HERITAGE DESKTOP ASSESSMENT

FOR THE PROPOSED MINING RIGHT APPLICATION ON THE FARMS VAN ASWEGENS HOEK 493 RD AND GREYLINGSLYN 355 RD, BOSHOFF AREA, FREE STATE PROVINCE.

Client:
Greenmined Environmental

Client information:
Christine Fouche

E – Mail: Christine.F@greenmined.co.za

HCAC - Heritage Consultants

Private Bag X 1049
Suite 34
Modimolle
0510

Tel: 082 373 8491
Fax: 086 691 6461
E-Mail: jaco.heritage@gmail.com

Report Author:

Mr. J. van der Walt

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	Name	**Qualifications and Certifications**	**Date**
Archaeologist	Jaco van der Walt	MA Archaeology ASAPA #159	April 2019
Archival Specialist	Liesl Bester	BHCS Honours	April 2019
Palaeontologist	Marion Bamford	PhD Palaeobotany	April 2019

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EXECUTIVE SUMMARY

Site name and location: The proposed Invest in Property 84 Mining right application is situated in the Free State province approximately 56 km north of Boshof, and ±53 km west of Hertzogville extending from the eastern bank of the Vaal River in land. The extent of the proposed mining area is 3 955.70 ha

1: 50 000 Topographic Map: 2725 CC

EIA Consultant: Greenmined Environmental

Developer: Invest in Property 84 (Pty) Ltd

Heritage Consultant: HCAC.
Contact person: Jaco van der Walt, Tel: +27 82 373 8491, Email: jaco.heritage@gmail.com.

Date of Report: 15 May 2019

Findings of the Assessment:

The scope of work comprises a heritage desktop assessment for an extensive mining application of approximately 3 955.70 ha. Due to the large geographical size of the mining right area and the fact that the relatively small impact areas (two hectares at three mining areas at one time) of the proposed mining is not confirmed as yet, it is not feasible to conduct fieldwork at this point.

Few heritage surveys were conducted in the greater area and this desktop study is informed by available data for the 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 the proposed mining 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 cultural layering dating back to the Stone Age with scatters and sites dating to the MSA and LSA. Based on CRM studies conducted in the area and Stone Age land use patterns, Stone Age scatters as well as distinct sites can be expected. Based on the SAHRA paleontological sensitivity map the area is of moderate sensitivity and an independent paleontological assessment was conducted (Bamford 2019). 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 mining has commenced. 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 or no go areas are identified. It is therefore recommended that the project can proceed (based on approval from SAHRA) with the following conditions of authorisation incorporated:

- Before commencing mining 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 Greenmined Environmental to conduct a heritage desktop study for the proposed Invest in Property 84 (Pty) Ltd mining right application. The application area is situated approximately 56 km north of Boshof, and ±53 km west of Hertzogville extending from the eastern bank of the Vaal River in land (Figure 1 - 3). The extent of the proposed mining area is 3 955.70 ha, and it is located on the farms as indicated in Table 1.

Table 1. Farms and farm portions under investigation

APPLICATION AREA	SUB-DIVISION DESCRIPTION
Whole farm Van Aswegens Hoek 493 RD	• Portion 0 (Remaining Extent) of the farm Van Aswegens Hoek 493 RD; • Portion 1 (Remaining Extent) of the farm Van Aswegens Hoek 493 RD; • Portion 2 (Remaining Extent) of the farm Van Aswegens Hoek 493 RD; • Portion 4 of the farm Van Aswegens Hoek 493 RD; • Portion 6 of the farm Van Aswegens Hoek 493 RD;
Whole farm Greylingslyn 355 RD	• Portion 0 (Remaining Extent) of the farm Greylingslyn 355 RD; • Portion 1 of the farm Greylingslyn 355 RD; and • Portion 2 of the farm Greylingslyn 355 RD.

The desktop report aims to identify possible heritage resources within the project site and to recommend management protocols to implement before mining can commence. The study furthermore aims to submit appropriate recommendations with regards to the responsible cultural resources management measures that might be required 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.

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. It is important to note that no fieldwork was conducted, as this will be done when the localities of the invasive exploration are fixed.

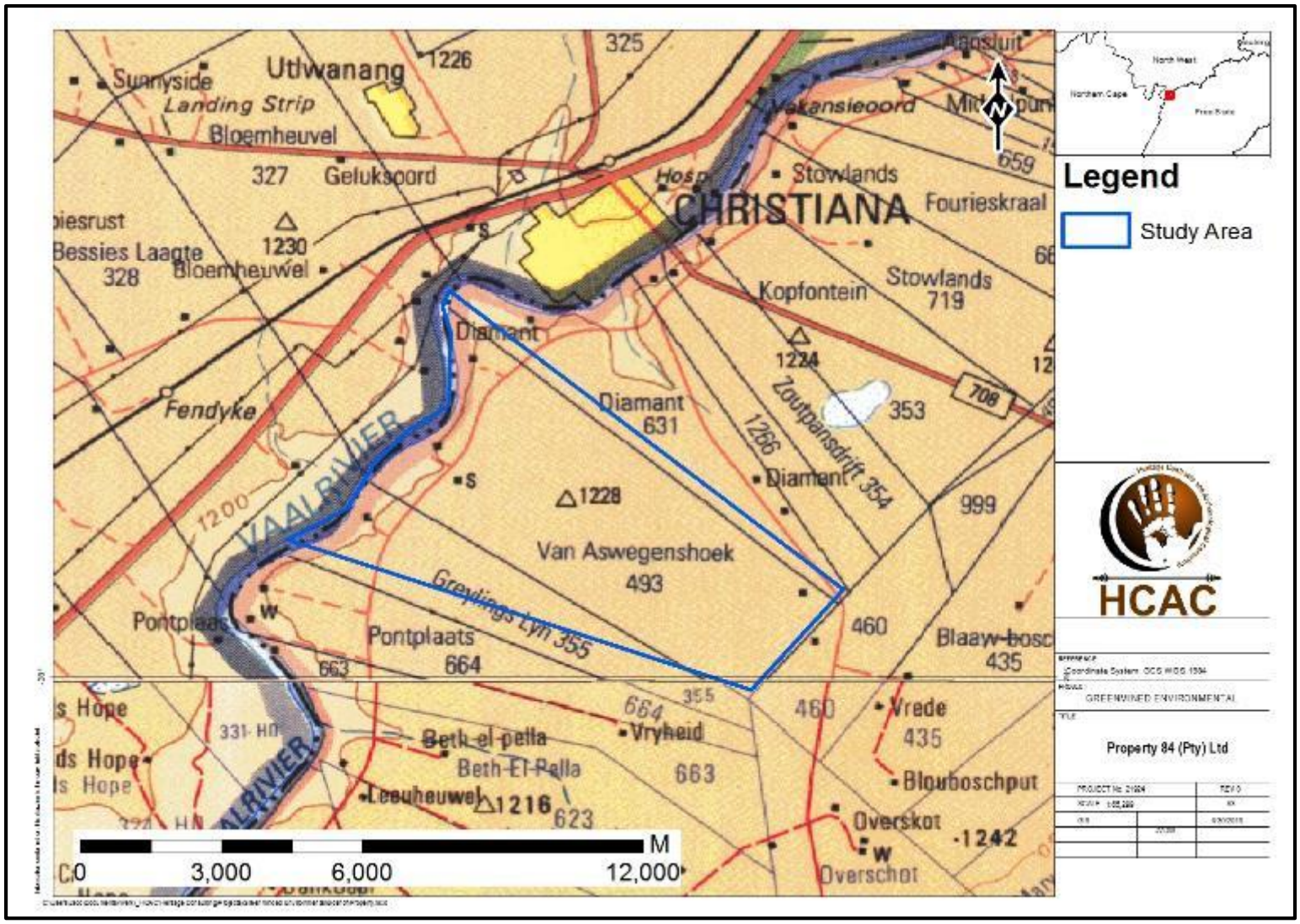


Figure 1. Regional Locality map of the site under investigation indicated in blue.

