



KATHU CEMETERY

Heritage Impact Assessment for the Proposed New Kathu Cemetery on parts of the Remainder of the Farm Lyleveld 545 on the southern side of the town of Kathu in the Gamagara Local Municipality, Northern Cape.

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DECLARATION OF INDEPENDENCE

The report has been compiled by PGS Heritage, an appointed Heritage Specialist for Synergistics Environmental Services (Pty) Ltd. The views stipulated in this report are purely objective and no other interests are displayed in the findings and recommendations of this Heritage Impact Assessment.


HERITAGE CONSULTANT: PGS Heritage
CONTACT PERSON: Wouter Fourie
Tel: +27 (012) 332 5305
Fax: +27 (012) 332 2625
Email: wouter@pgsheritage.co.za

SIGNATURES:



STONE AGE SPECIALIST: Dr. Tim Forssman



SIGNATURES:



ACKNOWLEDGEMENT OF RECEIPT

CLIENT: Synergistics Environmental Services (Pty) Ltd
CONTACT PERSON: M's. Chiara Kotze
Address: PO Box 68821
Bryanston
2021
Tel: +27 (0) 11 326 4158
Fax: +27 (0) 11 326 4118
Email: ckotze@slrconsulting.com

SIGNATURE:

Report Title	Heritage Impact Assessment for the Proposed New Kathu Cemetery on parts of the Remainder of the Farm Uitkoms 463 on the north eastern side of the town of Kathu in the Gamagara Local Municipality, Northern Cape.		
Control	Name	Signature	Designation
Author	Wouter Fourie		Heritage Specialist / PGS Heritage
Reviewed	Dr. Tim Forssman Dr. Matt Lotter Dr. Matt Caruana		Stone Age Specialists / PGS Heritage Associate
Reviewed	Chiara Kotze		Client / Synergistics Environmental Services

The heritage impact assessment report has been compiled taking into account the NEMA Appendix 6 requirements for specialist reports as indicated in the table below.

NEMA Regulations (2014) - Appendix 6	Relevant section in report
Details of the specialist who prepared the report	Page 1 of Report – Contact details and company
The expertise of that person to compile a specialist report including a curriculum vitae	Section 1.2– refer to Appendix C
A declaration that the person is independent in a form as may be specified by the competent authority	Page ii of the report
An indication of the scope of, and the purpose for which, the report was prepared	Section 1.1
The date and season of the site investigation and the relevance of the season to the outcome of the assessment	Section 3
A description of the methodology adopted in preparing the report or carrying out the specialised process	Section 3
The specific identified sensitivity of the site related to the activity and its associated structures and infrastructure	Section 6
An identification of any areas to be avoided, including buffers	Section 6
A map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;	Section 6
A description of any assumptions made and any uncertainties or gaps in knowledge;	Section 1.3
A description of the findings and potential implications of such findings on the impact of the proposed activity, including identified alternatives, on the environment	Section 6
Any mitigation measures for inclusion in the EMPr	Section 7
Any conditions for inclusion in the environmental authorisation	Section 7
Any monitoring requirements for inclusion in the EMPr or environmental authorisation	Section 7
A reasoned opinion as to whether the proposed activity or portions thereof should be authorised and	Section 7
If the opinion is that the proposed activity or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan	
A description of any consultation process that was undertaken during the course of carrying out the study	Not applicable. A public consultation process was handled as part of the basic assessment and EMP process.
A summary and copies if any comments that were received during any consultation process	SAHRA did indicate that a HIA and PIA was needed.
Any other information requested by the competent authority.	Not applicable.

EXPLANATION OF ABBREVIATIONS USED IN THIS DOCUMENT

Abbreviations	Description
AIA	Archaeological Impact Assessment
ASAPA	Association of Southern African Professional Archaeologists
CMP	Conservation Management Plan
CRM	Cultural Resource Management
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EMPR	Environmental Management Programme Report
ESA	Earlier Stone Age
GPS	Global Positioning System
HIA	Heritage Impact Assessment
KC	Kathu Cemetery – abbreviation used as prefix to find spots
LIA	Late Iron Age
LSA	Later Stone Age
MSA	Middle Stone Age
NEMA	National Environmental Management Act
NHRA	National Heritage Resources Act
PGS	PGS Heritage
PHRA	Provincial Heritage Resources Authority
SAHRA	South African Heritage Resources Agency
SAHRIS	South African Heritage Resources Information System

EXECUTIVE SUMMARY

PGS Heritage (Pty) Ltd was appointed by Synergistics Environmental Services (Pty) Ltd to undertake a Heritage Impact Assessment (HIA), which forms part of the Basic assessment for the proposed New Kathu Cemetery on parts of the Remainder of the Farm Lyleveld 545 13km south of the town of Kathu in the Gamagara Local Municipality, Northern Cape Province.

Due to the significance of the Stone Age sites from the surrounding landscape, and in adherence to the recommendation made by SAHRA in their letter of response to the initial submission of the proposed development on SAHRIS, Dr. Tim Forssman was appointed to review the report and provide inputs in terms of the Stone Age. Drs. Matt Caruana and Matt Lotter assisted with the fieldwork, analysis and review of the material.

An archival and historical desktop study was undertaken and was used to compile a historical layering of the study area within its regional context. This component indicated that the landscape within which the project area is located has a rich and diverse history.

The proposed National Heritage Site Nomination of the Kathu Archaeological Complex demonstrates the importance of the archaeological heritage of the region (Walker et al, 2013; SAHRIS accessed August 2014). The scientific and heritage significance, and the occurrence of was taken into account in the HIA under review (Beaumont, 1990, 2004, 2013; Porrat et al, 2010; Herries, 2012; Chazan et al, 2012; Wilkins & Chazan, 2012; Walker et al, 2013; Walker et al 2014). The heritage desktop study component of the project was followed by fieldwork. The methodology comprised a detailed walk through of the study area by an experienced fieldwork team consisting of two archaeologists.

The area north of the existing Kathu cemetery was previously studied by Beaumont (**Table 10**) and lithic densities and debitage frequencies found at Uitkoms 1 (**Figure 3**) was comparable to those found at Kathu Townlands 1. He describes Uitkoms 4, 15km north of the New Kathu Cemetery (**Figure 3**), as a buried site of approximately 100 meters wide. No controlled excavations have been done at Uitkoms 4.

However, due to the fact that subterranean Stone Age material is known from the surroundings of the study area, the following general recommendations are required:

- It is recommended that a set of test excavation be done to determine presence and extent of an archaeological deposit;
- If a deposit is identified a controlled sampling of the material found should be done;
- This work must be done in such a way as to augment the current research questions and field work such as the excavations at the Kathu Townlands Site and Kathu Pan;
- These test excavations and sampling must be done after a permit has been granted under Section 35 of the NHRA (Act 25 of 1999) to a qualified and experienced Stone Age archaeologist;
- In the event that substantive material is uncovered, it is recommended that a display at the cemetery of the material found at **KC1** is considered;
- An archaeologist suitably qualified in Stone Age fieldwork and research must be appointed to undertake an Archaeological Watching Brief during the Construction¹ Phase of the project. The appointed archaeologist will be responsible for the following:
 - Provide training to the project Environmental Control Office (ECO) in Stone Age archaeology and the identification of Stone Age artefacts and sites. The ECO will be responsible for daily on-site monitoring during the Construction Phase with the appointed archaeologist visiting the site every two weeks.
 - Conduct an archaeological monitoring program whereby the construction site is visited once every two weeks for at least the first three months of the project.
 - On-site assessment of any Stone Age material exposed during construction and the provision of recommendations for the way in which the exposed material must be mitigated.
 - Compile and submit an archaeological monitoring report at the end of the monitoring process.
- During the monitoring undertaken everyday on-site by the ECO and once every two weeks by the appointed archaeologist, all construction work must be closely monitored. Should any Stone Age material or any archaeological material be identified, all construction work in that area must immediately stop and the ECO or archaeologist (if already present on site) must demarcate a construction free area around the discovery. If the ECO made the discovery, the archaeologist must be contacted immediately to visit the construction site to assess the exposed material. After assessing the exposed material, the archaeologist would provide recommendations for the exposed material

¹ *the initial site establishment when the area is cleared and support infrastructure is established.*

which may range from destruction without mitigation (if the exposed material is found to be of little significance) to archaeological mitigation (if the exposed material is found to be significant).

Palaeontology

As per the palaeontological desktop assessment (Butler, 2017). The proposed development is unlikely to pose a substantial threat to local fossil heritage. However, should fossil remains be discovered during any phase of construction, either on the surface or exposed by fresh excavations, the ECO responsible for these developments should be alerted immediately. Such discoveries ought to be protected (preferably *in situ*) and the ECO should alert SAHRA (South African Heritage Research Agency) so that appropriate mitigation (*e.g.* recording, sampling or collection) can be taken by a professional paleontologist.

The specialist involved would require a collection permit from SAHRA. Fossil material must be curated in an approved collection (*e.g.* museum or university collection) and all fieldwork and reports should meet the minimum standards for palaeontological impact studies developed by SAHRA.

The development of the proposed New Kathu cemetery can continue if the recommendations as outlined in this report are adhered to.

TABLE OF CONTENTS	PAGE
1 INTRODUCTION	1
1.1 Scope of the Study	1
1.2 Specialist Qualifications	1
1.3 Assumptions and Limitations	2
1.4 Legislative Context	2
1.5 Terminology and Abbreviations	3
2 TECHNICAL DETAILS OF THE PROJECT	6
2.1 Site Location and Description	6
2.2 Technical Project Description	6
3 ASSESSMENT METHODOLOGY	8
3.1 Methodology for Assessing Heritage Site Significance	8
3.2 Methodology for Impact Assessment	9
4 Current Status quo	14
4.1 Description of Study Area	14
5 DESKTOP STUDY FINDINGS	16
5.1 Previous Studies	16
5.2 Archaeological & Historical Sequence	27
5.3 Palaeontology	38
6 FIELDWORK FINDINGS	39
6.1 Find spot descriptions	40
7 IMPACT OF PROPOSED DEVELOPMENT ON HERITAGE RESOURCES	45
7.1 Archaeological Resources	45
7.2 Palaeontological Resources	46
8 MITIGATION MEASURES and general recommendations	47
9 CONCLUSIONS	49
10 REFERENCES	52
10.1 Published References.....	52
10.2 Unpublished References	55
10.3 Archival References.....	60
10.4 Internet References	60
10.5 Historic Topographic Maps	60

LIST OF APPENDICES:

- Appendix A Legislative Requirements – Terminology and Assessment Criteria
- Annexure B Heritage Resources Distribution Map

TABLE OF FIGURES

Figure 1 – Human and Cultural Time line in Africa (Morris, 2008; Lomekwian not included)..... 5

Figure 2 – Locality of study area..... 7

Figure 3 – Layout of proposed cemetery and access road (in red and yellow)..... 7

Figure 4 –General condition of study area 14

Figure 5 - Position of the proposed access road from N14..... 15

Figure 6 - Disturbance caused by geotechnical testing 15

Figure 7 – Shows the location of areas of archaeological interest in the Kathu region in relation to the proposed New Kathu cemetery..... 27

Figure 8 – Reverend John Campbell (Campbell, 1815). He passed through the general vicinity of the study area during his travels from Klaarwater to Kuruman..... 30

Figure 9 - Nicolaas Waterboer, who succeeded as leader of Griquatown in 1852 after the death of his father Andries Waterboer (Reader’s Digest, 1994:168). 32

Figure 10 - 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..... 33

Figure 11 - An everyday scene during the Rinderpest Epidemic (Snyman, 1983:20). 34

Figure 12 - Toto, leader of the Thlaro along the Langberg (Snyman, 1986:17). 35

Figure 13 - Dr. 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). 37

Figure 14 – Map indicating transect and find spots..... 39

Figure 15 - KC1 find spot..... 40

Figure 16 - Collection of lithics at KC1 41

Figure 17 - KC2 find spot..... 42

Figure 18 - Lithics identified at KC2 42

Figure 19 - KC4 find spot..... 43

Figure 20 - Lithics found at KC4..... 44

Figure 21 - Lithics found at KC6..... 45

Figure 22 - Shifting the New Kathu cemetery boundary ~50 m to minimize any impact on find spots. 49

1 INTRODUCTION

PGS Heritage (Pty) Ltd (PGS) was appointed by Synergistics Environmental Services (Pty) Ltd to undertake a Heritage Impact Assessment (HIA), which forms part of the Basic Assessment (BA) for the proposed new Kathu Cemetery on parts of the Remainder of the Farm Lyleveld 545 on the southern side of the town of Kathu in land that will be transferred to the Gamagara Local Municipality, Northern Cape Province, as part of the Dingleton Resettlement project.

