

PHASE 1 HIA REPORT BAKENRANT PLOT 106 KAKAMAS- NORTH NORTHERN CAPE

PROPOSED AGRICULTURAL DEVELOPMENTS, BAKENRANT PLOT 106,
KAKAMAS-NORTH, KAI !GARIB LOCAL MUNICIPALITY, Z.F. MGCAWU DISTRICT
MUNICIPALITY, NORTHERN CAPE.

PREPARED FOR:
THE ECO BALANCE PLANNING CO.

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15 MAY 2021

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For this project, Jan Engelbrecht was responsible for the field survey of the development footprint, identification of heritage resources, and recommendations. Heidi Fivaz was responsible for research and report compilation. Sky-Lee Fairhurst conducted the desktop study, and Elize Butler completed the PIA.

Declaration of independence:

We, Jan Engelbrecht and Heidi Fivaz, partners of UBIQUE Heritage Consultants, hereby confirm our independence as heritage specialists and declare that:

- we are suitably qualified and accredited to act as independent specialists in this application;
- we do not have any vested interests (either business, financial, personal or other) in the proposed development project other than remuneration for the heritage assessment and heritage management services performed;
- the work was conducted in an objective and ethical manner, in accordance with a professional code of conduct and within the framework of South African heritage legislation.



Signed:
J.A.C. Engelbrecht & H. Fivaz
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Date: 2021-05-15

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EXECUTIVE SUMMARY

Project description

UBIQUE Heritage Consultants were appointed by Eco Balance Planning Co. as independent heritage specialists in accordance with Section 38 of the NHRA and the National Environmental Management Act 107 of 1998 (NEMA) to conduct a cultural heritage assessment to determine the impact of the proposed agricultural development of Bakenrant, Plot 106, Kakamas-North of Kai !Garib Local Municipality, Z.F. Mgcawu District Municipality, Northern Cape, on any sites, features, or objects of cultural heritage significance.

Findings and Impact on Heritage Resources

One occurrence of a low-density surface scatter of MSA/Early LSA was recorded outside the demarcated development footprints. The sample size is small, without context, of low significance and will not be impacted by the agricultural development.

The development footprint is underlain by the ancient Precambrian basement rocks of the Namaqua-Natal Province, mantled by sediments of the Gordonia Formation (Kalahari Group). A low Palaeontological Significance has been allocated to the proposed development as the Palaeontological Sensitivity of the Gordonia Formation is low. The ancient Precambrian basement rocks are zero (Butler 2021). These rocks are approximately one to two billion years old and completely unfossiliferous. Therefore, it is recommended that no further palaeontological heritage studies, ground-truthing, and/or specialist mitigation are required pending the discovery of newly discovered fossils (Butler 2021, Appendix A).

Recommendations

Based on the assessment of the potential impact of the development on the identified heritage, the following recommendations are made, taking into consideration any existing or potential sustainable social and economic benefits:

1. No significant heritage sites or features were identified within the surveyed sections of the areas earmarked for agricultural developments. Therefore the proposed development can continue.
2. The cultural material recorded (BKRO01) to the south of the proposed development footprints is of low significance and will not be affected by the development.
3. Due to the low palaeontological significance of the area, no further palaeontological heritage studies, ground-truthing and/or specialist mitigation are required. It is considered that the development of the proposed development is deemed appropriate

and feasible and will not lead to detrimental impacts on the palaeontological resources of the area (Butler 2021). If fossil remains or trace fossils are discovered during any phase of construction, either on the surface or exposed by excavations the Chance Find Protocol (Appendix A/11) must be implemented by the Environmental Control Officer (ECO) in charge of these developments. These discoveries ought to be protected, and the ECO must report to SAHRA (Contact details: SAHRA, 111 Harrington Street, Cape Town. PO Box 4637, Cape Town 8000, South Africa. Tel: 021 462 4502. Fax: +27 (0)21 462 4509. Web: www.sahra.org.za) so that mitigation can be carried out by a palaeontologist (Butler 2021).

