally approved layout (FEIR 2007) are aligned and have been fully assessed and that the Updated Layout (2023) falls within the scope of EA, the following table has been established:

	Approved Layout (FEIR, 2007)	Existing/Constructed Gamma Substation	Updated Layout (April 2023)
<b>Footprint</b>	60 ha	~28 ha	~42 ha
<b>Properties Assessed</b>	<ul style="list-style-type: none"> <li>▪ Portion 1 of the Farm</li> </ul>	<ul style="list-style-type: none"> <li>▪ Portion 1 of the Farm</li> </ul>	<ul style="list-style-type: none"> <li>▪ Portion 1 of the Farm</li> </ul>

	Uitvlugfontein No.265 ▪ The Farm Schietkuil No.3	Uitvlugfontein No.265 ▪ The Farm Schietkuil No.3	Uitvlugfontein No.265 ▪ The Farm Schietkuil No.3
<b>Incoming and outgoing powerlines (765kV):</b>	X5 765kV Power lines	X3 existing lines (Hydra, Perseus and Kappa)	X3 existing lines (Hydra, Perseus and Kappa), no new 765kV power lines
<b>Transformers</b>	X2 EHV transformers	No transformers currently installed	X1 transformer to be installed
<b>Turn-in lines</b>	X6 400kV incoming/out going lines (turn-in and turn-out lines)	No 400kV turn-in lines	Existing 400kV Hydra-Droerivier 2 OHL to be reconfigured to turn-in to the new 400kV/132kV yard.

- The updated layout falls within the authorised footprint of the originally assessed layout in the FEIR (2007) and still falls within the authorised properties i.e., Portion 1 of the Farm Uitvlug Fontein No.265 and The Farm Schietkuil No.3;
- No new additional infrastructure has been included within the Updated Layout that will trigger the requirement for new listed activities, or a change in the scope of the EA. All approved infrastructure as indicated in the table above indicates that the updated layout is in compliance with the EA and FEIR (2007);
- The updated layout is aligned with FEIR (2007) in that it had been envisioned that development would be undertaken in phases based on the demand in the future.
- The 400kV OHL turn-in of the existing 400kV Droerivier-Hydra No. 2 OHL remains within Eskom's existing servitude rights on the property.
- 

## 2. SITE SENSITIVITY VERIFICATION METHODOLOGY

The site sensitivity verification of the proposed project is based on:

- A desktop review of (a) the relevant 1:50 000 scale topographic map 3123CB - Current and historical editions (1973), (b) Google Earth© satellite imagery, (c) published historical and archaeological literature, as well as (d) several previous HIA and AIA assessments undertaken in the general vicinity of the study area.
- A two-day field assessment of the proposed project area by a field archaeologist during the period 20 to 21 July 2022.

### 3. OUTCOME OF SITE SENSITIVITY VERIFICATION

It is well known that the Karoo contains a long and rich archaeological record dating from the ESA to the historic period. However, vast areas of the region have yet to be subjected to systematic analytical research.

The evaluation of satellite imagery and the analysis of the studies previously undertaken in the area has indicated that certain areas may be sensitive from a heritage perspective. Archaeological surveys and studies in the Karoo have shown rocky outcrops, dry riverbeds, riverbanks and confluence to be prime localities for archaeological finds and specifically Stone Age sites (Orton, 2012; Fourie, 2015).