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 (HIA) aims to inform the BA in the development of a comprehensive Environmental Management Plan (EMP) to assist the developer in managing the identified 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

This HIA was compiled by PGS, the staff of which has a combined experience of nearly 50 years in the heritage consulting industry and have extensive experience in managing HIA processes.

Mr. Wouter Fourie, Principal Heritage Specialist 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).

Dr. Tim Forssman acted as specialist for the Stone Age. He has undertaken extensive and in-depth research at several Stone Age, Iron Age and rock art localities around southern Africa. He has also published several scientific articles with a focus on the Later Stone Age, Iron Age, rock art and archaeological method. He is registered with the Association of Southern African Professional Archaeologists (ASAPA).

1.3 Assumptions and Limitations

Not detracting in any way from the comprehensiveness of the fieldwork undertaken, it is necessary to realise that the heritage sites located during the fieldwork do not necessarily represent all the heritage sites present within the area. Should any heritage features or objects not included in the 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 has 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.

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 Programme (EMP) – Section (34)(b)
- ii. National Heritage Resources Act (NHRA) Act 25 of 1999
 - a. Protected Areas – Section 28;
 - b. Protection of Heritage Resources – Sections 34 to 36; and
 - c. 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 NEMA (No 107 of 1998) states that an integrated EMP should (23:2 (b)) "...identify, predict and evaluate the actual and potential impact on the environment, socio-economic conditions and cultural heritage". In accordance with legislative requirements and EIA rating criteria, the regulations of SAHRA and ASAPA have also been incorporated to ensure that a comprehensive and legally compatible HIA report is compiled.

1.5 Terminology and Abbreviations

Archaeological resources

- i. 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;
- ii. 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 a 10m buffer area;
- iii. 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;
- iv. structures, features and artefacts associated with military history which are older than 75 years and the site on which they are found.

Cultural significance

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

Development

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

- i. construction, alteration, demolition, removal or change in use of a place or a structure at a place;
- ii. carrying out any works on or over or under a place;

- iii. subdivision or consolidation of land comprising a place, including the structures or airspace of a place;
- iv. constructing or putting up for display signs or boards;
- v. any change to the natural or existing condition or topography of land; and
- vi. any removal or destruction of trees, or removal of vegetation or topsoil

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.

Find Spot

Can be classified as an area where only a single artefact or low density of artefacts occurs. The absence of associated material or artefacts that indicate a temporal shallow or ephemeral occupation. The association of numerous artefacts or structures and /or cultural deposits that all combine to indicate a temporal depth and information to a site.

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 place or object of cultural significance. The association of numerous artefacts or structures and /or cultural deposits that all combine to indicate a temporal depth and information to a site.

Later Stone Age (LSA)

The archaeology of the last 20 000 years, associated with fully modern people.

Late Iron Age (Early Farming Communities)

The archaeology of the last 2000 years up to the 1800s associated with ironworking and farming activities such as herding and agriculture.

Middle Stone Age (MSA)

The archaeology of the Stone Age from 20 000/40 000-300 000/300 000 years ago – a period associated with early modern humans.

Earlier Stone Age (ESA)

The archaeology of the Stone Age from 300 000 years ago to >3.2 million years ago, associated with the Lomekwian, Oldowan and Acheulean industries.

Palaeontology

Any fossilised remains or fossil trace of animals or plants which lived in the geological past and any site which contains such fossilised remains or trace.

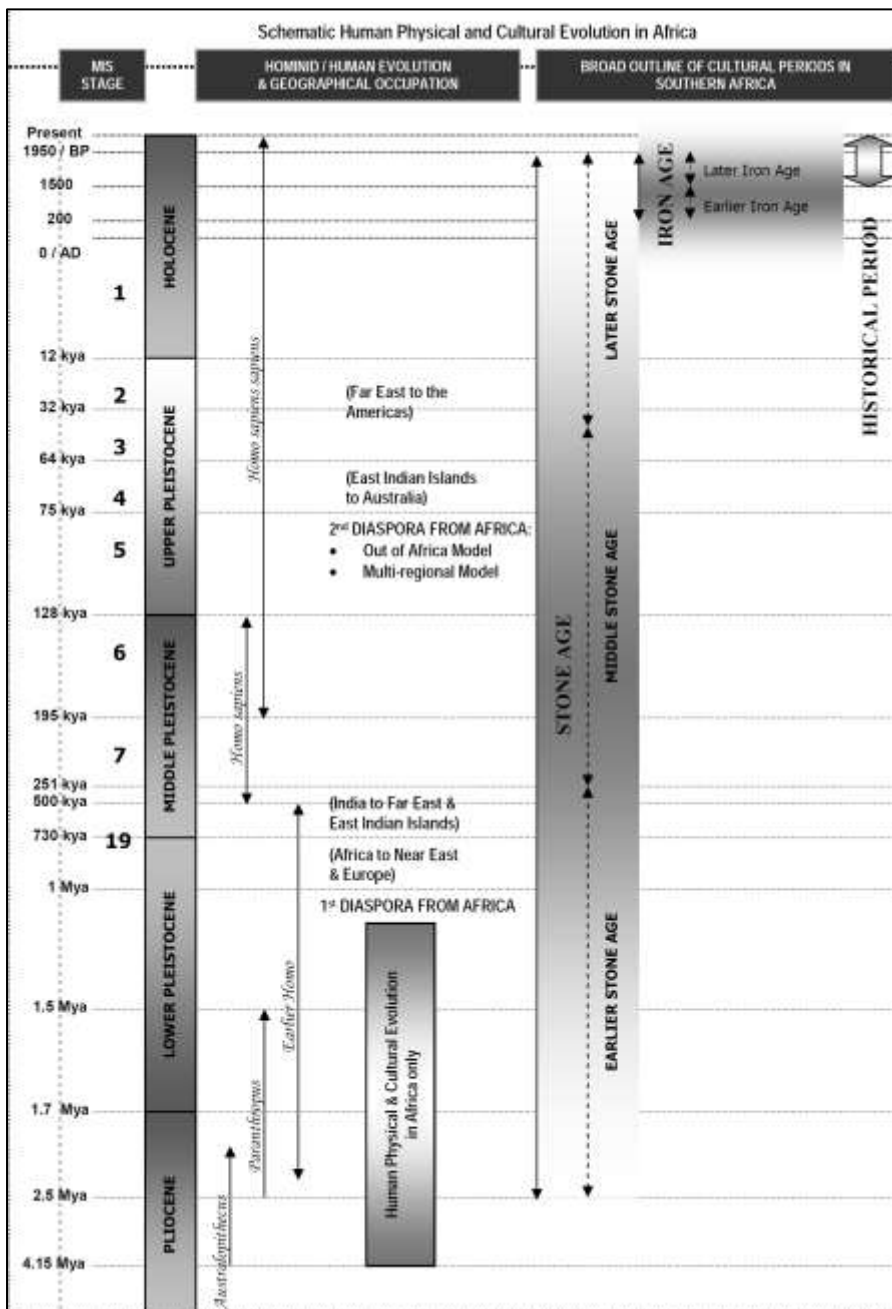


Figure 1 – Human and Cultural Time line in Africa (Morris, 2008; Lomekwian not included)

2 TECHNICAL DETAILS OF THE PROJECT

2.1 Site Location and Description

Coordinates	New Kathu Cemetery: S27 48 52.39 E23 02 30.78
Property	Parts of the Remainder of the Farm Lyleveld 545.
Location	The proposed New Kathu cemetery is situated on parts of the Remainder of the Farm Lyleveld 545 on the side of the town of Kathu in land that will be transferred to the Gamagara Local Municipality, Northern Cape Province, as part of the Dingleton Resettlement project. The site is situated adjacent and on the northern side of the N14 tar road about 13km south from the town of Kathu.
Extent	The proposed study area measures approximately 5 ha/50 000 sq. m. (Figure 3).
Land Description	The study area is bordered by the N14 tar road on the southern boundary. The rest of the site is bordered by open veld, and a Transnet rail line to the west. The study area comprises flat plains with mixed wooded and shrub savannah and a Kalahari Sand substrate.

2.2 Technical Project Description

The current Kathu municipal cemetery is reaching capacity and the need for expansion of the cemetery has been identified by the local municipality.

The new cemetery of 5 hectares is planned on the Remainder of the Farm Lyleveld 545, which is located 13km south of Kathu with its southern boundary along the N14 (**Figure 2**).

