NEW KATHU CEMETERY – PHASE II

Phase II of the Heritage Impact Assessment for the Proposed New Kathu Cemetery on parts of the Remainder of the Farm Lylyveld 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 SLR Consulting. 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.

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Report Title	Phase II of the Heritage Impact Assessment for the Proposed New Kathu Cemetery on parts of the Remainder of the Farm Lylyveld 545 on the southern side of the town of Kathu in the Gamagara Local Municipality, Northern Cape.		
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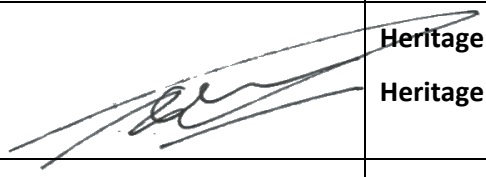
Author	**Wouter Fourie**		**Heritage Specialist / PGS Heritage**
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EXPLANATION OF ABBREVIATIONS USED IN THIS DOCUMENT

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
BA	Basic Assessment
EMPR	Environmental Management Programme Report
ESA	Earlier Stone Age
GPS	Global Positioning System
HIA	Heritage Impact Assessment
HRMS	Heritage Research and Management Specialists
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
POI	Point of Interest
SAHRA	South African Heritage Resources Agency
SAHRIS	South African Heritage Resources Information System

EXECUTIVE SUMMARY

PGS Heritage was appointed by SLR Consulting to undertake a Heritage Impact Assessment (HIA), which forms part of the Basic Assessment (BA) for the proposed Kathu Cemetery expansion on parts of the Remainder of the Farm Lylyveld 545 on the southern side of the town of Kathu in land that will be transferred to 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 South African Heritage Resources Agency SAHRA in their letter of response to the initial submission of the proposed development on South African Heritage Resources Information System (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.

In 2017, a Phase I report was produced by Stone Age specialists' Drs Timothy Forssman, Matt Lotter and Matthew Caruana, which concluded that five artefact scatters (2301171-5) were identified on the property, albeit two of those were comprised of single stone tool occurrences (2301173 and 2301175). Recommendations suggested that the three, more complete scatters (2301171, 2301172 & 2301174) should be excavated to determine their composition and relationship to the stratigraphy of the property. Based on initial observations these scatters could have been eroding from an artefactual layer, possibly associated with calcretes, which is reflected in other archaeological sites in the Kathu region (Walker et al, 2013; SAHRIS accessed August 2014). The scientific and heritage significance as well as the occurrence of archaeological material was considered 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).

Excavations of the three Stone Age scatters (2301171, 2301172 & 2301174) were conducted in January 2018, as well as augering to test the extent of any artefactual occurrence across the Lylyveld Farm. The findings of this fieldwork conclude that the scatters are purely surface occurrences and artefacts do not occur at depth. Further, no Stone Age tools are found outside of these scatter areas. As such, the Stone Age materials on Lylyveld Farm do not hold any significant scientific value and development should proceed.

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1 INTRODUCTION

PGS Heritage was appointed by SLR Consulting to undertake a Heritage Impact Assessment (HIA), which forms part of the Basic Assessment (BA) for the proposed Kathu Cemetery expansion on parts of the Remainder of the Farm Lylyveld 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. An initial Phase I report identified scatters of Stone Age materials on parts of the farm proposed for development as well as within a 50m buffer area. PGS was then appointed to mitigate three scatters that would possibly be affected during development.

1.1 Scope of the Study

The aim of the study is to excavate Stone Age scatters 2301171, 2301172 and 2301174 and assess their scientific significance. The HIA aims to inform the BA in the development of a comprehensive Environmental Management Programme (EMPr) 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 Heritage, 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 Cultural Resource Management (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).

Mr. Henk Steyn, Principal Archaeologist for this project, is registered with the ASAPA and has CRM accreditation within said organisation.

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 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. Mineral and Petroleum Resources Development Act (MPRDA) Act 28 of 2002
iv. Development Facilitation Act (DFA) Act 67 of 1995

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 and Regulations of 2014 (Gazette No. 38282)
    a. Basic Assessment (BA) – Sections 19 & 20; Appendix 1
    b. Environmental Scoping Report (ESR) – Section 21 to 24; Appendix 2
    c. Environemental Impacts Assessment (EIA) – Section 23 ; Appendix 3
    d. EMP (EMP) – Section 1
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. Mineral 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 & 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.

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

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 to 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 (Myr), 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.

