

HERITAGE DESKTOP REPORT

FOR THE PROPOSED MIDDELWATER EXPLORATION PROJECT, PRIESKA
DISTRICT, NORTHERN CAPE PROVINCE

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EXECUTIVE SUMMARY

Site name and location: Middelwater Exploration Co (Pty) Ltd intends to apply for a prospecting right on the farm Middelwater 18, portion 0 (also known as remaining extent) Siyathemba Local Municipality, Pixley Ka Seme District Municipality, Prieska Administrative District, Northern Cape Province.

1: 50 000 Topographic Map: 2922 AD & CB.

EIA Consultant: Greenmined Environmental

Developer: Middelwater Exploration Co (Pty) Ltd

Heritage Consultant: Heritage Contracts and Archaeological Consulting CC (HCAC).

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Date of Report: 4 December 2018

Findings of the Assessment:

The scope of work comprises a heritage desktop report for six drill points on a large prospecting right area comprising approximately 7 983 ha. Prospecting will consist of drill pads measuring 400m² mostly located in existing gravel roads to minimize the impact on the environment.

Several prospecting applications are currently underway for the immediate surrounding area. Two of these were subjected to heritage assessments (Van Vollenhoven 2018; Mtenga 2018) that identified heritage resources that consist of MSA/LSA artifacts scattered over a large area and historical features. One of these studies (Van Vollenhoven 2018) included the farm under investigation (Middelwater) but could not gain access to the farm.

The Stone Age artifact scatters are considered to be background scatter as defined by Orton (2016) and of low heritage significance. Beaumont et al. (1995: 240) observed that “thousands of square kilometers of Bushmanland are covered by a low-density lithic scatter and similar occurrences are expected within the study area. Due to the limited footprint of the seven drill sites on a large area of relative low heritage significance the impact of the project is expected to be low.

This desktop study is informed by available data for the area and 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 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 to very high 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. Prospecting rights in close proximity to the study area subjected to field based heritage assessments did not recommend further mitigation (Van Vollenhoven 2018 and Mtenga (2018). It is therefore recommended that exploration can commence (based on approval from SAHRA) with the following management measures incorporated into the EMP for the project:

- All drilling points should be located on existing roads as far as possible.
- The environmentalist should inspect the location for each drill site to confirm that there are no stone packed features (Structures or graves) close to the impact area of the drill locations.
- 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 Greenmined Environmental to conduct a heritage desktop study for the proposed Middelwater prospecting application. The proposed prospecting activities (six drill pads) are located 33 km North-West of Prieska, Northern Cape Province, adjacent to the Orange River (Figure 1 - 3). The commodities of interest are Beryllium, Cobalt, Copper, Feldspar, Gold, Iron Ore, Lead, Lithium, Manganese, Mica, Nickel, Silver, Tantalum, Tin, Tungsten, Uranium and Zinc.

The aim of the desktop report is 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, 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 desktop report. The report includes information collected from various sources and consultations. Possible impacts are identified and mitigation measures are proposed in the following report.

