The proposed upgrade of the 66kV network in the Kuruman area, Northern Cape Province

Heritage Impact Assessment

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Declaration of Independence

PGS Heritage, an appointed Heritage Specialist for Zitholele Consulting (Pty) Ltd, has compiled the report. The views stipulated in this report are purely objective and no other interests are displayed during the decision making processes discussed in the Heritage Impact Assessment Process.

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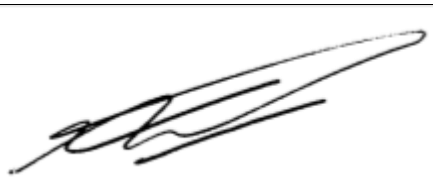
Author	W Fourie		Principal Investigator
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EXECUTIVE SUMMARY

PGS Heritage was appointed by Zitholele Consulting (Pty) Ltd to undertake a Heritage Impact Report that forms part of the Basic Assessment (BA) Process for the proposed upgrading of the 66kV network to 132kV network in the Hotazel, Kuruman and Kathu area, Northern Cape Province.

The Heritage Impact assessment and field work survey yielded 15 heritage sites, a total of 2 cemeteries (**K1** and **K10)** were identified, 9 historic farmsteads, two historic asbestos mines, a sacred/religious site (**K4)** and a Provincial Monument (**K5**) and a memorial (**K12**) were identified.

Section 3.2 lists and describes all the sites in detail.

The following recommendation focussed on specific heritage finds types must be implemented

Cemeteries

- Adjust the development layout and demarcate site with at least a 20-meter buffer. In the case of K12 this buffer must be made at least 100 meters to keep the development away from the memorial.
- In the event that the sites cannot be excluded from the development footprint a grave relocation process as described in Section 5 of this reports needs to be implemented.

Historical Structures

- Adjust Corridors and position of pylons to avoid these structures;
- Mitigation in the form of a watching brief and monitoring at these sites during construction if any construction is to take place closer than 100 meters from the site;
- **All** structure will require a destruction permit under Section 34 of the NHRA;
- The permit will entail initial documentation of the layout and condition of the structures and its structures with layout sketches and detailed photography, after which the destruction permit can be applied for with the backing of the documentary evidence;
- A qualified heritage practitioner must do this documentation.

Sacred/ religious site

- Select Rir-Gamo Alt 1 to avoid impacting on the sites vista;
- If the Rir-Gamo Alt 2 is considered and selected a consultation process with local spiritual and religious groupings will be required to consult on the possible impacts and consequences of construction activities on the site and intangible heritage.

Declared Provincial Heritage Site – Moffat Mission

- Choose Gamo-Mothi Alt 2 as better option;
- Adjust Corridors and position of pylons to avoid the site;
- Mitigation in the form of a watching brief and monitoring at these sites during construction if any construction is to take place closer than 200 meters from the site;
- **A buffer of at least 500 meters must be kept from the monument. This distance can however be negotiated with the Provincial Heritage Authority – Heritage Northern Cape**

Historic Mines

These sites and structures are protected under Section 34 of the NHRA, will need to be avoided and preserved. Due to the sensitive nature of asbestos and its history of negative health effects, heritage mitigation efforts will be prohibitively expensive, and avoidances of these areas is recommended.

Palaeontology

An analysis of the SAHRIS paleontological sensitivity map indicates that 70% of the study area is under lain by paleontological sensitive geology. Interpreting this data according to the SAHRIS guidelines indicates that a field assessment and protocol for finds will be required for large sections of the alternative alignments.

It is recommended that a full Paleontological Impact Assessment (PIA) be initiated during the pre-construction phase when the heritage walk down of the final alignment will be done.

Through a comparative assessment of the alternatives and evaluation against the heritage resources identified it was possible to assign a rating of Preferred, Favourable, Not Preferred or No preference as described in Table 1 below.

Table 1: Preferred corridor alternative

Key

PREFERRED	The alternative will result in a low impact / reduce the impact
FAVOURABLE	The impact will be relatively insignificant
NOT PREFERRED	The alternative will result in a high impact / increase the impact
NO PREFERENCE	The alternative will result in equal impacts

No.	Corridor Alternative	Preference	Naming of alternatives between substations
1.	Hotazel Substation to Eldoret Substation	FAVOURABLE	· Hot-Eldo Alt 1
		PREFERRED	· Hot-Eldo Alt 2
2.	Eldoret Substation to Riries Substation	PREFERRED	· Eldo-Rir Alt 1
		PREFERRED	· Eldo-Rir Alt 2
		FAVOURABLE	· Eldo-Rir Alt 3
3.	Riries Substation to Gamohaan Substation	FAVOURABLE	· Rir-Gamo Alt 1
		NOT PREFERRED	· Rir-Gamo Alt 2
4.	Gamohaan Substation to Mothibistad Substation	PREFERRED	· Gamo-Mothi Alt 1
		NOT PREFERRED	· Gamo-Mothi Alt 2
5.	Mothibistad Substation to Moffat Substation	PREFERRED	· Mothi-Moffat Alt 1
		PREFERRED	· Mothi-Moffat Alt 2
6.	Moffat Substation to Valley Substation	PREFERRED	· Moffat-Valley Alt 1
		NOT PREFERRED	· Moffat-Valley Alt 2
7.	Valley Substation to Sekgame Substation	FAVOURABLE	· Valley-Sekg Alt 1
		PREFERRED	· Valley-Sekg Alt 2
		FAVOURABLE	· Valley-Sekg Alt 3
		PREFERRED	· Valley-Sekg Alt 4

Refer to **Appendix A** for positions of the heritage sites and find spots relative to the Corridors.

The evaluation has shown that the alignments **Rir-Gamo Alt 1** (*Impacts on K4 – Gamohaan Sacred Site*), **Gamo-Mothi Alt1** (*Impacts on the Moffatt Mission station site K*5) and **Moffat-Valley Alt2**

(*Impacts on a large amount of heritage resources*) are alternatives not preferred with the rest having favourable or preferred ratings.

The overall impact on identified heritage resources is rated as moderate to low. By designing the layout within the final corridor to avoid as far as possible the heritage resources identified; and then finally doing a heritage walk down of the final alignment focussing on the pylon position and footprints of construction, the impact on heritage resources can be minimised to acceptable levels.

Further to these recommendations the general Heritage Management Guideline in Sections 7 needs to be incorporated in to the EMP for the project.

The overall impact of the development on heritage resources is seen as acceptably low and can impacts can be mitigated to acceptable levels.

The following general mitigation measures are recommended:

a. All the stakeholders must agree upon a monitoring plan for the different phases of the project focussing on the areas where earthmoving will occur.
b. If during construction any possible finds are made, the operations must be stopped and the qualified archaeologist be contacted for an assessment of the find.
c. Should substantial fossil remains (e.g. well-preserved fossil fish, reptiles or petrified wood) be exposed during construction, however, the ECO should carefully safeguard these, preferably in situ, and alert SAHRA as soon as possible so that appropriate action (e.g. recording, sampling or collection) can be taken by a professional palaeontologist.
d. A management plan must be developed for managing the heritage resources in the surface area impacted by operations during construction and operation of the development. This includes basic training for construction staff on possible finds, action steps for mitigation measures, surface collections, excavations, and communication routes to follow in the case of a discovery.

ESKOM SoC

HERITAGE IMPACT ASSESSMENT

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1. INTRODUCTION

PGS Heritage was appointed by Zitholele Consulting (Pty) Ltd to undertake a Heritage Impact Report that forms part of the BA Process for the proposed upgrade of the 66kV network in the Kuruman area, Northern Cape Province

1.1 Scope of the Study

The aim of the study is to identify possible heritage sites and finds that may occur in the proposed development area. The Heritage Impact Assessment aims to inform the BA Process in the development of a comprehensive Environmental Management Plan (EMPr) to assist Eskom in managing the discovered heritage resources in a responsible manner, in order to protect, preserve, and develop them within the framework provided by the National Heritage Resources Act of 1999 (Act 25 of 1999) (NHRA).

1.2 Specialist Qualifications

PGS Heritage (PGS) compiled Heritage Impact Assessment.

The staff at PGS has a combined experience of nearly 70 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.

Wouter Fourie, Project manager for this project, is registered as a Professional Archaeologist with the Association of Southern African Professional Archaeologists (ASAPA) and has CRM accreditation within the said organisation, as well as being accredited as a Professional Heritage Practitioner with the Association of Professional Heritage Practitioners – Western Cape (APHP).

Marko Hutten, heritage specialist and project archaeologist, has 15 years of experience in the industry and is registered with the Association of Southern African Professional Archaeologists (ASAPA) as a Professional Archaeologist and is accredited as a Field Director.

1.3 Assumptions and Limitations

Not subtracting in any way from the comprehensiveness of the fieldwork undertaken, 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 subterranean nature of some archaeological sites and the current dense vegetation cover. As such, should any heritage features and/or objects not included in the present inventory be located or observed, a heritage specialist must immediately be contacted.

Such observed or located heritage features and/or objects may not be disturbed or removed in any way until such time that the heritage specialist had been able to make an assessment as to the significance of the site (or material) in question. This applies to graves and cemeteries as well. In the event that any graves or burial places are located during the development the procedures and requirements pertaining to graves and burials will apply as set out below.

The accessibility of the proposed alternative alignments was hampered by terrain and permissions to enter sections of the proposed alternatives. An effort was made to provide a good overview of the type of heritage resources that could be found in the study areas.

It must be stressed that a final walk down will be required on the completion of the design of the final alignment.

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:

i. National Environmental Management Act (NEMA) Act 107 of 1998
ii. National Heritage Resources Act (NHRA) Act 25 of 1999
iii. Minerals and Petroleum Resources Development Act (MPRDA) Act 28 of 2002

The following sections in each Act refer directly to the identification, evaluation and assessment of cultural heritage resources.

i. National Environmental Management Act (NEMA) Act 107 of 1998

a. Basic Environmental Assessment (BEA) – Section (23)(2)(d)
b. Environmental Scoping Report (ESR) – Section (29)(1)(d)
c. Environmental Impacts Assessment (EIA) – Section (32)(2)(d)
d. Environmental Management Plan (EMP) – Section (34)(b)

ii. National Heritage Resources Act (NHRA) Act 25 of 1999
a. Protection of Heritage resources – Sections 34 to 36; and
b. Heritage Resources Management – Section 38

iii. Minerals and Petroleum Resources Development Act (MPRDA) Act 28 of 2002
a. Section 39(3)

The NHRA stipulates that cultural heritage resources may not be disturbed without authorization from the relevant heritage authority. Section 34(1) of the NHRA states that, "no person may alter or demolish any structure or part of a structure which is older than 60 years without a permit issued by the relevant provincial heritage resources authority…" The NHRA is utilized as the basis for the identification, evaluation and management of heritage resources and in the case of CRM those resources specifically impacted on by development as stipulated in Section 38 of NHRA, and those developments administered through NEMA, and MPRDA legislation. In the latter cases the feedback from the relevant heritage resources authority is required by the State and Provincial Departments managing these Acts before any authorizations are granted for development. The last few years have seen a significant change towards the inclusion of heritage assessments as a major component of Environmental Impacts Processes required by NEMA and MPRDA. This change requires us to evaluate the Section of these Acts relevant to heritage (Fourie, 2008):

The NEMA 23(2)(b) states that an integrated environmental management plan should, "…identify, predict and evaluate the actual and potential impact on the environment, socio-economic conditions and cultural heritage".

A study of subsections (23)(2)(d), (29)(1)(d), (32)(2)(d) and (34)(b) and their requirements reveals the compulsory inclusion of the identification of cultural resources, the evaluation of the impacts of the proposed activity on these resources, the identification of alternatives and the management procedures for such cultural resources for each of the documents noted in the Environmental Regulations. A further important aspect to be taken account of

in the Regulations under NEMA is the Specialist Report requirements laid down in Section 33 of the regulations (Fourie, 2008).

1.5 Terminology and Abbreviations

Abbreviations	Description
AIA	Archaeological Impact Assessment
ASAPA	Association of South African Professional Archaeologists
CRM	Cultural Resource Management
DEA	Department of Environmental Affairs
DWS	Department of Water and Sanitation
EIA practitioner	Environmental Impact Assessment Practitioner
EIA	Environmental Impact Assessment
ESA	Early Stone Age
GPS	Global Positioning System
HIA	Heritage Impact Assessment
I&AP	Interested & Affected Party
LSA	Late Stone Age
LIA	Late Iron Age
MSA	Middle Stone Age
MIA	Middle Iron Age
NEMA	National Environmental Management Act
NHRA	National Heritage Resources Act
PHRA	Provincial Heritage Resources Agency
PSSA	Paleontological Society of South Africa
ROD	Record of Decision
SADC	Southern African Development Community
SAHRA	South African Heritage Resources Agency

- *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 is 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.

- *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

- *Holocene*

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

- *Late Stone Age*

  The archaeology of the last 20 000 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 20-300 000 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.

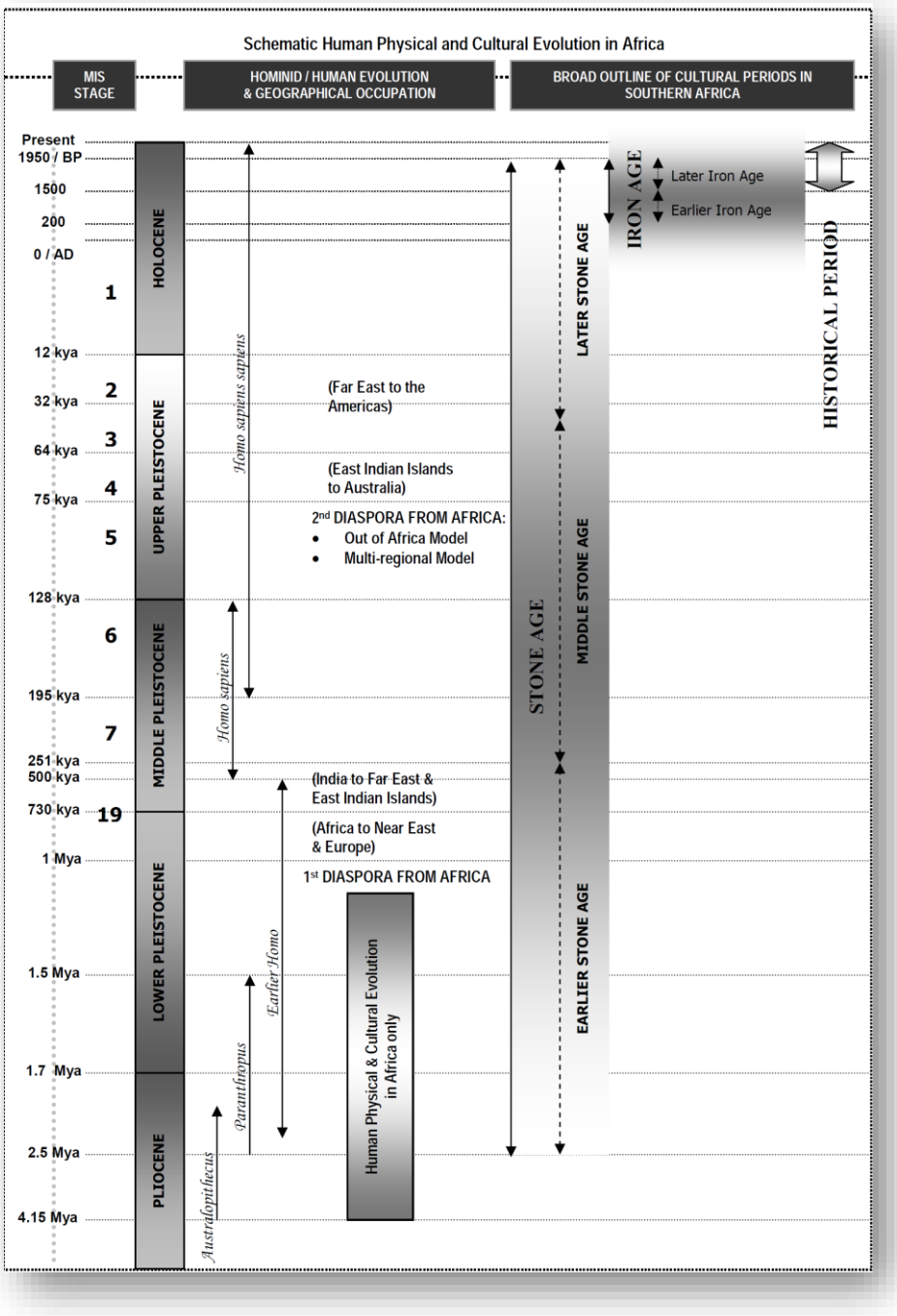


Figure 1: Human and Cultural Timeline in Africa (Morris, 2013)

2. TECHNICAL DETAILS OF THE PROJECT

1.6 Background to the proposed development

Eskom is proposing to upgrade their existing 66kV network to a 132 kV network between Hotazel and Kuruman, and construct a new section of 132 kV from a substation south of Kuruman to Kathu in the Northern Cape Province. The proposed project will facilitate the strengthening of Eskom's distribution network within the area. Furthermore the proposed project will also result in the construction of a circular feed which will ensure a secure supply in the event where one of the power lines experiences a fault. In addition to strengthening the national grid, the proposed project will also assist with ensuring adequate electricity supply to meet the growing energy demand associated with the planned mining activities in the area as well as planned developments in the local communities of Hotazel, Kuruman and Kathu.

1.7 Project Description

The upgrading of the 66kV network will consist of the following:

- Upgrade existing 66kV network to a 132kV network between Hotazel Substation and Valley Substation to supply the following substations: Gamohaan Sub, Eldoret Sub, Riries Sub, Valley Sub, Mothibistad Sub, Moffat Sub. Decommission the existing 66kV network.
- Extend 132kV substations at the current substation site and decommission old 66kV infrastructure at Eldoret Sub, Riries Sub, Valley Sub, and Moffat Sub.
- Build new Mothibistad 132/22kV Substation.
- Build new Gamohaan 132/22kV Substation.
- Decommission existing Mothibistad Switching Station and Asbes Substation.
- Construction of a 132kV power line extending from the existing Valley Substation to the proposed Sekgame Switching Station.

1.8 Project Location

The study area is located within the northern part of the Northern Cape Province and stretches from Hotazel in the north towards Kuruman and then south-westward towards Kathu in the western section of the study area.

1.9 Proposed Alternatives

It is proposed that route alternatives will be investigated for the proposed development. Between two and four alternative corridor routes will be proposed for each section of the proposed power line. The corridors will be 1km wide (500m either side of the centre line). The route alternatives are listed in Table 2.

Table 2: Route alternatives

No.	Corridor Alternative	Naming of alternatives between substations
1.	Hotazel Substation to Eldoret Substation	· Hot-Eldo Alt 1 · Hot-Eldo Alt 2
2.	Eldoret Substation to Riries Substation	· Eldo-Rir Alt 1 · Eldo-Rir Alt 2 · Eldo-Rir Alt 3
3.	Riries Substation to Gamohaan Substation	· Rir-Gamo Alt 1 · Rir-Gamo Alt 2
4.	Gamohaan Substation to Mothibistad Substation	· Gamo-Mothi Alt 1 · Gamo-Mothi Alt 2
5.	Mothibistad Substation to Moffat Substation	· Mothi-Moffat Alt 1 · Mothi-Moffat Alt 2
6.	Moffat Substation to Valley Substation	· Moffat-Valley Alt 1 · Moffat-Valley Alt 2
7.	Valley Substation to Sekgame Substation	· Valley-Sekg Alt 1 · Valley-Sekg Alt 2 · Valley-Sekg Alt 3 · Valley-Sekg Alt 4

The proposed route alternatives are indicated on the locality map below (Figure 2).

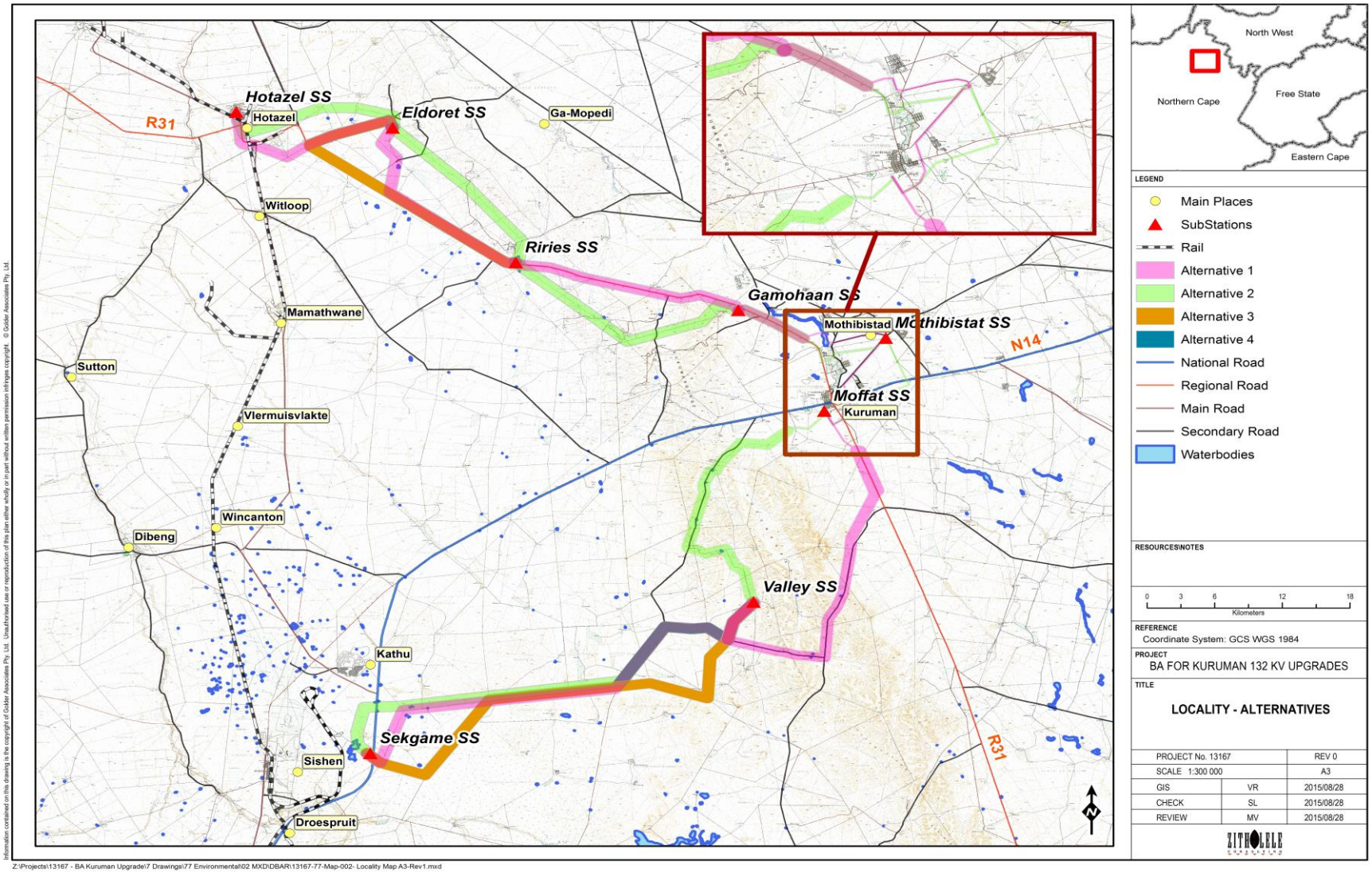


Figure 2: Locality map with proposed power line route alternatives and substation alternative locations

1.9.1 Tower Types

The tower types that are to be used will vary depending on the most appropriate structure, the terrain traversed, ground clearance requirements, geology, etc. The tower types may consist of the following:

- Mono-pole guyed intermediate suspension structures;
- Mono-pole self-supporting intermediate suspension structures;
- Mono-pole angle suspension structures;
- Mono-pole strain structures;
- H-Pole structures; and
- 3 Pole strain structures.

