

INTEGRATED HERITAGE IMPACT ASSESSMENT IN TERMS OF SECTION 38(8) OF THE NATIONAL HERITAGE RESOURCES ACT, 1999 (ACT 25 OF 1999)

PROPOSED DEVELOPMENT OF THE **AMDA DELTA PV (SOLAR ENERGY FACILITY) ON REMAINING EXTENT OF THE FARM KLONDIKE NO 670, AND OVERHEAD POWER LINE GRID CONNECTION TO THE MOOKODI MTS SUB-STATION ACROSS THE REMAINDER OF ERF 506 AND REMAINDER OF THE FARM ROSENDAL 673, VRYBURG DISTRICT, NORTH WEST PROVINCE**



On behalf of: AMDA Delta (Pty) Ltd

September 2016

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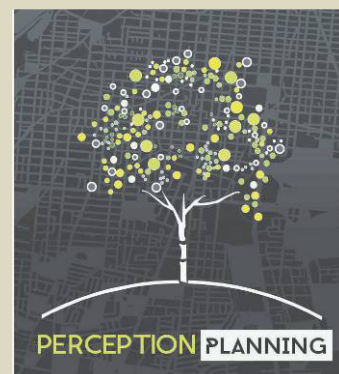
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CONTENTS:

1. INTRODUCTION
2. INDEPENDENCE OF ASSESSOR
3. METHODOLOGY
4. DESCRIPTION OF STUDY AREA
5. DEVELOPMENT PROPOSAL & ALTERNATIVES
 - 5.1 Preferred Layout Alternative
 - 5.2 Preliminary Development Zone
 - 5.3 Preferred Project Footprint
 - 5.4 Mitigated Project Footprint
 - 5.5 No-Go / Status-Quo Alternative
6. PLANNING CONTEXT
7. BRIEF HISTORICAL BACKGROUND
 - 7.1 Basic Pre-Colonial perspectives (LSA)
 - 7.2 Colonial perspectives
 - 7.3 Farms Klondike 670, Rosendal 673 and Erf 506, Vryburg District
8. HERITAGE RESOURCES AND ISSUES
 - 8.1 Landscape Character
 - 8.1.1 Cultural landscape context
 - 8.2 Built Environment
 - 8.3 Archaeology
 - 8.4 Palaeontology
 - 8.5 Eco-tourism
9. HERITAGE INFORMANTS AND INDICATORS
10. PUBLIC PARTICIPATION
11. LIMITATIONS AND ASSUMPTIONS
12. RECOMMENDATION

ANNEXURES:

1. Proposed site layout plan (Preferred Alternative)
2. Archaeological Impact Assessment
3. Palaeontological Impact Assessment

FIGURES:

1. Locality plan
2. Provisional development layout
3. Extract from early 1900-1919 mapping
4. Mapping/ images: Ruined calcrete structures
5. Mapping/ images: Unmarked graves
6. Contextual map: Built Environment
7. Archaeological occurrences A
8. Archaeological occurrences B
9. Archaeological occurrences C
10. Archaeological occurrences D

REFERENCES and ACKNOWLEDGEMENTS:

1. Cape Town Archives
2. Surveyor General Office
3. Draft Scoping Report, Cape Environmental Assessment Practitioners (Pty) Ltd, 22nd March 2016.

4. Phase 1a Archaeological Impact Assessment: Proposed development of the AMDA Delta PV (Solar Energy Facility) on Remaining Extent Klondike No 670, and Overhead Power Line Grid Connection to the Mookodi MTS Sub-Station across Remainder of Erf 506 and Remainder of the Farm Rosendal 673, Vryburg, Registration Division, North West Province, Dr. Peter Nilssen, August 2016.
5. Recommended Exemption from further Palaeontological Studies: Proposed AMDA Delta Solar PV Development on the remaining extent of Klondike No. 670-In, Naledi Local Municipality, Northwest Province, Northern Cape, Natura Viva, May 2016.
6. <http://www.quovadis-southern-africa.co.za/content/9/1420/en/history-of-stellaland-vryburg-kalahari-north-west-province.html>
7. <https://en.wikipedia.org/wiki/Vryburg>
8. <http://www.samilitaryhistory.org>

ABBREVIATIONS:

1. NGSi - National Geo-Spatial Information, Department of Rural Development and Land Reform, Mowbray
2. DEA – Department of Environmental Affairs
3. HIA – Heritage Impact Assessment
4. NHRA - National Heritage Resources Act, 1999 (Act 25 of 1999)
5. SAHRA - South African Heritage Resources Agency

COVER: Extract from 109 Vryburg Imperial (1900-1919) (Source: National Geo-Spatial Information, Department of Rural Development and Land Reform, Mowbray)

1. INTRODUCTION

PERCEPTION Planning was appointed by *AMDA Delta (Pty) Ltd* to undertake an Integrated Heritage Impact Assessment (HIA) in terms of Section 38(8) of the National Heritage Resources Act, 1999 (Act 25 of 1999) as part of a proposal to establish a commercial solar energy facility as well as associated grid connection - to be referred to as *AMDA Delta PV* - on portions of the following cadastral land units:

Solar Energy Facility:

- Remainder of the farm Klondike 670, Vryburg District, Ratlou Local Municipality, North West Province, measuring 1,148.6057ha, registered to Klondike Beleggings (Pty) Ltd and held under title deed T945/1970.

Grid connection across:

- Remainder of the farm Rosendal 673, Vryburg District, Ratlou Local Municipality, North West Province, measuring 1,044.2062 ha, registered to Naledi Municipality and held under title deed T 1321/2001;
- Remainder of Erf 506, Vryburg District, Ratlou Local Municipality, North West Province, measuring 4,736.9726 ha, registered to Naledi Municipality and held under title deed VF 3/14.

This report serves as an Integrated Heritage Impact Assessment (HIA) and includes inputs from the following specialist reports sanctioned as part of the HIA:

- Basic archival background research (*Perception Planning, S. de Kock*);
- Archaeological Impact Assessment (*Dr. P. Nilssen*);
- Palaeontological specialist assessment: Exemption (*Natura Viva, Dr. J. Almond*).

2. INDEPENDENCE OF ASSESSOR

With relation to the author's appointment as an independent specialist responsible for the compilation of an Integrated Heritage Impact Assessment in terms of Section 38(8) of the National Heritage Resources Act, 1999 (Act 25 of 1999) for this project, it is hereby declared that the undersigned:

- Acts as an independent specialist in this application;
- Regards the information contained in this report as it relates to my specialist input/study to be true and correct;
- Does not have and will not have any financial interest in the undertaking of the activity, other than remuneration for work performed in terms of the NEMA, the Environmental Impact Assessment Regulations, 2014 and any specific environmental management Act;
- Have and will not have any vested interest in the proposed activity proceeding;
- Have disclosed, to the applicant, EAP and competent authority, any material information that have or may have the potential to influence the decision of the competent authority or the objectivity of any report, plan or document required in terms of the NEMA, the Environmental Impact Assessment Regulations, 2014 and any specific environmental management Act;
- Is fully aware of and meet the responsibilities in terms of NEMA, the Environmental Impact Assessment Regulations, 2014 (specifically in terms of regulation 13 of GN No. R. 982) and any specific environmental management Act, and that failure to comply with these requirements may constitute and result in disqualification;
- Is aware that a false declaration is an offence in terms of regulation 48 of GN No. R. 982.

It is further hereby certified that the author has 19 years professional experience as urban planner (3 years of which were abroad) and 10 years professional experience as professional heritage practitioner. The author is professionally registered/ affiliated as follows:

- Professional Heritage Practitioner (Association for Professional Heritage Practitioners)
- Professional Planner (South African Council for Planners, South African Planning Institute)
- ExCo: International Council for Monuments and Sites (ICOMOS) South Africa

3. METHODOLOGY

As part of the compilation of this Integrated HIA report the site and its environs was studied, visited, photographed and assessed, which more specifically involved the following (for broad overview of HIA process refer to explanatory flow diagram below):

- Field work carried out over 5 days by Dr. Peter Nilssen on 14, 15, 18, 19 and 20th April 2016;
- Liaising with project manager, environmental consultant and various specialist consultants;
- Assimilating findings and recommendations emanating from specialist inputs into HIA;
- Identification of heritage-related issues and concerns;
- Analysis of development site and its environs;
- Identification of contextual spatial informants;
- Establishing cultural significance, based on criteria set out in NHRA;
- Identification of heritage-related design informants based on the above;
- Focused public participation process to be coordinated as part of Environmental Impact Assessment facilitated by *Cape Environmental Impact Assessment Practitioners (Pty) Ltd (CapeEAPrac)*;
- Assess conformity of final proposed site layout to design informants identified;
- Submission to competent authority (SAHRA) via SAHRIS.

4. DESCRIPTION OF STUDY AREA¹

The study area is located on a portion of the remaining extent of farm Klondike No 670 and is situated approximately 8km south-west of Vryburg as seen on Figure 1 below. The subject site measure about 1,142 ha in extent while the development footprint (AMDA Delta solar photovoltaic energy facility) comprises of an area of 268 ha.

