
APPENDIX D: HERITAGE AND PALAEOLOGICAL ASSESSMENT

HERITAGE SCOPING REPORT

FOR THE PROPOSED ORION NO 5 PROSPECTING APPLICATION (AREA 1) ON
THE FARMS KLIPGATSPAN, HUMANSRUS, KAFFIRS KOLK AND HOEKPLAAS,

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EXECUTIVE SUMMARY

Site name and location: The proposed No 5 Prospecting project is located on the farms Klipgatspan, Humansrus, Kaffirs Kolk and Hoekplaas, 15km South of Copperton and 60km South-West of Prieska in the Northern Cape Province

1: 50 000 Topographic Map: 2322 AB & 2922 CD.

EIA Consultant: ABS Africa (Pty) Ltd.

Developer: Orion Exploration No.5

Heritage Consultant: Heritage Contracts and Archaeological Consulting CC (HCAC).
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Date of Report: 23 November 2018

Findings of the Assessment:

The scope of work comprises a heritage scoping report for a large prospecting right area comprising approximately 19 727 ha. Due to the geographical size of the exploration application and the fact that no intrusive activities will occur at this point of the application, it was deemed not feasible to conduct fieldwork at this point. Several large-scale heritage surveys conducted for renewable energy and mining projects the archaeological character of the area is well described (e.g., Orton & Webley 2013 a and b, van der Walt 2012, 2013 & 2017) and this desktop study is informed by available data for the area. Some of the aforementioned studies to name a few, covered portions of the current study area and 127 heritage features is on record for the study area. Based on these studies the following resources can be expected in the study area as indicated below.

Standing structures older than 60 years are protected by Section 34 of the NHRA (Act 25 of 1999) and the destruction or demolition of structures older than 60 years will require relevant permits. Although it is not foreseen that non-intrusive exploration activities will impact on standing structures, features older than 60 years can be expected in the study area in the form of farmsteads.

With regard to the archaeological component of Section 35 this brief background study indicates that the general area under investigation has a wealth of heritage sites and a cultural layering dating back to the Stone Age with scatters and sites dating to the ESA, MSA and LSA. Based on the SAHRA paleontological sensitivity map the area is of moderate sensitivity and an independent paleontological assessment was conducted (Bamford 2018). This study concluded that a Fossil Chance Find Protocol should be added to the EMPr and no palaeontological site visit is required unless fossils are revealed once excavations and drilling has commenced. As far as the palaeontology is concerned a prospecting right should be granted. In terms of Section 36 no known graves occur in the study area. It should be noted that graves can occur anywhere on the landscape and precolonial graves are expected.

It is anticipated that any sites that occur within the project area will have a Generally Protected B (GP.B) or lower field rating and all sites should be mitigatable and no red flags have been identified. It is therefore recommended that non-invasive exploration can commence (based on approval from SAHRA) with the following conditions of authorisation incorporated:

- Before commencing invasive prospecting activities, the impact areas should be subjected to a heritage walk down.
- Inclusion of a chance find protocol (both archaeology and palaeontology) in the EMPr.

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ABBREVIATIONS

AIA: Archaeological Impact Assessment
ASAPA: Association of South African Professional Archaeologists
BIA: Basic Impact Assessment
CRM: Cultural Resource Management
EAP: Environmental Assessment Practitioner
ECO: Environmental Control Officer
EIA: Environmental Impact Assessment*
EIA: Early Iron Age*
EMP: Environmental Management Plan
ESA: Early Stone Age
GPS: Global Positioning System
HIA: Heritage Impact Assessment
LIA: Late Iron Age
LSA: Late Stone Age
MEC: Member of the Executive Council
MIA: Middle Iron Age
MPRDA: Mineral and Petroleum Resources Development Act
MSA: Middle Stone Age
NEMA: National Environmental Management Act
PRHA: Provincial Heritage Resource Agency
SADC: Southern African Development Community
SAHRA: South African Heritage Resources Agency
SAHRIS: South African Heritage Resources Information System

**Although EIA refers to both Environmental Impact Assessment and the Early Iron Age both are internationally accepted abbreviations and must be read and interpreted in the context it is used.*

GLOSSARY

Archaeological site (remains of human activity over 100 years old)

Early Stone Age (2 million to 300 000 years ago)

Middle Stone Age (300 000 to 30 000 years ago)

Late Stone Age (30 000 years ago until recent)

Historic (approximately AD 1840 to 1950)

Historic building (over 60 years old)

Lithics: Stone Age artefacts

1. INTRODUCTION

HCAC was contracted by ABS Africa (Pty) Ltd to conduct a heritage scoping study for the proposed Orion No 5-prospecting application. The proposed prospecting activities are located 15km South of Copperton and 60km South-West of Prieska in the Northern Cape Province. Orion Exploration No.5 intends to undertake prospecting activities for a variety of minerals on the farms, Klipgatspan, Humansrus, Kaffirs Kolk and Hoekplaas. (Figure 1).

The aim of the scoping report is to conduct a desktop study to identify possible heritage resources within the project site. The study furthermore aims to assess the impact of the proposed project on non-renewable heritage resources and to submit appropriate recommendations with regards to the responsible cultural resources management measures that might be required to assist the developer in managing the discovered heritage resources in a responsible manner, in order to protect, preserve and develop them within the framework provided by Heritage legislation.

This report outlines the approach and methodology utilised for the scoping phase of the project. The report includes information collected from various sources and consultations. Possible impacts are identified and mitigation measures are proposed in the following report. It is important to note that no field work was conducted as part of the scoping phase but will be conducted as part of the impact assessment phase.

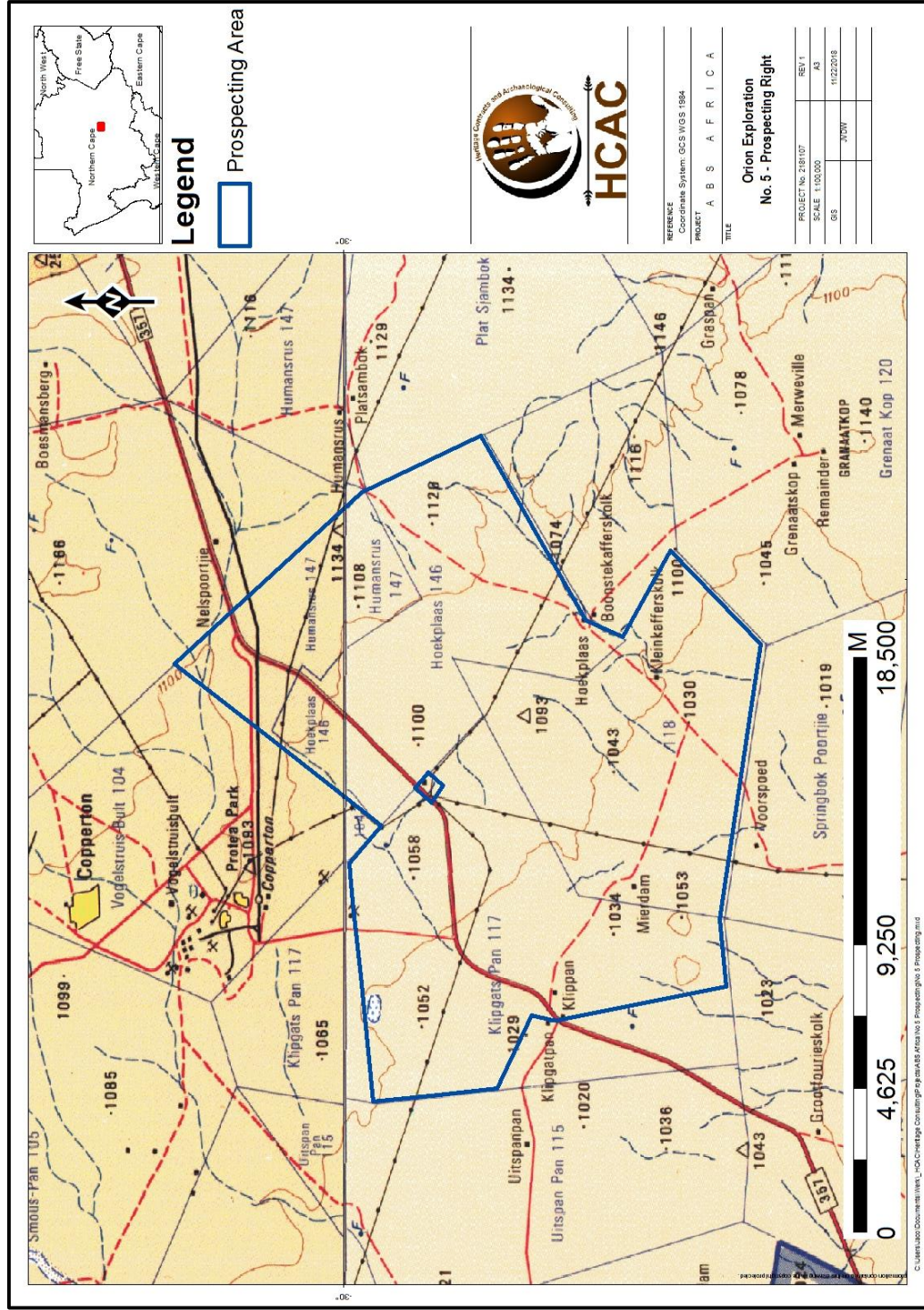


Figure 1. Regional Locality map of the site under investigation indicated in blue.

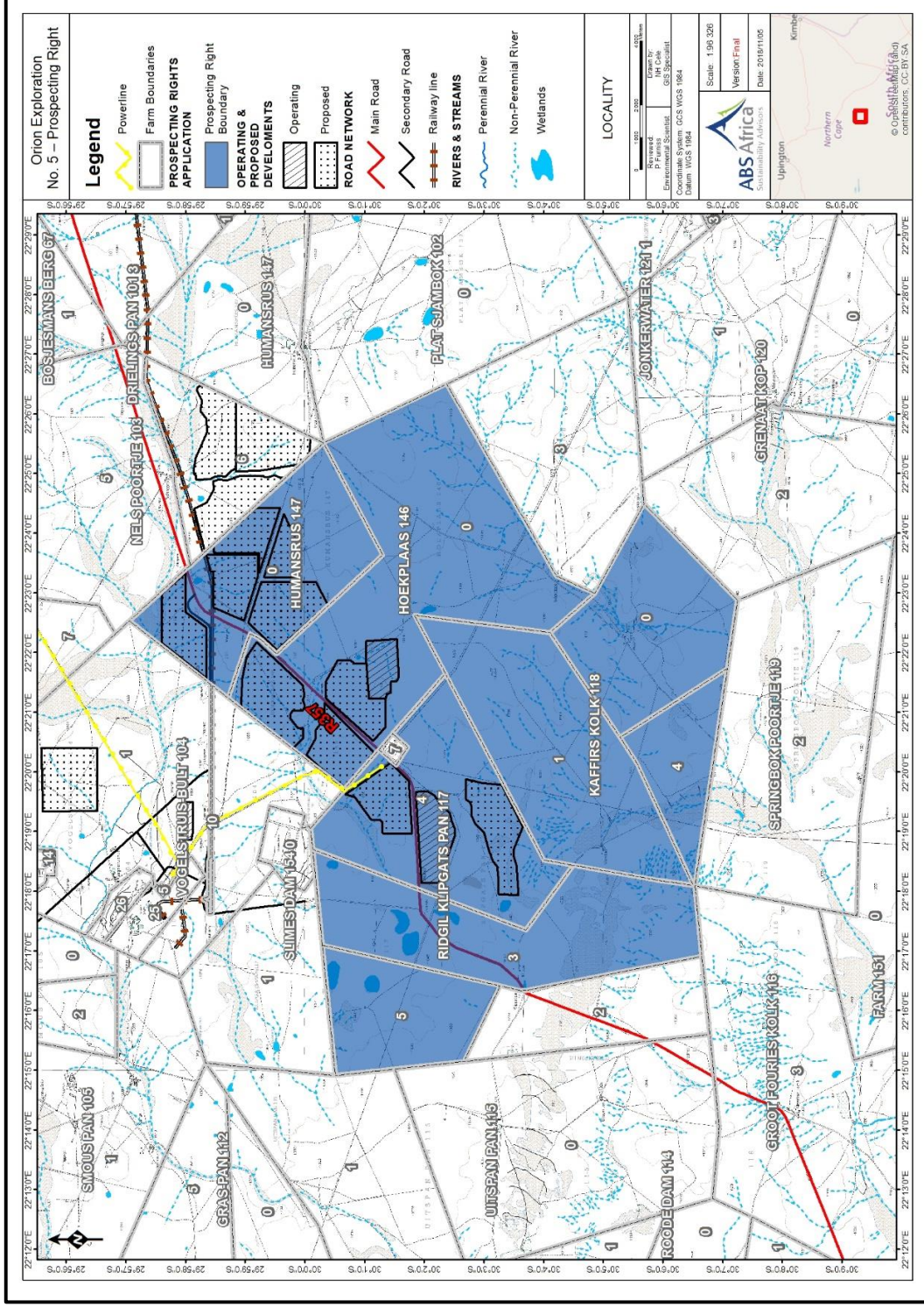


Figure 2. 1:50 000 Topographical map indicating the prospecting right boundary.

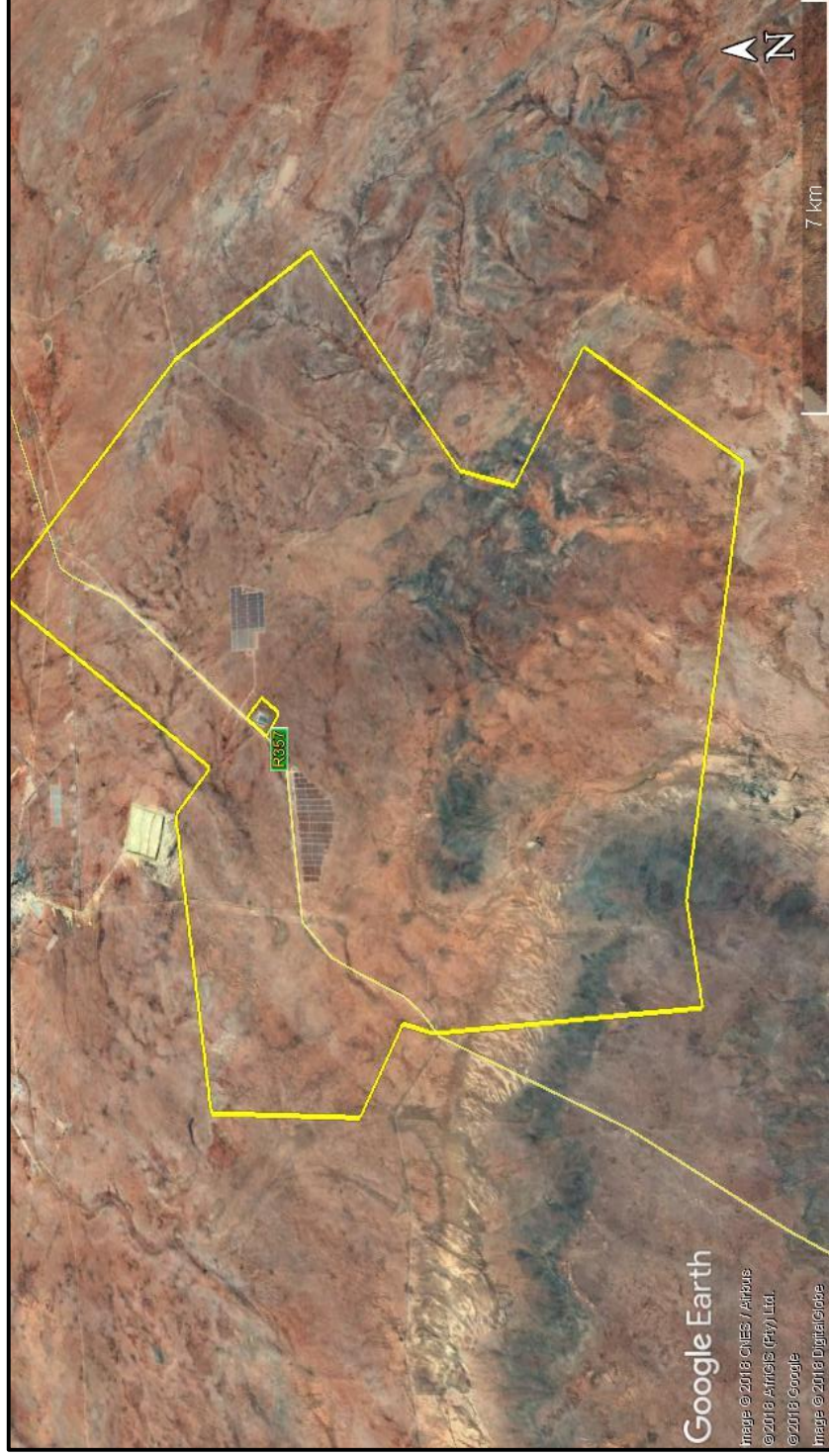


Figure 3. Google Earth image of the study area.

1.1 Terms of Reference

The main aim of this scoping report is to determine if any known heritage resources occur within the project site. The objectives of the scoping report were to:

- » Conduct a desktop study:
 - * Review available literature, previous heritage studies and other relevant information sources to obtain a thorough understanding of the archaeological and cultural heritage conditions of the area;
 - * Identify known and recorded archaeological and cultural sites; and
 - * Determine whether the area is renowned for any cultural and heritage resources, such as Stone Age sites, informal graveyards or historical homesteads.
- » Compile a specialist Heritage Scoping Report in line with the requirements of the EIA Regulations, 2014, as amended on 07 April 2017.

The reporting of the scoping component is based on the results and findings of a desktop study, wherein potential issues associated with the proposed project will be identified, and those issues requiring further investigation through the IA Phase highlighted. Reporting will aim to identify the anticipated impacts, as well as cumulative impacts, of the operational units of the proposed project activity on the identified heritage resources for all 3 development stages of the project, i.e. construction, operation and decommissioning. Reporting will also consider alternatives should any significant sites be impacted on by the proposed project. This is done to assist the developer in managing the discovered heritage resources in a responsible manner, in order to protect, preserve and develop them within the framework provided by Heritage Legislation.

During the EIA phase, the following terms apply:

Field study

Conduct a field study to: (a) locate, identify, record, photograph and describe sites of archaeological, historical or cultural interest; b) record GPS points of sites/areas identified as significant areas; c) determine the levels of significance of the various types of heritage resources affected by the proposed development

Reporting

Report on the identification of anticipated and cumulative impacts the operational units of the proposed project activity may have on the identified heritage resources for all 3 phases of the project; i.e., construction, operation and decommissioning phases. Consider alternatives, should any significant sites be impacted adversely by the proposed project. Ensure that all studies and results comply with the relevant legislation, SAHRA minimum standards and the code of ethics and guidelines of ASAPA.