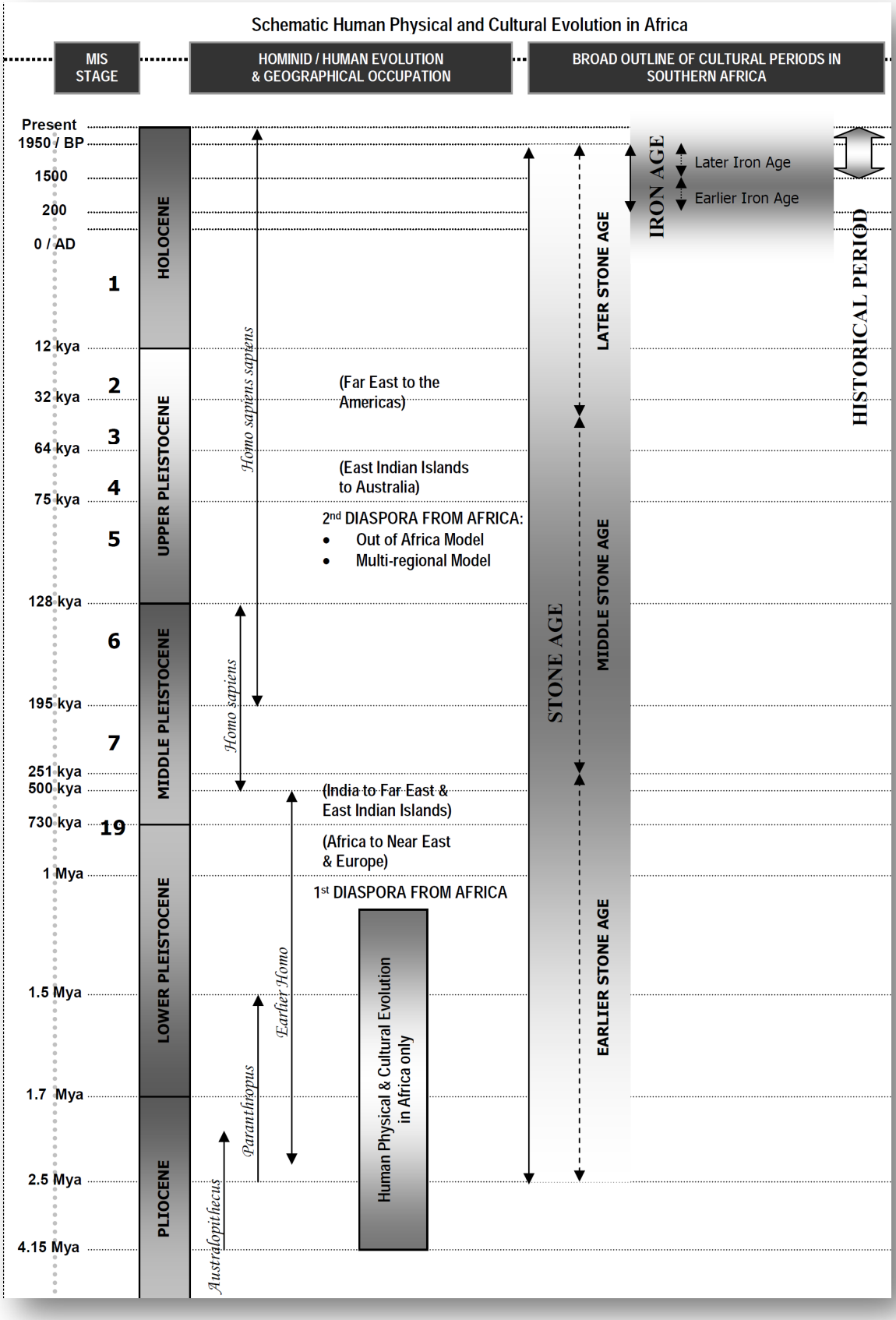

Figure 1 – Human and Cultural Time line in Africa (Morris, 2008; Lomekwian not included)

2 TECHNICAL DETAILS OF THE PROJECT

2.1 Site Location and Description

Coordinates	Kathu Cemetery: S27 40 28.3 E23 04 34.3
Property	Parts of the Remainder of the Farm Lylyveld 545.
Location	The proposed Kathu cemetery is situated on parts of the Remainder of the Farm Lylyveld 545 on the southern side of the town of Kathu in land that will be transferred to the Gamagara Local Municipality, Northern Cape Province. The site is situated adjacent and on the eastern side of the N14 tar road about 13km from the town of Kathu.
Extent	The proposed study area measures approximately 300 x 180 m
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. 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. Due to the existing Kathu Cemetery being located in the protected Kathu Forest, extending the cemetery on the Farm Uitkom 463 is not possible. An alternative location has been proposed to establish a new cemetery.

The new cemetery of approximately 5 hectares is planned on the Remainder of the Farm Lylyveld 545, which is located 13km south of Kathu with its southern boundary along the N14.

Figure 2 – Layout of proposed cemetery and access road (in red and yellow) with a 50m buffer zone surrounding the site

3 ASSESSMENT METHODOLOGY

3.1 Methodology for Assessing Heritage Site Significance

This report was compiled by PGS Heritage for the proposed new Kathu cemetery on parts of the Remainder of the Farm Lylyveld 545 to the 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 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 2018. The fieldwork was conducted by archaeologists, Drs. Timothy R. 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 - <10/50m^2
    - Medium - 10-50/50m^2
    - High - >50/50m^2
- Uniqueness; and
- Potential to answer present research questions.

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

A - No further action necessary;
B - Mapping of the site and controlled sampling required;
C - No-go or relocate 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 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	*Isolated corridor / proposed corridor*	Incidental
2	LOW	*Study area*	Short-term
3	MODERATE	*Local*	Medium-term
4	HIGH	*Regional / Provincial*	Long-term
5	VERY HIGH	*Global / National*	Permanent

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, will be 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:

Impact Risk = (SIGNIFICANCE +*Spatial*+ Temporal) X Probability

3 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 kilometers south of the town of Kathu. It comprises of an area 300mx170m and is approximately 5 hectares in size. The site is bordered by the N14 on its southern boundary (**Figure 2**).

The site itself has a flat topography and is characterised by wooded grassland vegetation on red Kalahari sands and no exposed pebble/gravel layers, as were visible in the existing cemetery, 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 overlapped or were adjacent to the study area. 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 3** 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, Danielskuil.** 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 (Grensplaat) 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 that 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 Kathu cemetery, suggesting mitigation measures to avoid these. A survey for the Kalahari Solar Power project some 5 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 II 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: unpaged) 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 stone tools. 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). Derived knapping techniques were used to produce handaxes, blades, convergent flakes/points, scrapers and prepared core technologies 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 (Wilkens & 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 to 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 recorded. 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 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 closest to the current study area (**Figure 3**) as a buried site of approximately 100 meters wide. No controlled excavations have been done at Uitkoms 4.