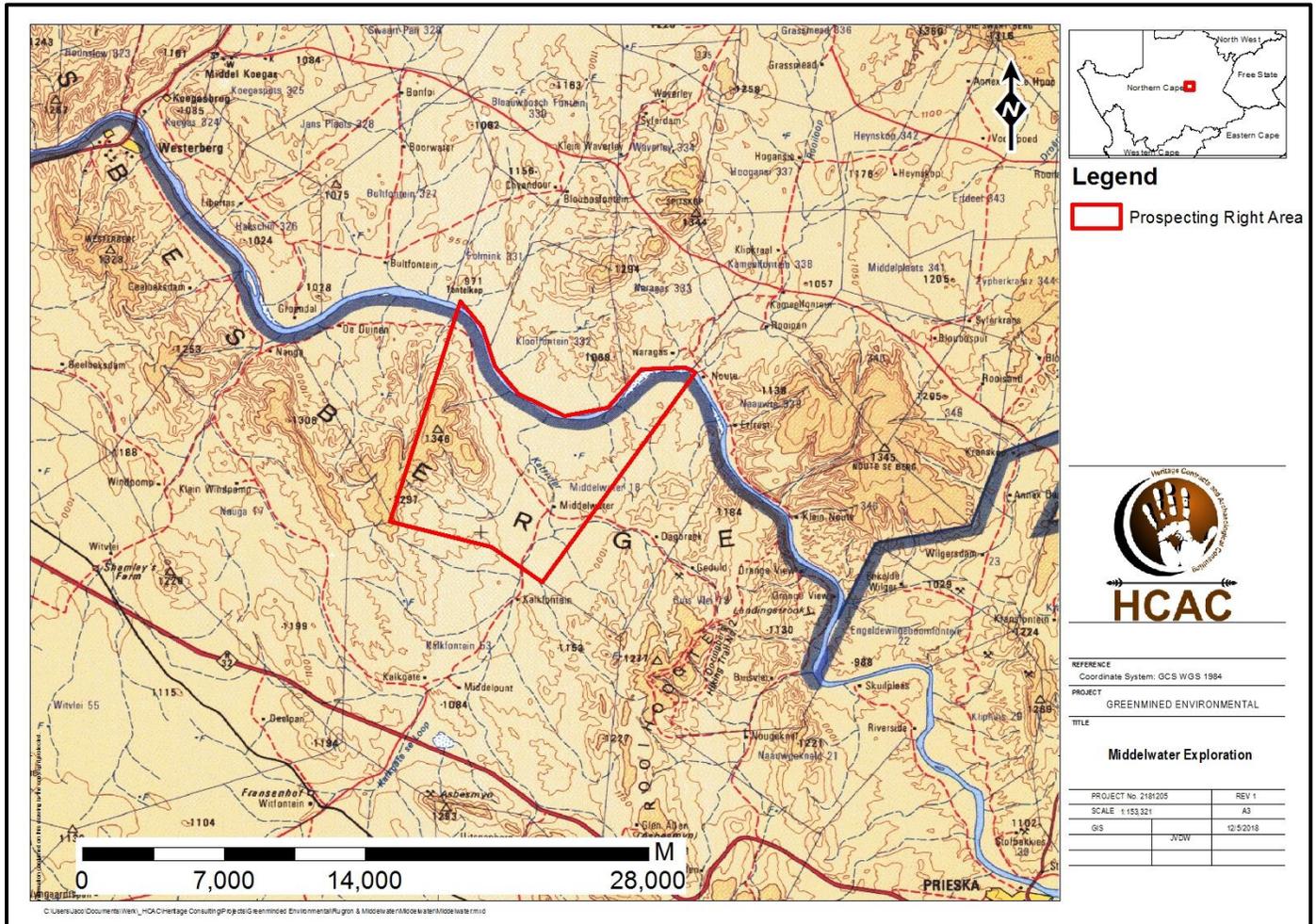


Figure 1. Regional Locality map of the site under investigation indicated in blue.



Figure 2. Google Earth image of the study area.

1.1 Terms of Reference

The main aim of this desktop report is to determine if any known heritage resources occur within the project site. The objectives of the desktop 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 Desktop Report in line with the requirements of the EIA Regulations, 2014, as amended on 07 April 2017.

The reporting is based on the results and findings of a desktop study, wherein potential issues associated with the proposed project will be identified. Reporting will aim to identify the anticipated impacts of the proposed project activity on heritage resources. 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 heritage resources in a responsible manner, in order to protect, preserve and develop them within the framework provided by Heritage Legislation.

1.2 Nature of the development

Non-Invasive Prospecting Methods

(These activities do not disturb the land where prospecting will take place, e.g. aerial photography, desktop studies, aeromagnetic surveys, etc)

Phase 1 (month 0 to 6), phase 3 (months 15 to 27) and phase 4 (months 30 to 36)

Desktop Studies

Desktop studies form a very important preparatory step in a new exploration project, and as the name suggests, this task is executed mainly from an office environment. Desktop studies will be conducted by the project geologist as part of preliminary investigations into the prospecting area by looking at all relevant published literature, geological maps, mining maps and any available evidence or records of findings. The outcome of the desktop studies will be a geological report of the prospecting area with a particular emphasis on the prospectivity of the area. This report will also inform other subsequent prospecting steps.

Spatial Database Compilation

Spatial information will be compiled into a GIS database for access, correlation and evaluation. The GIS system will be used and maintained for the period of the prospecting right exploration program and regularly updated as new information is generated by the exploration program.

Land Survey

All spatial information accessed and collected in the field will be standardized using the WGS84 datum.

Remote Sensing

As part of the initial review, public domain aerial photos will be acquired and a detailed geological and structural interpretation will be done on these to aid in identifying target areas that are not readily evident on the ground and to provide an independent interpretation of the geology of the area. Satellite imagery will also be acquired to provide a more regional viewpoint of the area of interest. As before a detailed geological and structural interpretation will be done on these images to provide a more regional viewpoint on the target areas. Satellite imagery is used to complement the aerial photos interpretations as the combination of multi-spectral bands can be used to highlight certain lithology's, vegetation types, soil types, alteration minerals, etc.

Geophysical survey to be undertaken

Both airborne and ground geophysical surveys may be undertaken for the prospecting right area, depending on the results of the desktop study. A small airborne magnetic/radiometric survey may be carried out over the prospect and surrounding areas to map the structural geology of the area. Follow up ground geophysical surveys will be carried out on coincident targets from the compilation of geological and geophysical data. These surveys may include ground gravity, ground electromagnetics, IP and controlled source audio magnetotellurics (CSAMT).

Field geological studies will follow after the desktop studies, and they typically include walking over the prospecting area making general observations of the geology and topography. Geological mapping activities, if terrain is suitable, may include detailed outcrop mapping, identification of iron ore hosting strata, iron ore seam outcrop mapping and sampling of exposed iron ore seams where available.

The 3D geological modelling and resource estimation step will follow after favourable exploration drilling results. This geological modelling step mainly entails geological interpretation of collected log sheet data and the subsequent geological domain. The geological model, which shows the physical continuity of the iron ore seams and the distribution of the iron ore qualities, is a critical input in iron ore resource estimation. The iron ore resource statement, which is an outcome of the resource estimation process, gives an indication of the amount of available iron ore resources in tonnage and associated qualities.

DESCRIPTION OF PLANNED INVASIVE ACTIVITIES:

(These activities result in land disturbances e.g. sampling, drilling, etc.)