4. Although all possible care has been taken to identify sites of cultural importance during the investigation of study areas, it is always possible that hidden or sub-surface sites could be overlooked during the assessment. If during construction, any evidence of archaeological sites or remains (e.g. remnants of stone-made structures, indigenous ceramics, bones, stone artefacts, ostrich eggshell fragments, charcoal and ash concentrations), fossils or other categories of heritage resources are found during the proposed development, SAHRA APM Unit (Natasha Higgitt/Phillip Hine 021 462 5402) must be alerted as per section 35(3) of the NHRA. If unmarked human burials are uncovered, the SAHRA Burial Grounds and Graves (BGG) Unit (Thingahangwi Tshivhase/Mimi Seetelo 012 320 8490), must be alerted immediately as per section 36(6) of the NHRA. A professional archaeologist or palaeontologist, depending on the nature of the finds, must be contacted as soon as possible to inspect the findings. If the newly discovered heritage resources prove to be of archaeological or palaeontological significance, a Phase 2 rescue operation may be required subject to permits issued by SAHRA. UBIQUE Heritage Consultants and its personnel will not be held liable for such oversights or costs incurred as a result of such oversights.

TABLE OF CONTENTS

EXECUTIVE SUMMARY	i
Project description	i
Findings and Impact on Heritage Resources	i
Recommendations.....	i
TABLE OF FIGURES	iv
ABBREVIATIONS	v
GLOSSARY	v
1. INTRODUCTION.....	1
1.1 Scope of study.....	1
1.2 Assumptions and limitations	2
2. TERMS OF REFERENCE	3
2.1. Statutory Requirements.....	3
2.1.1 General	3
2.1.2 National Heritage Resources Act 25 of 1999.....	3
2.1.3 Heritage Impact Assessments/Archaeological Impact Assessments.....	4
2.1.4 Definitions of heritage resources.....	4
2.1.5 Management of Graves and Burial Grounds.....	5
3. STUDY APPROACH AND METHODOLOGY.....	7
3.1 Desktop study	7
3.1.1 Literature review.....	7
3.2 Field study	7
3.2.1 Systematic survey	7
3.2.2 Recording significant areas	8
3.2.3 Determining significance	8
3.2.4 Assessment of development impacts.....	10
3.3 Oral history	11
3.4 Report.....	12
4. PROJECT OVERVIEW.....	13
4.1 Technical information	13
4.2 Description of the affected environment.....	15
5. HISTORICAL AND ARCHAEOLOGICAL BACKGROUND.....	17
5.1 Region.....	17
5.1.1 Stone Age.....	17
5.1.2 Iron Age.....	19
5.1.3 Historical period	20
5.2 Local	24
5.2.1 Stone Age.....	25

5.2.2 Iron Age.....	30
5.2.3 Historical/Colonial period.....	31
5.2.4 Graves/Burials	34
Recorded graves/burials/cemeteries in and around the areas of study.....	35
Northern Cape, KAKAMAS, NG Kerk, Muur van Herinnering	35
6. IDENTIFIED RESOURCES AND HERITAGE ASSESSMENT.....	36
6.1 Surveyed area	36
6.2 Identified heritage resources	36
6.3 Discussion	37
6.3.1 Archaeological features.....	37
6.3.2 Palaeontological resources.....	38
7. ASSESSMENT OF THE IMPACT OF THE DEVELOPMENT	39
8. RECOMMENDATIONS.....	40
9. CONCLUSION	41
10. BIBLIOGRAPHY.....	41
APPENDIX A	48
PALAEONTOLOGICAL DESKTOP ASSESSMENT FOR THE PROPOSED AGRICULTURAL DEVELOPMENT, ON PLOT 106 BAKENRANT, ZF MGCAWU DISTRICT MUNICIPALITY, KAI !GARIB LOCAL MUNICIPALITY, NEAR KAKAMAS, IN THE NORTHERN CAPE	48