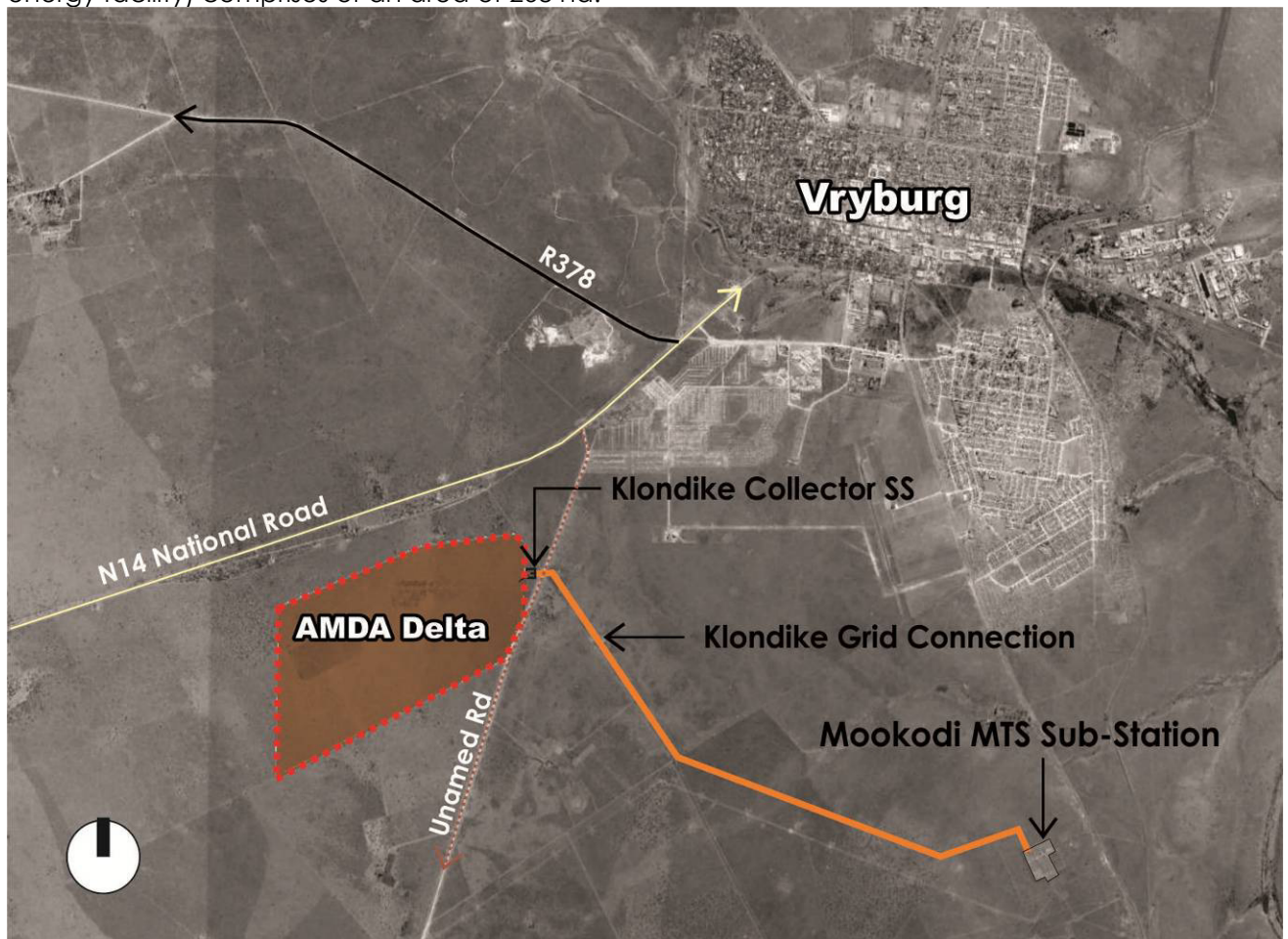


Figure 1: Location of property and proposed site in relation to Vryburg and direct environs (Source: GoogleEarth, 2015)

The proposed overhead power line route for the grid connection to Eskom's Mookodi MTS substation (position about 500m west to the N18 national road) runs across the Remainder of Erf 506 and

¹ Transposed from Nilssen, P (August 2016)

Remainder of Farm Rosendale 673, Vryburg. Vehicular access to the study area is from the N14 National Road. The study area is overgrown by sparse and low-shrubs vegetation. The topography of the study area and surrounding consists of a flat to undulating terrain with low hills and ridges. To the eastern portion of the subject site runs the Korobela River and about 2km east of Mookodi MTS sub-station runs the Leeuspruit River.

According to the Phase 1a Archaeological Impact Assessment (Nilssen, 2016), the endemic vegetation of the area is Ghaap Plateau Vaalbosveld or Kalahari Plateau Bushveld which is typical of the Savannah Biome. The vegetation consists of grasses, trees and shrubs. The dominant indigenous tree is the protected Camel thorn tree (*Vachellia erioloba*). Exotic Eucalyptus trees and other alien vegetation are commonly present in the immediate surroundings of farmsteads. As a result of cattle farming, however, most of the Camel thorn trees are removed when very young in order to stimulate the growth of grasses for increased grazing. Considerable expanses of the immediate and surrounding landscape have been altered by farming activities and about a third of the AMDA Delta study area has been cleared and ploughed in recent times. As a result, the vegetation regime has been dramatically changed in historic times. Overall, archaeological visibility of exposed ground surfaces is good and allowed for adequate observations for the purpose of this assessment.

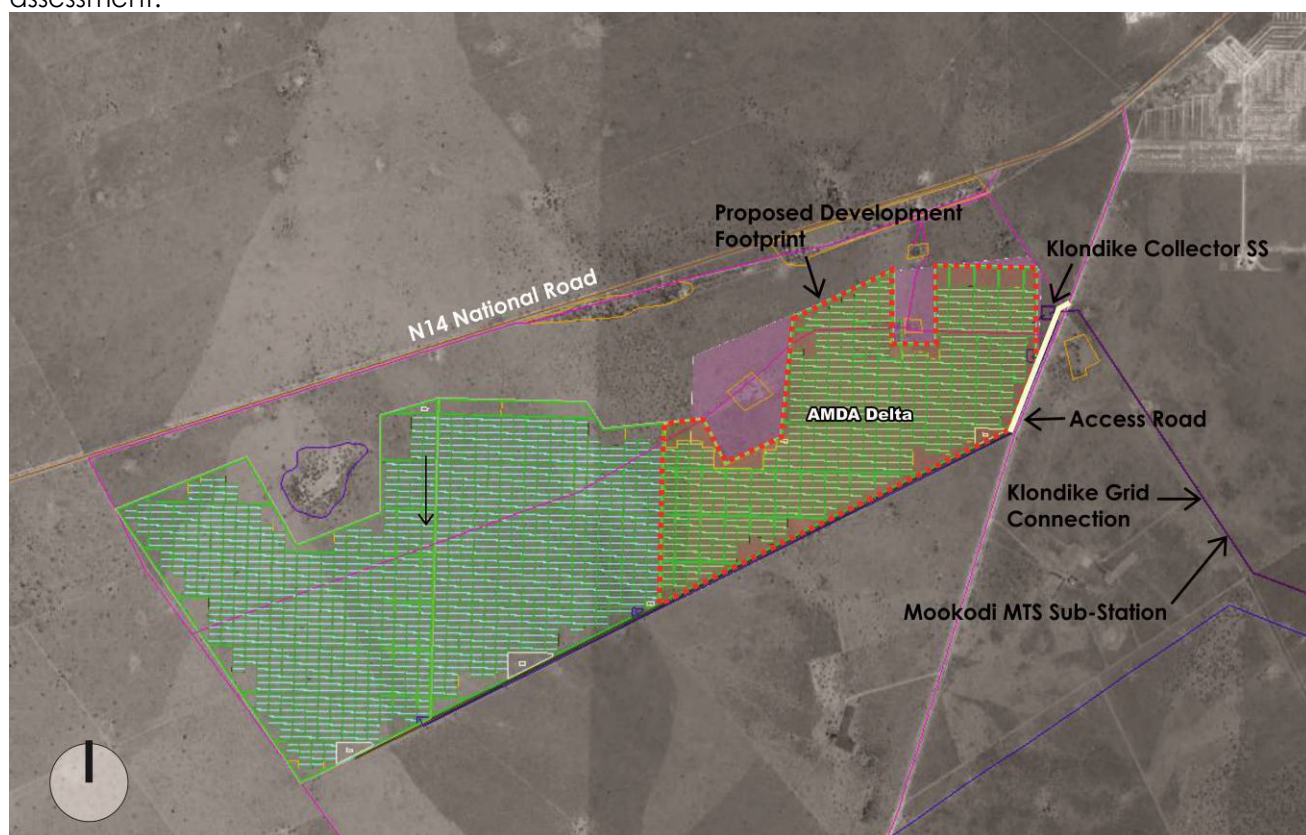


Figure 2: Proposed development site boundary within context of direct environs (Source: Google Earth, 2015)

The land use of the affected area is rural and agricultural, dominated by cattle farming. Relatively modern farmsteads, associated outbuildings and farming infrastructure occur in the larger study area and grid connection corridor. Relatively recent human related disturbances to the environment include roads (surfaced and gravel), single vehicle gravel tracks, cattle and pedestrian tracks, clearing (large piles of calcrete) and ploughing, fencing, overhead power lines, minor earthmoving, bore holes, windmills, free-standing cement dams and plastic reservoirs, and the relatively new Mookodi MTS sub-station. Natural disturbances include burrowing by large and small animals.

In addition to modern structures including a large shed and three "labourers" cottages, a few interesting historic structures were recorded in the vicinity together with a small unmarked grave yard of some 550 m² in extent with at least 13 to 15 unmarked graves (Refer to Section 8.2). Photographs of the site and its environs are attached to the Archaeological Impact Assessment (Annexure 2 to this report).

5. DEVELOPMENT PROPOSAL & ALTERNATIVES

According to the information received from *AMDA Delta (Pty) Ltd and Cape EAprac*, the proposed photovoltaic (PV) SEF will contain a generating capacity of 75 MWAC with an estimated maximum footprint of ± 220 ha. However, a preliminary study area of ± 900 ha was identified by the Project Developer.

The technology under consideration is photovoltaic (PV) modules mounted on either of fixed or tracking structures. Other infrastructure includes inverter stations, internal electrical reticulation, internal roads, an on-site switching station/ substation, a 132 kV overhead (OH) transmission line, auxiliary buildings, construction laydown areas and perimeter fencing and security infrastructure. The on-site switching station / substation will locate the main power transformer/s that will step up the generated electricity to a suitable voltage level for transmission into the national electricity grid, via the OH line. Auxiliary buildings include, *inter alia*, a control building, offices, warehouses, visitors centre, staff lockers and ablution facilities and gate house and security offices. The most-recent site development plan, which incorporates findings from various environmental- and heritage-related specialist studies, is attached as **Annexure 1**.