To assist the developer in managing the discovered heritage resources in a responsible manner, and to protect, preserve, and develop them within the framework provided by the National Heritage Resources Act of 1999 (Act No 25 of 1999).

1.2 Nature of the development

The following non-invasive prospecting methods are intended for this phase of the project:

Non-Invasive Prospecting Methods

- Compile a working plan on a scale of 1: 10,000, which would integrate all geological, geophysical and geochemical data, as well as farm tracks, fences and drainages, to cover the relevant portion of the prospect area.
- Geological mapping of a zone covering the approximate position of the old "sea floor".
- Geophysical Surveys.
- Reconnaissance soil sampling traverses followed by more detailed and systematic soil sampling and trenches.
- Geochemical Surveys- It is expected that more than 1,000 soil samples may be collected on traverse lines and analysed using a hand-held XRF. Tranches might also be dug to determine geological contacts

1.3. The receiving environment

The proposed prospecting activities are located 15km South of Copperton and 60km South-West of Prieska in the Northern Cape Province of South Africa, on the following farms: Klipgatspan, Humansrus, Kaffirs Kolk and Hoekplaas. The vegetation is predominantly Bushmanland Arid Grassland vegetation in the Nama-Karoo biome (Mucina & Rutherford 2006) which consists of Karoo scrub and grass and a few isolated *Acacia Karoo* trees.

2. APPROACH AND METHODOLOGY

This scoping report was conducted as part of the first phase of the prospecting activities (non-invasive activities). The aim of the scoping phase is to cover available data regarding archaeological and cultural heritage to compile a background history of the study area in order to identify possible heritage issues or fatal flaws that could possibly be associated with the project and should be avoided during development.

This was accomplished by means of the following phases (the results are represented in section 4 of this report):

2.1 Literature review

A review was conducted utilising data for information gathering from a range of sources on the archaeology and history of the area. The aim of this is to extract data and information on the area in question, looking at archaeological sites, historical sites and graves of the area.

2.2 Information collection

The South African Heritage Resources Information System (SAHRIS) was consulted to further collect data from CRM practitioners who undertook work in the area to provide the most comprehensive account of the history of the area where possible. In addition, the archaeological database housed at the University of the Witwatersrand was consulted.

2.3 Public consultation

No public consultation was conducted during this phase by the author.

2.4 Google Earth and mapping survey

Google Earth and 1:50 000 maps of the area were utilised to identify possible places where archaeological sites might be located.

2.5 Genealogical Society of South Africa

The database of the genealogical society was consulted to collect data on any known graves in the area.

2.6. Restrictions

This study did not assess the impact on intangible resources of the project. Based on available data and resources as outlined in the report additional information that becomes available at a later stage might change the outcome of assessment. No field work was conducted.

3. LEGISLATION

For this project, the National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA) is of importance and the following sites and features are protected:

- a. Archaeological artefacts, structures and sites older than 100 years;
- b. Ethnographic art objects (e.g. prehistoric rock art) and ethnography;
- c. Objects of decorative and visual arts;
- d. Military objects, structures and sites older than 75 years;
- e. Historical objects, structures and sites older than 60 years;
- f. Proclaimed heritage sites;
- g. Grave yards and graves older than 60 years;
- h. Meteorites and fossils; and
- i. Objects, structures and sites of scientific or technological value.

The national estate includes the following:

- a. Places, buildings, structures and equipment of cultural significance;
- b. Places to which oral traditions are attached or which are associated with living heritage;
- c. Historical settlements and townscapes;
- d. Landscapes and features of cultural significance;
- e. Geological sites of scientific or cultural importance;
- f. Archaeological and palaeontological importance;
- g. Graves and burial grounds;
- h. Sites of significance relating to the history of slavery; and
- i. Movable objects (e.g. archaeological, palaeontological, meteorites, geological specimens, military, ethnographic, books etc.).

Section 34 (1) of the Act deals with structures that are older than 60 years. Section 35(4) of this Act deals with archaeology, palaeontology and meteorites. Section 36(3) of the Act, deals with human remains older than 60 years. Unidentified/unknown graves are also handled as older than 60 years until proven otherwise.

3.1 Heritage Site Significance and Mitigation Measures

The presence and distribution of heritage resources define a Heritage Landscape. In this landscape, every site is relevant. In addition, because heritage resources are non-renewable, heritage surveys need to investigate an entire project area. In all initial investigations, however, the specialists are responsible only for the identification of resources visible on the surface.

This section describes the evaluation criteria used for determining the significance of archaeological and heritage sites. National and Provincial Monuments are recognised for conservation purposes. The following interrelated criteria were used to establish site significance:

- » The unique nature of a site;
- » The integrity of the archaeological/cultural heritage deposit;
- » The wider historic, archaeological and geographic context of the site;
- » The location of the site in relation to other similar sites or features;
- » The depth of the archaeological deposit (when it can be determined or is known);
- » The preservation condition of the site; and
- » Potential to answer present research questions.

The criteria above will be used to place identified sites within the South African Heritage Resources Agency's (SAHRA's) (2006) system of grading of places and objects that form part of the national estate. This system is approved by the Association of South African Professional Archaeologists (ASAPA) for the Southern African Development Community (SADC) region.

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

4. REGIONAL OVERVIEW

4.1 General Information

4.1.1. Database search

Previous heritage studies were conducted in the greater study area (SAHRIS) by Van Ryneveld (2006) and Orton (2015) and Kaplan and Wiltshire (2011). All the studies recorded ESA, MSA and LSA artefacts scattered over the landscape with MSA and LSA sites centred on pans and watercourses. Studies by Van der Walt (2012, 2013, 2017) concurred with these findings and also recorded widespread Stone Age scatters and some discreet MSA and LSA sites. Interestingly the farms under investigation or parts thereof were subjected to HIA studies for other projects and is summarised below:

Author	Year	Project	Findings
Orton, J.	2011	Heritage impact assessment for a proposed photovoltaic energy plant on the farm Hoekplaas near Copperton, Northern Cape	Stone Age scatters and stone walled enclosures.
Orton, J. & Webley, L.	2013a	Heritage Impact Assessment for Multiple Proposed Solar Energy Facilities on Farm Hoekplaas 146, Copperton, Northern Cape	Archaeological resources were found to be widespread across the site but the majority are of low value. A few sites, located predominantly around the pans, were of higher value and would require mitigation if they cannot be protected. Particularly important in this regard is an MSA site with fossil bone located at a quarried pan alongside the main road. One area at PV11 has extensive archaeological resources and is best avoided
Orton, J. & Webley, L.	2013b	Heritage Impact Assessment for Multiple Proposed Solar Energy Facilities on The Remainder of Farm Klipgats Pan 117, Copperton, Northern Cape	Archaeological resources were found to be widespread across the site but the majority are of low value. A few sites, located predominantly around the pans and on the hill in the south, were of higher value and would require mitigation if they cannot be protected. One area, the northern part of Alternative 1 PV2, has extensive archaeological resources and is best avoided.
De Kock, SE & Narainne, GJR.	2016	Integrated Heritage Impact Assessment In Terms Of Section 38(8) Of The National Heritage Resources Act, 1999 (Act 25 Of 1999) Proposed Development Of Humansrus Solar PV Facility 4 On The Farm Humansrus 147, Prieska District And Pixley Ka Seme District Municipality, Northern Cape Province	The archaeological survey identified an amorphous distribution of Early and Middle Stone Age artefacts randomly scattered across the landscape. No Later Stone Age sites, such as those mitigated by Orton (2014) on the adjoining farm of Klipgats Pan 117, were observed.

The above-mentioned studies recorded the following sites located within the study area as described in Table 1.

Table 1. Known heritage features in the study area

Site Number	Site Name	Grading	Coordinates		Description
HUM147/024	Humansrus	IIIc	-29,979568	22,362691	Discrete pavement with some medium density ESA. 1 x weathered biface. (2013- 2017)
HOEK030	Hoekplaas	IIIc	-30,062694	22,37475	Low density background scatter across this hill. The area is very rocky. There are large numbers of particularly large artefacts and most of this material is probably ESA. No doubt the hill provided a good source of stone materials for flaking.
HUM147/008	Humansrus	IIIc	-29,966748	22,365059	Pan areas with low density general scatter. Bedrock outcrops. Possibly all ESA.
HUM147/009	Humansrus	IIIc	-29,967567	22,363588	Pan areas with low density general scatter. Bedrock outcrops. Possibly all ESA.
HUM147/010	Humansrus	IIIc	-29,968212	22,362571	Pan areas with low density general scatter. Bedrock outcrops. Possibly all ESA.
HUM147/023	Humansrus	IIIc	-29,977933	22,359834	Discrete pavement with some medium density ESA. 1 x weathered biface.
KGP2014/006	KGP2014/006	IIIa	-30,032728	22,314541	LSA site with quartz, quartzite, cryptocrystalline silica (CCS), a CCS adze, 1 hammer stone / upper grindstone, a fragment of Unio caffer (freshwater mussel shell) and much ostrich eggshell.
KGP2014/008	KGP2014/008	IIIb	-30,035314	22,309609	LSA site with quartz, quartzite and ostrich eggshell, two probable lower grindstones.
KGP2014/009	KGP2014/009	IIIb	-30,034618	22,309413	LSA scatter with quartz, quartzite and a hammer stone, tooth fragment, ostrich eggshell. Fairly low density but enough to be meaningful.
KGP2014/011	KGP2014/011	IIIc	-30,033262	22,308308	Ephemeral LSA site among bushes with quartz, quartzite, ostrich eggshell.
HOEK032	Hoekplaas	IIIb	-30,029444	22,39575	LSA scatter with CCS, quartz, quartzite, bladelets in a sandy area with bushes near the pan. Might be subsurface material present here.
HOEK035	Hoekplaas	IIIc	-30,028861	22,395417	LSA scatter and some background scatter inside the edge of the pan in a sandy area. Quite widespread.
HOEK036	Hoekplaas	IIIc	-30,029139	22,3955	LSA scatter in a sandy area inside the edge of the pan. Quartz, CCS, quartzite, bladelets, one large thumbnail scraper.
HOEK031	Hoekplaas	IIIb	-30,029389	22,395389	LSA scatter with CCS, quartz, quartzite, bladelets tooth fragment. Dense scatter in a gravel-free area inside the edge of the pan.
HOEK033	Hoekplaas	IIIb	-30,029194	22,395917	LSA scatter among calcrete nodules. CCS, quartz, quartzite. Extensive scatter.
HOEK034	Hoekplaas	IIIb	-30,028972	22,395806	LSA scatter among calcrete nodules. CCS, quartz, quartzite. Extensive scatter.
KLGP071	KLIPGATS	IIIc	-30,025333	22,323889	Ephemeral LSA scatter of CCS, quartzite and quartz around southern edge of pan.
KLGP075	KLIPGATS	IIIc	-30,011944	22,319556	Quartzite and CCS background scatter in gravel area on crest of calcrete ridge slope. Also, an ephemeral LSA quartz and OES scatter in a proximate sandy patch.
KLGP069	KLIPGATS	IIIb	-30,025028	22,326639	LSA scatter with good spatial integrity. Includes quartz, quartzite, CCS and OES. 15 m diameter in a sandy area alongside a shallow pan.

KLGP074	KLIPGATS	IIIc	-30,021111	22,323972	Ephemeral LSA scatter of quartz and quartzite alongside shallow pan. Some OES nearby as well.
KGP2014/016	KGP2014/016	IIIb	-30,039893	22,312095	LSA scatter with quartz and ostrich eggshell.
KLGP076	KLIPGATS	IIIc	-30,01275	22,316583	Mixed LSA (CCS and OES) and background (quartzite and CCS) scatter in sandy area with gravel near shallow pan.
KLGP077	KLIPGATS	IIIc	-30,012778	22,316167	Light LSA scatter of CCS, quartz and OES plus a scatter of grey quartzite which is probably mostly background scatter in pan. Bone frag
KLGP078	KLIPGATS	IIIc	-30,012806	22,315944	LSA scatter of quartz, quartzite, CCS and OES in shallow pan with gravel. Quite diffused and 15 to 20 m in diameter.
KLGP079	KLIPGATS	IIIc	-30,012861	22,315667	LSA scatter of quartz, quartzite and CCS in sandy area in shallow pan. Quite widespread and about 20 m diameter.
KLGP080	KLIPGATS	IIIc	-30,012389	22,315778	LSA scatter of quartz and quartzite in sandy area with gravel near edge of shallow pan. Diffuse scatter.
KGP2014/010	KGP2014/010	IIIc	-30,033028	22,3085	Ephemeral LSA site among bushes with quartz, quartzite, ostrich eggshell.
KGP2014/014	KGP2014/014	IIIc	-30,04325	22,300444	Ephemeral LSA scatter among bushes with quartzite and 2 lower grindstones.
KGP2014/004	KGP2014/004	IIIb	-30,035864	22,312127	LSA scatter of pottery and background scatter of stone artefacts alongside ephemeral pan. At last 12 sherds (1 rim), mixed grass and mineral (grit) temper. Context is poor but soil containing sherds should be sieved.
KGP2014/012	KGP2014/012	IIIc	-30,032917	22,308111	Ephemeral LSA site with quartz, quartzite.
KGP2014/013	KGP2014/013	IIIb	-30,0325	22,308544	Ephemeral LSA site among bushes with quartz, quartzite, hornfels, CCS, ostrich eggshell.
KGP2014/018	KGP2014/018	IIIc	-30,038694	22,305361	Small scatter of fresh quartzite flakes, all same material, presumably LSA.
KGP2014/019	KGP2014/019	IIIc	-30,038111	22,326611	LSA scatter with quartzite and CCS in sandy patch behind bushes.
KGP2014/020	KGP2014/020	IIIc	-30,036611	22,321333	Ephemeral LSA quartz scatter around an ephemeral pan.
KPGP005	Klipgats	IIIc	-30,032833	22,302306	Background scatter, mixed age, quartz and quartzite LSA artefacts and older material.
HOEK001	Hoekplaas	IIIc	-29,994833	22,349722	Discrete quartzite scatter with all artefacts of same type of rock which looks fresh. Likely LSA
KLGP002	Klipgats_Pan	IIIb	-30,028333	22,315417	Discrete LSA quartz scatter with some quartzite and some ostrich eggshell. Approximately 9 m diameter. Quartz and ostrich eggshell both fresh.
HOEK004	Hoekplaas	IIIc	-30,015361	22,364361	Small LSA CCS, quartz and quartzite scatter in an open sandy area.
KLGP003	Klipgats_Pan	IIIb	-30,027528	22,320056	LSA quartz, quartzite and CCS scatter with lots of ostrich eggshell. One upper grindstone.
HOEK005	Hoekplaas	IIIc	-30,015472	22,364556	More LSA CCS, quartz and quartzite scatter in an open sandy area.
KLGP004	Klipgats_Pan	IIIc	-30,025528	22,322639	Scatter of ostrich eggshell. LSA. Some quartzite but this may be background scatter.
HOEK006	Hoekplaas	IIIc	-30,015917	22,364778	LSA scatter of CCS, quartz, quartzite and ostrich eggshell in sandy (but bushy) area. Also, a lower grindstone and a hammer stone / upper grindstone

KPGP017	Klipgats	IIIc	-30,037528	22,313861	Ostrich eggshell scatter with background scatter SA and LSA in ephemeral pan.
HOEK007	Hoekplaas	IIIc	-30,016444	22,365	LSA scatter of CCS, quartz and quartzite in sandy area with some gravel.
KLGP005	Klipgats_Pan	IIIc	-30,053139	22,3215	Scatter of ostrich eggshell and one possible backed quartz flake. LSA.
HOEK008	Hoekplaas	IIIb	-30,016361	22,3655	LSA scatter of CCS, quartz and quartzite and including one CCS backed point.
HOEK010	Hoekplaas	IIIb	-30,015389	22,366583	LSA CCS, quartz, quartzite and hornfels scatter including one hornfels backed point.
HOEK012	Hoekplaas	IIIc	-30,015111	22,366389	LSA scatter of CCS, quartz and quartzite in sandy area with some calcrete fragments.
HOEK013	Hoekplaas	IIIc	-30,013444	22,365194	Ephemeral LSA scatter of CCS, quartz and quartzite in a sandy area.
HOEK013	Hoekplaas	IIIc	-30,024778	22,357778	Ephemeral LSA scatter of CCS, quartz and quartzite in a sandy area.
HOEK015	Hoekplaas	IIIc	-30,030639	22,364778	LSA scatter of CCS, quartz, quartzite and ostrich eggshell. Some bone noted and one CCS end scraper. Also, background scatter in the area.
KLGP009	Klipgats_Pan	IIIc	-30,059583	22,309944	Ephemeral LSA quartz scatter on sand.
HOEK017	Hoekplaas	IIIc	-30,024611	22,371389	Ephemeral LSA scatter of CCS, quartz and quartzite in a sandy area.
KLGP010	Klipgats_Pan	IIIb	-30,059778	22,309611	Dense LSA quartz, quartzite and CCS scatter on sand. One CCS scraper. Bone fragments, one mandible.
HOEK018	Hoekplaas	IIIc	-30,012111	22,364583	Ephemeral LSA quartzite, as well as background scatter in a sandy area.
HOEK020	Hoekplaas	IIIc	-29,9895	22,356583	LSA scatter in a sandy area in an ephemeral pan. Quartz, quartzite and CCS and some ostrich eggshell (OES) nearby.
KLGP011	Klipgats_Pan	IIIb	-30,059972	22,308944	LSA quartz and CCS scatter in sandy area. One CCS scraper.
KLGP012	Klipgats_Pan	IIIc	-30,061056	22,307944	LSA quartz, quartzite, hornfels and CCS scatter on top of hill among gravel. Also, some pink glass in this area.
KLGP013	Klipgats_Pan	IIIc	-30,060556	22,309806	Ephemeral LSA scatter of quartz, CCS, pink glass and a square iron nut.
KLGP014	Klipgats_Pan	IIIb	-30,060639	22,309917	Small stone circle. Nearby are LSA quartz and CCS artefacts, OES, burnt bone fragments, glass and ceramics including a stopper.
KLGP015	Klipgats_Pan	IIIc	-30,060972	22,310167	LSA quartz, quartzite and CCS scatter and small metal fragment of an old harmonica.
KLGP023	Klipgats_Pan	IIIc	-30,026306	22,320722	Ephemeral LSA quartz and CCS scatter.
KLGP024	Klipgats_Pan	IIIc	-30,026472	22,319861	Low density LSA quartz, CCS, quartzite scatter of 20 m diameter.
KLGP025	Klipgats_Pan	IIIc	-30,027694	22,310444	Ephemeral LSA quartz, CCS, quartzite and ostrich eggshell scatter of 20 m diameter alongside ephemeral pan.
KLGP026	Klipgats_Pan	IIIc	-30,027028	22,310194	Ephemeral LSA scatter of Quartzite, CCS and ostrich eggshell. Includes a distal tip of a hand-axe which is all that is left after using the hand-axe as a core.
KLGP027	Klipgats_Pan	IIIc	-30,028111	22,309333	Ephemeral LSA scatter of quartzite, quartz and ostrich eggshell.
KLGP029	Klipgats_Pan	IIIc	-30,029	22,313722	Ephemeral scatter of ostrich eggshell. LSA.
KLGP030	Klipgats_Pan	IIIc	-30,029222	22,314556	Ephemeral LSA scatter of quartz, quartzite and CCS.
KLGP028	Klipgats_Pan	IIIc	-30,027889	22,31	Small, discrete LSA quartz scatter of 3 m diameter