TABLE OF FIGURES

Figure 1 Regional locality of the development footprint, indicated on Google Earth Satellite imagery.....	14
Figure 2 Locality of the development footprint, indicated on 1: 50 000 2820CB and 2820DA maps.....	15
Figure 3 Views of the affected development area.....	16
Figure 4 1910-1911 Imperial Map of Kakamas and surrounds, with the wagon routes indicated. Image from UCT digital collections, https://digitalcollections.lib.uct.ac.za/	24
Figure 5 Heritage Screening tool (https://screening.environment.gov.za/) indicating projected heritage sensitivity around the study area.....	25
Figure 6 Survey tracks across the development footprint.....	36
Figure 7 Distribution of identified heritage resources, Plot 106 Kakamas-North.....	37
Figure 8 Photographic selection of the lithic material recorded.....	38
Figure 9 SAHRIS PalaeoSensitivity Map, indicating Moderate (green), Low (blue), Insignificant/Zero (grey), and Unknown (clear)) palaeontological significance in the study area, (https://sahris.sahra.org.za/map/palaeo).....	38

ABBREVIATIONS

AIA:	Archaeological Impact Assessment
ASAPA:	Association of South African Professional Archaeologists
BIA:	Basic Impact Assessment
CRM:	Cultural Resource Management
ECO:	Environmental Control Officer
EIA:	Environmental Impact Assessment*
EIA:	Early Iron Age*
EMP:	Environmental Management Plan
ESA:	Earlier Stone Age
GPS:	Global Positioning System
HIA:	Heritage Impact Assessment
LIA:	Late Iron Age
LSA:	Later 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
NHRA:	National Heritage Resources Act
OWC:	Orange River Wine Cellars
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 it must be read and interpreted in the context it is used.*

GLOSSARY

Archaeological:	<p>material remains resulting from human activity which are in a state of disuse and are in or on land and are older than 100 years, including artefacts, human and hominid remains and artificial features and structures;</p> <ul style="list-style-type: none"> – rock art, being any form of painting, engraving or other graphic representation on a fixed rock surface or loose rock or stone, which was executed by human agency and is older than 100 years (as defined and protected by the National Heritage Resources Act (NHRA) (Act No. 25 of 1999) including any area within 10 m of such representation; – wrecks, being any vessel or aircraft, or any part thereof, which were wrecked in South Africa, whether on land, in the internal waters, the territorial waters or in the culture zone of the Republic, as defined respectively in sections 3, 4 and 6 of the Maritime Zones Act, 1994 (Act No. 15 of 1994), and any cargo, debris or artefacts found or associated therewith, which is older than 60 years or which SAHRA considers to be worthy of conservation; – features, structures and artefacts associated with military history, which are older than 75 years and the sites on which they are found.
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Stone Age:	The first and longest part of human history is the Stone Age, which began with the appearance of early humans between 3-2 million years ago. Stone Age people were hunters, gatherers and scavengers who did not live in permanently settled communities. Their stone tools preserve well and are found in most places in South Africa and elsewhere.
Earlier Stone Age:	>2 000 000 - >200 000 years ago
Middle Stone Age:	<300 000 - >20 000 years ago
Later Stone Age:	<40 000 - until the historical period
Iron Age:	(Early Farming Communities). Period covering the last 1800 years, when immigrant African farmer groups brought a new way of life to southern Africa. They established settled villages, cultivated domestic crops such as sorghum, millet and beans, and herded cattle as well as sheep and goats. As they produced their own iron tools, archaeologists call this the Iron Age. Early Iron Age: AD 200 - AD 900 Middle Iron Age: AD 900 - AD 1300 Later Iron Age: AD 1300 - AD 1850
Historic:	Period of arrival of white settlers and colonial contact. AD 1500 to 1950
Historic building:	Structures 60 years and older.
Fossil:	Mineralised bones of animals, shellfish, plants and marine animals. A trace fossil is the track or footprint of a fossil animal that is preserved in stone or consolidated sediment.
Heritage:	That which is inherited and forms part of the National Estate (historic places, objects, fossils as defined by the National Heritage Resources Act 25 of 1999).
Heritage resources:	These mean any place or object of cultural significance, tangible or intangible.
Holocene:	The most recent geological period that commenced 10 000 years ago.
Palaeontology:	Any fossilised remains or fossil trace of animals or plants which lived in the geological past, other than fossil fuels or fossiliferous rock intended for industrial use, and any site that contains such fossilised remains or traces
Cumulative impacts:	“Cumulative Impact”, in relation to an activity, means the past, current and reasonably foreseeable future impact of an activity, considered together with the impact of activities associated with that activity that may not be significant, but may become significant when added to existing and reasonably foreseeable impacts eventuating from similar or diverse activities.
Mitigation:	Anticipating and preventing negative impacts and risks, then to minimise them, rehabilitate or repair impacts to the extent feasible.
A ‘place’:	a site, area or region;