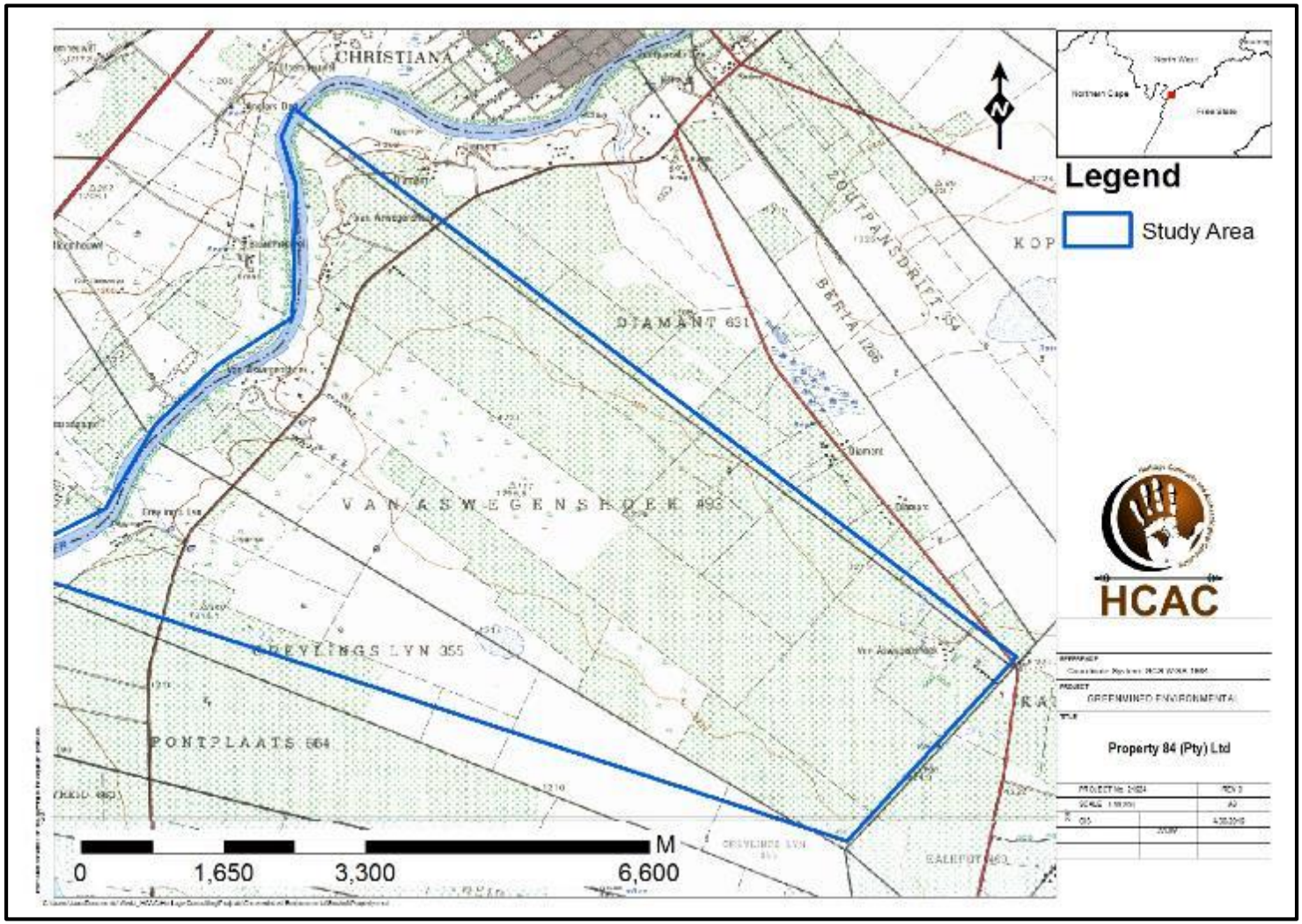


Figure 2. 1:50 000 Topographical map of the study area.

Figure 3. 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 is identified. 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 three 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. The consideration of alternatives is done to assist the developer in responsibly managing heritage resources, in order to protect, preserve and develop them within the framework provided by Heritage Legislation.

When the localities of mining impact areas are fixed, the following terms will 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 likely and cumulative impacts of the operational units of the proposed project on heritage resources for all three 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 responsibly managing the discovered heritage resources, 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 applicant currently holds a prospecting right (FS 30/5/1/1/2/449 PR) over the proposed mining right application area, where the prospecting for alluvial diamonds is in progress. Owing to the outcome of the prospecting operation up until now, the applicant wishes to convert the prospecting right into a mining right for the winning of alluvial diamonds and gold.

The mining method to be used will resemble the current prospecting invasive activities implemented by the applicant, as part of the approved prospecting right. Upon the prospecting and exploration of allowable (agreed to by the landowner) farm portions to determine the precise location and direction of the channels to be mined, the opencast and strip-mining method will be implemented to recover the alluvial diamond bearing gravel of the footprint area. After the removal of topsoil, excavators will open pits of ±350 m² that will vary in depth from 300 mm – 1.2 m depending on the presence of the diamondiferous gravel. The diamondiferous gravel will then be excavated and transported to the processing area where it will be fed into a scrubber and sizing screen. Excess sand will be removed, and the product will continue from the material conveyor to a stockpile, from where it will be fed into the washing pans. The concentrated product from the pans will be extracted into steel containers that will be loaded onto a truck and transported to an off-site recovery plant. The paddle from the washing pans will be pumped into the settling pond and excess water will be allowed to evaporate. Oversized rock, sand and tailings will be used to refill the excavation and landscape the disturbed area prior to the replacement of the previously stockpiled topsoil.

Should gold be recovered from the concentrated product, at the recovery plant, the applicant will sell the mineral in accordance with the approved mining right. No additional activities/process will be required to win/extract gold.