KLGP031	Klipgats_Pan	IIIc	-30,029583	22,315639	Ephemeral LSA scatter of quartzite, quartz and ostrich eggshell.
KLGP032	Klipgats_Pan	IIIc	-30,015139	22,313167	LSA scatter of quartz, quartzite and CCS in ephemeral pan area.
KLGP033	Klipgats_Pan	IIIc	-30,014917	22,311667	Scatter of LSA quartz, quartzite, CCS and ostrich eggshell in ephemeral pan area. Also includes a crystal quartz backed triangle.
KLGP034	Klipgats_Pan	IIIc	-30,061889	22,308417	Ephemeral LSA quartz scatter.
KLGP035	Klipgats_Pan	IIIc	-30,062889	22,307667	LSA scatter of quartz, CCS, quartzite and ostrich eggshell in sandy area. One CCS thumbnail scraper.
KLGP036	Klipgats_Pan	IIIc	-30,062917	22,307333	LSA scatter of CCS, quartz and quartzite in sandy area.
KLGP037	Klipgats_Pan	IIIc	-30,062778	22,306944	LSA scatter of CCS, quartz, quartzite and ostrich eggshell in sandy area.
KLGP038	Klipgats_Pan	IIIc	-30,062417	22,305778	Ephemeral scatter of LSA quartz and CCS.
KLGP040	Klipgats_Pan	IIIb	-30,063639	22,305583	Large LSA scatter of quartz, quartzite, CCS and hornfels with bone and ostrich eggshell. Large number of stone artefacts.
KLGP041	Klipgats_Pan	IIIc	-30,063639	22,305278	Scatter of ostrich eggshell with few artefacts. LSA.
KLGP042	Klipgats_Pan	IIIc	-30,063778	22,305056	LSA scatter of quartz, quartzite and hornfels on crest of hill. Also ostrich eggshell and a possible glass flake.
KLGP043	Klipgats_Pan	IIIc	-30,063083	22,305139	Extensive, low density scatter of LSA quartz, quartzite, CCS and hornfels.
KLGP044	Klipgats_Pan	IIIc	-30,06375	22,30625	LSA quartz and ostrich eggshell scatter on river bank.
KLGP046	Klipgats_Pan	IIIc	-30,056917	22,295361	Ephemeral LSA scatter of quartz, quartzite and CCS.
KLGP047	Klipgats_Pan	IIIa	-30,067806	22,308306	Very high density and extensive LSA scatter of quartz, quartzite, CCS and ostrich eggshell. Also, bone frags. Ostrich eggshell flask mouth and some decorated fragments on one patch, more decorated fragments on another patch. Points around the edges.
KLGP049	Klipgats_Pan	IIIc	-30,067806	22,307889	LSA quartz scatter with a lower grindstone / hammer stone. Also, ostrich eggshell.
KLGP050	Klipgats_Pan	IIIc	-30,067583	22,307861	LSA quartz and quartzite scatter.
KLGP052	Klipgats_Pan	IIIb	-30,066444	22,308583	LSA scatter of quartz, quartzite and CCS. Quartzite unifacial artefact.
KLGP053	Klipgats_Pan	IIIc	-30,066083	22,308306	Small scatter of LSA quartz, CCS and quartzite.
KLGP055	Klipgats_Pan	IIIc	-30,065361	22,307806	LSA scatter of quartz and CCS with some bone.
KLGP056	Klipgats_Pan	IIIc	-30,065333	22,307611	LSA scatter of quartz, CCS, quartzite and ostrich eggshell.
KLGP062	Klipgats_Pan	IIIc	-30,066694	22,3085	LSA scatter of quartz, quartzite, CCS and ostrich eggshell. One CCS thumbnail scraper.
KLGP063	Klipgats_Pan	IIIb	-30,066611	22,308583	Dense LSA scatter of quartz, CCS, quartzite and ostrich eggshell
KLGP064	Klipgats_Pan	IIIc	-30,028861	22,315	LSA quartzite, quartz and ostrich eggshell scatter. All same pale grey quartzite and there is lots of ostrich eggshell. Also, a CCS hammer stone. Site about 10 m diameter
KLGP065	Klipgats_Pan	IIIc	-30,014806	22,315306	Small, discrete scatter of green CCS in a 1 m diameter area. LSA.
HOEK021	Hoekplaas	IIIc	-29,992889	22,352417	Mixture of background scatter and an LSA scatter amongst taller bushes in a shallow water course. Includes quartz, quartzite, porphyry, CCS, ceramic, glass. Mitigate in the densest LSA area only

HOEK022	Hoekplaas	IIIc	-29,993139	22,351639	LSA scatter among bushes in shallow water course. Includes quartz, quartzite, CCS, OES.
HOEK024	Hoekplaas	IIIc	-30,037028	22,379722	LSA scatter of quartz, quartzite, CCS and OES at edge of grassy pan. Also, quartzite background scatter here.
HOEK025	Hoekplaas	IIIc	-30,037083	22,380333	LSA scatter of quartz, quartzite, CCS and OES near grassy pan.
HOEK026	Hoekplaas	IIIc	-30,037583	22,381972	LSA scatter of quartz, quartzite, CCS and OES near grassy pan. Also, some background scatter here.
HOEK027	Hoekplaas	IIIc	-30,036167	22,379833	LSA scatter of quartz, quartzite and CCS on edge of pan.
HOEK028	Hoekplaas	IIIb	-30,036139	22,379556	Good LSA scatter of quartz, quartzite and CCS inside edge of grassy pan. Fairly continuous scatter at this distance in from edge of grassy pan.
HOEK029	Hoekplaas	IIIc	-30,036361	22,379417	Good LSA scatter of quartz, quartzite and CCS inside edge of grassy pan. Fairly continuous scatter at this distance in from edge of grassy pan. Similar to the above but mostly quartzite.
KLGP082	KLIPGATS	IIIb	-30,026361	22,319917	Dense distribution of artefacts on a sandy plain. Grey and black quartzite flakes, flaked quartz cobbles. Although some flakes look recently flaked, there is some MSA present. Extends over an area 5m x 5m.
HUM147/058	Humansrus	IIIc	-29,995847	22,399498	A triangular (convergent) MSA flake
HUM147/059	Humansrus	IIIc	-29,994905	22,398923	A triangular (convergent) MSA flake
HUM147/060	Humansrus	IIIc	-29,994501	22,397664	A triangular (convergent) MSA flake, A few banded ironstone flakes.
KPGP004	Klipgats	IIIc	-30,033333	22,302417	Background scatter, mixed age, several MSA blades.
HUM147/001	Humansrus	IIIc	-29,958403	22,375361	Area of pan with MSA scatter sporadically around the edges.
HUM147/113	Humansrus	IIIc	-29,991994	22,394655	Fine-grained rock. MSA. An artefact which looks like a large adze
HUM147/002	Humansrus	IIIc	-29,95872	22,37599	Area of pan with MSA scatter sporadically around the edges.
HUM147/003	Humansrus	IIIc	-29,958973	22,376137	Area of pan with MSA scatter sporadically around the edges. A 1 x unifacial point. Small biface artefact.
HUM147/004	Humansrus	IIIc	-29,964675	22,375751	Light MSA scatter at the edge of the pan. Slightly concentrated at GPS point but scattered throughout in low density.
HUM147/005	Humansrus	IIIc	-29,965701	22,376155	Light MSA scatter at the edge of the pan. Slightly concentrated at GPS point but scattered throughout in low density.
HOEK045	Hoekplaas	IIIc	-30,036778	22,379389	Very dense distribution of artefacts on the inside margins of the same pan in chert, quartz, quartzite and CCS. MSA artefacts are present.
MIER002	Mierdam	IIIa	-30,07039	22,35148	Stone tools were identified to occur specifically in areas where there are outcrops or low hills and most commonly date to the Middle Stone Age, although one site also included material that can be dated to the Later Stone Age.
KPGP001	Klipgats	IIIc	-30,032333	22,302333	Background scatter, mixed age (MSA and LSA).
KPGP010	Klipgats	IIIc	-30,03475	22,312139	Background scatter in ephemeral pan, MSA with some possible LSA.
HOEK002	Hoekplaas	IIIa	-30,003889	22,356111	This site is revealed in the eroded edge of a pan which has been quarried for road material. There is a layer of pebbles and artefacts about 0,3 m to 0,5 m below surface and is a reburied lag deposit. The assemblage is blade-rich MSA quartzite

KLGP001	Klipgats_Pan	IIIb	-30,014778	22,31525	Dense background scatter among cobbles and gravel but including a scatter of MSA material in one stone type. Some LSA around too. One ESA hand-axe. Materials include quartzite, CCS, silcrete, quartz and others
HOEK003	Hoekplaas	IIIa	-30,0035	22,356	This site is revealed in the eroded edge of a pan which has been quarried for road material. There is a layer of pebbles and artefacts about 0,3 m to 0,5 m below surface and is a reburied lag deposit. The assemblage is blade-rich MSA quartzite
HOEK041	Hoekplaas	IIIc	-29,991861	22,362111	Background scatter. Some very weathered hornfels artefacts including one handaxe. Spread of relatively recently flaked quartzite flakes nearby, probably LSA superimposed on MSA and ESA.
HOEK049	Hoekplaas	IIIc	-30,024167	22,396056	On inside margin of the pan, another scatter of artefacts. Both MSA and LSA present. Many pieces on quartz, chert also some jasper.
HUM147/020	Humansrus	IIIc	-29,96993	22,368399	Extensive grey quartzite outcrop area with stone scatter. Low density ESA/MSA but made on variety of raw materials. [1996-1998]
HUM147/063	Humansrus	IIIc	-29,99127	22,399481	Next to the powerline servitude several bedrock boulders with dense distribution of stone artefacts. Concentration of weathered ESA on hornfels. Crude handaxe. Smaller quartzite flakes probably MSA. Some banded ironstone cores, 1 blade in hornfel
PRIES001	Prieska	IIIb	-30,09346	22,34082	Stone tools were identified to occur specifically in areas where there are outcrops or low hills and most commonly date to the Middle Stone Age, although one site also included material that can be dated to the Later Stone Age.
PRIES002	Prieska	IIIb	-30,07039	22,35148	Stone tools were identified to occur specifically in areas where there are outcrops or low hills and most commonly date to the Middle Stone Age, although one site also included material that can be dated to the Later Stone Age.
MIER001	Mierdam	IIIa	-30,09346	22,34082	Stone tools were identified to occur specifically in areas where there are outcrops or low hills and most commonly date to the Middle Stone Age, although one site also included material that can be dated to the Later Stone Age.

4.1 2. Public consultation

No public consultation was conducted by the heritage consultant during the scoping phase.

4.1.3. Google Earth and mapping survey

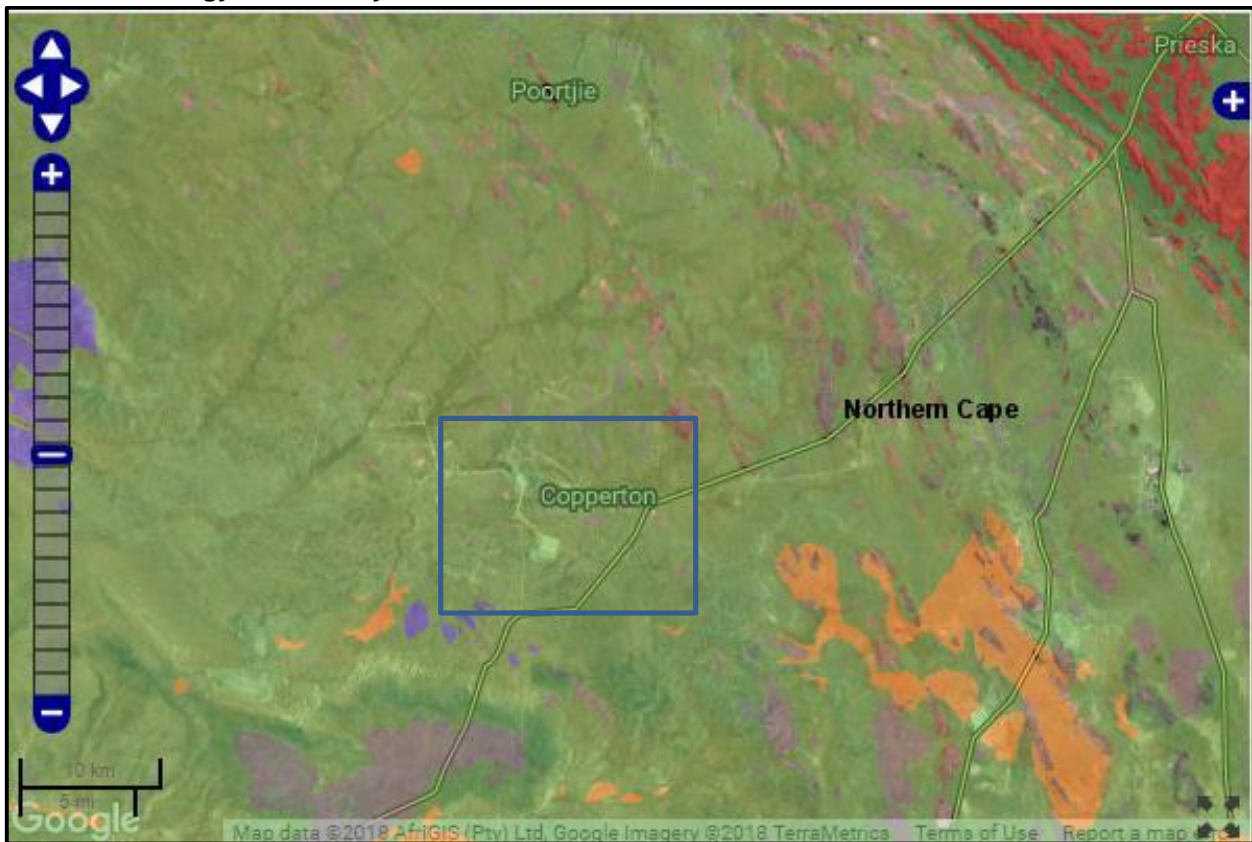
Google Earth and 1:50 000 maps of the area were utilised to identify possible places where archaeological sites might be located.

4.1.4. Genealogical Society of South Africa

No grave sites are on record for the study area.

5. BACKGROUND INFORMATION AVAILABLE ON THE STUDY AREA

5.1. Palaeontology of the study area



Colour	Sensitivity	Required Action
RED	VERY HIGH	Field assessment and protocol for finds is required
ORANGE/YELLOW	HIGH	Desktop study is required and based on the outcome of the desktop study, a field assessment is likely
GREEN	MODERATE	Desktop study is required
BLUE	LOW	No palaeontological studies are required however a protocol for finds is required
GREY	INSIGNIFICANT/ZERO	No palaeontological studies are required
WHITE/CLEAR	UNKNOWN	These areas will require a minimum of a desktop study. As more information comes to light, SAHRA will continue to populate the map.

Figure 4. The approximate study area indicated on the SAHRIS Paleontological map as of moderate significance.

5.2. Archaeological Overview of the study area.

Beaumont *et al.* (1995: 240) observed that “thousands of square kilometres of Bushmanland are covered by a low-density lithic scatter”. These artefacts are generally very well weathered and mostly pertain to the ESA and MSA. Occasional LSA artefacts are also noted. What is noteworthy of the Northern Cape archaeological record is the presence of pans which frequently display associated archaeological material. Of interest, is the work of Kiberd (2001, 2005, 2006) who excavated Bundu Pan, some 25 to 30 km northwest of Copperton. The site yielded ESA, MSA and LSA horizons and the artefacts were accompanied by warthog and equid teeth to name a few (Beaumont *et al.* 1995).

Orton (2011) noted that to the northwest, west and southwest of Copperton sites have been investigated by Beaumont and colleagues (1995), Smith (1995) and Parsons (2003, 2004, 2007, 2008) yielding LSA deposits. Work on these sites led to a distinction between hunter-gatherer and herder sites, based on stone artefact assemblages (Beaumont *et al.* 1995). All these Later Stone Age sites have very few, if any, organic items on them. The only organic material found on sites like these is fragments of ostrich eggshell probably belonging to broken water containers. Such flasks have been widely recorded across the Northern Cape (Morris 1994).

The archaeological importance of pans in the area are now well documented (Kiberd 2006, Kaplan & Wiltshire 2011, Orton 2012) and if any occur in the study area they could be of significance. Van der Walt (2012) recorded low densities of ESA, MSA and LSA scatters and these occurrences were given a field rating of low archaeological significance. However, several discrete MSA and LSA sites were also documented.

Most of the material expected for the study area is MSA in nature consisting of large flakes, radial and bipolar cores, points, end scrapers, large utilized and retouched blade tools, and utilized and retouched flakes.

5.3. Historical Overview

In order to understand the historical context of a certain area, it is necessary to consider the geographic and climatic nature of the region in question. The town of Copperton is located in a region in South Africa known as the Upper Karoo. One gets a good idea of what the natural landscape in the Upper Karoo was like between the late 1700s and early 1800s when reading the transcripts of some of the early European travellers who passed through the area. One C. J. Skead compiled a book in which many of these texts are assembled. In November 1900, the traveller W. Somerville wrote about the Groot Riviers Poort, or Prieskapoort, 10km south of Prieska and therefore not very far from Copperton. He noted that grasslands and thorn trees covered the landscape, but that no tree was to be seen. When he neared the Orange River, he noted that the banks were covered with wood, but only along the margin of the river. These were mainly willow and karee trees. Along the tributary streams were thorn trees (Skead 2009: 87).

Exactly one year later, One P. B. Borchers wrote about the Grootrivierpoort at Prieska, making similar remarks about the flora as Somerville did. He also noted that the *poort* at the entrance to the Orange River was known by the “natives” under the name of t’Gariiep. When this traveller passed along the banks of the Orange River near Prieska in the same year, he made notes on the Bushmen, who were still present in the area at that time.

Regarding the manufacturing of bows and arrows by the Bushmen, he noted that the wood of the bow was of a type of tree commonly known as *caree boomen*, which was very tough and pliable. The arrows were made of a type of reed fairly common along all springs and river flowing there, known as *fluitjies riet*.

The Bushmen apparently used the poison of venomous plants and poison extracted from the fangs of snakes to smear on their arrow points. These people also found sustenance in a type of small bulb, commonly called *mans uitjies* by the Khoikhoi, which were described to be the size of small marbles and not unpleasant in taste (Skead 2009: 87-88).