The final tower types that will be used for the proposed 132kV power line will be determined once the routing has been negotiated and a servitude has been secured.

The foundation depths will range between 1.5-3.0 meters. Spanning lengths between tower structures will be between 225-250m. The tower type structures will vary in length from 18-24m in height. Finally, a Kingbird conductor is likely to be used. An illustration of an example of one of the proposed towers is provided in **Figure 3** below.

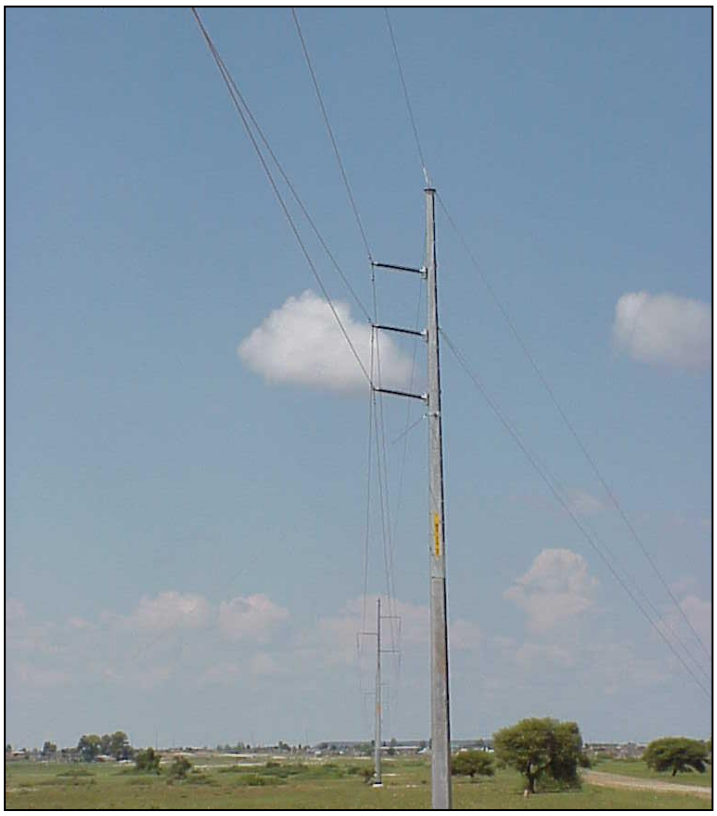


Figure 3: Proposed monopole tower type

2 ASSESSMENT METHODOLOGY

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

PGS Heritage (PGS) compiled this Heritage Impact Assessment (HIA) report for the proposed development. The applicable maps, tables and figures, are included as stipulated in the NHRA (no 25 of 1999), the National Environmental Management Act (NEMA) (no 107 of 1998) and the South African Heritage Resources (SAHRA) guidelines for Archaeological Impact Assessments (2007). The HIA process consisted of three steps:

- Step I – Literature Review: The background information to the field survey leans on information gathered for the larger study area.

- Step II – Physical Survey: A physical survey was conducted on foot and by vehicle through the proposed alignments by qualified archaeologists (March 2015), aimed at locating and documenting sites falling within and adjacent to the proposed development

footprint. The fieldwork was based on an overall field visit and does not constitute a walk down of the final alignment.

- Step III – The final step involved the recording and documentation of relevant archaeological resources, as well as the assessment of resources in terms of the heritage impact assessment criteria and report writing, as well as mapping and constructive recommendations

The significance of heritage sites was based on four main criteria:

- **site integrity** (i.e. primary vs. secondary context),
- **amount of deposit, range of features** (e.g., stonewalling, stone tools and enclosures),
    - Density of scatter (dispersed scatter)
        - Low - <10/50m^2
        - Medium - 10-50/50m^2
        - High - >50/50m^2
- **uniqueness** and
- **potential** to answer present research questions.

Management actions and recommended mitigation, which will result in a reduction in the impact on the sites, will be expressed as follows:

A - No further action necessary;
B - Mapping of the site and controlled sampling required;
C - No-go or relocate pylon position
D - Preserve site, or extensive data collection and mapping of the site; and
E - Preserve site

Impacts on these sites by the development will be evaluated as follows

2.1 Site Significance

Site significance classification standards prescribed by the South African Heritage Resources Agency (2006) and approved by the Association for Southern African Professional Archaeologists (ASAPA) for the Southern African Development Community (SADC) region, were used for the purpose of this report.

Table 3: Site significance classification standards as prescribed by SAHRA

FIELD RATING	GRADE	SIGNIFICANCE	RECOMMENDED MITIGATION
National Significance (NS)	Grade 1	-	Conservation; National Site nomination
Provincial Significance (PS)	Grade 2	-	Conservation; Provincial Site nomination
Local Significance (LS)	Grade 3A	High Significance	Conservation; Mitigation not advised
Local Significance (LS)	Grade 3B	High Significance	Mitigation (Part of site should be retained)
Generally Protected A (GP.A)	Grade 4A	High / Medium Significance	Mitigation before destruction
Generally Protected B (GP.B)	Grade 4B	Medium Significance	Recording before destruction
Generally Protected C (GP.A)	Grade 4C	Low Significance	Destruction

2.2 Methodology for Impact Assessment

The impacts will be ranked according to the methodology described below. Where possible, mitigation measures will be provided to manage impacts. In order to ensure uniformity, a standard impact assessment methodology will be utilised so that a wide range of impacts can be compared with each other. The impact assessment methodology makes provision for the assessment of impacts against the following criteria, as discussed below.

2.2.1 Nature of the impact

Each impact should be described in terms of the features and qualities of the impact. A detailed description of the impact will allow for contextualisation of the assessment.

2.2.2 Extent of the impact

Extent intends to assess the footprint of the impact. The larger the footprint, the higher the impact rating will be. The table below provides the descriptors and criteria for assessment.

Table 4: Criteria for the assessment of the extent of the impact.

Extent Descriptor	Definition	Rating
Site	Impact footprint remains within the boundary of the site.	1
Local	Impact footprint extends beyond the boundary of the site to the adjacent surrounding areas.	2
Regional	Impact footprint includes the greater surrounds and may include an entire municipal or provincial jurisdiction.	3
National	The scale of the impact is applicable to the Republic of South Africa.	4
Global	The impact has global implications	5

2.2.3 Duration of the impact

The duration of the impact is the period of time that the impact will manifest on the receiving environment. Importantly, the concept of reversibility is reflected in the duration rating. The longer the impact endures, the less likely it is to be reversible. See

Table 5 for the criteria for rating duration of impacts.

Table 5: Criteria for the rating of the duration of an impact.

Duration Descriptor	Definition	Rating
Construction / Decommissioning phase only	The impact endures for only as long as the construction or the decommissioning period of the project activity. This implies that the impact is fully reversible.	1
Short term	The impact continues to manifest for a period of between 3 and 5 years beyond construction or decommissioning. The impact is still reversible.	2
Medium term	The impact continues between 6 and 15 years beyond the construction or decommissioning phase. The impact is still reversible with relevant and applicable mitigation and management actions.	3
Long term	The impact continues for a period in excess of 15 years beyond construction or decommissioning. The impact is only reversible with considerable effort in implementation of rigorous mitigation actions.	4
Permanent	The impact will continue indefinitely and is not reversible.	5

2.2.4 Potential intensity of the impact

The concept of the potential intensity of an impact is the acknowledgement at the outset of the project of the potential significance of the impact on the receiving environment. For example, SO_2 emissions have the potential to result in significant adverse human health effects, and this potential intensity must be accommodated within the significance rating. The importance of the potential intensity must be emphasised within the rating methodology to indicate that, for an adverse impact to human health, even a limited extent and duration will still yield a significant impact.

Within potential intensity, the concept of irreplaceable loss is taken into account. Irreplaceable loss may relate to losses of entire faunal or floral species at an extent greater than regional, or the permanent loss of significant environmental resources. Potential intensity provides a measure for comparing significance across different specialist assessments. This is possible by aligning specialist ratings with the potential intensity rating provided here. This allows for better integration of specialist studies into the environmental impact assessment. See Table 6 and **Table 7** below.

Table 6: Criteria for impact rating of potential intensity of a negative impact.

Potential Intensity Descriptor	Definition of negative impact	Rating
High	Significant impact to human health linked to mortality/loss of a species/endemic habitat.	16
Moderate-High	Significant impact to faunal or floral populations/loss of livelihoods/individual economic loss.	8
Moderate	Reduction in environmental quality/loss of habitat/loss of heritage/loss of welfare amenity	4
Moderate-Low	Nuisance impact	2
Low	Negative change with no associated consequences.	1

Table 7: Criteria for the impact rating of potential intensity of a positive impact.

Potential Intensity Descriptor	Definition of positive impact	Rating
Moderate-High	Net improvement in human welfare	8
Moderate	Improved environmental quality/improved individual livelihoods.	4
Moderate-Low	Economic development	2
Low	Positive change with no other consequences.	1

It must be noted that there is no HIGH rating for positive impacts under potential intensity, as it must be understood that no positive spinoff of an activity can possibly raise a similar significance rating to a negative impact that affects human health or causes the irreplaceable loss of a species.

2.2.5 Likelihood of the impact

This is the likelihood of the impact potential intensity manifesting. This is not the likelihood of the activity occurring. If an impact is unlikely to manifest then the likelihood rating will reduce the overall significance. Table 8 provides the rating methodology for likelihood.

Table 8: Criteria for the rating of the likelihood of the impact occurring

Likelihood Descriptor	Definition	Rating
Improbable	The possibility of the impact occurring is negligible and only under exceptional circumstances.	0.1
Unlikely	The possibility of the impact occurring is low with a less than 10% chance of occurring. The impact has not occurred before.	0.2
Probable	The impact has a 10% to 40% chance of occurring. Only likely to happen once in every 3 years or more.	0.5
Highly Probable	It is most likely that the impact will occur and there is a 41% to 75% chance of occurrence.	0.75
Definite	More than a 75% chance of occurrence. The impact will occur regularly.	1

The rating for likelihood is provided in fractions in order to provide an indication of percentage probability, although it is noted that mathematical connotation cannot be implied to numbers utilised for ratings.

2.2.6 Cumulative Impacts

Cumulative impact are reflected in the in the potential intensity of the rating system. In order to assess any impact on the environment, cumulative impacts must be considered in order to determine an accurate significance. Impacts cannot be assessed in isolation. An integrated approach requires that cumulative impacts be included in the assessment of individual impacts.

The nature of the impact should be described in such a way as to detail the potential cumulative impact of the activity.

2.2.7 Significance Assessment

The significance assessment assigns numbers to rate impacts in order to provide a more quantitative description of impacts for purposes of decision making. Significance is an expression of the risk of damage to the environment, should the proposed activity be authorised.

To allow for impacts to be described in a quantitative manner in addition to the qualitative description given above, a rating scale of between 1 and 5 was used for each of the assessment criteria. Thus the total value of the impact is described as the function of significance, which takes cognisance of extent, duration, potential intensity and likelihood.

Impact Significance = (extent + duration + potential intensity) x likelihood

Table 9 provides the resulting significance rating of the impact as defined by the equation as above.

Table 9: Significance rating formulas.

Score	Rating	Implications for Decision-making
< 3	Low	Project can be authorised with low risk of environmental degradation
3 - 9	Moderate	Project can be authorised but with conditions and routine inspections. Mitigation measures must be implemented.
10 - 20	High	Project can be authorised but with strict conditions and high levels of compliance and enforcement. Monitoring and mitigation are essential.
21 - 26	Fatally Flawed	Project cannot be authorised

3. CURRENT STATUS QUO

2.3 Previous Heritage studies in the study area

A search of the South African Heritage Resources Information System (SAHRIS) produced numerous studies conducted in the vicinity of the study area, with only one study falling in a 1 kilometre corridor of the alternative routes.

Several assessments have been conducted in the greater area, however only assessments that revealed significant finds have been noted here.

Beaumont 2013

Phase 2 Archaeological permit mitigation report on A~0.7 HA Portion of the farm Bestwood 549, situated on the eastern outskirts of Kathu, John Taolo Gaetsewe District municipality, Northern Cape Province.

This assessment took place prior to the development of a shopping centre, and flanking parking area on a stand that stretches to the Bestwood/Uitkoms fence. Beaumont (2013) mentioned that the test pit produced evidence to suggest that the entire site was quarried over some unknown interval in Late Acheulean times. Beaumont further emphasizes that although there have been other mention of such Acheulean quarry occurrence, the Kathu Townlands site is by far the largest and contains the greatest number of artefacts (ca. one billion).

Dreyer 2006 (a)

First phase archaeological and cultural heritage assessment of the proposed residential developments at the farm Hartnolls 458, Kathu, Northern Cape.

This assessment was conducted when the planned residential developments at the farm Hartnolls 458, Kathu, Northern Cape occurred. Dreyer (2006) who conducted the assessment mentions the presence of archaeological materials in the form of Early Stone Age hand axes, which can be found on bare rocky outcrops on the surface. The distribution of these artefacts was documented as being fairly general and widespread.

Dreyer 2006 (b)

First phase Archaeological and cultural heritage investigation of the proposed tourist facilities and 4x4 route at Bothiting/Keangkop, Kuruman, North West Province.

Dreyer mentions the occurrence of Graves, traditional houses and traditional kraals (makgotla) of several chiefs in the area.

Dreyer 2013

First Phase Archaeological and Heritage assessment of the Vaal-Gamagara water pipeline project, Northern Cape, Revisit to the Kathu Pan archaeological site.

This assessment observed Sedibeng water upgrade to the Vaal – Gamagara water scheme line which runs from the pump station at Vaal Gamagara Village near Delportshoop on the Vaal river, to the water reservoir at Black Rock. The pipeline then links up with the reservoir at Kathu Pan archaeological site.

This is a highly significant archaeological site. According to Dreyer (2013) the Kathu Pan has a rich source of archaeological and faunal deposits.

Kaplan 2012 (a)

Archaeological Impact Assessment the proposed Mount Roma Energy Solar Plant on farm 321 near Kuruman Northern Cape Province

During an assessment for the proposed construction of a 10MW Concentrated Photovoltaic (CPV) Energy Generation Facility on Farm 321 Mount Roper, northwest of Kuruman, Kaplan (2012) mentions thirty-one archaeological occurrences (numbering more than 50 stone artefacts). Most of the tools recorded during the survey are assigned to the Middle and Later Stone Age. Only one Early Stone Age biface (a possible handaxe) was recovered. The tools were spread fairly thinly and unevenly over the landscape, but tend to cluster across the northern portion of the property, which is overlain by extensive sheets of ironstone gravels.

Most of the lithics recorded comprise modified (i. e. retouched and utilized) flakes and pieces of stone, but several retouched blade tools, and two pointed flakes were also found. Four scrapers were recovered, including one end scraper on a long blade, and three convex

scrapers. Some of the tools are burnished, while others are also abraded (having been rolled around by natural processes).

Several low density scatters of tools were documented on the gravels across the northern portion, while a very thin scatter of MSA flake tools (in indurated shale and ironstone) was recovered from alongside small, dry pan.

More than 90% of the tools found are made on banded ironstone with the remainder in indurated shale, chalcedony and quartzite. Sheets of ironstone gravels are prolific across the vegetated northern portion of the footprint area. Banded ironstone is known to have been a desirable raw material for making stone artefacts and occurs on a number of sites throughout the Northern Cape.

Kaplan 2012 (b)

Archaeological Impact Assessment for the Proposes Whitebank Keren Energy Solar Plant on Farm 379 Near Kuruman Northern Cape Province

Thirty-two archaeological occurrences numbering about 70 stone implements were located during this particular assessment. Most of the tools are assigned to the Middle Stone Age, but a few ESA tools were also found, including one well-crafted bifacial handaxe. No Later Stone Age lithics were recovered.

The Author states that archaeological remains comprise an unusual, compelling and enigmatic collection, of tools, characterized by some large, heavy, chunky, implements with extensive retouch, step flaking, and utilization damage on blocks of banded ironstone. Lacking stratigraphic context, such tools almost defy description and their function is not clearly apparent.

While no cores were recovered in the footprint area, it is apparent that some on-site knapping did take place, as several large chunks have been flaked and modified.

Kusel & van der Ryst 2009

Cultural Heritage Resources Impact Assessment of manganese mining areas on the farms Belgravia 264, Santoy 230, Gloria 226 and Nchwaning 267, at Black Rock, north of Kuruman, Kgalagadi District municipality, Northern Cape Province.

This report mentions that the original Black Rock mine represents the early history of manganese mining in South Africa, and that the mine technique used was both open cast and underground mining. This report also mentions that a large cemetery for mine workers is present as well as a small isolated cemetery with three graves. The mines of the area are world renown for unique minerals, which are found nowhere else.

Furthermore the report states that Stone Age material was found at a large quarry on the banks of the Ga-Mogara River. This included Early and Middle Stone Age material.

In this case this particular report recommended that the Black Rock mine be declared **a National Heritage Site** and the original mine be made assessable to the public. The stress for protecting this site is sever stating that a watching brief is recommended for the archaeological sites and that no development, mining or quarrying should take place within a 100m distance from the middle of the Ga-Mogara River.

Morris 2010 (a)

Proposed Kathu-Sishen solar energy facilities: Specialist input for the Environmental Impact Assessment phase and Environmental Management Plan for the proposed Kathu-Sishen solar energy facilities, Northern Cape.

This assessment concluded the presence of several graves in the area as well as potential (dolines). Morris describes three relatively small 'pans', which appear to be dolines, or 'plugged' sink holes, which occur within the distribution area of the development. They occur in the vicinity of GPS positions: at 27.57599o S 22.92752o E, 27.57506o S 22.93190o E and 27.59886o S 22.93925o E.

Morris suggests that these may represent features similar to the Kathu Pan archaeological sites. It is possible that they contain archaeological material – a variety of stone tools were noted in different raw materials including chert, but not in high densities.

Morris 2010 (b)

Heritage Impact Assessment of an area of proposed housing development and associated infrastructure in Kuruman, Northern Cape.

This assessment revealed low density of stone tools, however there is the occurrence of a large burial site. It is believed by the author that the site contains a few hundred in number and dates between 50 years to a century old. The burial ground lies approximately 500 m north of the old Gasegonyane settlement near the Eye, 500 m north west of the 'Old Location' and 900-1000 m north west of the 'New Location', which includes the ruins of a church.

The above mentioned former locations have left a footprint in the landscape which depict the twentieth century history of Kuruman and the workings of a segregationist and later, Apartheid policies and the ways these were expressed geographically. The author of this report recommend that parts of these remaining elements of these locations be incorporated into public memory spaces in Kuruman.

Pelser & Vollenhoven 2009 (a)

A report on a Heritage Impact Assessment Study for the proposed mining development of the remaining extent and portions 2, 3, 4 and 5 of Kapstewel 436 Kuruman registration district, Siyanda district municipality, Northern Cape Province

This report mentions the possible discovery of a single iron age site although, according to the authors, it is difficult to determine at this stage. If any major sites existed they might have been completely destroyed by recent historical mining activities. The closest known Iron Age sites in the wider geographical area include Doornfontein, Blinkklipkop (near Postmasburg) and the well-known Dithakong near Kuruman (Mitchell 2002: 346).

A number of recent, historical sites were located. These all related to recent mining activities and prospecting in the study area. These include the remains of an old mining complex. There are various prospecting trenches, mine buildings and an ore crushing facility. Although the authors state it is probably less than 60 years of age and therefore of low significance.

A second site occurred with low stone walled features, possibly dating to either the Iron Age or to earlier Later Stone Age hunter-gatherers. There are at least 3 circular and semi-circular features that might represent either windbreaks for shelters or dwellings. No artifacts were identified. The exact function or age of these features is unknown at this stage, and the authors stress that further investigation is needed.

The third site is that of a possible grave site that is of high significance.

The fourth recorded site contains at least 9 circular (stone-lined) depressions, stretched in a row along an old mine prospecting road. The function or exact age of these features is unknown, but the authors state it is possible that it is related to the recent historic mining activities in the area and that it represents a mine camp where tents were pitched. The linear layout of the site does not conform to the Iron Age and its location next to the road does seem to favour the mine camp conclusion. Bottles and other cultural material found in the vicinity also seems to date the site to the 1960's/70's.

Other sites included an old farm stead and old mining offices, all of which are less than 60 years of age.

Pelser & Vollenhoven 2009 (b)

A report on a Heritage Impact Assessment Study for the proposed mining development of the remaining extent and portions 1 of Kareepan 450 and remaining extent of Pensfontein 449 Kuruman registration district, Siyanda district municipality, Northern Cape Province.

A number of single Stone Age tools and larger scatters of stone tools were found during the survey, clear evidence that Stone Age people were active in the area. Some stone tools were also found during the survey of one of the other application areas (Kapstewel).

Van Schalkwyk 2010

Archaeological Impact Survey Report for the Proposed development of a solar power plant on the farm Bestwood 459, Kathu Region, Northern Cape Province.

This AIA was conducted by van Schalkwyk (2010) when it was proposed to develop a solar power plant on a small section of land on the farm Bestwood 459 in the Kathu region of Northern Cape Province. A large Early Stone Age factory site was identified in the area. Cores, flakes and tools dating to the late Early Stone Age and Middle Stone Age were identified. According to van Schalkwyk (2010) this site is seen to link with other sites in the vicinity, raising its significance to be high on a local level.

Van Schalkwyk 2010 (b)

Archaeological Impact Survey report for the proposed Kalahari Solar Park development on the farm Kathu 465, Northern Cape Province.

In this assessment van Schalkwyk mentions the presence of a very important site dating to the Stone Age, which occurs on the study area. However, it is mentioned that it would not be impacted on by development in this case.

Webley, L. & Halkett, D. 2008

Phase 1 Heritage Impact Assessment: Proposed prospecting on the farms Adams 328 and Erin 316, Kuruman, Ga-Segonyana Municipality in the Northern Cape

This report mentions the observation of Stone Age remains and material relating to 20th century occupation on the farms. The observations included, two ephemeral and isolated scatters of MSA material on Erin, Two 20th C graves, farm buildings which include a shed, workers cottages, a dam kraals and boreholes on Erin dating to the 20th C. On the farm Adams, two graves, a workers cottage and limestone dam all dating to the 20th C as well as a scatter of MSA and LSA stone artefacts were recorded.