It is proposed that three sites will be operated simultaneously within the footprint of the mining right area. The estimated footprint of a single site will be ±2 ha meaning that the unrehabilitated mining areas calculates to ±6 ha at any given time (BID 2019)

THE MINING ACTIVITIES (AT A SINGLE SITE) WILL CONSIST OF THE FOLLOWING:

1. Stripping and stockpiling the topsoil;

2. Excavating pits to uncover the diamondiferous gravel;

3. Processing the excavated material;

4. Transporting the product to the off-site recovery plant;

5. Backfilling the excavation;

6. Rehabilitating the settling pond footprint;

7. Removing the temporary infrastructure from the processing area;

8. Ripping compacted areas, landscaping and replacing the topsoil; and

9. Vegetating the entire reinstated area.

The applicant will exclusively make use of temporary equipment that can easily be removed upon rehabilitation of the affected area.

EACH MINING SITE WILL CONTAIN THE FOLLOWING:

- Excavation Equipment;
- Earth Moving Equipment;
- Screens, conveyors and pans of the processing plant;
- Containers for administration, storage and workshop purposes;
- Mobile ablution facilities;
- Generator;
- Diesel tanks (<80 m^3);
- Water winning and storage equipment; and
- A settling pond.

The life of mine is expected to be in excess of 30 years, and the applicant will apply for the mining right to be valid for a 30-years period.

ACCESS ROUTE:

Access to the farms are from the provincial surfaced road, crossing the properties, from Christiana in the north running parallel to the Vaal River in a south-western direction.

The applicant will strive to make use of the existing farm roads as far as possible, however some new roads, or upgrading of existing roads may be required to reach allowable mining areas. The construction of a new access road will be in consultation with the landowner and will as far as possible be kept to already disturbed areas following fence lines or similar infrastructure.

Haul roads, at each operational site, will be extended as mining progress, and will be rehabilitated as part of the final reinstatement of the area.

All roads will be selected to avoid watercourses and steep gradients. Adequate drainage and erosion protection in the form of cut-off berms or trenches will be provided where necessary.

1.3. The receiving environment

The extent of the proposed mining area is 3 955.70 ha, and located on the farms Van Aswegens Hoek 493 RD and Greylingslyn 355 RD. The vegetation cover of the application area various from highly degraded to natural with a well-established layer of indigenous vegetation representative of the Kimberley Thornveld or the Highveld Alluvial Vegetation as classified by Mucina and Rutherford (2006). Various power lines traverse the properties and farm buildings, and associated infrastructure such as dams, roads, pivots, radio towers etc. is present throughout the proposed mining right area

2. APPROACH AND METHODOLOGY

This desktop report was conducted as part of the first phase of the mining right application. The study aims 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 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 the 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 or 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, the recorded sites help to contextualise the study area. Known sites are indicated in relation to the study area in Figure 4 with a rock engraving site to the north of the study area.

Author	Year	Project	Findings
Rossouw, L	2006	A Preliminary Evaluation of Archaeological and Palaeontological Impact with Regard to the Application for Prospecting Rights on the Farms Doornfontein 12, Grasbult 5, Schoolplaats 3, Schoolplaats Annex 4 and Pontdrift 2 in the Warrenton, Northern Cape	The study indicated that the area is archaeologically rich and paleontologically sensitive but no sites were recorded.
Dreyer, C.	2008	First Phase Archaeological and Cultural Heritage Investigation of The Proposed Hlangana Groot Rivier Estate, Boshof, Free State	No sites
Tomose, N.G.	2016	Heritage Impact Assessment for Proposed Construction of a 15,5km single-circuit BPBH and KDLO Interconnector 22kV powerline near Boshof	Isolated MSA sites
Van Vollenhoven, A.C.	2018	A Report on An Archaeological Impact Assessment for Two Proposed 22 Kv Power Lines Close to Christiana, North West Province	No sites

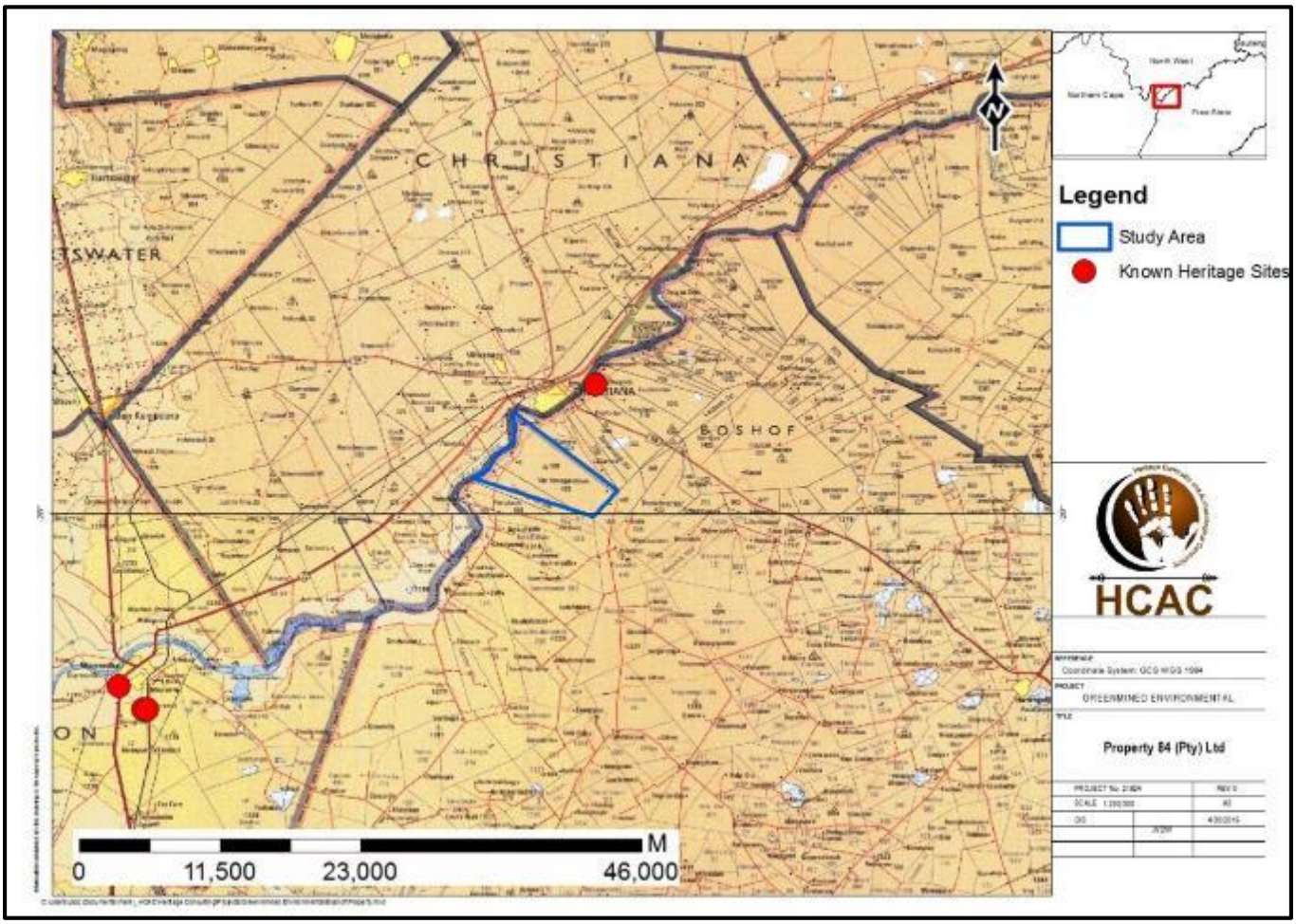


Figure 4. Known sites in relation to the study area.