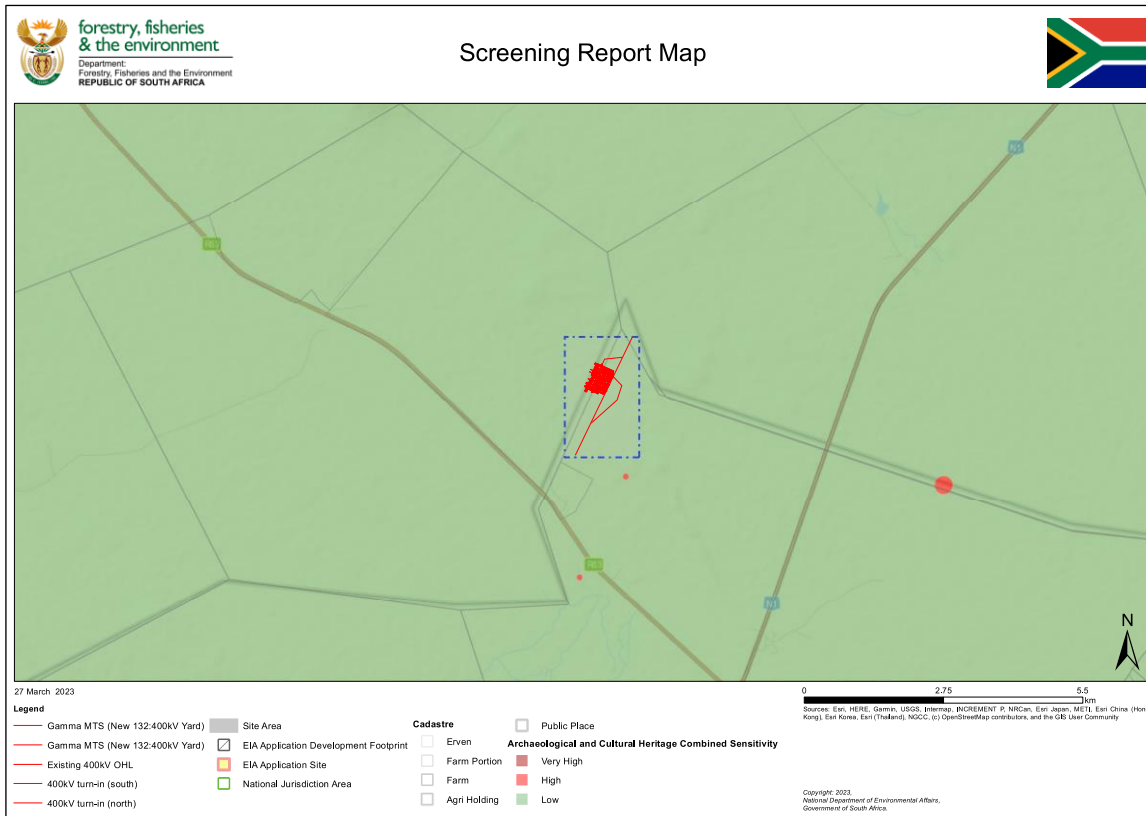
Scatters of MSA and LSA artefacts have been reported in and around the wider study area. This is a result of the erosional nature of the environment, which tends to leave artefacts exposed on the surface rather than buried beneath layers of sediment. To date, heritage studies in the area have shown that these artefacts have occurred in secondary contexts, often associated with gravel deposits, having been subjected to erosion of the soils in which they were once deposited (Binneman et al., 2011; Booth and Sanker, 2012; Booth, 2012; Tusenius, 2012; Halkett and Webley, 2011; Lavin, 2021a). Although context is generally poor, the Karoo is still regarded as a region that is very rich in archaeological and historical heritage.

The field work that was conducted in the study area has not identified any archaeological or cultural heritage resources that warrant conservation.

### 4. NATIONAL ENVIRONMENTAL SCREENING TOOL

The Archaeological and Cultural Heritage Sensitivity Map for the proposed project area prepared using the DFFE screening tool indicates a **Low Sensitivity** rating for the study area (**Figure 28**). The low rating as provided by the Environmental Screening Tool possibly reflects scarcity of heritage reports conducted in the general region.

In this instance, the DFFE screening tool sensitivity map in **Figure 28** is supported based on the findings of this fieldwork.



*Figure 28 – Archaeology and Heritage screening map for the proposed Part 2 Amendment Application for the existing 765kV Gamma Substation and Associated Powerline Turn-in Infrastructure.*

## 5. CONCLUSION

The Archaeological and Cultural Heritage sensitivity of the project area for the proposed Part 2 Amendment Application for the existing 765kV Gamma Substation and Associated Powerline Turn-in Infrastructure, has been evaluated, based on desktop studies and a multiple day field assessment.

It is concluded that the low rating as provided by the Environmental Screening Tool has been confirmed by the field work, during which no significant archaeological or cultural heritage resources were identified.