HERITAGE IMPACT ASSESSMENT:
PROPOSED THERMAL POWER DUAL FUEL GENERATOR ON FARM 432/REM AND ACCESS ROAD ON FARM 464/1, NORTH OF KATHU, KURUMAN MAGISTERIAL DISTRICT, NORTHERN CAPE

Report for:

Savannah Environmental (Pty) Ltd
P.O. Box 148, Sunninghill, 2157
Tel: 011 656 3237
Email: joanne@savannahsa.com

On behalf of:

Hyperion Solar Development (Pty) Ltd

Dr Jayson Orton
ASHA Consulting (Pty) Ltd
40 Brassie Street, Lakeside, 7945
Tel: (021) 788 1025 | 083 272 3225
Email: jayson@asha-consulting.co.za

08 October 2020

SUMMARY

ASHA Consulting (Pty) Ltd was appointed by Savannah Environmental (Pty) Ltd to provide a scoping heritage assessment for the proposed development of a dual fuel thermal power generation plant to be located on Farm 432/rem and an access road to cross Farm Selsden 464/1. The site is located some 15 km north of Kathu. The power generator plant would be centred on S27° 33′ 13.7″ E23° 03′ 53.3″, while the southern end of the access road would be at S27° 36′ 05.0″ E23° 01′ 44.0″.

The study area is generally sandy with some calcrete exposed at the surface in the south. Vegetation includes grass, bushes and thorn trees. The site was not subjected to a field survey because good data for the area are already on record and, due to the known sandy surface, it was not expected that a survey would prove useful.

The desktop study revealed that, although fossil localities are unknown in the area aside from Kathu Pan, there is a small chance of finding fossils in the Kalahari Group sediments (calcrete and red aeolian sand). Studies in the immediate area (including at the generator site) have shown that in sandy and calcrete-covered areas archaeological materials are virtually absent from the surface. However, the surface exposure of an area of ironstone gravel with associated artefacts to the southeast of the generator site and another tiny exposure within it shows that such material extends beneath the sand cover. It is thus likely that excavations for foundations would intersect the gravel and reveal archaeological materials. Graves are an ever-present but very unlikely type of heritage resource that could be present.

The main issue for this project will be the potential to intersect archaeological resources during excavations for the generator and, to a lesser degree, the road. However, with appropriate mitigation, the impacts can be easily managed and a scientific benefit could even be derived with successful description and rescue of heritage materials. It is especially important to the archaeology of the region, and Grade I Kathu Complex, to understand both the vertical and horizontal distribution of buried archaeological resources and development projects allow opportunities to gain such insights.

It is recommended that the proposed development proceed to the EIA Phase because no fatal flaws have been identified and all impacts can be readily managed and/or mitigated. Indeed, some benefit is likely to accrue with application of the correct archaeological mitigation measures.

The EIA Phase work can also be conducted from the desktop, since reasonably good information is available and a surface examination of the site is highly unlikely to provide any new insights.

Glossary

Acheulean: An archaeological name for the period comprising the later part of the Early Stone Age. This period started about 1.7-1.5 million years ago and ended about 250-200 thousand years ago.

Background scatter: Artefacts whose spatial position is conditioned more by natural forces than by human agency.

Doline: a sinkhole caused by collapse of surface sediments into an underground solution cavity.

Early Stone Age: Period of the Stone Age extending approximately between 2 million and 200 000 years ago.

Fauresmith: A period right at the end of the Early Stone Age when very small handaxes were made.

Handaxe: A bifacially flaked, pointed stone tool type typical of the Early Stone Age Acheulian Industry. It is also referred to as a large cutting tool.

Holocene: The geological period spanning the last approximately 10-12 000 years.

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

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

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

Pleistocene: The geological period beginning approximately 2.5 million years ago and preceding the Holocene.

Abbreviations

APHP: Association of Professional Heritage Practitioners

ASAPA: Association of Southern African Professional Archaeologists

BA: Basic Assessment

BIF: Banded Iron Formation

CRM: Cultural Resources Management

DMR: Department of Mineral Resources

ECO: Environmental Control Officer

ESA: Early Stone Age

GP: General Protection

GPS: global positioning system

HIA: Heritage Impact Assessment

LSA: Later Stone Age

MSA: Middle Stone Age

NBKB: Ngwao-Boswa Ya Kapa Bokoni

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

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

PPP: Public Participation Process

PV: Photovoltaic

SAHRA: South African Heritage Resources Agency

SAHRIS: South African Heritage Resources Information System

Contents

1. INTRODUCTION

ASHA Consulting (Pty) Ltd was appointed by Savannah Environmental (Pty) Ltd to provide a scoping heritage assessment for the proposed development of a dual fuel thermal power generation plant to be located on Farm 432/rem and an access road to cross Farm Selsden 464/1. The power generator site is located some 15 km north of Kathu, while the southern end of the road is about 9.5 km north of Kathu (Figures 1 & 2). The generator plant would be centred on S27° 33' 13.7" E23° 03' 53.3", while the southern end of the access road would be at S27° 36' 05.0" E23° 01' 44.0".

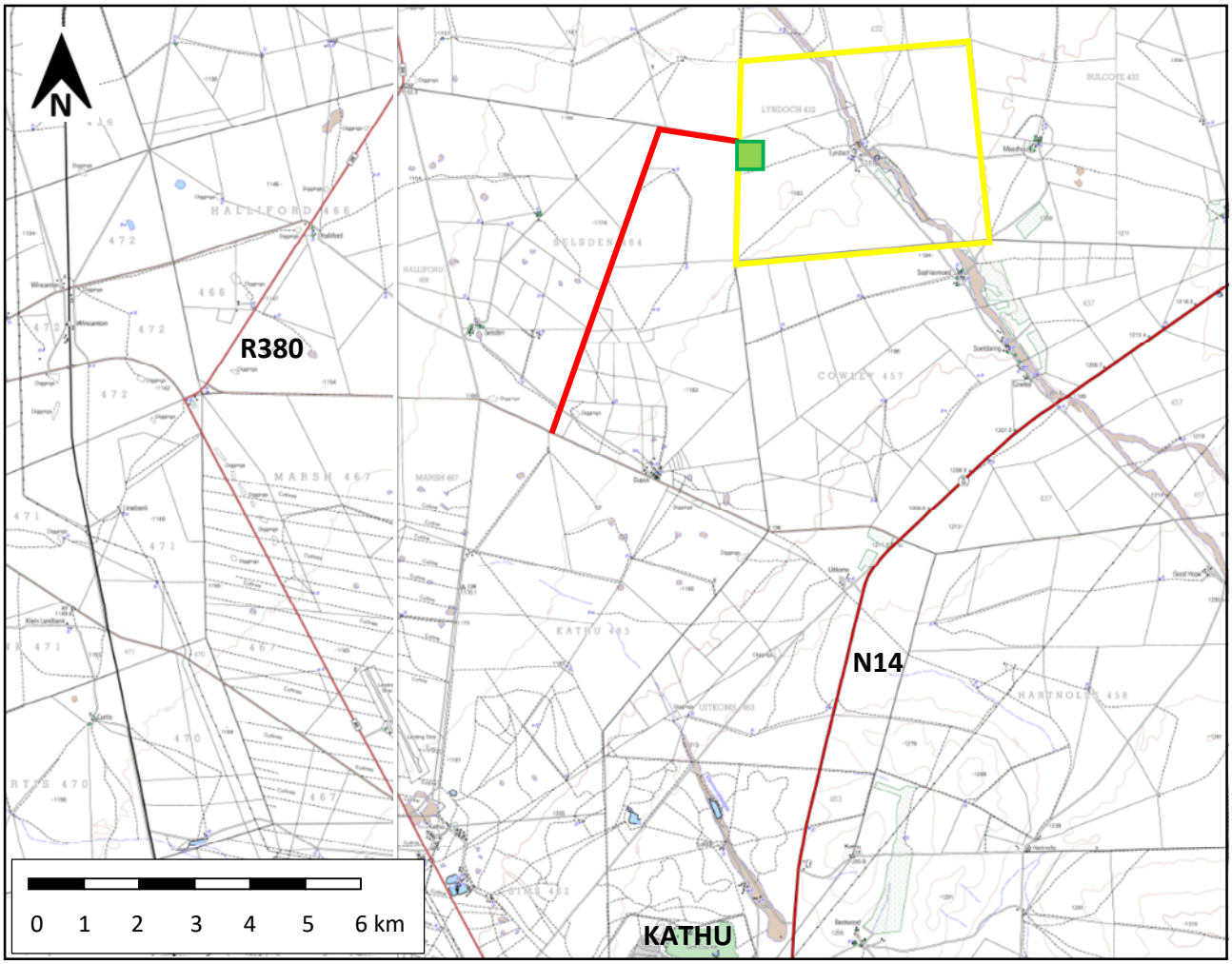


Figure 1: *Extract from 1:50 000 topographic maps 2722DB & 2723CA showing the location of the authorised Hyperion PV Cluster (yellow polygon), the proposed dual fuel generator (green polygon) and the proposed access road line (red line) relative to the town of Kathu in the south. Source of basemap: Chief Directorate: National Geo-Spatial Information. Website: www.ngi.gov.za.*

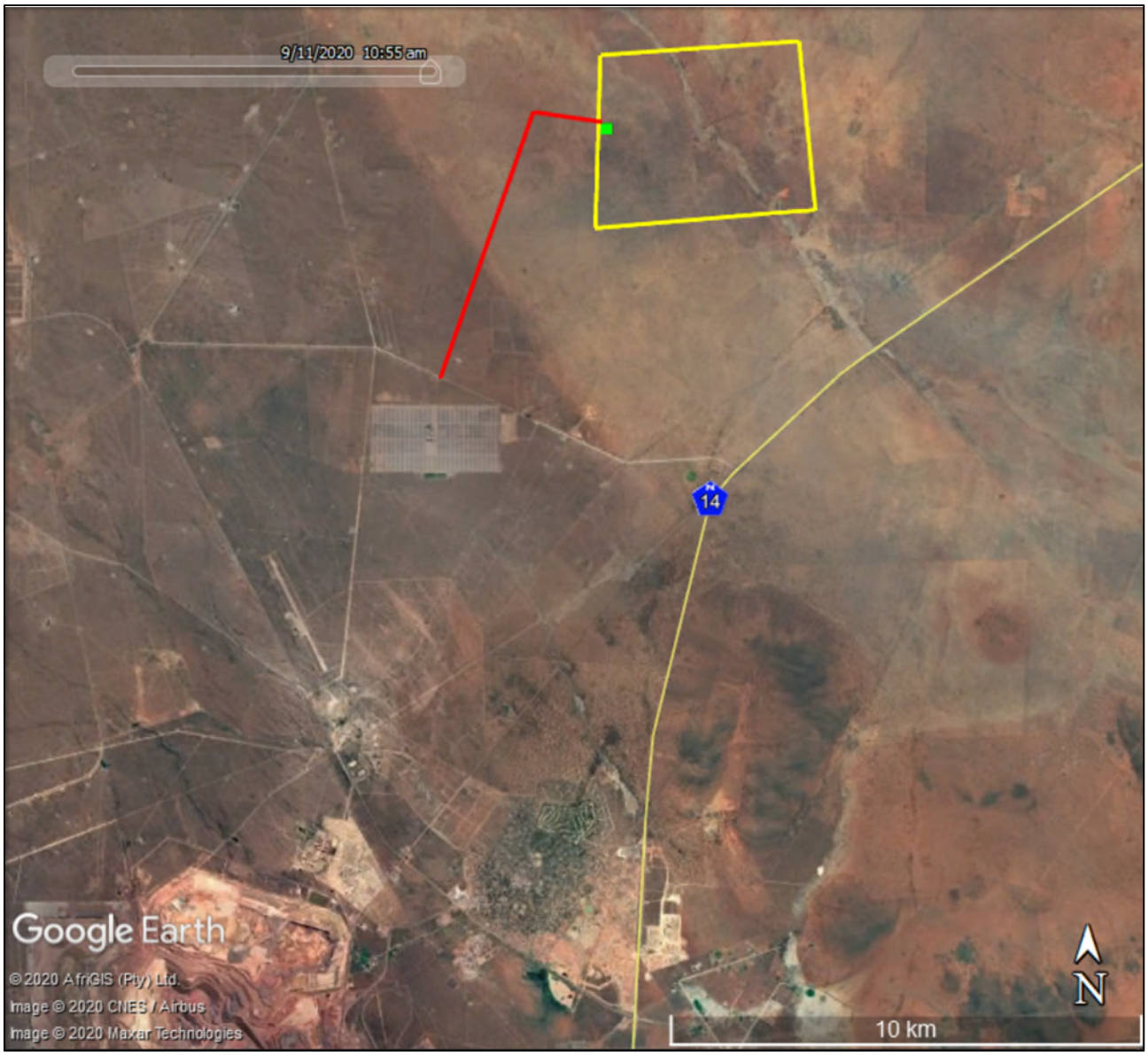


Figure 2: *Aerial view of the study area showing the location of the authorised Hyperion PV Cluster (purple polygon), the existing Kalbas Substation (yellow polygon) and the currently proposed access road (red line). The inset shows the Kalbas Substation connection.*