In September 1822, W. J. Burchell passed through Prieska, as well as the area to the south and southwest thereof. Some 50km southwest of Prieska, he found a large muddy dam, which was situated in a very extensive hollow flat. This would become a lake in the rainy season. There was apparently still some clean water to be found. The area around this was hard and dry, and plentifully strewn with stones and low shrubs. Burchell passed through Prieska to the Orange River in the same month. He noted that none of the bushes exceeded a foot in height. Nearer to the Orange River, the travelling party found a group of Khoikhoi camped in a grove.

By 1903, Copperton was located in an area in which the annual rainfall measured between 10 and 20 inches, and was therefore quite arid. The study area is located in a summer rainfall region. By the early 1900s, the Prieska district, in which Copperton would be located, could not be considered a very agriculturally active area. Only between 25 and 50 sheep were kept per square mile, and only between 2 and 5 heads of cattle. The area where Copperton was later founded would have been too dry and too far from the Orange River to allow for the growing of crops (Burton 1903: 40; 256).

In an article in the Patriot, dated December 1995, some background information is given on the history of the town of Copperton. This town is not very old, as it was only developed in 1972 with the establishment of a copper mine in the area. The mine closed in 1992, and Copperton was sold to a private person, on the condition that the houses in the town would be demolished. About 300 houses were broken down, when it was decided that some homes would be kept in order to develop a retirement town. These houses were apparently solidly built, with stone walls and corrugated roofs. It was noted that the area was very sparsely populated, and that the farmers in the area farmed with sheep. Next to the Orange River, maize and grapes were planted. It was noted that the closest hospitals were located at Prieska, some 35 to 40 minutes' drive from Copperton, and linked with a tarred road (Anon 1995: 4).

5.4 Historical maps and documents relating to the area under investigation

The site under investigation is located on both sides of the R357, about eight kilometres to the south of Copperton and about 47 kilometres south west of Prieska in the Northern Cape Province. This study area comprises the following properties:

- Klipgats Pan 117: Portions 3, 4 & 5
- Kaffirs Kolk 118: Portions 1, 4 & RE
- Hoekplaas 146: RE
- Humansrus 147: RE

Firstly, historical topographical maps will be provided, in order to show how the area developed over time. In the second section, references for relevant documents found at the National Archives will be provided, should a more in-depth study be done in the future.

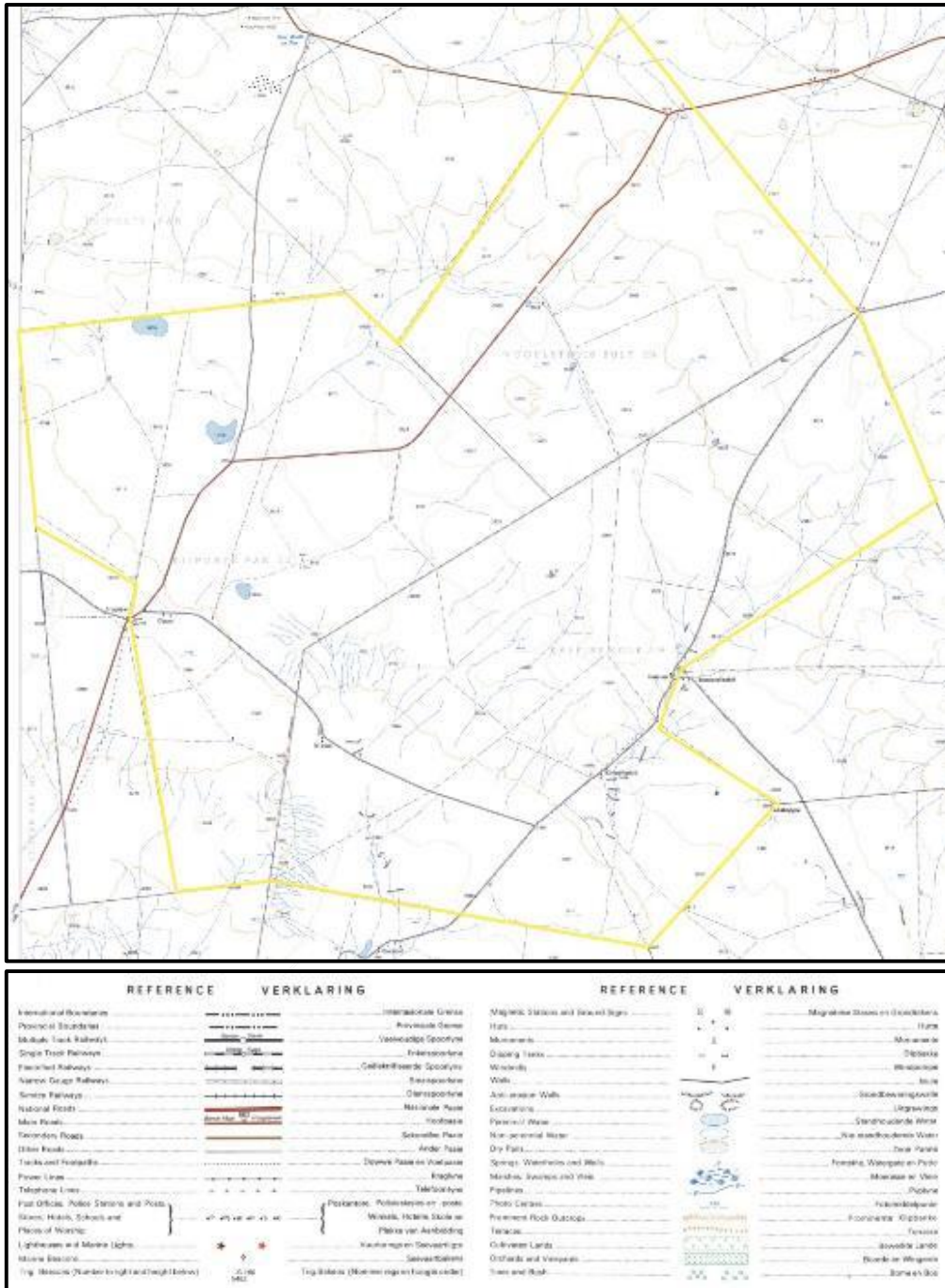
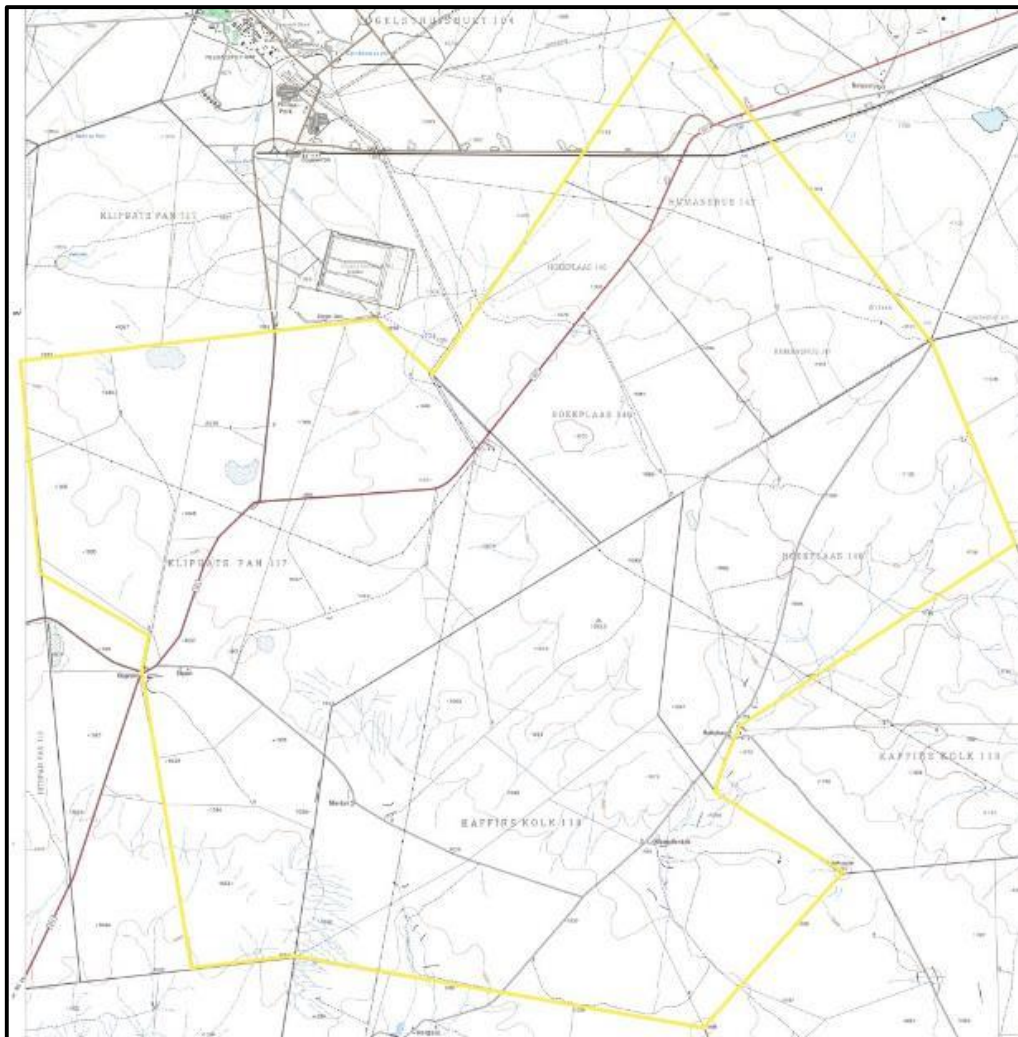


Figure 5. 1970 Topographical map of the sites under investigation.

The approximate study area is indicated with a yellow border (Figure 5). Developments on specific parts of the study area will now be discussed. **Klipgats Pan 117 portions:** A main road, some minor roads, a service railway and a number of tracks / footpaths went through the property; three dams and a number of streams are visible; two buildings and a small dam with anti-erosion walls can be seen at Klippan (centre west); some individual wind mills, a ruin and a water reservoir can be seen in other parts of the property. **Vogelstruis Bult 104 portions:** A main road, a secondary road and three tracks / footpaths went through this area; one can see three small dams and a number of streams; a number of individual wind mills can be seen. **Kaffirs Kolk 118 portions:** Several streams, a service railway, a number of minor roads and tracks / footpaths went through the property; two buildings, a wind mill and several anti-erosion walls can be seen near Mierdam (west); two buildings, a wind mill and several anti-erosion walls can be seen near Kleinkafferskolk (east); to the north east of the latter site, two buildings, a water reservoir, a cultivated land and a small dam with an anti-erosion wall are visible at Hoekplaas; individual wind mills, anti-erosion walls, small dams, a cultivated land and water reservoirs can be seen in other parts of the property. (Topographical Map 1970; Topographical Map 1970).



REFERENCE	VERKLARING	REFERENCE	VERKLARING
National Freeway; National Route	Nasionale Oewegpad; Nasionale Route	International Boundary and Resour	Internasionale Grens as Resour
Arterial Route	Hooftraaroute	Provincial Boundary	Provinsiale Grens
Main Road	Hoofpad	Game, Nature Reserve & State Forest Boundary	Wilt- en Natuurreservaat en Staatswoudgrens
Secondary Road; Bench Mark	Sekondêre Pad; Hoopstenek	Perennial River	Staanhoudende River
Other Road; Bridge	Ander Pad; Brug	Perennial Water	Staanhoudende Water
Track and Hiking Trail	Downs Pad en Voetsporepad	Non-perennial River	Nie-staanhoudende River
Railway; Station or Siding	Spoorweg; Stasie of Bylyn	Non-perennial Water	Nie-staanhoudende Water
Other Railway; Tunnel	Ander Spoorweg; Tunnel	Dry Water Course	Droëloop
Embankment; Cutting	Opwaaier; Deurgroening	Dry Pan	Droë Pan
Power Line	Kraglyn	Mound and Vlei	Muraal en Vlei
Built-up Area	Bevolkte Gebied	Pipehole below ground	Pyplyn (in die grond)
Buildings; Ruin	Geboue; Museum	Water Tower; Reservoir; Water Point	Wateroring; Reservoir; Waterpunt
Post Office; Police Station; Store	Postkantoor; Polisestasie; Winkel	Control Rocks	Kontroleerokke
Place of Worship; School; Hotel	Plak van Aandagting; Skool; Hotel	Provisional Bush Outlines	Provisoriese Koppings
Fence; Wall	Grasheining; Muur	Erehek; Sand	Erehek; Sand
Windmill/Monument	Windmolen/Monument	Woodland	Seibete Gebied
Communication Tower	Kommunikasietoring	Cultivated Land	Beweide Land
Mine Dump; Excavation	Mynafval; Uitgraving	Orchard or Vineyard	Boord of Wingerd
Trigonometrical Station; Merka Beacon	Polstasie; Seewaarskoon	Recreation Ground	Ontspanningsgebied
Lighthouse and Marine Light	Wartoring of Seewaarsig	Row of Trees	Rye Bone
Cemetery; Grave	Begraafplaas; Graf		

Figure 6. 1988 Topographical map of the sites under investigation.

Developments on specific parts of the study area based on the 1988 Topographic map, will now be discussed (Figure 6). **Klippats Pan 117 portions:** A main road, a secondary road, a minor road and a number of tracks / footpaths went through the property; three dams and a number of streams are visible; three buildings, a wind mill and a small dam with anti-erosion walls can be seen near Klippan (centre west); some individual buildings, wind mills, a ruin and a water reservoir can be seen in other parts of the property. **Humansrus RE:** A main road, a secondary road, a railway, a power line and a number of tracks / footpaths went through this area; one can see a small dry pan and a number of streams; a number of individual wind mills, excavation sites and water reservoirs can be seen. **Hoekplaas 146:** A number of streams, a main road and two tracks / footpaths went through the property; two buildings, a water reservoir, a cultivated land and a small dam with an anti-erosion wall are visible at the Hoekplaas site; three small dams, a number of wind mills and a section of cultivated land are visible in different parts of the property. **Kaffirs Kolk 118 portions:** Several streams, a power line, a number of minor roads and tracks / footpaths went through the property; two buildings, a wind mill and several anti-erosion walls can be seen near Mierdam (west); two buildings, a wind mill and several anti-erosion walls can be seen near Kleinkafferskolk (east); individual wind mills, anti-erosion walls and small dams can be seen in other parts of the property. (Topographical Map 1988; Topographical Map 1988)

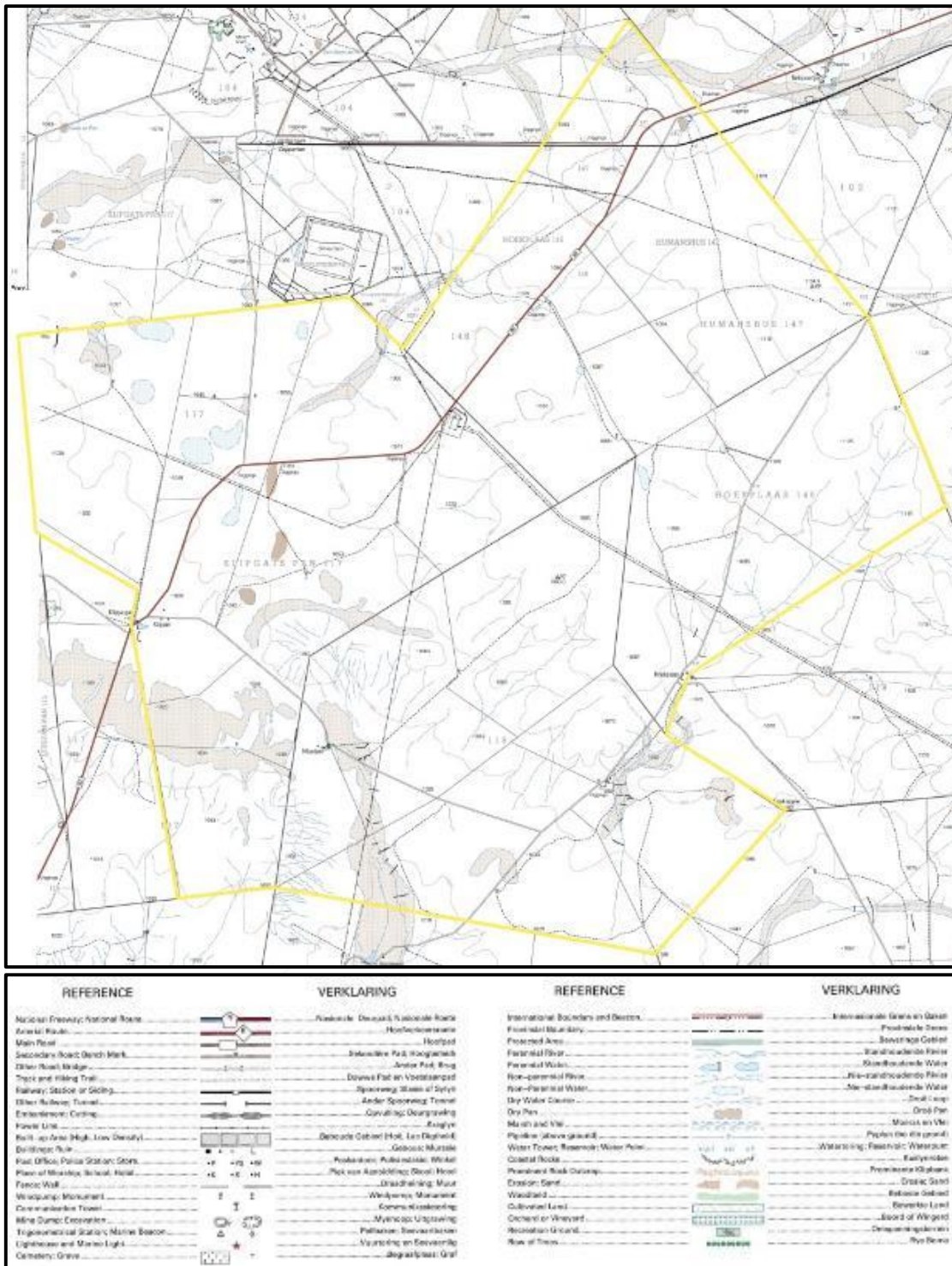


Figure 7. 2005 Topographical map of the sites under investigation.