- a building or other structure which may include equipment, furniture, fittings and articles associated with or connected with such building or other structure;
- a group of buildings or other structures which may include equipment, furniture, fittings and articles associated with or connected with such group of buildings or other structures;
- an open space, including a public square, street or park; and
- in relation to the management of a place, includes the immediate surroundings of a place.

‘Public monuments and memorials’: mean all monuments and memorials—

- erected on land belonging to any branch of central, provincial or local government, or on land belonging to any organisation funded by or established in terms of the legislation of such a branch of government; or
- which were paid for by public subscription, government funds, or a public-spirited or military organisation, and are on land belonging to any private individual;

‘Structures’: any building, works, device or other facility made by people and which are fixed to land, and include any fixtures, fittings and equipment associated therewith.

1. INTRODUCTION

1.1 Scope of study

The project involves the development of four parcels of land for agricultural purposes in Kakmas-North, Kai !Garib Local Municipality, Z.F. Mgcawu District Municipality, Northern Cape. UBIQUE Heritage Consultants were appointed by Eco Balance Planning Co. as independent heritage specialists in accordance with the National Environmental Management Act 107 of 1998 (NEMA), and in compliance with Section 38 of the National Heritage Resources Act 25 of 1999 (NHRA), to conduct a cultural heritage assessment (AIA/HIA) of the development area.

The assessment aims to identify and report any heritage resources that may fall within the development footprint; to determine the impact of the proposed development on any sites, features, or objects of cultural heritage significance; to assess the significance of any identified resources; and to assist the developer in managing the documented heritage resources in an accountable manner, within the framework provided by the National Heritage Resources Act (Act 25 of 1999) (NHRA).

South Africa's heritage resources are rich and widely diverse, encompassing sites from all periods of human history. Resources may be tangible, such as buildings and archaeological artefacts, or intangible, such as landscapes and living heritage. Their significance is based upon their aesthetic, architectural, historical, scientific, social, spiritual, linguistic, economic or technological values; their representation of a time or group; their rarity; and their sphere of influence.

The integrity and significance of heritage resources can be jeopardised by natural (e.g. erosion) and human (e.g. development) activities. In the case of human activities, a range of legislation exists to ensure the timeous and accurate identification and effective management of heritage resources for present and future generations.

The result of this investigation is presented within this heritage impact assessment report. It comprises the recording of heritage resources present/ absent and offers recommendations for the management of these resources within the context of the proposed development.

Depending on SAHRA's acceptance of this report, the developer will receive permission to proceed with the proposed development, taking into account any proposed mitigation measures.

1.2 Assumptions and limitations

It is assumed that the description of the proposed project, as provided by the client, is accurate. Furthermore, it is assumed that the public consultation process undertaken as part of the Environmental Impact Assessment (EIA) is comprehensive and does not have to be repeated as part of the heritage impact assessment.

The significance of the sites, structures and artefacts is determined by means of their historical, social, aesthetic, technological and scientific value in relation to their uniqueness, condition of preservation and research potential. The various aspects are not mutually exclusive, and the evaluation of any site is done with reference to any number of these aspects. Cultural significance is site-specific and relates to the content and context of the site.

All possible care has been taken during the comprehensive field survey and intensive desktop study to identify sites of cultural importance within the development areas. However, it is essential to note that some heritage sites may have been missed due to their subterranean nature or due to dense vegetation cover. No subsurface investigation (i.e. excavations or sampling) were undertaken since a permit from SAHRA is required for such activities. Therefore, should any heritage features and/or objects such as architectural features, stone tool scatters, artefacts, human remains, or fossils be uncovered or observed during construction, operations must be stopped, and a qualified archaeologist contacted for an assessment of the find. Observed or located heritage features and/or objects may not be disturbed or removed in any way until such time that the heritage specialist has been able to assess the significance of the site (or material) in question.