Phase 2 (month 6 to 15) and phase 4 (months 27 to 30)

Drilling:

The exact location where drilling will be carried out will be determined by the results of geophysical and geological work carried out in Phase 1 of the prospecting programme. The initial holes will be drilled on the Prospecting area that forms part of this application. All drill holes will be approved by the team's environmental manager prior to approval thereof. The environmental management plan related to this project will consider environmental sensitivities and advise on the location of drilling holes. By the quarter of exploration, there will be clearly defined targets that will warrant testing by diamond, reverse circulation or percussions drilling. It is envisaged that a combination of HQ (63.5 mm) and NQ (47.63 mm) drilling will be used to drill targets. The core will be logged, cut and sampled at a core yard to be located near the prospecting site. The samples will be crushed and milled and then analysed at an accredited laboratory in for iron ore quality. The resultant drill holes will be cased and capped to make it safe for people and animals, and also allow for future access by the exploration team.

MAIN PROSPECTING ACTIVITIES:

Drill site establishment:

A drill site of approximately 400 m² will be established that will require:

- Clearing of vegetation for sumps and the drill entrance point;
- Earth sumps for water recycling;
- Laydown area for drill rods, fuel and chemical storage;
- Chemical toilets.
- Drilling and removal of geological cores:
- Drilling a hole of approximately 110 mm in diameter and removing of rock core. Number of boreholes will be finalised once non-invasive prospecting is completed.
- Casing of boreholes: 1m² per borehole.
- Rehabilitation of drill sites.

1.3. The receiving environment

The farm Middelwater 18 is situated approximately 33 km North-West of Prieska, Northern Cape Province, adjacent to the Orange River. The foremost part of the prospecting area comprises of natural vegetated areas representative of the Nama Karoo Biome, specifically the Northern Upper Karoo (NKu3). Shrubland dominated by dwarf karoo shrubs, grasses and *Accacia melifera* subsp. *detinens* and some other low trees (especially on sandy soils in the north parts and vicinity of the orange river) (Figure 4 to 7). Flat to gently sloping, with isolated hills of upper karoo hardeveld in the south and vaalbos rocky shrub land in the northeast and with many interspersed pans.

The dominant vegetation is a grassy, dwarf shrubland. Grasses tend to be more common in depressions and on sandy soils, and less abundant on clayey soils. Grazing rapidly increases the relative abundance of shrubs. Most of the grasses are of the C4 type and, like the shrubs, are deciduous in response to rainfall events.

Most of the land is used for grazing, by sheep (for mutton, wool and pelts) and goats, which can be commensurate with conservation. However, under conditions of overgrazing, many indigenous species may proliferate, including Threethorn *Rhigozum trichotomum*, Bitterbos *Chrysocoma ciliata* and Sweet Thorn *Acacia karroo*, and many grasses and other palatable species may be lost. There are very few rare or Red Data Book plant species in the Nama Karoo Biome.



Figure 4. General site conditions



Figure 5, General site conditions



Figure 6. Vegetation in the study area



Figure 7. General site conditions

2. APPROACH AND METHODOLOGY

This desktop report was conducted as part of the first phase of the prospecting. The aim of the study 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.

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

Although the current area under investigation does not seem to have been covered by heritage surveys, several sites are on record to the southwest of the area (Figure 8) indicating that similar sites can be expected in the study area.

In the immediate area the following recent studies were consulted of which the results are not included in Figure 8:

Author	Year	Project	Findings
Mtenga, E.	2018	Phase I Heritage Impact Assessment (including palaeontological assessment) requested in terms of section 38 of the National Heritage Resources Act No 25/1999 for the proposed mine prospecting and application for mining right on a portion of the remaining extent of the Farm Kransfontein 19 & Portion 2 (De Rust) Of The Far Kransfontein 19, Prieska District, Northern Cape Province	Stone Age Sites, Historical structure and burial sites.
Van Vollenhoven, A.	2018	A Report On A Cultural Heritage Impact Assessment For A Proposed Mining Rights Application On The Farms Folmink 331, Klooffontein 332, Middelwater 18 And Farm 597, Close To Prieska, Northern Cape Province.	Stone wall sites, historical structures, graves, grindstone and whetstone