1.1. The proposed project

1.1.1. Project description

The power generation facility will be a hybrid facility consisting of a dispatchable, duel fuel (liquid or gas) thermal generation plant in combination with a solar plant. There will be a single point of connection to the utility (Eskom). The facility will aim to meet the bid requirement of being 100% dispatchable between the hours of 05h00 and 21h30. Where possible and where available, solar power will be utilised to meet the demand however where solar power is not available (typically between the hours of 5h00 and 07h00 and again between 18h00 and 21h30), thermal generation will be utilised. It is currently estimated that between 50 – 65% of the demand will be met utilising solar power with the remaining 35 – 50 % being met with thermal generation. The facility will be controlled by a joint controller that will have the capability of assessing the demand and regulating the power supply from the solar and thermal facilities accordingly. Figure 3 shows a schematic view of the proposed facility.

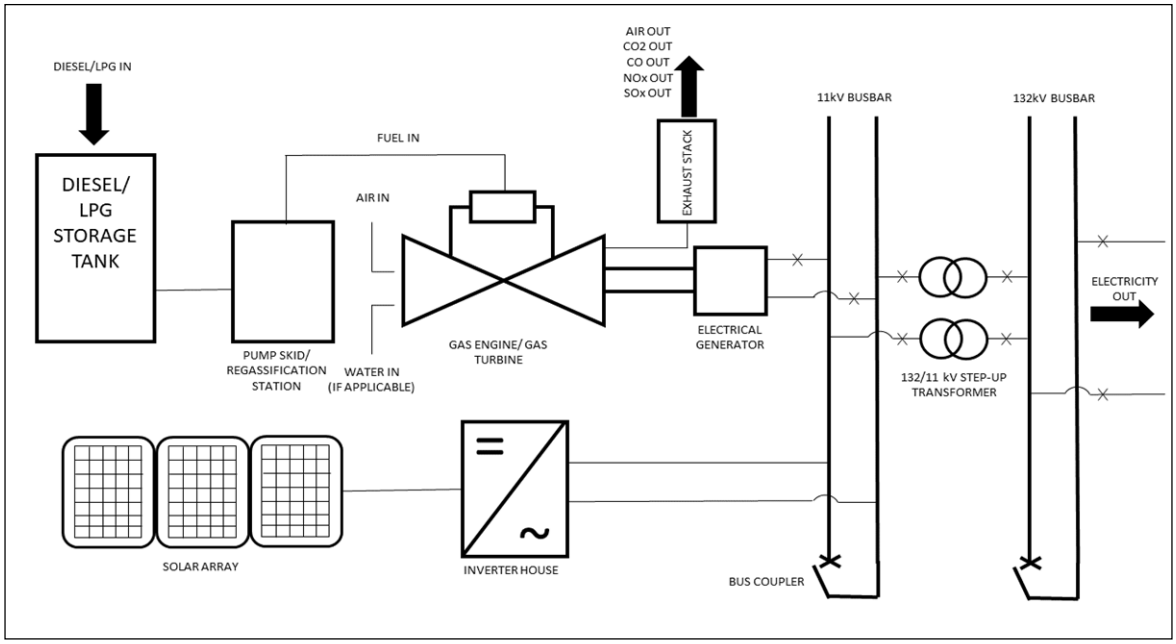


Figure 3: *Schematic view of the proposed system.*

The thermal generation plant will include the following infrastructure:

- » Gas turbines or Reciprocating Engines
- » Access road
- » Truck entrance and parking facility
- » Regasification plant and fuel preparation plant
- » Dry cooling system for operating oils/chemicals
- » Fuel off-loading facility
- » Fuel storage facility
- » Water demineralisation plant
- » Substation, cabling, O&M building, fencing, warehouses and workshops

It is also proposed to develop an access road that will run northwards from the T25 gravel road to the generator site. The road would be about 8 km long and would have a surfaced width of 8 m with an additional 2 m on either side to accommodate side drains.

1.1.2. Identification of alternatives

No alternative sites for the generator are being considered because this site was chosen specifically to be within the footprint the already authorised Hyperion solar PV development. Similarly, other technologies are not being considered since the project is designed to run on two fuel types and to support a solar plant at times of higher demand. Four other access road alignments to the Hyperion PV cluster were considered during an earlier impact assessment but the present alignment (which was not investigated at that time) has been sensibly chosen to follow the proposed powerline linking the Hyperion PV Cluster to the existing Eskom Kalbas Substation (Note that the power line is the subject of a separate impact assessment process). As such, no other road alternatives are being considered during the present assessment. Therefore, this assessment will consider only the preferred and No-Go alternatives.

1.1.3. Aspects of the project relevant to the heritage study

All aspects of the proposed development are relevant since excavations for foundations and/or services may impact on archaeological and/or palaeontological remains, while all above-ground aspects create potential visual (contextual) impacts to the cultural landscape and any significant heritage sites that might be visually sensitive.

1.2. Terms of reference

ASHA Consulting was asked to compile a scoping heritage assessment that would briefly assess heritage issues in relation to the project and identify any potential impacts that may occur. Due to the heritage consultant's knowledge of the area, it was agreed that the study should be a desktop assessment. The assessment was to consider all aspects of heritage including archaeology, palaeontology and the cultural landscape.

1.3. Scope and purpose of the report

Scoping reports are not required under the NHRA and, from a heritage point of view, thus only serve to identify issues and impacts under NEMA.

1.4. The author

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

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

1.5. Declaration of independence

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

2. HERITAGE LEGISLATION

The National Heritage Resources Act (NHRA) No. 25 of 1999 protects a variety of heritage resources as follows:

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

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

- Structures: "any building, works, device or other facility made by people and which is fixed to land, and includes any fixtures, fittings and equipment associated therewith";
- Palaeontological material: "any fossilised remains or fossil trace of animals or plants which lived in the geological past, other than fossil fuels or fossiliferous rock intended for industrial use, and any site which contains such fossilised remains or trace";
- Archaeological material: a) "material remains resulting from human activity which are in a state of disuse and are in or on land and which are older than 100 years, including artefacts, human and hominid remains and artificial features and structures"; b) "rock art, being any form of painting, engraving or other graphic representation on a fixed rock surface or loose rock or stone, which was executed by human agency and which is older

than 100 years, including any area within 10m of such representation"; c) "wrecks, being any vessel or aircraft, or any part thereof, which was wrecked in South Africa, whether on land, in the internal waters, the territorial waters or in the maritime culture zone of the Republic, as defined respectively in sections 3, 4 and 6 of the Maritime Zones Act, 1994 (Act No. 15 of 1994), and any cargo, debris or artefacts found or associated therewith, which is older than 60 years or which SAHRA considers to be worthy of conservation"; and d) "features, structures and artefacts associated with military history which are older than 75 years and the sites on which they are found";

- Grave: "means a place of interment and includes the contents, headstone or other marker of such a place and any other structure on or associated with such place"; and
- Public monuments and memorials: "all monuments and memorials a) "erected on land belonging to any branch of central, provincial or local government, or on land belonging to any organisation funded by or established in terms of the legislation of such a branch of government"; or b) "which were paid for by public subscription, government funds, or a public-spirited or military organisation, and are on land belonging to any private individual."

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

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

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

As already noted, scoping reports are not required under the NHRA but the above describes the types of heritage for which protection is provided and that are considered in this scoping assessment.

3. METHODS

3.1. Literature survey and information sources

A survey of available literature was carried out to assess the general heritage context into which the development would be set. This literature included published material, unpublished commercial reports and online material, including reports sourced from the South African Heritage Resources Information System (SAHRIS). The 1:50 000 map was sourced from the Chief Directorate: National Geo-Spatial Information.

3.2. Field survey

Although the IFC Performance Standard 8 requires fieldwork, motivation for carrying out the heritage assessment as a desktop study is provided here:

- The heritage consultant is well-familiar with the broader study area having worked on the Hyperion PV Cluster (Orton 2019a, 2019b, 2019c, 2019d) which includes the present site (Figure 3) and the Kalahari Solar development (Orton & Walker 2015) which lies 6.5 km south of the present study area. These projects were both conducted with fieldwork;
- The distribution of archaeological resources is very well understood in relation to the local geology. Archaeological materials are seldom seen on the surface of the aeolioan sand with the exception of locations in close proximity to water sources (e.g. ephemeral stream beds or pans). Artefacts are also absent from areas coated in calcrete. Stone artefacts are very strongly associated with the underlying iron-rich gravels but, when the surface is sandy, the presence of gravels and/or artefacts below ground cannot be predicted. A precautionary approach is thus indicated; and
- The nature of much of the surface in the study area (red Kalahari sand) is evident from aerial photography and is such that archaeological materials are extremely unlikely to be seen. This is because, if present, they are buried by the aeolian sands.

It should be noted that amount of time between the dates of the field inspections for the above-mentioned projects and the present report do not materially affect the outcome of the present report.