5.1 Preferred Layout Alternative

The proposed AMDA Echo PV Energy Facility is to consist of solar photovoltaic (PV) technology with fixed, single or double axis tracking mounting structures, with a net generation (contracted) capacity of 75MWAC (MegaWatts - Alternating Current) (and up to 90MWDC Direct Current installed/nameplate capacity), as well as associated infrastructure, which will include:

- On-site switching-station / substation;
- Auxiliary buildings (gate-house and security, control centre, office, warehouse, canteen & visitors centre, staff lockers etc.);
- Inverter-stations, transformers and internal electrical reticulation (underground cabling);
- Access and internal road network;
- Laydown area;
- Overhead electrical transmission line / grid connection (connect to the Mookodi substation);
- Rainwater tanks; and
- Perimeter fencing.

During the pre-application stage a number of project footprints and configurations were considered by the applicant and optimised with input from ecological specialists.

5.2 Preliminary Development Zone

In February 2016 the applicant defined a preliminary development zone for the proposed development. This took into account the terrain and other technical requirements for the development as well as feedback from the Ecological Specialist, Mr Simon Todd.

5.3 Preferred Project Footprint

Based on the preliminary development zones informed by the ecological specialist, the preferred project footprint was developed to be technically feasible, while incorporating the recommendations of the specialist.

5.4 Mitigated Project Footprint

On completion of all the specialist baseline assessment, a mitigated project footprint will be developed to avoid any other sensitive features identified.

5.5 The No-Go Alternative

The Status Quo Alternative proposes that the AMDA Delta PV Energy Facility not go ahead and that the area in proximity to the Mookodi substation remain undeveloped as it is currently. The land on which the proposed project is proposed is currently vacant. It is currently used for limited cattle grazing activities, however due to a combination of poor soil quality, water scarcity and extreme climatic conditions, it has no potential for irrigated crop cultivation. The area in question is also considered too small to generate noteworthy financial benefit from agricultural activities due to its low carrying capacity.

The 'No-go/Status Quo' alternative will limit the potential associated with the land and the area as a whole for ensuring energy security locally, as well as the meeting of renewable energy targets on a provincial and national scale. Should the 'do-nothing' alternative be considered, the positive impacts associated with the solar facility (increased revenue for the farmer, economic investment,

local employment and generation of electricity from a renewable resource) will not be realised. The no-go alternative is thus not considered a favourable option in light of the benefits associated with the proposed solar facility, however it will be used as a baseline from which to determine the level and significance of potential impacts associated with the proposed solar development during the Impact Assessment phase of the on-going environmental process.

6. PLANNING CONTEXT

A Planning specialist will be appointed in order to consider the planning implications of the proposed facility. The results of the findings of the planning specialist will be presented in the EIR. The following key components will likely take place from a planning perspective.

- A land use change application for the rezoning of approximately 250ha, from Agricultural Zone I to Special Zone, will be lodged at the Naledi Local Municipality,
- If there are restrictive Title Deed conditions burdening the proposed development, an application for the removal thereof will be lodged.
- Parallel to the rezoning application, a long term lease application will be lodged at the National Department of Agriculture, in accordance with the Subdivision of Agricultural Land Act (Act 70 of 1970).
- Relevant planning documents, on all spheres of Government, will be evaluated before any land use change application is launched.

7. HISTORICAL BACKGROUND

Basic historic background research focussed on primary sources obtained through the Cape Town Archives, Deeds Office, Surveyor General's Office as well as existing research as referenced.

7.1 Basic Pre-Colonial perspectives²

A literature review of previous archaeological and heritage-related work in the surrounding area was conducted in part by using information from the Report Mapping Project of the SAHRA-APM Unit as well as SAHRIS. Most of the reports cited here were downloaded from the SAHRA web site (<http://www.sahra.org.za/sahris/map/reports>). Further pertinent information from related reports was obtained from references cited below.

The North West and Northern Cape Provinces have a rich and long archaeological record that spans the entire Stone Age, includes Iron Age sites, and more recent historic occupation of the region. Detailed accounts of the history, heritage resources and associated hominin and human behaviours have already been written and are not repeated here (see for e.g. Küsel and Küsel 2015, Birkholtz 2014, Hutten 2012, Kruger 2013 and van der Walt 2014). Of relevance here is the nature of the archaeological record in the surroundings of the present study area, which give an indication of the type of heritage resources that are expected to occur in the proposed development site.

The nearest and most significant heritage site is that of the Taung Skull World Heritage Site, which is situated approximately 60km to the south of the present study area. The site is famous for the late Professor Raymond Dart's identification of the skull of an infant gracile australopithecine, named Australopithecus Africanus that was unearthed from a limestone quarry in the mid 1920s. This was the first major hominin discovery in South Africa, and indeed one of the earliest worldwide. The National Heritage Site of Wonderwerk Cave is situated roughly 100km south of the present study area, and archaeological investigations in the cave are ongoing. This is an important Stone Age site and one of the few which contains the full Stone Age sequence from Early Stone Age (ESA) through Middle Stone Age (MSA) to Later Stone Age (LSA). Rock paintings adorn the walls of the cave near its entrance.

Numerous archaeological resources were identified and recorded along the Harts River some 60km south of the present study area in the late 1980s by the Harts River Valley Survey Project of the University of the Witwatersrand. These finds included Early Stone Age, pastoralist (Iron Age) and rock art sites (Birkholtz 2014). Several heritage related impact assessments in the surroundings of the present study area reported the complete absence of heritage and archaeological resources within their studied areas (Birkholtz 2014, Dreyer 2008, Hutten 2012 & 2015, Kruger 2015 and van Schalkwyk 2011). Overall, a pattern emerges showing that archaeological resources are most commonly

² Nilssen, P (2016)

clustered around rivers and river valleys, existing and ancient drainage lines, pans, and ridges with rocky outcrops, and that heritage resources are generally absent from flatlands that are some distance from existing or ancient water sources.

7.2 Colonial perspectives

According to secondary sources, the town of Vryburg was established after about 400 colonialists (or "Free Burghers"), mostly of Dutch descent, travelled through the area during 1882 to wage war against two local chiefs on behalf of the government. In return for their efforts they were granted large portions of land, which they declared and Republic in 1883 and named "Stellaland". However, their independence was short-lived as the area in 1885 was annexed by the British to the Bechuanaland Protectorate (Botswana). The Republic's flag, secondary sources recount, was shipped to England as part of a trophy display of conquests but returned by King George in 1934.³

7.3 Farms Klondike 670, Rosendal 673 and Erf 506, Vryburg District

The farm Klondike 670, formerly also known as "Kaalplaats", was first surveyed during January 1899 and measured 3,715 morgen 154 square roods ($\pm 3,182.2362$ ha). During March 1899 the farm was transferred in various shares to Eduard T Dalton, Pieter Hirschmann van der Hoff and Pieter Ulrich de Malander Fischer, the latter two of which were trading as "Van Der Hoff & Fischer"⁴. The nature of their business could not be confirmed. The farm Rosendal 673 was first surveyed during 1892 and measured 3,182 morgen 520 square roods ($\pm 2,726.22$ ha). The property was transferred to the "Southern Land Company Limited" during March 1899⁵.

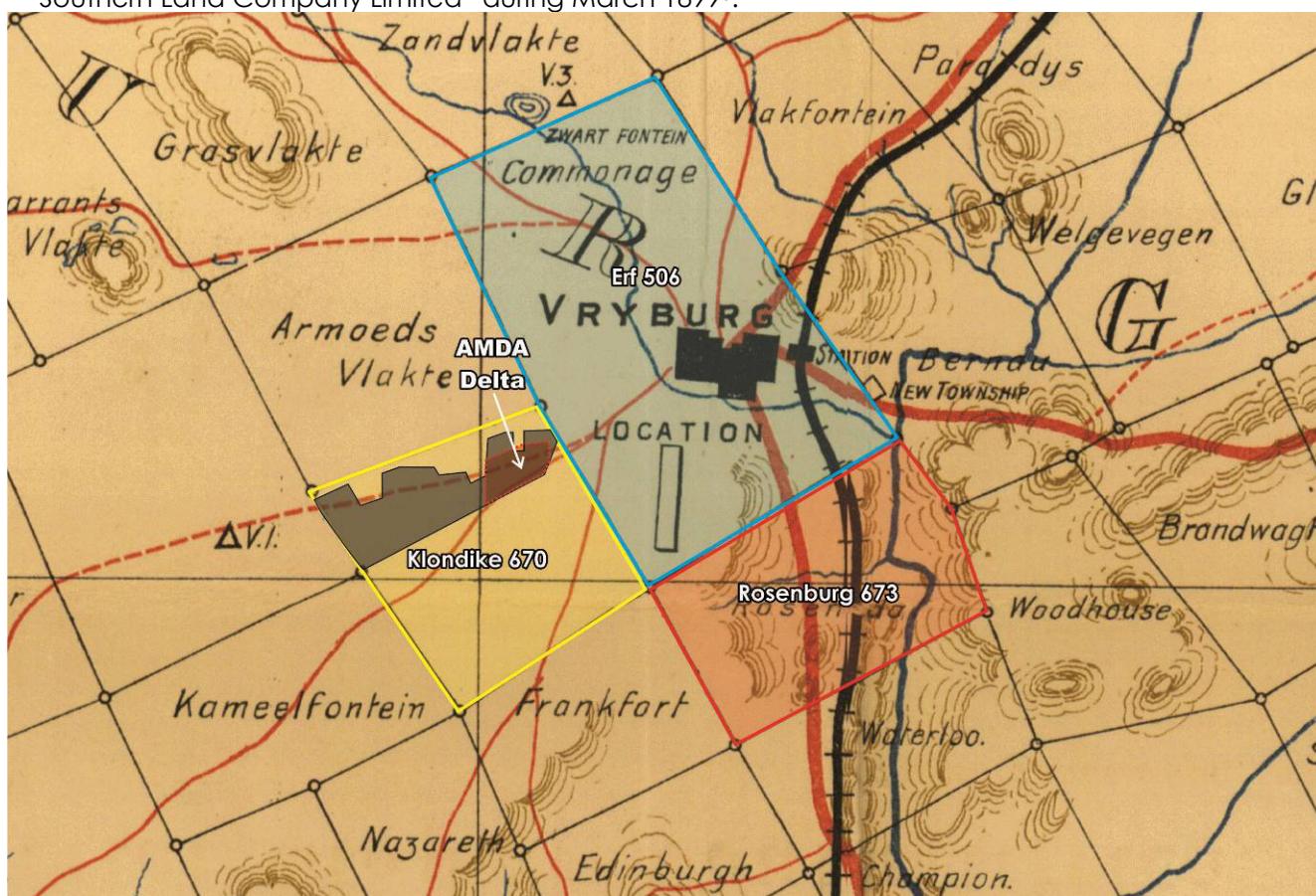


Figure 3: Extract from Imperial Mapping 109 (1900-1919) (Source: National Geo-Spatial Information, Department of Rural Development and Land Reform, Mowbray)