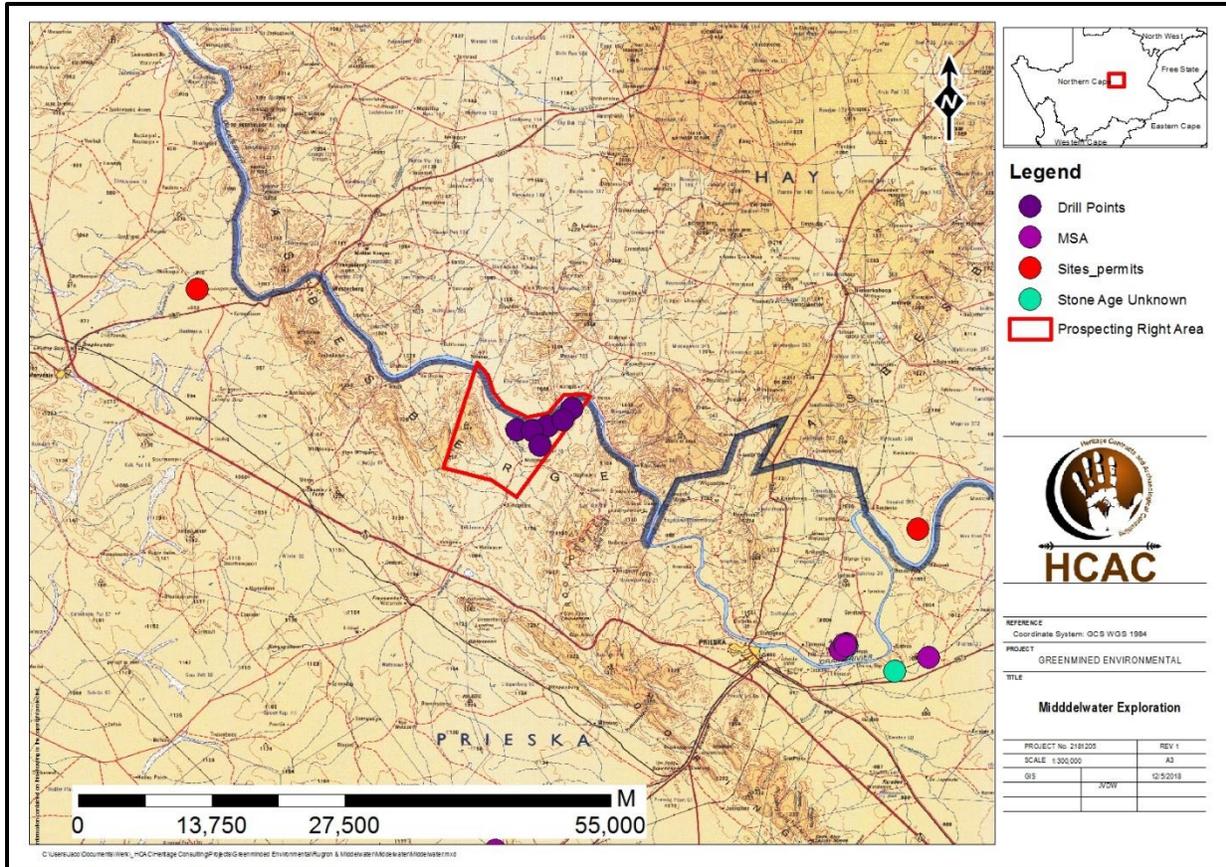


Figure 8. Known sites in relation to the study area.

4.1.2. Public consultation

No public consultation was conducted by the heritage consultant.

4.1.3. Google Earth and mapping survey

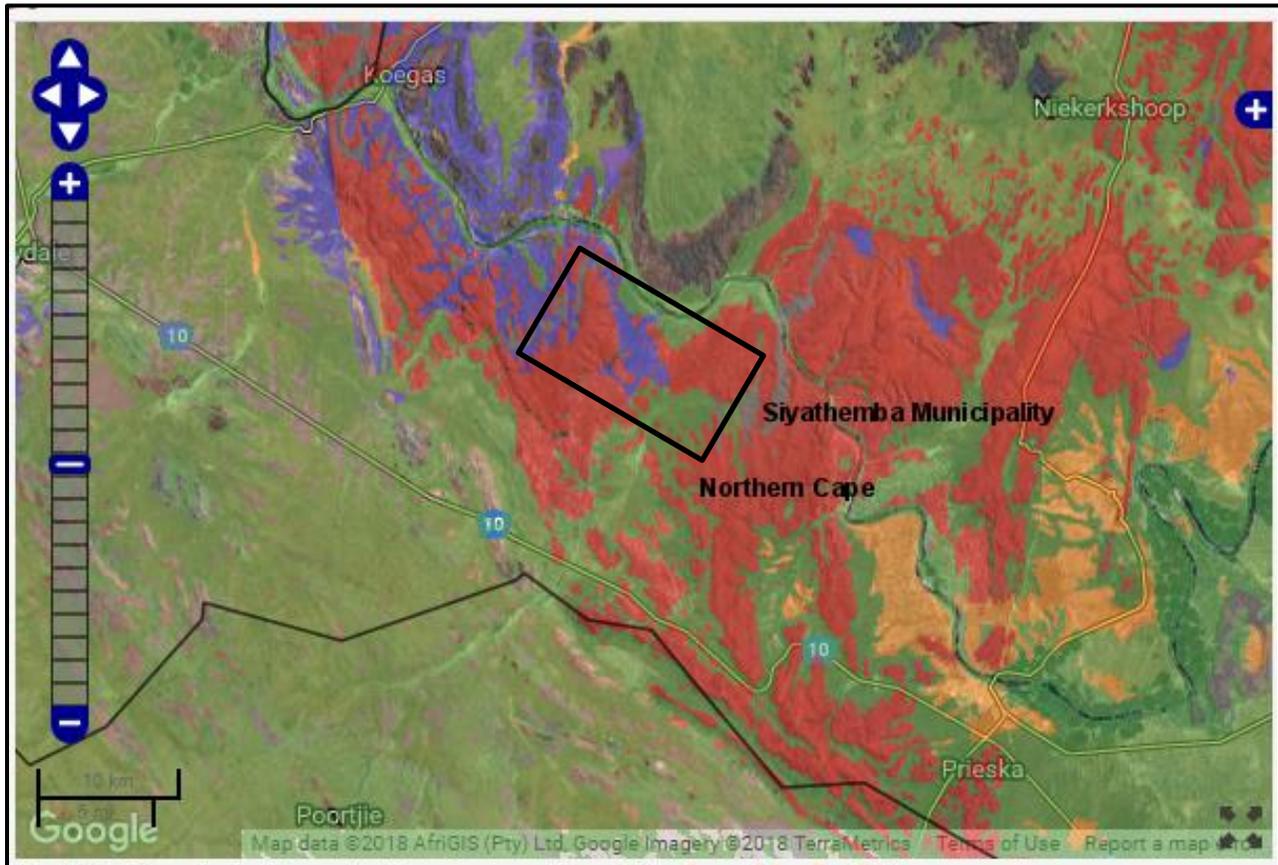
Google Earth and 1:50 000 maps of the area were utilised to identify possible places where archaeological sites might be located.