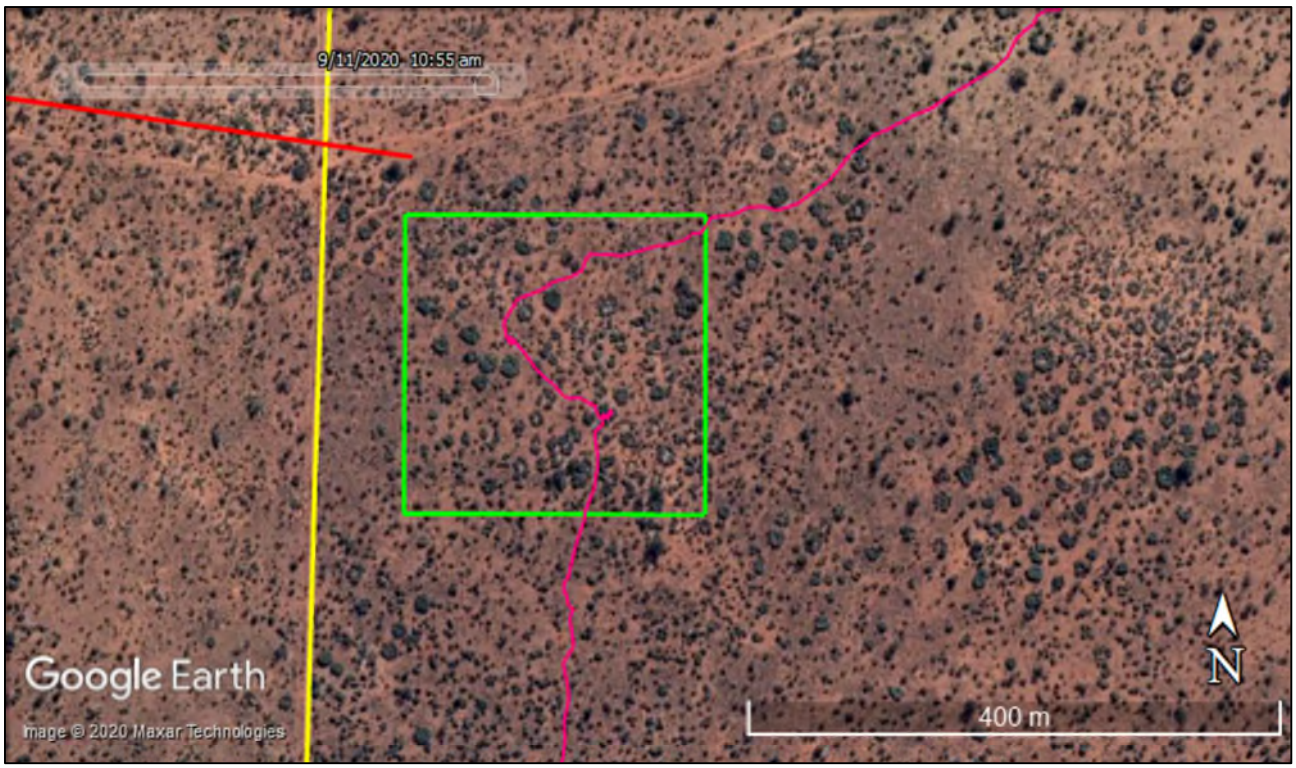


Figure 3: *Aerial view of the proposed generator site (green polygon) and northern end of the access road (red line) showing the 21 July 2018 survey track (pink line) passing through the generator site. The yellow line is a cadastral boundary.*

3.3. Specialist studies

No specialist studies were commissioned as part of this scoping assessment. The heritage specialist made use of the existing palaeontological reports in order to predict the impacts that would result from the present project.

3.4. Impact assessment

For consistency among specialist studies, the impact assessment was conducted through application of a methodology supplied by Savannah Environmental.

3.5. Grading

S.7(1) of the NHRA provides for the grading of heritage resources into those of National (Grade I), Provincial (Grade II) and Local (Grade III) significance. Grading is intended to allow for the identification of the appropriate level of management for any given heritage resource. Grade I and II resources are intended to be managed by the national and provincial heritage resources authorities respectively, while Grade III resources would be managed by the relevant local planning authority. These bodies are responsible for grading, but anyone may make recommendations for grading.

It is intended under S.7(2) that the various provincial authorities formulate a system for the further detailed grading of heritage resources of local significance but this is generally yet to happen. SAHRA (2007) has formulated its own system[1] for use in provinces where it has commenting authority. In this system sites of high local significance are given Grade IIIA (with the implication that the site should be preserved in its entirety) and Grade IIIB (with the implication that part of the site could be mitigated and part preserved as appropriate) while sites of lesser significance are referred to as having 'General Protection' (GP) and rated as GP A (high/medium significance, requires mitigation), GP B (medium significance, requires recording) or GP C (low significance, requires no further action).

3.6. Consultation

The NHRA and IFC standards[2] require consultation as part of a heritage impact assessment (HIA) but, since the present heritage scoping study falls within the context of an EIA which includes a public participation process (PPP), no dedicated consultation was undertaken as part of the present study. Interested and affected parties would have the opportunity to provide comment on the heritage aspects of the project during the PPP.

3.7. Assumptions and limitations

No fieldwork was carried out for the reasons outlined above. It is highly unlikely that informative field data could have been collected and, therefore, the lack of fieldwork is not considered a limitation of this assessment.

4. PHYSICAL ENVIRONMENTAL CONTEXT

4.1. Site context

The study area lies to the north of Kathu which is a modern town focused on the mining of iron ore. A large open mine pit and associated infrastructure occur to the southwest of the town. In recent years, several solar energy facilities have been constructed in the area to the north of the town, including one located 6.5 km south of the proposed generator site and immediately south of the southern end of the proposed access road. The land use on the surrounding farms is largely livestock grazing. The well-known Kathu Forest lies in the area between Kathu and the study area but is focused closer to Kathu.

[1] The system is intended for use on archaeological and palaeontological sites only.

[2] IFC Performance Standard 8 lists consultation with Indigenous communities where such people use, or have within living memory used, cultural heritage for long-standing cultural purposes. Such people were not identified in or close to the study area. Consultation with regulatory agencies is also required and will happen as part of the approval process.

4.2. Site description

The study area is coated in red Kalahari sand which supports grass, bushes and thorn trees. Although no site visit was conducted specifically for this assessment, the generator site was covered during the survey for the Hyperion PV cluster. Figure 4 shows a view taken from within the generator site. It illustrates the general landscape context into which the facility and access road would be placed.

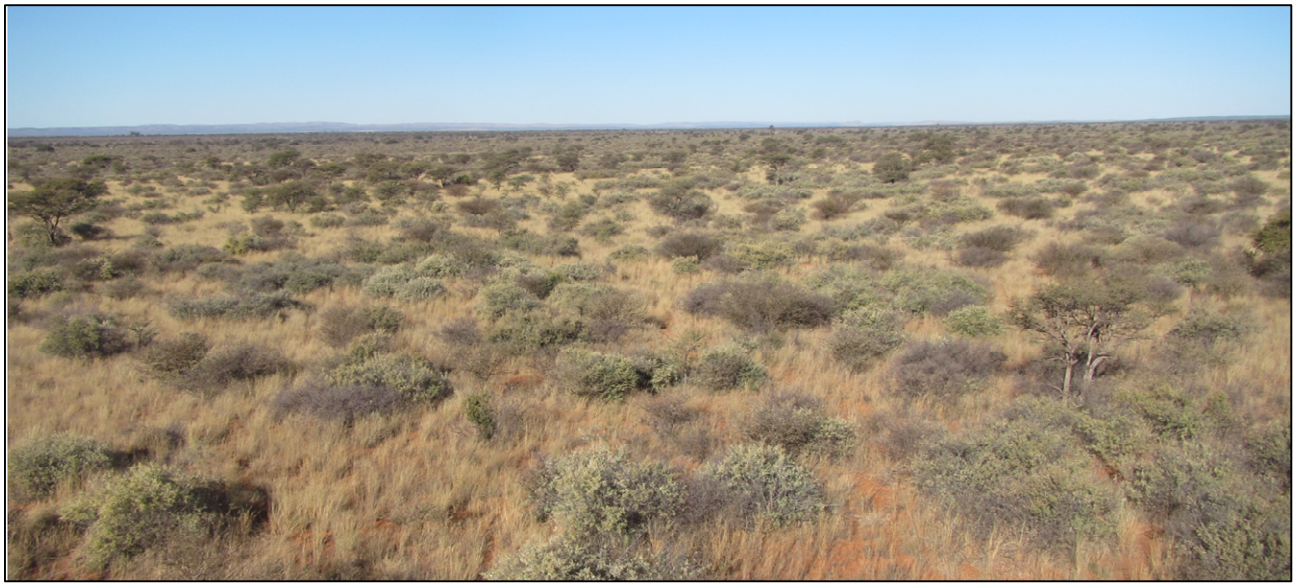


Figure 4: *View towards the south from a survey beacon within the generator site (taken on 21 July 2018). The access road would pass into view from the right hand side of this photograph then turn left (southwards) in the middle distance.*

5. FINDINGS OF THE HERITAGE STUDY

This section describes the heritage resources recorded in the study area during the course of the project.

5.1. Palaeontology

Although not studied by a specialist specifically for this project, the palaeontological sensitivity can be gleaned from other work done in the immediately surrounding area. The SAHRIS Palaeosensitivity Map indicates that the generator site and the vast majority of the access road are of moderate palaeontological sensitivity with only the very southern end of the access road being of high sensitivity (Figure 5). The ratings provided on SAHRIS are largely theoretical ratings based on the geological horizons present in the area.

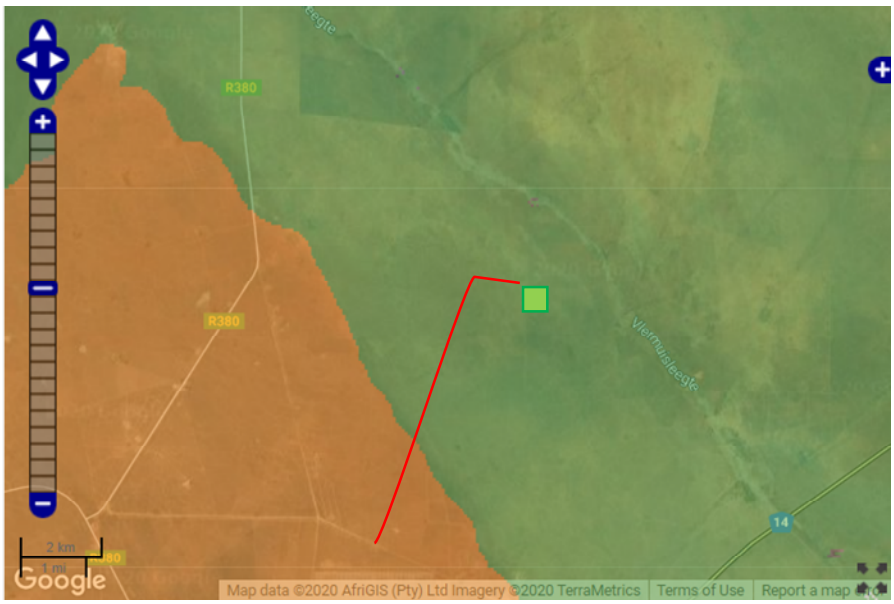


Figure 5: *Extract from the SAHRIS Palaeosensitivity map showing the study area to be of moderate (green shading) to high (orange shading) sensitivity.*

Almond (2018) studied the potential palaeontological impacts for the authorised Hyperion PV Cluster where the generator site lies. He noted the Kathu region to be largely underlain by Late Cenozoic continental sediments of the Kalahari Group (Partridge *et al.* 2006). From other work in the area he considers these sediments to be of generally low sensitivity. Some areas have a thick layer of calcrete of the Mokolanen Formation (up to 5 million years old), while younger calcrete of the Kalahari Group occurs at the surface in places. Gravels of the Obobogorop Formation and red Kalahari aeolian sands of the Gordonia Formation overlie these older rocks. Figure 6 shows an extract from the relevant geological map. It is evident that the study area overlies Kalahari Group aeolian sand and, in the far south, calcrete.

Almond (2018) considers the Kalahari Group aeolian sediments to be of low sensitivity except that there is a small possibility of encountering quaternary-aged mammalian remains (bones, teeth and horncores), trace fossils and plant fossils in buried pans or solution cavities (dolines) as occurs at the famous Kathu Pan located 7 km south of the Kalbas Substation. Rossouw (n.d.) sees the same concern with the sands and notes that the calcretes may contain fossils. Given how little is known about the area's fossil potential, he considers excavations into the calcrete as a benefit to palaeontology if appropriate mitigation measures are carried out[3].

[3] No measures are proposed, however, and it is assumed here that inspection of excavations would be appropriate.