The original boundaries of Erf 506, Vryburg represents the town Commonage (or "allotment area"), was first surveyed during 1915 and measured 7,148 morgen 144.48 square roods ($\pm 1,902$ ha). Given the array of existing land uses highlighted on the survey drawing, as well as the number of established businesses that had existed by this date, the town was clearly already well-established. The survey drawing shows the grid street layout together with uses such as a "milk factory",

³ McIver, Alan (May 2015)

⁴ SG CB30/1899

⁵ SG CB 1194/1892

“Lazaretto” (military fortification⁶), a goal, various cemeteries, hospital, police station, pumping site and a memorial site⁷.

Early (1900-1919) SG mapping for the region shows minor roads and tracks traversing the farm Klondike. No farmstead or other structures were noted at that time. Mapping shows a “location” on the southernmost portion of the Commonage (Erf 506) as well as main roads and the railway line. Basic historic background research did not identify or highlight any significant historic or other heritage-related themes that would be negatively impacted through the proposed development.

8 HERITAGE RESOURCES AND ISSUES

8.1 Landscape Character

8.1.1 *Cultural landscape context*

The term “cultural landscape” refers to the imprint created on a natural landscape through human habitation and cultivation over an extended period of time. While the area has been inhabited for many hundreds of thousands of years (pre-colonial history) prior to Western settlement (colonial history), the nomadic lifestyles of early inhabitants are not always as evident within the landscape as the significant imprints made by humans during the last two – three hundred years and more.

Unlike ancient landscapes in parts of the world where environmental conditions allowed more intensive cultivation over periods much longer than locally and allowed natural and cultural components of the landscape to become interwoven, landscape components, the North West has not yet developed in such a manner. The fact that natural and cultural landscape components in the region are therefore more distinguished means that the cultural landscape is likely to be very vulnerable to the cumulative impact of inappropriate large-scale development.

Ultimately, definition of a cultural landscape can be informed by the following elements, weighed through professional opinion, public values and statutory (legal) framework:

Natural Landscape	Historical Architecture
Public Memory	Palaeontology
Social History	Archaeology

The site may be described as forming part of a typical North Western landscape, defined by flat and wide open spaces overgrown by sparse, low-growing vegetation. From a Pre-Modern perspective, the site formed part of an area mostly used for small stock farming and so, modern man-made features noted on the site include e.g. vehicle tracks, fencing and related infrastructure such as boreholes, small dams, watering and feeding troughs for domestic stock. The site can be described as forming part of an arid rural landscape defined by a myriad of farming activities. While relatively flat, the landscape is interspersed with low koppies/ridges. A cluster of ruined structures (some of which were constructed using local calcrete materials as well as a small graveyard forms part of the broader cultural landscape but fall outside the proposed development footprint (Refer Section 8.2).

8.2 Built Environment

A grouping of **two ruined (historic) structures**, were recorded by the archaeologist at waypoint 74 (Figures 4, 6). The structures are made of calcrete blocks and nodules and are bound together by an old mortar sourced from local sediments. The presence of metal as well as modern cement in parts of these structures shows that they were mended or modified in more recent times. The size of the structures suggests that they were used for human habitation, though the one in a more advanced state of ruin might have served as a shelter for small domestic stock.

A few pieces of glass and metal were identified on the ground in near proximity to these structures, but no refuse heap or midden was seen. No items identifiable to a specific historic period were seen. Interestingly, there is virtually no plastic associated with these structures while plastic and other modern refuse litters the area around the new “labourers” cottages to the south. The exact age of the structures could not be determined. Oral history sources could not provide any insight into the age or whereabouts of former residents of the structures.

⁶ <http://www.samilitaryhistory.org/vol036wh.html>
⁷ C25/1917

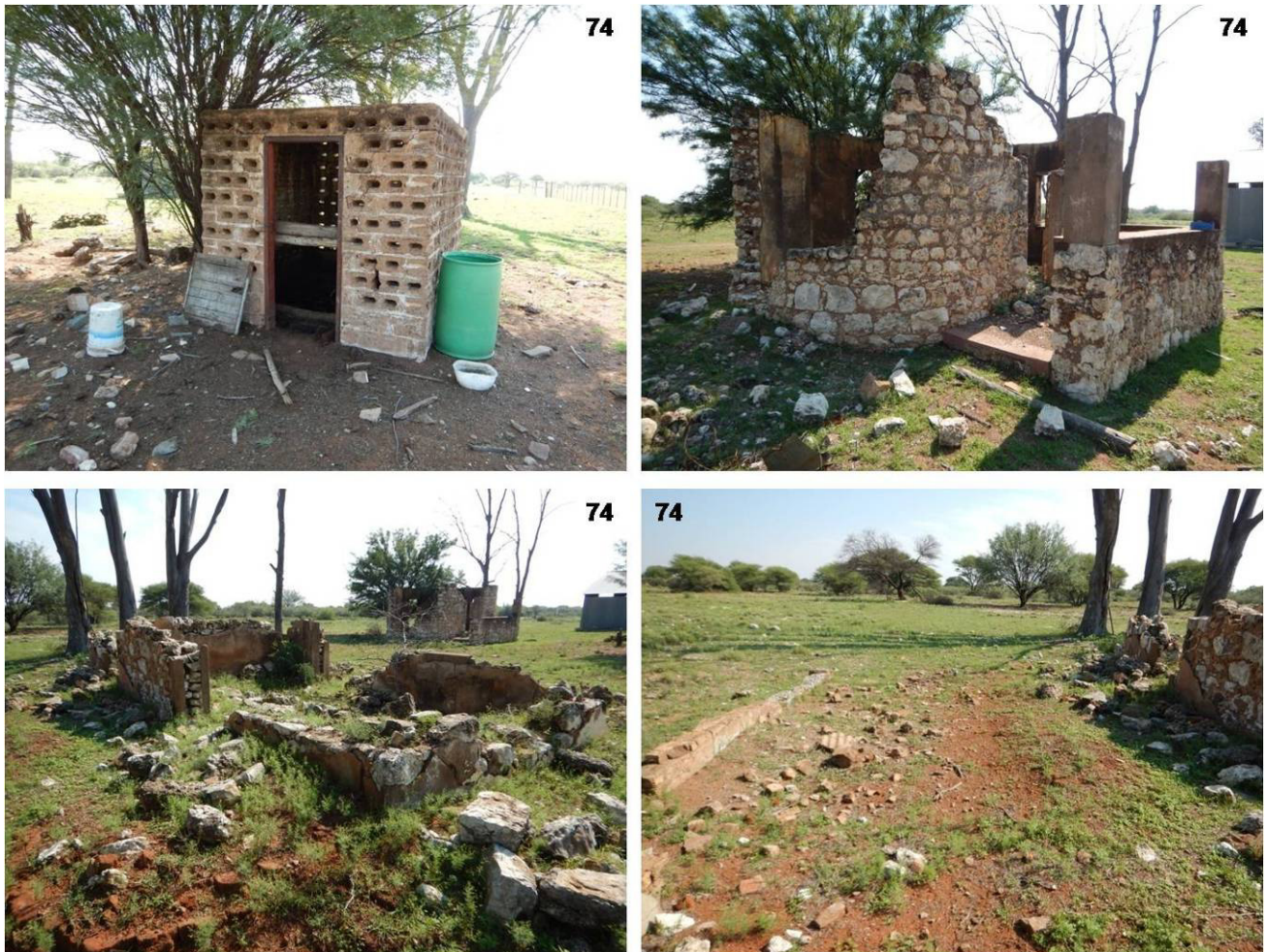


Figure 4: Structures at waypoint 74 include two calcrete structures in various stages of ruin. Note modern cement plaster in places while the mortar is clearly old and consists of local sediments (Source: Nilssen, P)

A number of **unmarked graves** of $\pm 550 \text{ m}^2$ in extent were noted by the archaeologist at waypoint 77 and are likely to be associated to the calcrete structures (Figures 5, 6). Having clearly been neglected for many years, the area and many of the graves are overgrown with grass and bushes, which made counting difficult.

Furthermore, cattle tracks run through this area and have dispersed some of the mounds or cairns over time. It is estimated that there may be up to 20 graves. The bulk of the graves are elongated elliptical mounds of medium to small calcrete blocks and nodules while some are rectangular to elliptical calcrete outlines with and without mounds or calcrete fillings. In a few instances the ends of mounds are marked with bigger pieces of calcrete. Most of the graves are between 1.5 and 2 m in length while 2 are about a meter in length, suggesting that the latter contain the remains of young children. One grave is partially burrowed by a large mammal, but no human or other remains are exposed. All graves are oriented east-west and most are aligned in at least two rows running north-south.