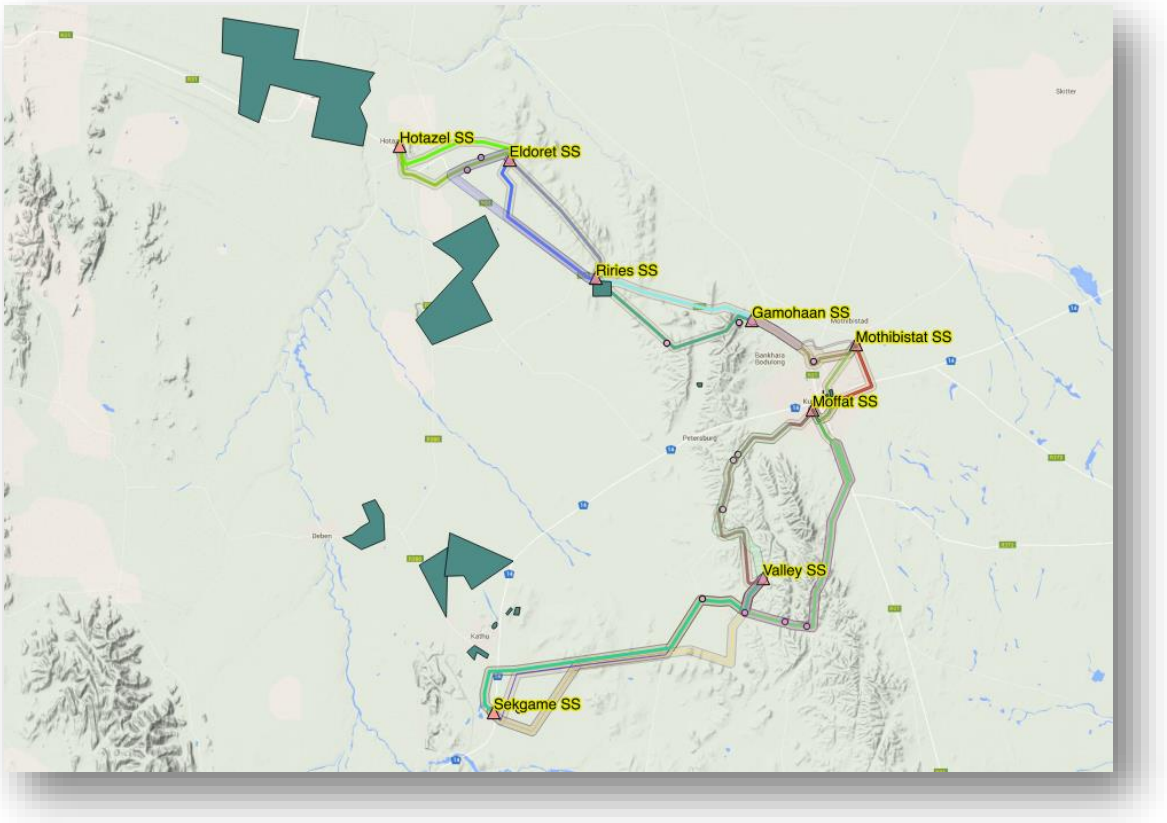


Figure 4: Position of other heritage studies mentioned in text

2.4 Background history

The aim of the archival background research is to identify possible heritage resources that could be encountered during the fieldwork. The archival research focused on available information sources, which were used to compile a background history of the study area and surrounds. This data then informed the possible heritage resources to be expected during field surveying.

2.4.1 Historic Overview of Study Area and Surrounding Landscape

The Northern Cape has a wealth of pre-colonial archaeological sites (Beaumont & Morris 1990; Morris & Beaumont 2004). Archaeological sites in the region include the world

renowned long-sequence Wonderwerk Cave, the major Tswana town and the pre-colonial stone-walled settlements of Dithakong. More locally, the two shelters on the northern and southern faces of Gamohaan (in the Kuruman Hills north west of the town) contain Later Stone Age remains and rock paintings.

Historically, Kuruman boasts one of the longest trajectories of African-colonial interaction centred on the nearly two-century old Moffat Mission, characterised by what Comaroff and Comaroff referred to as a "long conversation". Locally, the 'Eye' and the watercourse springing from it has been the focus of utilization and settlement and it was in its immediate vicinity that the town of Kuruman developed in the late nineteenth century.

The table below illustrates a sequence of events, which has shaped what Kuruman is today.

DATE	DESCRIPTION
	Settlement during the Later Stone Age Stone Age sites occur in the larger geographical area, including the well-known Wonderwerk Cave in the Kuruman Hills, Tsantsabane and Doornfontein, specularite workings and a cluster of important Stone Age sites near Kathu River. Several Stone Age sites are known for the area surrounding Kuruman, as well as along the Kuruman River (Humphreys & Thackeray, 1983; Beaumont & Morris, 1990; Parsons, 2003). Some sites contain rock engravings, such as Nchwaneng and Tsineng (Beaumont & Morris, 1990; Morris, 1988, 2002, 2003, 2005). As the wider landscape became increasingly inhabited, the San were forced to move further west and northwest to remain in the vicinity of wild game (Snyman, 1992). Two possible stone tools were found during the survey. However, these artefacts were disassociated from any wider archaeological evidence of previous settlement.
AD 400 – 1100	The expansion of early farmers, who, among other things, cultivated crops, raised livestock, made ceramic containers (pots), mined ore and smelted metals, brought the Early Iron Age (EIA) to South Africa. They settled in

	semi-permanent villages (De Jong 2010: 35).
from 15th century	The Highveld became active again due to a gradually warmer and wetter climate. From here communities spread to other parts of the interior. This later phase, termed the Late Iron Age (LIA), was accompanied by extensive stonewalled settlements, such as the Thlaping capital Dithakong, 40 km north of Kuruman (De Jong 2010: 35-36).
	Sotho-Tswana and Nguni societies, the descendants of the LIA mixed farming communities, found the region already sparsely inhabited by the Late Stone Age (LSA) Khoisan groups, the so-called 'first people'. Most of them were eventually assimilated by LIA communities and only a few managed to survive, such as the Korana and Griqua. This period of contact is known as the Ceramic Late Stone Age and is represented by the Blinkklipkop specularite mine near Postmasburg and finds at the Kathu Pan (De Jong 2010: 36).
end of the 17th century	The Tlharo seems to have been the first Tswana group to enter the Kuruman area. They originated from the Hurutshe group further to the north-east. The Tlharo moved in a southern direction down the Molopo River. Their early settlements included Khuis, Madibeng, Heuningvlei, Langeberg and Tsineng (Snyman, 1992).
During the mid-1700s	The second important Tswana group from the wider area is the Tlhaping. They originated from the Rolong group. The Tlhaping moved southward along the Harts and Vaal Rivers to the edge of the Kalahari Desert. The Tlhaping established a capital on a perennial river known as Nokaneng. Their ruler during this time was King Maswe. The exact locality of Nokaneng is not known.
1775	During the reign of Molehabangwe, who had succeeded his father Maswe, a confederation was formed which consisted of a stratified society comprised of the Tlhaping, Rolong, Tlharo, Kgalagadi and San groups. While the Tlhaping was seen as the ruler class, the Kgalagadi and San were viewed as vassals (Snyman, 1992).

1770	The Tlhaping conducted extensive trading activities with the Korana to the south and the Tswana to the north. Some of the Korana groups crossed the Orange River and came to the land of the Tlhaping. Although the initial contact was peaceful, conflict soon erupted.
Approximately 1790	The better-armed Korana managed to force the Tlhaping out of the area. This move was further augmented by the fact that the Nokaneng River had dried up.
1820	Campbell noted on his visit to Nokaneng and Kuruman that the rivers had dried up, and deep wells in the river bed supplied salt water (1922:Vol. II:125).
	The Tlhaping first moved to Kathu and then to Ga-Mopedi on the Kuruman River to eventually established themselves at Dithakong on the Moshaweng River (Snyman, 1992).
	 *Figure 5: "Tlhaping women cultivating gardens and singing" One of the sketches appearing in Dr. Andrew Smith's journal (Lye, 1975:171).*
1805	While on their way to the Kuruman River, Lichtenstein and his fellow travellers visited a small settlement consisting of, "…about thirty flat spherical huts." Although the people who stayed here were herdsmen who looked after the cattle of richer people living on the Kuruman River, they indicated that San (Bushmen) were also present in the area. Lichtenstein's

	party subsequently travelled further north to visit the capital of King Mulihawang located on a plain in the vicinity of the Kuruman River. He described the town as consisting of six hundred houses with 5000 inhabitants. The individual dwellings were described as follows: "The houses were all of a circular form, with the roof running up to a point; the roof rests on a circle of poles, which are united together below by thin walls of loam; above, for a little way below the roof, they are left open to admit light and air." (Lichtenstein, 1930:373). Lichtenstein also indicated that hedges were used as cattle enclosures.
1835	In the vicinity of Tsineng, Smith found a number of springs which the local people called Malichana. He observed a small group of Tswanas (Bituanas) as well as a Griqua family staying near the springs, and indicated that the Tswana group conducted agricultural activities in gardens laid out near the springs. From Tsineng, Smith's party travelled all along the bank of the Kuruman River, presumably to the confluence of the Ga-Mogara River. On this stretch of the journey Smith observed, "…a number of almost naked natives in the distance carrying ostrich shells and something resembling leather sacks upon their shoulders…" (Lye, 1975:181). These people were on their way to a water hole, which had been excavated some seven meters deep. Anyone wishing to obtain water had to climb down the hole making use of footholds along the sides.
23 March 1885	Britain declared a Protectorate over Bechuanaland and the Kalahari.
30 September 1885	The Protectorate was divided into two parts. The area north of the Molopo River remained the Bechuanaland Protectorate and up to 1895 was administered from Vryburg. The capital was later moved to Mafeking. The area south of the Molopo became the Crown Colony of British Bechuanaland with its capital at Vryburg (Tlou & Campbell, 1997). This area included the present study area as well as the town of Kuruman.
November 1895	In accordance with Act 31 of 1895 the area south of the Molopo River, namely British Bechuanaland, was included in the Cape Colony.

1819	Reverend Robert Moffat first arrived in the Kuruman area. He found the Tlhaping settled at Maropin in the Kuruman Valley under their ruler Mothibi.
	They subsequently moved upstream to the vicinity of present-day Kuruman. During the same time Moffat found the BaTlharo established at Tsening.
3 November 1921	The Superintendent of Natives, indicated that before the farms to the west of the Lower Kuruman Native Reserve were surveyed and ceded to different white farmers, the black people of the area "…had the run of the whole country to the Moshewing River on the one side and the Gamagara River on the other…" and grazed their livestock and conducted agricultural activities over these vast tracts of land. In an associated petition document drawn up by the Thlaro people of Bathlaros, they indicated that their agricultural lands and cattle posts used to stretch in a westward direction all the way to the "Dibeng" River, which appears to be the present-day Ga-Mogara River (NTS, 7752, 22/335).
4 May 1895	"Native reserves", including the Lower Kuruman Native Reserve, were established by virtue of Bechuanaland Proclamation No. 220 of 1895. At the time of its establishment, the Lower Kuruman Native Reserve had a population of 5425, and was 225 square miles in extent. With time, the population density and livestock numbers increased drastically. During negotiations and discussions on such an expansion of the reserve, it was indicated that a number of black people were residing outside the boundaries of the reserve. As a result of these pressures the size of the reserve was subsequently extended.

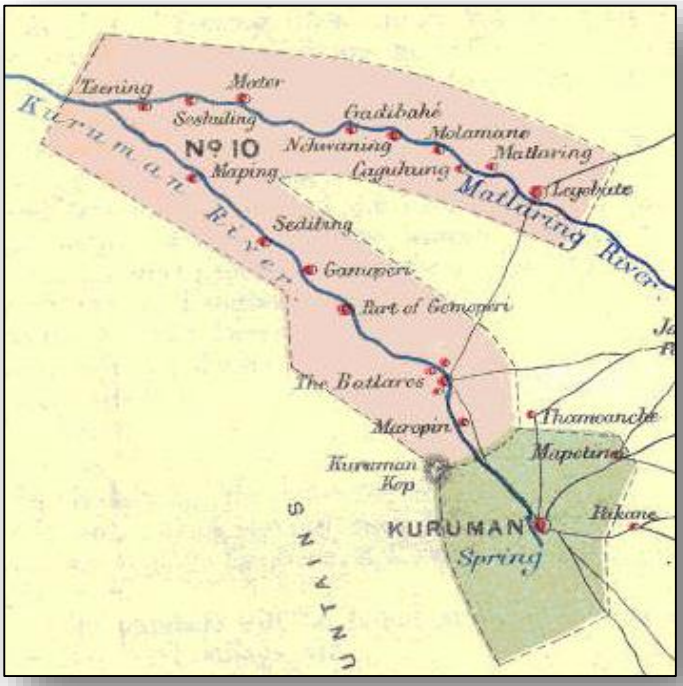


Figure 6: Map showing the original demarcation of the Lower Kuruman Native Reserve.

1897 Conflict broke out between the authorities and a Thlaping leader from Taung, Galeshewe. The conflict arose after some of Galeshiwe's cattle that were infected by Rinderpest had to be destroyed. After killing an officer, Galishewe fled to the Thlaro leader Toto of the Langeberg. Subsequently, a full-scale rebellion broke out that was eventually suppressed (Breutz, 1963).

Although most of the activities associated with the rebellion took place away from the study area and surrounding region, it can be expected that the movement of military units must have taken place a number of times in the area. From the British records, for example, it is known that military patrols traversed the area between Kuruman and Tsineng, as well as along the Ga-Mogara river.

Factors such as population expansion, increasing pressure on natural resources, the emergence of power blocs, attempts to control trade and penetration by Griquas, Korana and white communities from the south-west resulted in a period of instability in Southern Africa that began in the late 18th century and effectively ended with the settlement of white farmers in the interior. This period, known as the difaqane or Mfecane. Here, the period of

instability, beginning in the mid-1820s, was triggered by the incursion of displaced refugees associated with the Tlokwa, Fokeng, Hlakwana and Phuting tribal groups.

The difaqane coincided with the penetration of the interior of South Africa by white traders, hunters, explorers and missionaries. The first was PJ Truter's and William Somerville's journey of 1801, which reached Dithakong at Kuruman. They were followed by Cowan, Donovan, Burchell and Campbell and resulted in the establishment of a London Mission Society station near Kuruman in 1817 by James Read. Robert Moffat and his wife Mary came to Kuruman in 1820 and the mission has been known as The Moffat Mission Station ever since.

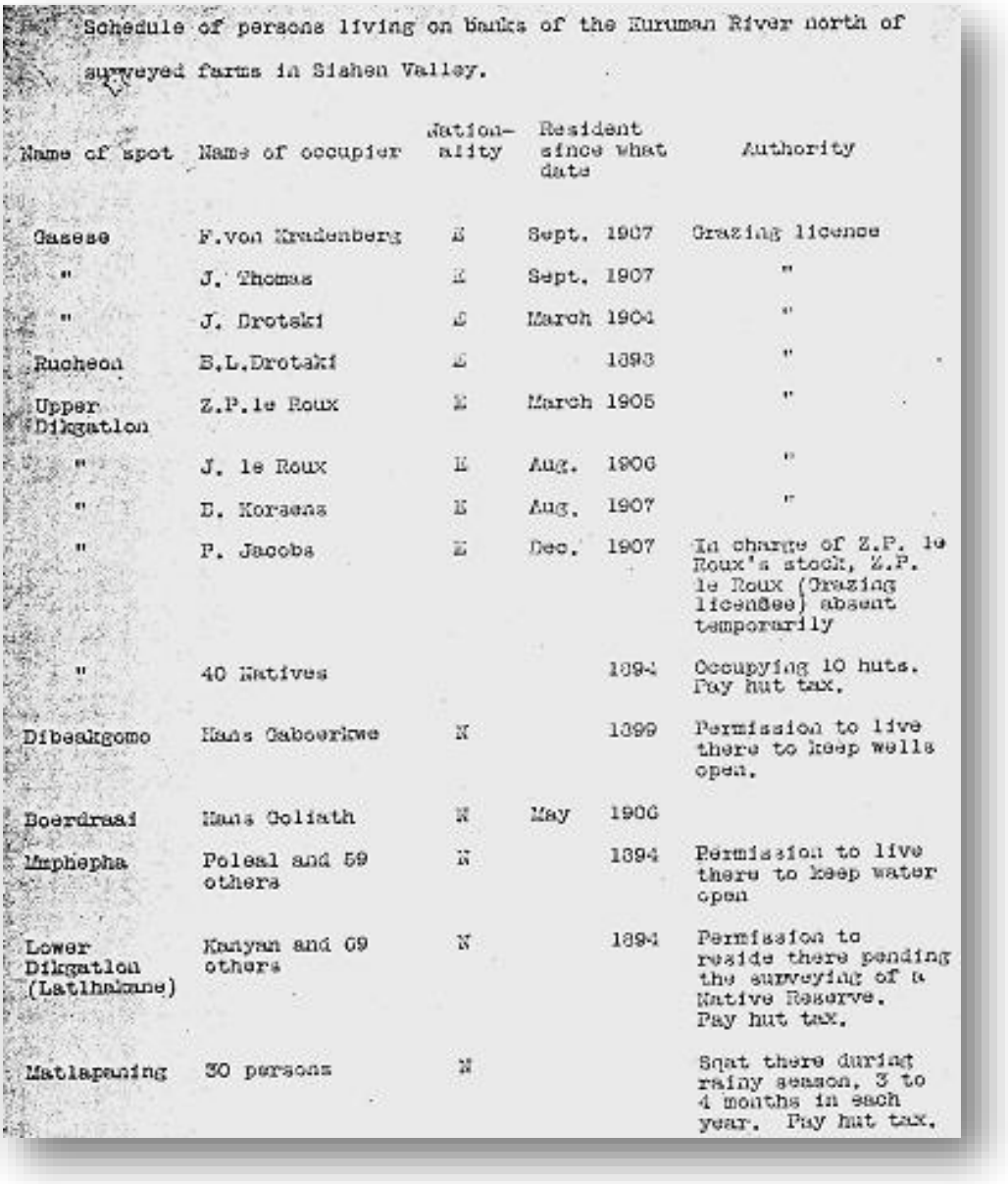
The Great Trek of the Boers from the Cape in 1836 brought large numbers of Voortrekkers up to the borders of the regions known as Bechuanaland and Griqualand West, thereby coming into conflict with many Tswana groups and also the missionaries of the London Mission Society. The conflict between Boer and Tswana communities escalated in the 1860s and 1870s when the Korana and Griqua communities became involved and later also the British government.

Although some white farmers did travel down the Kuruman River to settle in the vicinity of Boeredraai during the latter part of the 19th century, by 1897 most of them had moved away again.

The first white people to settle on a permanent basis in the area were the Le Roux family who established themselves at Dikgathlon. More families followed and subsequently also settled in the area. During a period of great drought between 1907 and 1908 many farmers of the then Cape Colony moved into these areas along the edge of the Kalahari Desert in search of better grazing for their cattle (Smit, 1966).

When the First World War (1914-1918) broke out the South African Union Government decided to attack German South West Africa. As a result a number of boreholes were dug all along the banks of the Kuruman River. These boreholes were drilled at places such as Eensaam, Kameelrus, Murray, Springputs and Van Zylsrus (Smit, 1966; Van der Merwe, 1949). After the war, farmers established themselves at these localities as borehole watchmen, in exchange for free grazing rights on the surrounding land. Subsequently, more boreholes were sunk by the Department of Lands (Smit, 1966; Van der Merwe, 1949).

At the end of the First World War the Department of Lands started distributing the farms on application under very lenient conditions. Many of the people who were already established as borehole watchmen and tenants were given first choice (Smit, 1966). Since the formulation of the Land Settlement Act No. 12 of 1912, as amended by Act No. 23 of 1917, many farms were distributed during this time, so much so that by 1929 all the farms up to Vanzylsrust were already handed out (Smit, 1966).



Schedule of persons living on banks of the Kuruman River north of surveyed farms in Siahen Valley.

Name of spot	Name of occupier	Nationality	Resident since what date	Authority
Gasese	F.von Krudenberg	E	Sept. 1907	Grazing licence
"	J. Thomas	E	Sept. 1907	"
"	J. Drotski	E	March 1904	"
Rucheon	B.L.Drotski	E	1893	"
Upper Dikgatlon	Z.P.le Roux	E	March 1905	"
"	J. le Roux	E	Aug. 1906	"
"	D. Korsens	E	Aug. 1907	"
"	P. Jacobs	E	Dec. 1907	In charge of Z.P. le Roux's stock, Z.P. le Roux (Grazing licensee) absent temporarily
"	40 Natives		1894	Occupying 10 huts. Pay hut tax.
Dibeakgomo	Hans Gaboerlwe	N	1899	Permission to live there to keep wells open.
Boerdraai	Hans Goliath	N	May 1906	
Mmphepha	Poleal and 59 others	N	1894	Permission to live there to keep water open
Lower Dikgatlon (Latlhakane)	Kanyan and 69 others	N	1894	Permission to reside there pending the surveying of a Native Reserve. Pay hut tax.
Matlapaning	30 persons	N		Squat there during rainy season, 3 to 4 months in each year. Pay hut tax.

Figure 7: Police document listing all the people who resided on the banks of the Kuruman River at the time of an inspection in 1908. The names of a number of the early white pioneers in the area are also listed here.

2.4.2 Farm Surveys

During the 1910s a full scale survey of large portions of the region was undertaken by Dirk Roos and Hendrik Wessels. While Wessels was concerned with surveying the farms from Dingle and Sishen up to Cobham and Shirley, Dirk Roos was responsible for the surveying of the farms from Mamatwan in the south to areas further north of the Kuruman River (Samangan, 1977).

Many stories are told about these two pioneering characters. As they were allowed to name the farms they surveyed, most of the farms names appearing on maps of the area were created by them. The farm Wessels, for example, was named by Dirk Roos in honour of his colleague Hendrik Wessels. Mamatwan, another farm forming part of this study, was derived from the Tswana name for a bat.

Kuruman's name is thought to be derived from the name of an 18th century San leader Kudumane (Kalahari Tourism Information Booklet p.32). Although a fair amount of information on the general history of Kuruman and the Moffat Mission Station is available,

2.4.3 Mining

The study area and surrounding region is today well known for its manganese mines. The importance of manganese lies in the fact that it is used in the manufacture of carbon steel. Dr. A.W. Rogers published a record of the geology of present-day Botswana and Griqualand West as part of the annual report of the Geological Commission of the Cape Colony in 1906. The significance ofhis publication is that Rogers found that the well-known hill from the area known as Black Rock consisted largely of manganese, a mineral ore previously undiscovered in the Cape Colony. Dr. Boardman investigated the manganese deposits at Black Rock during or directly after 1940 and published his findings in a paper he wrote for the Geological Society of South Africa. A prospector by the name of A.T. Fincham obtained options on a number of farms surrounding Black Rock. S.A. Manganese rejected these options as they felt that the Black Rock area was too isolated at the time. However, Ammosal over his options on three farms and after a further assessment by geophysicist Oscar Weiss, decided to mine the Black Rock area during mid-1940.