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 9. The approximate study area indicated on the SAHRS Paleontological map as ranging from low to moderate to very high 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) highlighting the archaeological importance of pans.

Orton (2011) noted that to the south west of the study area, around 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).

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. 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. 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’Gariep. 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.

5.4 Historical maps and documents relating to the area under investigation

The farm Middelwater 18 is situated approximately 33 kilometres north west of Prieska, Northern Cape Province, adjacent to the Orange River.

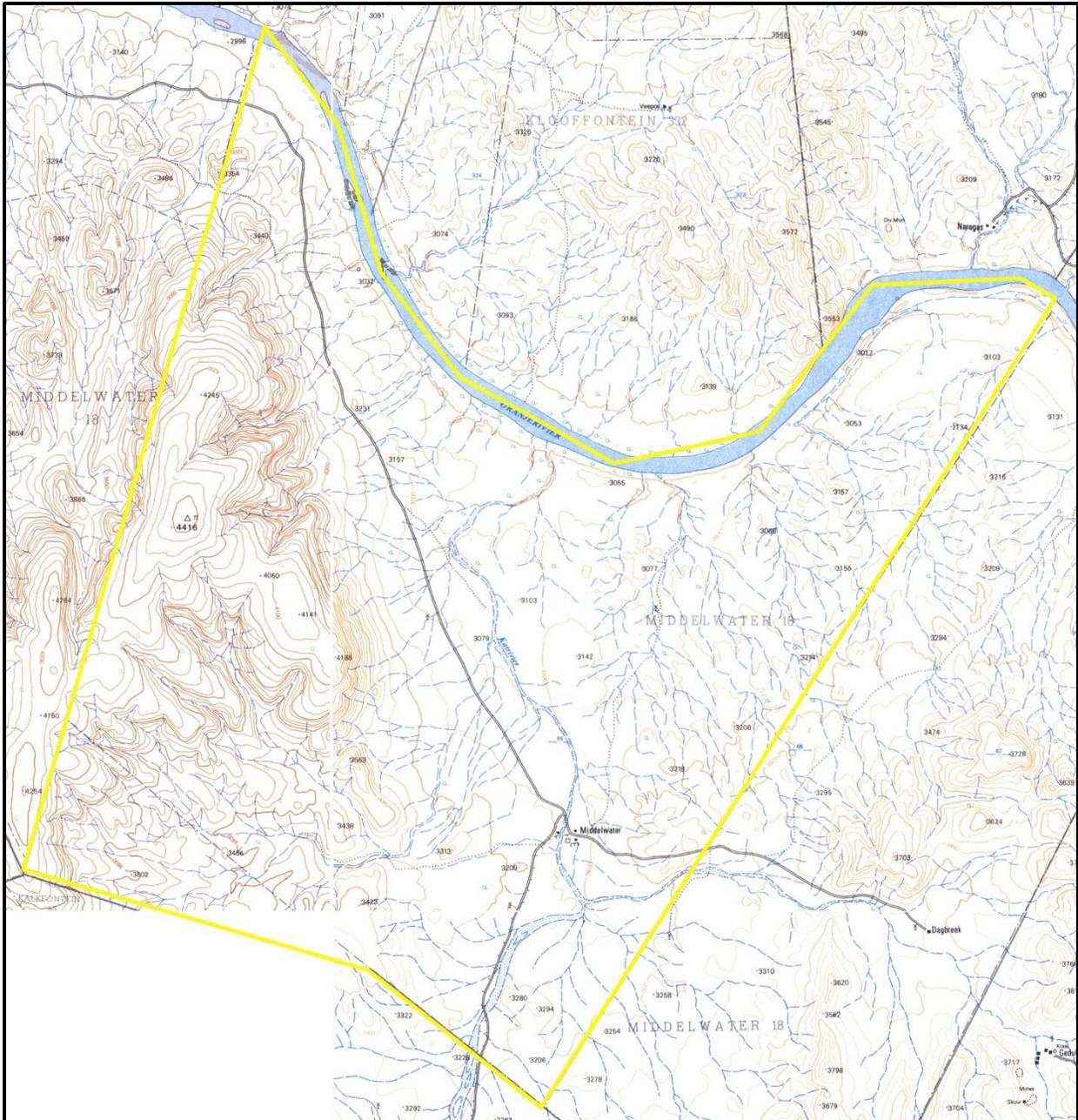


Figure 10. 1970 Topographical map of the site under investigation. The approximate study area is indicated with a yellow border. The Orange River formed the northern boundary of the study area, and the Katrivier and several streams went through the property. Two minor roads went through the farm, and a telephone line ran along one of the roads. One can see three buildings and a short anti-erosion wall at the intersection of the roads (site known as Middelwater). A windmill is visible further to the south west. (Topographical Map 1970; Topographical Map 1970; Topographical Map 1970)