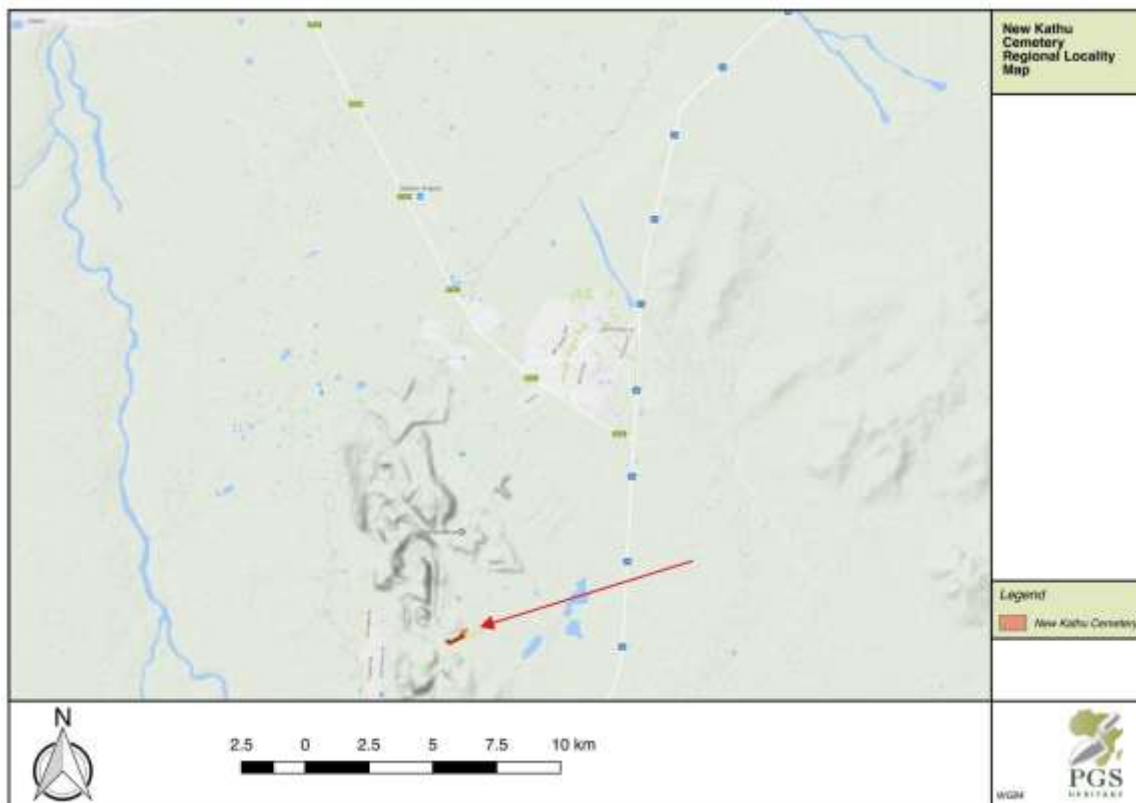


Figure 2 – Locality of study area



Figure 3 – Layout of proposed cemetery and access road (in red and yellow)

3 ASSESSMENT METHODOLOGY

3.1 Methodology for Assessing Heritage Site Significance

This report was compiled by PGS for the proposed New Kathu cemetery on parts of the Remainder of the Farm Lyleveld 545 13km south of the town of Kathu in land that will be transferred to the Gamagara Local Municipality, Northern Cape Province, as part of the Dingleton Resettlement project. The applicable maps, tables and figures are included as stipulated in the NHRA (no 25 of 1999) and the National Environmental Management Act (NEMA) (no 107 of 1998). The HIA process consisted of three steps:

Step I – Literature Review: The background information to the field survey leans greatly on the archival and historical cartographic material assessed as part of the study as well as a study of the available literature.

Step II – Physical Survey: The physical survey was conducted on foot over the entire area proposed for the development. Priority was placed on the undisturbed areas. A systematic inspection of the area on foot along linear transects resulted in the maximum coverage of the proposed area. The field work was conducted on 23 January 2017. The fieldwork was conducted by archaeologists, Drs. Timothy Forssman and Matt G. Lotter. The survey focused on the study area as provided by the client.

Step III – Report: The final step involved the recording and documentation of relevant heritage resources, the assessment of resources regarding the heritage impact assessment criteria and report writing as well as mapping and recommendations.

The significance of heritage sites was based on five 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 - <10/50m²
 - Medium - 10-50/50m²
 - High - >50/50m²
- 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 development position
- D - Preserve site, or extensive data collection and mapping of the site; and
- E - Preserve site.

3.1.1 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 (see **Table 1**).

Table 1 - 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	Conservation; Mitigation not advised
Local Significance (LS)	Grade 3B	High	Mitigation (Part of site should be retained)
Generally Protected A (GP.A)		High/Medium	Mitigation before destruction
Generally Protected B (GP.B)		Medium	Recording before destruction
Generally Protected C (GP.C)		Low	Destruction

3.2 Methodology for Impact Assessment

In order to ensure uniformity, a standard impact assessment methodology has been utilised so that a wide range of impacts can be compared. The impact assessment methodology makes provision for the assessment of impacts against the following criteria:

- Significance;

- Spatial scale;
- Temporal scale;
- Probability; and
- Degree of certainty.

A combined quantitative and qualitative methodology was used to describe impacts for each of the aforementioned assessment criteria. A summary of each of the qualitative descriptors, along with the equivalent quantitative rating scale for each of the aforementioned criteria, is given in **Table 2**.

Table 2 - Quantitative rating and equivalent descriptors for the impact assessment criteria

RATING	SIGNIFICANCE	EXTENT SCALE	TEMPORAL SCALE
1	VERY LOW	<i>Isolated corridor / proposed corridor</i>	<u>Incidental</u>
2	LOW	<i>Study area</i>	<u>Short-term</u>
3	MODERATE	<i>Local</i>	<u>Medium-term</u>
4	HIGH	<i>Regional / Provincial</i>	<u>Long-term</u>
5	VERY HIGH	<i>Global / National</i>	<u>Permanent</u>

A more detailed description of each of the assessment criteria is given in the following sections.

3.2.1 Significance Assessment

The significance rating (importance) of the associated impacts embraces the notion of extent and magnitude, but does not always clearly define these, since their importance in the rating scale is very relative. For example, 10 structures younger than 60 years might be affected by a proposed development, and if destroyed the impact can be considered as VERY LOW in that the structures are all of Low Heritage Significance. If two of the structures are older than 60 years and of historic significance, and as a result of High Heritage Significance, the impact will be considered to be HIGH to VERY HIGH.

A more detailed description of the impact significance rating scale is given in **Table 3** below.

Table 3 - Description of the significance rating scale

RATING	DESCRIPTION
--------	-------------

5	VERY HIGH	Of the highest order possible within the bounds of impacts which could occur. In the case of adverse impacts: there is no possible mitigation and/or remedial activity which could offset the impact. In the case of beneficial impacts, there is no real alternative to achieving this benefit.
4	HIGH	Impact is of substantial order within the bounds of impacts which could occur. In the case of adverse impacts: mitigation and/or remedial activity is feasible but difficult, expensive, time-consuming or some combination of these. In the case of beneficial impacts, other means of achieving this benefit are feasible but they are more difficult, expensive, time-consuming or some combination of these.
3	MODERATE	Impact is real but not substantial in relation to other impacts, which might take effect within the bounds of those which could occur. In the case of adverse impacts: mitigation and/or remedial activity are both feasible and fairly easily possible. In the case of beneficial impacts: other means of achieving this benefit are about equal in time, cost, effort, etc.
2	LOW	Impact is of a low order and therefore likely to have little real effect. In the case of adverse impacts: mitigation and/or remedial activity is either easily achieved or little will be required, or both. In the case of beneficial impacts, alternative means for achieving this benefit are likely to be easier, cheaper, more effective, less time consuming, or some combination of these.
1	VERY LOW	Impact is negligible within the bounds of impacts which could occur. In the case of adverse impacts, almost no mitigation and/or remedial activity is needed, and any minor steps which might be needed are easy, cheap, and simple. In the case of beneficial impacts, alternative means are almost all likely to be better, in one or a number of ways, than this means of achieving the benefit. Three additional categories must also be used where relevant. They are in addition to the category represented on the scale, and if used, will replace the scale.
	0	There is no impact at all - not even a very low impact on a party or system.

3.2.2 Spatial Scale

The spatial scale refers to the extent of the impact i.e. will the impact be felt at the local, regional, or global scale. The spatial assessment scale is described in more detail in **Table 4**.

Table 4 - Description of the spatial significance rating scale

RATING	DESCRIPTION
--------	-------------

5	Global/National	The maximum extent of any impact.
4	Regional / Provincial	The spatial scale is moderate within the bounds of possible impacts, and will be felt at a regional scale (District Municipality to Provincial Level). The impact will affect an area up to 50 km from the proposed site / corridor.
3	Local	The impact will affect an area up to 5 km from the proposed site.
2	Study Area	The impact will affect an area not exceeding the boundary of the study area.
1	Isolated Sites / proposed site	The impact will affect an area no bigger than the site.

3.2.3 Temporal/Duration Scale

In order to accurately describe the impact, it is necessary to understand the duration and persistence of an impact in the environment.

The temporal or duration scale is rated according to criteria set out in **Table 5**.

Table 5 - Description of the temporal rating scale

RATING		DESCRIPTION
1	Incidental	The impact will be limited to isolated incidences that are expected to occur very sporadically.
2	Short-term	The environmental impact identified will operate for the duration of the construction phase or a period of less than 5 years, whichever is the greater.
3	Medium-term	The environmental impact identified will operate for the duration of life of the project.
4	Long-term	The environmental impact identified will operate beyond the life of operation of the project.
5	Permanent	The environmental impact will be permanent.

3.2.4 Degree of Probability

The probability or likelihood of an impact occurring is outlined in **Table 6** below.

Table 6 - Description of the degree of probability of an impact occurring

RATING	DESCRIPTION
1	Practically impossible
2	Unlikely
3	Could happen
4	Very likely
5	It's going to happen / has occurred

3.2.5 Degree of Certainty

As with all studies, it is not possible to be 100% certain of all facts, and for this reason a standard “degree of certainty” scale is used, as discussed in **Table 7**. The level of detail for specialist studies is determined according to the degree of certainty required for decision-making.

Table 7 - Description of the degree of certainty rating scale

RATING	DESCRIPTION
Definite	More than 90% sure of a particular fact.
Probable	Between 70 and 90% sure of a particular fact, or of the likelihood of that impact occurring.
Possible	Between 40 and 70% sure of a particular fact, or of the likelihood of an impact occurring.
Unsure	Less than 40% sure of a particular fact or the likelihood of an impact occurring.
Can't know	The consultant believes an assessment is not possible even with additional research.

3.2.6 Quantitative Description of Impacts

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, spatial and temporal scale, as described below:

$$\text{Impact Risk} = (\text{SIGNIFICANCE} + \text{Spatial} + \text{Temporal}) \times \text{Probability}$$

$$3 \qquad \qquad \qquad 5$$

An example of how this rating scale is applied is shown below:

Table 8 - Example of Rating Scale

IMPACT	SIGNIFICANCE	SPATIAL SCALE	TEMPORAL SCALE	PROBABILITY	RATING
	Low	Local	Medium Term	Could Happen	Low
Impact on heritage resources	2	3	3	3	1.6

Note: The significance, spatial and temporal scales are added to give a total of 8, which is divided by 3 to give a criterion rating of 2.67. The probability (3) is divided by 5 to give a

probability rating of 0.6. The criteria rating of 2.67 is then multiplied by the probability rating (0,6) to give the final rating of 1,6.

The impact risk is classified according to five classes as described in Table 9 below.

Table 9 - Impact Risk Classes

RATING	IMPACT CLASS	DESCRIPTION
0.1 – 1.0	1	Very Low
1.1 – 2.0	2	Low
2.1 – 3.0	3	Moderate
3.1 – 4.0	4	High
4.1 – 5.0	5	Very High

Therefore, with reference to the example used for heritage structures above, an impact rating of 1.6 will fall in the Impact Class 2, which will be considered to be a low impact.

4 CURRENT STATUS QUO

4.1 Description of Study Area

The study area is situated 13 km south of the town of Kathu. It comprises of an area 170mx290m and is approximately 5 hectares in size. The site is bordered by the N14 on its southern boundary (**Figure 3**).