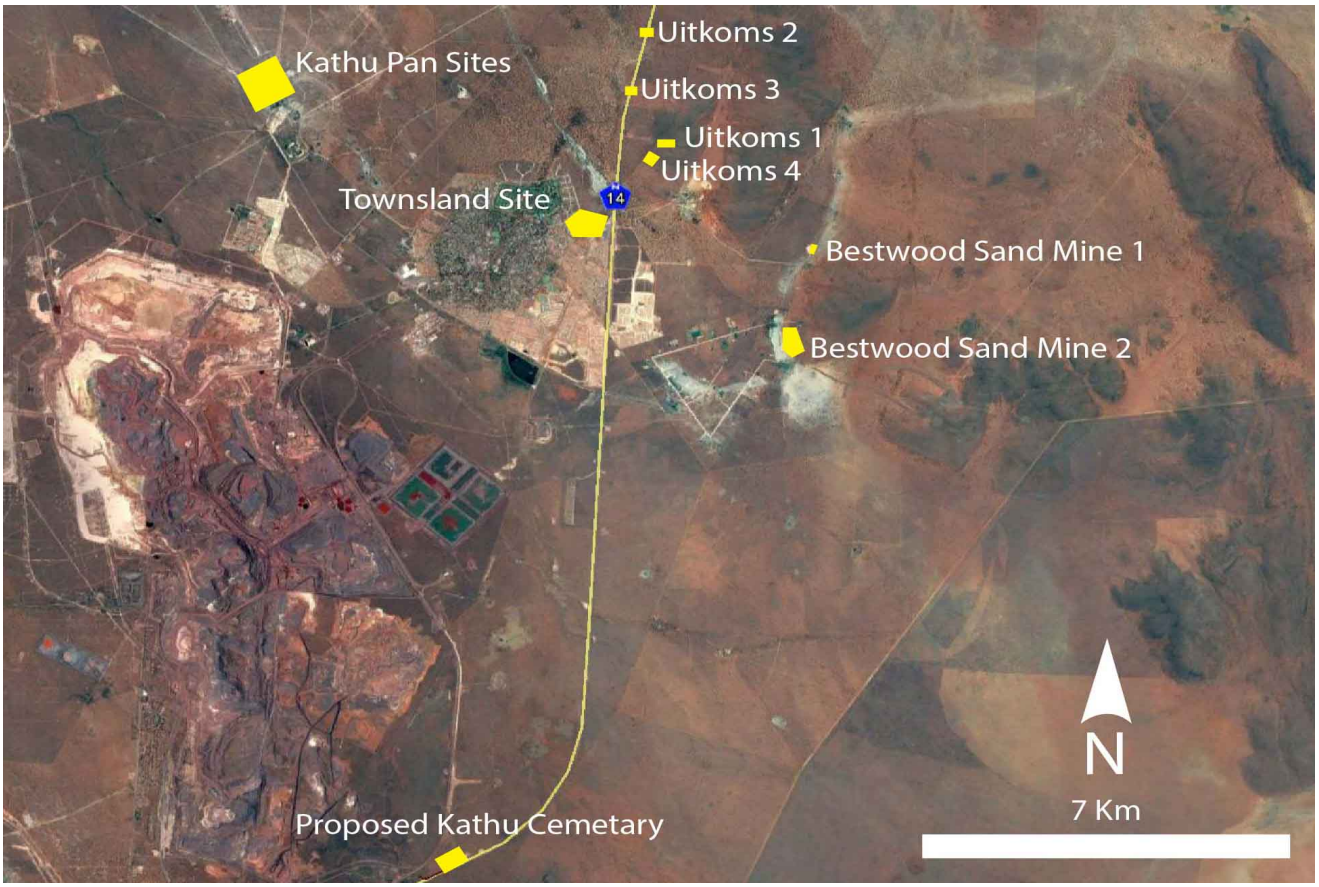

Figure 3 – Shows the location of areas of archaeological interest in the Kathu region in relation to the proposed Kathu Cemetery.

*Table 10: List of studies associated with Figure 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
>250 000 to 40 000 years ago	The Middle Stone Age (MSA) is associated with flakes, points and blades manufactured by means of the prepared core technique. This phase is furthermore associated with modern humans and complex cognition (Wadley 2013). MSA sites and occurrences have been identified in the direct vicinity of the study area, including the very significant Kathu Pan localities (Wilkins & Chazan, 2012). See also, for example, Beaumont (2009) and Kruger (2014).
40 000 years ago to the historic past	The Later Stone Age (LSA) is the third archaeological phase identified and is associated with an abundance of very small stone tools known as microliths. A number of Later Stone Age sites are known from the direct vicinity of the study area. The only site identified during the HIA within the study area is also a LSA occurrence (see Section 6 Fieldwork Findings). According to Beaumont (2000) pecked engravings, originally from the farms Sishen 543 and Bruce 544, were donated to the McGregor Museum with some engravings located on the grounds of the Sishen Iron Ore Mine as well. These two farms are situated 5.5km and 3.3km south-west of the study area. More engraving sites are known from further afield including one on the farm Palingpan. This farm is situated roughly 44.7km south of the present study area.
c. 1950	At the time Dr. L.G. Boardman was assessing the ore reserves at Manganore and Lohathla as well as the farm Lilyveld for S.A. Manganese. He found that the latter farm contained large quantities of haematite iron ore and persuaded the directors of S.A. Manganese to acquire the farm (S.A. Manganese, 1977). The farm Lilyveld is situated directly south and adjacent to the farm Sekgame and is roughly 5.1km south of the study area.
1953	Iscor commenced iron production at Sishen (Snyman, 1983). In the same year the railway line from Postmasburg to Sishen was extended to haul ore to Iscor's plants in Pretoria, Vanderbijlpark and Newcastle (Erasmus, 2004).
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).

5.3 Palaeontology

Two palaeontological desktop studies conducted in the vicinity of the study area were utilised as background documents for this report:

Rubidge, B. 2014. **Palaeontological Desktop Study Kathu Supplier Park Development Kathu, Northern Cape Province**.

Almond, J.E. 2014. *Palaeontological specialist assessment: desktop study: Residential Development on Remainder and Portion 3 of Farm Bestwood Rd 459 In Kathu, Gamagara Municipality, Northern Cape Province*

Evaluation of the two reports indicate that the proposed New Kathu cemetery is underlain by the same geological formations as for the two developments of the said desktop assessments.

Rubidge (2014) describes the geology as "*…will cover Precambrian rocks of the Griquatown Group which are not exposed and are overlain by Tertiary and Quaternary aged sediments of the Kalahari Formation. There is only a slight possibility that the sediments Kalahari Formation could contain fossil material...*"

Almond (2014) further expands by indicating that "*Large areas of unconsolidated, reddish-brown aeolian (i.e. wind-blown) sands of the Quaternary Gordonia Formation (Kalahari Group) are mapped in the Sishen - Kathu region where their thickness is variable.*"

Based on the findings of the studies by Rubidge and Almond (2014) a desktop study was commissioned by PGS available as a separate report on SAHRIS.

6 STONE AGE SCATTER DESCRIPTIONS

The following Stone Age scatters were excavated to determine their scientific significance as required for the Lylyveld 545 Farm HIA (**Figures 4 & 5**).