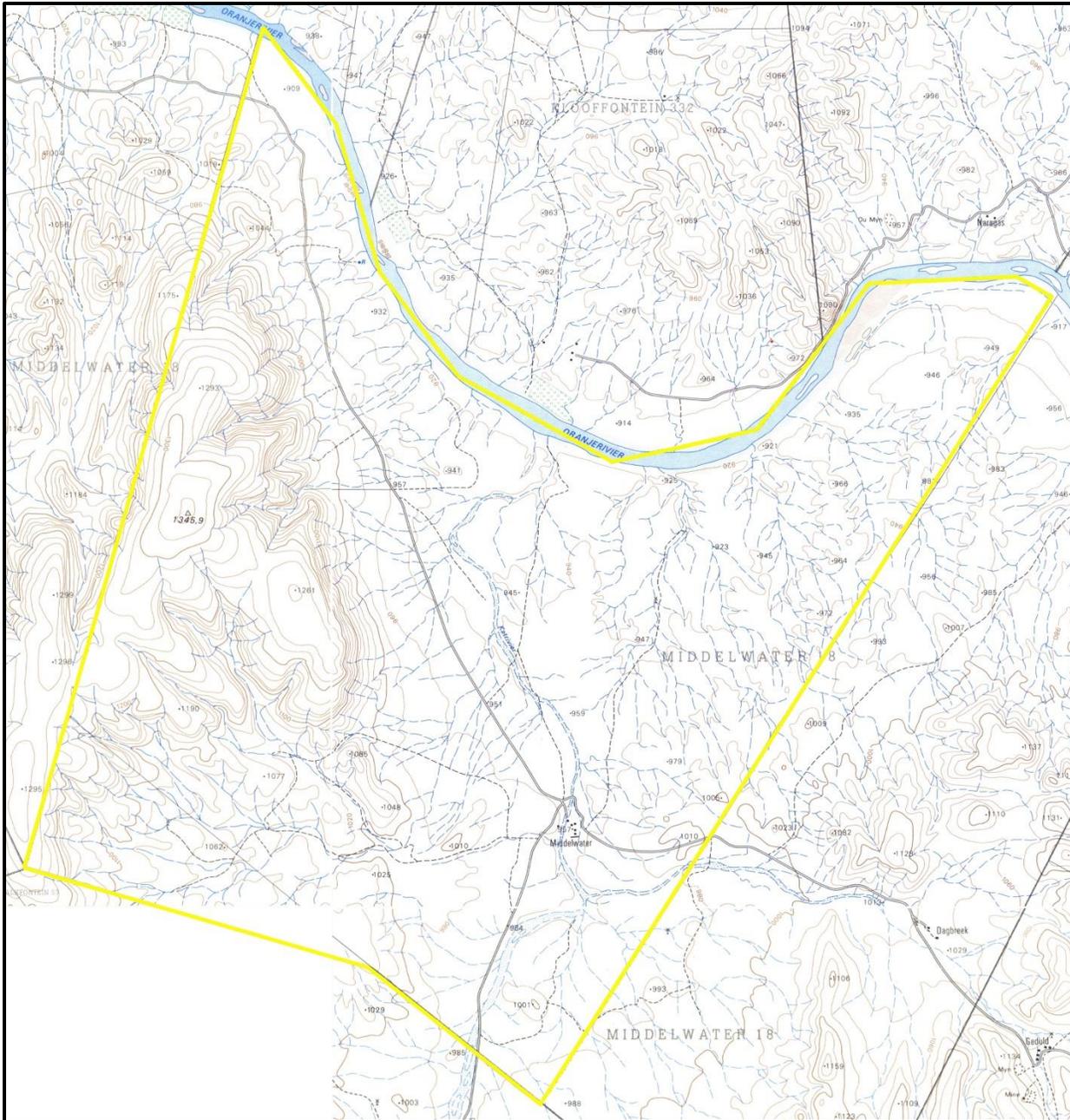


Figure 11. 1988 Topographical map of the site under investigation. The approximate study area is indicated with a yellow border. The Orange River formed the northern boundary of the study area, and the Katrivier and several streams went through the property. A number of minor roads and several tracks / footpaths went through the study area. One can see six buildings and a short anti-erosion wall at the intersection of the roads (at Middelwater). (Topographical Map 1988; Topographical Map 1988; Topographical Map 1988)