Two farm labourers were consulted in this regard and although one man had been on the farm for many years and who knew about the graves, he did not know who they belonged to. Similarly the farm manager, Mr Henk De Jager, who has been in the area for 20 years is familiar with the site, but also does not know who the graves belong to. The oral link between living relatives and those buried here has likely been lost. That the calcrete structures described above were occupied by relatives of the people buried at this site is possible.

Once identified, the decision was taken to exclude the calcrete structures as well as the unmarked graveyard from the proposed development footprint in its entirety. The implication of this mitigatory measure therefore reflects in the site layout plan.

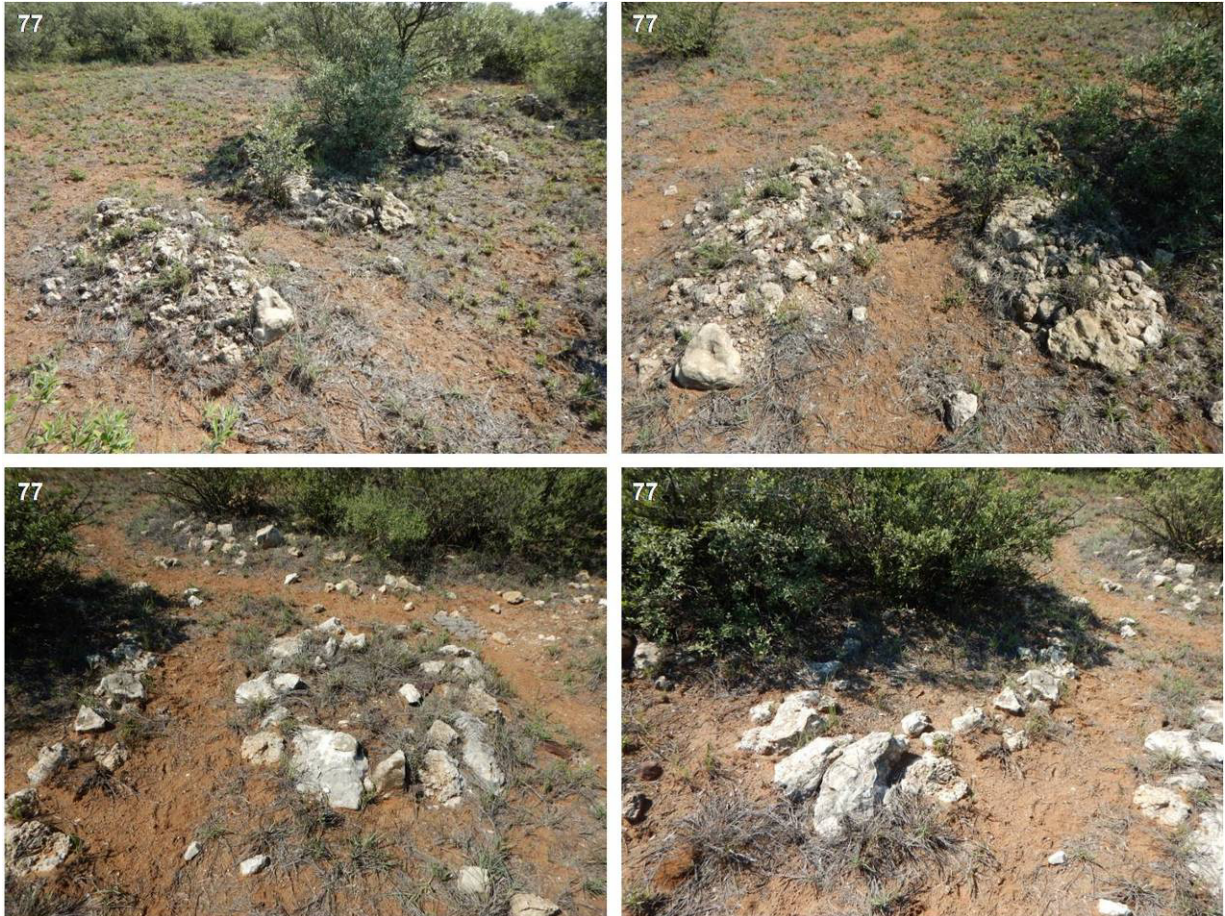


Figure 5: Some of the unmarked graves in the unmarked burial ground at waypoint 77. The calcrete mounds in the top images are between 1.5 and 2 m in length while the calcrete outlined grave at bottom left is about a meter in length. All graves are oriented E-W in at least two rows that are oriented N-S. (Source: Nilssen, P)

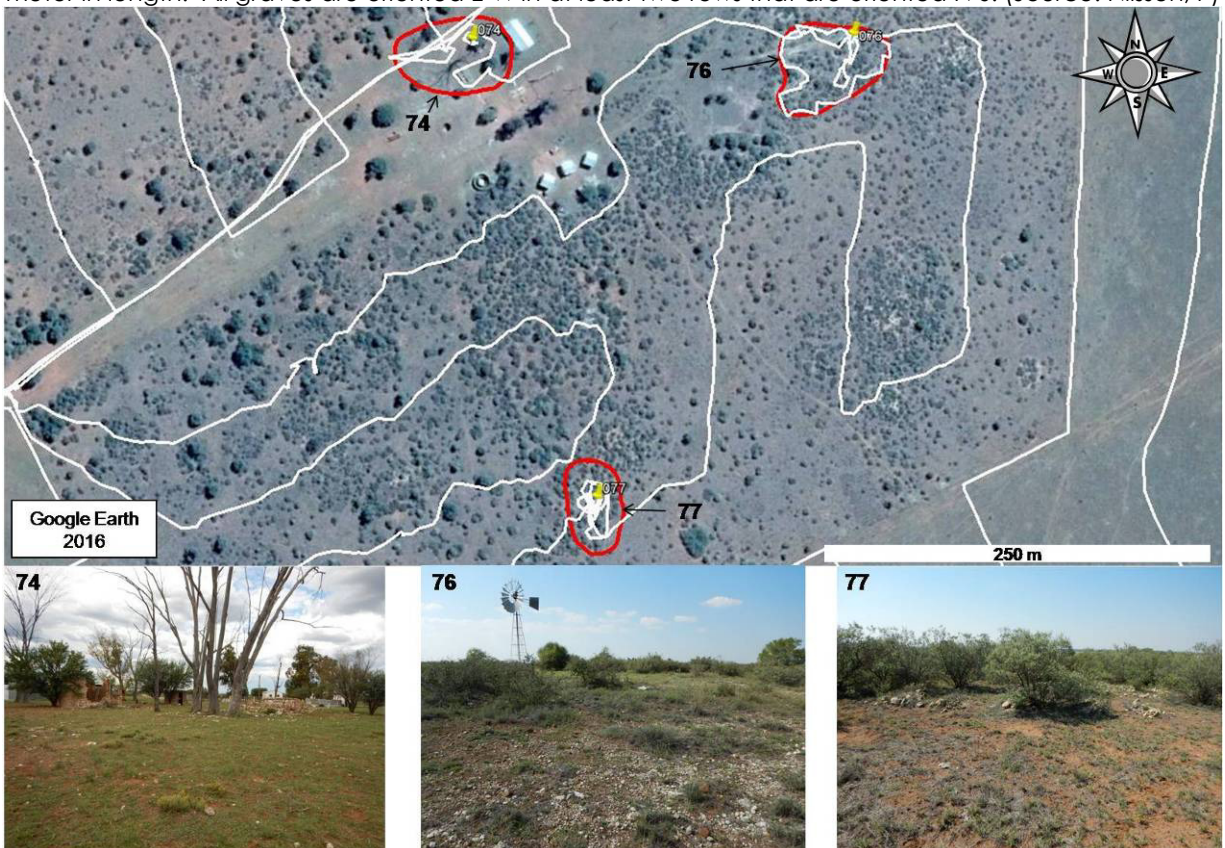


Figure 6: Area enlarged from Figure 6 showing archaeological localities around the outbuildings and modern "labourers" cottages. Ruined calcrete structures occur at waypoint 74, disturbed and temporally mixed Stone Age stone artefacts occur at waypoint 76 and the unmarked grave yard and unmarked graves are located at around the bore hole and windmill at waypoint 77. The red polygon around the graves is the suggested placement of a wall or fence. The bottom images show the context of the resources. (Source: Nilssen, P)

8.3 Archaeology

This section provides an archaeological assessment prepared and compiled by Dr Peter Nilssen as attached as **Annexure 3** to this Integrated HIA.

The proposed development will involve area and linear developments that could have a permanent negative impact on archaeological resources. Direct negative impacts on archaeological resources will occur during the construction and installation phase of the proposed development. Indirect and cumulative impacts will occur during the operational phase of the development and as a result of other potential future developments in the surrounding area.

Previous heritage related work in the surrounding environment shows that archaeological resources are most commonly clustered around rivers and river valleys, existing and ancient drainage lines, pans, and ridges with rocky outcrops, and that heritage resources are generally absent from flatlands that are some distance from existing or ancient water sources. The bulk of the archaeological record is of the Stone Age, and based on the receiving environment, it was expected that mainly Stone Age resources would be encountered with lesser potential for the occurrence of significant historic heritage resources.

A very low density background scatter of isolated stone artefacts of the different Stone Age periods was identified in the study area, often in previously disturbed contexts. These finds are not associated with any organic, faunal or other cultural remains. As a result, these heritage resources are considered to be of low archaeological significance. Because they were adequately recorded during this study, it is suggested that no further investigation or work is needed before development commences. Due to their low significance, a permit for their disturbance or destruction is not required from the heritage authorities, and their destruction will not detract from the heritage value of the area.