2. TERMS OF REFERENCE

An HIA/ AIA must address the following key aspects:

- the identification and mapping of all heritage resources in the area affected;
- an assessment of the significance of such resources in terms of heritage assessment criteria set out in regulations;
- an assessment of the impact of the development on heritage resources;
- an evaluation of the impact of the development on heritage resources relative to the sustainable social and economic benefits to be derived from the development;
- if heritage resources will be adversely affected by the proposed development, the consideration of alternatives; and
- plans for mitigation of any adverse effects during and after completion of the proposed development.

In addition, the HIA/AIA should comply with the requirements of NEMA, including providing the assumptions and limitations associated with the study; the details, qualifications and expertise of the person who prepared the report; and a statement of competency.

2.1. Statutory Requirements

2.1.1 General

The Constitution of the Republic of South Africa Act 108 of 1996 is the source of all legislation. Within the Constitution the Bill of Rights is fundamental, with the principle that the environment should be protected for present and future generations by preventing pollution, promoting conservation and practising ecologically sustainable development. With regard to spatial planning and related legislation at national and provincial levels the following legislation may be relevant:

- Physical Planning Act 125 of 1991
- Municipal Structures Act 117 of 1998
- Municipal Systems Act 32 of 2000
- Development Facilitation Act 67 of 1995 (DFA)

The identification, evaluation and management of heritage resources in South Africa are required and governed by the following legislation:

- National Environmental Management Act 107 of 1998 (NEMA)
- KwaZulu-Natal Heritage Act 4 of 2008 (KZNHA)
- National Heritage Resources Act 25 of 1999 (NHRA)
- Minerals and Petroleum Resources Development Act 28 of 2002 (MPRDA)

2.1.2 National Heritage Resources Act 25 of 1999

The NHRA established the South African Heritage Resources Agency (SAHRA) together with its Council to fulfil the following functions:

- coordinate and promote the management of heritage resources at national level;

- set norms and maintain essential national standards for the management of heritage resources in the Republic and to protect heritage resources of national significance;
- control the export of nationally significant heritage objects and the import into the Republic of cultural property illegally exported from foreign countries;
- enable the provinces to establish heritage authorities which must adopt powers to protect and manage certain categories of heritage resources; and
- provide for the protection and management of conservation-worthy places and areas by local authorities.

2.1.3 Heritage Impact Assessments/Archaeological Impact Assessments

Section 38(1) of the NHRA of 1999 requires **the responsible heritage resources authority to notify the person who intends to undertake a development that fulfils the following criteria to submit an impact assessment report if there is reason to believe that heritage resources will be affected by such event:**

- the construction of a road, wall, power line, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length;
- the construction of a bridge or similar structure exceeding 50m in length;
- any development or other activity that will change the character of a site—
 - exceeding 5000m² in extent; or
 - involving three or more existing erven or subdivisions thereof; or
 - involving three or more erven or divisions thereof which have been consolidated within the past five years; or
 - the costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority;
- the rezoning of a site exceeding 10 000m² in extent; or
- any other category of development provided for in regulations by SAHRA or a provincial heritage resources authority.

2.1.4 Definitions of heritage resources

The NHRA defines a heritage resource as any place or object of cultural significance, i.e. of aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance. These include, but are not limited to, the following wide range of places and objects:

- living heritage as defined in the National Heritage Council Act No 11 of 1999 (cultural tradition; oral history; performance; ritual; popular memory; skills and techniques; indigenous knowledge systems; and the holistic approach to nature, society and social relationships);
- Ecofacts (non-artefactual organic or environmental remains that may reveal aspects of past human activity; definition used in KwaZulu-Natal Heritage Act 2008);
- places, buildings, structures and equipment;
- places to which oral traditions are attached or which are associated with living heritage;
- historical settlements and townscapes;
- landscapes and natural features;

- geological sites of scientific or cultural importance;
- archaeological and palaeontological sites;
- graves and burial grounds;
- public monuments and memorials;
- sites of significance relating to the history of slavery in South Africa;
- movable objects, but excluding any object made by a living person; and
- battlefields.