During 1950 S.A. Manganese surveyed a large tract of land, including the farms Wessels, Mamatwan, Dikgathlong and Dibiaghomo. Promising results over large sections of land were

found, and a drilling rig soon arrived. At Dibiaghomo ore containing a very high manganese percentage was reached. Other boreholes in the area yielded similar results and the freehold to a number of farms was obtained. When information about these discoveries leaked out and reached Ammosal, a tussle broke out between the two companies to obtain freeholds to as many farms in the mineral-rich area as possible.

Although mining operations started in earnest on Smartt, S.A. Manganese's attention was soon drawn to the farm Hotazel. A whole village was constructed on the farm, and the Hotazel mine was officially opened on 19 November 1959. Although, the mining rights of the farm Wessels had been acquired by S.A. Manganese in 1952, it was not until 1965 that the farm was again investigated. By January 1969 20 boreholes had been sunk on the farm Wessels, Dibiaghomo and Dikgathlong, which revealed three bands of manganese ore, of which the top and bottom bands were considered mineable. The official opening of Wessels mine took place on 2 May 1973. By 1976 the mine was producing 750 000 tons of ore a year (Samangan, 1977).

2.5 Significant Aspects Regarding the History and Archaeology of the Study Area

2.5.1 The Stone Age

As highlighted in the historic overview above and confirmed during the fieldwork, the study area and direct surroundings is well known for its heritage relating to the Stone Age. In this section an outline will be provided of only the Late Iron Age.

2.6 Archival and Historic Maps of the Study Area and Surrounding Landscape

From the archives several maps were identified depicting the study area. These maps are presented below with short discussion on each.

2.6.1 Merensky Map, 1887

The map depicted in

Figure 8 below is titled “Original Map of South Africa” (National Archives, Maps, 3/302). It was compiled by Reverend A. Merensky dated 1887. The map is not accurate, but provides characteristics of the study area at the time. It is evident that many of the settlements were located on the existing rivers. See for example ‘Ga Maperi’, ‘Batlaros’, ‘Old Lattaku’ and so forth.

Figure 8: Map depicting the study area and surrounding region. Note that almost all the towns are situated on or near the main rivers (National Archives, Maps, 3/302).

2.6.2 “Kuruman”, Undated

This map is simply titled “*Kuruman”*, and contains no other information (National Archives, Maps, 3/533). An important observation made from this map and which is supported by the

other data, is that the proclaimed farms at the time extended only to the vicinity of the Kuruman River, with no proclaimed farms to the west of it. Although settlements are shown to the west of the said river, these are all located on the banks of rivers.

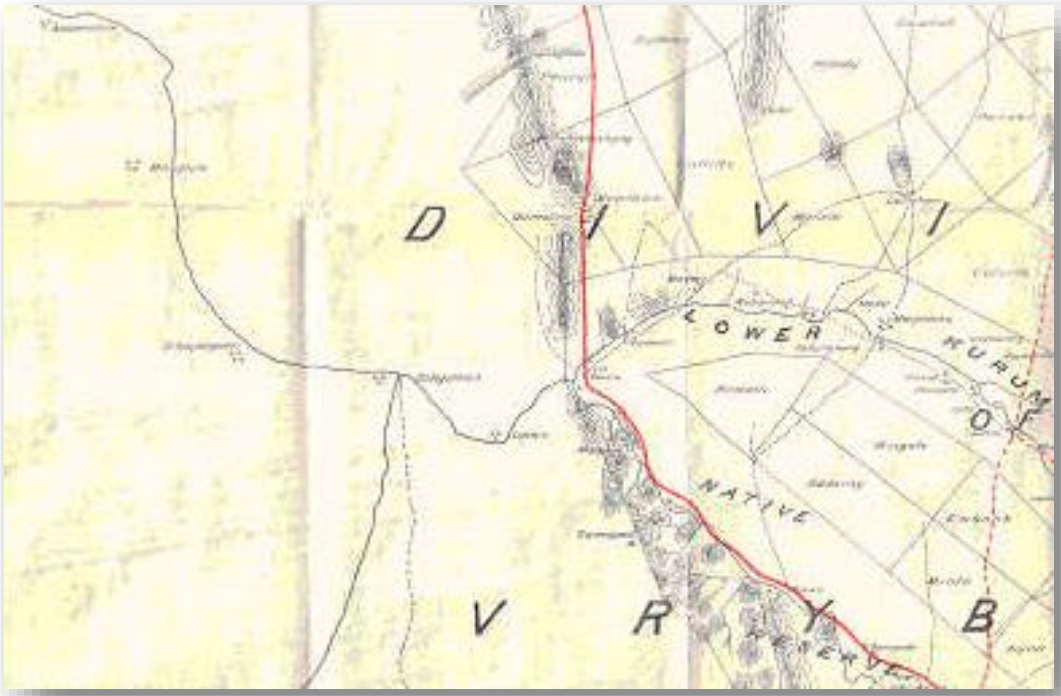


Figure 9 – Depiction of the wider landscape surrounding the study area (National Archives, Maps, 3/533). The so-called Lower Kuruman Native Reserve is shown on the right.

2.6.3 Orange River Sheet 3, 1945

This map is titled is titled "Orange River Sheet 3", dated 1945 (National Archives, Maps, 2/1085). It was produced by the Union Defence Force (U.D.F.), and although this edition is dated 1945, was drawn in 1942. The map provides a general view on the study area and the surrounding region.

No settlement features or human activity centres are shown for the area in which the farm under discussion a located. Note the way in which the secondary road (thin brown line) follows the rivers. Only the smaller roads (brown stippled line) cross over the waterless

areas. Furthermore, three Post Offices are shown, all located on the rivers. Although three mines are indicated, these are all situated closer to Kuruman.

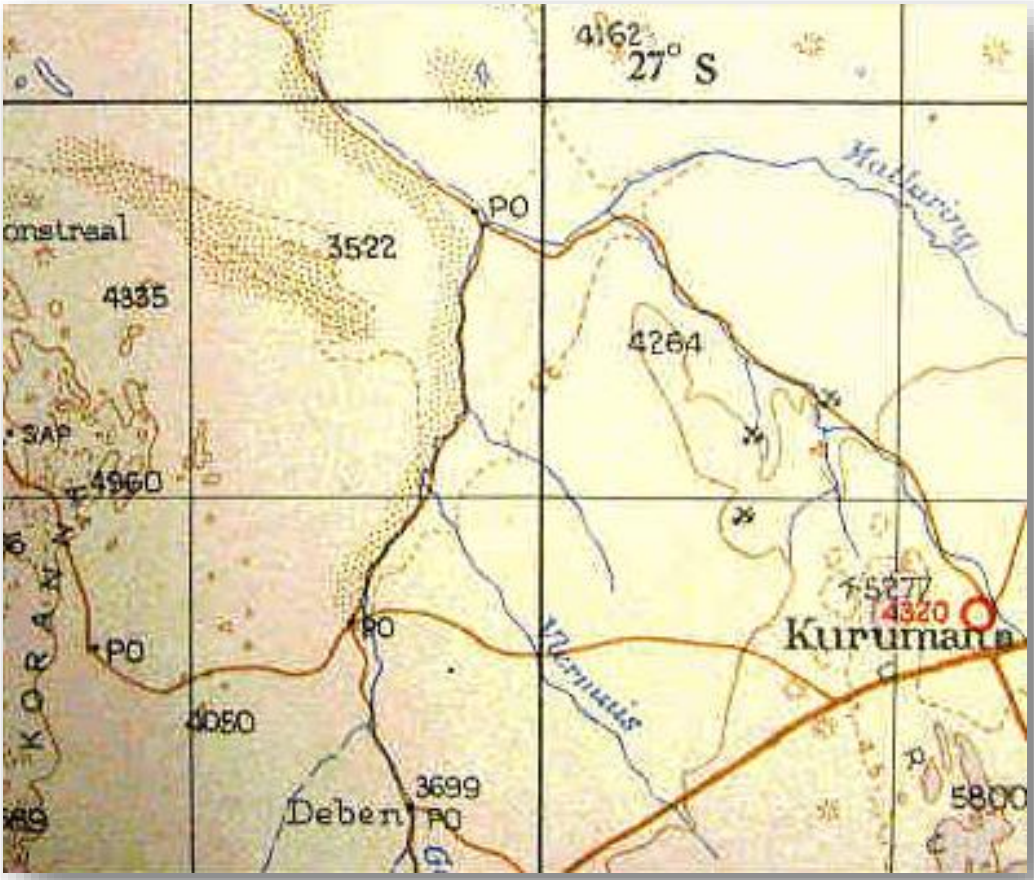


Figure 10: Map depicting the study area and surrounding region (National Archives, Maps, 2/1085).

2.7 Archaeological & Historical Sequence of the Kathu area

DATE	DESCRIPTION
2.5 million to 250 000 years ago	The Earlier Stone Age (ESA) is the first and oldest 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 more robust flaked tools. It dates to approximately <2 million years ago. The second technological phase is the Acheulian and comprises more refined stone artefacts such as the cleaver and bifacial hand axe. The Acheulian dates back to approximately 1.5 million years ago. A number of important ESA sites are known from the general vicinity, including the very significant ESA Kathu Pan and Kathu Townlands localities and also the Bestwood sites (Chazan et al, 2012) respectively northeast and northwest of the of

DATE	DESCRIPTION
	the study area. Research at Kathu Townlands was first undertaken by P.B. Beaumont (1990, 2004). The locality has a remarkable high lithic density containing millions of ESA artefacts (Mitchell, 2002; Walker et al, 2013 Walker et al. 2014). Moreover, the interface between the ESA and MSA is also represented at Kathu Pan by the transitional lithic industry of the Fauresmith (Porat et al 2010).
>250 000 to 40 000 years ago	The Middle Stone Age (MSA) is associated with flakes, points and blades manufactured by means of the prepared core technique. This phase is furthermore associated with modern humans and complex cognition (Wadley 2013). MSA sites and occurrences had been identified in the direct vicinity of the study area, including the very significant Kathu Pan localities (Wilkins & Chazan, 2012). See also, for example, Beaumont (2009) and Kruger (2014).
40 000 years ago to the historic past	The Later Stone Age (LSA) is the third archaeological phase identified and is associated with an abundance of very small stone tools known as microliths. A number of Later Stone Age sites are known from the direct vicinity of the study area. The only site identified during the HIA within the study area is also a LSA Age occurrence (see Section 6 Fieldwork Findings). According to Beaumont (2000) pecked engravings, originally from the farms Sishen 543 and Bruce 544, were donated to the McGregor Museum with some engravings located on the grounds of the Sishen Iron Ore Mine as well. These two farms are situated 5.5km and 3.3km south-west of the study area. More engraving sites are known from further afield including one on the farm Palingpan. This farm is situated roughly 44.7km south of the present study area.
800 AD – 820 AD	The archaeological excavations undertaken by Beaumont and Bashier (1974) and Thackeray et al (1983) have revealed that the mining of specularite at Doornfontein and Tsantsabane/Blinkklipkop commenced during this time. Blinkklipkop for example is located 66.7km south of the study area. During this initial period the mining activities would have been undertaken by San hunter-gatherers and Kora pastoralists. Only after the 17th century were such mining activities likely also undertaken by the Iron Age Tswana groups.
Early 1600s	The Tswana groups known as the Thlaping and Thlaro moved southward into the area presently known as the Northern Cape. A century later they were settled in areas as far south as Majeng (Langeberg), Tsantsabane (Postmasburg) and Tlhaka le Tlou (Daniëlskuil) (Snyman, 1986). In terms of the Thlaro specifically, Breutz (1963) states that after they broke away from the Hurutshe during the period between 1580 and 1610, they travelled along the Molopo River and the Southern Kalahari before arriving at the confluence of the Kudumane, Mosaweng and Molopo. From here they established themselves at Tsowe (west of Morokweng), Gatlhose (10.9km south-east of the study area), Majeng (Langberg), Khoiise (Khuis on the Molopo River) and Tlhaka-la-Tlou (present day Danielskuil situated roughly 72km south-east of the study area). It is evident that the study area and surrounding landscape would be been central within the overall settlement area of the two Tswana groups at the time.

DATE	DESCRIPTION
c. 1770	During this time the Kora moved into the area. Due to their superior firearms they applied increasing pressure on the Thlaping and Thlaro groups. In the end the Thlaping moved into a north-eastern direction to settle in the general vicinity of Dithakong, north-east of present-day Kuruman. The Thlaro settled in areas to the west and north-west of the Thlaping (Snyman, 1986).
c. 1786 – c. 1795	The German deserter by the name of Jan Bloem established himself at Tsantsabane (Blinkklip) (Legassick, 2010). This place is located 5km north-east of the present-day town of Postmasburg. The settlement of Jan Bloem at the specularite mine may have been a way in which to control the valuable site and any trading activities associated with it.
c. 1795	Legassick (2010) confirms the presence of the Thlaping, Thlaro and Kora in the general vicinity of the study area during this time. This said the study area and surrounding landscape would have represented a western peripheral area of the overall landscape occupied by especially the Thlaping and Thlaro groups at the time. From a map depicted in Leggassick (2010:338) it is evident that at the time the Kora started moving in north-eastern direction from the areas along the central Orange river to the banks of the Harts River.
Early 1800s	After the threat of the Kora became less intensive, the Thlaping moved to the vicinity of present-day Kuruman. The Thlaro returned to the Langeberg, establishing them on a permanent basis there during the 1820s (Snyman, 1986). The settlement of the Thlaping in the vicinity of Kuruman occurred during the reign of Molehabangwe. This period in the history of the Thlaping was seen as a period of wealth and power, and at the time they even had control of the *sibello* quarry near Blinkklip (Legassick, 2010).
1801	The first known visit to this area by European explorers (i.e. excluding European renegades and fugitives such as Jan Bloem) took place in 1801. The journey was undertaken by P.J. Truter and Dr. W. Somerville. They crossed over the Orange River in the vicinity of Prieska, and passed Blinkklip on their way to present-day Kuruman (Bergh, 1999). Although their exact route is not known, it is possible that their journey from present-day Postmasburg to Kuruman would have passed some distance to the east of the present study area.
1802 - 1813	During this year William Anderson and Cornelius Kramer, both of the London Missionary Society, established a mission station at a place called Leeuwenkuil. The focus of their work was a group known as the Bastards (Erasmus, 2004). This group could be described as a cultural conglomeration descending not only from relationships between different cultures and races (i.e. European and Khoi), but also comprised remnants of Khoi and San groups as well as freed slaves. The particular group later became known as the Griqua. Due to the problems caused by the presence of lions at Leeuwenkuil, the mission station was moved in 1805 to Klaarwater. On 7 August 1813 the name of the settlement which had sprung up here was renamed Griquatown. This came about as a result of a number of proposals made by Reverend John Campbell, the Director of the London Missionary Society who was visiting the mission stations from this area at the time. He suggested that "...*the Bastards change their name to*

DATE	DESCRIPTION
	'Griqua' and that Klaarwater became Griquatown. This was because 'on consulting among themselves they found a majority were descended from a person of the name Griqua'..." (Legassick, 2010). Griquatown is located 129km south of the present study area.
1805	During this year German explorer Martin Hinrich Carl Lichtenstein travelled through the general vicinity of the study area. After crossing the Orange River in the vicinity of present-day Prieska, Lichtenstein's party visited present-day Danielskuil, and by June 1805 they were at Blinkklip (Postmasburg), a well-known source for obtaining specular haematite. Archaeological investigations at Blinkklipkop (also known as Nauga) established a date of AD 800 for the utilization of this particular rich source (Thackeray, et al 1983). From here they travelled further north and reached the Kuruman River where they met Tswana-speaking people. They followed the river downstream for three days, after which they followed a tributary to reach Lattakoe. From here they turned south and reached the Orange River on 11 July 1805. While on his way to the Kuruman River (and to the south thereof), Lichtenstein visited a small settlement consisting of "*…about thirty flat spherical huts.*" Although the people staying here were herdsmen who looked after the cattle of richer people living on the Kuruman River, they indicated that San (Bushmen) were also present in the area (Lichtenstein, 1930). Although Lichtenstein was certainly not the first European explorer to travel through this area (the Truter & Somerville expedition had for example passed through this area in 1801), or for that matter the last (Burchell travelled through the area in 1811 followed by John Campbell in 1813) (Bergh, 1999), Lichtenstein did leave behind a written record of this journey providing a valuable glimpse into the early history of the general surroundings of the study area. What is also significant about the visit of Lichtenstein is that his journey took him from present-day Postmasburg to a place known as Tsenin which is located north-west of Kuruman. As a result he would have passed in close proximity to the present study area.
1813	During 1813 John Campbell of the London Missionary Society also visited the general vicinity of the study area. He arrived at Klaarwater on 9 June 1813, where he rested for a few days before continuing in a northern direction toward present-day Kuruman, passing through Blinkklip on the way (Bergh, 1999).

DATE	DESCRIPTION
	 *Figure 11: Reverend John Campbell (Campbell, 1815). He passed through the general vicinity of the study area during his travels from Klaarwater to Kuruman.*
20 December 1820	On this day Andries Waterboer was elected as leader of Griquatown in the place of Berend Berends (Legassick, 2010). This period saw fission within the Griqua community, and it is not surprising that two long-term leaders moved away from Griquatown to establish autonomous settlements away from their former town. Berend Berends for example moved to Danielskuil (72km south-east of the study area), whereas Adam Kok II established himself in the vicinity of Campbell (138km south-east of the study area) (Legassick, 2010).
1821 – August 1828	During this period a group of Griqua became dissatisfied with Waterboer and moved away from Griquatown to first settle along the Modder River. This group was known as the Bergenaars and was supported by Kora and San elements (Cope, 1977). A section of the Bergenaars known as the Klein Bergenaars (Little Bergenaars) settled along the Langberg. This mountain range is located roughly 35km west of the present study area. The Bergenaars constantly attacked the Thlaro, Thlaphing as well as the Griqua. On three separate occasions (Late 1824, July 1827 and December 1827) they attacked Griquatown itself. They also attacked the London Missionary Society station at Kuruman on several occasions with the last attack taking place in August 1828 (Cope, 1977).
1824	Robert Moffat of the London Missionary Society established the mission station at Kuruman (Erasmus, 2004).
Early 1830s	During this time Andries Waterboer stationed a number of Griqua families at a fountain north of Tsantsabane (Blinkklip) as well as at Danielskuil (Legassick, 2010).

DATE	DESCRIPTION
22 April 1842	On this day a treaty was signed between Griqua leader Andries Waterboer and Thlaping leader Mahura at Mahura's settlement near Taungs. The agreement included a definition of the boundary between the two groups. The section of the agreed upon boundary closest to the study area ran from "...*the northerly point of the Langeberg and extending a little south of Nokaneng, and further half-way between Maremane and Klipfontein*..." (Legassick, 2010:291). While the exact location of Nokaneng is not currently known, the farms Klipfontein 437 and Maremane 678 are situated 44.6km and 27.6km to the south. This suggests that the present study area was located north of the boundary line between the Griqua and the Thlaping as defined in the treaty. As such, the study area was defined within this treaty as forming part of the land of the Thlaping. However, it must be noted that this boundary line was not cast in stone. This boundary was very similar to an earlier one that was thought to have been agreed to during the 1820s as a boundary between the Griqua and the Thlaping (Legassick, 2010).
1850	During this time a Thlaro leader by the name of Molete and his baThlaro baga Keakopa followers moved away from the Korannaberg and established themselves at Gathlose, roughly 10.9km south-east of the study area. Breutz (1963) states that the land around Gathlose and Maremane used to belong to the Kora (Koranna) people and that they gave permission to Molete to settle here. After his death between 1885 and 1890, Molete was succeeded by Holele who ruled until his death during the Langberg Rebellion of 1897. Holele was succeeded by Kebiditswe John Holele who filled the post until 1912 when he was succeeded by his younger brother Kgosieng. Kgosieng ruled until he was pensioned on 28 February 1937, and was succeeded by Kebiditswe's son, Kgosietsiele Smous. Kgosietsiele died on 30 June 1956 and was succeeded by his son Frank Motsewakgosi Holele (Breutz, 1963). Likely between 1850 and 1860 the area known as Maremane (located directly north of Gathlose) was an outpost grazing area of the BaThlaro chief Makgolokwe and his son Toto. The first designated leader of this area was Isaak Thupane, followed by Toto's son Robanyane who fled to present-day Namibia after the Langberg Rebellion of 1897. He was succeeded by his father's brother Jan Molebane Toto. However, the government only recognised him as chief in 1912 up to which point John Holele of the Gathlose Reserve was appointed by the government to act for the Maremane area as well. Molebane was dismissed in 1925 and was succeeded in 1926 by his brother David Makgolokwe. David Makgolokwe remained at his post until his death in 1942 when he was succeeded by Puso Togelo who remained as leader until his death in 1954. He in turn was succeeded by Felix Kgosithebe Toto (Breutz, 1963).
1850 – 1855	During this period a Thlaro chief by the name of Isaak Thupane established himself at Logageng (Gatkoppies) near Postmasburg. He subsequently moved with his followers to Groenwater 453. During the time that Thupane was living at Logageng, Kgangeng discovered the fountain at Metsematale. Subsequently, the land was ceded by Waterboer to the Thlaro and Kgangeng and his followers settled at Groenwater as well. The farm Groenwater 453 is located 57.9km south-east of the present study area.

DATE	DESCRIPTION
13 December 1852	After the death of Andries Waterboer, his son Nicolaas Waterboer became the leader of Griquatown. He ruled Griquatown until the annexation of the area by the British in 1871 (see below) (Legassick, 2010). It was during the rule of Nicolaas Waterboer that diamonds were discovered in the area which led to a period of claims and counter-claims between the Griqua, the Orange Free State as well as the Zuid-Afrikaansche Republiek and which eventually led to the annexation of the area.

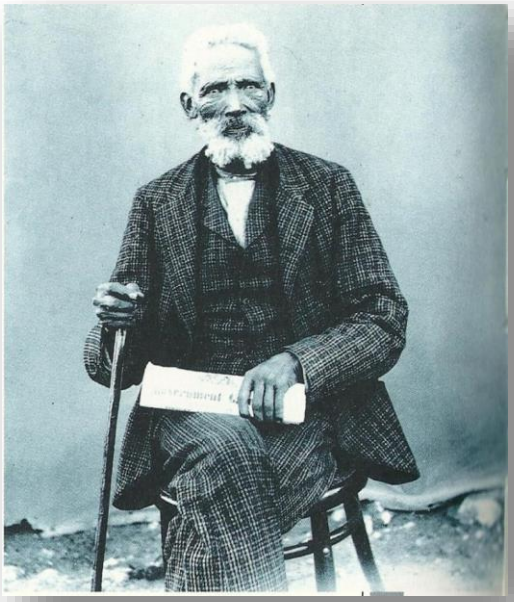


Figure 12: Nicolaas Waterboer, who succeeded as leader of Griquatown in 1852 after the death of his father Andries Waterboer (Reader's Digest, 1994:168).