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.

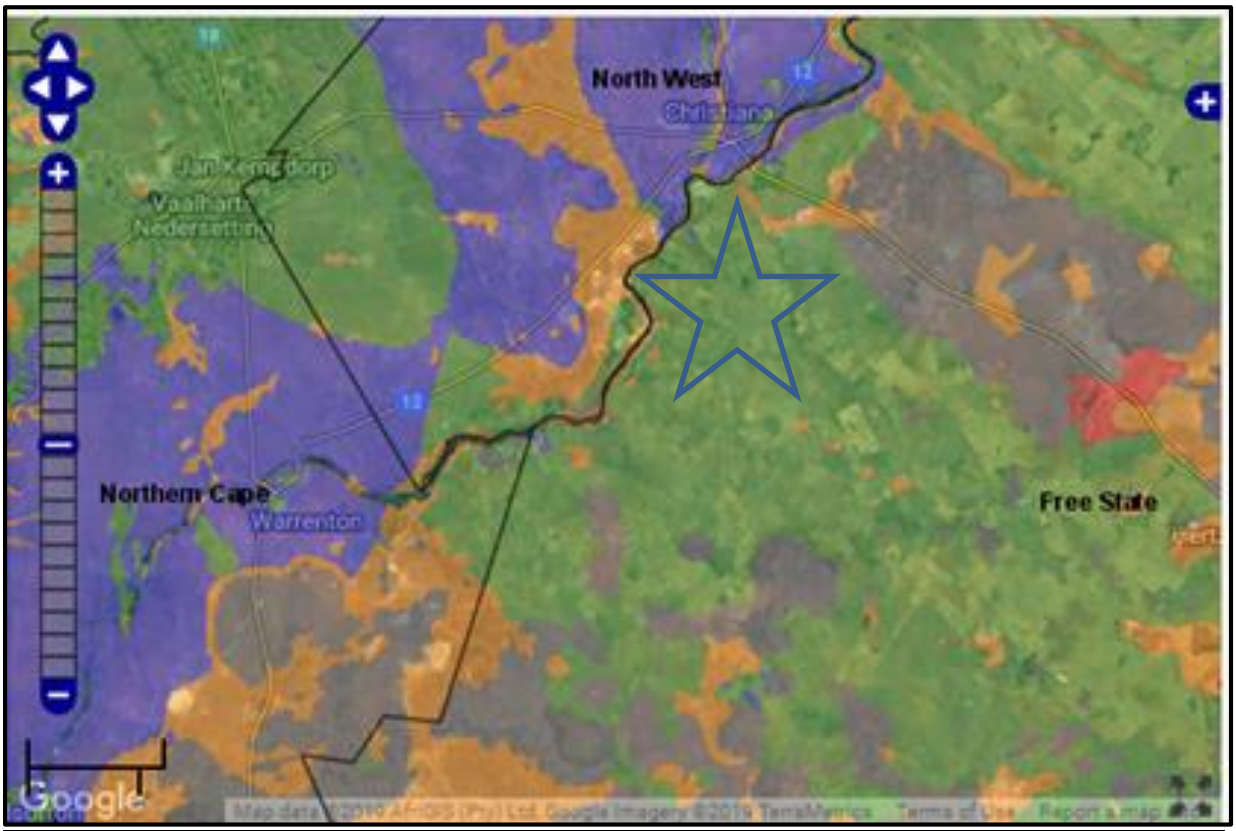
4.1.4. Genealogical Society of South Africa

No gravesites are on record for the study area.

5. BACKGROUND INFORMATION AVAILABLE ON THE STUDY AREA

5.1. Palaeontology of the study area

The study area is of moderate paleontological sensitivity (Figure 5) according to SAHRIS. Prof Marion Bamford conducted an independent study for this project (Bamford 2019).



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 5. The approximate location of the study area (star) indicated on the SAHRIS Paleontological map as of moderate significance.

5.2. Archaeological Overview of the study area.

5.2.1. Stone Age

South Africa has a long and complex Stone Age sequence of more than 2 million years. The broad sequence includes the Later Stone Age, the Middle Stone Age and the Earlier Stone Age. Each of these phases contains sub-phases or industrial complexes, and within these we can expect regional variation regarding characteristics and time ranges. For Cultural Resources Management (CRM) purposes it is often only expected/ possible to identify the presence of the three main phases. Yet sometimes the recognition of cultural groups, affinities or trends in technology and/or subsistence practices, as represented by the sub-phases or industrial complexes, is achievable (Lombard 2011). The three main phases can be divided as follows;

- Later Stone Age; associated with Khoi and San societies and their immediate predecessors. Recently to ~30 thousand years ago.
- Middle Stone Age; associated with Homo sapiens and archaic modern humans. 30-300 thousand years ago.
- Earlier Stone Age; associated with early Homo groups such as Homo habilis and Homo erectus. 400 000-> 2 million years ago.

Since there are no caves in the study area, no Stone Age sites of high significance is expected, although isolated finds or background scatter (Orton 2016) can occur anywhere on the landscape. Next to the rivers, pans and rocky outcrops sites of medium significance could occur. Some rock engravings are on record to the North of Boshoff (Bergh 1999).

5.2.2. Iron Age (general)

The Iron Age as a whole represents the spread of Bantu speaking people and includes both the pre-Historic and Historic periods. It can be divided into three distinct periods:

- The Early Iron Age: Most of the first millennium AD.
- The Middle Iron Age: 10th to 13th centuries AD
- The Late Iron Age: 14th century to colonial period.

The Iron Age is characterised by the ability of these early people to manipulate and work Iron ore into implements that assisted them in creating a favourable environment to make a better living.