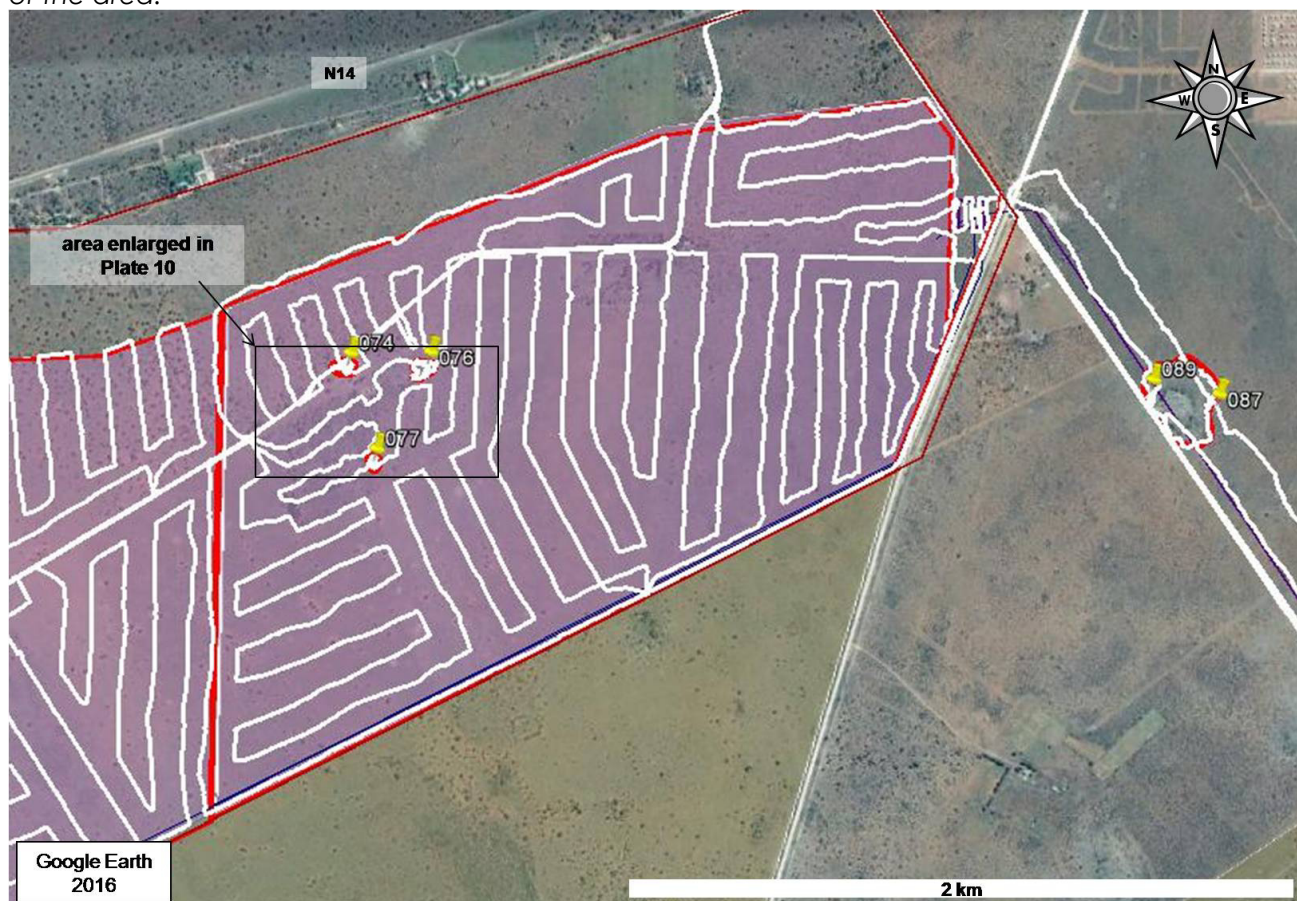


Figure 7: Image showing archaeological survey walk tracks (white lines) and archaeological sites (labelled red polygons).

Due to the disturbed nature of the area around waypoint 76, the low density of temporally mixed Stone Age stone artefacts, and the entire absence of faunal, organic and other cultural remains, this occurrence is considered to be of low significance and requires no further investigation or work. The loss of these archaeological resources will not reduce the heritage value of the area and a permit

for their destruction is not needed. This locality is also partially avoided by the revised development layout plans.

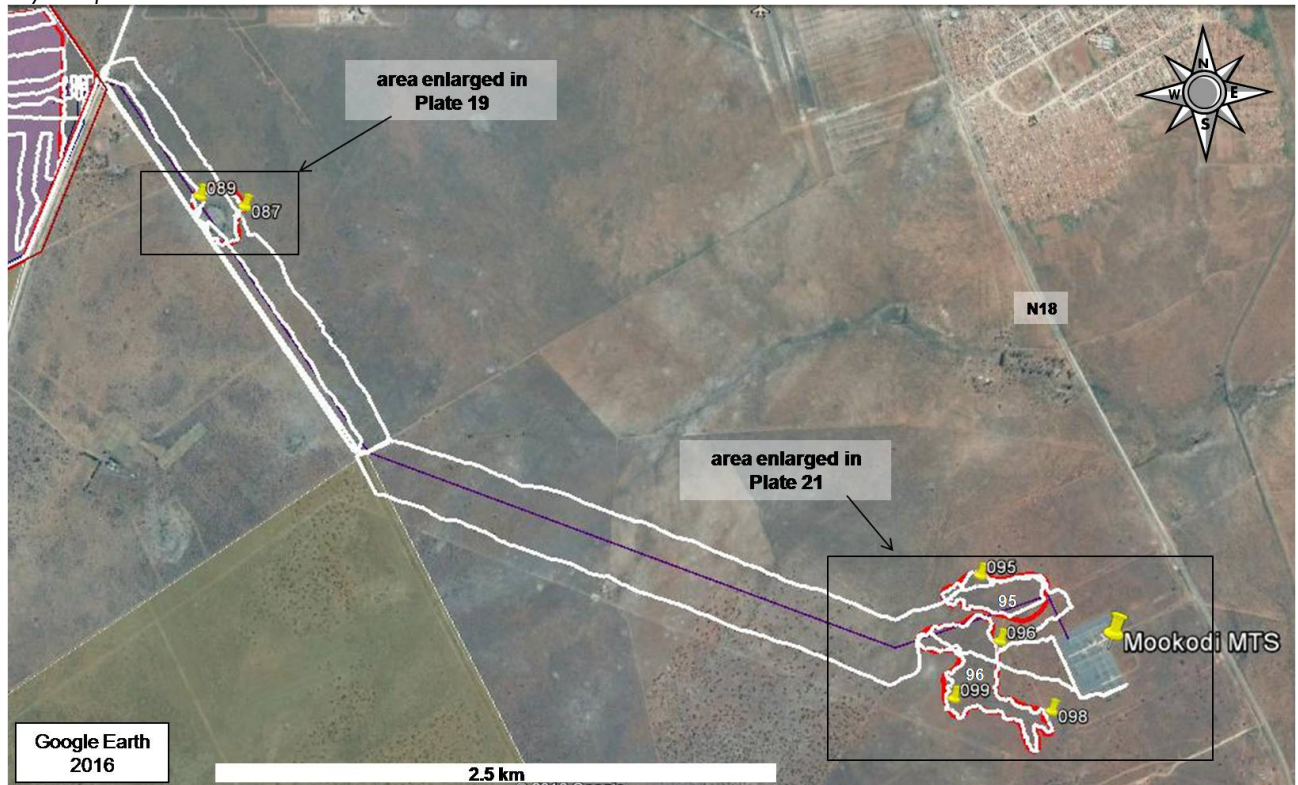


Figure 8: Image showing archaeological survey walk tracks (white lines) and archaeological sites (labelled red polygons).

Although the pan site at waypoints 87 & 89 contains temporally mixed Stone Age materials and preserves no faunal, organic or other cultural materials, it is an example of humans re-using a water source over a very long period of time. The dominance of scrapers suggests that people were processing and possibly tanning hides here from MSA through LSA times. Adzes are usually associated with removing bark and working wood and may be related to the manufacture of digging sticks, spears, bows and arrow shafts. The presence of the complete or near complete core reduction sequence suggests that stone tools were made on site. This locality is considered to be of medium significance and should be conserved in perpetuity as part of the National Estate and for potential future research. A temporary fence should be erected around this site under the supervision of a suitably qualified and accredited archaeologist before construction commences to avoid damage or disturbance (see red polygon in Figure 9). The red polygon already allows for a buffer between the archaeological resources and the surrounding environment. Management measures for this site should be included in the Construction and Operational Environmental Management Plan for the development. This recommendation was accepted by the applicant and the revised grid connection route will run to the west of the site.

Rocky outcrops and water sources are often archaeologically sensitive, and in the case of the sites at waypoints 94 & 95 and waypoints 96, 98 & 99, both elements are present. The availability of raw materials for the production of stone tools and the presence of water was clearly attractive to people from as early as the MSA through to LSA times as is reflected by the presence of their tools. Although these archaeological resources are temporally mixed and consist only of stone artefacts, their context and content provide an important example of landscape and resource use through deep time. Consequently, these sites are considered to be of medium significance and it is recommended that the areas around waypoints 94 & 95 as well as waypoints 96, 98 & 99 be conserved in perpetuity as part of the National Estate and for potential future research. A temporary fence should be erected around these sites under the supervision of a suitably qualified and accredited archaeologist before construction commences to avoid damage or disturbance (see red polygons in Figure 8). The red polygons already allow for a buffer between the archaeological resources and the surrounding environment. Management measures for these sites should be included in the Construction and Operational Environmental Management Plan for the development.