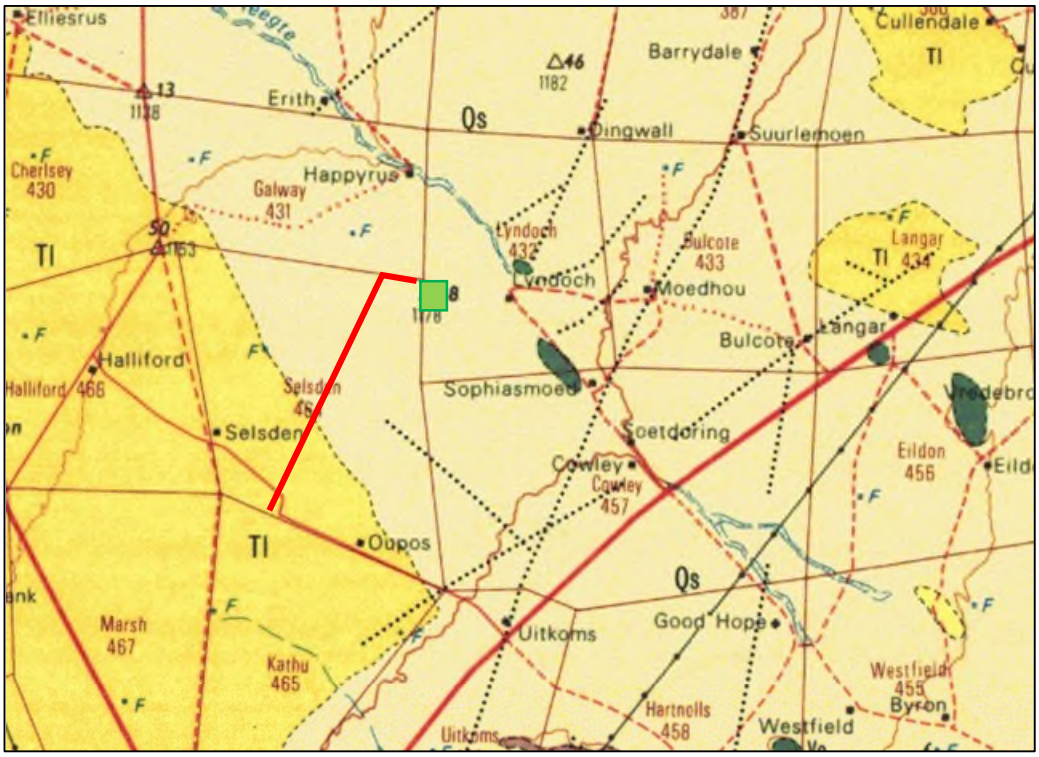


Figure 6: *Extract from the 1:250 000 geological map 2722 showing the location of the proposed generator (green polygon) and access road (red line). Tl (yellow) indicates calcretes (surface limestone) of the Kalahari Group, while Qs (pale orange) denotes aeolian sands of the Gordonia Formation, Kalahari Group (Source Almond 2018: figure 2).*

5.2. Archaeology

5.2.1. Desktop study

The vicinity of Kathu has long been known to have highly significant archaeological resources and much literature related to the archaeology of the area exists. The region is perhaps best-known for the extensive deposits of Early Stone Age (ESA) material that have been described. Most research has been centred on the site of Kathu Pan (which also hosts younger archaeology), but Kathu Townlands (at the north-eastern edge of Kathu) has also seen considerable attention. Due to the amount of literature associated with the Kathu area, only certain relevant papers and reports were consulted in compiling the summary below. Several Kathu sites, together known as the Kathu Complex, have been formally graded as a Grade 1 heritage resource indicating that the collection of sites has been accorded national significance. The archaeological resources within and beyond the proposed declaration area are under continued threat from development in the vicinity (see for example the Kalahari Solar and Kathu Extension 6-10 developments which, to the present author's knowledge, commenced without archaeological mitigation).

Several archaeological localities are reviewed, whereafter some general comments are provided. Figure 7 locates the sites relative to Kathu and the project under study. Archaeology tends to be physically associated with gravel deposits but these are mostly obscured by surface sands. The lack of known archaeological sites near the current project site does not indicate a lack of archaeological deposits north of Kathu. This paucity is more of a reflection of this area being largely unexamined by archaeologists.

5.2.2. Kathu Pan

Kathu Pan (KP1) is the most studied and best-known site in the area and has the longest history of research. It was discovered in 1974 (Beaumont 1990) and reported in popular literature the following year (Anonymous 1975; see also Hocking 1983). The site is a natural sinkhole located

within a large pan that, under natural conditions, would have filled with water in summer (owing to the rising water table during the summer rainy season) and become a valuable water supply for prehistoric populations (Van Zinderen Bakker 1995). It has produced a sequence of ESA deposits including some Fauresmith material and evidence for the onset of the Middle Stone Age (MSA) some 500 000 years ago (Wilkins 2013). Wilkins *et al.* (2012) have studied fracture patterns on points from the site and determined that they were used in a hafted manner as spear tips. The site has also yielded very early evidence for blade production (Wilkins & Chazan 2012). A special feature of KP1 is the fact that faunal remains have been preserved. Such preservation is unusual for Kathu. These remains include species such as hippopotamus that point to a far wetter environment than exists in the region today (Klein 1988).

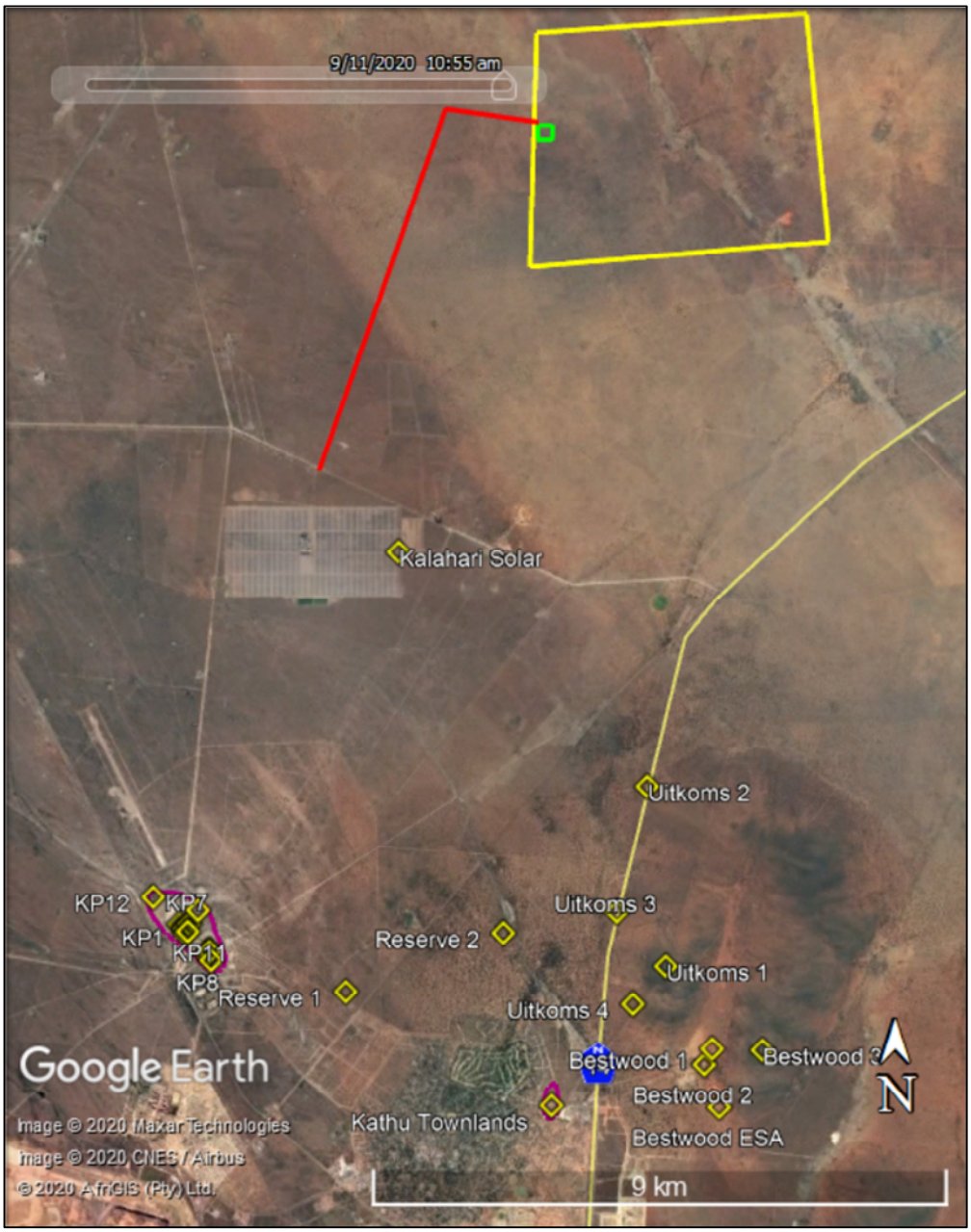


Figure 7: *Aerial view of the Kathu area showing the locations of previously recorded archaeological occurrences (labelled yellow symbols). Key as per Figures 1 and 2.*

The sequence described by Klein (1988:11), from top to bottom, is as follows:

» Approximately 1.5 m of organic silty sands containing Holocene-aged Iron Age and Later Stone Age (LSA) material;

» Between 0.9 m and 1.7 m of less organic silty sand containing rare LSA artefacts;
» Approximately 0.8 m of poorly sorted gravelly sand with many Pleistocene-aged MSA artefacts and associated faunal remains; and
» About 3.5 m to 4 m of medium to fine-grained sand containing fossil spring deposits that in turn contain abundant, Pleistocene-aged ESA artefacts and associated fauna.

This sequence makes the site one of only a handful in the country to preserve deposits pertaining to all three Stone Ages. Dreyer (2013) notes a circle of standing stones whose function he could not determine. However, his description and illustrations are clearly of a *trapvloer* (threshing floor) which serves to add a historical layer to the site. Porat *et al.* (2010: table 4) obtained optically stimulated luminescence and electron spin resonance/U-series dates on the deposits. The Fauresmith ESA was dated to about half a million years ago, while an age of 330 000 to 250 000 years was obtained for the MSA. Ages of 17 500 to 15 500 years and 10 500 to 9500 years were obtained for the LSA levels. Artefactual material supports quite recent occupation near the surface (Porat *et al.* 2010). On the basis of the presence of the teeth of the extinct elephant *Elephas recki*, Klein (2000) reports that the lowest archaeological layer, containing Acheulean artefacts, is likely to be between 1 million and 500 000 years old. Importantly, the ESA stone artefacts are reported to be fresh and unabraded (Porat *et al.* 2010).

5.2.3. Kathu Townlands

The Kathu Townlands site lies across the surface of a low rise within the bounds of the town of Kathu. It was first reported in 1980 and had initial excavations carried out by Beaumont in 1982 and 1990 (Beaumont 1990). Due to proposed development on the site, mitigation work was carried out to enable a better understanding of the deposits (Walker *et al.* 2013). The archaeological material was found to occur within a dense accumulation of banded iron formation (BIF) rubble with a sandy matrix directly over bedrock. The artefacts from both the Beaumont and Walker excavations lack evidence of water transport, but damage to the artefacts does indicate mechanical damage through redeposition subsequent to the ESA occupation (Walker *et al.* 2014).