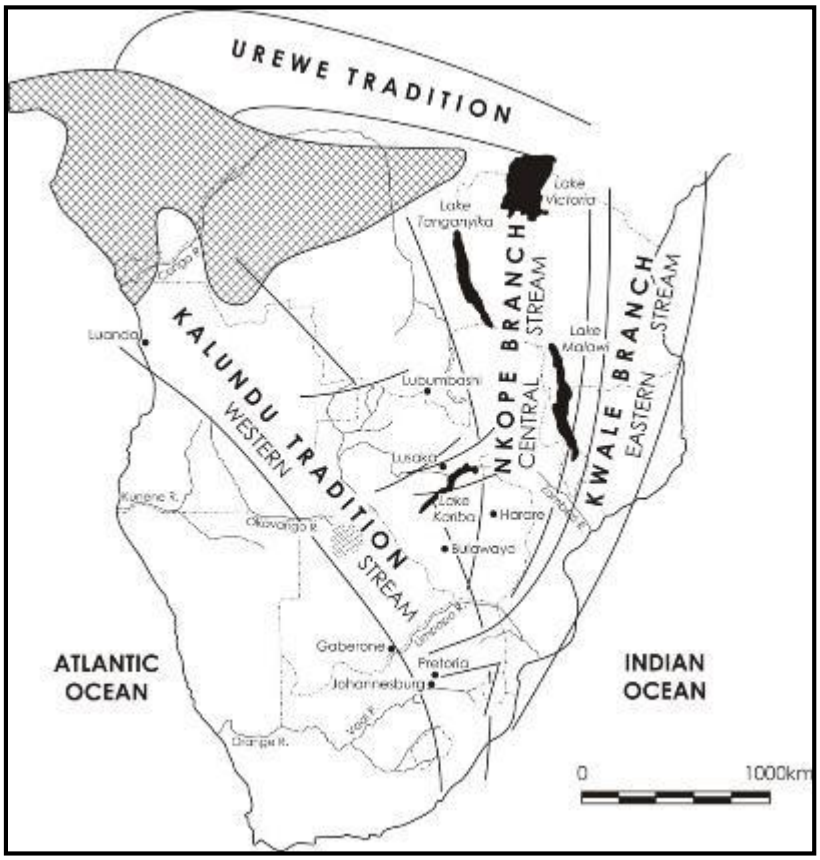


Figure 6: Movement of Bantu speaking farmers (Huffman 2007)

No Sites dating to the Early or Middle Iron Age have been recorded or is expected for the study area. The same goes for the Later Iron Age period where the study area is situated outside the southern periphery of distribution of Late Iron Age stone walled settlements in the North West Province. Boshoff is located south of the known Iron Age sequence distribution (Huffman 2007) and no stone walled settlements are visible on areal imagery of the study area.

5.3. Historical Overview

5.3.1. History of Boshoff

The town of Boshoff was established on a farm bought from a local Griqua, Dawid Danster. The farm was bought by DS Fourie and sold to the Nederduitse Gereformeerde Kerk. Under direction from Rev Andrew Murray the town was laid out in 1856. The new town was named after the second president of the Orange Free State – Jacobus Nicolaas Boshoff.

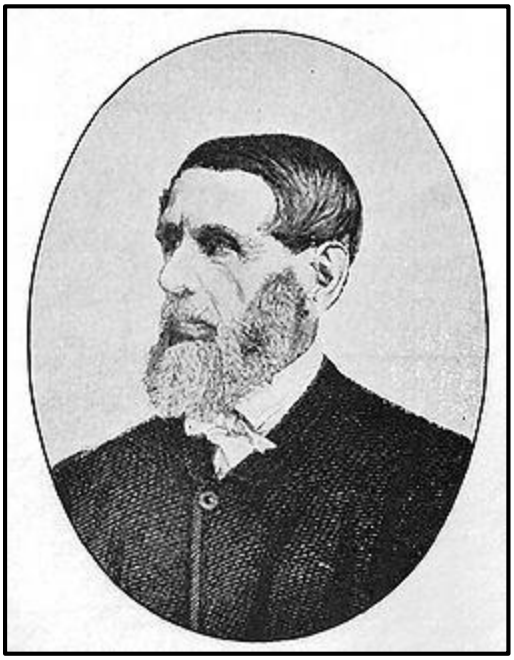


Figure 7.JN Boshoff (1808 – 1881)

Boshoff was established as a municipality in 1872, in 1874 The Dutch Reformed Church was built. It was enlarged in 1913, and renovated in 1954. Solomon Tshekisho Plaatje (9 October 1876 – 19 June 1932) was born in Doornfontein near Boshof, Orange Free State, the sixth of eight sons. His grandfather's name was Selogilwe Mogodi but his employer nicknamed him Plaatje and the family started using this as a surname. Sol Plaatjie was a writer, intellectual and Christian, he spoke 7 languages and was the founding member of the South African Native National Congress (SANNC) which later became the African National Congress (ANC). He died of Pneumonia in 1932 and was buried close to Kimberley.

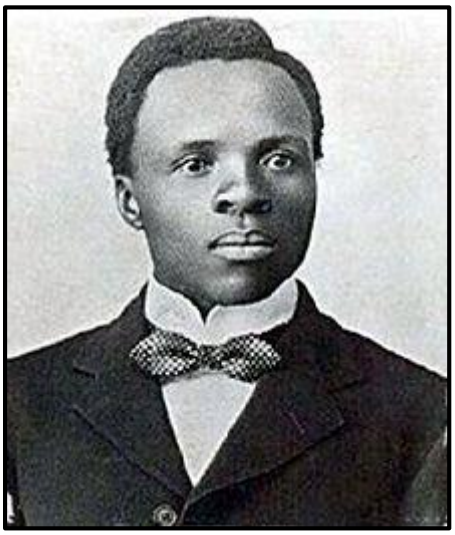


Figure 8: Sol Plaatje

The gaol of Boshof is a stone building erected in 1891.

In 1895 Georges Henri Anne-Marie Victor de Villebois-Mareuil (1847-1900) resigned as Colonel from the First Foreign Legion of the French Army. When he joined the Boer forces, they made him General of International Forces.

De Villebois-Mareuil became military advisor to the Free State forces. He lead a party of about 75 foreign volunteers, which consisted of French, German, Dutch and Americans, and 11 boers, to blow up a bridge on the Modder River (which is about 30Km south of Boshof), south of Boshof. On 5 April 1900 they encountered a British force of 750 men and 4 field-guns under leadership of Lord Methuen. During this Battle of Boshof, after about 3 hours of fighting, a cannon shell killed De Villebois-Mareuil (http://routes.co.za/fs/boshof 2005).

The spot he is said to have been killed is on the farm Middelkuil, 10Km east from Boshof on the Bosvarkpad, where there is a memorial to him. He was originally buried in the town cemetery, but was later reburied at Magersfontein.

The local Boshoff commando was involved in the Siege of Kimberley (between 1899 – February 1900) specifically in the disruption of the water supply at Riverton.

The Poplar Grove Battlefield site is located close to town. On 7 March 1900, the Boer General, Christiaan de Wet, ambushed the British forces advancing on Bloemfontein on this site. The ambush was not a success and the British nearly succeeded in surrounding the Boers, who were forced to leave their defences and fall back. There is a Gunpowder House dating from the Anglo-Boer War.

Rooidakskool (i.e. Red Roof School): the school was established in 1907. When the school changed names, a museum was established by that name. Cultural exhibits from the school's history can be viewed in the museum.

In 1912 some South Africans visited Sweden and attended an evening of folk dancing. One of the South Africans was Samuel Henri Pellisier (born in Bethulie on 10 November 1887), who was a teacher at Boshof's Rooidak School.

On his return to South Africa, Pellisier adapted four Swedish dances and taught them to his pupils. The dances were first performed on 28 February 1914 (according to Wynand Theron) on the farm Vuisfontein, about 3Km from Boshof on the road to Hertzogville. Today there is a monument at this spot (http://routes.co.za/fs/boshof 2005).

Figure 9: The 1914 picnic where Volkspele was first performed.
Photo: Wynand Theron (http://routes.co.za/fs/boshof 2005).