Furthermore, a place or object is to be considered part of the national estate if it has cultural significance or other special value because of—

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

2.1.5 Management of Graves and Burial Grounds

- **Graves younger than 60 years** are protected in terms of Section 2(1) of the Removal of Graves and Dead Bodies Ordinance 7 of 1925 as well as the Human Tissues Act 65 of 1983.
- **Graves older than 60 years, situated outside a formal cemetery administered by a local Authority** are protected in terms of Section 36 of the NHRA as well as the Human Tissues Act of 1983. Accordingly, such graves are the jurisdiction of SAHRA. The procedure for Consultation Regarding Burial Grounds and Graves (Section 36(5) of NHRA) is applicable to graves older than 60 years that are situated outside a formal cemetery administered by a local authority. Graves in the category located inside a formal cemetery administered by a local authority will also require the same authorisation as set out for graves younger than 60 years over and above SAHRA authorisation.

The **protocol for the management of graves older than 60 years situated outside a formal cemetery administered by a local authority** is detailed in Section 36 of the NHRA:

- (3) (a) No person may, without a permit issued by SAHRA or a provincial heritage resources authority—

(a) destroy, damage, alter, exhume or remove from its original position or otherwise disturb the grave of a victim of conflict, or any burial ground or part thereof which contains such graves;

(b) destroy, damage, alter, exhume, remove from its original position or otherwise disturb any grave or burial ground older than 60 years which is situated outside a formal cemetery administered by a local authority; or

(c) bring onto or use at a burial ground or grave referred to in paragraph (a) or (b) any excavation equipment, or any equipment which assists in the detection or recovery of metals.

(4) SAHRA or a provincial heritage resources authority may not issue a permit for the destruction or damage of any burial ground or grave referred to in subsection (3)(a) unless it is satisfied that the applicant has made satisfactory arrangements for the exhumation and re-interment of the contents of such graves, at the cost of the applicant and in accordance with any regulations made by the responsible heritage resources authority.

(5) SAHRA or a provincial heritage resources authority may not issue a permit for any activity under subsection (3)(b) unless it is satisfied that the applicant has, in accordance with regulations made by the responsible heritage resources authority—

(a) made a concerted effort to contact and consult communities and individuals who by tradition have an interest in such grave or burial ground; and

(b) reached agreements with such communities and individuals regarding the future of such grave or burial ground.

(6) Subject to the provision of any other law, any person who in the course of development or any other activity discovers the location of a grave, the existence of which was previously unknown, must immediately cease such activity and report the discovery to the responsible heritage resources authority which must, in cooperation with the South African Police Service and in accordance with regulations of the responsible heritage resources authority—

(a) carry out an investigation for the purpose of obtaining information on whether or not such grave is protected in terms of this Act or is of significance to any community; and

(b) if such grave is protected or is of significance, assist any person who or community which is a direct descendant to make arrangements for the exhumation and re-interment of the contents of such grave or, in the absence of such person or community, make any such arrangements as it deems fit.

3. STUDY APPROACH AND METHODOLOGY

3.1 Desktop study

The first step in the methodology was to conduct a desktop study of the heritage background of the area and the proposed development site. This entailed the scoping and scanning of historical texts/records as well as previous heritage studies and research around the study area.

The study area is contextualised by incorporating data from previous CRM reports in the area and an archival search. The objective of this is to extract data and information on the area in question, looking at archaeological sites, historical sites and graves in the area.

No archaeological site data was available for the project area. A concise account of the archaeology and history of the broader study area was compiled (sources listed in the bibliography).

3.1.1 Literature review

A survey of the literature was undertaken to obtain background information regarding the area. Through researching the SAHRA APM Report Mapping Project records and the SAHRIS online database (<http://www.sahra.org.za/sahris>), it was determined that several other archaeological or historical studies had been performed within the broader vicinity of the study area. Sources consulted in this regard are indicated in the bibliography.