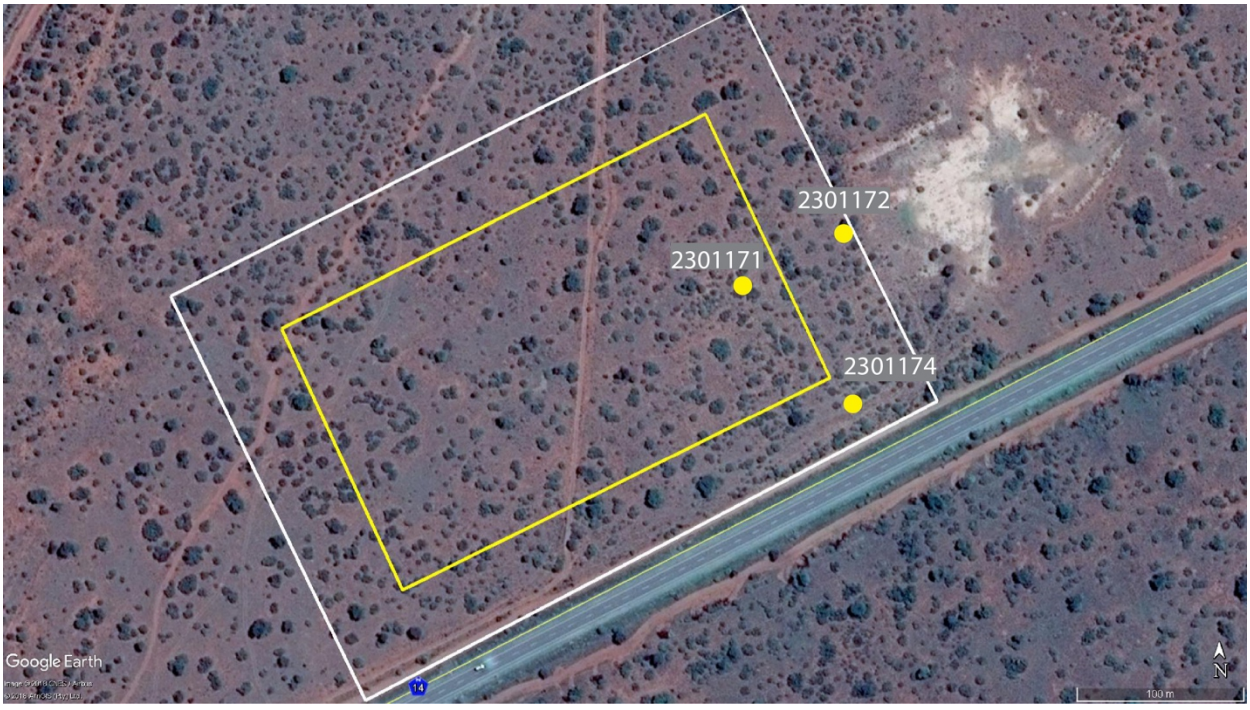

Figure 4 - POI waypoints showing the location of areas with archaeological finds.

6.1 POI Descriptions

- **2301171**
  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. 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. Due to the limited number of diagnostic artefacts it is difficult to determine the chronology.
  Significance: Low; however, it is our recommendation that an archaeologist is present when earth diggings occur in this area.

- **2301172**
  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. 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. Due to the limited number of diagnostic artefacts it is difficult to determine the chronology.
  Significance: Low; however, it is our recommendation that an archaeologist is present when earth diggings occur in this area.

- **2301174**
  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. 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. Due to the limited number of diagnostic artefacts it is difficult to determine the chronology.
  Significance: Low; however, it is our recommendation that an archaeologist is present when earth diggings occur in this area.

7 METHODOLOGY

7.1 Excavations

Stone Age scatters were first delineated using a handheld GPS unit and 1x1 meter squares were plotted within them according to the highest density of artefacts (**Figures 5 & 6**). The goal of the excavations was not only to recover archaeological remains but also establish any stratigraphic sequences that might preserve artefacts at depth. Two stratigraphic units were present within the substrate at Lylyveld Farm, Kalahari Sands (Kalahari Group; termed Horizon A) overlying a

calcrete horizon (Horizon B). Excavations proceeded until a sterile layer was uncovered. In terms of protocols, squares were initially excavated in 5cm spit depths until a reasonable stratigraphy was established. Thereafter, squares were excavated according to stratigraphic depths of identified units. All artefacts recovered from excavations were numbered and labelled in the field and removed for analysis. All sediments removed from the excavations were sieved through a 2mm mesh to ensure that all archaeological materials were recovered, including small flaking debris (i.e. >2cm artefacts).

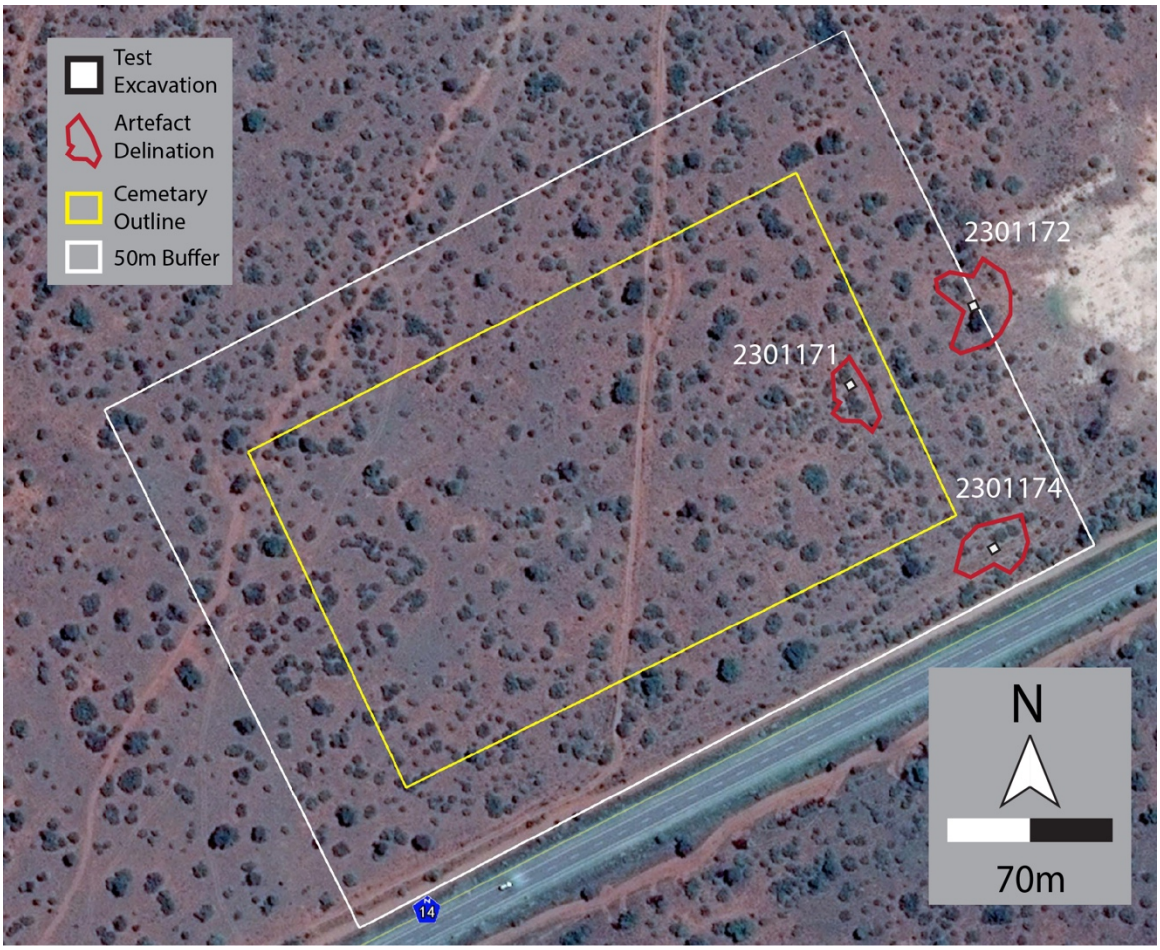

Figure 5 – Delineations of Stone Age scatters and positioning of excavation squares.