Figure 4 –General condition of study area



Figure 5 - Position of the proposed access road from N14



Figure 6 - Disturbance caused by geotechnical testing

The site itself has a flat topography and is characterised by wooded grass-land vegetation on red Kalahari sands (**Figure 4- Figure 6**). No exposed pebble/gravel layers were observed.

5 DESKTOP STUDY FINDINGS

The examination of heritage databases, historical data and cartographic resources represents a critical additional tool for locating and identifying heritage resources and in determining the historical and cultural context of the study area. Therefore, an internet literature search was conducted and relevant archaeological and historical texts were also consulted. Relevant topographic maps and satellite imagery were studied.

5.1 Previous Studies

Researching the SAHRA APM Report Mapping Project records and the SAHRIS online database (<http://www.sahra.org.za/sahris>), it was determined that a great number of previous archaeological studies were conducted around Kathu. Several other previous archaeological or historical studies had been performed within the wider vicinity of the study area. A selection of previous studies for the area in the APM Report Mapping Project are listed in chronological order. Refer to **Figure 7** for a locality map of the studies completed in close vicinity to the current study area:

- Morris, D. & Beaumont, P.B. 1994. **Ouplaas 2 Rock Engravings, Daniëlskuil**. An unpublished report by the McGregor Museum on file at SAHRA as 1994-SAHRA-0025.
- Morris, D. 1999. **Proposed mining areas and properties at Ulco, Northern Cape, Including the vicinities of Gorrokop and Groot Kloof**. An unpublished report by the McGregor Museum on file at SAHRA as 1999-SAHRA-0055.
- Beaumont, P.B. 2000. **Archaeological Impact Assessment: Archaeological Scoping Survey for the purpose of an EMPR for the Sishen Iron Ore Mine**. An unpublished report by the McGregor Museum on file at SAHRA as 2000-SAHRA-0023.
- Morris, D. 2001. **Report on Assessment of Archaeological Resources in the vicinity of proposed mining at Morokwa**. An unpublished report by the McGregor Museum on file at SAHRA as 2001-SAHRA-0078.

- Beaumont, P.B. 2004. **Heritage EIA of two areas at Sishen Iron Ore Mine.** An unpublished report by the McGregor Museum on file at SAHRA as 2004-SAHRA-0067.
- Morris, D. 2005. **Report on a Phase 1 Archaeological Assessment of Proposed Mining Areas of the Farms Bruce, King, Mokaning and Parson, Between Postmasburg and Kathu, Northern Cape.** An unpublished report by the McGregor Museum on file at SAHRA as 2005-SAHRA-0032.
- Beaumont, P.B. 2005a. **Heritage Impact Assessment of an area of the Sishen Iron Ore Mine that may be covered by the Vliegveldt waste dump.** An unpublished report by the McGregor Museum on file at SAHRA as 2005-SAHRA-0230.
- Beaumont, P.B. 2005b. **Heritage Impact Assessment for EMPR Amendment for crusher at Sishen Iron Ore Mine.** An unpublished report by the McGregor Museum on file at SAHRA as 2005-SAHRA-0259.
- Beaumont, P.B. 2006a. **Phase 1 Heritage Impact Assessment Report on Erf 1439, Remainder of Erf 2974, Remainder of Portion 1 of the Farm Uitkoms 463, and Farms Kathu 465 and Sims 462 at and near Kathu in the Northern Cape Province.** An unpublished report by the McGregor Museum on file at SAHRA as 2006-SAHRA-0127.
- Beaumont, P.B. 2006b. **Phase 1 Heritage Impact Assessment Report on Portions A and B of the Farm Sims 462, Kgalagadi District, Northern Cape Province.** An unpublished report by the McGregor Museum on file at SAHRA as 2006-SAHRA-0165.
- Beaumont, P.B., 2006c. **Phase 1 Heritage Impact Assessment Report on Portion 48 and the remaining Portion of Portion 4 of the Farm Bestwood 459, Kgalagadi District, Northern Cape Province.** An Archaeological Impact Assessment report by the Archaeology Department, McGregor Museum, prepared for MEG Environmental Impact Studies.
- Dreyer, C. 2006. **First Phase Archaeological and Cultural Heritage Assessment of the proposed residential developments at the farm Hartnolls 458, Kathu, Northern Cape.** Accessed SAHRIS 14 August 2014.
- Beaumont, P.B. 2007. **Supplementary Archaeological Impact Assessment report on sites near or on the Farm Hartnolls 458, Kgalagadi District Municipality, Northern Cape Province.** Accessed SAHRIS 14 August 2014.

- Beaumont, P.B. 2008a. **Phase 1 Archaeological Impact Assessment Report on Portion 459/49 of the farm Bestwood 459 at Kathu, Kgalagadi District Municipality, Northern Cape Province.** Accessed SAHRIS 14 August 2014.
- Beaumont, P.B. 2008b. **Phase 1 Heritage Impact Assessment Report on a portion of the remainder of the farm Sekgame 461, Kathu, Gamagara Municipality, Northern Cape Province.** Accessed SAHRIS 14 August 2014.
- Dreyer, C. 2007. **First Phase Archaeological and Cultural Heritage Assessment of the Proposed Garona-Mercury Transmission Power Line, Northern Cape, North-West Province & Free State.** An unpublished report by Pr. Archaeologist/Heritage Specialist on file at SAHRA as 2007-SAHRA-0052.
- Dreyer, C. 2008a. **First Phase Archaeological and Cultural Heritage Assessment of the proposed residential developments at a portion of the remainder of the farm Bestwood 459 Rd, Kathu, Northern Cape.** An unpublished report by Pr. Archaeologist/Heritage Specialist on file at SAHRA as 2008-SAHRA-0433.
- Dreyer, C. 2008b. **First Phase Archaeological and Cultural Heritage Assessment of the proposed Bourke project, ballast site and crushing plant at Bruce Mine, Dingleton, near Kathu, Northern Cape.** An unpublished report by Pr. Archaeologist/Heritage Specialist on file at SAHRA as 2008-SAHRA-0666.
- Kaplan, J.M. 2008. **Phase 1 Archaeological Impact Assessment: proposed housing development, Erf 5168, Kathu, Northern Cape Province.** An unpublished report by the Agency for Cultural Resources Management on file at SAHRA as 2008-SAHRA-0487.
- Morris, D. 2008. **Archaeological and Heritage Phase 1 Impact Assessment for proposed upgrading of Sishen Mine diesel depot storage capacity at Kathu, Northern Cape.** An unpublished report by the McGregor Museum on file at SAHRA as 2008-SAHRA-0489.
- Morris, D. 2010. **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.** Accessed SAHRIS 13 August 2014.

- Van Schalkwyk, J. 2010. **Archaeological impact survey report for the proposed development of a solar power plant on the farm Bestwood 459, Kathu Region, Northern Cape Province.** Accessed SAHRIS 13 August 2014.
- Van der Ryst, MM & Küsel, SU. 2011. **Specialist report on the Stone Age and other heritage resources at Kolomela, Postmasburg, Northern Cape.** Commissioned by African Heritage Consultants.
- Van der Ryst, MM and Küsel, SU. 2012. **Phase 2 specialist study of affected Stone Age locality at site SA02, a demarcated surface area, on the farm Nooitgedacht 469 (Woon 469).** Commissioned by Sishen Iron Ore Mine and AGES (Pty) Ltd.
- Beaumont, P.B. 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.** Accessed SAHRIS 14 August 2014.
- Walker S.J.H., Chazan M., Lukich V. & Morris D. 2013. **A second Phase 2 archaeological data recovery at the site of Kathu Townlands for Erf 5116: Kathu, Northern Cape Province.** Accessed on SAHRIS 12 August 2014.
- Walker, S.J., Chazan, M & Morris, D. 2013a. **Kathu Pan: location and significance. A report requested by SAHRA for the purpose of nomination.** Accessed SAHRIS 12 August 2014.
- Walker, S.J. Chazan, M., Lukich V., & Morris, D. 2013b. **A second Phase 2 archaeological data recovery at the site of Kathu Townlands for Erf 5116: Kathu, Northern Cape Province.** Accessed SAHRIS 11 December 2014.
- Kaplan, J. 2014. **Heritage Impact Assessment proposed mixed use development in Kathu, Northern Cape Province. Remainder & Portion 1 of the Farm Sims 462, Kuruman RD.** Prepared for: Enviroafrica. Accessed on SAHRIS 14 August 2014.
- Morris, D. 2014. **Rectification and/or regularisation of activities relating to the Bestwood township development near Kathu, Northern Cape: Phase 1 Archaeological Impact Assessment.** Accessed on SAHRIS 12 August 2014.

Researching the SAHRIS online database (<http://www.sahra.org.za/sahris>) further studies were identified in the vicinity of the study area:

- SAHRIS case number 1063. Consultation in terms of Section 40 of the Mineral and Petroleum Resources Development Act 2002, (Act 28 of 2002) for the approval of an Environmental Management Plan for prospecting right in respect of manganese and sugillite on Portions 1 and 2 of the farm Curtis No. 470, situated in Magisterial District of Kuruman, Northern Cape.
- SAHRIS case number 1089. Consultation in terms of Section 40 of the Mineral and Petroleum Resources Development Act 2002, (Act 28 of 2002) for the approval of an Environmental Management Programme for a mining right in respect of manganese and iron ore on Erf 416, 417, 418, 419, 420, 421, 422, remaining extent of Erf 423, 424, 426, 493, 548, 549, (a portion of Portion 548), 550 (a portion of Portion 548), 551(a portion of Portion 548), 569, 679 (a portion of Portion 548), and 681 (a portion of Portion 548) of farm Dingleton township (now Dingle) 543 remaining extent of Portion 2 (Doornvlei), Portions 7, 11 (a portion of Portion 2) and 13 (a portion of Portion 2) of the farm Gamagara 541, remaining extent of Portion 19 (a portion of Portion 1), Portion 24 (a portion of Portion 19) and 25 (a portion of Portion 19) of the farm Sishen 543, remaining extent of Portion 2 (Parson a) and Portion 6 (a portion of Portion 2) of the farm Parson 564, remaining extent, remaining extent of Portion 2 (Grensplaas) and Portion 4 (Stuk) of the farm Fritz No.540, situated in the Magisterial District of Kuruman, Northern Cape region.
- SAHRIS case number 1332. Resources Development Act 2002, (Act 28 of 2002) for the approval of an amendment to the Environmental Management Programme for a mining right in respect of iron ore on Portion 2, 6 and the remainder of farm Parson Po. 564, Portions 1,2,3 and the remainder of farm King No. 561, Portion 3,4,5 and the remainder of Bruce No.544, Portion 1,2,3,4,5 remainder of Mokaning No.560 situated in the Magisterial District of Kuruman, Northern Cape.
- SAHRIS case number 1402. Consultation in terms of Section 40 of the Mineral and Petroleum Resources Development Act of 2002, (Act 28 of 2002) for the approval of an Environmental Management Plan in respect of borrow pits 1,2,3,4,5,6,7,8 & 9 on Portion 19 of farm 543, remaining extent and Portion 1 of Gamagara 541, Portion 1 and Portion 2 of Fritz 540, remainder of Nooitgedacht 469 and remainder of Lylyveld 545, situated in the Magisterial District of Kuruman Northern Cape region.