5.2.4. Bestwood

Archaeological sites were first reported at Bestwood by Dreyer (2008). Further research has been undertaken there by Chazan *et al.* (2012). They described two sites, designated Bestwood 1 and Bestwood 2. These are both windows into a larger landscape of artefacts that have been exposed by sand quarrying activity within a sandy valley. A third site, Bestwood 3, is located on the hilltop along the east side of this valley (not to be confused with Uitkoms 1 which is located on the hilltop to the west of the valley). Their initial investigation at Bestwood 1 revealed a lithic industry characterized by well-made hand-axes, well-retouched scrapers, occasional blades and a great diversity of core types (Chazan *et al.* 2012:331). They conclude that the site represents an ESA living surface. Again, the artefacts are fresh which militates against extensive transport and long-term exposure.

Walker *et al.* (2013) note that excavations at Bestwood 1 demonstrated that this material is present *in situ* in a single horizon beneath the covering sands. This horizon is artefactually similar to the surface exposures at Bestwood 3 and Uitkoms 1. Given these observations (as well as other currently unpublished work done at Bestwood), it seems that the archaeological deposit extends beyond the limits of the quarries, across the landscape and connects the two hilltop exposures as a continuous horizon. They also note the presence of ESA material in another quarry to the south (indicated in Figure 18 above as Bestwood ESA).

5.2.5. Uitkoms

The farm Uitkoms to the northeast of Kathu has also yielded various archaeological occurrences. Beaumont has named these occurrences as Uitkoms 1, 2, 3 and 4. Uitkoms 1 appears to be similar to Kathu Townlands 1 in terms of artefact density and debitage frequency, but occurs on a hilltop. Indeed, in his first published description of Uitkoms 1, he considered these sites to be

connected as one continuous landscape of artefacts (Beaumont 2004). Uitkoms 4 is largely buried beneath surface sands in a manner similar to Bestwood 1 and 2, "where bifaces are very similar to those from the quarries, but with a formal tool incidence about a thousand times higher, and like that at a typical occupation site" (Beaumont 2008b:3). The Uitkoms 2 & 3 localities appear to be first described by Beaumont (2007). He describes these sites as follows: "In mid-2006, two road cuttings along the N14 further towards Kuruman were also seen to contain ESA artefacts in a thin rubble of jaspilite and below red sand. One of these, Uitkoms 3, suggests that the Uitkoms 1 site also extends over the north-western side of the Kathu hill (Fig. 1). The other, Uitkoms 2, could represent the extreme western limit of a site that may range over two upslope hills on Hartnolls" (Beaumont 2007: 1-2).

5.2.6. General comments

The above sites show that archaeological materials are fairly widespread around Kathu and the area is best regarded as an archaeological landscape rather than a collection of individual sites. Indeed, in his discussion of precolonial cultural landscapes, Orton (2016:124) cited the Kathu area as an example of a Type 4 landscape which was described as a large area "containing multitudes of artefacts or occurrences not separable into individual sites".

A large number of impact assessments have been carried out in the Kathu area. Although some have discovered significant archaeological heritage sites, others reported little or nothing. It is currently unclear if these differences are due to varying methodologies employed by different observers (for example the methods employed in distinguishing between a 'site' and 'background scatter'), variations in surface geomorphology, or actual differences in the nature of the archaeological deposits as manifested on the surface. Several observations are directly relevant to the present assessment. In the Hyperion PV Cluster area Orton (2019a, b, c, d) noted stone artefacts to be present beneath the cover sands and visible along the margins of the Vlermuisleegte. A small hill some 1.0 km southeast of the generator site was found to be an outcropping area of ironstone gravel with many associated artefacts. Within the generator site a very small gravel patch hosts a trigonometric beacon; it is likely that at least some of the gravel was brought to the surface during construction of the tower on which the beacon stands. These observations prove that archaeological materials do occur beneath the aeolian sand. Near the southern end of the proposed access road Orton (2015) noted MSA artefacts scattered around two small pans. Just south again, Orton and Walker (2015) examined a section of the same calcrete area that is intersected by the southern end of the proposed access road and found calcrete exposed at the surface with artefacts virtually absent. Moving eastwards, however, the calcrete gave way to BIF gravel and the number of artefacts increased dramatically.

Further afield, to the east of Kathu, Morris (2014) examined already disturbed areas finding nothing except some artefacts and banded ironstone fragments that were in obvious secondary context related to the on-going construction activities in the area. In a survey further just north of Kathu, Dreyer (2010) found nothing. Gaigher (2013) examined an area about 8 km west of the proposed access road and reported very little archaeological material. By contrast, surveys on Hartnolls to the northeast of Kathu have revealed extensive archaeological deposits said to be similar to those of Kathu Townlands and those found at Bestwood (Beaumont 2007; Dreyer 2006). To the northwest of Kathu, Pelser (2018) located light scatters of Stone Age materials in a number of places.

De Jong (2008) reports that rock engravings are also known from the Kathu area. He does not provide locations for these engravings, nor citations for their publication. The present literature review has revealed no primary archaeological sources to substantiate this statement.

Humphreys (1976) has considered the evidence for the southern limit of Late Iron Age occupation in the area and concluded that there was likely some occupation of the Kathu area from at least about AD 1700 onwards. However, reliable documentary evidence from the 19th century points to Iron Age people not being present much further southwest than Kuruman (Figure 8). Nevertheless, that they did live in the present study area at some point is testified to by the reporting of an Iron Age site close to Kathu (Reserve 1). This site is reported by

Beaumont (2006: 3) who describes it as: "an Iron Age (Tswana?) ceramic surface scatter" and states that it was excavated in 1989. Unfortunately, he provides no description or further reference. Enquiries at McGregor Museum have not been able to produce any further documentation on this site. Dreyer (2012) surveyed the same property again and, although he marks the site on a map, he provides no commentary at all – as such no further description of this site can be provided here.

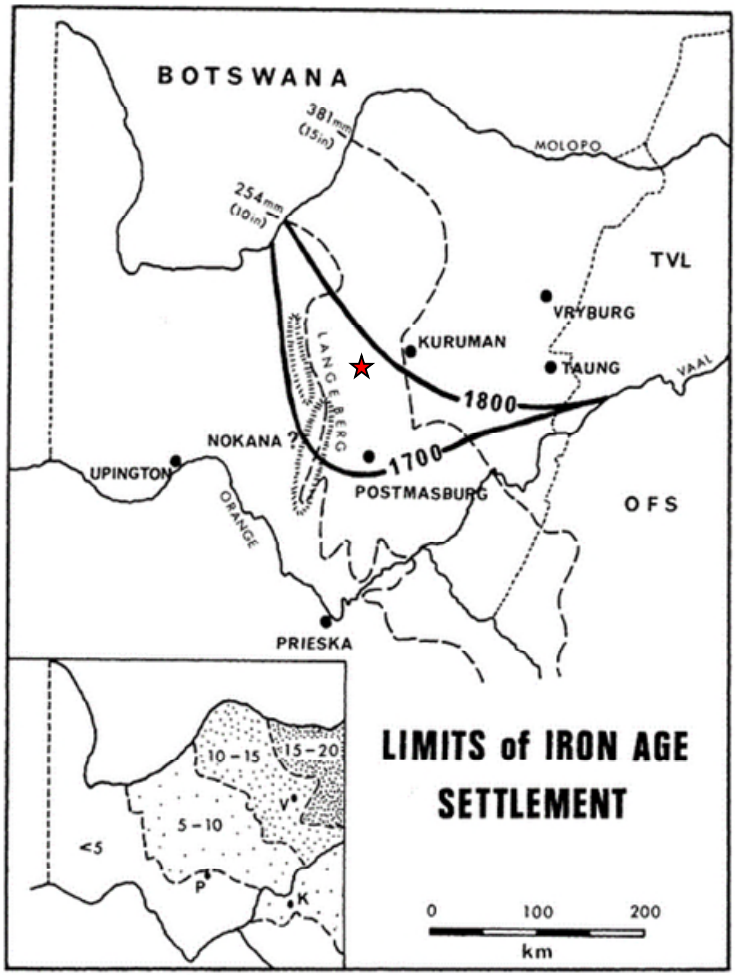


Figure 8: *Map showing the approximate south-western limits of Iron Age settlement in the Northern Cape. Source: Humphreys (1976: fig. 1). The red star indicates the position of Kathu.*

5.3. Site visit

No site visit was conducted. It is envisaged that with a ground survey very little or no archaeology would have been seen on the sandy surface as was the case throughout the majority of the Hyperion PV Cluster area (Orton 2019a, b, c, d). The survey by Orton and Walker (2015) to the south of the proposed access road has shown that stone artefacts are virtually non-existent on the calcrete-covered areas.

5.4. Graves

It is unlikely that historical graves will occur in remote locations (i.e. away from farmsteads) such as the present study area. Pelser (2018) reported a set of 12-15 graves from close to Kathu Pan. One of the three dated graves is now older than 60 years making it a heritage resource. Five farm workers' graves were found 1.6 km east of the generator site close to the Farm 432/rem farmhouse. The only dated one was from 1973. Nearby, a single grave is dated 1928 but, according to the farm owner, the grave is somewhat of a mystery. Some years ago, some family of the deceased came to remove the remains to another location but, despite excavating

the grave and some of the surrounding area no remains were located. The grave was then rebuilt in the same location and left as is (Orton 2019a, b, c, d). There is a chance that Stone Age or even Iron Age graves could be found in the area. These would be isolated features and may or may not be marked at the surface. Orton (2019a, b, c, d) located a collection of stones in an otherwise sandy area on the northeast bank of the Vlermuisleegte. With no other stones naturally occurring in the immediate vicinity, there is a chance that this feature represents a grave.

5.5. Historical aspects and the Built environment

5.5.1. Desktop study

Although a town named Kathu (or variations thereof) can be found on maps going back to the 1890s, the modern town of Kathu only dates back to the 1970s when iron ore mining commenced. Aerial photographs from 1957 show no mining and no development of any sort in the current town area.

The Langeberg Rebellion was an important historical event to have occurred in the area. The following description is based on Saker and Aldridge (1971). The former Crown Colony of British Bechuanaland was annexed by the Cape Colony on 16th November 1895. Just over a year later, in December 1896 and January 1897, revolts – collectively known as the Langeberg Rebellion – broke out in the area. Over the following months they took root in the Langeberg Mountains, west of modern-day Kathu, and were only suppressed by the Government in August 1897. The discontent among the Tlhaping and Tlharo people had arisen some years earlier when, in 1884, about 75% of their land was taken away from them. Two years later the Land Commission met to settle land claims after the demise of the Boer Republics of Stellaland and Goshen, but little was done to help the Tlhaping and Tlharo. Although ten Native Reserves were proclaimed, 1400 square miles of crown land was made available for white settlement – this created further friction and unhappiness. In addition to the loss of their land, the Tswana chiefs were losing their authority. Eventually, on 27 November 1896, seventeen head of cattle strayed out of the Taungs Reserve and were shot. This appears to have been the critical moment when the rebellion began.

5.5.2. Site visit

No site visit was conducted, but it is clear from aerial photography that no historical or built heritage features occur along the proposed alignment. A trigonometrical survey beacon lies within the generator site. It is built on a base of unknown age but the beacon is marked on the 1972 topographic map of the area. Regardless of its age, the beacon and its base have no heritage value.

5.6. Cultural landscapes and scenic routes

Two aspects of the cultural landscape require discussion. The first is the precolonial cultural landscape of archaeological materials that occurs widely in the area, while the second is the 20th century surface landscape related to farming. The archaeological landscape is comprised of all the sites discussed in Section 5.2 above and is not repeated here.

The more recent agricultural landscape on site is very poorly developed in terms of human interventions. It is focused on livestock farming but this leaves a negligible cultural imprint on the landscape (essentially just fences, sand tracks and the occasional wind pump). Electrical developments and mining dominate the broader landscape around Kathu, including a large photovoltaic (PV) solar development just south of the present study area. Two other PV plants have been constructed some 9-11 km west of the proposed access road. Overall, the cultural landscape is strongly dominated by these modern landscape uses which are of no heritage concern. Because of this, none of the roads in the area can be considered significant scenic routes.