The approximate study area is indicated with a yellow border (Figure 7). Developments on specific parts of the study area will now be discussed. **Klipgats Pan 117 portions:** A main road, a power line and a number of minor roads and tracks / footpaths went through the property; several dams (some dry, some non-perennial) and a number of streams are visible; three buildings, a wind mill and a small dam with anti-erosion walls can be seen near Klippan (centre west); in the eastern part of the property one can see a development with roads and eight buildings; individual wind mills, a water reservoir and diggings can be seen in other parts of the property. **Humansrus RE:** A number of streams, a main road, a secondary road, a railway, a power line and a number of tracks / footpaths went through this area; a large, dry riverbed is visible in the northern part of the property; a number of individual wind mills, diggings and water reservoirs can be seen. **Hoekplaas 146:** A number of streams, a main road and several tracks / footpaths went through the property; two buildings, a water reservoir and a small dam with an anti-erosion wall are visible at the Hoekplaas site; three small dams, a dry pan and a number of wind mills are visible in different parts of the property. **Kaffirs Kolk 118 portions:** Several streams, a power line, a number of minor roads and tracks / footpaths went through the property; four buildings, a wind mill and several anti-erosion walls can be seen near Mierdam (west); three buildings, a wind mill, diggings and several anti-erosion walls can be seen near the area where Kleinkafferskolk was previously located; large dry pans, individual wind mills and anti-erosion walls can be seen in other parts of the property. (Topographical 2005; Topographical Map 2005)

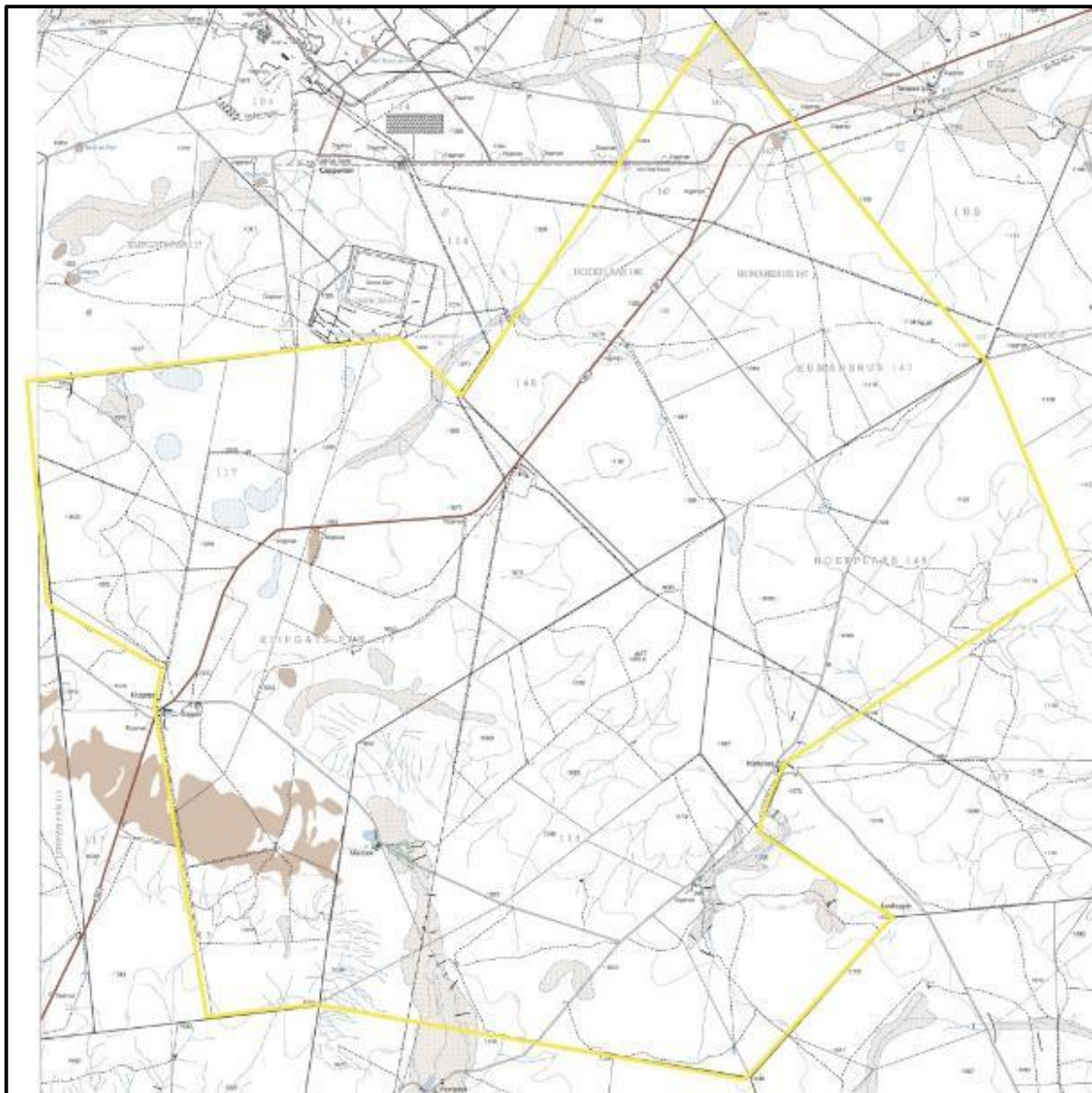


Figure 8. 2011-2014 Topographical map of the sites under investigation.

The following developments can be seen (Figure 8): **Klippgats Pan 117 portions:** A main road, a number of power lines, minor roads and tracks / footpaths went through the property; several dams (some dry, some non-perennial), erosion sites and a number of streams are visible; nine buildings, a ruin, a wind mill, two water reservoirs and two small dams with anti-erosion walls can be seen near Klippan (centre west); in the eastern part of the property one can see a development with roads and four buildings; individual wind mills and a water reservoir can be seen in other parts of the property. **Humansrus RE:** A number of streams, a main road, a secondary road, and old rail route, a minor road, a power line and a number of tracks / footpaths went through this area; a large, dry riverbed is visible in the northern part of the property; a number of individual wind mills, diggings and water reservoirs can be seen. **Hoekplaas 146:** A number of streams, a main road and several tracks / footpaths went through the property; two buildings, a ruin, a water reservoir and a small dam with an anti-erosion wall are visible at the Hoekplaas site; four small dams, diggings and a number of wind mills are visible in other parts of the property. **Kaffirs Kolk 118 portions:** Several streams, a power line, a number of minor roads and tracks / footpaths went through the property; three buildings, a ruin, orchards, a dam and several anti-erosion walls can be seen near Mierdam (west); three buildings, a wind mill, diggings and several anti-erosion walls can be seen near the area where Kleinkafferskolk was previously located; large dry pans, individual buildings, wind mills, water reservoirs and anti-erosion walls can be seen in other parts of the property. (Topographical 2011; Topographical Map 2014)



Figure 9. 2018 Google Earth image showing the study area in relation to Upington, Prieska, the N10 and other sites. (Google Earth 2018)

The following Documents at the National Archives and Records Service of South Africa (NARSSA) can be consulted in future for a more in-depth study

Klipgats Pan 117:

DEPOT KAB (Cape Town Archives Repository)
SOURCE PAE
TYPE LEER
VOLUME_NO 832
SYSTEM 10
REFERENCE P128/118/ER
PART 1
DESCRIPTION PRIESKA **KLIPGATSPAN** PRIMARY SCHOOL. INSPECTION REPORT.
STARTING 1929
ENDING 1936

DEPOT KAB (Cape Town Archives Repository)
SOURCE PAE
TYPE LEER
VOLUME_NO 1064
SYSTEM 11
REFERENCE P128/118
PART 1
DESCRIPTION PRIESKA **KLIPGATSPAN** PRIMARY SCHOOL ADMINISTRATIVE AND PERSONNEL AFFAIRS.
STARTING 1930
ENDING 1934

DEPOT KAB (Cape Town Archives Repository)
SOURCE PAE
TYPE LEER
VOLUME_NO 1064
SYSTEM 11
REFERENCE P128/118
PART 2
DESCRIPTION PRIESKA **KLIPGATSPAN** PRIMARY SCHOOL ADMINISTRATIVE AND PERSONNEL AFFAIRS.
STARTING 1935
ENDING 1941

DEPOT KAB (Cape Town Archives Repository)
SOURCE PAE
TYPE LEER
VOLUME_NO 832
SYSTEM 10

REFERENCE P128/118/ER

PART 2

DESCRIPTION PRIESKA **KLIPGATSPAN** PRIMARY SCHOOL. INSPECTION REPORT.

STARTING 1938

ENDING 1940

Kaffirs Kolk 118:

DEPOT KAB (Cape Town Archives Repository)

SOURCE LND

TYPE LEER

VOLUME_NO 1/255

SYSTEM 01

REFERENCE L747

PART 1

DESCRIPTION "**KAFFIRSKOLK**", PRIESKA DIVISION: LEASE OF FOR 10 YEARS
REQUESTING.

STARTING 1887

ENDING 1887

DEPOT KAB (Cape Town Archives Repository)

SOURCE LND

TYPE LEER

VOLUME_NO 1/259

SYSTEM 01

REFERENCE L846

PART 1

DESCRIPTION ARREAR QUITRENT UNDER ACT 14/78 DUE ON LOT 4823, "**KAFFIRSKOLK**"
AND "**T**'GARDEN": RESUMPTION OF RECOMMENDING.

STARTING 1887

ENDING 1887

DEPOT SAB (Pretoria National Archives Repository)

SOURCE MNW

TYPE LEER

VOLUME_NO 919

SYSTEM 01

REFERENCE MM505/28

PART 1

DESCRIPTION BOVENSTE **KAFFIRSKOLK** PORTION **KAFFIRSKOLK** AND "**T**" GOEDEN
PRIESKA - DISPOSAL LAND SETTLEMENT ACT

STARTING 1928

ENDING 1928

DEPOT SAB (Pretoria National Archives Repository)
SOURCE LDE
TYPE LEER
VOLUME_NO 4410
SYSTEM 01
REFERENCE E13678
PART 3
DESCRIPTION PRIESKA BOVENSTE **KAFFIRS KOLK** GEDEELTE VAN DIE PLAAS **KAFFIRS KOLK** EN T'GOEDEN JC CILLIERS EN AC CILLIERS JUNIOR.
STARTING 1939
ENDING 1949

DEPOT SAB (Pretoria National Archives Repository)
SOURCE LDE
TYPE LEER
VOLUME_NO 4411
SYSTEM 01
REFERENCE E13678
PART 4
DESCRIPTION PRIESKA BOVENSTE **KAFFIRS KOLK** SYNDE GEDEELTE VAN DIE PLAAS **KAFFIRS KOLK** EN T'GOEDEN - JC CILLIERS EN AC CILLIERS.
STARTING 1949
ENDING 1963
REMARKS RH CILLIERS.

Vogelstruis Bult 104:

DEPOT KAB (Cape Town Archives Repository)
SOURCE LND
TYPE LEER
VOLUME_NO 1/339
SYSTEM 01
REFERENCE L3959
PART 1
DESCRIPTION LOT 4824, "**VOGELSTRUIS BULT**", PRIESKA: APPLICATIONS FOR.
STARTING 1889
ENDING 1890

DEPOT KAB (Cape Town Archives Repository)
SOURCE LND
TYPE LEER
VOLUME_NO 1/772
SYSTEM 01

REFERENCE L13094

PART 1

DESCRIPTION PRIESKA, **VOGELSTRUIS BULT**: ANNUAL QUITRENT, RE.

STARTING 1900

ENDING 1901

DEPOT KAB (Cape Town Archives Repository)

SOURCE LDR

TYPE LEER

VOLUME_NO 127

SYSTEM 01

REFERENCE F22/1192

PART 1

DESCRIPTION LAND BOARD REPRESENTATIVE. ANNEX **VOGELSTRUIS BULT**, PRIESKA.

STARTING 1930

ENDING 1930

DEPOT SAB (Pretoria National Archives Repository)

SOURCE BAO

TYPE LEER

VOLUME_NO 2730

SYSTEM 01

REFERENCE C31/3/2730

PART 1

DESCRIPTION ENKELKWARTIERE. PLUTO MINING AND PROSPECTING COMPANY
VOGELSTRUISBULT PRIESKA.

STARTING 19700421

ENDING 19731019

REMARKS A12/3/6/P61/4.

DEPOT KAB (Cape Town Archives Repository)

SOURCE KUS

TYPE LEER

VOLUME_NO 4/834

SYSTEM 01

REFERENCE 7/2/1/E2503

PART 1

DESCRIPTION ONDERWYS. PRIMERE, JUNIOR EN SENIOR SEKONDERE SKOLE.
DAARSTELLING, NAAMSVERANDERING EN SLUITING. **VOGELSTRUISBULT** LAERSKOOL,
PRIESKA.

STARTING 19700000

ENDING 19800000

DEPOT KAB (Cape Town Archives Repository)
SOURCE KUS
TYPE LEER
VOLUME_NO 4/834
SYSTEM 01
REFERENCE 7/2/1/E2503
PART 2
DESCRIPTION ONDERWYS. PRIMERE, JUNIOR EN SENIOR SEKONDERE SKOLE.
DAARSTELLING,
NAAMSVERANDERING EN SLUITING. **VOGELSTRUISBULT LAERSKOOL, PRIESKA.**
STARTING 19810000
ENDING 19850000

DEPOT KAB (Cape Town Archives Repository)
SOURCE KUS
TYPE LEER
VOLUME_NO 4/835
SYSTEM 01
REFERENCE 7/2/1/E2503
PART 3
DESCRIPTION ONDERWYS. PRIMERE, JUNIOR EN SENIOR SEKONDERE SKOLE.
DAARSTELLING, NAAMSVERANDERING EN SLUITING. **VOGELSTRUISBULT LAERSKOOL, PRIESKA.**
STARTING 19860000
ENDING 19880000

Hoekplaas 146:

No documents found

Humansrus 147:

No documents found



6. PROBABILITY OF OCCURRENCE OF SITES

Based on the above information, it is possible to determine the probability of finding archaeological and cultural heritage sites within the study area to a certain degree. For the purposes of this section of the report the following terms are used – low, medium and high probability. Low probability indicates that no known occurrences of sites have been found previously in the general study area. Medium probability indicates some known occurrences in the general study area are documented and can therefore be expected in the study area. A high probability indicates that occurrences have been documented close to or in the study area and that the environment of the study area has a high degree of probability for the occurrence of sites.

» Archaeological and Cultural Heritage Landscape

NOTE: *Archaeology is the study of human material and remains (by definition) and is not restricted in any formal way as being below the ground surface.*

Archaeological remains dating to the following periods can be expected within the study areas:

- » Stone Age finds
 - ESA: *High Probability*
 - MSA: *High Probability*
 - LSA: *High Probability*
 - LSA –Herder: *Medium to high Probability*
- » Iron Age finds
 - EIA: *Low Probability*
 - MIA: *Low Probability*
 - LIA: *Low Probability*
- » Historical finds
 - Historical period: *Low-Medium Probability*
 - Historical dumps: *Low Probability*
 - Structural remains: *Medium - High Probability*
- » Living Heritage
 - For example, rainmaking sites: *Low Probability*
- » Burial/Cemeteries
 - Burials over 100 years: *High Probability*
 - Burials younger than 60 years: *Medium to high Probability*

Subsurface excavations including prospecting, ground levelling, landscaping, and foundation preparation can expose any number of these resources.

7. ASSUMPTIONS AND LIMITATIONS

The study area was not subjected to a field survey at this stage in the environmental process, it is recommended that this will be done during the impact assessment phase when the actual exploration localities are fixed. It is assumed that information obtained for the wider area is applicable to the study area. Additional information could become available in future that could change the results of this report. It is assumed that the EAP will upload all relevant documents to the SAHRIS.

8. FINDINGS

Based on previous studies conducted in the study area 127 heritage features were identified as indicated in Figure 10 and Table 1.

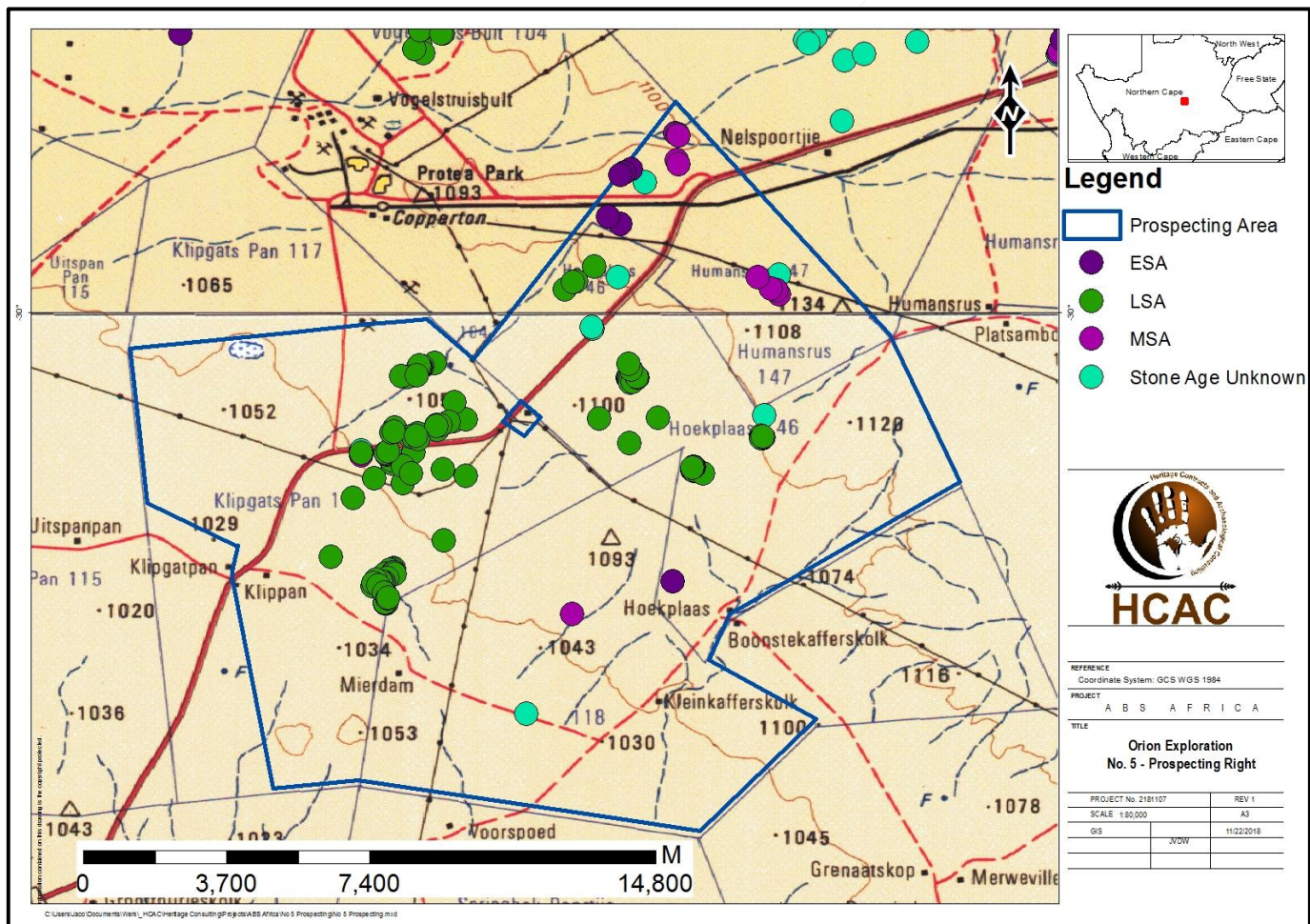


Figure 10. Heritage Sensitivity map

8.1. Archaeology and Palaeontology

8.1.1 Archaeological finds

Based on CRM studies conducted in the area ESA, MSA and LSA scatters as well as distinct sites can be expected. No Impacts to heritage resources is envisaged during the non-invasive prospecting activities but invasive activities can alter/ destroy heritage resources.