- SAHRIS case number 1411. **Consultation of scoping report submitted in terms of Section 22 of the Mineral and Petroleum Resources Development Act 2002, (Act 28 of 2002) in respect of remaining extent of Portion 1 (Barnadene) of farm sims No.462, remaining extent of and remaining extent and remaining extent of Portion 2 (Rusoord) and remaining extent of Portion 3 (Portion of Portion 1) of Farm Sacha No.468, remaining extent of Portion 4 of the farm Gamagara No.541, remaining extent of Portion 1 (lot a) of the farm Sishen No. 543, situated in the Magisterial District of Kuruman.**

- SAHRIS case number 1505. **Environmental Impact Assessment and Environmental Management Programme.**

- SAHRIS case number 2516. **Consultation in terms of Section 40 of the Mineral and petroleum Resources Development Act 2002, (Act 28 of 2002) for the approval of an Environmental Management Plan for mining permit for aggregate gravel on the remainder of the farm Galway No.431, situated in the Magisterial District of Kuruman, Northern Cape region.**

- SAHRIS case number 2769. **Proposed construction of 400kV transmission line from Ferrum substation (Kathu) to Garona substation (Groblershoop) in the Northern Cape.**

- SAHRIS case number 3029. **Proposed Development of 3 500 Erven on 280 Ha of Vacant Land on a Portion of Remainder of Farm Sekgame 461, Kathu.**

- SAHRIS case number 3157. **Consultation in terms of section 40 of the mineral and petroleum resources development act 2002, (act 28 of 2002) in respect of prospecting for manganese and iron ore on the farm Seldsden No.464 situated in the Magisterial District of Kuruman, Northern Cape Region.**

- SAHRIS case number 3698. **Proposed relocation of the Vaal Gamagara water pipeline at the Sishen Iron Ore Mine.**

- SAHRIS case number 3701. **Proposed relocation of Rail and Associated Infrastructure at Sishen Iron Ore Mine.**

- SAHRIS case number 4456. **Proposed development of 380ha for residential uses, Kathu, Portion 175/1 and Portion 175/2, Joe Morolong Local Municipality, John Taolo District Municipality, Northern Cape Province.**
- SAHRIS case number 4785. **SAHRA comments for the Heritage Impact Assessment Report for the Kalahari Solar Power Project located on Farm Kathu 465, near Kathu within the Northern Province.**
- SAHRIS case number 4460. **Residential development on Remainder, and Portion 3 of Farm Bestwood 459 near the town of Kathu, Northern Cape.**
- SAHRIS case number 5323. **EIA and EMPr for the Proposed Solar CSP Integration Project: Project 2 - 400kV Power Line from Ferrum to the Solar Substation.**
- SAHRIS case number 5648. **The project will consist of the construction of an approximately 67km Double Circuit 400kV power line from the Manganore Substation to the Ferrum Substation, including the construction of the new Manganore TX (Transmission) Substation adjacent to the existing Manganore DX (Distribution) Substation. The line runs in a northerly direction through areas of the Tsantsabane, Ga-Segonyana and Gamagara Local Municipalities in the Northern Cape Province.**

Most of the studies listed above located surface scatters of Stone Age artefacts of limited significance (e.g. Dreyer 2008a, 2008b; Kaplan 2008; SAHRIS case number 3029) if not actual Stone Age sites. A few studies did not identify any heritage resources (e.g. Beaumont 2006; SAHRIS case number 1063; SAHRIS case number 2769; SAHRIS case number 5323) although in some cases this was possibly because the survey area had already been altered by mining activities (e.g. Dreyer 2008b). Many studies referred to the Kathu Pan site, an ancient limestone sinkhole formation, discovered in 1974 during the establishment of the town of Kathu and renowned for both significant palaeontological (including specimens from up to 850 000 years BP) and Stone Age deposits from 500 000 BP onwards (e.g. SAHRIS case number 4785). Equally, a number of studies consulted referred to the Uitkoms 1 site on Kathu Hill with its high number of Stone Age artefacts (e.g. SAHRIS case number 4785).

Four of the studies consulted on the SAHRIS website had no relevant documents available (SAHRIS case number 1089; SAHRIS case number 2516; SAHRIS case number 3157; SAHRIS case

number 3701). One study referred to heritage sites listed in an earlier impact assessment document, the latter not being available on the SAHRIS website (SAHRIS case number 1332). Some studies had documentation with no relevant heritage information (e.g. SAHRIS case number 1402) or documentation which referred to the need for completion of archaeological studies (e.g. SAHRIS case number 1411).

In a survey for the expansion of the Sishen Mine immediately to the south of the current study area Beaumont (2000) recorded surface LSA lithics which he stated were not associated with living sites. This study also listed a large number of Stone Age artefacts as well as two Iron Age collections from the near vicinity of the study area and accessioned in the McGregor Museum. Partially overlapping and to the south of the study area Beaumont (2004) recorded only surface scatters of possible Acheulian lithics while later studies in approximately the same area located no heritage resources (Beaumont 2005a, 2005b) or, again, a few scattered stone tools of MSA appearance (Morris 2008). Morris (2001) undertook a survey 25 kilometres to the south, locating surface scatters of stone artefacts, but noting that the area between Postmasburg and Kathu is known for specularite workings and that any development should take cognisance of this. In another survey some 10 kilometres south of the current study area Morris (2005) located scatters of stone artefacts on hills and plains, ceramic remains reflecting a Tswana settlement, and four cemeteries.

To the north of the study area Beaumont (2006) undertook a survey for the Kalahari Gholf en Jag development. While no significant new heritage resources were located in this survey the author referred to previous surveys and excavations undertaken on the properties involving nine archaeological sites. These included six of the Kathu Pan sites characterised by Late Pietersburg, Howiesons Poort, Wilton and Fauresmith technologies, as well as Later Stone Age ceramics. Further, this includes the Kathu Townlands site, excavated in the 1980s and found to contain approximately 10 000 Acheulian artefacts per cubic metre, and finally a Late Iron Age site thought to be of Tswana origin (Beaumont 2006). A later survey for the same development concurred with the findings of this report that most of the area was devoid of heritage resources. However, it stressed the high importance of the Kathu Pan sites and recommended that its northern area be excluded from any development, especially as the use of GPS technology had improved the accuracy of mapping and it had been found that some of the sites now fell within the development area (SAHRIS case number 4456). Many of the other studies referred to these and other known heritage sites, for example specularite workings on the Gamagara River to the south west of Kathu (e.g. SAHRIS case number 3029).

In a survey of two options for a power line route Dreyer (2007) noted the wealth of stone tool sites in the vicinity of Kathu, particularly extensive ESA sites and the presence of the existing Kathu cemetery, suggesting mitigation measures to avoid these. A survey for the Kalahari Solar Power project some 19 kilometres to the north of the current study area located a number of Stone Age sites as well as surface scatters of lithics and referred to the possibility of significant sub-surface deposits in a number of localities (SAHRIS case number 4785). On the Ghaap Escarpment, Morris (1999) identified LSA and MSA lithics and referred to known rock painting sites at Groot Kloof. These paintings are of unusual quality and the most elaborate of their kind along the Ghaap escarpment (Morris 1999; SAHRIS case number 1505). Rock engravings at Lime Acres some 80 kilometres to the south east consist of 119 distinct images spread over some 22 dolomite rock slabs and are interesting in that they are fairly recent, depicting colonial scenes such as horses with riders and were likely engraved by Korana people descendants of Khoekhoen pastoralists (Morris & Beaumont 1994).

Van der Ryst & Küsel (2012) conducted a Phase 2 around a pan and surrounds for a proposed extension of the Sishen waste dump. Sampling of the lithics produced low to medium densities of MSA and LSA tool types on the plains and the periphery of the pan and surrounds. This is consistent with the results from several surveys as discussed above. Where Stone Age occurrences have been documented these are usually distributed either in fairly low scatters over large areas, or in very high densities where sources of, in particular, Banded Ironstone Formations (BIFs) outcrop. Surface sites around Kathu exhibit a palimpsest of prehistoric utilisation and may contain lithics from all periods in the Stone Age succession.

It is therefore important to note a concern raised by Morris (2014: unpagged) that a “consistent issue in the assessment of the presence or absence of archaeological deposits in and around Kathu ... is the fact that the landscape is often capped by (1) calcrete (not uniformly ancient – Walker et al 2013) and (2) younger Gordonia Formation Aeolian sands (Almond 2014)”. That subsurface archaeological remains may occur under overlying soils and calcretes should be taken into account when archaeological and heritage surveys are undertaken. The clearing of topsoils during development activities frequently exposes archaeological deposits. In areas where BIFs outcrop there tends to be extremely high densities of lithics. BIFs are an excellent source of good toolstone. It was extensively used in the extraction of raw materials and the *in situ* manufacture of ESA Large Cutting Tools (LCT’s) and for MSA assemblages. Significant

exposures of siliceous BIFs in association with high levels of lithic production have been recorded at, for example, Kathu Townlands and Bestwood.

The LCT's from this area often contain very fine handaxes with some superb examples produced on banded ironstone. Lithics in some of the Acheulian deposits, but also in MSA levels, display a shiny silica skin. At Kathu Townlands an outcropping of banded ironstone that covers a large area of around 25 km contains enormous quantities of flaked items. This phenomenon is ascribed to the use of the high-grade bedrock ironstone as a source for raw materials and is supported by the high incidence of handaxe roughouts (Beaumont 2004b). The prepared core technique was used to produce the spectacular small handaxes, long blades, convergent flakes/points and scrapers found in Fauresmith collections.

The Kathu Complex sites contain important ESA Acheulian and transitional ESA/MSA Fauresmith assemblages (Beaumont, 1990, 2004, 2013; Herries, 2011; Chazan et al, 2012; Wilkins & Chazan, 2012, Walker et al, 2014). Walker et al (2014) suggest that the intensive occupation of the Kathu region can be linked to the availability of water resources. Current research projects are yielding important data on typologies, lithic technologies, technological innovations, complex spatial organisation and also dates for the ESA Acheulian and for the MSA assemblages. Research at Kathu Pan 1 established a date of 500 000 years for a Fauresmith blade assemblage where blades were systematically removed from prepared cores (Wilkins & Chazan, 2012).

Archaeological and palaeoenvironmental data from Kathu Pan and Kathu Townlands were used to reconstruct changes over time in the prehistoric environment (Beaumont 2004b). Associated faunal remains with some of the Acheulian include *Elephas recki recki*. These animals disappeared at sites in East Africa such as at Olorgesailie, Kenya, at around 600 000/800 000 years ago (Beaumont, 2004b; McNabb, 2004). Biostratigraphy or faunal correlation is often used to date the southern African sites and gives some indication of the approximate age of some of the associated assemblages. More recently a combination of OSL and ESR/U-series dating (Porat et al, 2010; Herries, 2011; Walker et al, 2014) were used to date the transition to MSA tool forms. At Kathu Pan the transitional Fauresmith has been dated to ca. 500 000 BP (Porat et al, 2010). Kathu Pan is formed by a shallow depression with an internal drainage and a high water table.