5.7. Statement of significance and provisional grading

Section 38(3)(b) of the NHRA requires an assessment of the significance of all heritage resources. In terms of Section 2(vi), ''cultural significance'' means aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance. The reasons that a place may have cultural significance are outlined in Section 3(3) of the NHRA (see Section 2 above).

Palaeontological resources are expected to be very rare. In general, fossils of less cultural significance for their scientific value are usually more common. Such finds would be of medium local significance and might be worthy of Grades GPB to GPA. However, in the highly unlikely event that an old doline preserving fossils was intersected during excavation for either the road or generator aspects of the project then such a find could have provincial to national significance and be considered Grade II or Grade I.

Aside from the small patch of artefacts known to exist in the generator footprint, no archaeological resources are expected to occur on the surface. There is a good chance that such materials can be located below the surface, however, especially if ironstone gravels are encountered. This seems certain to happen within the generator site but the density of artefacts present remains unknown. Although the Kathu Complex is of very high significance for its scientific value and is a Grade I archaeological cultural landscape, the studies by Orton (2019a, b, c, d) and Orton and Walker (2015) suggest that artefact densities are likely to be far lower in the present study area than within the Kathu Complex area. Any materials likely to be encountered during excavations for the project would more likely be of medium to high local significance and can be considered as Grade GPA to IIIB resources.

Graves are deemed to have high cultural significance for their social value and if any are found they would be rated as Grade IIIA.

The archaeological cultural landscape in the study area can be considered in the same light as the potential archaeological resources just mentioned, while the general historical/recent cultural landscape is of low local significance and of no further concern.

5.8. Summary of heritage indicators

Any fossils uncovered during the course of the project must be preserved *in situ* if possible and examined by a palaeontologist because otherwise important contextual information that assists with interpreting the find could be lost. Fossils are likely to be rare and, if found, could have considerable cultural significance.

- » Indicator: Fossils should not be disturbed, destroyed or removed from their context without study by a palaeontologist.

Any archaeological materials uncovered during the course of development must be preserved *in situ* if possible and examined by an archaeologist because otherwise important contextual information that assists with interpreting the find could be lost. There is the potential, albeit small, for artefacts or even deposits of high significance to be found.

- » Indicator: Archaeological materials should not be disturbed, destroyed or removed from their context without study by an archaeologist.

Graves are culturally significant heritage sites and should not be disturbed by the proposed development.

- » Indicator: Graves should not be disturbed, destroyed or moved without study by an archaeologist.

None of these indicators can be fully met through design interventions and mitigation measures will be required in order to minimise impacts.

6. ASSESSMENT OF IMPACTS

The cultural landscape has been shown to be of little to no significance and therefore does not require further assessment. The heritage issues that have been identified as potential concerns for the proposed generator and access road development are palaeontology (Table 1), archaeology (Table 2) and graves (Table 3). As such, only these three aspects of heritage are considered in this section.

Table 1: Assessment of palaeontological impacts.

Impacts
Fossils may be damaged or destroyed during any excavation work for foundations or road building.

Desktop Sensitivity Analysis of the Site:
The far southern end of the road alignment is rated as being of medium sensitivity on the SAHRIS Palaeosensitivity map, while the remainder of the study area is of low sensitivity. In practice, it is likely that all areas will be of low sensitivity since, aside from Kathu Pan, there are no known fossil localities in the area. Buried pan deposits or dolines, which are highly unlikely to occur, are the main identified potential sensitivity. Nevertheless, a small chance exists that fossils could be revealed in the Kalahari Group sediments.

Issue	Nature of Impact	Extent of Impact	No-Go Areas
Destruction and/or disturbance of fossils.	The excavation and construction work may result in the direct loss of fossils that could otherwise have provided scientific information related to past environments.	Most likely to be local, but an important discovery could extend to provincial or national significance.	None identified.

Gaps in knowledge & recommendations for further study
» The subsurface palaeontological record can never be fully understood and the EIA Phase report will need to make recommendations for monitoring and/or mitigation to be carried out in advance of or during construction work.

Table 2: Assessment of archaeological impacts.

Impacts
Archaeological stone artefacts may be damaged or destroyed during any excavation work for foundations or road building.

Desktop Sensitivity Analysis of the Site:
Most areas are likely to be of low to medium sensitivity, since dense artefacts as seen closer to Kathu have not been recorded in this area. However, the calcrete area in the far southern part of the road alignment is likely to be of lower sensitivity. It is unknown how deep the sand cover is, but the small outcropping area of artefact-bearing gravel in the generator site suggests that it may be quite shallow in places. In areas where the sand cover is thick, the sensitivity is expected to be lower, especially for road construction which would not require deep excavations. Due to the generally low-medium cultural significance of the archaeological

materials, the intensity of impacts is not expected to be very high and the resulting significance would likely be low with mitigation.

Issue	Nature of Impact	Extent of Impact	No-Go Areas
Destruction and/or disturbance of stone artefacts.	The excavation and construction work may result in the direct loss of stone artefacts that could otherwise have provided scientific information related to past occupants of the area. It should be remembered that the Kathu Complex to the south is a Grade I heritage site which means it has been accorded national significance.	Most likely to be local because of the distance from the declared Kathu Complex area.	None identified.

Gaps in knowledge & recommendations for further study

- The subsurface archaeological record can never be fully understood.
- The EIA Phase report will need to make recommendations for mitigation to be carried out in advance of construction work. This will likely entail monitoring of excavations and excavating column samples from a few strategic locations. It should be noted that the potential does exist for a larger excavation to be required if highly significant archaeological resources are discovered.

Table 3: Assessment of impacts to graves.

Impacts

Graves may be damaged or destroyed during any excavation work for foundations or road building.

Desktop Sensitivity Analysis of the Site:

All areas are expected to be of low sensitivity because of the rarity of burials in the landscape. The calcrete area in the south is highly unlikely to host burials.

Issue	Nature of Impact	Extent of Impact	No-Go Areas
Destruction and/or disturbance of graves.	The excavation and construction work may result in the direct loss of graves.	Local.	None identified.

Gaps in knowledge & recommendations for further study

- The distribution of graves can never be fully understood and often graves are only revealed during construction-related excavation.
- The EIA Phase report will need to make recommendations for mitigation or avoidance of graves visible on the surface and indicate how to proceed in the event that a grave is discovered during excavation.

6.1. The No-Go alternative

With implementation of the No-Go alternative the status quo would remain and no impacts to any heritage resources would be expected aside from those associated with natural erosion and weathering of surface materials. Such impacts are very slow and are of negligible significance.

6.2. Existing impacts to heritage resources

There are currently no obvious threats to heritage resources on the site aside from the natural degradation, weathering and erosion that will affect fossils and archaeological materials. Trampling from grazing animals and/or farm/other vehicles is not an issue because of the sand covering that exists.

6.3. Levels of acceptable change

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

7. EVALUATION OF IMPACTS RELATIVE TO SUSTAINABLE SOCIAL AND ECONOMIC BENEFITS

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

The project is needed to support a cluster renewable energy (solar PV) developments. While the powerline itself would not have much socio-economic benefit, the renewable energy facilities will assist with stabilising and enhancing electricity supply in South Africa. This is needed to drive the economy and employment, and to allow development to continue. This would result in benefits to all South Africans. While the Kathu Complex is a very significant heritage site, it is extensive, and much is known about it. For this reason, the provision of electricity to South Africa outweighs the potential extra impacts to heritage.

8. CONSULTATION

There are no directly affected communities in the area. The report is part of an environmental impact assessment process and will be subjected to a full PPP. Any heritage-related issues raised during that process will be responded to as required by the heritage specialist.

9. CONCLUSIONS

The main issue for this project will be the potential to intersect archaeological resources during excavations for the generator and, to a lesser degree, the road. However, with appropriate mitigation, the impacts can be easily managed and a scientific benefit could even be derived with successful description and rescue of heritage materials. It is especially important to the archaeology of the region, and Grade I Kathu Complex, to understand both the vertical and horizontal distribution of buried archaeological resources and development projects allow opportunities to gain such insights.

10. RECOMMENDATIONS & EIA PLAN OF STUDY

It is recommended that the proposed development proceed to the EIA Phase because no fatal flaws have been identified and all impacts can be readily managed and/or mitigated. Indeed, some benefit is likely to accrue with application of the correct archaeological mitigation measures.

The EIA Phase work can also be conducted from the desktop, since reasonably good information is available and a surface examination of the site is highly unlikely to provide any new insights.

11. REFERENCES

Almond, J. 2018. Kathu Hyperion Solar Project near Kathu, Northern Cape: palaeontological heritage desktop input. Unpublished report prepared for ASHA Consulting (Pty) Ltd. Cape Town: Natura Viva cc.

Anonymous. (1975). 1-million-year find at Sishen. Diamond Fields Advertiser, 13 Aug 1975

Beaumont, P.B. (1990). Kathu Townlands 1. In: Beaumont, P.B. & Morris, D. (eds) Guide to archaeological sites in the Northern Cape. Kimberley: McGregor Museum. 96–97.

Beaumont, P.B. (2004). Kathu Pan and Kathu Townlands / Uitkoms. In: Morris, D. & Beaumont, P.B. (eds) Archaeology in the Northern Cape: Some Key Sites. Kimberley: McGregor Museum. 50-53.

Beaumont, P. (2006). Phase 1 heritage impact assessment report on erf 1439, remainder of erf 2974, remainder of portion 1 of farm Uitkoms 463, and farms Kathu 465 and Sims 462 at and near Kathu in the Northern Cape Province. Unpublished report prepared for MEG Environmental Impact Studies. Kimberley: McGregor Museum.

Beaumont, P. (2007). Supplementary archaeological impact assessment report on sites near or on the farm Hartnolls 458, Kgalagadi District Municipality, Northern Cape Province. Unpublished report prepared for MEG Environmental Impact Studies. Kimberley: McGregor Museum.

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. Unpublished report prepared for MEG Environmental Impact Studies. Kimberley: McGregor Museum.

Beaumont, P.B. (2008b). Phase 1 heritage impact assessment report on portion 463/8 of the farm Uitkoms 463, near Kathu, Kgalagadi District Municipality, Northern Cape Province. Unpublished report prepared for MEG Environmental Impact Studies. Kimberley: McGregor Museum.

Chazan, M., Wilkins, J., Morris, D. & Berna, F. (2012). Bestwood 1: a newly discovered Earlier Stone Age living surface near Kathu, Northern Cape Province, South Africa. Antiquity 86: 331.

De Jong, R.C. (2008). Heritage impact assessment report: proposed residential development and associated infrastructure on a 200 ha portion of the farm Bestwood 429 RD at Kathu, Northern Cape Province. Unpublished report prepared for Rock Environmetal Consulting (Pty) Ltd. Queenswood, Pretoria: Cultmatrix.

Dreyer, C. (2006). First phase archaeological and cultural heritage impact assessment of the proposed residential developments at the farm Hartnolls 458, Kathu, Northern Cape. Unpublished report prepared for MDA Environmental Consultants. Brandhof: Cobus Dreyer.

Dreyer, C. (2008). First phase archaeological and cultural heritage assessment of the proposed residential developments at a portion of the remainder of the Farm Bestwood 459RD, Kathu, Northern Cape. Unpublished report prepared for Rock Environmental Consulting (Pty) Ltd. Brandhof: Cobus Dreyer.