8.1.2 Nature of Impact

The invasive phase of the project could directly impact on surface and subsurface archaeological sites.

8.1.3 Extent of impact

The project could have a low to medium impact on a local scale.

8.1.4. Paleontological resources

Bamford (2018) conducted an independent paleontological study and found that the proposed site lies on the Late Carboniferous-Early Permian Dwyka Group tillites, sands, shales, mudstones. Although fossils have not been reported from this site there is a small chance that typical (but very infrequent) early *Glossopteris* flora plants could occur in the sediments just below the surface. Surface exposures are likely to be very weathered. Therefore, a Fossil Chance Find Protocol should be added to the EMP. Based on this information it is recommended that no palaeontological site visit is required unless fossils are revealed once excavations and drilling has commenced. As far as the palaeontology is concerned a prospecting right should be granted (Bamford 2018).

8.2. Historical period

8.2.1 Historical finds:

Historical finds include middens, structural remains and the cultural landscape. Impacts to heritage resources will occur primarily during invasive activities and no impacts are expected during the initial non-invasive activities.

8.2.2 Nature of Impact

The non-invasive activities will not have an impact on heritage resources, but invasive activities could alter/ destroy non-renewable resources.

8.2.3 Extent of impact

The project could have a low impact on a local scale.

8.3. Burials and Cemeteries

8.3.1 Burials and Cemeteries

There are no graves on record for the study area but graves and informal cemeteries can be expected anywhere on the landscape

8.3.2 Nature of Impact

The invasive prospecting activities during later phases of the proposed project could directly impact on marked and unmarked graves.

8.3.3 Extent of impact

The project could have a low to medium impact on a local scale.

Impact on Heritage resources			
During the non-invasive prospecting no impacts are foreseen on heritage resources. The future invasive prospecting activities of the proposed project could directly impact on graves, archaeological sites and historical sites.			
Issue	Nature of Impact	Extent of Impact	No-Go Areas
Disturbance and destruction of archaeological sites, historical sites and graves.	Invasive exploration activities could cause irreversible damage or destroy heritage resources and depletion of the archaeological record of the area.	Low to Medium on a local scale.	TBC after field work
Description of expected significance of impact			
Significance of sites, mitigation and significance of possible impact can only be determined after a field survey has been conducted, but based on previous work in the area Stone Age finds and graves can be expected.			
Gaps in knowledge & recommendations for further study			
Large sections of the study area have been subjected to heritage resource surveys and it is assumed that information obtained for the wider region is applicable to the study area. It is recommended that prior to invasive prospecting, impact areas should subject to a field study to confirm the presence of heritage resources after which mitigation measures will be recommended (if needed).			

9. POTENTIAL SIGNIFICANCE OF HERITAGE RESOURCES

Based on the current information obtained for the area at a desktop level it is anticipated that any sites that occur within the proposed development area will have a Generally Protected B (GP.B) or lower field rating and all sites should be mitigatable. No red flags have been identified.

10. CONCLUSIONS AND RECOMMENDATIONS

The scope of work comprises a heritage scoping report for a large prospecting right area comprising approximately 19 727 ha. Due to the geographical size of the exploration application and the fact that no intrusive activities will occur at this point of the application, it was deemed not feasible to conduct fieldwork at this point. Several large-scale heritage surveys were conducted for renewable energy and mining projects and the archaeological character of the area is now well described (e.g., Orton & Webley 2013 a and b, van der Walt 2012, 2013 & 2017). This desktop study is informed by available data for the area. Some of the aforementioned studies, covered portions of the current study area and 127 heritage features is on record for the study area. Based on these studies the following resources can be expected in the study area as indicated below.

» Paleontological resources

The proposed site lies on the Late Carboniferous-Early Permian Dwyka Group tillites, sands, shales, mudstones. Although fossils have not been reported from this site there is a small chance that typical (but very infrequent) early *Glossopteris* flora plants could occur in the sediments just below the surface. A Fossil Chance Find Protocol should be added to the EMP. Based on this information it is recommended that no palaeontological site visit is required unless fossils are revealed once excavations and drilling has commenced (Bamford 2018).

» Widespread Stone Age scatters and sites (ESA; MSA and LSA)

Every site is relevant to the Heritage Landscape, but it is anticipated that few sites in the study area could have conservation value. The impact of non-invasive exploration on these features are considered negligible however known sites should be avoided during planning stages for intrusive exploration.

» Historical finds and Cultural landscape

Some structures could occur that are older than 60 years. No impact on structures older than 60 years is foreseen during prospecting activities, however if structures are to be impacted destruction/ alteration permits will have to be applied for.

» Burials and cemeteries

Formal and informal cemeteries as well as pre-colonial graves occur widely across Southern Africa. It is generally recommended that these sites are preserved *in situ* and within a development. These sites can however be relocated if conservation is not possible, but this option must be seen as a last resort and is not advisable. The presence of any grave sites must be confirmed during a field survey and the public consultation process when exploration localities are fixed.

» General

It is anticipated that any sites that occur within the project area will have a Generally Protected B (GP.B) or lower field rating, all sites should be mitigatable, and no red flags have been identified. It is therefore recommended that non-invasive exploration can commence (based on approval from SAHRA) with the following conditions of authorisation in the EMPr:

- Before commencing invasive prospecting activities, the impact areas should be subjected to a heritage walk down.
- Inclusion of a chance find protocol (both archaeology and palaeontology) as outlined below.

10.1. Chance Find Procedure – Archaeology

The possibility of the occurrence of subsurface finds cannot be excluded. Therefore, if during construction any possible finds such as stone tool scatters, artefacts or bone and fossil remains are made, the operations must be stopped and a qualified archaeologist must be contacted for an assessment of the find and therefore chance find procedures should be put in place as part of the EMP. A short summary of chance find procedures is discussed below.

This procedure applies to the developer's permanent employees, its subsidiaries, contractors and subcontractors, and service providers. The aim of this procedure is to establish monitoring and reporting procedures to ensure compliance with this policy and its associated procedures. Construction crews must be properly inducted to ensure they are fully aware of the procedures regarding chance finds as discussed below.

- If during the pre-construction phase, construction, operations or closure phases of this project, any person employed by the developer, one of its subsidiaries, contractors and subcontractors, or service provider, finds any artefact of cultural significance or heritage site, this person must cease work at the site of the find and report this find to their immediate supervisor, and through their supervisor to the senior on-site manager.
- It is the responsibility of the senior on-site Manager to make an initial assessment of the extent of the find and confirm the extent of the work stoppage in that area.
- The senior on-site Manager will inform the ECO of the chance find and its immediate impact on operations. The ECO will then contact a professional archaeologist for an assessment of the finds who will notify the SAHRA.

10.2. Monitoring Programme for Palaeontology – to commence once the drilling and prospecting begin.

1. The following procedure is only required if fossils are seen on the surface and when drilling or excavations commence.
2. When drilling or excavations begin the rocks and must be given a cursory inspection by the environmental officer or designated person. Any fossiliferous material (plants, insects, wood, bone, coal) should be put aside in a suitably protected place. This way the prospecting activities will not be interrupted.
3. Photographs of similar fossil plants must be provided to the developer to assist in recognizing the fossil plants in the shales and mudstones (for example see Figure 5, 6). This information will be built into the EMP's training and awareness plan and procedures.
4. Photographs of the putative fossils can be sent to the palaeontologist for a preliminary assessment.
5. If there is any possible fossil material found by the developer/environmental officer/miners then the qualified palaeontologist sub-contracted for this project, should visit the site to inspect the selected material and check the dumps where feasible.
6. Fossil plants or vertebrates that are considered to be of good quality or scientific interest by the palaeontologist must be removed, catalogued and housed in a suitable institution where they can be made available for further study. Before the fossils are removed from the site a SAHRA permit must be obtained. Annual reports must be submitted to SAHRA as required by the relevant permits.
7. If no good fossil material is recovered then the site inspections by the palaeontologist will not be necessary. Annual reports by the palaeontologist must be sent to SAHRA.
8. If no fossils are found and the excavations have finished then no further monitoring is required.

11. PLAN OF STUDY

With cognisance of the recorded archaeological sites in the wider area as well as within the study area and in order to comply with the National Heritage Resources Act (Act 25 of 1999) it is recommended that once the impact areas for invasive prospecting activities has been confirmed these areas should be subjected to a heritage walkdown. During this study sites of archaeological, historical or places of cultural interest must be located, identified, recorded, photographed and described. During this study, the levels of significance of recorded heritage resources must be determined and mitigation proposed should any significant sites be impacted upon, ensuring that all the requirements of the SAHRA are met.

11.1 Reasoned Opinion

If the above recommendations are adhered to, HCAC is of the opinion that the impact of non-invasive exploration on heritage resources is negligible. Once exploration sites are fixed the impacts resulting from this can be mitigated. This will be confirmed through the field visit in the next phase of the project.

If during the any stage of the project, any archaeological finds are made (e.g. graves, stone tools, and skeletal material), the operations must be stopped, and the archaeologist must be contacted for an assessment of the finds. Due to the subsurface nature of archaeological material and graves the possibility of the occurrence of unmarked or informal graves and subsurface finds cannot be excluded.

12. LIST OF PREPARERS

Jaco van der Walt (Archaeologist and project manager).

Liesl Bester (Archival Specialist)

13. STATEMENT OF COMPETENCY

The author of the report is a member of the Association of Southern African Professional Archaeologists and is also accredited in the following fields of the Cultural Resource Management (CRM) Section, member number 159: Iron Age Archaeology, Colonial Period Archaeology, Stone Age Archaeology and Grave Relocation. Jaco is also an accredited CRM Archaeologist with SAHRA and AMAFA.

Jaco has been involved in research and contract work in South Africa, Botswana, Mozambique, Zimbabwe, Tanzania and the DRC and conducted well over 300 AIAs since he started his career in CRM in 2000. This involved several mining operations, Eskom transmission and distribution projects and infrastructure developments. The results of several of these projects were presented at international and local conferences.

14. STATEMENT OF INDEPENDENCE

I, Jaco van der Walt as duly authorised representative of Heritage Contracts and Archaeological Consulting CC, hereby confirm my independence as a specialist and declare that neither I nor the Heritage Contracts and Archaeological Consulting CC have any interest, be it business, financial, personal or other, in any proposed activity, application or appeal in respect of which the client was appointed as Environmental Assessment practitioner, other than fair remuneration for work performed on this project.



SIGNATURE: _____

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**Palaeontological Impact Assessment for the proposed
prospecting rights application on farm Klipgats Pan
near Copperton, Northern Cape Province**

Desktop Study

For

Heritage Consultants

22 November 2018

Prof Marion Bamford

Palaeobotanist

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Expertise of Specialist

The Palaeontologist Consultant is: Prof Marion Bamford
Qualifications: PhD (Wits Univ, 1990); FRSSAf, ASSAf
Experience: 30 years research; 22 years PIA studies

Declaration of Independence

This report has been compiled by Professor Marion Bamford, of the University of the Witwatersrand, sub-contracted by Heritage Consultants, Modimolle, South Africa. The views expressed in this report are entirely those of the author and no other interest was displayed during the decision making process for the Project.

Specialist: Prof Marion Bamford

Signature: 

Executive Summary

A palaeontological Impact Assessment was requested for the prospecting rights application for the farm Klippgats Pan, southwest of Copperton, Prieska area, the old Prieska Copper Mine. To comply with the South African Heritage Resources Agency (SAHRA) in terms of Section 38(8) of the National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA), a desktop Palaeontological Impact Assessment (PIA) was completed for the proposed development of a sand mining area.

The proposed site lies on the Late Carboniferous-Early Permian Dwyka Group tillites, sands, shales, mudstones. Although fossils have not been reported from this site there is a small chance that typical (but very infrequent) early *Glossopteris* flora plants could occur in the sediments just below the surface. Surface exposures are likely to be very weathered. Therefore a Fossil Chance Find Protocol should be added to the EMPr. Based on this information it is recommended that no palaeontological site visit is required unless fossils are revealed once excavations and drilling has commenced. As far as the palaeontology is concerned a prospecting right should be granted.

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1. Background

A Prospecting Right and Environmental Authorisation (EA) for prospecting activities in the vicinity of the historical Prieska Copper Mine (PCM) is in progress, in terms of the National Environmental Management Act 107 of 1998 and the Mineral and Petroleum Resources Development Act 28 of 2002. The following farms relate to the prospecting right application:

Table 1: Klipgats Pan cluster of farms for the EA

Farm Name	Farm No	Subdivision No
Klipgats Pan	117	5
Kaffirs Kolk	118	1
Kaffirs Kolk	118	4
Klipgats Pan	117	4
Hoekplaas	146	RE
Kaffirs Kolk	118	RE
Humansrus	147	RE
Klipgats Pan	117	3

A Palaeontological Impact Assessment was requested for the Klipgats Pan Prospecting Rights Application. To comply with the South African Heritage Resources Agency (SAHRA) in terms of Section 38(8) of the National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA), a desktop Palaeontological Impact Assessment (PIA) was completed for the proposed project.

Table 2: Specialist report requirements in terms of Appendix 6 of the EIA Regulations (2014)

A specialist report prepared in terms of the Environmental Impact Regulations of 2014 must contain:	Relevant section in report
Details of the specialist who prepared the report	Appendix B
The expertise of that person to compile a specialist report including a curriculum vitae	Appendix B
A declaration that the person is independent in a form as may be specified by the competent authority	Page 1
An indication of the scope of, and the purpose for which, the report was prepared	Section 1
The date and season of the site investigation and the relevance of the season to the outcome of the assessment	N/A
A description of the methodology adopted in preparing the report or carrying out the specialised process	Section 2
The specific identified sensitivity of the site related to the activity and its associated structures and infrastructure	Section ii Error! Reference source not found.
An identification of any areas to be avoided, including buffers	N/A

A map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;	N/A
A description of any assumptions made and any uncertainties or gaps in knowledge;	Section 5
A description of the findings and potential implications of such findings on the impact of the proposed activity, including identified alternatives, on the environment	Section 4
Any mitigation measures for inclusion in the EMPr	N/A
Any conditions for inclusion in the environmental authorisation	N/A
Any monitoring requirements for inclusion in the EMPr or environmental authorisation	Section 8
A reasoned opinion as to whether the proposed activity or portions thereof should be authorised	N/A
If the opinion is that the proposed activity or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan	N/A
A description of any consultation process that was undertaken during the course of carrying out the study	N/A
A summary and copies if any comments that were received during any consultation process	N/A
Any other information requested by the competent authority.	N/A

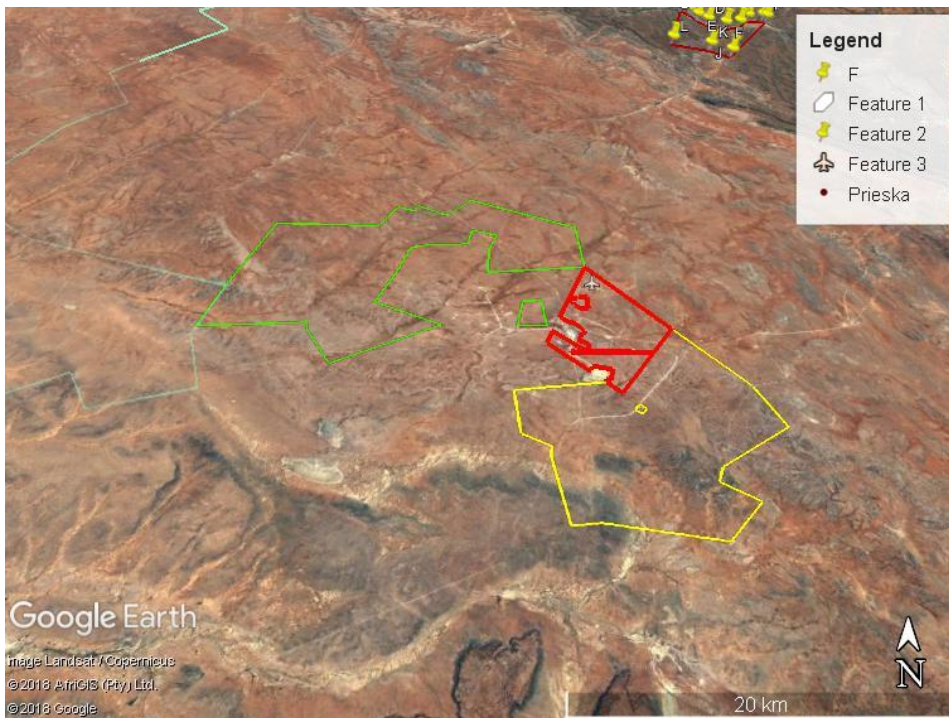


Figure 1: Google Earth map of the proposed area for the Klippgats Pan Prospecting Rights Application shown in the yellow outline. Map supplied by Heritage Consultants.

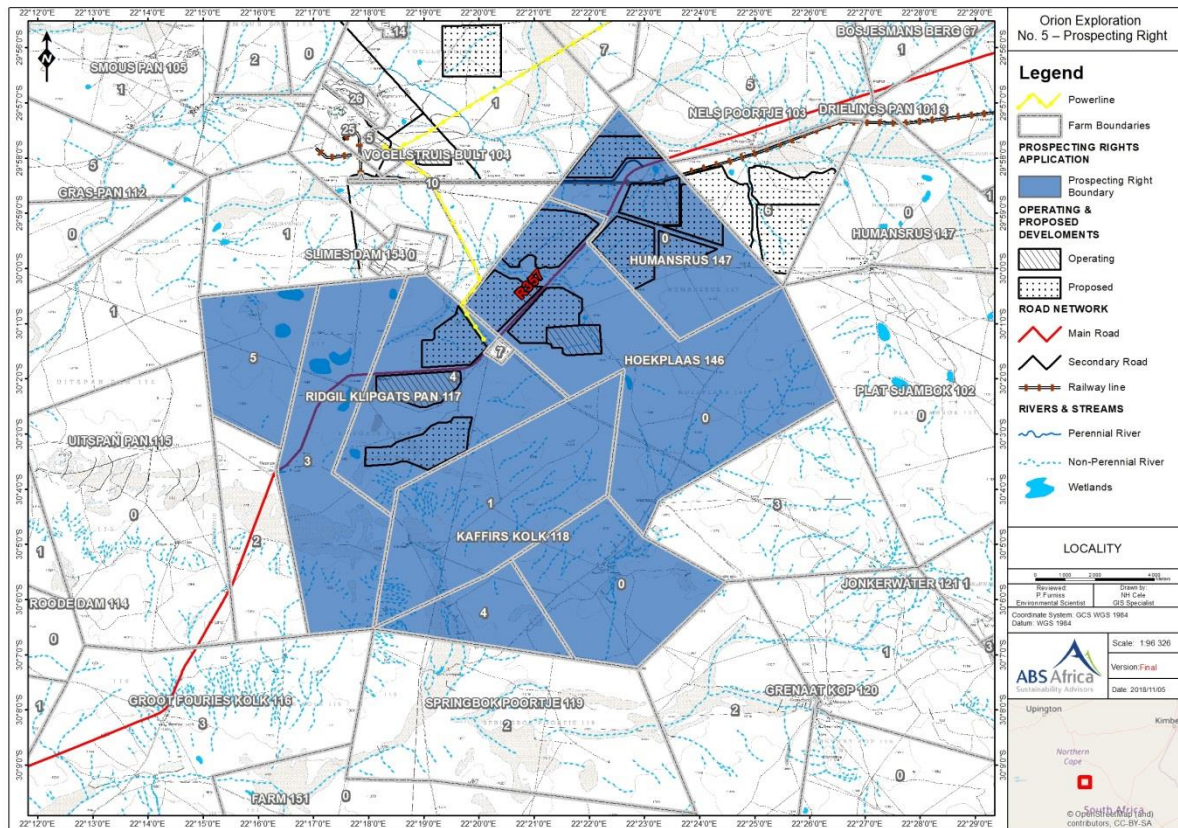


Figure 2: Site map for the Klipgats Pan prospecting rights area shown in blue.