North-east of Kathu several newly-found ESA sites with LCT's and an associated range of tools occur in sand quarries and on a hilltop at Uitkoms Farm and the Bestwood locality (Figure 3)

(Chazan et al, 2012). The residential and commercial developments at Bestwood and close to the Townlands demonstrate the importance of Phase 2 heritage studies in the Kathu region.

The concerns that Walker et al (2014:8) raise with regard to the impact of the exponential development should feature in any survey that is undertaken around Kathu. With reference to the Townlands locality they urge that a “broader landscape-based effort of subsurface testing including palaeo-landscape and paleo-environmental reconstruction is essential to our understanding of this extraordinary record. Sources of this information must be protected along with archaeological remains. Together with the other components of the Kathu Complex, this site represents a high density of hominin occupation that presents a challenge to reconstructions of hominin adaptations during the Early-Middle Pleistocene”.

The area around the existing Kathu cemetery was previously studied by Beaumont (**Table 10**) and lithic densities and debitage frequencies found at Uitkoms 1 (**Figure 7**) was comparable to those found at Kathu Townlands 1. He describes Uitkoms 4, about 15km north of the current study area (Figure 7) as a buried site of approximately 100 meters wide. No controlled excavations have been done at Uitkoms 4.



Figure 7 – Shows the location of areas of archaeological interest in the Kathu region in relation to the proposed New Kathu cemetery.

Table 10 - Table of studies associated with 3 (Walker et al., 2013b)


Numbers	RMP	Report Date	Project name	Reference
A	MAPID_00906	30-Apr-06	Kalahari Golf en Jag Expansion	(Beaumont, 2006a)
B	Not mapped	29-May-06	Bestwood 459 Portion 48	(Beaumont, 2006c)
C	MAPID_00918	30-May-06	Uitkoms 463, Portion 5	(Beaumont, 2006b)
D	MAPID_00997	28-Jun-06	Hartnolls 458, 1st Phase 1	(Dreyer, 2006)
D	MAPID_00998	17-Jan-07	Hartnolls 458, 2ndPhase 2	(Beaumont, 2007)
E	MAPID_01686	06-Feb-08	Portion of Sekgame 461	(Beaumont, 2008b)
F	MAPID_01687	07-Feb-08	Uitkoms 463, Portion 8	(Beaumont, 2008a)
G	MAPID_01692	12-Jun-08	Bestwood 459 Portion 49	(Beaumont, 2008c)
H	MAPID_01617	11-Aug-08	Bestwood Estates	(Dreyer, 2008)

5.2 Archaeological & Historical Sequence

DATE	DESCRIPTION
3.2 million to 250 000 years ago	<p>The Earlier Stone Age (ESA) is the first and oldest phase identified in South Africa’s archaeological history and here it comprises two technological phases. The earliest of these, known only from sites outside of southern Africa, is the Lomekwian industry (3.2 Myr) and is associated with percussive tools and large flakes. Occurring in South Africa is the Oldowan industry (2.6 – 1.5 Myr) characterised by expedient, yet organised flaking systems with primarily core- and flake-based assemblages. Finally, the Acheulian industry (1.7 Myr – 250 kyr) is the last ESA industry to develop, comprised by Large Cutting Tools (i.e. handaxes and cleavers) and organised core reduction (i.e. Levallois).</p> <p>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 17km northwest, 13km northeast and 12km-14.5km northeast of 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).</p>
>250 000 to 40 000 years ago	<p>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).</p> <p>MSA sites and occurrences have been identified in the Kathu area, including the very significant Kathu Pan localities (Wilkins & Chazan, 2012). See also, for example, Beaumont (2009) and Kruger (2014).</p>
40 000 years ago to the historic past	<p>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.</p> <p>A number of Later Stone Age sites are known from the direct vicinity of the existing Kathu cemetery.</p> <p>According to Beaumont (2000) pecked engravings, originally from the farms</p>

DATE	DESCRIPTION
	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 existing Kathu Cemetery. 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 17 th 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 central within the overall settlement area of the two Tswana groups at the time.
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 Legassick (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

DATE	DESCRIPTION
	<i>sibello</i> 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 proposed cemetery.
1802 - 1813	<p>During this period 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.</p> <p>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 “...<i>the Bastards change their name to ‘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’...</i>” (Legassick, 2010). Griquatown is located 114km south of the present study area.</p>
1805	<p>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 Daniëlskuil, 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 utilisation 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.</p> <p>While on his way to the Kuruman River (and to the south thereof), Lichtenstein visited a small settlement consisting of “...<i>about thirty flat spherical huts.</i>” Although the people staying here were herdsman 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).</p> <p>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</p>

DATE	DESCRIPTION
	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).
 <p data-bbox="196 1373 1374 1451"><i>Figure 8 – Reverend John Campbell (Campbell, 1815). He passed through the general vicinity of the study area during his travels from Klaarwater to Kuruman.</i></p>	
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	<p data-bbox="443 1720 1407 1861">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).</p> <p data-bbox="443 1861 1407 1966">A section of the Bergenaars known as the Klein Bergenaars (Little Bergenaars) settled along the Langberg. This mountain range is located roughly 31km west of the present study area.</p> <p data-bbox="443 1966 1407 2029">The Bergenaars constantly attacked the Thlaro, Thlaphing as well as the Griqua. On three separate occasions (Late 1824, July 1827 and December 1827) they</p>

DATE	DESCRIPTION
	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).
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 38km and 21km 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 бага 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 Kgosien. Kgosien 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 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 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

DATE	DESCRIPTION
	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 54km south-east of the present study area.
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.

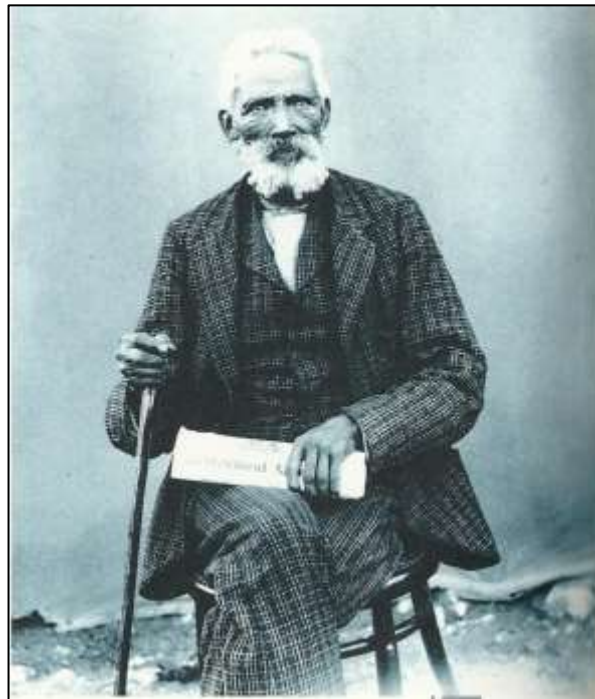


Figure 9 - Nicolaas Waterboer, who succeeded as leader of Griquatown in 1852 after the death of his father Andries Waterboer (Reader's Digest, 1994:168).

Before 1856	During the period before 1856 the Thlaro leader Masibi occupied the area known as Skeyfontein, which is located 73km 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 1885	Sir Charles Warren proclaims the area between the Molopo River and the 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

DATE	DESCRIPTION
	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.

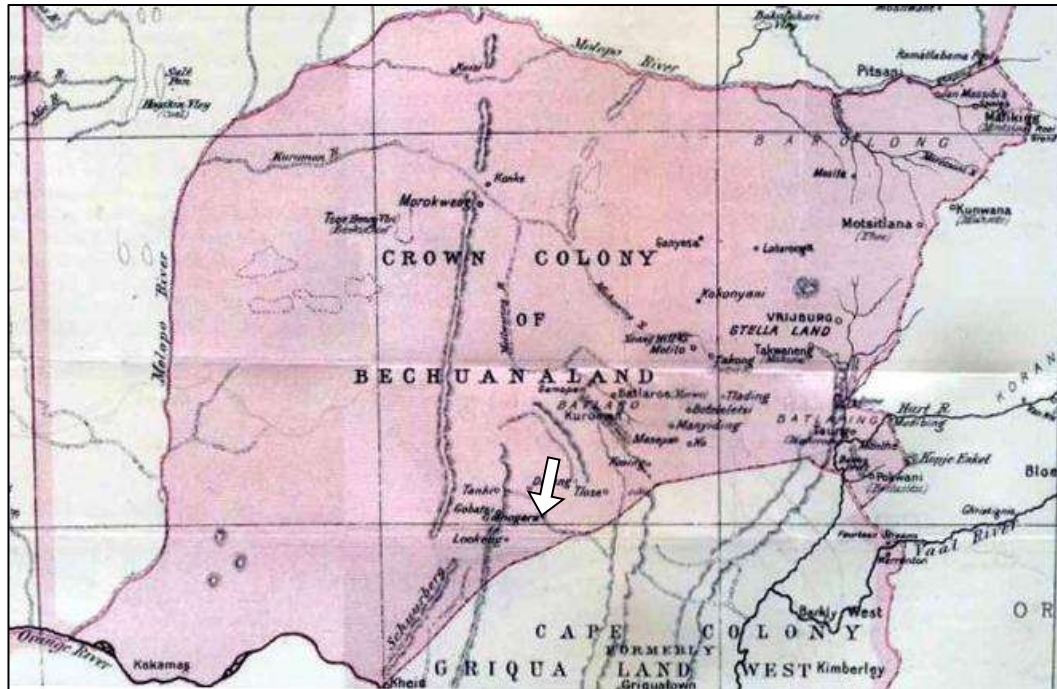


Figure 10 - Section of a map titled “Sketch Map of British Bechuanaland” which is dated to May 1887 (www.wikipedia.com) (www.kaiserscross.com). The approximate position of the study area is shown.

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 (28 km north-west of the study area), Gatlhose (14km east of the study area), Maremane (23km 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 farm Bishop’s Wood. This farm is located 18km north 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 14km east of the study area.

DATE	DESCRIPTION
	<div data-bbox="212 423 1356 1048" data-label="Image"> </div> <div data-bbox="300 1070 1273 1104" data-label="Caption"> <p><i>Figure 11 - An everyday scene during the Rinderpest Epidemic (Snyman, 1983:20).</i></p> </div>
<p>1897</p>	<p>The Rinderpest epidemic did not only have a massive socio-economic impact on the landscape, 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).</p> <p>Although most of the activities associated with the rebellion took place some 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 Pudahush (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.</p> <p>The rebellion was suppressed and came to an end with the surrender of rebel</p>

DATE	DESCRIPTION
	leader Toto, his son Robanyane and their Thlaro followers on 2 August 1897 (Snyman, 1986).