Dreyer, C. (2010). First phase archaeological & cultural heritage assessment of the proposed iron ore mining developments on Portion 2 of the farm Demaneng 546, Kuruman, Northern Cape. Unpublished report. Brandhof: Cobus Dreyer.

Dreyer, C. (2013). First phase archaeological & heritage assessment of the Vaal-Gamagara Water Pipeline Project, Northern Cape Revisit to the Kathu Pan archaeological site. Unpublished report prepared for MDA Environmental and Development Consultants. Brandhof: Cobus Dreyer.

Gaigher, S. (2013). Heritage impact assessment report environmental impact assessment phase proposed establishment of the San Solar Energy Facility located north of Kathu on a Portion of the Farm Wincanton 472, Northern Cape Province. Unpublished report prepared for Savannah Environmental (Pty) Ltd. Louis Trichardt: G&A Heritage.

Hocking, A. 1983. *Kaias & Cocopans: the story of mining in South Africa's Northern Cape*. Johannesburg: Hollards Publishers.

Humphreys, A.J.B. (1976). Note on the Southern Limits of Iron Age Settlement in the Northern Cape. *South African Archaeological Bulletin* 31: 54-57.

International Finance Corporation. 2012. IFC Performance Standards on Environmental and Social Sustainability. Accessed online on29th September 2020 at: https://www.ifc.org/wps/wcm/connect/c02c2e86-e6cd-4b55-95a2-b3395d204279/IFC_Performance_Standards.pdf?MOD=AJPERES&CVID=kTjHBzk

Klein, R.G. (1988). The Archaeological Significance of Animal Bones from Acheulean Sites in Southern Africa. *The African Archaeological Review* 6: 3-25.

Klein, R.G. (2000). The Earlier Stone Age of southern Africa. *South African Archaeological Bulletin* 55: 107-122.

Lombard, M., Wadley, L. Deacon, J., Wurz, S., Parsons, I., Mohapi, M., Swart, J. & Mitchell, P. 2012. South African and Lesotho Stone Age sequence updated (i). *South African Archaeological Bulletin* 195: 123-144.

Morris, D. (2014). Rectification and/or regularisation of activities relating to the Bestwood Township development near Kathu, Northern Cape: Phase 1 archaeological impact assessment. Unpublished report prepared for Jeffares & Green (Pty) Ltd. Kimberley: McGregor Museum.

Orton, J. (2015). Kathu Solar Project power line: pre-construction inspection of pans. Unpublished letter to Savannah Environmental (Pty) Ltd. Muizenberg: ASHA Consulting (Pty) Ltd.

Orton, J. (2019a). Heritage Impact Assessment: proposed Hyperion Solar Development 1, Lyndoch 432/Rem, Kuruman Magisterial District, Northern Cape. Unpublished report prepared for Savannah Environmental (Pty) Ltd. Lakeside: ASHA Consulting (Pty) Ltd.

Orton, J. (2019b). Heritage Impact Assessment: proposed Hyperion Solar Development 2, Lyndoch 432/Rem, Kuruman Magisterial District, Northern Cape. Unpublished report prepared for Savannah Environmental (Pty) Ltd. Lakeside: ASHA Consulting (Pty) Ltd.

Orton, J. (2019c). Heritage Impact Assessment: proposed Hyperion Solar Development 3, Lyndoch 432/Rem, Kuruman Magisterial District, Northern Cape. Unpublished report prepared for Savannah Environmental (Pty) Ltd. Lakeside: ASHA Consulting (Pty) Ltd.

Orton, J. (2019d). Heritage Impact Assessment: proposed Hyperion Solar Development 4, Lyndoch 432/Rem, Kuruman Magisterial District, Northern Cape. Unpublished report prepared for Savannah Environmental (Pty) Ltd. Lakeside: ASHA Consulting (Pty) Ltd.

Orton, J. & Walker, S. (2015). Archaeological survey for the proposed Kalahari Solar Project, Kuruman Magisterial District, Northern Cape. Unpublished report prepared for Savannah Environmental (Pty) Ltd. Muizenberg: ASHA Consulting (Pty) Ltd.

Pelser, A.J. (2018). Report on a Phase 1 Heritage Assessment for the proposed township establishment on Portions 1 & 2 of the farm Kalahari Gholf & Jag Landgoed 775, Gamagara Local Municipality (Kathu), Northern Cape Province. Unpublished report prepared for Maxim Planning Solutions. Lynnwood Ridge: APAC.

Porat, N., Chazan, M., Grün, R., Aubert, M., Eisenmann, V., Horwitz, L.K. (2010). New radiometric ages for the Fauresmith industry from Kathu Pan, southern Africa: implications for the Earlier to Middle Stone Age transition. *Journal of Archaeological Science* 37: 269–283.

Rossouw, L. n.d. Palaeontological Desktop Assessment of the proposed new 40478 Vaal-Gamagara water pipe line between Sishen and Black Rock Mine near Hotazel, NC Province. Unpublished report prepared for MDA Environmental Consultants. Bloemfontein: Paleo Field Services.

Saker, H. & Aldridge, J. (1971). The origins of the Langeberg Rebellion. *Journal of African History* 12: 299-317.

Van Schalkwyk, J. (2010). Archaeological impact survey report for the proposed Kalahari Solar Park Development ON THE farm Kathu 465, Northern Cape Province. Unpublished report prepared for Cultmatrix. Monument Park: J. van Schalkwyk.

Van Schalkwyk, J. (2012). Heritage impact assessment for the proposed estate development on the farm Kalahari Golf and Jag Landgoed 775, Kathu, Northern Cape Province. Unpublished report prepared for MEG Omgewingsimpakstudies. Monument Park: J. van Schalkwyk.

Van Zinderen Bakker, E.M. (1995). Archaeology and Palynology, *South African Archaeological Bulletin* 50: 98-105.

Walker, S., 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. Unpublished report prepared for PZK Beleggings 3000 CC. Kimberley: McGregor Museum.

Walker, S.J.H., Lukich, V., Chazan, M. (2014). Kathu Townlands: a high density Earlier Stone Age locality in the interior of South Africa. PLoS ONE 9(7): e103436. doi:10.1371/journal.pone.0103436.

Orton, J. & Walker, S. 2015b. Heritage impact assessment for a proposed 132 kV power line, Kuruman Magisterial District, Northern Cape. Unpublished report prepared for Savannah Environmental (Pty) Ltd. Muizenberg: ASHA Consulting (Pty) Ltd.

PartridgE, T.C., Botha, G.A. & Haddon, I.G. 2006. Cenozoic deposits of the interior. In: Johnson, M.R., Anhaeusser, C.R. & Thomas, R.J. (Eds) *The geology of South Africa*: 585-604. Marshalltown: Geological Society of South Africa.

SAHRA. 2007. Minimum Standards: archaeological and palaeontological components of impact assessment reports. Document produced by the South African Heritage Resources Agency, May 2007.

APPENDIX 1 – Curriculum Vitae

Curriculum Vitae

Jayson David John Orton

ARCHAEOLOGIST AND HERITAGE CONSULTANT

Contact Details and personal information:

Address: 40 Brassie Street, Lakeside, 7945
Telephone: (021) 789 0327
Cell Phone: 083 272 3225
Email: jayson@asha-consulting.co.za

Birth date and place: 22 June 1976, Cape Town, South Africa
Citizenship: South African
ID no: 760622 522 4085
Driver's License: Code 08
Marital Status: Married to Carol Orton
Languages spoken: English and Afrikaans

Education:

SA College High School	Matric	1994
University of Cape Town	B.A. (Archaeology, Environmental & Geographical Science)	1997
University of Cape Town	B.A. (Honours) (Archaeology)*	1998
University of Cape Town	M.A. (Archaeology)	2004
University of Oxford	D.Phil. (Archaeology)	2013

*Frank Schweitzer memorial book prize for an outstanding student and the degree in the First Class.

Employment History:

Spatial Archaeology Research Unit, UCT	Research assistant	Jan 1996 – Dec 1998
Department of Archaeology, UCT	Field archaeologist	Jan 1998 – Dec 1998
UCT Archaeology Contracts Office	Field archaeologist	Jan 1999 – May 2004
UCT Archaeology Contracts Office	Heritage & archaeological consultant	Jun 2004 – May 2012
School of Archaeology, University of Oxford	Undergraduate Tutor	Oct 2008 – Dec 2008
ACO Associates cc	Associate, Heritage & archaeological consultant	Jan 2011 – Dec 2013
ASHA Consulting (Pty) Ltd	Director, Heritage & archaeological consultant	Jan 2014 –

Professional Accreditation:

Association of Southern African Professional Archaeologists (ASAPA) membership number: 233
CRM Section member with the following accreditation:

- Principal Investigator: Coastal shell middens (awarded 2007)
  Stone Age archaeology (awarded 2007)
  Grave relocation (awarded 2014)
- Field Director: Rock art (awarded 2007)
  Colonial period archaeology (awarded 2007)

Association of Professional Heritage Practitioners (APHP) membership number: 43

- Accredited Professional Heritage Practitioner

➢ *Memberships and affiliations:*

South African Archaeological Society Council member		2004 – 2016
Assoc. Southern African Professional Archaeologists (ASAPA) member	2006 –	
UCT Department of Archaeology Research Associate	2013 –	
Heritage Western Cape APM Committee member	2013 –	
UNISA Department of Archaeology and Anthropology Research Fellow	2014 –	
Fish Hoek Valley Historical Association		2014 –
Kalk Bay Historical Association	2016 –	
Association of Professional Heritage Practitioners member		2016 –

Fieldwork and project experience:

Extensive fieldwork and experience as both Field Director and Principle Investigator throughout the Western and Northern Cape, and also in the western parts of the Free State and Eastern Cape as follows:

Feasibility studies:

- Heritage feasibility studies examining all aspects of heritage from the desktop

Phase 1 surveys and impact assessments:

- Project types
  - Notification of Intent to Develop applications (for Heritage Western Cape)
  - Desktop-based Letter of Exemption (for the South African Heritage Resources Agency)
  - Heritage Impact Assessments (largely in the Environmental Impact Assessment or Basic Assessment context under NEMA and Section 38(8) of the NHRA, but also self-standing assessments under Section 38(1) of the NHRA)
  - Archaeological specialist studies
  - Phase 1 archaeological test excavations in historical and prehistoric sites
  - Archaeological research projects
- Development types
  - Mining and borrow pits
  - Roads (new and upgrades)
  - Residential, commercial and industrial development
  - Dams and pipe lines
  - Power lines and substations
  - Renewable energy facilities (wind energy, solar energy and hydro-electric facilities)

Phase 2 mitigation and research excavations:

- ESA open sites
  - Duinefontein, Gouda, Namaqualand
- MSA rock shelters
  - Fish Hoek, Yzerfontein, Cederberg, Namaqualand
- MSA open sites
  - Swartland, Bushmanland, Namaqualand
- LSA rock shelters
  - Cederberg, Namaqualand, Bushmanland
- LSA open sites (inland)
  - Swartland, Franschhoek, Namaqualand, Bushmanland
- LSA coastal shell middens
  - Melkbosstrand, Yzerfontein, Saldanha Bay, Paternoster, Dwarskersbos, Infanta, Knysna, Namaqualand
- LSA burials
  - Melkbosstrand, Saldanha Bay, Namaqualand, Knysna
- Historical sites
  - Franschhoek (farmstead and well), Waterfront (fort, dump and well), Noordhoek (cottage), variety of small excavations in central Cape Town and surrounding suburbs
- Historic burial grounds
  - Green Point (Prestwich Street), V&A Waterfront (Marina Residential), Paarl

Awards:

Western Cape Government Cultural Affairs Awards 2015/2016: Best Heritage Project.