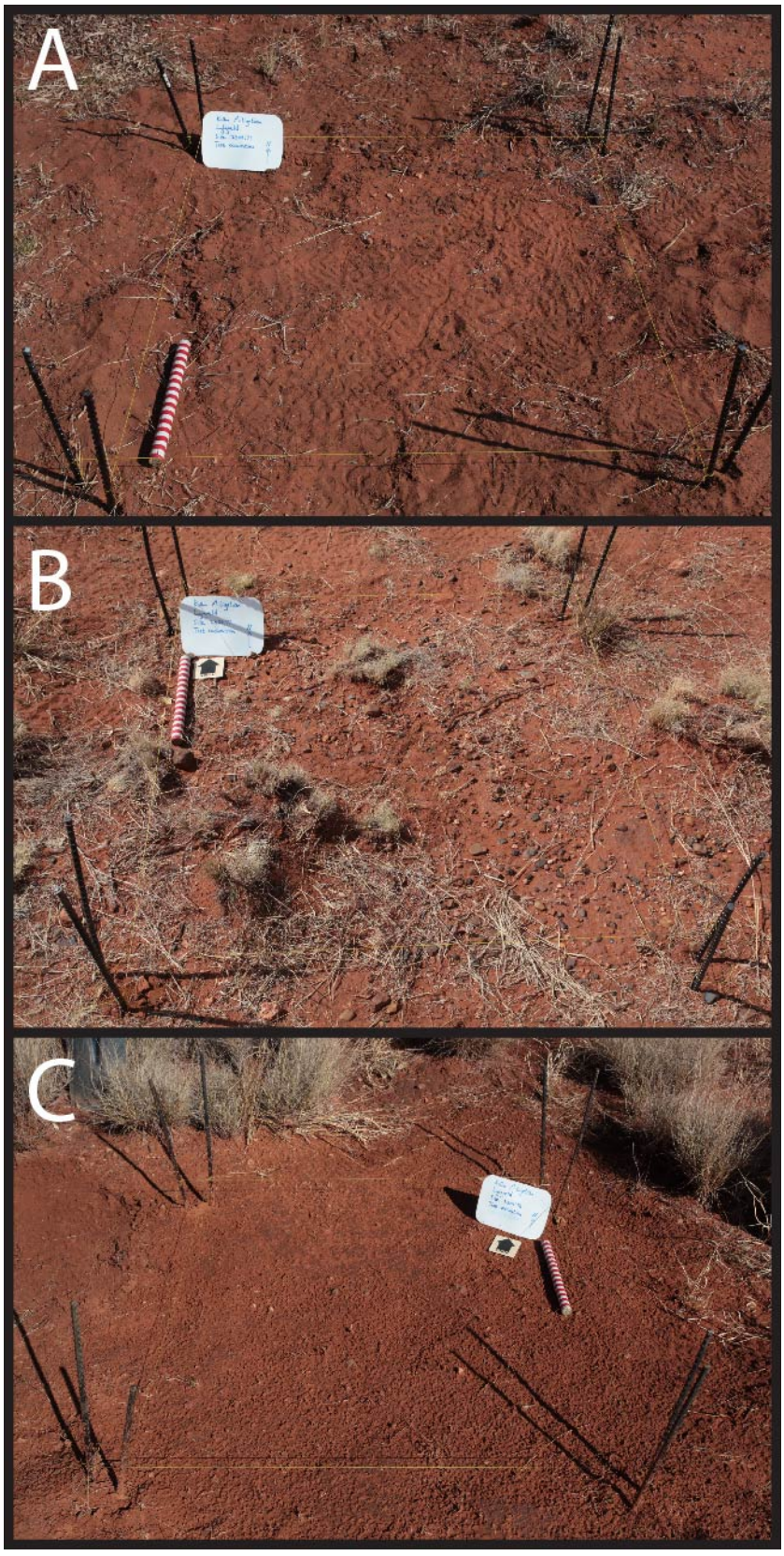

Figure 6 – Excavation squares (A. 2301171; B. 2301172; C. 2301174).

7.2 Augering

Fifteen auger tests were evenly distributed across the proposed area of development on the Lylyveld 545 Farm, at approximately 50m intervals (**Figure 7**). This was done using measurement tools on Google Earth to create 15 evenly distributed coordinates for the augering holes. The purpose of the auger tests is to establish the horizontal distribution of archaeological remains across the farm portion and determine the extent of the cultural residues. Further, this will also establish the approximate depth of stratigraphic units within the limits of the auger's length. The auger is manually twisted into sediments and all material captured is emptied and sieved for artefacts (**Figure 8**).

Figure 7 – Positioning of auger holes, evenly distributed across the proposed development area.

Figure 8 – Manually operated augering

7.3 Post-Excavation Analysis

All artefactual materials were analysed at the HRMS Head Office and the results below describe their raw material and typological frequencies. Basic counts are provided, as well as pie charts that represent percentages of the various material categories.

8 RESULTS

8.1 Excavation data

Context and stratigraphy

All of the test excavations comprise simple stratigraphic profiles that begin with an uppermost layer of surface material. Underlying this occurs two stratigraphic horizons (A & B), each of which vary in depth between the excavations and across the entire survey area.

A basic summary of these horizons is as follows based on the three test excavations (**Figures 9-11**):

- Surface: this comprises sporadic organic matter (primarily grasses and *Acacia* thornveld), natural colluvial gravels and pebbles, calcrete nodules and, specifically within the three excavation areas, low-density scatters of Stone Age artefacts. These all occur within dry unconsolidated sediments of red/brown colouration (primarily silts and fine to coarse sands – Kalahari Group sediments).

- Horizon A: this underlies the surface material and geologically comprises the exact same sediment as than found above (Kalahari Group sediments). These are matrix-supported sediments that are uniform, structureless and bioturbated. Stone Age artefacts occur in this horizon, yet they are sporadic and their numbers decrease with depth. Horizon A thickness varies between each of the excavations, with a minimum thickness of 10 cm at site 2301174 and a maximum of 50 cm at site 2301172.