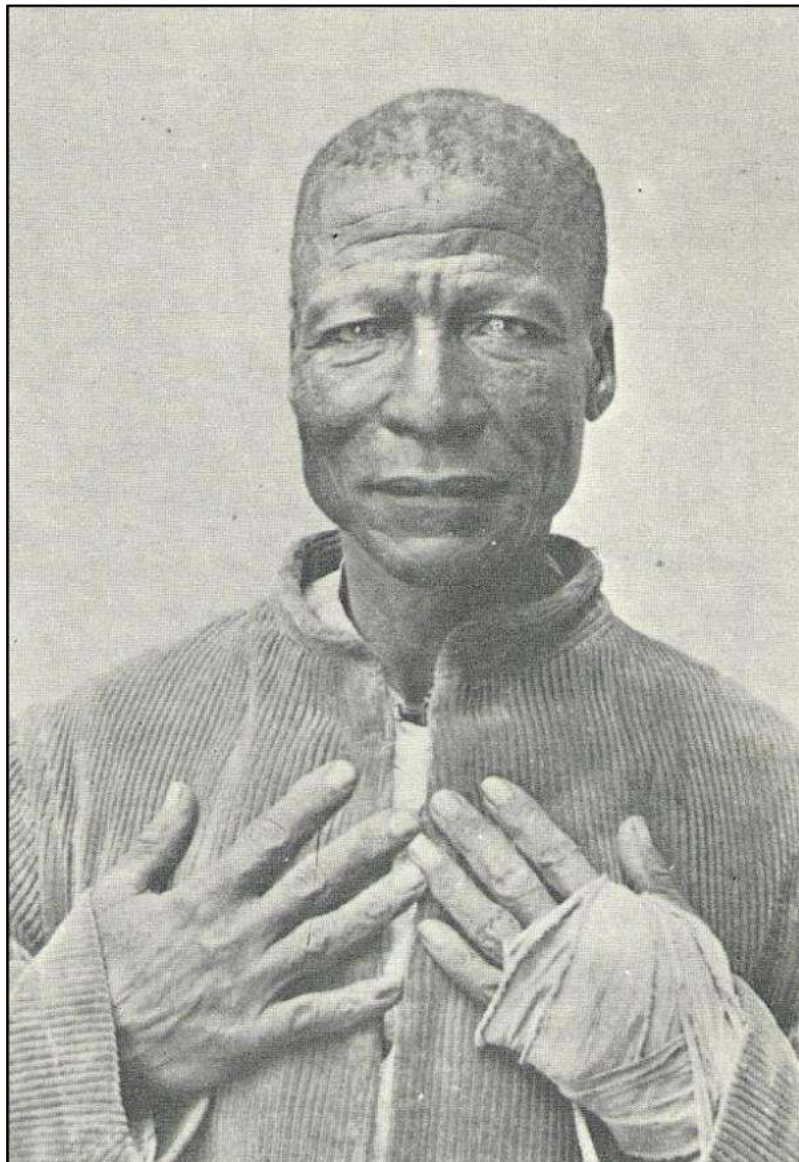



Figure 12 - Toto, leader of the Thlaro along the Langberg (Snyman, 1986:17).

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).
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

DATE	DESCRIPTION
	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 between 10 and 20km east of the present study area.

DATE	DESCRIPTION
	 <p data-bbox="220 1070 1356 1149"><i>Figure 13 - Dr. 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).</i></p>
c. 1936	<p data-bbox="443 1167 1410 1727">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 about 25km south of the study area.</p>
1937	<p data-bbox="443 1740 1410 2016">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). The Lohatla mine village was also established during this time (Snyman, 1983). Furthermore, the African Metals Corporation Limited</p>

DATE	DESCRIPTION
	(Amcors) 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 18km 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 (Amcors) established a new company known as Manganore Iron Mining Ltd. to work on the iron ore deposits owned by them. These deposits were <i>inter alia</i> located on the farms Klipfontein, Kapstewel and Doornput (S.A. Manganese, 1977). All three these farms are located roughly 35km 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 5km east 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, approximately 5km east.
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).

5.3 Palaeontology

A palaeontological desktop study was completed by Ms. Elize Butler (Butler, 2017). The study found that the proposed development site is completely underlain by sediments of the Early Precambrian, Transvaal Supergroup, Ghaap Group and Campbell Rand Subgroup. The Campbell Rand Subgroup sediments were deposited on the shallow submerged Kaapvaal Craton, approximately 2.6 to 2.5 Ga (billion years ago). The development site near Kathu consists of a flat-lying terrain and vegetation cover of grassy thornveld. The PalaeoMap (SAHRA website) indicates that the palaeontological significance of the Transvaal Group, Campbell Rand Subgroup

is moderate and thus the overall impact of the proposed New Kathu Cemetery development on the remaining extent of the farm Lyleveld 545 is rated as negative moderate significance.

6 FIELDWORK FINDINGS

Transects walked throughout the 100m evaluation zone identified six findspots (KC1, KC2, KC3, KC4, KC5, KC6) (**Figure 14**) (Also refer to **Annexure B** for an enlarged map). Four of the POI were found within the limits of the evaluation zone on (KC6) juts outside the proposed access road alignment, and one within the boarder of the proposed boundary of the new cemetery (KC1). All findspots are either low density scatters or where single artefacts were recorded. As such, all find spots were deemed having a low heritage significance. However, a number of studies and past HIAs in the Kathu area have found significant finds as this area is of critical importance to ESA and MSA archaeological research.



Figure 14 – Map indicating transect and find spots

6.1 Find spot descriptions

6.1.1 KC1

Type: Low-density Stone Age scatter

Chronology: Possible MSA

Description: Scatter of lithics over approx. 15x10m area. This area has less grass and is slightly higher in elevation than the surrounding landscape (**Figure 15**). Suggests possible erosion and hence exposure of artefacts on the surface, over time. Lithics are made of fine-grained materials, possibly dolerite or banded ironstone (**Figure 16**). Due to the limited number of diagnostic artefacts it is difficult to determine the chronology.

Significance: Low; however, it is recommended that an archaeologist is present when earth diggings occur in this area.



Figure 15 - KC1 find spot



Figure 16 - Collection of lithics at KC1

6.1.2 KC2

Type: Low-density Stone Age scatter

Chronology: Possible MSA

Description: Scatter of lithics over approx. 15x10m area. This area has less grass and is slightly higher in elevation than the surrounding landscape (Figure 17). Suggests possible erosion and hence exposure of artefacts on the surface, over time. Lithics are made of fine-grained materials, possibly dolerite or banded ironstone. Artefact types include: cores, flakes, and one denticulated converging flake (Figure 18). Due to the limited number of diagnostic artefacts it is difficult to determine the chronology.

Significance: Low; however, it is recommended that an archaeologist is present when earth diggings occur in this area.



Figure 17 - KC2 find spot



Figure 18 - Lithics identified at KC2

6.1.3 KC3

Type: Flake find spot

Chronology: Possible MSA

Description: Single flake exposed on the surface, broken into two pieces.

Significance: Low

6.1.4 KC4

Type: Low-density Stone Age scatter

Chronology: Possible MSA

Description: Scatter of lithics over approx. 10x8m area. This area has less grass and is slightly higher in elevation than the surrounding landscape (Figure 19). Suggests possible erosion and hence exposure of artefacts on the surface, over time. Lithics are made of fine-grained materials, possibly dolerite or banded ironstone (Figure 20). Due to the limited number of diagnostic artefacts it is difficult to determine the chronology.

Significance: Low; however, it is recommended that an archaeologist is present when earth diggings occur in this area.



Figure 19 - KC4 find spot



Figure 20 - Lithics found at KC4

6.1.5 KC5

Type: Single artefact occurrence

Chronology: Possible MSA

Description: Single artefact exposure; convex scraper on side-struck flake, made on dolerite or banded ironstone.

Significance: Low

6.1.6 KC6

Type: Low-density surface scatter of Stone Age artefacts

Chronology: Stone Age, likely Middle Stone Age

Description: ±6x20m area that contains a low-density surface scatter of lithics. These lithics have accumulated within an erosional depression on the landscape and have hence been washed in from elsewhere (versus having eroded out from the underlying sediments)

Significance: Low (only because these pieces have clearly eroded out from somewhere nearby on the landscape, but the pieces that occur here are completely out of context)



Figure 21 - Lithics found at KC6

7 IMPACT OF PROPOSED DEVELOPMENT ON HERITAGE RESOURCES

7.1 Archaeological Resources

Based on the data of previous studies in the Kathu area as well as the fieldwork, the possible impact of the proposed new cemetery on the identified archaeological material is rated as LOW. However, because this area is a continuous cultural landscape and the occurrence of artefacts in the proposed area more than likely suggests more will be found, especially once excavations begin. It is very likely that the development will have a permanent negative high impact on subsurface archaeological resources.

With the implementation of mitigation measures this impact and risk can be reduced from HIGH negative to MODERATE positive. The mitigation measures will enable the identification of additional archaeological resources and the collection of data that could add to the current research questions.

Table 11 - Impact Evaluation – Archaeological resources

IMPACT	SIGNIFICANCE	SPATIAL SCALE	TEMPORAL SCALE	PROBABILITY	RATING
<i>Impact on archaeological deposits</i>					
<i>No mitigation</i>	HIGH	Local	Permanent	Very Likely	High Negative
	4	3	5	4	3.20
<i>With mitigation</i>	MODERATE	Local	Permanent	Could happen	Moderate Positive
	3	3	5	3	2.20

7.2 Palaeontological Resources

Significance - The site is underlain by the Ghaap Group (Campbell Rand Subgroup). Stromatolites are known (from the literature) to be present in the development area and the likelihood of significant fossil heritage in the Kathu area is considered to be medium.

Spatial Scale - The impact on fossil materials and thus palaeontological heritage will be limited to the construction phase when new excavations into fresh potentially fossiliferous bedrock take place. The extent of the area of potential impact is thus restricted to the project site and therefore categorised as local.

Temporal Scale - The expected duration of the impact is assessed as potentially permanent to long term. In the absence of mitigation procedures (should fossil material be present within the affected area) the damage or destruction of any palaeontological materials will be permanent.

Probability - Stratigraphic and geographical distribution of Archaean stromatolites within the Campbell Rand Subgroup has been documented in the literature. Stromatolite assemblages may be present within the development site. By taking a precautionary approach, an insignificant loss of fossil resources is expected. Since concentrations of small to large stromatolites might occur within the site, the probability of impacts on palaeontological heritage during the construction phase is probable.