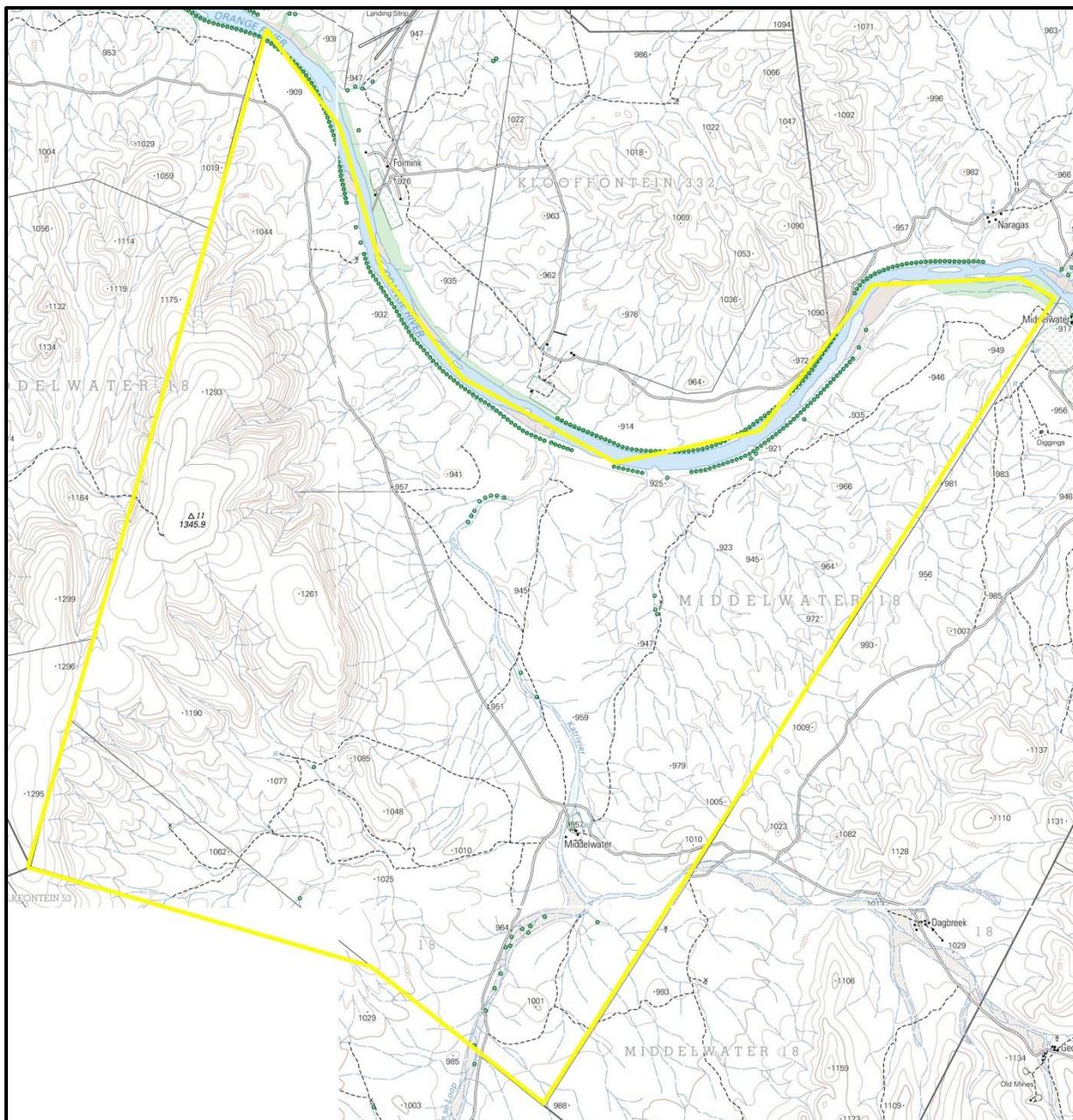


Figure 12. 2005 Topographical map of the site under investigation. The approximate study area is indicated with a yellow border. The Orange River formed the northern boundary of the study area, and the Katrivier and several streams went through the property. A number of minor roads and several tracks / footpaths went through the study area. One can see three buildings, a water reservoir and a small section of cultivated land at the intersection of the roads (at Middelwater). A water reservoir and two windmills can be seen in other parts of the study area. (Topographical Map 1988; Topographical Map 1988; Topographical Map 1988) (Topographical Map 2005; Topographical Map 2005; Topographical Map 2005)



Figure 13. 2018 Google Earth image showing the study area in relation to the Orange River, the N10, Prieska and other sites. (Google Earth 2018)

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: *Medium Probability*
 - MSA: *High Probability*
 - LSA: *Medium-High Probability*
 - LSA –Herder: *Medium 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 and 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 wider area, widely dispersed scatters of artefacts dating back to the Stone Age (mostly dating to the MSA and LSA) is expected in the study area. The Middelfontein farmstead and associated structures is located at 29° 29' 27.5372" S, 22° 31' 52.3899" E, this area might also contain graves, but will not be impacted on by the proposed prospecting activities. Based on a desktop assessment of the study area no known heritage sites occur within the prospecting area. Due to the importance of environmental indicators such as water sources, higher lying areas etc. that attracted human activity in antiquity, these factors were used as the main criteria for generating a four-tier map of the study area (Figure 14). The relative sensitivity mapping followed the following four tier sensitivity classes approach with:

- Dark Red: Very High Sensitivity
- Red: High Sensitivity,
- Orange: Medium Sensitivity
- Green: Low Sensitivity