2. Methods and Terms of Reference

The Terms of Reference (ToR) for this study were to undertake a PIA and provide feasible management measures to comply with the requirements of SAHRA.

The methods employed to address the ToR included:

1. Consultation of geological maps, literature, palaeontological databases, published and unpublished records to determine the likelihood of fossils occurring in the affected areas. Sources included records housed at the Evolutionary Studies Institute at the University of the Witwatersrand and SAHRA databases;
2. Where necessary, site visits by a qualified palaeontologist to locate any fossils and assess their importance (*not applicable to this assessment*);
3. Where appropriate, collection of unique or rare fossils with the necessary permits for storage and curation at an appropriate facility (*not applicable to this assessment*); and
4. Determination of fossils' representivity or scientific importance to decide if the fossils can be destroyed or a representative sample collected (*not applicable to this assessment*).

3. Geology and Palaeontology

i. Project location and geological context

The oldest rocks in the area are those of the Keimos Suite and they are a group of syn- to post-tectonic granitoids that have intruded into the igneous and metamorphic rocks of the Namaqua-Natal Province. There are also outcrops of the quartzites of the Uitdraai Formation and the Dagbreek Formation. The rocks of the Prieska Copper Mine are known as the Copperton Volcanic Centre (Cornell et al., 2006) and include the Copperton Formation, the Kielder Formation, topped by the Dagbreek Formation.

Overlying this ancient rocks are sediments of the Dwyka Group and the Prince Albert Formation of the Ecca Group, both early Karoo Supergroup deposits from the receding glaciers and inland sea (Late Carboniferous to Early Permian in age). To the north and east much of the land surface is covered by alluvium, sands, silcretes and limestones that are much younger, from the Quaternary.

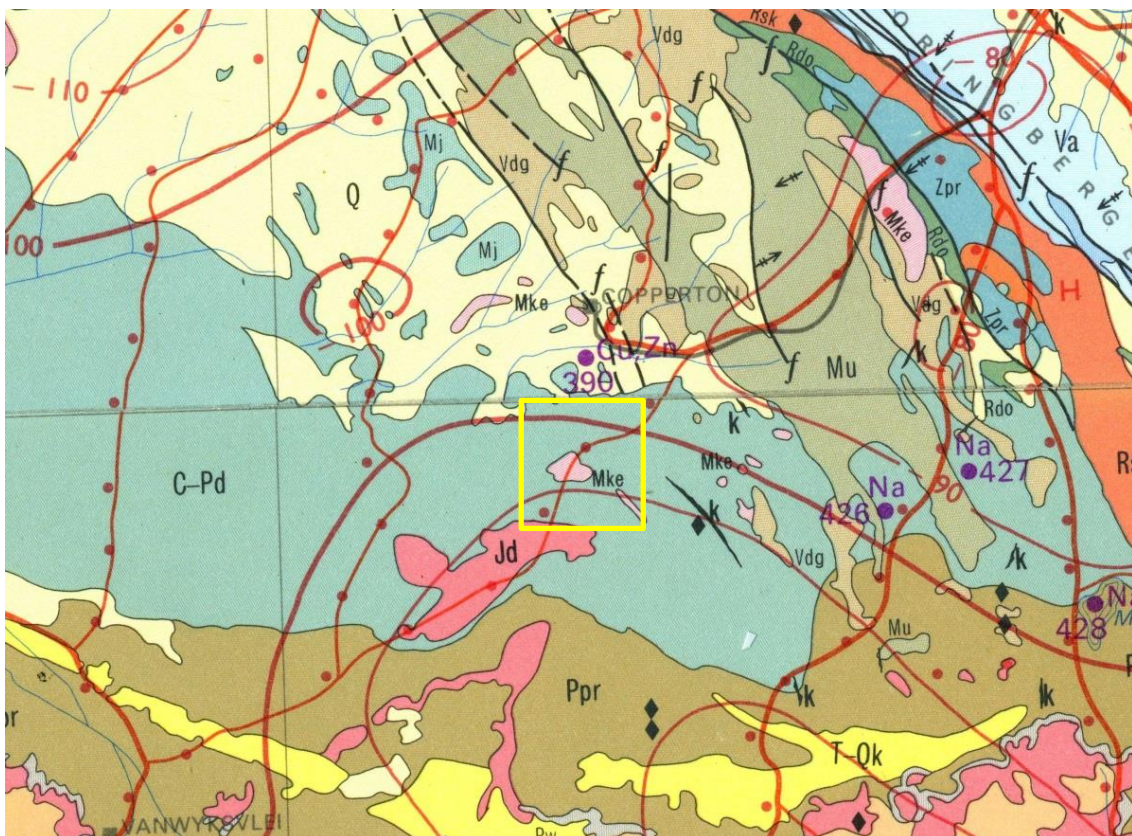


Figure 3: Geological map of the area around Copperton with the proposed site for the Klipgats Pan prospecting shown within the yellow rectangle. Abbreviations of the rock types are explained in Table 3. Map enlarged from the Geological Survey 1: 1 000 000 map 1984.

Table 3: Explanation of symbols for the geological map and approximate ages (Barbolini et al., 2016; Johnson et al., 2006; Cornell et al., 2006). SG = Supergroup; Fm = Formation.

Symbol	Group/Formation	Lithology	Approximate Age
Q	Quaternary	Alluvium, sand, calcrete	Neogene, ca 25 Ma to present
T-Qk	Tertiary-Quaternary	Sand, limestone	
Jd	Jurassic dykes	Dolerite dykes, intrusive	Jurassic, approx. 180 Ma
Ppr	Prince Albert Fm, Ecca Group, Karoo SG	Shale	290-283.5 Ma
C-Pd	Dwyka Group, Karoo SG	Tillite, sandstone, mudstone, shale	>290 Ma
Vdg	Dagbreek Fm, Vaalkoppies Group, Kaaien Terrane	Schist, quartzite, amphibolite	Ca 1800 – 2120 Ma
Mu	Uitdraai Fm, Brulpan Group, Kaaien Terrane	quartzite	Ca 1930 Ma
Mke	Keimos Suite, Kakamas Terrane	granite	Ca 1080-1090 Ma ??

ii. Palaeontological context

The palaeontological sensitivity of the area under consideration is presented in Figure 4. The site for prospecting is in the Dwyka Group tillites, sandstone, mudstone and shales, and these potentially could preserve fossils. Around 300-290 Ma the climate in southern Africa was still relatively cool, but there were well developed Carboniferous floras in the northern hemisphere. In South Africa, however, much of the land surface was covered by ice sheets. As they melted they dropped the moraine trapped in the ice, together with limited plant matter from the vegetation that gradually recovered and colonised the land surface. Terrestrial vertebrates had not evolved at this time. The late Carboniferous flora comprised *Glossopteris* leaves and seeds, wood, and other plants such as lycopods, sphenophytes and ferns.

The Dwyka Group is made up of seven facies that were deposited in a marine basin under differing environmental settings of glacial formation and retreat (Visser, 1986, 1989; Johnson et al., 2006). In the north these are called the Mbizane Formation, and the Elandsvlei Formation in the south. Described below are the seven facies (Johnson et al., 2006 p463-465):

The massive diamictite facies comprises highly compacted diamictite that is clast-poor in the north. It was deposited in subaqueous or subglacial positions.

The stratified diamictite comprises alternating diamictite, mudrock, sandstone and conglomerate beds. They are interpreted as being rapidly deposited, sediment gravity flows but with some possible reworking of the subglacial diamictites.

The massive carbonate-rich diamictite facies is clast-poor and was formed by the rainout of debris, with the carbonate probably originating by crystallisation from interstitial waters.

The conglomerate facies ranges from single layer boulder beds to poorly sorted pebble and granule conglomerates. The boulder beds are interpreted as lodgement deposits whereas the poorly sorted conglomerates are a product of water-reworking of diamicton by high-density sediment gravity flows.

The sandstone facies were formed as turbidite deposits.

The mudrock with stones facies represents rainout deposits in the distal iceberg zone.

The mudrock facies consists of dark-coloured, commonly carbonaceous mudstone, shale or silty rhythmite that was formed when the mud or silt in suspension settled. This is the only fossiliferous facies of the Dwyka Group.

The Dwyka *Glossopteris* flora outcrops are very sporadic and rare. Of the seven facies that have been recognised in the Dwyka Group fossil plant fragments have only been recognised from the mudrock facies. They have been recorded from around Douglas only (Johnson et al., 2006; Anderson and McLachlan 1976) although the Dwyka Group exposures are very extensive. Jurassic Dolerites do not contain fossils as they are igneous intrusives.

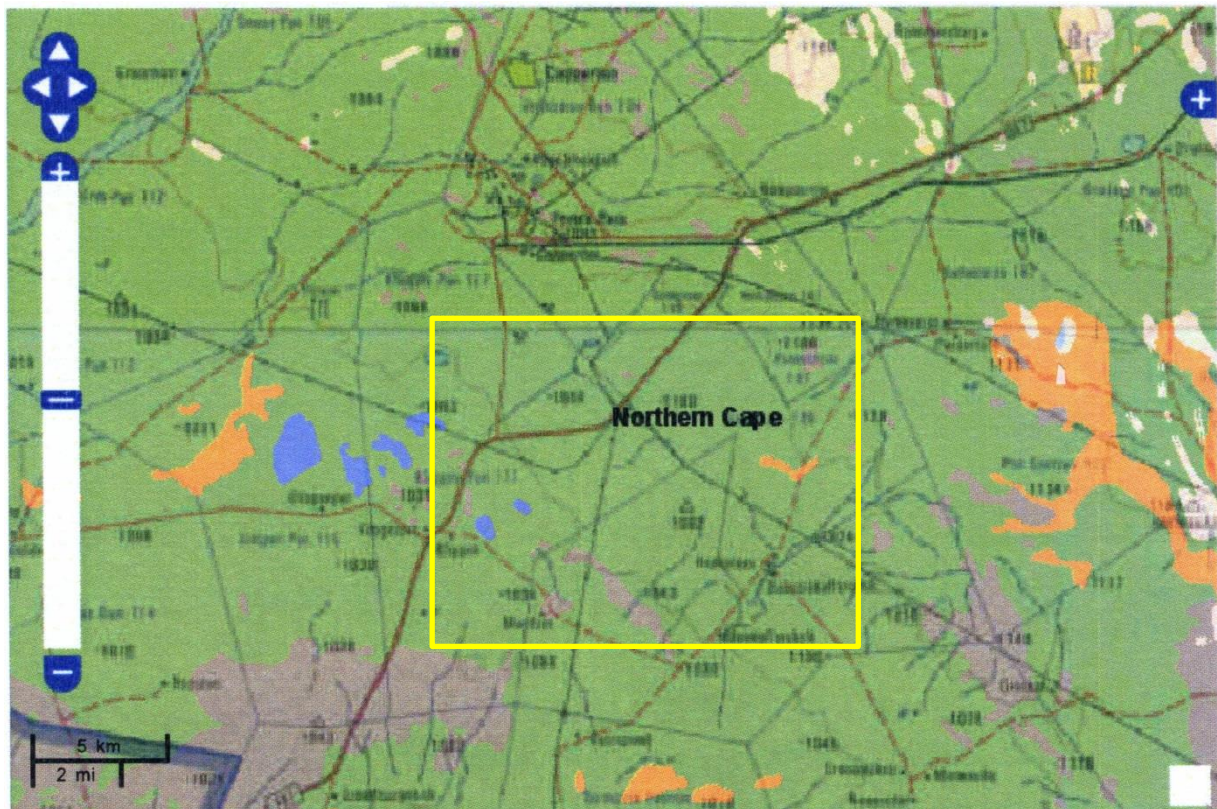


Figure 3: SAHRIS palaeosensitivity maps for the site for the proposed prospecting right application, around the Farm Klipgats Pan shown within the yellow rectangle. Colours indicate the following degrees of sensitivity: red = very highly sensitive; orange/yellow = high; green = moderate; blue = low; grey = insignificant/zero.

From the SAHRIS map above the area is indicated as moderately sensitive (green; Figure 4) so a desktop assessment is being reported upon here. No fossils have been reported from the Copperton area but there is a very small chance that fossil plant fragments could occur in the prospecting area, but relatively close to the surface because the underlying strata, that are the target of the project, are too old for fossils. Fossils are not likely to be seen on the land surface because of extensive weathering and previous farming or mining activities.

4. Impact assessment

An assessment of the potential impacts to possible palaeontological resources considers the criteria encapsulated in Table :

TABLE 4A: CRITERIA FOR ASSESSING IMPACTS

PART A: DEFINITION AND CRITERIA		
Criteria for ranking of the SEVERITY/NATURE of environmental impacts	H	Substantial deterioration (death, illness or injury). Recommended level will often be violated. Vigorous community action.
	M	Moderate/ measurable deterioration (discomfort). Recommended level will occasionally be violated. Widespread complaints.
	L	Minor deterioration (nuisance or minor deterioration). Change not measurable/ will remain in the current range. Recommended level will never be violated. Sporadic complaints.
	L+	Minor improvement. Change not measurable/ will remain in the current range. Recommended level will never be violated. Sporadic complaints.
	M+	Moderate improvement. Will be within or better than the recommended level. No observed reaction.
	H+	Substantial improvement. Will be within or better than the recommended level. Favourable publicity.
Criteria for ranking the DURATION of impacts	L	Quickly reversible. Less than the project life. Short term
	M	Reversible over time. Life of the project. Medium term
	H	Permanent. Beyond closure. Long term.
Criteria for ranking the SPATIAL SCALE of impacts	L	Localised - Within the site boundary.
	M	Fairly widespread – Beyond the site boundary. Local
	H	Widespread – Far beyond site boundary. Regional/ national
PROBABILITY (of exposure to impacts)	H	Definite/ Continuous
	M	Possible/ frequent
	L	Unlikely/ seldom

TABLE 4B: IMPACT ASSESSMENT

PART B: ASSESSMENT		
SEVERITY/NATURE	H	-
	M	-
	L	Loose sands do not preserve plant fossils; so far there are no records from the Dwyka Group of plant or animal fossils in this region so it is very unlikely that fossils occur on the site. The impact would be very unlikely.
	L+	-
	M+	-
	H+	-
DURATION	L	-
	M	-

PART B: ASSESSMENT		
	H	Where manifest, the impact will be permanent.
SPATIAL SCALE	L	Since only the possible fossils within the area would be fossil plants from the <i>Glossopteris</i> flora in the shales, the spatial scale will be localised within the site boundary.
	M	-
	H	-
PROBABILITY	H	-
	M	-
	L	It is unlikely that any fossils would be found in the loose sand that will be drilled through but there may be plant fragments in the underlying shales or mudstones. There will be no fossils in the rocks that are being targeted for the mining operation as they are too old. Nonetheless a chance find protocol should be added to the eventual EMPr.

Based on the nature of the project, surface activities may impact upon the fossil heritage if preserved in the development footprint. Overlying rocks of the Dwyka Group, namely the mudstones or shales might preserve fossil plants but the target rocks for the project are much too old to contain fossils and igneous in origin. Furthermore, the material to be mined is loose sand and this does not preserve fossils. Since there is an extremely small chance that fossils from the Late Carboniferous Dwyka Group may be disturbed a Fossil Chance Find Protocol has been added to this report. Taking account of the defined criteria, the potential impact to fossil heritage resources is extremely low.

5. Assumptions and uncertainties

Based on the geology of the area and the palaeontological record as we know it, it can be assumed that the formation and layout of the dolomites, sandstones, shales and sands are typical for the country and do contain fossil plant, insect, invertebrate and vertebrate material. The sands of the Quaternary period would not preserve fossils.

6. Recommendation

Based on experience and the lack of any previously recorded fossils from the area, it is extremely unlikely that any fossils would be preserved in the loose sands of the Quaternary. There is very small chance that fossil plant fragments may occur in the Dwyka Group shales and mudstones so a Chance Find Protocol should be added to the EMPr: if fossils are found once drilling and prospecting has commenced then they should be rescued and a palaeontologist called to assess and collect a representative sample.

7. References

- Anderson, A.M., 1981. The *Umfolozia* arthropod trackways in the Permian Dwyka and Ecca Series of South Africa. *Journal of Palaeontology* 55, 84-108.
- Anderson, A.M., McLachlan, I.R., 1976. The plant record in the Dwyka and Ecca Series (Permian) of the south-western half of the great Karoo Basin, South Africa. *Palaeontologia africana* 19, 31-42.
- Anderson, J.M., Anderson, H.M., 1985. *Palaeoflora of Southern Africa: Prodrum of South African megaflores, Devonian to Lower Cretaceous*. A.A. Balkema, Rotterdam. 423 pp.
- Barbolini, N., Bamford, M.K., Rubidge, B., 2016. Radiometric dating demonstrates that Permian spore-pollen zones of Australia and South Africa are diachronous. *Gondwana Research* 37, 241-251.
- Cornell, D.H., Thomas, R.J., Moen, H.F.G., Reid, D.L., Moore, J.M., Gibson, R.L., 2006. The Namaqua-Natal Province. In: Johnson, M.R., Anhaeusser, C.R. and Thomas, R.J., (Eds). *The Geology of South Africa*. Geological Society of South Africa, Johannesburg / Council for Geoscience, Pretoria. Pp 325-379.
- Johnson, M.R., van Vuuren, C.J., Visser, J.N.J., Cole, D.I., Wickens, H.deV., Christie, A.D.M., Roberts, D.L., Brandl, G., 2006. Sedimentary rocks of the Karoo Supergroup. In: Johnson, M.R., Anhaeusser, C.R. and Thomas, R.J., (Eds). *The Geology of South Africa*. Geological Society of South Africa, Johannesburg / Council for Geoscience, Pretoria. Pp 461 – 499.
- Van der Westhuizen, W.A., de Bruijn, H., Meintjes, P.G., 2006. The Ventersdorp Supergroup. In: Johnson, M.R., Anhaeusser, C.R. and Thomas, R.J., (Eds). *The Geology of South Africa*. Geological Society of South Africa, Johannesburg / Council for Geoscience, Pretoria. pp 187-208.
- Visser, J.N.J., 1986. Lateral lithofacies relationship in the glaciogenic Dwyka Formation in the western and central parts of the Karoo Basin. *Transactions of the Geological Society of South Africa* 89, 373-383.
- Visser, J.N.J., 1989. The Permo-Carboniferous Dwyka Formation of southern Africa: deposition by a predominantly subpolar marine ice sheet. *Palaeogeography, Palaeoclimatology, Palaeoecology* 70, 377-391.