  The presence of artefacts in Horizon A is very likely due to the downward movement of artefacts from the surface sediments, since these are unconsolidated and bioturbation is common throughout this horizon. This bioturbation is likely the result of plant activity and localised animal burrowing, both of which are frequent at the surface throughout the entire study area. The movement of artefacts due to bioturbation is a very common phenomenon in many archaeological sites.

- Horizon B: this underlies Horizon A and is completely devoid of Stone Age artefacts. The upper portion of this horizon comprises small pedogenic calcrete nodules that are gravel to pebble sized, matrix-supported by sediments similar to those in Horizon A, although with a lighter grey colouration. With depth these sediments disappear and give rise to a completely clast-supported bed of larger calcrete nodules (up to cobble size; **Figure 10**). The total depth of Horizon B is not known.

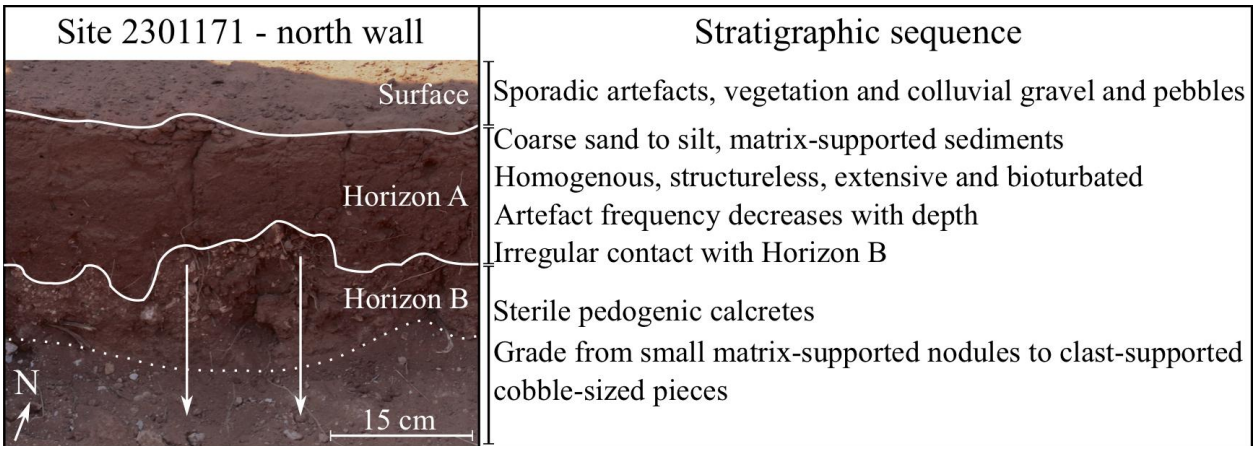

Figure 9 - Stratigraphy at test excavation site 2301171. Artefacts occur only at the surface and within the upper levels of Horizon A.

Figure 10 - Close of test excavation at site 2301171 (upper); depth is 25 cm and Horizon B is visible. Note the location of two auger holes in the south portion of the excavation. Calcrete clasts increase in size with depth (lower). Scale bar is 30 cm.

Figure 11 - Close of test excavation 2301172 at a depth of 30 cm; locally Horizon A continues to 50 cm (upper). Close of test excavation 2301174 at a depth of 10 cm; upper surface of sterile Horizon B is clearly visible (lower). Scale bar is 30 cm.

Test excavation notes

- Site 2301171: excavations stopped at a depth of 25 cm since Horizon A proved to be completely devoid of artefacts from 15 cm onwards. Horizon B begins at approximately 15 cm, which would account for the lack of artefacts as one moves down through the sediments. Two auger holes were sunk to assess the thickness of Horizon B and to establish artefact frequency with depth. These confirmed the sterile nature of the calcretes, the thickness of Horizon B (>20 cm locally) and the lack of fine sediments characteristic of Horizon A.

- Site 2301172: excavations stopped at a depth of 30 cm since the Horizon A artefacts became extremely rare after 10 cm. A single auger test confirmed the thickness of Horizon A to 50 cm, underlain by the sterile calcretes of Horizon B.

- Site 2301174: excavations stopped at a depth of 10 cm due to the presence of sterile calcretes at this depth (Horizon B).

8.2 Auger data

From the 15 auger holes sunk throughout the study area clarity has been provided on the distribution of the Stone Age artefacts, the character and composition of the deposits, and the potential for future impacts from development (**Table 11**).

All of the auger holes confirm the following:

1. Where Stone Age artefacts are absent at the surface they do not occur at depth.
2. Although the amount of sediment excavated by the auger covers only a small area, careful screening of this sediment recovered no artefacts at all in the tested areas. This has important implications for the distribution of artefacts across the study area and thus the cultural landscape that is Lylyveld 545.
3. Horizon A, although of variable depth, is an extensive deposit that covers the entire study area.
4. Horizon A appears uniform across this entire area, comprised of red/brown silts and fine to coarse sands, and natural colluvial gravel and pebbles. In some areas this horizon is more consolidated than in others.
5. It is likely that Horizon B underlies Horizon A across the entire site, even though this horizon was not reached in all of the auger holes.
6. Where Horizon B was reached no artefacts were recovered. This confirms the trend observed in the three test excavations.
7. It is unlikely that future developments (excavations) in the study area will uncover significant Stone Age assemblages at depth, and thus the potential for impacts is very low.

Table 11 - Auger sample data showing artefact presence, stratigraphic information (depths recorded in meters) and archaeological significance (none for all test sites).

Sample site notes:	**Sample locations:**														
	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	A14	A15
Artefacts at surface	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
Artefacts at depth	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
Horizon A* present	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Horizon A max depth	>1.2	>1.2	>1.2	0.7	0.4	>1.2	>1.2	>1.2	0.9	0.35	>1.2	0.9	0.6	0.4	0.2
Horizon B* present	No	No	No	Yes	Yes	No	No	No	Yes	Yes	No	Yes	Yes	Yes	Yes
Total depth sampled	1.2	1.2	1.2	0.7	0.5	1.2	1.2	1.2	0.9	0.35	1.2	0.9	0.6	0.4	0.2
Significance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
*A=red/brown sands and silts, with sporadic natural gravels and pebbles															
*B=sterile clast-supported pedogenic calcrete nodules from gravel to cobble size															

8.3 Artefact data

A limited quantity of Stone Age artefacts were retrieved during all excavations and surface collections (n=114; **Table 12**). Raw materials are dominated by crypto-crystalline silicates (CCS), followed thereafter by banded ironstone and infrequent quartzite pieces (**Table 12; Figure 12**). The vast majority of recovered artefacts were comprise flaking debris, followed thereafter by complete flakes. Cores (n=5) only occur at one site (2301172), as do formal tools (n=1 side scraper; 2301174; **Table 12; Figure 13**).