APPENDIX 2 – Fossil Chance Finds Procedure

<table>
<tr><th colspan="3">CHANCE FOSSIL FINDS PROCEDURE: KATHU LYNDOCH SOLAR PROJECT NEAR KATHU</th></tr>
<tr><td>Province & region:</td><td colspan="2">NORTHERN CAPE, Kuruman District</td></tr>
<tr><td>Responsible Heritage Management Authority</td><td colspan="2">SAHRA, 111 Harrington Street, Cape Town. PO Box 4637, Cape Town 8000, South Africa. Phone: +27 (0)21 462 4502. Fax: +27 (0)21 462 4509. Web: www.sahra.org.za</td></tr>
<tr><td>Rock unit(s)</td><td colspan="2">Kalahari Group, consolidated older alluvial / pan deposits, buried dolines</td></tr>
<tr><td>Potential fossils</td><td colspan="2">Bones, teeth, horn cores of mammals as well as calcretised burrows (e.g. termite nests, plant root and stem casts), non-marine molluscs</td></tr>
<tr><td rowspan="5">ECO protocol</td><td colspan="2">1. Once alerted to fossil occurrence(s): alert site foreman, stop work in area immediately (N.B. safety first!), safeguard site with security tape / fence / sand bags if necessary.</td></tr>
<tr><td colspan="2">2. Record key data while fossil remains are still in situ:
• Accurate geographic location – GPS co-ordinates, describe and mark on site map / 1: 50 000 map / satellite image / aerial photo
• Context – describe position of fossils within stratigraphy (rock layering), depth below surface
• Photograph fossil(s) in situ with scale, from different angles, including images showing context (e.g. rock layering)</td></tr>
<tr><td>3. If feasible to leave fossils in situ:
• Alert Heritage Management Authority and project palaeontologist (if any) who will advise on any necessary mitigation
• Ensure fossil site remains safeguarded until clearance is given by the Heritage Management Authority for work to resume</td><td>3. If not feasible to leave fossils in situ (emergency procedure only):
• Carefully remove fossils, as far as possible still enclosed within the original sedimentary matrix (e.g. entire block of fossiliferous rock)
• Photograph fossils against a plain, level background, with scale
• Carefully wrap fossils in several layers of newspaper / tissue paper / plastic bags
• Safeguard fossils together with locality and collection data (including collector and date) in a box in a safe place for examination by a palaeontologist
• Alert Heritage Management Authority and project palaeontologist (if any) who will advise on any necessary mitigation</td></tr>
<tr><td colspan="2">4. If required by Heritage Management Authority, ensure that a suitably-qualified specialist palaeontologist is appointed as soon as possible by the developer.</td></tr>
<tr><td colspan="2">5. Implement any further mitigation measures proposed by the palaeontologist and Heritage Management Authority</td></tr>
<tr><td>Specialist palaeontologist</td><td colspan="2">Record, describe and judiciously sample fossil remains together with relevant contextual data (stratigraphy / sedimentology / taphonomy). Ensure that fossils are curated in an approved repository (e.g. museum / university / Council for Geoscience collection) together with full collection data. Submit Palaeontological Mitigation report to Heritage Management Authority. Adhere to best international practice for palaeontological fieldwork and Heritage Management Authority minimum standards.</td></tr>
</table>

APPENDIX 3 – Site Sensitivity Verification

A site sensitivity verification was undertaken in order to confirm the current land use and environmental sensitivity of the proposed project area. The details of the site sensitivity verification are noted below:

Date of Site Visit	21 July 2018 (for Hyperion PV Cluster)
Specialist Name	Dr Jayson Orton
Professional Registration Number	ASAPA: 233; APHP: 043
Specialist Affiliation / Company	ASHA Consulting (Pty) Ltd

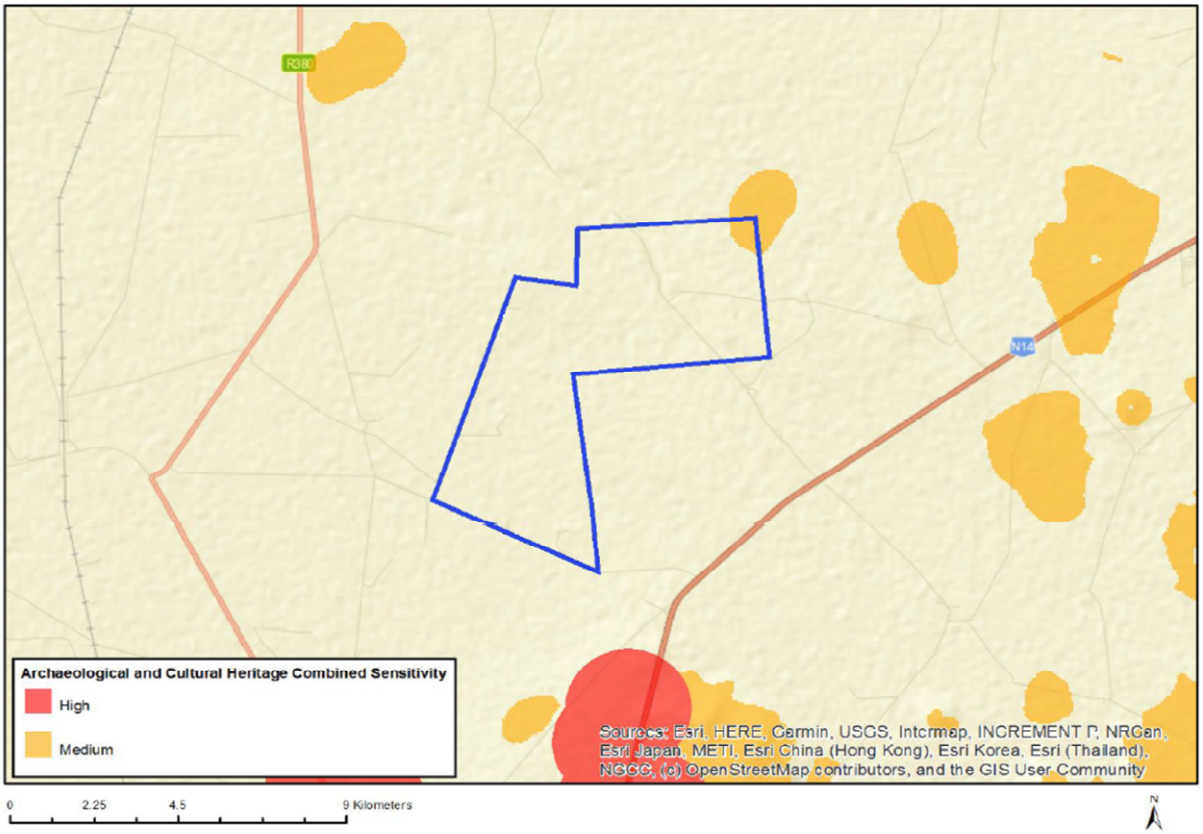
- Provide a description on how the site sensitivity verification was undertaken using the following means:
(a) desk top analysis, using satellite imagery;
(b) preliminary on -site inspection; and
(c) any other available and relevant information.

Although fieldwork for an earlier project did visit the area, no fieldwork was specifically undertaken for this project because previous observations suggested this would be pointless. Satellite aerial photography was used in combination with the author's accumulated knowledge of the local landscape to confirm that the expected landscape character prevailed throughout the study rea. Desktop research was also used to inform on the heritage context of the area. This information is presented in the report (Sections 5.2.1 and 5.5.1).

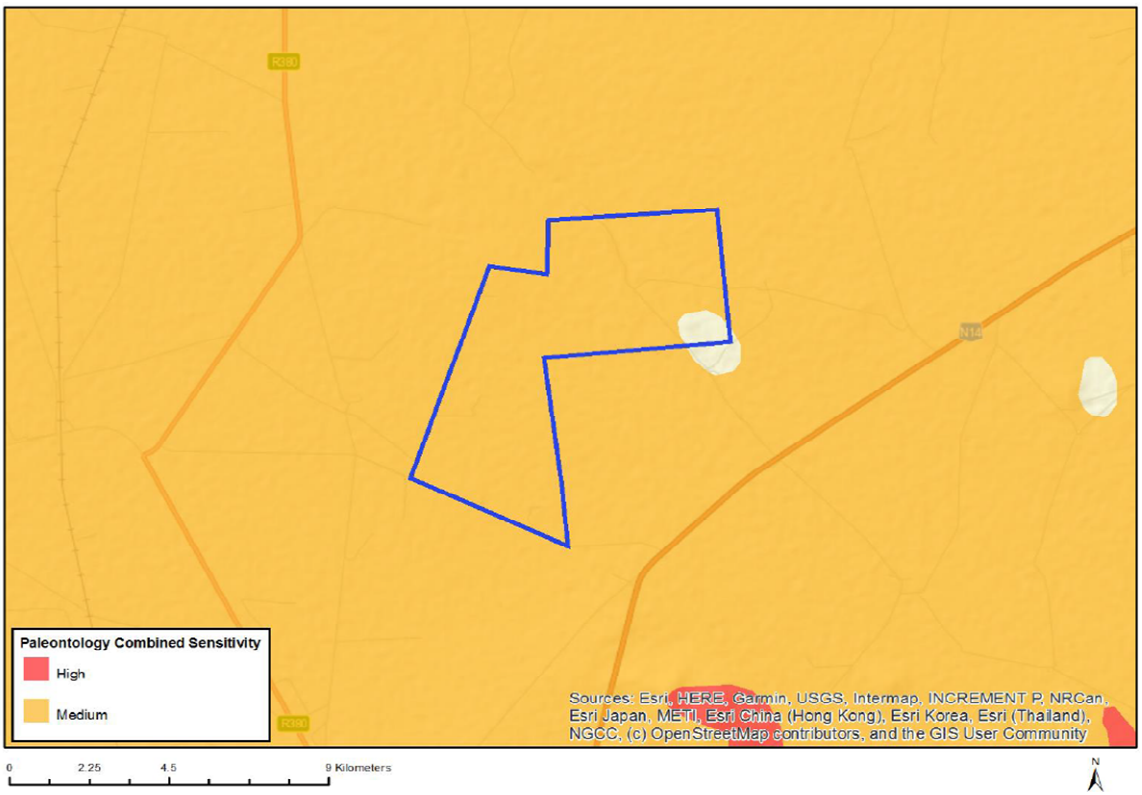
- Provide a description of the outcome of the site sensitivity verification in order to:
(a) confirm or dispute the current use of the land and the environmental sensitivity as identified by the screening tool, such as new developments or infrastructure, the change in vegetation cover or status etc.; and
(b) include a motivation and evidence (e.g. photographs) of either the verified or different use of the land and environmental sensitivity.

The map below is extracted from the screening tool report and shows the archaeological and heritage sensitivity to be low. The site visit to the generator area and the specialist's knowledge of the surroundings confirms that the majority of the site is of low sensitivity at the surface. However, outcrops of ironstone gravel with artefacts shows that the subsurface strata are more sensitive and a sensitivity rating of medium or low-medium is more appropriate. The exception is the southern end of the access road alignment which crosses a calcrete area. This area is considered as of low sensitivity which agrees with the screening tool map. Given that archaeological remains are absent from the sandy surface with just a few seen associated with the gravel patch at the survey beacon, there is no photographic record of the archaeological heritage on the site.

The screening tool maps the site as being of medium palaeontological sensitivity. This is disputed by the specialist on the basis that the Hyperion PV cluster palaoentologist found the area to be of low sensitivity. On the strength of other work to the west, there is a slightly greater chance of finding fossils in the southern part of the access road alignment where it crosses an area of calcrete.



Screening tool map: archaeological and cultural heritage theme.



Screening tool map: palaeontological heritage theme.