8. Chance Find Protocol

Monitoring Programme for Palaeontology – to commence once the drilling and prospecting begin.

1. The following procedure is only required if fossils are seen on the surface and when drilling or excavations commence.
2. When drilling or excavations begin the rocks and must be given a cursory inspection by the environmental officer or designated person. Any fossiliferous material (plants, insects, wood, bone, coal) should be put aside in a suitably protected place. This way the prospecting activities will not be interrupted.
3. Photographs of similar fossil plants must be provided to the developer to assist in recognizing the fossil plants in the shales and mudstones (for example see Figure 5, 6). This information will be built into the EMP's training and awareness plan and procedures.
4. Photographs of the putative fossils can be sent to the palaeontologist for a preliminary assessment.
5. If there is any possible fossil material found by the developer/environmental officer/miners then the qualified palaeontologist sub-contracted for this project, should visit the site to inspect the selected material and check the dumps where feasible.
6. Fossil plants or vertebrates that are considered to be of good quality or scientific interest by the palaeontologist must be removed, catalogued and housed in a suitable institution where they can be made available for further study. Before the fossils are removed from the site a SAHRA permit must be obtained. Annual reports must be submitted to SAHRA as required by the relevant permits.
7. If no good fossil material is recovered then the site inspections by the palaeontologist will not be necessary. Annual reports by the palaeontologist must be sent to SAHRA.
8. If no fossils are found and the excavations have finished then no further monitoring is required.

Appendix A – Examples of Dwyka fossils

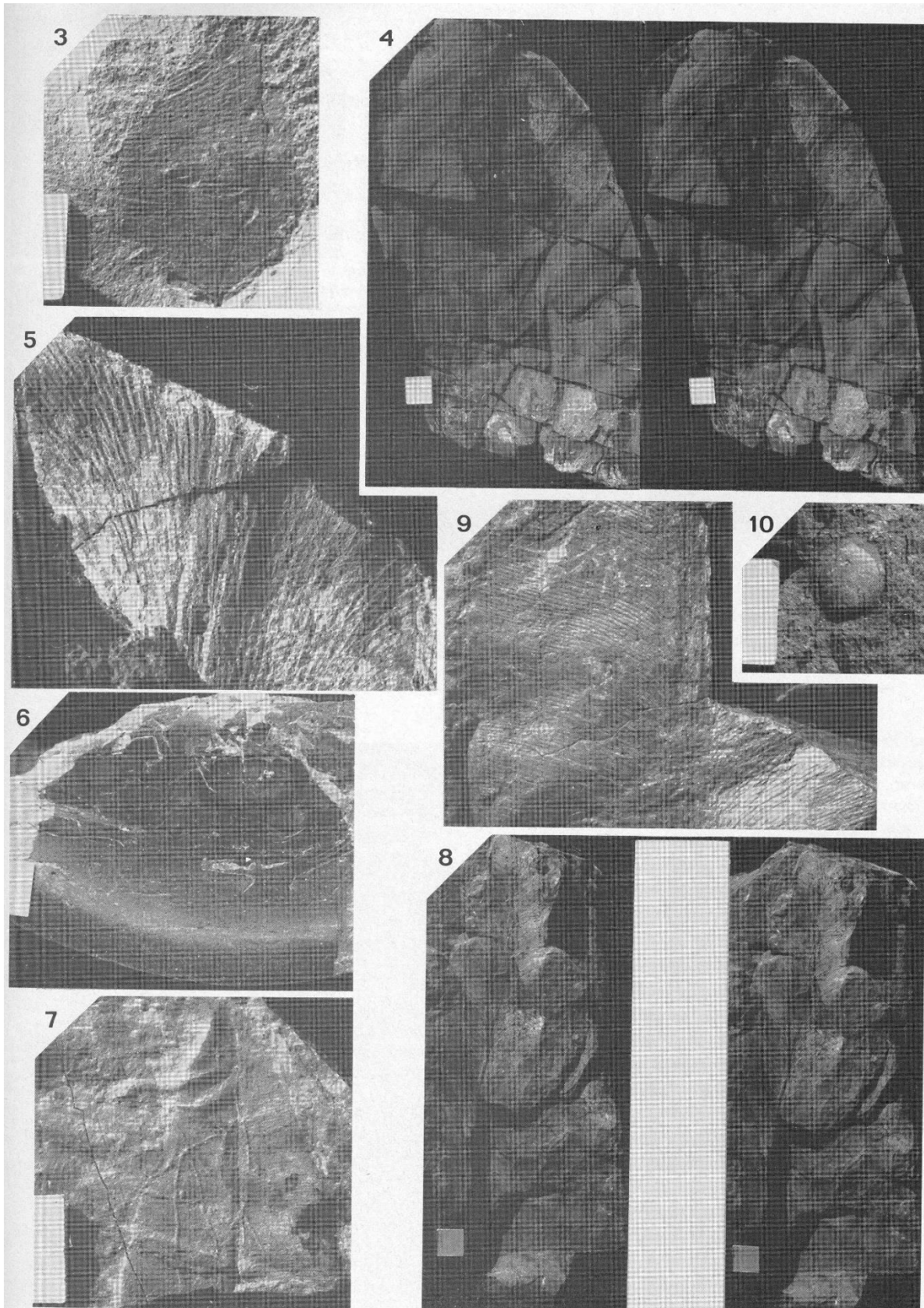


Figure 6: Fossil plants from the Dwyka Group near Douglas (From Anderson and McLachlan, 1976, (figures 3-10)).

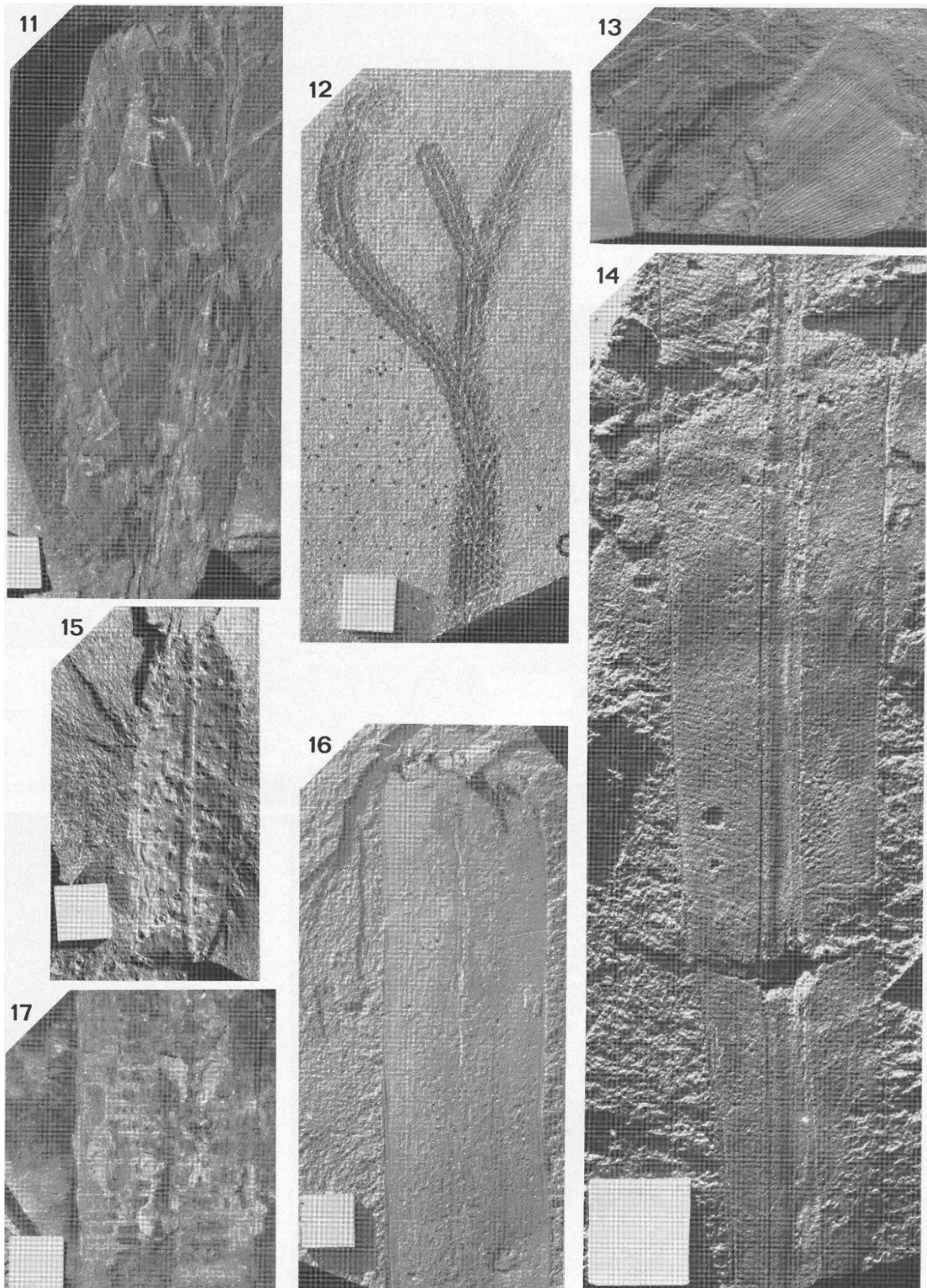


Figure 6: More examples of fossil plants from the Dwyka group near Douglas (from Anderson and McLachlan, 1976, figures 11-17).

Curriculum vitae (short) - Marion Bamford PhD October 2018

I) Personal details

Surname : **Bamford**
First names : **Marion Kathleen**
Present employment : Professor; Director of the Evolutionary Studies Institute.
Member Management Committee of the NRF/DST Centre of Excellence Palaeosciences, University of the Witwatersrand, Johannesburg, South Africa-
Telephone : +27 11 717 6690
Fax : +27 11 717 6694
Cell : 082 555 6937
E-mail : marion.bamford@wits.ac.za ; marionbamford12@gmail.com

ii) Academic qualifications

Tertiary Education: All at the University of the Witwatersrand:
1980-1982: BSc, majors in Botany and Microbiology. Graduated April 1983.
1983: BSc Honours, Botany and Palaeobotany. Graduated April 1984.
1984-1986: MSc in Palaeobotany. Graduated with Distinction, November 1986.
1986-1989: PhD in Palaeobotany. Graduated in June 1990.

iii) Professional qualifications

Wood Anatomy Training (overseas as nothing was available in South Africa):
1994 - Service d'Anatomie des Bois, Musée Royal de l'Afrique Centrale, Tervuren, Belgium, by Roger Dechamps
1997 - Université Pierre et Marie Curie, Paris, France, by Dr Jean-Claude Koeniguer
1997 - Université Claude Bernard, Lyon, France by Prof Georges Barale, Dr Jean-Pierre Gros, and Dr Marc Philippe

iv) Membership of professional bodies/associations

Palaeontological Society of Southern Africa – 1984 to present
Royal Society of Southern Africa - Fellow: 2006 onwards
Academy of Sciences of South Africa - Member: Oct 2014 onwards
International Association of Wood Anatomists - First enrolled: January 1991
International Organization of Palaeobotany – 1993+

Botanical Society of South Africa
 South African Committee on Stratigraphy – Biostratigraphy - 1997 - 2016
 SASQUA (South African Society for Quaternary Research) – 1997+
 PAGES - 2008 –onwards: South African representative
 ROCEEH / WAVE – 2008+
 INQUA – PALCOMM – 2011+onwards

vii) Supervision of Higher Degrees

All at Wits University

Degree	Graduated/completed	Current
Honours	6	1
Masters	8	1
PhD	10	3
Postdoctoral fellows	9	3

viii) Undergraduate teaching

Geology II – Palaeobotany GEOL2008 – average 65 students per year
 Biology III – Palaeobotany APES3029 – average 25 students per year
 Honours – Evolution of Terrestrial Ecosystems; African Plio-Pleistocene Palaeoecology;
 Micropalaeontology – average 2-8 students per year.

ix) Editing and reviewing

Editor: Palaeontologia africana: 2003 to 2013; 2014 – Assistant editor
 Guest Editor: Quaternary International: 2005 volume
 Member of Board of Review: Review of Palaeobotany and Palynology: 2010 –
 Cretaceous Research: 2014 -

Review of manuscripts for ISI-listed journals: 25 local and international journals

x) Palaeontological Impact Assessments

Selected – list not complete:

- Thukela Biosphere Conservancy 1996; 2002 for DWAF
- Vioolsdrift 2007 for Xibula Exploration
- Rietfontein 2009 for Zitholele Consulting
- Bloeddrift-Baken 2010 for TransHex
- New Kleinfontein Gold Mine 2012 for Prime Resources (Pty) Ltd.
- Thabazimbi Iron Cave 2012 for Professional Grave Solutions (Pty) Ltd
- Delmas 2013 for Jones and Wagener
- Klipfontein 2013 for Jones and Wagener
- Platinum mine 2013 for Lonmin
- Syferfontein 2014 for Digby Wells
- Canyon Springs 2014 for Prime Resources
- Kimberley Eskom 2014 for Landscape Dynamics

- Yzermyne 2014 for Digby Wells
- Matimba 2015 for Royal HaskoningDV
- Commissiekraal 2015 for SLR
- Harmony PV 2015 for Savannah Environmental
- Glencore-Tweefontein 2015 for Digby Wells
- Umkomazi 2015 for JLB Consulting
- Ixia coal 2016 for Digby Wells
- Lambda Eskom for Digby Wells
- Alexander Scoping for SLR
- Perseus-Kronos-Aries Eskom 2016 for NGT
- Mala Mala 2017 for Henwood
- Modimolle 2017 for Green Vision
- Klipoortjie and Finaalspan 2017 for Delta BEC
- Ledjadja borrow pits 2018 for Digby Wells
- Lungile poultry farm 2018 for CTS
- Olienhout Dam 2018 for JP Celliers
- Isondlo and Kwasobabili 2018 for GCS
- Kanakies Gypsum 2018 for Cabanga
- Nababeep Copper mine 2018
- Glencore-Mbali pipeline 2018 for Digby Wells
-

xi) Research Output

Publications by M K Bamford up to June 2018 peer-reviewed journals or scholarly books: over 120 articles published; 5 submitted/in press; 8 book chapters.

Scopus h index = 26; Google scholar h index = 28;

Conferences: numerous presentations at local and international conferences.

xii) NRF Rating

NRF Rating: B-2 (2016-2020)

NRF Rating: B-3 (2010-2015)

NRF Rating: B-3 (2005-2009)

NRF Rating: C-2 (1999-2004)

APPENDIX E: SUMMARY LIST OF LEGISLATION

Access to Land, Land Use and Development Planning

- Upgrading of Land Tenure Rights Act 112 of 1991
- Less Formal Township Establishment Act 113 of 1991
- Restitution of Land Rights Act 22 of 1994
- Land Reform (Labour Tenants) Act 3 of 1996
- Communal Property Associations Act 28 of 1996
- Interim Protection of Informal Land Rights Act 31 of 1996
- Extension of Security of Tenure Act 62 of 1997
- Fencing Act 31 of 1963
- Prevention of Illegal Eviction from and Unlawful Occupation of Land Act 19 of 1998
- Communal Land Rights Act 11 of 2004
- The Development Facilitation Act 67 of 1995
- Local Government Transition Act 209 of 1993
- Local Government: Municipal Structures Act 117 of 1998
- Local Government: Municipal Systems Act 32 of 2000
- National Building Regulations and Building Standards Act 103 of 1977
- Northern Cape Planning and Development Act 7 of 1998
- Spatial Planning and Land Use Management Act 16 of 2013
- Astronomy Geographic Advantage Act 21 of 2007

Mining and Mineral Rights

- Minerals and Petroleum Resources Development Act 28 of 2002 (MPRDA)
- Minerals and Petroleum Resources Development Amendment Act 49 of 2008
- Mine Health and Safety Act 29 of 1996
- Nuclear Energy Act 46 of 1999
- National Nuclear Regulator Act 47 of 1999

Environmental Assessment

- National Environmental Management Act 107 of 1998 (NEMA)
- National Environmental Management Amendment Act 62 of 2008 (NEMA)
- National Environmental Management Laws Second Amendment Act 30 of 2013 (NEMA)
- National Environmental Management Laws Amendment Act 14 of 2013 (NEMA)
- National Environmental Management Laws Amendment Act 25 of 2014 (NEMA)

Protected Areas

- National Environmental Management: Protected Areas Act 57 of 2003 (NEMPAA)
- National Environmental Management: Protected Areas Amendment Act 21 of 2014
- National Forests Act 84 of 1998

Astronomy Geographic Advantage Act 21 of 2007

Agricultural Resources

- Conservation of Agricultural Resources Act 43 of 1983
- Subdivision of Agricultural Land Act 70 of 1970

Biodiversity

- National Environmental Management: Biodiversity Act 10 of 2004 (NEMBA)
- Game Theft Act 105 of 1991
- Animals Protection Act 71 of 1962
- National Veld and Forest Fire Act 101 of 1998
- Nature Conservation Ordinance 19 of 1974
- Northern Cape Nature Conservation Act 9 of 2009
- Municipal Ordinance PN955 of 1975

Water

- National Water Act 36 of 1998
- National Water Amendment Act 27 of 2014
- Water Services Act 108 of 1997

Roads and Traffic

- National Land Transport Act 5 of 1998
- Road Traffic Act 29 of 1989


Pollution

- Health Act 63 of 1977
- Hazardous Substances Act 115 of 1973
- National Environmental Management: Waste Act 59 of 2008
- National Environmental Management: Air Quality Act 39 of 2004 (NEMAQA)
- National Environmental Management: Waste Amendment Act 26 of 2014
- Municipal Ordinance PN20 of 1974

Heritage Resources

- National Heritage Resources Act 25 of 1999
- World Heritage Convention Act 49 of 1999



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