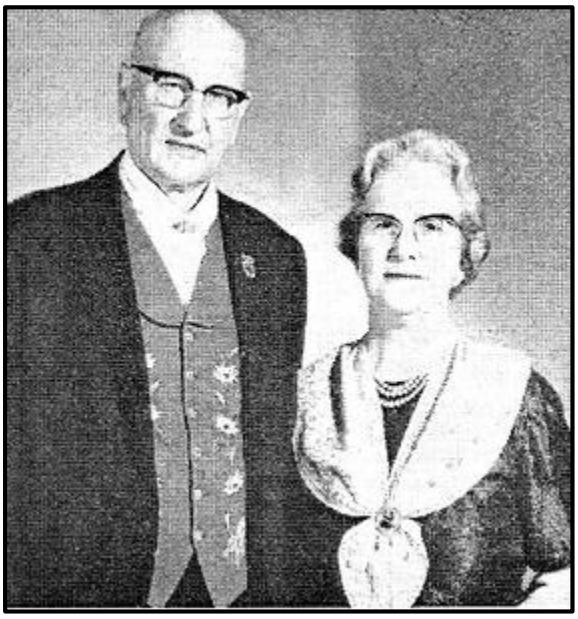


Figure 10: Samuel Pellisier and his wife in Volkspele dress.
Photo: Wynand Theron (http://routes.co.za/fs/boshof 2005).

5.4. Cultural Landscape

The site under investigation borders on the Vaal River to the west and is located less than a kilometre south of the town of Christiana. The town forms part of North West Province, but the study area is situated on the other side of the border, in Free State Province.

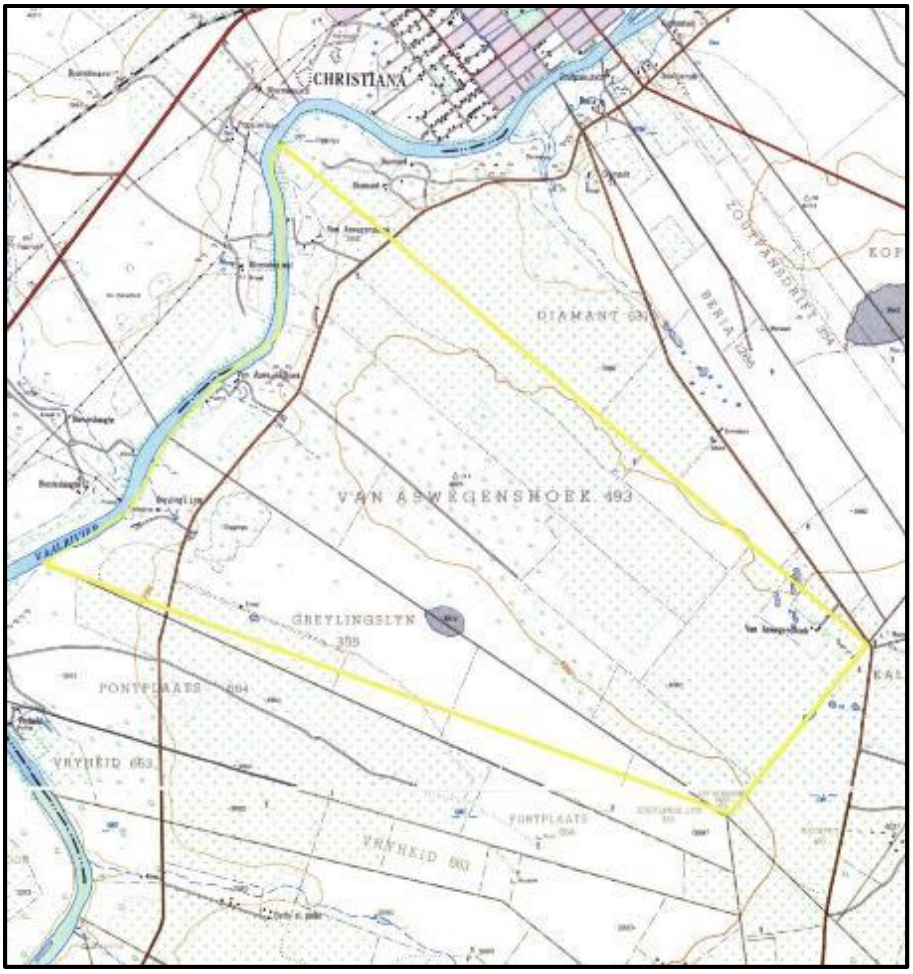


Figure 11. 1967-1968 Topographical map of the site under investigation. The approximate study area is indicated with a yellow border. Large sections of land along the north eastern border were under cultivation, and some cultivated lands can also be seen to the south-west thereof. A secondary road went through the property and one can see a number of minor roads, seven huts, about 15 buildings, an anti-erosion wall, a pump, a small dam and a diggings site between the road and the Vaal River. To the east of the road one can see a large diggings site, two minor roads, a number of tracks / footpaths, a shed, about 11 dams, three windmills, three huts and three buildings. (Topographical Map 1967-1968)