Before 1856	During the period before 1856 the Thlaro leader Masibi occupied the area known as Skeyfontein, which is located 74.3km south of the study area.
1867	Diamonds were discovered for the first time in South Africa near Hopetown. Alluvial diamonds were also discovered along both banks of the Orange River (Van Staden, 1983).
27 October 1871	The area located in general terms between the Orange and Vaal Rivers and south of Kuruman was proclaimed as British Territory and named Griqualand West (www. wikipedia.org). The study area fell outside and to the north of this territory at the time.
1878	A rebellion broke out amongst some of the Tswana communities living in Griqualand West. This rebellion, which was a response to British expansion and colonialism, spread to the Langberg. A British force left Griqualand West in October 1878 and defeated the "rebels" at the Langberg (Snyman, 1986).
30 September	Sir Charles Warren proclaims the area between the Molopo River and the

DATE	DESCRIPTION
1885	northern boundary of Griqualand West as the Crown Colony of British Bechuanaland. Its western boundary was defined by the Molopo River and its eastern extremity reached as far as Mafeking. The proclamation followed on a military operation under Warren's command to occupy the Boer Republics of Stellaland and Goosen. As a result the Crown Colony of British Bechuanaland included the lands of the two republics as well as the land of various Tswana groups. (www.wikipedia.org). At the time the study area was located near the southern boundary of this newly proclaimed territory.

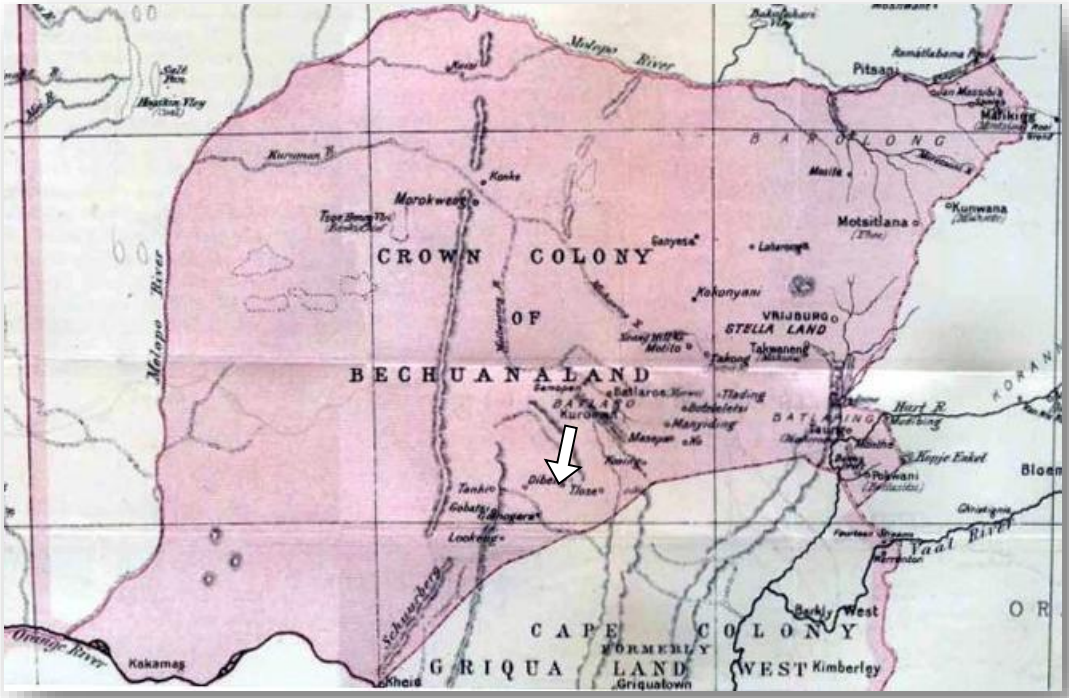
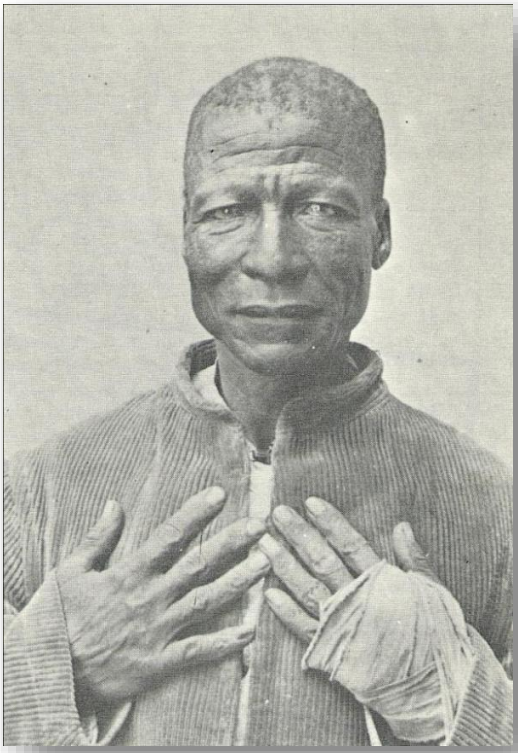


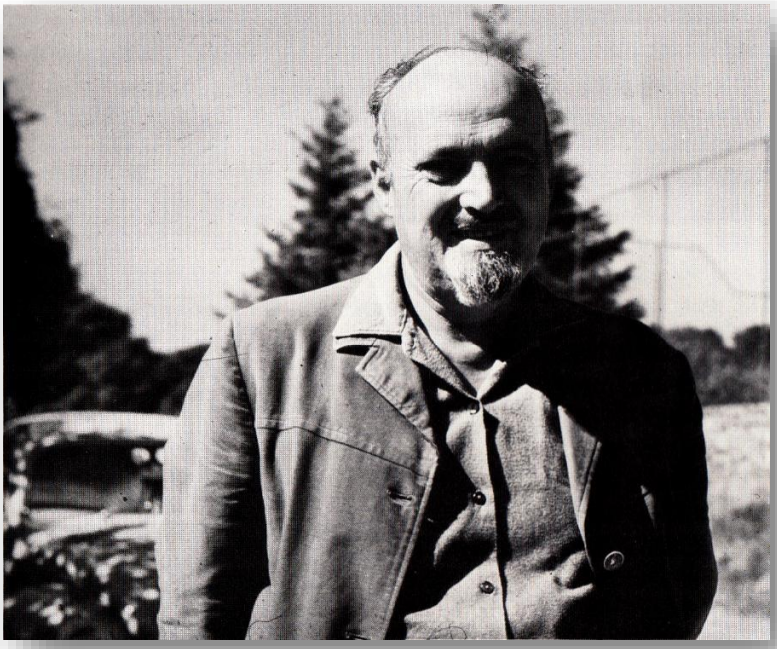
Figure 13 - Section of a map titled "Sketch Map of British Bechuanaland" which is dated to May 1887 (www.wikipedia.com) (www.kaiserscross.com). The approximate position of the study area is shown.

1886	As a result of the work of a commission appointed by the British rulers of the Crown Colony of British Bechuanaland, a number of so-called "native reserves" were established in this area. These included Deben (19.1km north-west of the study area), Gatlhose (11.5km east of the study area), Maremane (27.9km south-east of the study area), Langberg (directly south-west of the farm Sekgame) as well as Kathu (directly west of the farm Sekgame) (Snyman, 1986). The establishment of so many "native reserves" in close proximity to the study area clearly support the suggestion made earlier that the study area was centrally located in the historic and prehistoric territories of Tswana groups such as the Thlaro and Thlaping. In the same year a trader by the name of John Ryan established a shop on the

DATE	DESCRIPTION
	farm Bishop's Wood. This farm is located 12.1km west of the study area.
16 November 1895	The Crown Colony of British Bechuanaland was annexed by the Cape Colony (www.wikipedia.org).
September 1896	During this time a viral disease affecting cattle (and some other species of even-toed ungulates) known as Rinderpest swept through Southern Africa (www.wikipedia.org). Although attempts were made to halt the spread of the disease from the north by erecting a fence between the boundaries of Griqualand West and Bechuanaland, this proved unsuccessful. Incidentally, only three gates were placed in this fence, namely at Gatlhose, Nelsonsfontein and Blikfontein (Snyman, 1988). Of these three places, Gatlhose is the closest and is situated 10.9km south-east of the study area.
	
	Figure 14: An everyday scene during the Rinderpest Epidemic (Snyman, 1983:20).
1897	The Rinderpest epidemic did not only have a massive socio-economic impact on the landsccape, it also resulted in the Langberg Rebellion of 1897. During this time conflict broke out between the authorities and a Thlaping leader from Taung, namely Galeshiwe. The conflict arose after infected cattle belonging to him were destroyed by representatives of the government as a way of kerbing the spread of the disease. After killing an officer, Galishewe fled to the Thlaro leader Toto of the Langberg. Subsequently, a full-scale rebellion broke out (Breutz, 1963). The British authorities eventually mustered a military force which included sections of the Cape Mounted Rifles and Bechuanaland Field Force and which on 14 March 1897 stood at roughly 1,000 men. Opposing this formidable and well equipped force supported by artillery the Tswana rebels possessed an army of roughly 1,500 men who from the start of the rebellion already experienced serious shortages in the way of provisions and ammunitions (Snyman, 1986). Although most of the activities associated with the rebellion took place some

DATE	DESCRIPTION
	distance to the west of the study area, the impact of the rebellion was felt throughout the surrounding landscape. Some noteworthy skirmishes took place on 9 May 1897 at Puduhush (some 31.8km south-west of the study area) and on 30 July 1897 at Gamaluse and Gamasep (29.9km west of the study area). Furthermore, the main British force under the overall command of Lieutenant-Colonel E.H. Dalgety used the farm Bishop's Wood as a base of operations (Snyman, 1986). The farm Bishop's Wood is located 11.9km west of the study area. The rebellion was suppressed and came to an end with the surrender of rebel leader Toto, his son Robanyane and their Thlaro followers on 2 August 1897 (Snyman, 1986).
	 ***Figure 15: Toto, leader of the Thlaro along the Langberg (Snyman, 1986:17).***
1899 - 1902	The South African War was fought between Great Britain and the Boer republics of the Zuid-Afrikaansche Republiek and Orange Free State. However, no skirmishes or battles from this war are known from the direct vicinity of the study area. The closest known battles and skirmishes to the present study area include Kareepan on 10 August 1901 and Doornfontein in February 1902 (Snyman, 1983). These farms are located roughly 54km south and 52km south-east of the study area respectively.
1907	A number of trekboers from the southern Free State arrived in the general vicinity of the present study area (Erasmus, 2004).

DATE	DESCRIPTION
1913	In this year the so-called "Native Locations" of Skeyfontein and Groenwater were established by Proclamation 131 of 1913 (Breutz, 1963).
1914	The town of Dibeng was laid out in 1914 on the banks of the Ga-Mogara river. This followed on the establishment of the Dibeng Dutch Reformed Church parish in 1909 (Erasmus, 2004).
1927	Gamagara Manganese Corporation Ltd and Central Manganese Ltd obtained options on farms in the vicinity of Lomoteng and Sishen (Snyman, 1988).
4 November 1930	On this day the extension of the railway line from Koopmansfontein to Postmasburg was officially opened by the Minister of Railways, C.W. Malan. This meant that Postmasburg was now one of the few towns in the Northern Cape which boasted a direct rail link. While the extension of the railway line to Beeshoek was built by the Manganese Corporation further extensions to Lohatla and Manganore (1936), Sishen (1953) and Hotazel (1961) were undertaken by the South African Railways (Snyman, 1983).
1930 - 1932	During 1930 an Englishman by the name of Pringle-Smith was appointed by S.A. Manganese to devise and execute a "...*thorough prospecting programme of S.A. Manganese's properties*..." (S.A. Manganese, 1977:46). This meant that the prospecting work undertaken in 1927 and which had been halted due to the poor financial climate and the lack of a railway link could now be proceeded with. Within a relatively short spate of time Pringle-Smith started opening up the beds on the farms Kapstewel and Doornput. However, the company did not have the market which for example the Manganese Corporation possessed at the time, and as a result the ore was stockpiled at these two farms. Pringle-Smith left the Postmasburg area in 1932 after the financial implications of the Great Depression worsened the situation for S.A. Manganese to such an extent that he was asked to agree to a much lower salary (S.A. Manganese, 1977).
Early 1930s	Due to the financial impacts of the Great Depression, a number of smaller manganese mining companies were closed down. A period of amalgamation followed which resulted in the South African Manganese Limited as well as the Associated Manganese Miners of South Africa Limited becoming the leaders in the manganese mining industry (Snyman, 1983).
c. 1932 - 1937	During this approximate period a geological assessment of the minerals and ore deposits of the Postmasburg District was undertaken by the South African Geological Survey. One member of the geological team was Dr. Leslie Gray Boardman. His responsibility was to work on manganese and haematite deposits in the district. Apart from the manganese deposits near Postmasburg, Dr. Boardman also identified large deposits of iron ore deposits on farms along the northern end of their area of study including Sishen, Bruce and King (S.A. Manganese, 1977). These three farms are located 3.4km, 3.5km and 12.9km south of the present study area.

DATE	DESCRIPTION
	 ***Figure 16: Gr. Leslie Gray Boardman, the geologist who during the 1930s realized the immense potential of the Sishen area for iron ore mining (S.A. Manganese, 1977:65).***
c. 1936	After the willingness of the South African Railways Administration to extend the railway line from Postmasburg to Kapstewel and Lohatla became known, the entire manganese industry north of Postmasburg changed for the better. An example of this was that S.A. Manganese stepped up operations on the farm Kapstewel. The work here was overseen by Captain T.L.H. Shone (S.A. Manganese, 1977). The promise of railway extensions to this area also resulted in other mining activities such as the establishment of a mining company by the name of Gloucester Manganese. This company was established to mine the manganese deposits on the farm Gloucester. Shortly thereafter an amalgamation took place between Gloucester Manganese and the Manganese Corporation which resulted in the formation of the Associated Manganese Mines of South Africa Limited (Ammosal). Ammosal re-erected the old ore handling plant from Beeshoek on the farm Gloucester and the operations here represented a large portion of the total manganese production of 250,000 tons (S.A. Manganese, 1977). The farm Gloucester is situated 36.5km south of the study area.
1937	The farm to the east of Gloucester, named Lohatla, was now being viewed more favourably by S.A. Manganese. During this year they reached an agreement with the owner, which eventually resulted in the acquisition of the farm (S.A. Manganese, 1977). During the same year the company bought the freehold of the farm Klipfontein and also bought 600 morgen of the farm Kapstewel in order to build a staff village. This village was named Manganore (S.A. Manganese, 1977).

DATE	DESCRIPTION
	The Lohatla mine village was also established during this time (Snyman, 1983). Furthermore, the African Metals Corporation Limited (Amcor) was established "…*to manufacture semi-processed iron and steel products*…" and in 1937 obtained the farm Demaneng for this purpose. However, this venture was a failure (Snyman, 1988:84). The farm Demaneng is located 8.1km south-east of the study area.
Late 1940s	During this time the decision was made by two of the bigger role players in the manganese mining industry around Postmasburg for the mining of haematite iron ore to commence in earnest. S.A. Manganese in conjunction with the African Metals Corporation (Amcor) established a new company known as Manganore Iron Mining Ltd. to work on the iron ore deposits owned by them. These deposits were *inter alia* located on the farms Klipfontein, Kapstewel and Doornput (S.A. Manganese, 1977). All three these farms are located roughly 45km south of the present study area.
c. 1950	At the time Dr. L.G. Boardman was assessing the ore reserves at Manganore and Lohathla as well as the farm Lilyveld for S.A. Manganese. He found that the latter farm contained large quantities of haematite iron ore and persuaded the directors of S.A. Manganese to acquire the farm (S.A. Manganese, 1977). The farm Lilyveld is situated directly south and adjacent to the farm Sekgame and is roughly 5.1km south of the study area.
1953	Iscor commenced iron production at Sishen (Snyman, 1983). In the same year the railway line from Postmasburg to Sishen was extended to haul ore to Iscor's plants in Pretoria, Vanderbijlpark and Newcastle (Erasmus, 2004).
1958	At least by 1958 Manganore Iron Mining also owned mineral and surface rights on the farm Sekgame. The study area is of course located on this farm.
1973	In this year a second mine was opened at Sishen to supply export iron ore to Saldanha Bay. During the same year the town of Kathu was established to accommodate employees for the new mine (Erasmus, 2004).
1976 - 1977	During this time the Gatlhose and Maremane Communities were removed from their land and taken to the Shipton Farms in the then homeland of Bophutatswana. After their removal, the South African Government decided to establish a Battle School here. As the Khosis Community was still staying on the land, they were moved to a section of the original land roughly 14 000 hectares in extent. The Lohatla Battle School was subsequently established (www.lrc.org.za/Docs/Judgments/khosis.doc).
1977	During this year the 860km long Sishen-Saldanha railway line was completed (Erasmus, 2004).
1980	In 1980 the town of Kathu received municipal status (Erasmus, 2004).

2.8 Further background on Stone Age of Kathu

2.8.1 Kathu Pan

A site complex not far from the R380, some 5 km north-west of Kathu, where the excavation of many dolines between 1980 and 1990 revealed stratified infills variously containing Ceramic Later Stone Age, Wilton, Oakhurst, Early Later Stone Age, Howieson's Poort, earlier Middle Stone Age, Fauresmith, and Acheulean assemblages (Beaumont 1990; Beaumont & Vogel 2006).

The Kathu Pan has a rich source of archaeological and faunal deposits. Kathu Pan 1 is unique among the sites of the Kathu Complex in that it includes these faunal remains (Klein, 1988). The fauna from Kathu Pan 1 include species such as hippopotamus that point to a far wetter environment than is found in the region today (Walker et al. 2013).

Previous investigations have produced artefacts of extraordinary technological skills in the form of hand axes and pointed flakes dating from all phases of the Stone Age (Dreyer, 2013). An unusual conjunction of geological circumstances led to the stratified preservation of an exceptional human record representing three phases of the Early Stone Age, two phases of the Middle Stone Age and about the entire Later Stone Age sequence. The Acheulean evidence from the Kathu Pan site is of particular significance and the information provides a basic typological framework for a large part of the Middle Pleistocene (Dreyer, 2013).

Dreyer (2013) explains that several seasons of excavations by Peter Beaumont, assisted by other specialists have been performed at Kathu Pan in the past. These excavations produced amongst other finds, portions of clay vessels, ostrich eggshell fragments, Middle Stone Age artefacts, prepared cores, long lithic blades, retouched points and material classified as Fauresmith artefacts. Further finds include coarse Acheulean hand axes and a variety of scrapers. The flakes represent the banded ironstone material found in the area. Grass pollen, indicating prehistoric vegetation, had been recovered. The investigations at Kathu Pan also produced the remains of large mammals, such as elephant, zebra, rhino, hippo, buffalo and giraffe, together with a variety of antelope and buck (Beaumont 1990).

The site of Kathu Pan 1 has produced a sequence of ESA deposits. Research on this site has produced the earliest evidence for human use of spears for hunting (Wilkins, et al., 2012) and some of the earliest known evidence of blade production (Wilkins & Chazan, 2012).

Figure 17: The location of the sites as indicated by Beaumont (1990, 2006).

2.8.2 Kathu Townlands

A rich deposit of Early Stone Age (ESA) characterised as a banded-ironstone quarry site which as yet remains to be described in detail in terms of spatial extent, though seemingly spread over not less than some 250 000 m2. The south eastern part of the Kathu Townlands site was subjected to intensive investigation in relation to the Rooisands Mall project, revealing that deposits up to a meter deep are exceedingly rich in artefacts, including bifaces and debitage, and material consistent with its interpretation as a quarry site. An important finding, documented in test excavations and development-related trenches, was that the apparent edge of the 'site' as it dips beneath the sands is misleading, and that calcrete growth sub-surface to the east of this point incorporates artefacts albeit in diminishing thicknesses (Walker et al. 2013).

2.8.3 Bestwood sand quarries

The archaeological deposits on the Farm of Bestwood 459, specifically those discovered in a sand quarrying activity, were first described in 2008 (Dreyer, 2008). These deposits, situated to the east and north east of the Bestwood Township Development, have since become a central portion to the archaeological research being undertaken at Kathu (Chazan, et al., 2012). A preliminary investigation in 2010 identified a lithic industry characterized by well-made handaxes, well retouched scrapers, occasional blades and a great diversity of core types, including choppers, polyhedrons, discoidal cores and unidirectional Levallois cores. In 2012, excavations by Chazan and Walker opened an area of 36 m2 exposing these deposits in plan. This excavation confirmed that the industry found in surface collection is found in situ in a single horizon under the covering sands (Morris 2014). According to Morris (2014) it is very likely that archaeological material extends beyond the limits of the quarry. Further field observations in 2012 and 2013 in the area have revealed artefact rich deposits directly beneath the sands further to the south. The sands that cover the Bestwood 1 archaeological horizon extend northwards towards the east of Uitkoms. Early Stone Age tools are found dispersed across these hills, in some areas at very high density, lying directly on exposed bedrock (Walker et al. 2013).

2.8.4 Uitkoms

There are also archaeological materials in the area around the Kathu Cemetery and across the farm of Uitkoms that have been designated by Beaumont as Uitkoms 1, 2, 3 & 4 (Morris 2014).

At Uitkoms 1 foot search and a test pit pointed to similar lithic densities, debitage frequencies as those found at Kathu Townlands 1 (Beaumont 2008, Morris 2014). This site is a locality on the crest of Kathu Hill, roughly 2 km north-east of Kathu, where a test pit in the early 1990's yielded 9,000 artefacts of Late Acheulean ascription in a 0.8 m deep banded ironstone rubble, with a foot recce showing that similar material extended for many hundreds of meters along high ground to the north-east, from which it is inferred that this site, seemingly largely on Hartnolls 458, could be larger than Kathu Townlands (Beamont 2013).

During an inspection in 2006 of two road cuttings along the N14, about 3 and 5 km north-east of Kathu, showed that both Uitkoms 2 & 3 contained Earlier Stone Age artefacts in a

thin banded ironstone rubble, with Uitkoms 2 perhaps the downslope limit of a site that may stretch eastwards along a ridge to within Hartnolls 457, while Uitkoms 3 could be a northern extension of Uitkoms 1 (Beamont 2013).