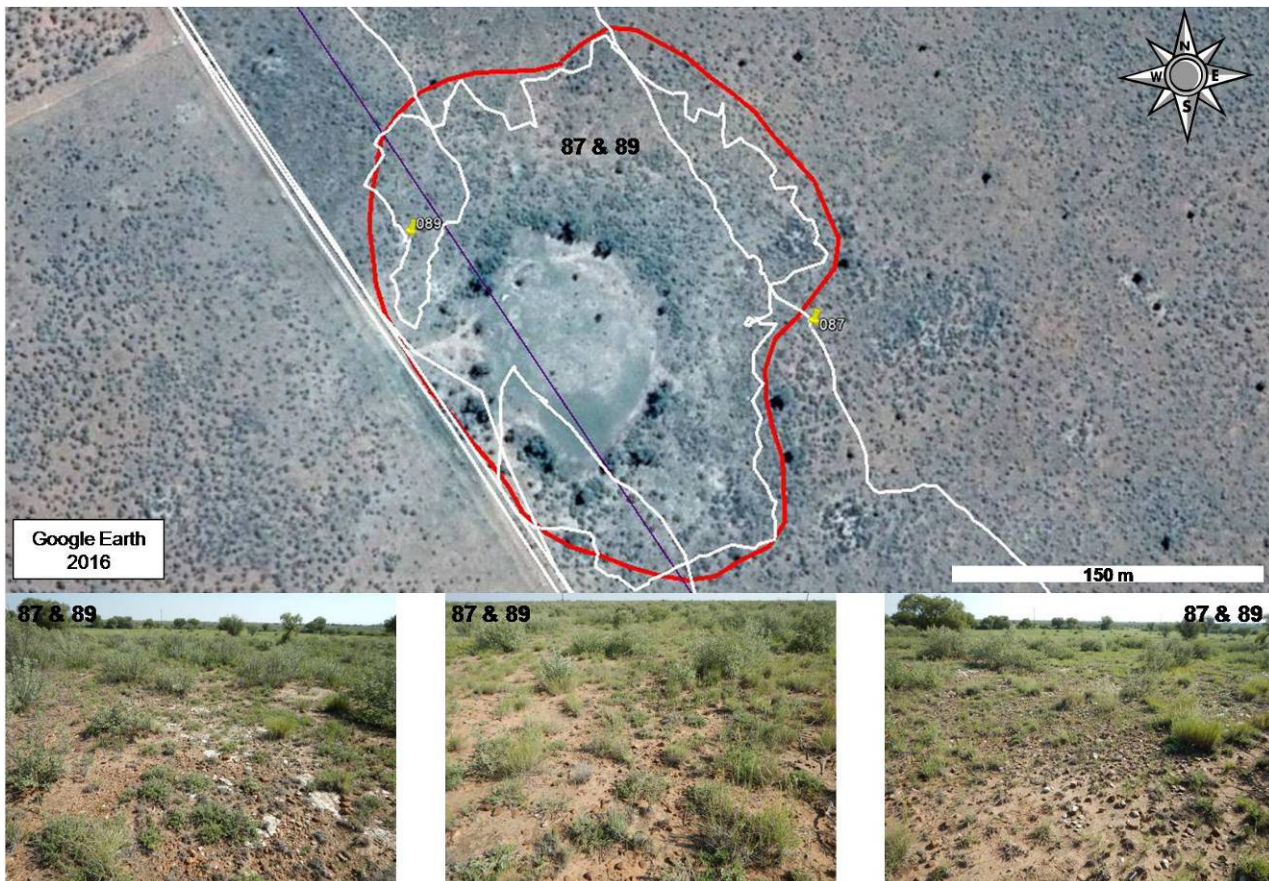


Figure 9: Aerial view of the LSA & MSA pan site at waypoints 87 & 89. Lower images show the context in immediate vicinity of pan including rim of trees, grass and exposed surfaces of gravel and bedded calcrete where stone artefacts are located. The red polygon is the suggested placement of a temporary fence (Source: Nilssen, P).

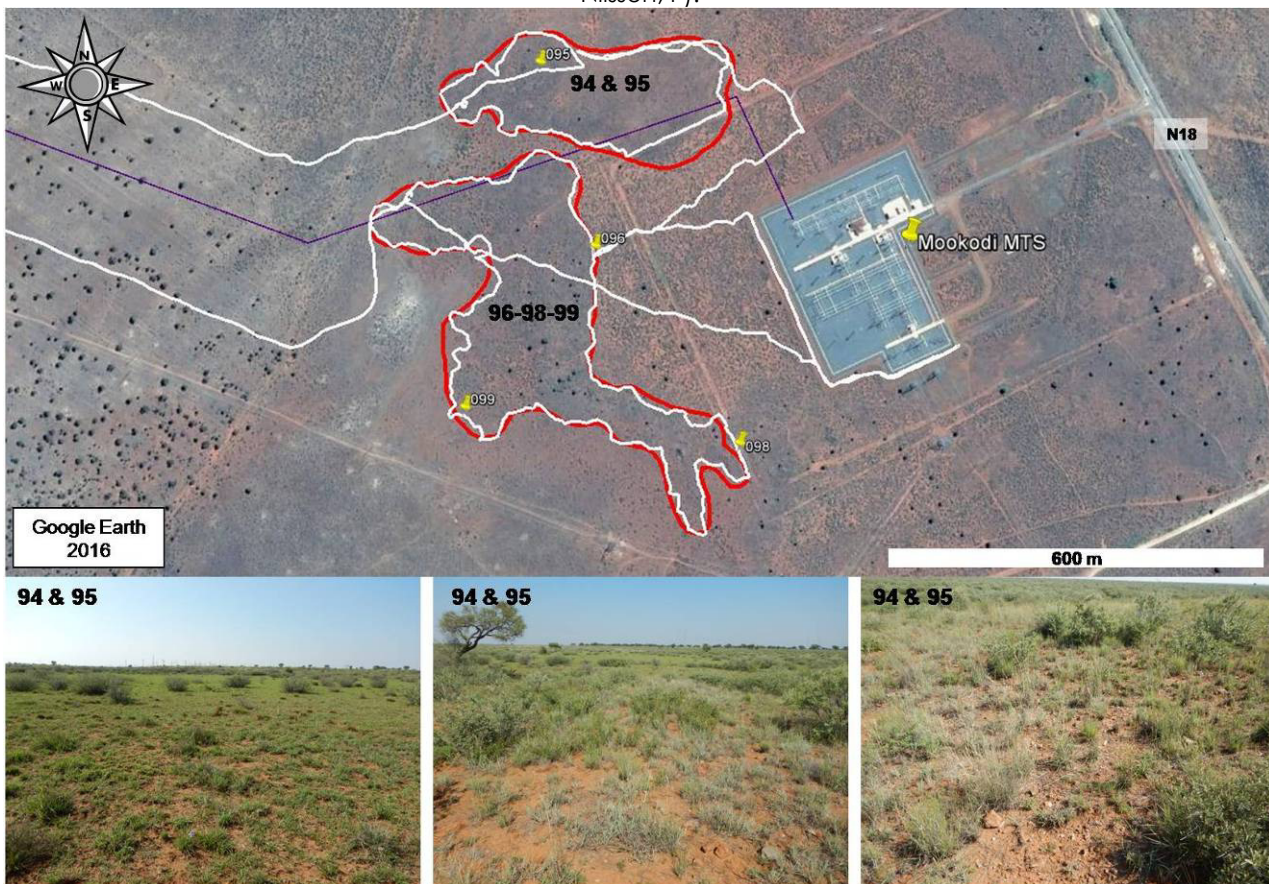


Figure 10: Top shows an aerial view of the LSA and MSA quarry and pan sites at waypoints 94 & 95 and waypoints 96, 98 & 99. Lower images show the context in the immediate vicinity of the pan west of waypoints 94 & 95 including grass, a prominent old tree and exposed rocky outcrops and gravel surfaces where stone artefacts are located. Red polygons are the suggested placements of temporary fences for protection and conservation

The proposed development will involve construction and installation activities that will have a permanent negative impact on archaeological resources identified in this study. However, a representative sample of the archaeological resources will be conserved and the remainder are considered to be of low significance, and therefore, their destruction will not have a negative impact on the heritage value of the area.

From an archaeological perspective, provided that these recommendations are considered and/or implemented, there are no fatal flaws, and therefore, there are no objections to the authorization of the proposed development of the AMDA Delta SEF and associated on-site collector sub-station, overhead power line grid connection and access road. The positive impact of the development is that it will allow for the conservation of archaeological resources that may otherwise have been overlooked or destroyed.

Summary of Recommended Mitigation Measures;

- Four archaeological sites identified in the studied area were selected for protection and conservation in perpetuity as part of the National Estate and for potential future research. These include the burial ground at waypoint 77; the LSA & MSA pan site at waypoints 87 & 89; and the LSA & MSA quarry and pan sites at waypoints 94 & 95 and waypoints 96, 98 & 99. Temporary fences should be erected around these sites in the presence of an archaeologist prior to the construction phase of development to ensure that they are not damaged or destroyed. Pylon locations in the vicinity of the quarry and pan sites should also be selected in the presence of a suitably qualified and accredited archaeologist so as to avoid areas with known sub-surface archaeological materials. These and further management measures for the four sites should be included in the Construction and Operational Environmental Management Plan for the development. The revised development layout plans show that the above four sites are already avoided and will not be directly impacted by the proposed development activities.
- Because the presence of sub-surface archaeological resources cannot be ruled out entirely, it is recommended that the Environmental Management Plan for the construction phase of development makes provision for archaeological training of the appointed Environmental Control Officer (ECO). This will allow for the ECO to recognise archaeological remains if they are exposed during construction, and to alert the authorities or a suitably accredited archaeologist, who should be called to site to assess the finds and to determine mitigation measures if necessary. Such work will be at the expense of the developer.

Required Mitigation Measures;

- In the event that excavations and earthmoving activities expose significant archaeological or heritage resources, such activities must stop and SAHRA must be notified immediately. Such resources must be handled in accordance with the National Heritage Resources Act (No. 25 of 1999) and at the expense of the developer.
- In the event of exposing human remains during construction, the matter will fall into the domain of the South African Heritage Resources Agency and will require a professional archaeologist to undertake mitigation if needed. Such work will also be at the expense of the developer.