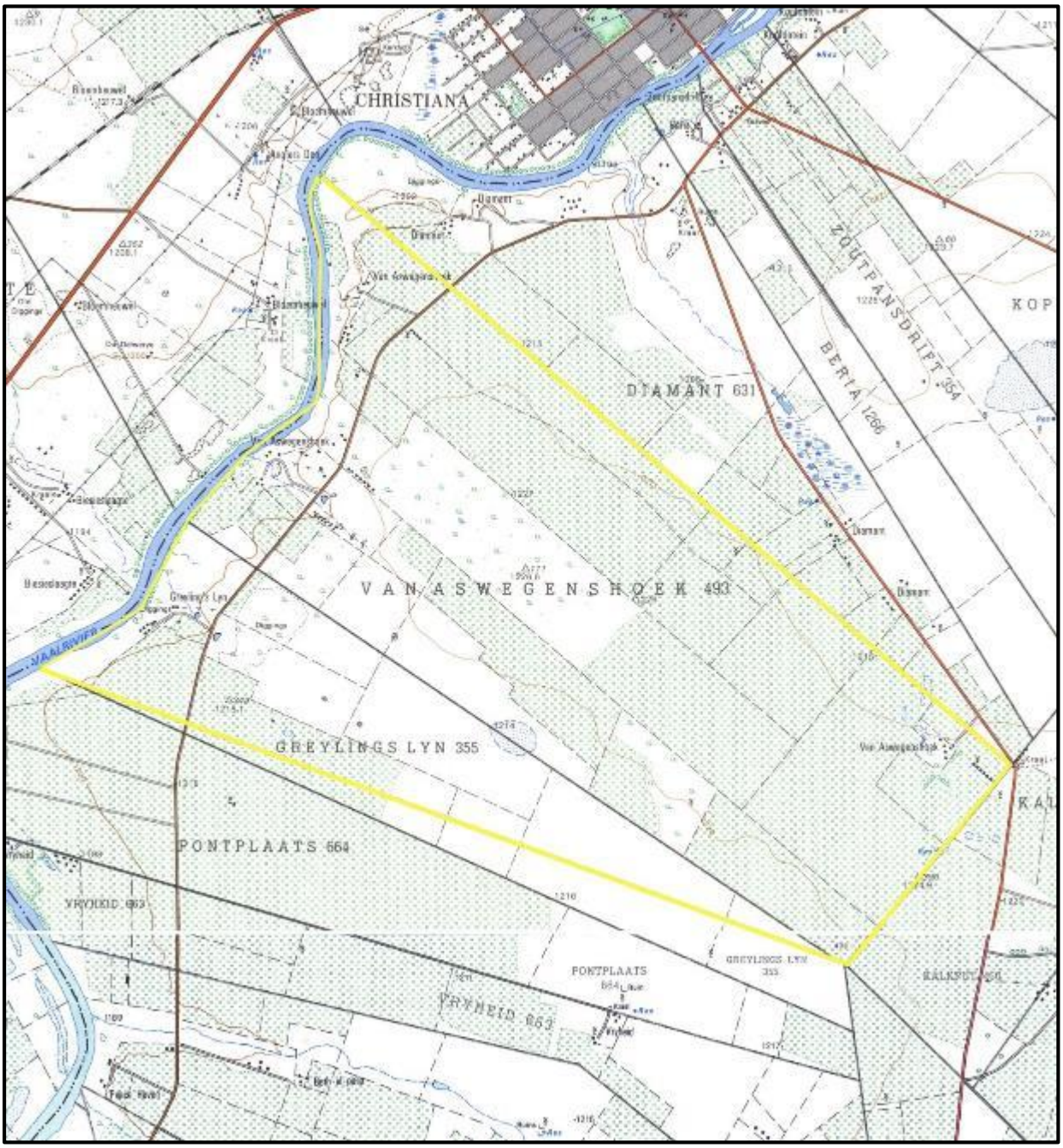


Figure 12. 1984-1986 Topographical map of the site under investigation. The approximate study area is indicated with a yellow border. Large sections of land throughout the property were under cultivation. A secondary road went through the property and one can see a number of minor roads, about 43 buildings, an anti-erosion wall, a small dam and a diggings site between the road and the Vaal River. To the east of the road one can see a large diggings site and four small diggings, a minor road, about eight dams, four windmills and about 38 buildings, including a school. (Topographical Map 1984-1986)

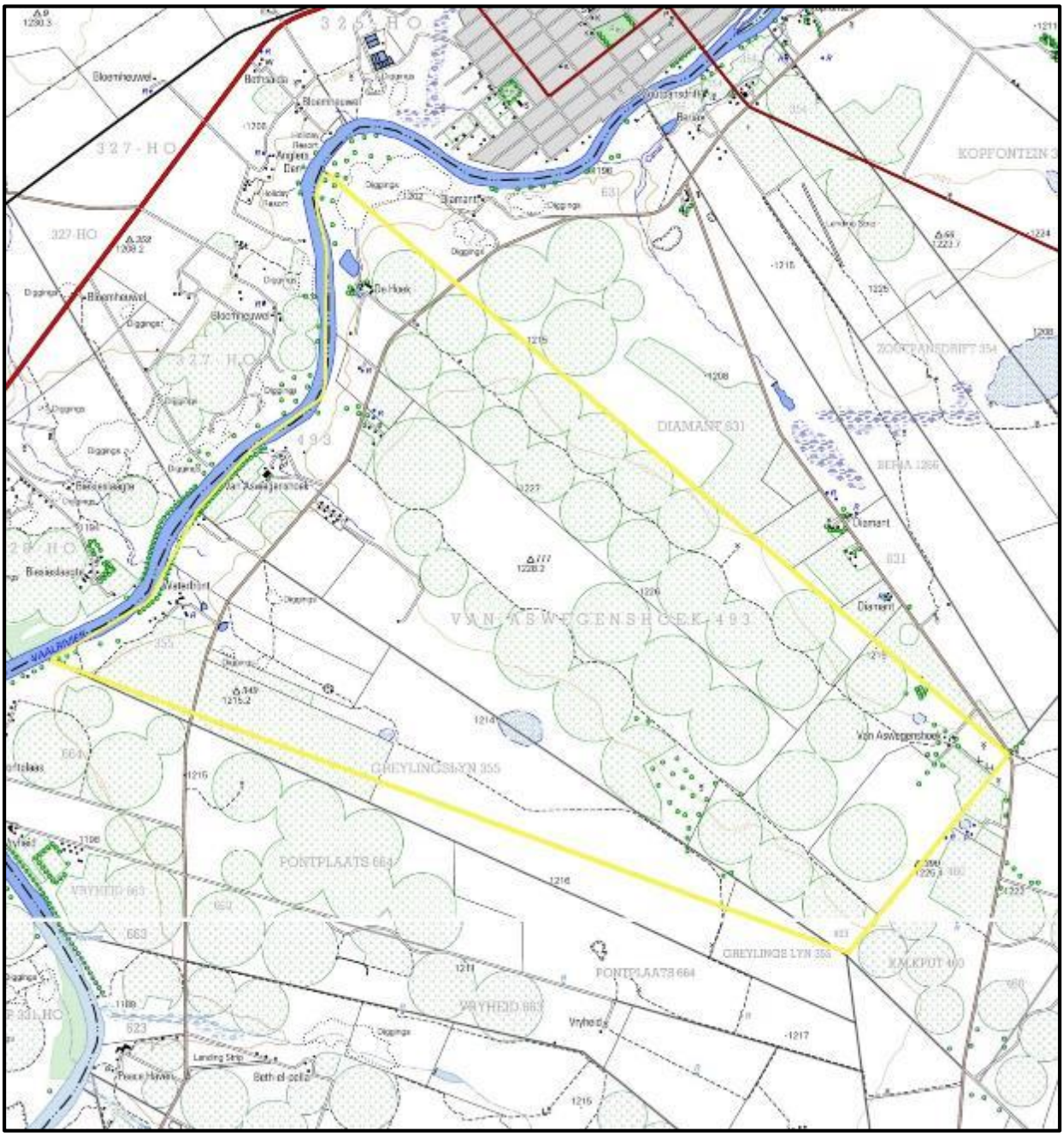


Figure 13. 2001-2008 Topographical map of the site under investigation. The approximate study area is indicated with a yellow border. Sections of land throughout the property were under cultivation. A secondary road went through the property and one can see a number of minor roads and tracks / footpaths, about 25 buildings, a small dam, three water reservoirs and two diggings sites between the road and the Vaal River. To the east of the road one can see four diggings, a number of minor roads and tracks / footpaths, four dams, two water reservoirs, four windmills, three ruins and about 21 buildings. (Topographical Map 2001-2008)

Figure 14. 2019 Google Earth image showing the study area in relation to Christiana, the N12, Warrenton, Jan Kempdorp, Hertzogville and other sites. (Google Earth 2019)

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: Low - *Medium Probability*
MSA*: Medium - High Probability*
LSA: Medium - High Probability

LSA –Herder: Low 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: *Medium - High Probability*
Burials younger than 60 years*: Medium to high Probability*

Subsurface excavations including 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 when the actual impact areas are confirmed. 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

Large sections of the study area are impacted on by extensive agricultural activities (Figure 3) with water from the Vaal River enabling farmers to irrigate their farms. These intensive agricultural activities would have impacted in surface indicators of heritage sites. Few known sites occur in the area (Figure 4) but based on previous CRM studies conducted in the area and land use patterns, heritage sites and a cultural layering dating back to the Stone Age with scatters and sites dating to the ESA, MSA and LSA can be expected in the study area. Sites and artefacts dating to these periods can be scattered over the landscape with Stone Age sites and artefacts expected to be centred around pans and watercourses. Due to the importance of water sources on the landscape that attracted human activity in antiquity, water sources, agricultural fields and Greenfield areas, was used as the main criteria for generating a four-tier sensitivity map of the study area (Figure 15).