Uitkoms 4 is described as a buried site at approximately -100 m wide, "where bifaces are very similar to those from the quarries, but with a formal tool incidence about a thousand times higher, and like that at a typical occupation site" (Beaumont 2008: 3). Found by Kobus Dreyer, collections from this partly exposed locality, situated just east of a cemetery flanking the N14, include refined handaxes, one V- shaped cleaver, a partially backed blade, and a few irregular flakes, and cores, mainly on jaspilite, except for a few quartzite specimens that almost certainly came from the Langeberge, about 40 km and more to the west (Beamont 2013).

2.8.5 Sishen Mine

A terrain approximately 12 km south-west of Kathu, where G & S Collins, in the 1960's, made collections of items (mainly ceramics) associated with since- destroyed specularite workings, and where G & D Fock recorded pecked engravings on white shale outcrops on Sishen 543 and Bruce 544, of which some were donated to the McGregor Museum prior to blasting in the 1970's (Beamont 2013).

2.8.6 Mashwening 1

Lying approximately 20 km south of Kathu, on the eastern side of that farm, is a low specularite outcrop covered by dozens of 2 m deep extraction pits, where a test trench in the late 1980's yielded superficial Ceramic Later Stone Age above a specularite rubble with Earlier Stone Age material, but it remains to excavate a much larger area in order to see if some pit sections or contents point clearly to mining at that time (Beamont 2013)

2.8.7 Wonderwerk Cave

This site occurs on the eastern flank of the Kuruman Hills, some 50 km south- east of Kathu where the 1978 – 1993 excavation of stratified sediments, with an accumulative depth of over 5 m, produced an industrial sequence extending upwards from Oldowan to historical times, and with signs of man-made fire in ~1.7 million year old and later levels (Beaumont 1990; Beaumont & Vogel 2006; Beaumont 2011).

Utilising the Kathu Pan and Wonderwerk Cave sequences, has made it possible to construct a long industrial succession of verifiable relative age, and to obtain chronometric ages for some of the assemblages, by means of half a dozen dating techniques, in order to produce a tentative regional timescale for much of human history (Beamont 2013).

2.9 Palaeontology

An analysis of the SAHRIS paleontological sensitivity map (**Figure 18**) indicates that 70% of the study area is under lain by paleontological sensitive geology. Interpreting this data according to the SAHRIS guidelines **(**Table 10) indicates that a field assessment and protocol for finds will be required for large sections of the alternative alignments.

It is recommended that a full Paleontological Impact Assessment (PIA) be initiated during the pre-construction phase when the heritage walk down of the final alignment will be done.

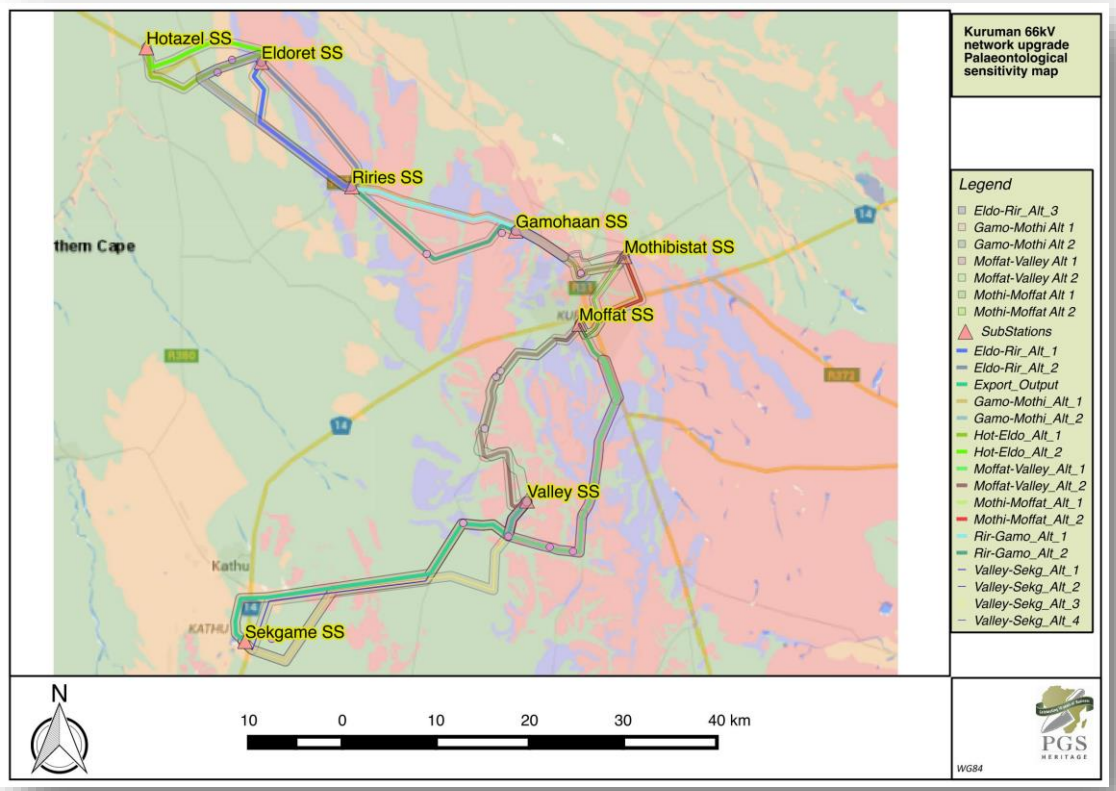


Figure 18: Paleontological sensitivity map for the project area (SAHRIS, 2015)

Table 10: Interpretation table for paleontological sensitivity (SAHRIS, 2015)

COLOUR	SENSITIVITY	REQUIRED ACTION
RED	VERY HIGH	field assessment and protocol for finds is required
ORANGE/YELLOW	HIGH	desktop study is required and based on the outcome of the desktop study, a field assessment is likely
GREEN	MODERATE	desktop study is required
BLUE	LOW	no paleontological studies are required however a protocol for finds is required
GREY	INSIGNIFICANT/ ZERO	no paleontological studies are required

COLOUR	SENSITIVITY	REQUIRED ACTION
WHITE/ CLEAR	UNKNOWN	these areas will require a minimum of a desktop study. As more information comes to light, SAHRA will continue to populate the map.

3 POSSIBLE HERITAGE FINDS

Evaluation of aerial photography has indicated areas in the Corridor region that may be sensitive from a heritage resources perspective (Refer to **Appendix A**). Archaeological surveys and studies in the region have shown rocky outcrops, riverbanks, foot of koppies and confluence to be prime localities for heritage finds.

The aerial photography has reference the following as of possible heritage sensitivity:

Farmsteads

Most of the farmsteads in the study area date from the mid to late 1800's and are of great historical and significance.

Structures

Numerous structures and outlines of man mad structures have been identified and rated as possible sensitive heritage resources from the aerial survey. Some of the early settler farmsteads have been abandoned for close to 100 years and only the remnants of the walling, middens and paddocks remain.

Ridges

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.

3.1 Field work findings

A site visit and screening survey of the Corridor alternatives provided for the study was conducted in March 2015. Due to the nature of cultural remains, with the majority of artefacts occurring below surface.

The site is predominantly covered in wooded grassland in the northern and south western areas with the central eastern sections of the study area dominated by ridges and mountains.

Figure 19: View of general landscape in the Hotazel area

Figure 20: View of alignments along tarred road

3.2 Heritage Sites

The survey yielded 15 heritage sites, a total of 2 cemeteries (**K1** and **K10**) were identified, 9 historic farmsteads, two historic asbestos mines, a sacred/religious site (**K4**) and a Provincial Monument (**K5**) and a memorial (**K12**) were identified.

Refer to **Appendix A** for the positions of the heritage sites relative to the Corridors.

3.2.1 Cemeteries

During the field work 2 cemeteries and one memorial (Table 11**)** was identified**.**

Table 11: Cemeteries

Site number	Type	Longitude	Latitude	Description	Heritage Significance	Alternative
K 1	Cemetery	27.21742	-23.05125	A large cemetery was identified at this location. This is the cemetery used by the residents of the adjacent Magobing Village. The cemetery is fenced and contains approximately 120 graves.	Grade 3A	**Hot-Eldo Alt 1 Hot-Eldo Alt 3**
K 10	Cemetery	27.57213	-23.32416	A small informal cemetery was identified at this location. The cemetery has two graves with formal dressings and headstones. The graves date from 1919 and 1936.	Grade 3A	**Moffat-Valley Alt 2**
K 12	Historic - memorial	27.51698	-23.34241	A monument was identified at this location. The monument was placed here in memory of Daniel Francois Botha who was shot dead at this location in 1929.	Grade 4A	**Moffat-Valley Alt 2**

Mitigation:

- Adjust the development layout and demarcate site with at least a 20-meter buffer. In the case of **K12** this buffer must be made at least 100 meters to keep the development away from the memorial.
- In the event that the sites cannot be excluded from the development footprint a grave relocation process as described in Section 5 of this reports needs to be implemented.

Figure 21: View of site K1

Figure 22: View of cemetery at site K10

Figure 23: Graves at site K10

Figure 24: View of memorial at Site K12

3.2.2 Historical Structures

Table 12: Heritage Structures

Site number	Type	Longitude	Latitude	Description	Heritage Significance	Corridor
K 2	Historic - farmstead	27.22961	-23.03555	An old farmstead with its associated structures was identified at this location. The farmstead was recently renovated and is currently being occupied. The owner of the farm, Mr. Dawid Venter, thinks that the structure dates from the 1940's.	Grade 4A	**Hot-Eldo Alt 1** **Eldo-Rir Alt 3**
K 7	Historic ruin - farmstead	27.68625	-23.39576	An old farmstead was identified at this location. The farmstead was constructed with bricks and cement and had a pitched corrugated iron roof. The structure was abandoned and the age of this building is not known.	Grade 4A	**Moffat-Valley Alt 2**
K 8	Historic - farmstead	27.67616	-23.35092	An old farmstead with its associated structures was identified at this location. The farmstead was brick-built and has a pitched corrugated iron roof. The house has metal door and window frames and external water and	Grade 4A	**Moffat-Valley Alt 2** **Valley-Sekg Alt 3**

				electrical systems were added to the original house. The associated storeroom and dam were stone-built.		
K 9	Historic - farmstead	27.57266	-23.32545	An old farmstead was identified at this location. The farmstead has a sandstone built foundation with brick walls built on top of the foundations. The house was renovated and is currently being occupied	Grade 4A	**Valley-Sekg Alt 3**
K 11	Historic - farmstead	27.52261	-23.33739	An old farmstead with its associated structures was identified at this location. The farmstead was brick-built and has a pitched corrugated iron roof. The house has metal door and window frames and external water and electrical systems were added to the original house. The house was renovated and forms part of the Corheim Guest Farm.	Grade 4A	**Moffat-Valley Alt 2**
K 13	Historic - farmstead	27.76857	-23.08091	An old farmstead with its associated structures was identified at this location. The farmstead was brick-built and has a pitched corrugated iron roof. The house has metal door and window frames and external water and electrical systems were added to the original house.	Grade 4A	**Valley-Sekg Alt 1**

				The house was recently renovated and is currently being occupied.		
K 14	Historic - farmstead	27.77443	-23.09437	An old farmstead with its associated structures was identified at this location. The farmstead was brick-built and has a pitched corrugated iron roof. The house has metal door and window frames and external water and electrical systems were added to the original house. The house is currently being occupied by farm workers.	Grade 4A	**Outside alternative buffer**
K 15	Historic - farmstead	27.66325	-23.30186	An old farmstead with its associated structures was identified at this location. The farmstead was brick-built and has a pitched corrugated iron roof. The house has metal door and window frames and external water and electrical systems were added to the original house.	Grade 4A	V**alley-Sekg Alt 1** **Valley-Sekg Alt 4**

Figure 25: Ruined house at site K2

Figure 26: Walling of stock enclosure at site K7

Figure 27: Main dwelling at site K8

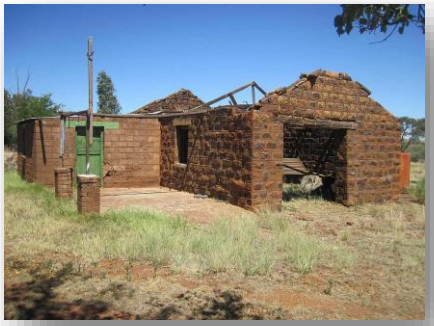


Figure 28: Stone shed at site K8

Figure 29: Stone shed at site K9

Figure 29: Stone shed at site K11

Figure 29: Stone shed at site K13

Figure 29: Stone shed at site K15

Figure 29: Stone shed at site K14

All the heritage structure identified, except for **K15**, are occupied. The best option in all the cases will be to take note of the position of these sites and leave at least a 200-meter buffer between the site and the final alignment. All the sites are protected under Section 34 of the NHRA.

Mitigation:

- Adjust Corridors and position of pylons to avoid these structures;
- Mitigation in the form of a watching brief and monitoring at these sites during construction if any construction is to take place closer than 100 meters from the site;
- **All** structure will require a destruction permit under Section 34 of the NHRA;
- The permit will entail initial documentation of the layout and condition of the structures and its structures with layout sketches and detailed photography, after which the destruction permit can be applied for with the backing of the documentary evidence;
- A qualified heritage practitioner must do this documentation.

3.2.3 Sacred/ religious site

Site number	Type	Longitude	Latitude	Description	Heritage Significance	Corridor
K 4	Sacred / Religious site	27.38431	-23.34377	A large overhang with evidence of religious activities was identified at this location. Several areas with the ashes of fires were identified as well as areas where candles were placed as well. The site is visited frequently and the area under the overhang is disturbed. Recent historic graffiti is visible on sections of the overhang wall, while feint rock art figures are discernible. Further investigation could possibly indicate the presence of a stone age site and/or rock art on the overhang walls.	Grade 3A possibly Grade 2	**Rir-Gamo Alt 2**

This heritage site is protected under Section 3 of the NHRA, will need to be avoided and preserved.

Mitigation:

- Select Rir-Gamo Alt 1 to avoid impacting on the sites vista;
- If the Rir-Gamo Alt 2 is considered and selected a consultation process with local spiritual and religious groupings will be required to consult on the possible impacts and consequences of construction activities on the site and intangible heritage.

Figure 30: View of large overhang at K4

Figure 31: View inside overhang at K4

Figure 32: Recent historic graffiti at K4

Figure 33: Visible rock art at K4

Figure 34: Further rock art at K4

3.2.4 Declared Heritage Site

Site number	Type	Longitude	Latitude	Description	Heritage Significance	Corridor
K 5	Historic – Mission	27.42334	-23.42936	The Moffat Mission Station was identified at this location. The gates to the Mission Station were locked as renovation work was going on during the time of the investigation. The extent of the missionary could not be determined as access was not possible. The mission station is a declared Provincial Monument.	Grade 2	**Gamo-Mothi Alt 1**

Figure 35: Entrance to Moffat Mission – K5

Figure 36: Notice of upgrading works at K5

This provincial monument is protected under Section 3 and 34 of the NHRA, will need to be avoided and preserved.

Mitigation:

- Choose Gamo-Mothi Alt 2 as better option;
- Adjust Corridors and position of pylons to avoid the site;
- Mitigation in the form of a watching brief and monitoring at these sites during construction if any construction is to take place closer than 200 meters from the site;
- **A buffer of at least 500 meters must be kept from the monument. This distance can however be negotiated with the Provincial Heritage Authority – Heritage Northern Cape**

3.2.5 Historic Mines

Site number	Type	Longitude	Latitude	Description	Heritage Significance	Corridor
K 3	Historic – Asbestos mine	27.40452	-23.26232	The infrastructure and remains of the old Wandrag Asbestos Mine were identified at this location. The infrastructure included several houses, offices, a labour compound and storerooms. The staff accommodation is still in use and the houses are being occupied. The labour compound and several other structures are not being used and are in a derelict state.	Grade 4A	**Rir-Gamo Alt 2**
K 6	Historic - Asbestos mine	27.69054	-23.42094	The remains and some of the infrastructure of the old Bosrand Asbestos Mine were identified at this location. Several mine dumps were situated next to the road and some derelict structures were situated on the other side of the road.	Grade 4A	**Moffat-Valley Alt 2**

Figure 37: Derelict mining infrastructure at K3

Figure 38: Asbestos heaps at the Bosrand asbestos min K6

Figure 39: Bosrand mine – name at entrance – K6

These sites and structures are protected under Section 34 of the NHRA, will need to be avoided and preserved. Due to the sensitive nature of asbestos and its history of negative health effects, heritage mitigation efforts will be prohibitively expensive, and avoidances of these areas is recommended.

3.3 Summary of field work findings

The survey yielded 15 heritage related sites:

- Two cemeteries and one memorial;
- Eight historical sites;
- One Sacred and religious significant site (**K4**);
- Two historic asbestos mines (**K3** and **K6**) and
- One provincial heritage site (**K5)**.

Taking the findings of the field work in to consideration

Table 13, gives a summary of the number of sites located in each of the Corridors and the projected possible impacts on heritage resources.

Table 13: Heritage Resources per Corridor

	Hot-Eldo		Eldo-Rir			Rir-Gamo		Gamo-Mothi		Mothi-Moffat		Moffat-Valley		Valley-Sekg			
	Alt1	***Alt2***	***Alt1***	***Alt2***	***Alt3***	***Alt1***	***Alt2***	***Alt1***	***Alt2***	***Alt1***	***Alt2***	***Alt1***	***Alt2***	***Alt1***	***Alt2***	***Alt3***	***Alt4***
Cemeteries	1				1								2				
Structures	1				1								4	2		2	1
Provincial Heritage site								1									
Asbestos Mines							1						1				
Sacred site							1										
Total count	***2***	***0***	***0***	***0***	***2***	***0***	***2***	***1***	***0***	***0***	***0***	***0***	***7***	***2***	***0***	***2***	***1***

Refer to **Appendix B** for positions of the heritage sites and find spots relative to the Corridors.

4 IMPACT ASSESSMENT

4.1 Impact Matrix

Table 14: Rating Matrix for impacts in the Pre-Construction phase

Activity	Nature of Impact	Impact type	Extent	Duration	Potential Intensity	Likelihood	Rating	Mitigation	Interpretation
Impact on cemeteries and memorials	Direct Impact:	Existing	1	1	1	0,1	0 - LOW	Planning and implementation of suggested mitigation measures before construction will reduce the overall impact on these sites	The identified cemeteries are currently only impacted by weather and general human activities
	Current impact on cemeteries and memorials	Cumulative	1	1	1	0,1	0 - LOW		Per-construction cumulative impacts seen as low
		Residual	1	1	1	0,1	0 - LOW		The development of mitigation measures during construction will have a positive impact at this stage
Impact on farmsteads	Direct Impact:	Existing	1	1	1	0,1	0 - LOW	Planning and implementation of suggested mitigation measures before construction will	the identified farmsteads are currently only impacted by weather and general human activities

Activity	Nature of Impact	Impact type	Extent	Duration	Potential Intensity	Likelihood	Rating	Mitigation	Interpretation
	Current impact on historic farmstead	Cumulative	1	1	1	0,1	0 - LOW	reduce the overall impact on these sites	Per-construction cumulative impacts seen as low
		Residual	1	1	1	0,1	0 - LOW		The development of mitigation measures during construction will have a positive impact at this stage
Impact on historic mines	Direct Impact:	Existing	1	1	1	0,1	0 - LOW	Planning and implementation of suggested mitigation measures before construction will reduce the overall impact on these sites	The identified mining infrastructure are currently only impacted by weather and general human activities
	Current impact on historic mines	Cumulative	1	1	1	0,1	0 - LOW		Per-construction cumulative impacts seen as low
		Residual	1	1	1	0,1	0 - LOW		The development of mitigation measures during construction will have a positive impact at this stage
Impact on provincial heritage sites	Direct Impact:	Existing	1	1	1	0,1	0 - LOW	Planning and implementation of suggested mitigation measures before construction will reduce the	The identified Moffat mission are currently only impacted by weather and general human activities
	Current impact on provincial heritage sites	Cumulative	1	1	1	0,1	0 - LOW		Per-construction cumulative impacts

Activity	Nature of Impact	Impact type	Extent	Duration	Potential Intensity	Likelihood	Rating	Mitigation	Interpretation
								overall impact on these sites	seen as low
		Residual	1	1	1	0,1	0 - LOW		The development of mitigation measures during construction will have a positive impact at this stage
Impact of sacred site	Direct Impact:	Existing	1	1	1	0,1	0 - LOW	Planning and implementation of suggested mitigation measures before construction will reduce the overall impact on these sites	The sacred site at **K4** are currently ipacted by human activities primeraly associated with religious activities, while weather conditions impacts on the site constantly
	Current impact on sacred sites	Cumulative	1	1	1	0,1	0 - LOW		Per-construction cumulative impacts seen as low
		Residual	1	1	1	0,1	0 - LOW		The development of mitigation measures during construction will have a positive impact at this stage

Table 15: Rating Matrix for impacts on Construction phase

Activity	Nature of Impact	Impact type	Extent	Duration	Potential Intensity	Likelihood	Rating	Mitigation	Interpretation
Impact on cemeteries and memorials	<u>Direct Impact:</u>	Existing	1	1	4	0,5	3 - MOD	• Adjust the development layout and demarcate site with at least a 20-meter buffer. In the case of K12 this buffer must be made at least 100 meters to keep the development away from the memorial. • In the event that the sites cannot be excluded from the development footprint a grave relocation process as described in Section 5 of this reports needs to be implemented.	The possibility of impacting the identified cemeteries without mitigation is moderately high an will require mitigation
	Current impact on cemeteries and memorials	Cumulative	1	1	8	0,2	2 - LOW		Mitigation by selecting alternative routes that will evade the identified site will enable the reduction in cumulative effects.
		Residual	1	1	4	0,2	1 - LOW		Mitigation by selecting alternative routes that will evade the identified site will enable the reduction in cumulative effects.

Activity	Nature of Impact	Impact type	Extent	Duration	Potential Intensity	Likelihood	Rating	Mitigation	Interpretation
Impact on farmsteads	Direct Impact:	Existing	1	1	4	0,5	3 - MOD	▪ Adjust Corridors and position of pylons to avoid these structures; ▪ Mitigation in the form of a watching brief and monitoring at these sites during construction if any construction is to take place closer than 100 meters from the site; ▪ **All** structure will require a destruction permit under Section 34 of the NHRA; ▪ The permit will entail initial documentation of the layout and condition of the	The possibility of impacting the identified cemeteries without mitigation is moderately high an will require mitigation
	Current impact on historic farmstead	Cumulative	1	1	8	0,2	2 - LOW		Mitigation by selecting alternative routes that will evade the identified site will enable the reduction in cumulative effects.
		Residual	1	1	4	0,2	1 - LOW		Mitigation by selecting alternative routes that will evade the identified site will enable the reduction in cumulative effects.

								structures and its structures with layout sketches and detailed photography, after which the destruction permit can be applied for with the backing of the documentary evidence; ▪ A qualified heritage practitioner must do this documentation.	