Flaking debris is dominated by artefacts less than 20 mm (small flaking debris, SFD), which make up large percentages of the total samples from sites 2301171 and 2301172 (**Table 12**). This smaller material is most common in the excavation samples, due to the fine sieve mesh used during sediment screening. The remaining flaking debris types (chunks, fragments and incompletes) occur infrequently, although incomplete flakes/blades are marginally more frequent in all of the samples (**Table 12**).

Complete flakes are common in each of the three sites and are comprised primarily of end-, side- and corner-struck types (**Table 12; Figures 14-18**). These are common in all Stone Age sites and are minimally informative. More significant however are the presence of core maintenance and convergent/pointed flakes, at sites 2301172 and 2301174 (**Table 12; Figures 15-17**).

Table 12 - Artefact typology and raw material frequencies by site.

Artefact types	2301171TE*		2301171SC*		2301172TE		2301172SC		2301174TE		2301174SC	
	N	%	N	%	N	%	N	%	N	%	N	%
Flaking debris:	**15**	**78.9**	**4**	**36.4**	**43**	**78.2**	**2**	**16.7**	**6**	**85.7**	**2**	**20**
SFD<20 mm	13	68.4	0	0	34	61.8	0	0	1	14.3	0	0
Chunk	0	0	0	0	1	1.8	0	0	0	0	0	0
Incomplete flake/blade	2	10.5	4	36.4	7	12.7	0	0	3	42.9	1	10
Flake/blade fragment	0	0	0	0	1	1.8	2	16.7	2	28.6	1	10
Complete flakes:	**4**	**21.1**	**7**	**63.6**	**9**	**16.4**	**8**	**66.7**	**1**	**14.3**	**7**	**70**
End-struck	1	5.3	3	27.3	4	7.3	1	8.3	0	0	3	30
Side-struck	1	5.3	2	18.2	1	1.8	1	8.3	0	0	2	20
Corner-struck	2	10.5	2	18.2	2	3.6	4	33.3	0	0	1	10
Core maintenance	0	0	0	0	1	1.8	1	8.3	1	14.3	0	0
Convergent/pointed	0	0	0	0	1	1.8	1	8.3	0	0	1	10
Cores:	**0**	**0**	**0**	**0**	**3**	**5.5**	**2**	**16.7**	**0**	**0**	**0**	**0**
Casual	0	0	0	0	2	3.6	0	0	0	0	0	0
Chopper	0	0	0	0	1	1.8	0	0	0	0	0	0
Multi-platform	0	0	0	0	0	0	1	8.3	0	0	0	0
Sub-radial	0	0	0	0	0	0	1	8.3	0	0	0	0
Formal tools:	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**10**
Side scraper	0	0	0	0	0	0	0	0	0	0	1	10
Assemblage total:	**19**	**100**	**11**	**100**	**55**	**100**	**12**	**100**	**7**	**100**	**10**	**100**
Raw materials:												
Quartzite	0	0	1	9.1	0	0	1	8.3	1	14.3	0	0
CCS	19	100	8	72.7	55	100	11	91.7	6	85.7	7	70
Banded ironstone	0	0	2	18.2	0	0	0	0	0	0	3	30

*TE=Artefacts collected from test excavation

*SC=Artefacts collected from the surface in and around the test excavations (see methods for a delineation of these surface collection areas)

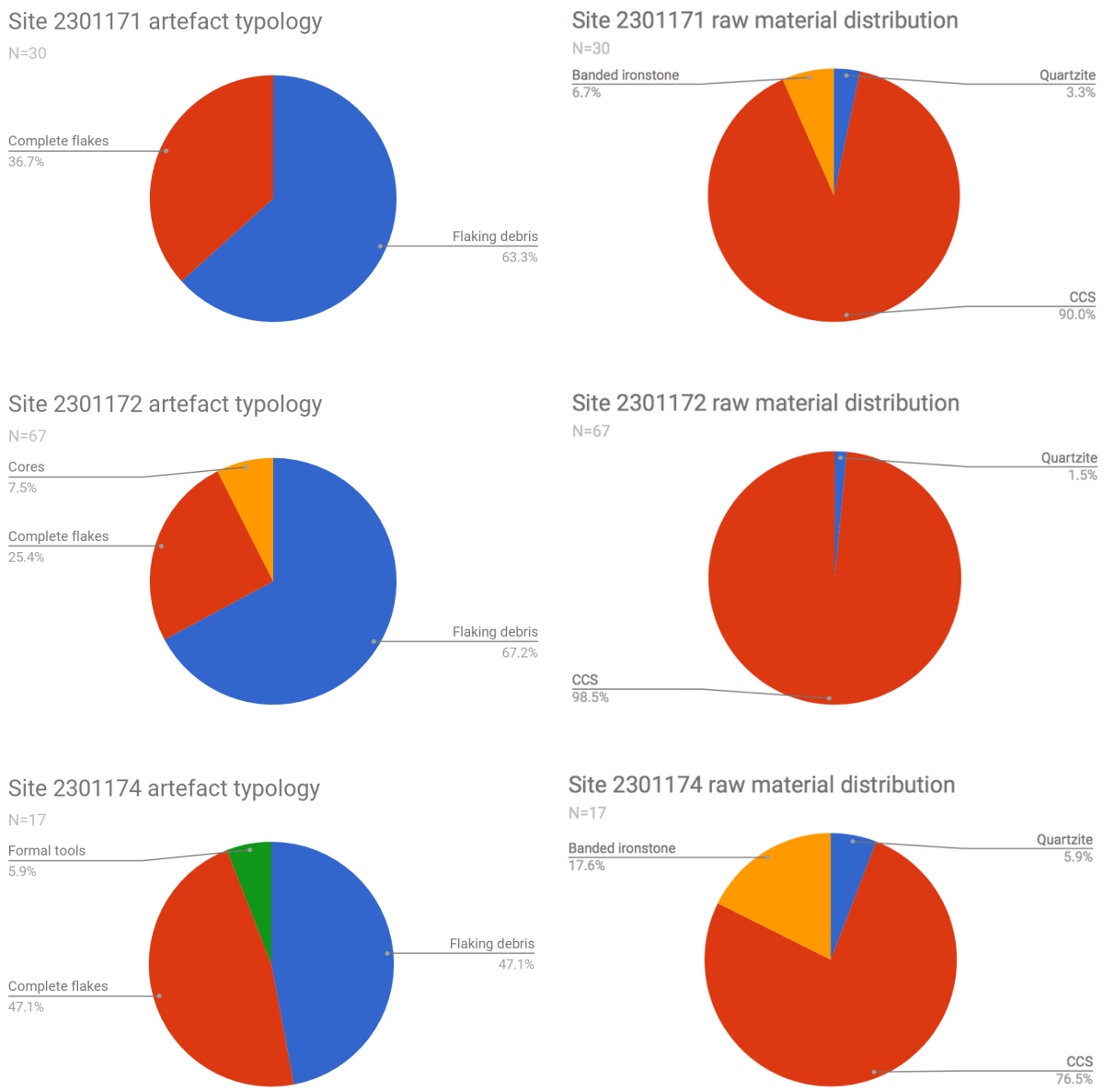

Figure 12 - Artefact types (right) and raw material distributions (left) by site for the combined excavation and surface collection samples.