8.4 Palaeontology

The Recommended Exemption from further Palaeontological Studies, compiled by Dr. John Almond, is attached as **Annexure 4** and summarised below with permission from the author. Kindly refer to specialist's report and findings.

The study area for the proposed AMDA Delta Solar PV Development on the Remaining Extent of Klondike No. 670 near Vryburg, Naledi Local Municipality, Northwest Province is underlain at depth by Precambrian sediments of the Schmidtsdrif Subgroup (probably Vryburg Formation) as well as Permo-Carboniferous glacial sediments of the Dwyka Group (Karoo Supergroup). The bedrocks are mantled by Late Caenozoic superficial sediments including calcretes, alluvial gravels and sandy soils. Desktop analysis as well as field studies in the vicinity indicates that all these sedimentary rocks are of low palaeontological sensitivity. Significant impacts on local palaeontological heritage are therefore not expected as a consequence of the proposed alternative energy development, including the c. 5 km long 132 kV overhead transmission line connection to the existing Mokoodi Substation. It is recommended that, pending the discovery of substantial new fossils remains (e.g. stromatolites, mammalian bones or teeth) during construction of the proposed solar energy facility and of the associated 132 kV transmission lines, exemption from further specialist palaeontological studies and mitigation be granted for this project.

Should any substantial fossil remains (e.g. well-preserved stromatolites, mammalian bones and teeth) be encountered during excavation, these should be safeguarded, preferably in situ, and reported by the ECO to the South African Heritage Resources Authority, as soon as possible (SAHRA contact details: P.O. Box 4637, Cape Town 8000. Tel: 021 462 4502. Email: phines@sahra.org.za). This is to ensure that appropriate mitigation action can be taken by a professional palaeontologist, at the developer's expense. Mitigation would normally involve the scientific recording and judicious sampling or collection of fossil material as well as associated geological data (e.g. stratigraphy, sedimentology, taphonomy) by a professional palaeontologist. These recommendations should be incorporated into the Environmental Management Plan for the proposed solar energy facility.

8.5 Eco-tourism⁸

One of the goals of ecotourism is to offer tourists insight into the impact of human beings on the environment, and to foster a greater appreciation of our natural habitats and from an economic perspective, heritage resources may prove to be valuable resources when used in sustainable manner through eco-tourism. This may for example include investment in adaptive reuse of historic buildings so as to conserve and enhance the unique character and historic themes pertinent to this area. Heritage tourism can therefore serve as a driver for economic development, including infrastructure development and poverty alleviation through job creation. The broader region's rich archaeological, palaeontological, historical and natural heritage has the potential to provide unique tourism opportunities when developed and used in responsible and sustainable ways.

Given the location as well as pattern of existing land use within the proximity of the site and furthermore, the relative low density of heritage resources considered of cultural significance noted as part of this assessment, we do not consider that the proposed development would offer significant heritage-related eco-tourism opportunities associated with the development site.

9 HERITAGE INFORMANTS AND INDICATORS

According to the requirements of Section 38(3) of the NHRA, land use planning and EIA processes must be informed by and incorporate heritage informants and indicators. It is the purpose of this Section to define heritage informants and indicators pertaining to the way in which heritage resources must be incorporated into the overall layout and design of the proposed development as read in conjunction with preceding Sections.

Cultural landscape issues

From a regional and natural landscape perspective, the proposed development site forms part of a transformed rural landscape that has been altered through farming activities. While human intervention within this landscape arguably stems from pre-colonial times, these impacts have no doubt intensified during the colonial period once land became privately-owned.

In addition to archaeological occurrences noted, evidence of colonial (pre-modern) history pertinent to the site remains in the form of two ruined calcrete structures and a number (± 20) unmarked graves within close proximity. Little information could be derived from archival and/or oral history sources approached concerning these and its degree of cultural significance (i.e. Grading) could therefore not be determined. A decision was therefore taken to exclude this area from the proposed development footprint.

Therefore, while the proposal would relate to a landscape modification, we do not consider that it would negatively affect any natural or cultural landscape of cultural significance associated with the site.

Built Environment

While interesting, the **calcrete and associated structures** at waypoint 74 are in various stages of ruin and are of no obvious heritage value. The structures are considered to be of low significance. Nevertheless, it is possible that they are related to the unmarked graves recorded at waypoint 77. Because this area has been excluded from the development footprint, no further archaeological work or investigation is required.

⁸ Section included in accordance with requirements set by National Department of Environmental Affairs

The **unmarked burial ground and unmarked graves** at waypoint 77 is of unknown significance, but is protected by heritage legislation. Although the revised development layout plan avoids this locality, it is nevertheless recommended that the locality be marked by a surrounding fence or wall (a low, rustic wall of calcrete would be appropriate) for its protection and conservation in perpetuity. It is recommended that a wall or fence placed about 10 to 15 m from the outer graves would be suitable and would enclose an area of about 1800 m². It is suggested that this wall should be erected before the construction phase to ensure that the graves are not damaged unwittingly. These management measures should be included in the Construction and Operational Environmental Management Plan for the development. This locality is avoided by the revised development layout plans.

Archaeology

The recommendations and mitigation measures put forward in the Archaeological Impact Assessment, and summarised in Section 8.3 of this report, shall be adhered to.

Palaeontology

While no further specialist palaeontological studies or monitoring are recommended at this stage, the mitigation measures put forward in Section 8.4 of this report shall be adhered to in order to safeguard chance fossil finds on site during the construction phase of the development.

10 PUBLIC PARTICIPATION

Due to the fact that there are no known local heritage conservation bodies in the Vryburg area (registered as such with the relevant provincial heritage resources authority in terms of Section 25 of the National Heritage Resources Act, 1999 (Act 25 of 1999)), the Public Participation Process (PPP) for this HIA will be coordinated with that of the EIA Process facilitated by Cape EAPrac in terms of the National Environmental Management Act, 1998 (Act 107 of 1998), so as to solicit possible heritage-related comments with relation to the proposed development.

11 LIMITATIONS AND ASSUMPTIONS

This report is limited to the assessment of the potential impact of the proposed facility on heritage resources found on/ within the proximity of the development site as defined in this report. There is a limitation in terms of understanding the cumulative impacts of the project when taken in conjunction with other similar future development projects in the surrounding area.

12 RECOMMENDATION

Having regard to the above assessment, it is recommended that:

- 12.1 This report fulfils the requirements of an Integrated Heritage Impact Assessment (HIA);
- 12.2 That the recommendations below be incorporated into the proposed development and that the Department of Environmental Affairs be informed accordingly:

Recommended Conditions of Approval	
AIA-1	<i>Four archaeological sites identified in the studied area were selected for protection and conservation in perpetuity as part of the National Estate and for potential future research. These include the burial ground at waypoint 77; the LSA & MSA pan site at waypoints 87 & 89; and the LSA & MSA quarry and pan sites at waypoints 94 & 95 and waypoints 96, 98 & 99. Temporary fences should be erected around these sites in the presence of an archaeologist prior to the construction phase of development to ensure that they are not damaged or destroyed. Pylon locations in the vicinity of the quarry and pan sites should also be selected in the presence of a suitably qualified and accredited archaeologist so as to avoid areas with known sub-surface archaeological materials. These and further management measures for the four sites should be included in the Construction and Operational Environmental Management Plan for the development.</i>
AIA-2	<i>Because the presence of sub-surface archaeological resources cannot be ruled out entirely, it is recommended that the Environmental Management Plan for the construction phase of development makes provision for archaeological training of the appointed Environmental Control Officer (ECO). This will allow for the ECO to recognise archaeological remains if they are exposed during construction, and to alert the authorities or a suitably accredited archaeologist, who should be called to site to assess the finds and to determine mitigation measures if necessary. Such work will be at the expense of the developer</i>

AIA-3	The unmarked burial ground and unmarked graves at waypoint 77 is of unknown significance, but is protected by heritage legislation. Although the revised development layout plan avoids this locality, it is nevertheless recommended that the locality be marked by a surrounding fence or wall (a low, rustic wall of calcrete would be appropriate) for its protection and conservation in perpetuity. It is recommended that a wall or fence placed about 10 to 15 m from the outer graves would be suitable and would enclose an area of about 1800 m ² . It is suggested that this wall should be erected before the construction phase to ensure that the graves are not damaged unwittingly. These management measures should be included in the Construction and Operational Environmental Management Plan for the development. This locality is avoided by the revised development layout plans.
AIA-4	In the event that excavations and earthmoving activities expose significant archaeological or heritage resources, such activities must stop and SAHRA must be notified immediately. Such resources must be handled in accordance with the National Heritage Resources Act (No. 25 of 1999) and at the expense of the developer.
AIA-5	In the event of exposing human remains during construction, the matter will fall into the domain of the South African Heritage Resources Agency and will require a professional archaeologist to undertake mitigation if needed. Such work will also be at the expense of the developer.
PIA-1	It is recommended that, pending the discovery of substantial new fossils remains during construction of the proposed AMDA Delta Solar PV Development on Farm Klondike No. 670 and of the associated 132 kV transmission lines, exemption from further specialist palaeontological studies and mitigation be granted for this project.
PIA-2	Should any substantial fossil remains (e.g. well-preserved stromatolites, mammalian bones and teeth) be encountered during excavation, these should be safeguarded, preferably in situ, and reported by the ECO to the South African Heritage Resources Authority, as soon as possible (SAHRA contact details: P.O. Box 4637, Cape Town 8000. Tel: 021 462 4502. Email: phines@sahra.org.za). This is to ensure that appropriate mitigation action can be taken by a professional palaeontologist, at the developer's expense. Mitigation would normally involve the scientific recording and judicious sampling or collection of fossil material as well as associated geological data (e.g. stratigraphy, sedimentology, taphonomy) by a professional palaeontologist. These recommendations should be incorporated into the Environmental Management Plan for the proposed solar energy facility.

PERCEPTION Planning

15th September 2016

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