Activity	Nature of Impact	Impact type	Extent	Duration	Potential Intensity	Likelihood	Rating	Mitigation	Interpretation
Impact on historic mines	Direct Impact:	Existing	1	5	4	0,5	5 - MOD	Avoid these sites at all cost	The possibility of impacting the identified cemeteries without mitigation is moderately high an will require mitigation
	Current impact on historic mines	Cumulative	1	5	8	0,2	3 - MOD		Mitigation by selecting alternative routes that will evade the identified site will enable the reduction in cumulative effects.
		Residual	1	5	4	0,2	2 - LOW		Mitigation by selecting alternative routes that will evade the identified site will enable the reduction in cumulative effects.

Activity	Nature of Impact	Impact type	Extent	Duration	Potential Intensity	Likelihood	Rating	Mitigation	Interpretation
Impact on provincial heritage sites	Indirect Impact:	Existing	1	1	4	0,5	3 - MOD	• Adjust Corridors and position of pylons to avoid the site; • Mitigation in the form of a watching brief and monitoring at these sites during construction if any construction is to take place closer than 200 meters from the site; • A buffer of at least 500 meters	The possibility of impacting the identified cemeteries without mitigation is moderately high an will require mitigation
	Current impact on provincial heritage sites	Cumulative	1	1	8	0,2	2 - LOW		Mitigation by selecting alternative routes that will evade the identified site will enable the reduction in cumulative effects.

		Residual	1	1	4	0,2	1 - LOW	must be kept from the monument. This distance can however be negotiated with the Provincial Heritage Authority – Heritage Northern Cape	Mitigation by selecting alternative routes that will evade the identified site will enable the reduction in cumulative effects.

Activity	Nature of Impact	Impact type	Extent	Duration	Potential Intensity	Likelihood	Rating	Mitigation	Interpretation
Impact of sacred site	Indirect Impact:	Existing	1	1	4	0,5	3 - MOD	• Select Rir-Gamo Alt 1 to avoid impacting on the sites vista; • If the Rir-Gamo Alt 2 is considered and selected a consultation process with local spiritual and religious groupings will be required to consult on the possible impacts and consequences of construction activities on the site and intangible heritage.	The possibility of impacting the identified cemeteries without mitigation is moderately high an will require mitigation
	Current impact on sacred sites	Cumulative	1	1	8	0,2	2 - LOW		Mitigation by selecting alternative routes that will evade the identified site will enable the reduction in cumulative effects.
		Residual	1	1	4	0,2	1 - LOW		Mitigation by selecting alternative routes that will evade the identified site will enable the reduction in cumulative effects.

Table 16: Rating Matrix for impacts on Operational phase

Activity	Nature of Impact	Impact type	Extent	Duration	Potential Intensity	Likelihood	Rating	Mitigation	Interpretation
Impact on cemeteries and memorials	Direct Impact:	Existing	1	1	4	0,5	3 - MOD	Mark as no-go areas during general maintenance activities	No direct impacts is forseen during the operational phase
	Current impact on cemeteries and memorials	Cumulative	1	1	8	0,2	2 - LOW		Operational cumulative impacts seen as low
		Residual	1	1	4	0,2	1 - LOW		None envisaged
Impact on farmsteads	Direct Impact:	Existing	1	1	4	0,5	3 - MOD	Mark as no-go areas during general maintenance activities	No direct impacts is forseen during the operational phase
	Current impact on historic farmstead	Cumulative	1	1	8	0,2	2 - LOW		Operational cumulative impacts seen as low
		Residual	1	1	4	0,2	1 - LOW		None envisaged

Activity	Nature of Impact	Impact type	Extent	Duration	Potential Intensity	Likelihood	Rating	Mitigation	Interpretation
Impact on historic mines	Direct Impact:	Existing	1	5	4	0,5	5 - MOD	Mark as no-go areas during general maintenance activities	No direct impacts is forseen during the operational phase
	Current impact on historic mines	Cumulative	1	5	8	0,2	3 - MOD		Operational cumulative impacts seen as low
		Residual	1	5	4	0,2	2 - LOW		None envisaged
Impact on provincial heritage sites	Indirect Impact:	Existing	1	1	4	0,5	3 - MOD	Mark as no-go areas during general maintenance activities	No direct impacts is forseen during the operational phase
	Current impact on provincial heritage sites	Cumulative	1	1	8	0,2	2 - LOW		Operational cumulative impacts seen as low
		Residual	1	1	4	0,2	1 - LOW		None envisaged
Impact of sacred site	Indirect Impact:	Existing	1	1	4	0,5	3 - MOD	Mark as no-go areas during general maintenance activities	No direct impacts is forseen during the operational phase
	Current impact on sacred sites	Cumulative	1	1	8	0,2	2 - LOW		Operational cumulative impacts seen as low
		Residual	1	1	4	0,2	1 - LOW		None envisaged

4.2 Confidence in Impact Assessment

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 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.

4.3 Cumulative Impacts

Cumulative impacts are envisaged on alternative Moffat-Valley Alt 2 that impacts on a large amount of identified heritage resources. By selecting Alternative 1 the sites that could possibly be impacted can be mitigated and avoided.

4.4 Reversibility of Impacts

Although heritage resources are seen as non-renewable the mitigation of impacts on possible finds through scientific documentation will provided sufficient mitigation on the impacts on possible heritage resources.

4.5 Comparative Assessment of Alternatives

The comparative assessment of the alternatives has shown that an overall low to medium impact on heritage is foreseen.

Through a comparative assessment of the alternatives and evaluation against the heritage resources identified it was possible to assign a rating of Preferred, Favourable, Not Preferred or No preference as described in Table 17 below.

Table 17: Comparative Assessment of Alternatives

Key

PREFERRED	The alternative will result in a low impact / reduce the impact
FAVOURABLE	The impact will be relatively insignificant
NOT PREFERRED	The alternative will result in a high impact / increase the impact
NO PREFERENCE	The alternative will result in equal impacts

No.	Corridor Alternative	Preference	Naming of alternatives between substations
1.	Hotazel Substation to Eldoret Substation	FAVOURABLE	· Hot-Eldo Alt 1
		PREFERRED	· Hot-Eldo Alt 2
2.	Eldoret Substation to Riries Substation	PREFERRED	· Eldo-Rir Alt 1
		PREFERRED	· Eldo-Rir Alt 2
		FAVOURABLE	· Eldo-Rir Alt 3
3.	Riries Substation to Gamohaan Substation	FAVOURABLE	· Rir-Gamo Alt 1
		NOT PREFERRED	· Rir-Gamo Alt 2
4.	Gamohaan Substation to Mothibistad Substation	PREFERRED	· Gamo-Mothi Alt 1
		NOT PREFERRED	· Gamo-Mothi Alt 2
5.	Mothibistad Substation to Moffat Substation	PREFERRED	· Mothi-Moffat Alt 1
		PREFERRED	· Mothi-Moffat Alt 2
6.	Moffat Substation to Valley Substation	PREFERRED	· Moffat-Valley Alt 1
		NOT PREFERRED	· Moffat-Valley Alt 2
7.	Valley Substation to Sekgame Substation	FAVOURABLE	· Valley-Sekg Alt 1
		PREFERRED	· Valley-Sekg Alt 2
		FAVOURABLE	· Valley-Sekg Alt 3
		PREFERRED	· Valley-Sekg Alt 4

5 MITIGATION MEASURES

5.1 Management Guidelines

1. The National Heritage Resources Act (Act 25 of 1999) states that, any person who intends to undertake a development categorised as-

(a) the construction of a road, wall, transmission line, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length;

(b) the construction of a bridge or similar structure exceeding 50m in length;

(c) any development or other activity which will change the character of a site-

  (i) exceeding 5 000 m^2 in extent; or

  (ii) involving three or more existing erven or subdivisions thereof; or

  (iii) involving three or more erven or divisions thereof which have been consolidated within the past five years; or

  (iv) the costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority;

(d) the re-zoning of a site exceeding 10 000 m^2 in extent; or

(e) any other category of development provided for in regulations by SAHRA or a provincial heritage resources authority, must at the very earliest stages of initiating such a development, notify the responsible heritage resources authority and furnish it with details regarding the location, nature and extent of the proposed development.

In the event that an area previously not included in an archaeological or cultural resources survey is to be disturbed, the South African Heritage Resources Agency (SAHRA) needs to be contacted. An enquiry must be lodged with them into the necessity for a Heritage Impact Assessment.

2. In the event that a further heritage assessment is required it is advisable to utilise a qualified heritage practitioner preferably registered with the Cultural Resources Management Section (CRM) of the Association of Southern African Professional Archaeologists (ASAPA).

This survey and evaluation must include:

(a) The identification and mapping of all heritage resources in the area affected;

(b) An assessment of the significance of such resources in terms of the heritage assessment criteria set out in section 6 (2) or prescribed under section 7 of the National Cultural Resources Act;

(c) An assessment of the impact of the development on such heritage resources;

(d) An evaluation of the impact of the development on heritage resources relative to the sustainable social and economic benefits to be derived from the development;

(e) The results of consultation with communities affected by the proposed development and other interested parties regarding the impact of the development on heritage resources;

(f) If heritage resources will be adversely affected by the proposed development, the consideration of alternatives; and

(g) Plans for mitigation of any adverse effects during and after the completion of the proposed development.

3. It is advisable that an information section on cultural resources be included in the SHEQ training given to contractors involved in surface earthmoving activities. These sections must include basic information on:
   a. Heritage;
   b. Graves;
   c. Archaeological finds; and
   d. Historical Structures.

   This module must be tailor made to include all possible finds that could be expected in that area of construction.
4. In the event that a possible find is discovered during construction, all activities must be halted in the area of the discovery and a qualified archaeologist contacted.
5. The archaeologist needs to evaluate the finds on site and make recommendations towards possible mitigation measures.
6. If mitigation is necessary, an application for a rescue permit must be lodged with SAHRA.
7. After mitigation an application must be lodged with SAHRA for a destruction permit. This application must be supported by the mitigation report generated during the rescue excavation. Only after the permit is issued may such a site be destroyed.
8. If during the initial survey sites of cultural significance is discovered, it will be necessary to develop a management plan for the preservation, documentation or destruction of such a site. Such a program must include an archaeological/paleontological monitoring programme, timeframe and agreed upon schedule of actions between the company and the archaeologist.
9. In the event that human remains are uncovered or previously unknown graves are discovered a qualified archaeologist needs to be contacted and an evaluation of the finds made.

10. If the remains are to be exhumed and relocated, the relocation procedures as accepted by SAHRA need to be followed. This includes an extensive social consultation process.

The definition of an archaeological/paleontological monitoring programme is a formal program of observation and investigation conducted during any operation carried out for non-archaeological reasons. This will be within a specified area or site on land, inter-tidal zone or underwater, where there is a possibility that archaeological deposits may be disturbed or destroyed. The programme will result in the preparation of a report and ordered archive.

The purpose of an archaeological/paleontological monitoring programme is:

- To allow, within the resources available, the preservation by record of archaeological/paleontological deposits, the presence and nature of which could not be established (or established with sufficient accuracy) in advance of development or other potentially disruptive works.
- To provide an opportunity, if needed, for the watching archaeologist to signal to all interested parties, before the destruction of the material in question, that an archaeological/paleontological find has been made for which the resources allocated to the watching brief itself are not sufficient to support treatment to a satisfactory and proper standard.
- A monitoring is not intended to reduce the requirement for excavation or preservation of known or inferred deposits, and it is intended to guide, not replace, any requirement for contingent excavation or preservation of possible deposits.
- The objective of the monitoring is to establish and make available information about the archaeological resource existing on a site.

Table 18: Roles and responsibilities of archaeological and heritage management

ROLE	RESPONSIBILITY	IMPLEMENTATION
A responsible specialist needs to be allocated and should sit in at all relevant meetings, especially when changes in design are discussed, and liaise with SAHRA.	The client	Archaeologist and a competent archaeology supportive team
If chance finds and/or graves or burial grounds are identified during construction or operational phases, a specialist must be contacted in due course for evaluation.	The client	Archaeologist and a competent archaeology supportive team
Comply with defined national and local cultural heritage regulations on management plans for identified sites.	The client	Environmental Consultancy and the Archaeologist
Consult the managers, local communities and other key stakeholders on mitigation of archaeological sites.	The client	Environmental Consultancy and the Archaeologist
Implement additional programs, as appropriate, to promote the safeguarding of our cultural heritage. (i.e. integrate the archaeological components into employee induction course).	The client	Environmental Consultancy and the Archaeologist,
If required, conservation or relocation of burial grounds and/or graves according to the applicable regulations and legislation.	The client	Archaeologist, and/or competent authority for relocation services
Ensure that recommendations made in the Heritage Report are adhered to.	The client	The client
Provision of services and activities related to the management and monitoring of significant archaeological sites.	The client	Environmental Consultancy and the Archaeologist
After the specialist/archaeologist has been appointed, comprehensive feedback reports should be submitted to relevant authorities during each phase of development.	Client and Archaeologist	Archaeologist

5.2 All phases of the project

5.2.1 Archaeology

Based on the findings of the HIA, all stakeholders and key personnel should undergo an induction course containing information on possible heritage finds and how to handle such finds during this phase. Induction courses generally form part of the employees' overall training and the archaeological component can easily be integrated into these training sessions.

Managers and supervisors should be informed of the the appropriate communication channels that should be followed after chance finds, and the required mitigation measures for those heritage sites identified during the walk down. This also in light of the walk down assessment that will be done for each pole position before construction which will highlight sensitive areas and the appropriate management measures.

The project will encompass a range of activities during the construction phase, including ground clearance, establishment of construction camps area and small-scale infrastructure development associated with the project.

It is possible that cultural material will be exposed during operations and may be recoverable, but this is the high-cost front of the operation, and so any delays should be minimised. Development surrounding infrastructure and construction of facilities results in significant disturbance, but construction trenches 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 is often changed or added to the subsequent history of the project. 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 and to make the correct judgment on which actions should be taken. A responsible archaeologist/palaeontologist must be appointed for this commission. This person does not have to be a permanent employee, but needs to sit in at relevant meetings, for example when changes in design are discussed, and notify SAHRA of these changes. The archaeologist would inspect the site and any development recurrently, with more frequent visits to the actual workface and operational areas.

In addition, the archaeologist to the client and SAHRA to ensure effective monitoring can submit feedback reports. This archaeological monitoring and feedback strategy should be incorporated into the Environmental Management Plan (EMP) of the project. Should an archaeological/paleontological site or cultural material be discovered during construction (or operation), such as burials or grave sites, the project needs to be able to call on a qualified expert to make a decision on what is required and if it is necessary to carry out emergency recovery. SAHRA would need to be informed and may give advice on procedure. The developers therefore should have some sort of contingency plan so that operations could move elsewhere temporarily while the material and data are recovered. The project thus needs to have an archaeologist/palaeontologist available to do such work. This provision can be made in an archaeological/paleontological monitoring programme.

5.2.2 Graves

In the case where a grave is identified during construction the following measures must be taken.

Mitigation of graves will require a fence around the cemetery with a buffer of at least 20 meters.

If graves are accidentally discovered during construction, activities must cease in the area and a qualified archaeologist be contacted to evaluate the find. To remove the remains a rescue permit must be applied for with SAHRA and the local South African Police Services must be notified of the find.

Where it is then recommended that the graves be relocated a full grave relocation process that includes comprehensive social consultation must be followed.

The grave relocation process must include:

i. A detailed social consultation process, that will trace the next-of-kin and obtain their consent for the relocation of the graves, that will be at least 60 days in length;
ii. Site notices indicating the intent of the relocation
iii. Newspaper Notice indicating the intent of the relocation
iv. A permit from the local authority;
v. A permit from the Provincial Department of health;
vi. A permit from the South African Heritage Resources Agency if the graves are older than 60 years or unidentified and thus presumed older than 60 years;
vii. An exhumation process that keeps the dignity of the remains intact;
viii. An exhumation process that will safeguard the legal implications towards the developing company;
ix. The whole process must be done by a reputable company that are well versed in relocations;
x. The process must be conducted in such a manner as to safeguard the legal rights of the families as well as that of the developing company.

6 CONCLUSIONS AND RECOMMENDATIONS

The Heritage Impact assessment and field work survey yielded 15 heritage sites, a total of 2 cemeteries (**K1** and **K10)** were identified, 9 historic farmsteads, two historic asbestos mines, a sacred/religious site (**K4)** and a Provincial Monument (**K5**) and a memorial (**K12**) were identified.

Section 3.2 lists and describes all the sites in detail.

The following recommendation focussed on specific heritage finds types must be implemented

Cemeteries

- Adjust the development layout and demarcate site with at least a 20-meter buffer. In the case of K12 this buffer must be made at least 100 meters to keep the development away from the memorial.
- In the event that the sites cannot be excluded from the development footprint a grave relocation process as described in Section 5 of this reports needs to be implemented.

Historical Structures

- Adjust Corridors and position of pylons to avoid these structures;
- Mitigation in the form of a watching brief and monitoring at these sites during construction if any construction is to take place closer than 100 meters from the site;
- **All** structure will require a destruction permit under Section 34 of the NHRA;
- The permit will entail initial documentation of the layout and condition of the structures and its structures with layout sketches and detailed photography, after which the destruction permit can be applied for with the backing of the documentary evidence;
- A qualified heritage practitioner must do this documentation.

Sacred/ religious site

- Select Rir-Gamo Alt 1 to avoid impacting on the sites vista;
- If the Rir-Gamo Alt 2 is considered and selected a consultation process with local spiritual and religious groupings will be required to consult on the possible impacts and consequences of construction activities on the site and intangible heritage.

Declared Provincial Heritage Site – Moffat Mission

- Choose Gamo-Mothi Alt 2 as better option;
- Adjust Corridors and position of pylons to avoid the site;
- Mitigation in the form of a watching brief and monitoring at these sites during construction if any construction is to take place closer than 200 meters from the site;
- **A buffer of at least 500 meters must be kept from the monument. This distance can however be negotiated with the Provincial Heritage Authority – Heritage Northern Cape**

Historic Mines

These sites and structures are protected under Section 34 of the NHRA, will need to be avoided and preserved. Due to the sensitive nature of asbestos and its history of negative health effects, heritage mitigation efforts will be prohibitively expensive, and avoidances of these areas is recommended.

Palaeontology

An analysis of the SAHRIS paleontological sensitivity map indicates that 70% of the study area is under lain by paleontological sensitive geology. Interpreting this data according to the SAHRIS guidelines indicates that a field assessment and protocol for finds will be required for large sections of the alternative alignments.

It is recommended that a full Paleontological Impact Assessment (PIA) be initiated during the pre-construction phase when the heritage walk down of the final alignment will be done.

Through a comparative assessment of the alternatives and evaluation against the heritage resources identified it was possible to assign a rating of Preferred, Favourable, Not Preferred or No preference as described in Table 19 below.

Table 19: Preferred corridor alternative

Key

PREFERRED	The alternative will result in a low impact / reduce the impact
FAVOURABLE	The impact will be relatively insignificant
NOT PREFERRED	The alternative will result in a high impact / increase the impact
NO PREFERENCE	The alternative will result in equal impacts

No.	Corridor Alternative	Preference	Naming of alternatives between substations
1.	Hotazel Substation to Eldoret Substation	FAVOURABLE	· Hot-Eldo Alt 1
		PREFERRED	· Hot-Eldo Alt 2
2.	Eldoret Substation to Riries Substation	PREFERRED	· Eldo-Rir Alt 1
		PREFERRED	· Eldo-Rir Alt 2
		FAVOURABLE	· Eldo-Rir Alt 3
3.	Riries Substation to Gamohaan Substation	FAVOURABLE	· Rir-Gamo Alt 1
		NOT PREFERRED	· Rir-Gamo Alt 2
4.	Gamohaan Substation to Mothibistad Substation	PREFERRED	· Gamo-Mothi Alt 1
		NOT PREFERRED	· Gamo-Mothi Alt 2
5.	Mothibistad Substation to Moffat Substation	PREFERRED	· Mothi-Moffat Alt 1
		PREFERRED	· Mothi-Moffat Alt 2
6.	Moffat Substation to Valley Substation	PREFERRED	· Moffat-Valley Alt 1
		NOT PREFERRED	· Moffat-Valley Alt 2
7.	Valley Substation to Sekgame Substation	FAVOURABLE	· Valley-Sekg Alt 1
		PREFERRED	· Valley-Sekg Alt 2
		FAVOURABLE	· Valley-Sekg Alt 3
		PREFERRED	· Valley-Sekg Alt 4

Refer to **Appendix A** for positions of the heritage sites and find spots relative to the Corridors.

The evaluation has shown that the alignments **Rir-Gamo Alt 1** (*Impacts on K4 – Gamohaan Sacred Site*), **Gamo-Mothi Alt1** (*Impacts on the Moffatt Mission station site K*5) and **Moffat-Valley Alt2** (*Impacts on a large amount of heritage resources*) are alternatives not preferred with the rest having favourable or preferred ratings.

The overall impact on identified heritage resources is rated as moderate to low. By designing the layout within the final corridor to avoid as far as possible the heritage resources identified; and then finally doing a heritage walk down of the final alignment focussing on the pylon position and footprints of construction, the impact on heritage resources can be minimised to acceptable levels.

Further to these recommendations the general Heritage Management Guideline in Sections 7 needs to be incorporated in to the EMP for the project.

The overall impact of the development on heritage resources is seen as acceptably low and can impacts can be mitigated to acceptable levels.

The following general mitigation measures are recommended:

e. All the stakeholders must agree upon a monitoring plan for the different phases of the project focussing on the areas where earthmoving will occur.
f. If during construction any possible finds are made, the operations must be stopped and the qualified archaeologist be contacted for an assessment of the find.
g. Should substantial fossil remains (e.g. well-preserved fossil fish, reptiles or petrified wood) be exposed during construction, however, the ECO should carefully safeguard these, preferably in situ, and alert SAHRA as soon as possible so that appropriate action (e.g. recording, sampling or collection) can be taken by a professional palaeontologist.
h. A management plan must be developed for managing the heritage resources in the surface area impacted by operations during construction and operation of the development. This includes basic training for construction staff on possible finds, action steps for mitigation measures, surface collections, excavations, and communication routes to follow in the case of a discovery.