Although this core maintenance and convergent/pointed flakes occur in many sites throughout the Stone Age they provide some indication on the upper limits of the stone tool technology. Core maintenance flakes provide insight into the way in which stone pebbles and cobbles were knapped (flaked), suggesting a systematic approach to managing core size, volume, shape, and edge angularities. Core maintenance flakes are removed from a core so that core longevity is increased, thus allowing more flakes to be struck from a single core. They are present in the archaeological record from at least 1 million years ago.

Convergent/pointed flakes are a common feature throughout the Stone Age and they play an important role in later periods, especially the MSA when tool hafting develops. Their presence

here may indicate a possible MSA period, but confirming this is not possible due to the small assemblage, the overall lack of diagnostic artefacts and the fact that these types occur throughout most of the Stone Age.

a  b 

Figure 13 - Excavation artefacts from site 2301171, all made on CCS. Dorsal (a) and ventral (b) views for an incomplete end-struck flake (left), complete corner-struck flake (middle) and complete end-struck flake (right).

a  b 

Figure 14 - Surface collection artefacts from site 2301171, made on banded ironstone (left) and CCS. Dorsal (a) and ventral (b) views for an end-struck complete flake (left), complete corner-struck flake (middle) and complete side-struck flake (right).

The cores from site 2301172 show a range of reduction strategies, including those that are purely opportunistic (casual cores, less than two flakes; n=2), those which are worked bifacially along a single edge (chopper-core; n=1) and those which are flaked more extensively utilising multiple edges and flaking directions (multi-platform and sub-radial cores; n=1 each; **Table 12; Figures 15 & 16**). These types of cores occur frequently throughout the Stone Age and thus they do not provide any indication on the age of the assemblages.

a  b 

Figure 15 - Excavation artefacts from site 2301172, all made on CCS. Chopper-core (upper left), casual core (upper right), core maintenance complete flake (lower left) and convergent/pointed incomplete flake (lower right).

a  b 

Figure 16 - Surface collection artefacts from site 2301172, all made on CCS. Sub-radial core (upper left), multi-platform core (upper right), convergent/pointed complete flake (lower left), complete end-struck flake (lower middle) and complete core maintenance flake (lower right).

a  b 

Figure 17 - Complete core maintenance flake on quartzite, from site excavation 2301174.

Only a single formal tool was recovered from Lylyveld 545 (n=1 side scraper; **Table 12; Figure 18**). This is made on a flake fragment where a single edge has been retouched to create a steep and somewhat denticulated scraping edge. Such tools are common throughout the Stone Age and their uses may include the shaping of wood or bone, processing of animal hides and vegetation and use in other subsistence-related activities.

a  b 

Figure 18 - Surface collection artefacts from site 2301174, made on CCS and banded ironstone (bottom left). Convergent/pointed complete flake (upper left), side scraper (upper right), and complete blades (lower).

9 IMPACT EVALUATION

Table 13 – Impact Evaluation of Stone Age Scatters on Lylyveld Farm

IMPACT	SIGNIFICANCE	SPATIAL SCALE	TEMPORAL SCALE	PROBABILITY	RATING
Stone Age Scatters					
	1	**2**	**5**	**2**	**1.6**

10 DISCUSSION

From a contextual perspective the Stone Age artefacts recovered from Farm Lylyveld 545 appear to be primarily low-density surface scatters. The significance of this is that artefacts at depth only occur within these scatters, and their preservation at depth is sporadic. It is most likely that the buried artefacts were once at the surface and thus part of the original surface scatters, but due to natural processes they have migrated downwards through the loose unconsolidated sediments. This is a common phenomenon in many archaeological sites.

For this reason, and based on the auger results obtained elsewhere on the property, the probability of recovering or damaging artefacts at depth across the new proposed cemetery area is very low. Although Horizon A is artefact bearing and is extensive across the whole of Farm Lylyveld 545, from the fifteen auger holes and three excavations we have confirmed that artefact preservation is constrained to the areas where artefacts occur at the surface. Most significantly, only one of these scatter areas (site 2301171) occurs in the delineated area of the new cemetery, with the remaining two occurring in the outer buffer area. As a result the potential for any negative impact is low (**Table 13**).

From a technological perspective there is little that can be concluded about the nature and antiquity of the small Stone Age assemblage. None of the recovered artefacts are indicative of a specific time period, and based on the sporadic nature of the artefacts, which are primarily non-diagnostic and uninformative, the quality of the Stone Age assemblage does not warrant any further work or mitigation. Furthermore, dating is not required on such a poor quality assemblage.

11 FINAL RECOMMENDATIONS

In accordance with the Phase I report mitigation work has now been conducted across Farm Lylyveld 545 in the areas identified by the relevant SAHRA permit. From this work we recommend the following:

- No further mitigation work is required.
- Should any artefacts be recovered from depths lower than Horizon B during developments on Farm Lylyveld 545, a qualified archaeologist or the environmental control officer (ECO) must be contacted.

12 CONCLUSIONS

PGS Heritage was appointed by SLR Consulting 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 Lylyveld 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.

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.

Excavations of Stone Age scatters (2301171, 2301172 & 2301174) revealed that these occurrences were restricted to surface accumulations lying on top of the Kalahari Sands. Further, these scatters were generally low-density and did not occur to any considerable depth, aside from those tools that had migrated downward due to post-depositional processes, i.e. bioturbative disturbance. Auger testing showed that no artefacts were recorded outside of the Stone Age scatters, which demonstrates that these artefactual occurrences are localised and of low significance. The development of this property should proceed with no further mitigation needed. If any artefacts are discovered at depths lower than Horizon B, a qualified archaeologist or the ECO must be contacted.

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13.5 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.