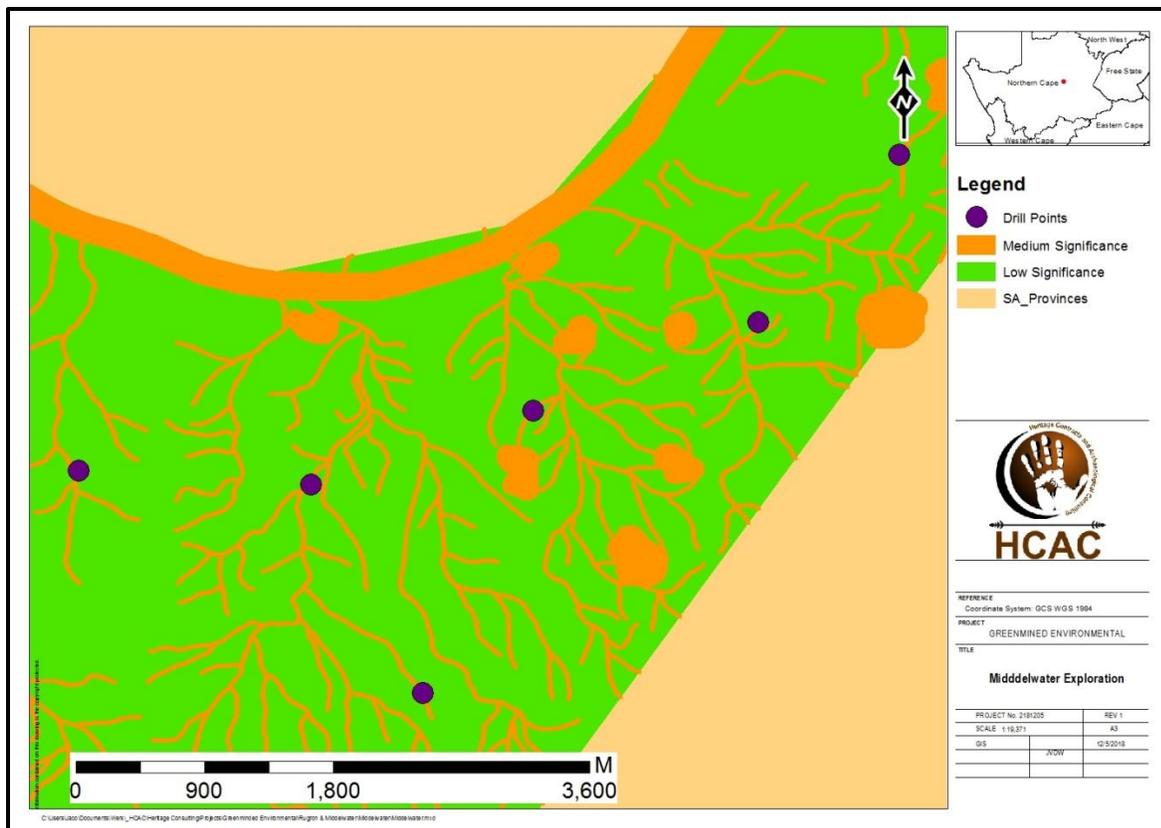


Figure 14. Four tier sensitivity map of the study area.

8.1. Archaeology and Palaeontology

8.1.1 Archaeological finds

Based on CRM studies conducted in the area MSA and LSA scatters and to a lesser extend isolated ESA artefacts can be expected. No Impacts to heritage resources is envisaged during the non-invasive prospecting activities and invasive activities (drilling) will, due to the small impact area of drill sites, have a negligible impact on heritage resources.

8.1.2. Paleontological resources

Bamford (2018) conducted an independent paleontological study and found that the proposed site lies on Kalahari Sands that do not preserve fossils except around pans. Below the sands are the non-fossiliferous Asbestos Hills Subgroup iron formation (the target of the operation) and potentially fossiliferous stromatolites of the Campbell Rand Subgroup. There is only an extremely small chance that microscopic green and blue-green algae could be preserved in the stromatolites. There is a small chance that fossil plants of the Dwyka Group *Glossopteris* flora could occur in the central part of the farm (Bamford 2018).

8.1.3. Nature of Impact

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

8.1.4. Extent of impact

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

8.2. Historical period

8.2.1 Historical finds:

Historical finds include middens, structural remains and the cultural landscape. No impacts are expected during the exploration 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.	NA
Description of expected significance of impact			
Based on previous work in the area widely scattered Stone Age finds and graves can be expected. The project is not expected to have an impact on significant heritage resources and due to the size of the drilling areas relative to the study area the impact will be very low.			
Gaps in knowledge & recommendations for further study			
It is assumed that information obtained for the wider region is applicable to the study area. A chance find procedure should be implemented for the project.			

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 desktop report for six drill points on a large prospecting right area comprising approximately 7 983 ha. Prospecting will consist of drill pads measuring 400m² mostly located in existing gravel roads to minimize the impact on the environment and due to the limited footprint of the seven drill sites on a large area of relative low heritage significance the impact of the project is expected to be very low.

This desktop study is informed by available data for the area and 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 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 to very high 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. Prospecting rights in close proximity to the study area were approved (Van Vollenhoven 2018 and Mtenga (2018). It is therefore recommended that exploration can commence (based on approval from SAHRA) with the following management measures incorporated into the EMP for the project:

- All drilling points should be located on existing roads as far as possible.
- The environmentalist should inspect the location for each drill site to confirm that there are no stone packed features (Structures or graves) close to the impact area of the drill locations.
- Inclusion of a chance find protocol (both archaeology and palaeontology) in the EMPr.

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

Taking cognisance of the small impact of the drill sites it is recommended the project can continue with no further studies, incorporating chance find procedures and the recommended management measures into the EMP.

11.1 Reasoned Opinion

If the above recommendations are adhered to, HCAC is of the opinion that the impact of exploration on heritage resources is low and that the project can continue.

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

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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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