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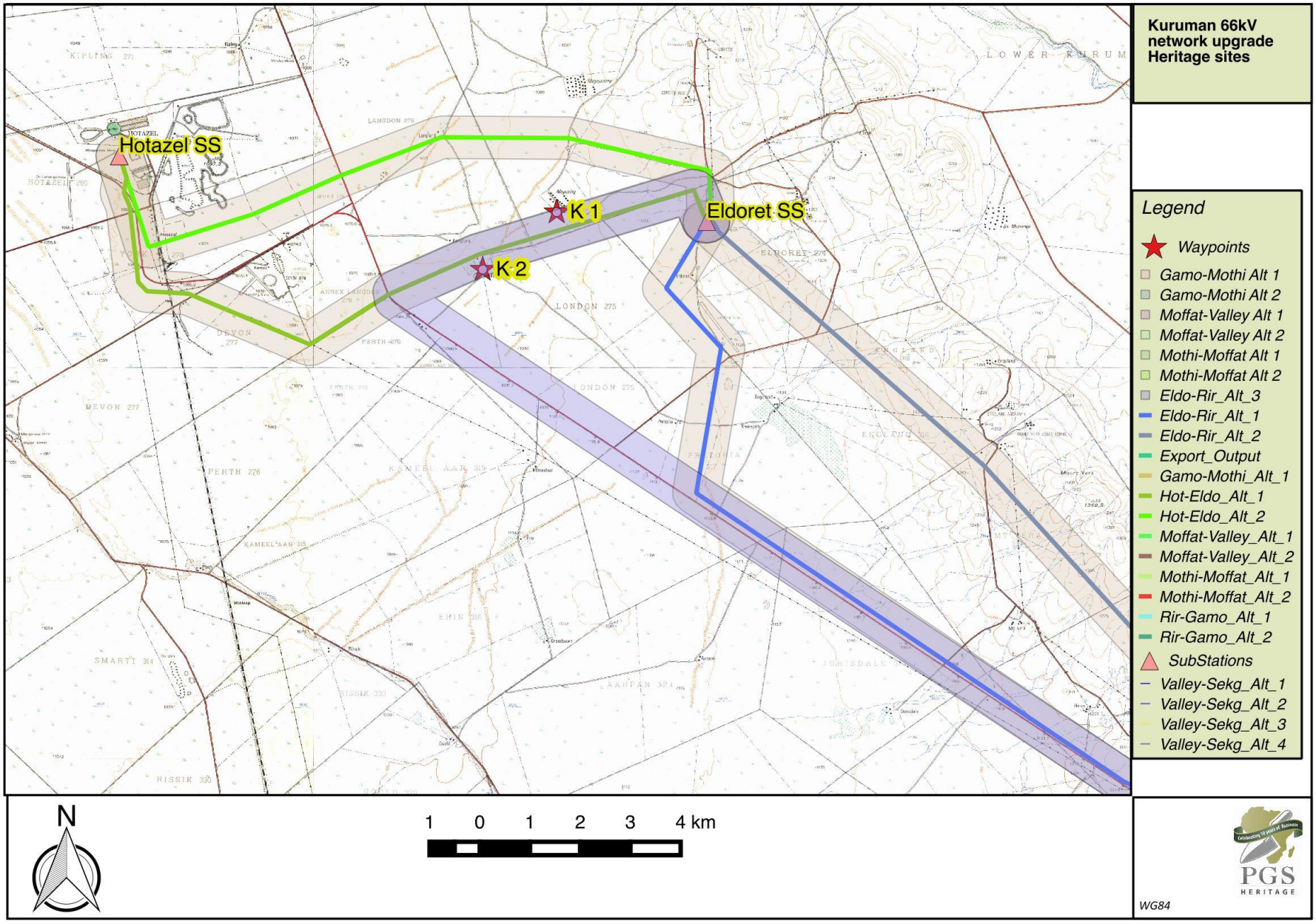
Appendix A

MAP OF HERITAGE SENSITIVE AREAS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K 2
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Moffat-Valley Alt 2
Mothi-Moffat Alt 1
Mothi-Moffat Alt 2
Eldo-Rir_Alt_3
Eldo-Rir_Alt_1
Eldo-Rir_Alt_2
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Mothi-Moffat_Alt_2
Rir-Gamo_Alt_1
Rir-Gamo_Alt_2
SubStations
Valley-Sekg_Alt_1
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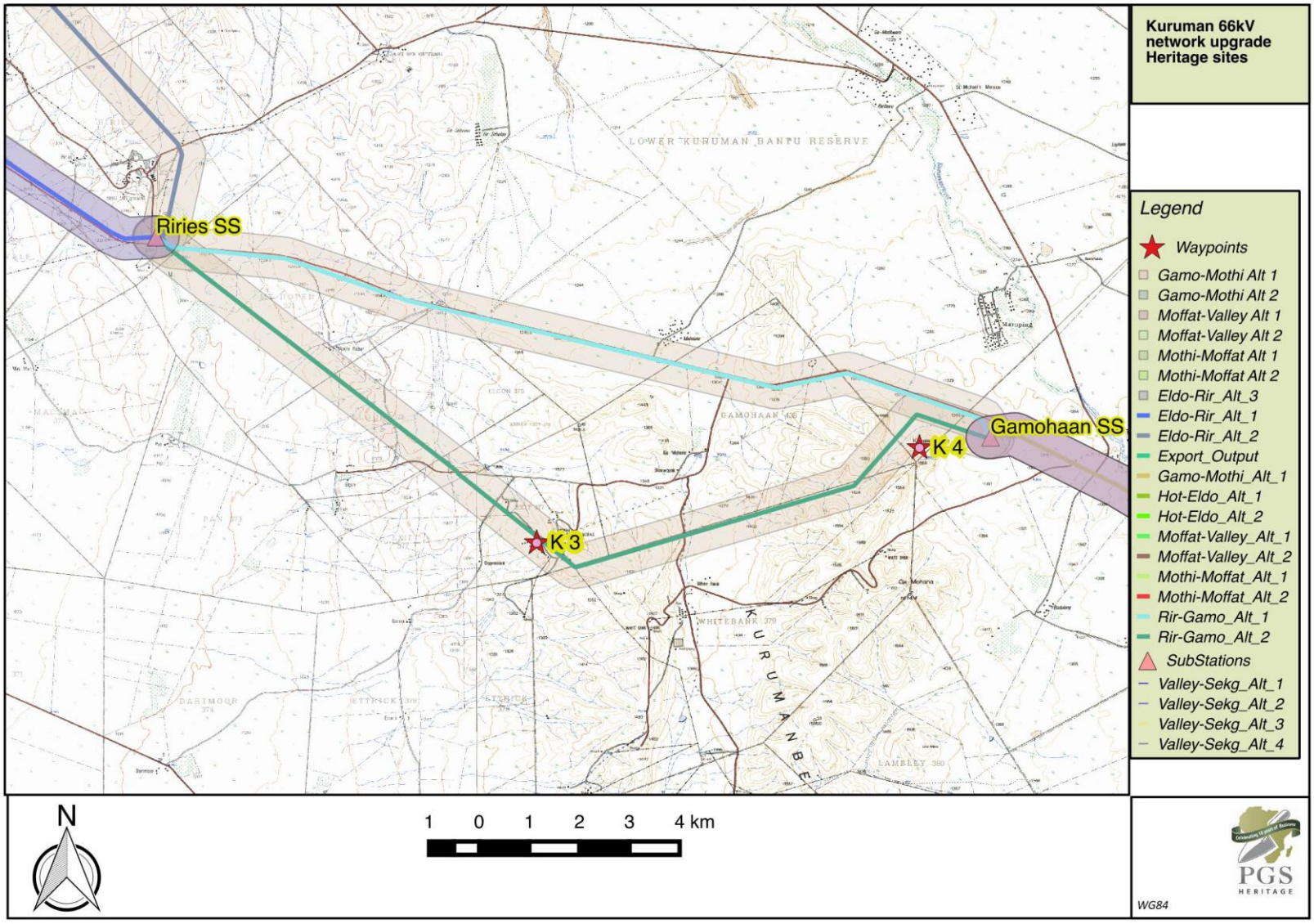
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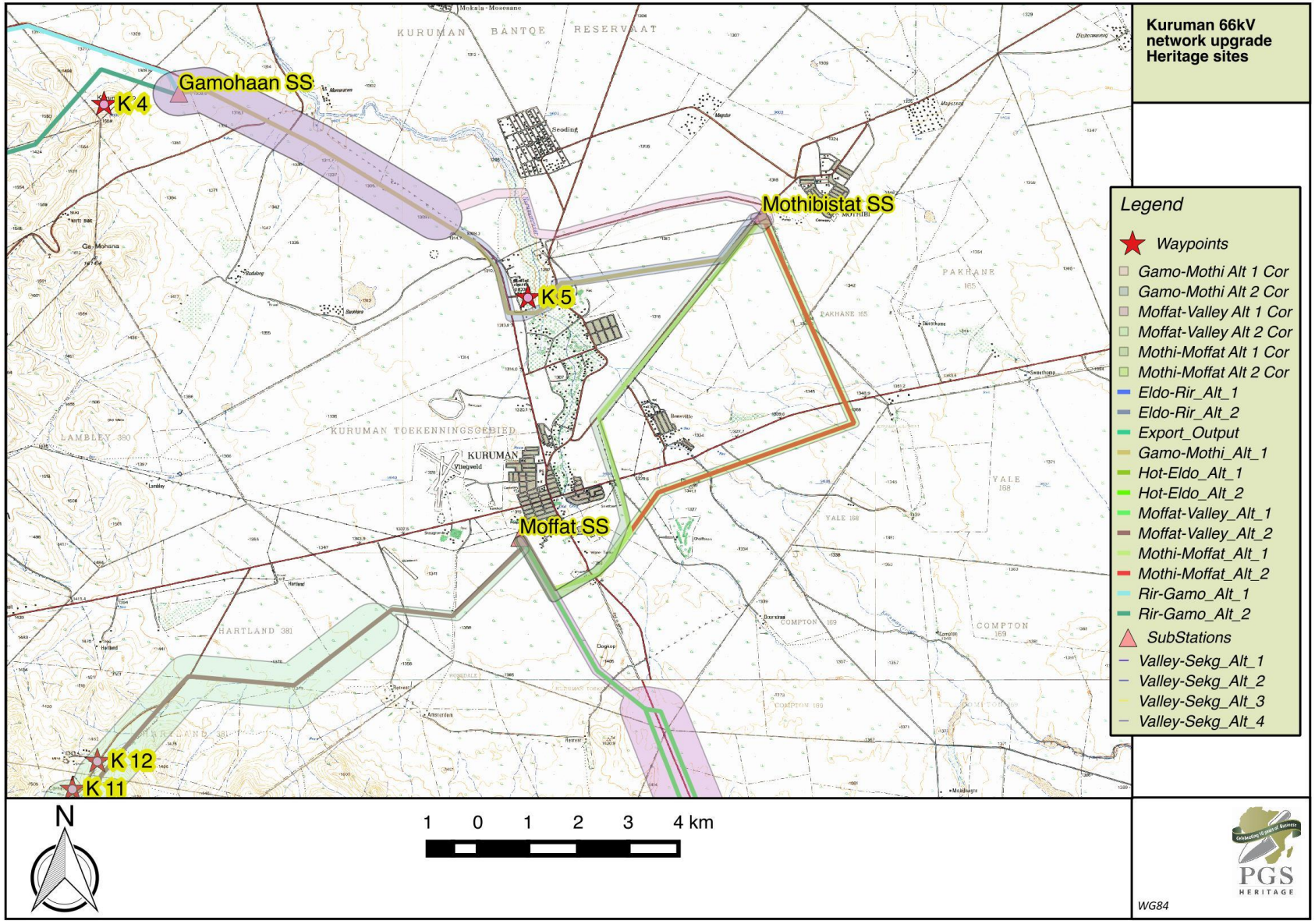
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Seoding
Ga-Mohana
LAMBLEY 380
HARTLAND 381
PAKHANE 165
VALE 168
COMPTON 169
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Gamo-Mothi Alt 2 Cor
Moffat-Valley Alt 1 Cor
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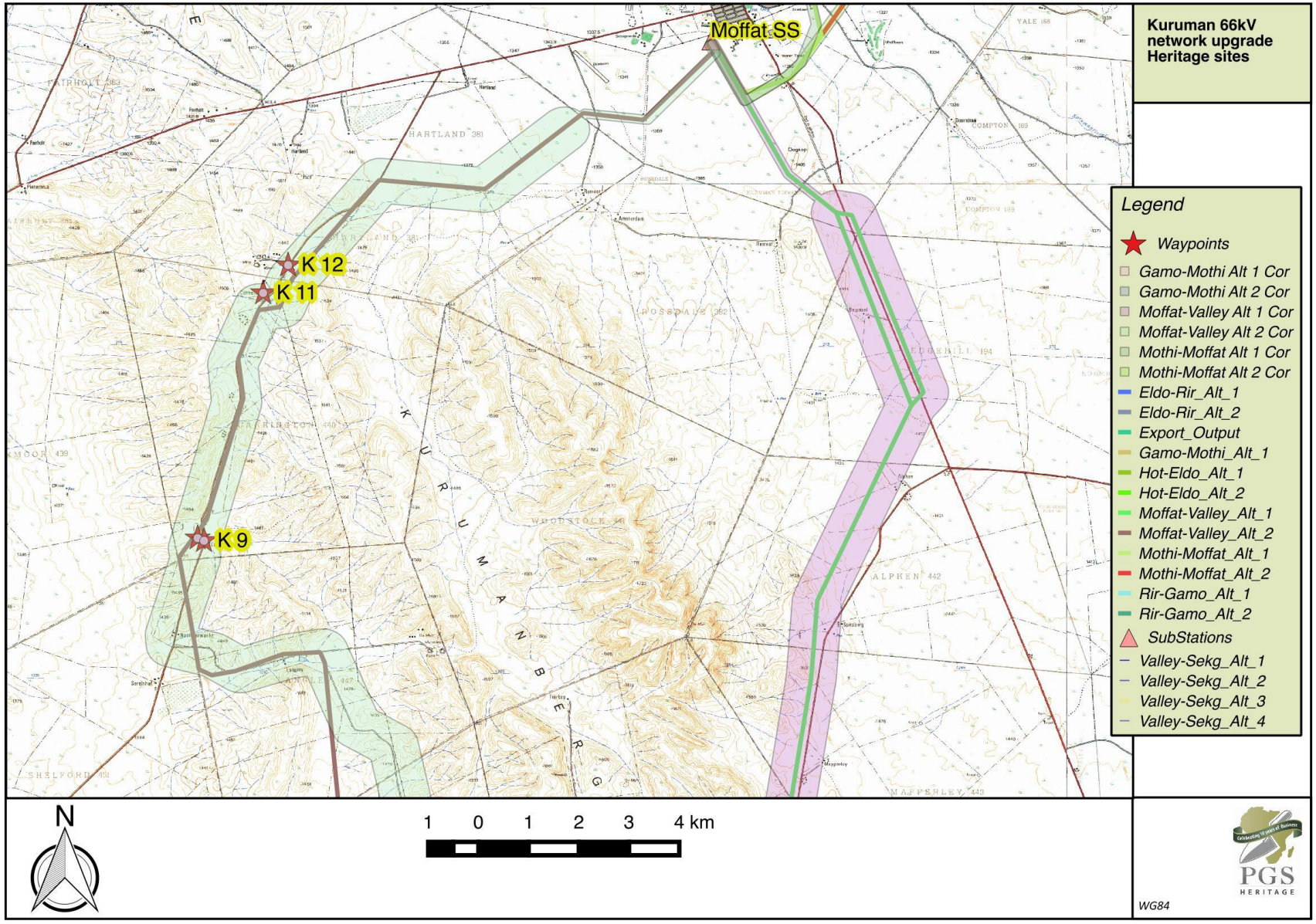
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ALPHEN 442
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Moffat-Valley Alt 1 Cor
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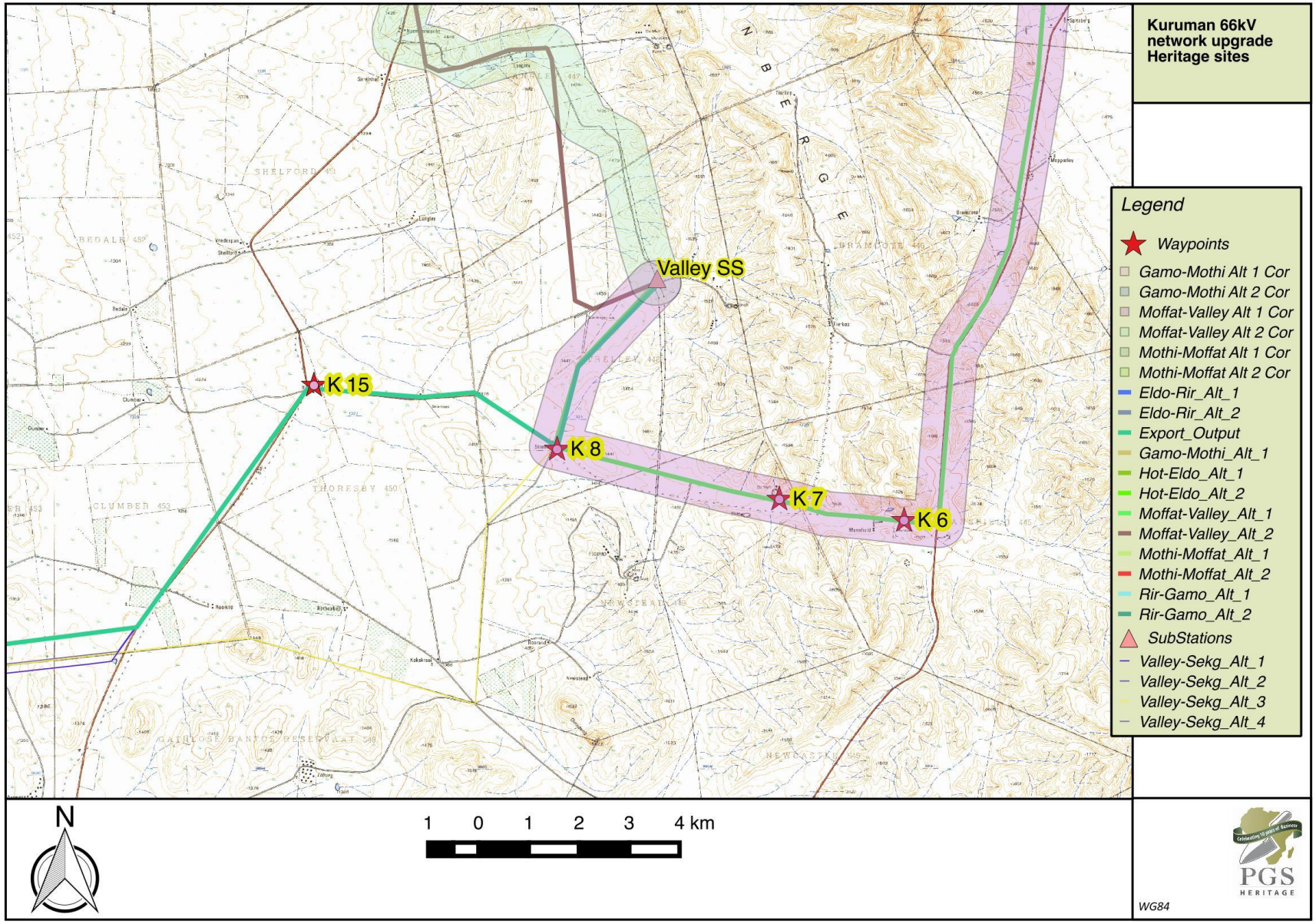
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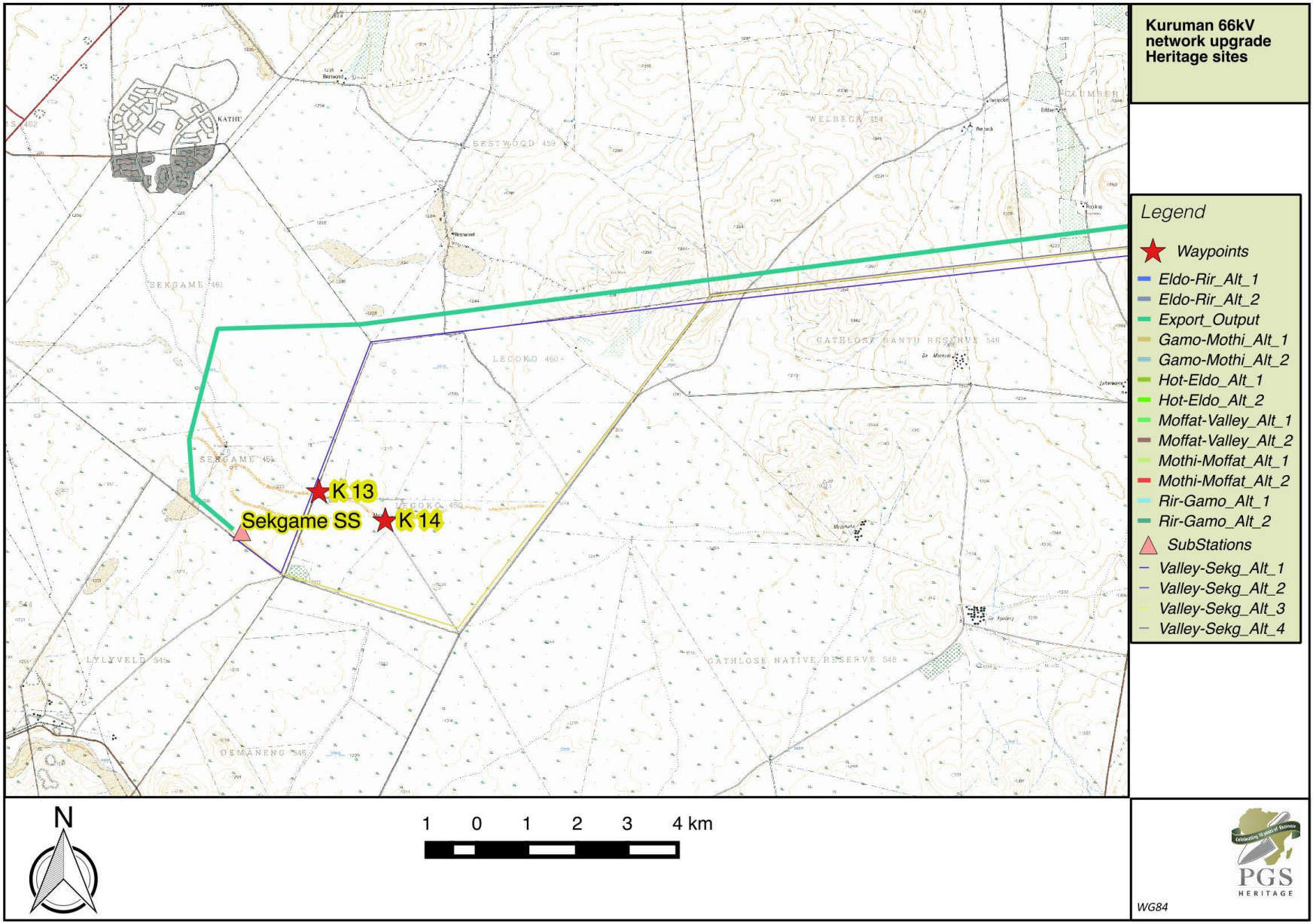
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Mothi-Moffat_Alt_1
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Rir-Gamo_Alt_2
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Valley-Sekg_Alt_2
Valley-Sekg_Alt_3
Valley-Sekg_Alt_4
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Sekgame SS
K 14
KATHU
BESTWOOD 459
WELBECK 354
SEKGAME 461
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