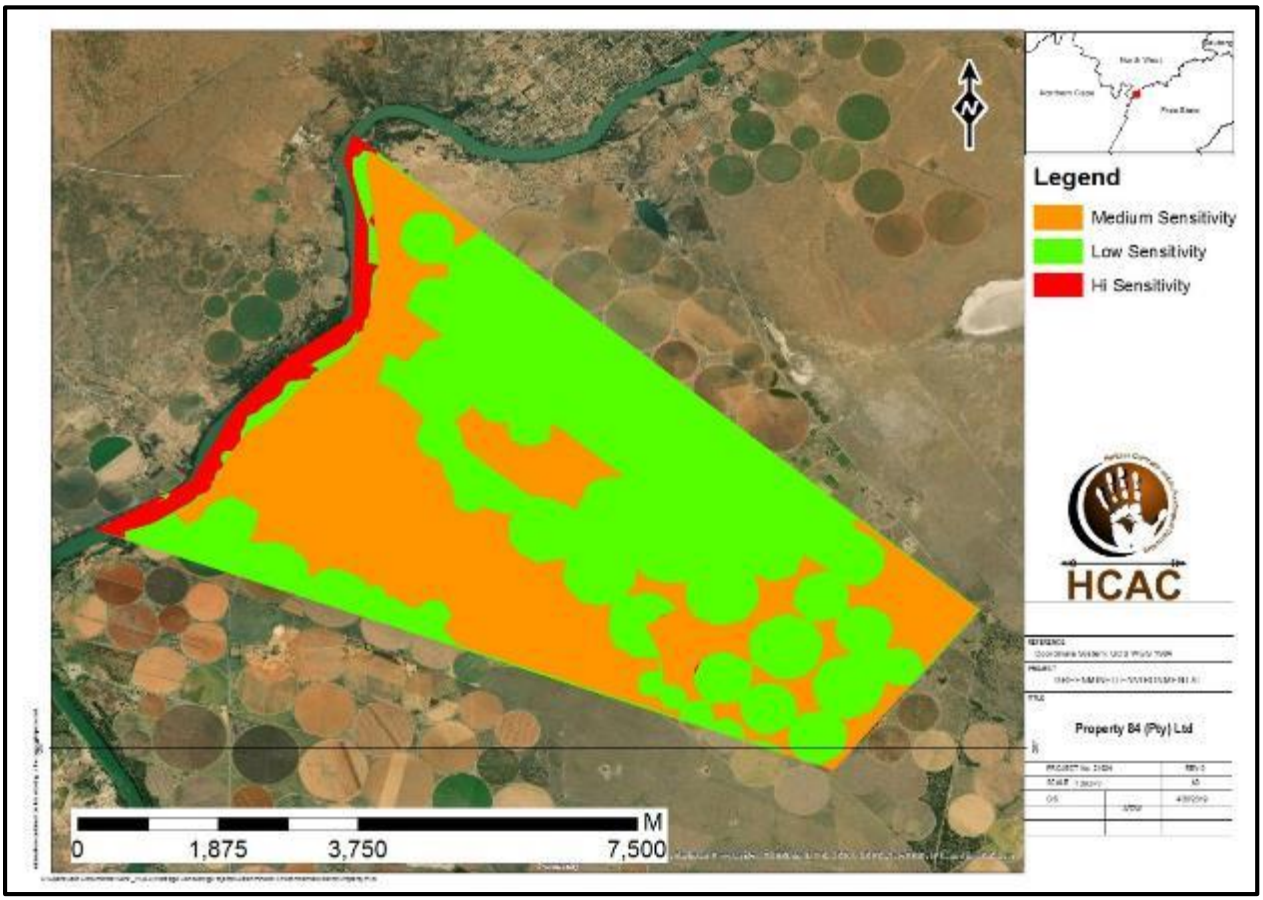


Figure 15. Heritage Sensitivity map.

8.1. Archaeology and Palaeontology

8.1.1 Archaeological finds

Based on CRM studies conducted in the area Stone Age scatters as well as distinct sites can be expected. Mining activities can alter/ destroy heritage resources.

8.1.2 Nature of Impact

Mining activities 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 (2019) conducted an independent paleontological study and found that the proposed site lies on the sands of the Quaternary group which are non-fossiliferous. There is a chance that there are underlying rocks of the Dwyka Group and Vryheid Formation that might contain fossil plants of the *Glossopteris* flora. Since there is a chance that the excavations for foundations and mining activities might penetrate these rocks and that they might contain fossils, a chance Find Protocol should be added to the EMPr. It is the opinion of the palaeontologist that the project can proceed. (Bamford 2019).

8.2. Historical period

8.2.1 Historical finds:

Historical finds include middens, structural remains and the cultural landscape. Based on historical maps the study area has been subjected to cultivation from before 1967 (Figure 11) the study area also included numerous agricultural developments and structures dating to prior 1968 (Figure 11). Impacts on heritage resources will occur primarily during mining activities.

8.2.2 Nature of Impact

The mining 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 mining activities 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 The future mining 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.	Mining 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 Based on information obtained from SAHRIS the study area has not 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 mining activities, impact areas should be subjected 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 desktop report for a large area comprising approximately 3 955.70 ha. Due to the geographical size of the current prospecting right and the fact that the relatively small impact areas of the proposed mining right have not been confirmed as yet, it was deemed not feasible to conduct fieldwork at this point. Some heritage surveys (Rossouw 2006; Dreyer 2008; Tomose 2016; Van Vollenhoven 2018) were conducted in the greater area and this desktop study is informed by available data for the 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 sands of the Quaternary group which are non-fossiliferous. There is a chance that there are underlying rocks of the Dwyka Group and Vryheid Formation that might contain fossil plants of the *Glossopteris* flora. Since there is a chance that the excavations for foundations and for mining activities might penetrate these rocks and that they might contain fossils, a chance Find Protocol should be added to the EMPr. It is the opinion of the paleontologist that the project can proceed.

(Bamford 2019).

» Archaeological resources - Widespread occurrences of Stone Age scatters with a higher probability of sites close to water sources and rocky outcrops.

Every site is relevant to the Heritage Landscape, but it is anticipated that few sites in the study area could have conservation value.

» 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 mining activities, however if structures older than 60 years 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 mining 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 the project is approved with the following conditions of authorisation in the EMPr:

- Before commencing mining 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 therefor 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 excavations or mining operations begin.

1. The following procedure is only required if fossils are seen on the surface or when excavations commence.
2. When 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) should be put aside in a suitably protected place. This way the excavations 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. 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 mining 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 project can be approved. Once mining impact areas 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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MAPS

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