Table 12 - Impact Evaluation – Palaeontological resources

IMPACT	SIGNIFICANCE	SPATIAL SCALE	TEMPORAL SCALE	PROBABILITY	RATING
<i>Impact on palaeontological deposits</i>					
<i>No mitigation</i>	MODERATE	Study Area	Permanent	Could happen	
	3	2	5	3	2.00
<i>With mitigation</i>	LOW	Study Area	Permanent	Could happen	
	2	2	5	3	1.80

8 MITIGATION MEASURES AND GENERAL RECOMMENDATIONS

However, due to the fact that subterranean Stone Age material is known from the surroundings of the study area, the following general recommendations are required:

- It is recommended that **KC1** be sampled and a geological trench be put in to test for any stratigraphic layering of artefacts. The intention here will be to assess whether artefacts do occur under the current land surface, and if so, at what density. This is the only site within the proposed area and it is not felt the sites in the evaluation zone require mitigation unless they are to be impacted by development;
 - Alternatively, moving the proposed cemetery boundary ~50 m to the South-West, would minimize any impact on KC1 and would thus negate the need to mitigate (please see Figure 22, which indicates this shift). However, this may impact other environmental factors and not be possible;
- If mitigation is to proceed, it is recommended that a set of test excavations be done to determine presence and extent of an archaeological deposit in and around the main site (**KC1**). This can be performed as part of the mitigation and would provide a finer-resolution understanding of what items of heritage significance can be found within the site;
- If a deposit is identified a controlled sampling of the material found should be done;
- This work must be done in such a way as to augment the current research questions and field work such as the excavations at the Kathu Townlands Site and Kathu Pan;

- These test excavations and sampling must be done after a permit has been granted under Section 35 of the NHRA (Act 25 of 1999) to a qualified and experienced Stone Age archaeologist;
- In the event that substantive material is uncovered, it is recommended that a display at the cemetery of the material found at KC1 is considered;
- An archaeologist suitably qualified in Stone Age fieldwork and research must be appointed to undertake an Archaeological Watching Brief during the Construction Phase² of the project. The appointed archaeologist will be responsible for the following:
 - Provide training to the project Environmental Control Office (ECO) in Stone Age archaeology and the identification of Stone Age artefacts and sites. The ECO will be responsible for daily on-site monitoring during the Construction Phase with the appointed archaeologist visiting the site every two weeks.
 - Conduct an archaeological monitoring program whereby the construction site is visited once every two weeks for at least the first three months of the project.
 - On-site assessment of any Stone Age material exposed during construction and the provision of recommendations for the way in which the exposed material must be mitigated.
 - Compile and submit an archaeological monitoring report at the end of the monitoring process.
- During the monitoring undertaken everyday on-site by the ECO and once every two weeks by the appointed archaeologist, all construction work must be closely monitored. Should any Stone Age material or any archaeological material be identified, all construction work in that area must immediately stop and the ECO or archaeologist (if already present on site) must demarcate a construction free area around the discovery. If the ECO made the discovery, the archaeologist must be contacted immediately to visit the construction site to assess the exposed material. After assessing the exposed material, the archaeologist would provide recommendations for the exposed material which may range from destruction without mitigation (if the exposed material is found to be of little significance) to archaeological mitigation (if the exposed material is found to be significant).

² *the initial site establishment when the area is cleared and support infrastructure is established.*



Figure 22 - Shifting the New Kathu cemetery boundary ~50 m to minimize any impact on find spots.

9 CONCLUSIONS

PGS Heritage was appointed by Synergistics Environmental Services (Pty) Ltd to undertake a Heritage Impact Assessment (HIA), which forms part of the Basic assessment for the proposed New Kathu Cemetery on parts of the Remainder of the Farm Lyleveld 545 13km south of the town of Kathu in the Gamagara Local Municipality, Northern Cape Province.

Due to the significance of the Stone Age sites from the surrounding landscape, and in adherence to the recommendation made by SAHRA in their letter of response to the initial submission of the proposed development on SAHRIS, Dr. Tim Forssman was appointed to review the report and provide inputs in terms of the Stone Age. Drs. Matt Caruana and Matt Lotter assisted with the fieldwork, analysis and review of the material.

An archival and historical desktop study was undertaken and was used to compile a historical layering of the study area within its regional context. This component indicated that the landscape within which the project area is located has a rich and diverse history.

The proposed National Heritage Site Nomination of the Kathu Archaeological Complex demonstrates the importance of the archaeological heritage of the region (Walker et al, 2013;

SAHRIS accessed August 2014). The scientific and heritage significance, and the occurrence of was taken into account in the HIA under review (Beaumont, 1990, 2004, 2013; Porrat et al, 2010; Herries, 2012; Chazan et al, 2012; Wilkins & Chazan, 2012; Walker et al, 2013; Walker et al 2014). The heritage desktop study component of the project was followed by fieldwork. The methodology comprised a detailed walk through of the study area by an experienced fieldwork team consisting of two archaeologists.

The area north of the existing Kathu cemetery was previously studied by Beaumont (**Table 10**) and lithic densities and debitage frequencies found at Uitkoms 1 (Figure 3) was comparable to those found at Kathu Townlands 1. He describes Uitkoms 4, 15km north of the New Kathu Cemetery (Figure 3), as a buried site of approximately 100 meters wide. No controlled excavations have been done at Uitkoms 4.

However, due to the fact that subterranean Stone Age material is known from the surroundings of the study area, the following general recommendations are required:

- It is recommended that a set of test excavation be done to determine presence and extent of an archaeological deposit;
- If a deposit is identified a controlled sampling of the material found should be done;
- This work must be done in such a way as to augment the current research questions and field work such as the excavations at the Kathu Townlands Site and Kathu Pan;
- These test excavations and sampling must be done after a permit has been granted under Section 35 of the NHRA (Act 25 of 1999) to a qualified and experienced Stone Age archaeologist;
- In the event that substantive material is uncovered, it is recommended that a display at the cemetery of the material found at **KC1** is considered;
- An archaeologist suitably qualified in Stone Age fieldwork and research must be appointed to undertake an Archaeological Watching Brief during the Construction³ Phase of the project. The appointed archaeologist will be responsible for the following:
 - Provide training to the project Environmental Control Office (ECO) in Stone Age archaeology and the identification of Stone Age artefacts and sites. The ECO will be responsible for daily on-site monitoring during the Construction Phase with the appointed archaeologist visiting the site every two weeks.

³ *the initial site establishment when the area is cleared and support infrastructure is established.*

- Conduct an archaeological monitoring program whereby the construction site is visited once every two weeks for at least the first three months of the project.
 - On-site assessment of any Stone Age material exposed during construction and the provision of recommendations for the way in which the exposed material must be mitigated.
 - Compile and submit an archaeological monitoring report at the end of the monitoring process.
- During the monitoring undertaken everyday on-site by the ECO and once every two weeks by the appointed archaeologist, all construction work must be closely monitored. Should any Stone Age material or any archaeological material be identified, all construction work in that area must immediately stop and the ECO or archaeologist (if already present on site) must demarcate a construction free area around the discovery. If the ECO made the discovery, the archaeologist must be contacted immediately to visit the construction site to assess the exposed material. After assessing the exposed material, the archaeologist would provide recommendations for the exposed material which may range from destruction without mitigation (if the exposed material is found to be of little significance) to archaeological mitigation (if the exposed material is found to be significant).

Palaeontology

As per the palaeontological desktop assessment (Butler, 2017). The proposed development is unlikely to pose a substantial threat to local fossil heritage. However, should fossil remains be discovered during any phase of construction, either on the surface or exposed by fresh excavations, the ECO responsible for these developments should be alerted immediately. Such discoveries ought to be protected (preferably *in situ*) and the ECO should alert SAHRA (South African Heritage Research Agency) so that appropriate mitigation (*e.g.* recording, sampling or collection) can be taken by a professional paleontologist.

The specialist involved would require a collection permit from SAHRA. Fossil material must be curated in an approved collection (*e.g.* museum or university collection) and all fieldwork and reports should meet the minimum standards for palaeontological impact studies developed by SAHRA.

The development of the proposed New Kathu cemetery can continue if the recommendations as outlined in this report are adhered to.

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10.5 Historic Topographic Maps

All the historic topographic maps used in this report were obtained from the Directorate: National Geo-spatial Information of the Department of Rural Development and Land Reform in Cape Town.

Annexure A

LEGISLATIVE REQUIREMENTS – TERMINOLOGY AND ASSESSMENT CRITERIA

General principles

In areas where there has not yet been a systematic survey to identify conservation worthy places, a permit is required to alter or demolish any structure older than 60 years. This will apply until a survey has been done and identified heritage resources are formally protected.

Archaeological and palaeontological sites, materials, and meteorites are the source of our understanding of the evolution of the earth, life on earth and the history of people. In terms of the heritage legislation, permits are required to damage, destroy, alter, or disturb them. Furthermore, individuals who already possess heritage material are required to register it. The management of heritage resources is integrated with environmental resources and this means that, before development takes place, heritage resources are assessed and, if necessary, rescued.

In addition to the formal protection of culturally significant graves, all graves which are older than 60 years and are not located in a cemetery (such as ancestral graves in rural areas), are protected. The legislation also protects the interests of communities that have an interest in the graves: they should be consulted before any disturbance takes place. The graves of victims of conflict and those associated with the liberation struggle are to be identified, cared for, protected and memorials erected in their honour.

Anyone who intends to undertake a development must notify the heritage resources authority and, if there is reason to believe that heritage resources will be affected, an impact assessment report must be compiled at the construction company's cost. Thus, the construction company will be able to proceed without uncertainty about whether work will have to be stopped if an archaeological or heritage resource is discovered.

According to the National Heritage Act (Act 25 of 1999 section 32) it is stated that:

An object or collection of objects, or a type of object or a list of objects, whether specific or generic, that is part of the national estate and the export of which SAHRA deems it necessary to control, may be declared a heritage object, including –

- objects recovered from the soil or waters of South Africa, including archaeological and palaeontological objects, meteorites and rare geological specimens;
- visual art objects;

- military objects;
- numismatic objects;
- objects of cultural and historical significance;
- objects to which oral traditions are attached and which are associated with living heritage;
- objects of scientific or technological interest;
- books, records, documents, photographic positives and negatives, graphic material, film or video or sound recordings, excluding those that are public records as defined in section 1 (xiv) of the National Archives of South Africa Act, 1996 (Act No. 43 of 1996), or in a provincial law pertaining to records or archives; and
- any other prescribed category.

Under the National Heritage Resources Act (Act No. 25 of 1999), provisions are made that deal with, and offer protection to, all historic and prehistoric cultural remains, including graves and human remains.

Graves and cemeteries

Graves younger than 60 years fall under Section 2(1) of the Removal of Graves and Dead Bodies Ordinance (Ordinance no. 7 of 1925) as well as the Human Tissues Act (Act 65 of 1983) and are under the jurisdiction of the National Department of Health and the relevant Provincial Department of Health and must be submitted for final approval to the Office of the relevant Provincial Premier. This function is usually delegated to the Provincial MEC for Local Government and Planning, or in some cases the MEC for Housing and Welfare. Authorisation for exhumation and reinternment must also be obtained from the relevant local or regional council where the grave is situated, as well as the relevant local or regional council to where the grave is being relocated. All local and regional provisions, laws and by-laws must also be adhered to. In order to handle and transport human remains, the institution conducting the relocation should be authorised under Section 24 of Act 65 of 1983 (Human Tissues Act).

Graves older than 60 years, but younger than 100 years, fall under Section 36 of Act 25 of 1999 (National Heritage Resources Act) as well as the Human Tissues Act (Act 65 of 1983) and are under the jurisdiction of the South African Heritage Resources Agency (SAHRA). The procedure

for Consultation regarding Burial Grounds and Graves (Section 36(5) of Act 25 of 1999) is applicable to graves older than 60 years that are situated outside a formal cemetery administrated by a local authority. Graves in the category located inside a formal cemetery administrated by a local authority will also require the same authorisation as set out for graves younger than 60 years, over and above SAHRA authorisation.

If the grave is not situated inside a formal cemetery but is to be relocated to one, permission from the local authority is required and all regulations, laws and by-laws set by the cemetery authority must be adhered to.

ANNEXURE B - HERITAGE RESOURCES DISTRIBUTION MAP