3.2 Field study

Phase 1 (AIA/HIA) requires the completion of a field study to establish and ensure the following:

3.2.1 Systematic survey

A systematic survey of the proposed project area to locate, identify, record, photograph, and describe archaeological, historical or cultural interest sites were completed.

UBIQUE Heritage Consultants inspected the proposed development and surrounding areas on the 19th and 20th of April 2021 and completed a controlled-exclusive, pre-planned, pedestrian and vehicular survey. We conducted an inspection of the surface of the ground, wherever the surface was visible. This was done with no substantial attempt to clear brush, sand, deadfall, leaves or other material that may cover the surface and with no effort to look beneath the surface beyond the inspection of rodent burrows, cut banks and other exposures fortuitously observed.

The survey was tracked with a handheld Garmin global positioning unit (Garmin eTrex 10).

3.2.2 Recording significant areas

GPS points of identified significant areas were recorded with a handheld Garmin global positioning unit (Garmin eTrex 10). Photographs were taken with a Canon IXUS 185 20-megapixel camera. Detailed field notes were taken to describe observations. The layout of the area and plotted GPS points, tracks and coordinates, were transferred to Google Earth and QGIS and maps were created.

3.2.3 Determining significance

Levels of significance of the various types of heritage resources observed and recorded in the project area will be determined to the following criteria:

Cultural significance:

- Low A cultural object being found out of context, not being part of a site or without any related feature/structure in its surroundings.
- Medium Any site, structure or feature being regarded less important due to several factors, such as date and frequency. Likewise, any important object found out of context.
- High age Any site, structure or feature regarded as important because of its or uniqueness. Graves are always categorised as of a high importance. Likewise, any important object found within a specific context.

Heritage significance:

- Grade I are Heritage resources with exceptional qualities to the extent that they are of national significance
- Grade II Heritage resources with qualities giving it provincial or regional importance although it may form part of the national estate
- Grade III Other heritage resources of local importance and therefore worthy of Conservation

Field ratings:

- i. National Grade I national significance should be managed as part of the estate

- | | | |
|------|------------------------------------|--|
| ii. | Provincial Grade II provincial | significance should be managed as part of the estate |
| iii. | Local Grade IIIA | should be included in the heritage register and not be mitigated (high significance) |
| iv. | Local Grade IIIB be | should be included in the heritage register and may be mitigated (high/ medium significance) |
| v. | General protection A (IV A) medium | site should be mitigated before destruction (high/ medium significance) |
| vi. | General protection B (IV B) | site should be recorded before destruction (medium significance) |
| vii. | General protection C (IV C) | phase 1 is seen as sufficient recording and it may be demolished (low significance) |

Heritage value, statement of significance:

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

3.2.4 Assessment of development impacts

A heritage resource impact may be defined broadly as the net change, either beneficial or adverse, between the integrity of a heritage site with and without the proposed development. Beneficial impacts occur wherever a proposed development actively protects, preserves or enhances a heritage resource, by minimising natural site erosion or facilitating non-destructive public use, for example. More commonly, development impacts are of an adverse nature and can include:

- destruction or alteration of all or part of a heritage site;
- isolation of a site from its natural setting; and / or
- introduction of physical, chemical or visual elements that are out of character with the heritage resource and its setting.

Beneficial and adverse impacts can be direct or indirect, as well as cumulative, as implied by the examples. Although indirect impacts may be more difficult to foresee, assess and quantify, they must form part of the assessment process. The following assessment criteria have been used to assess the impacts of the proposed development on possible identified heritage resources:

Criteria	Rating Scales	Notes
Nature	Positive	An evaluation of the type of effect the construction, operation and management of the proposed development would have on the heritage resource.
	Negative	
	Neutral	
Extent	Low	Site-specific affects only the development footprint.
	Medium	Local (limited to the site and its immediate surroundings, including the surrounding towns and settlements within a 10 km radius);
	High	Regional (beyond a 10 km radius) to national.
Duration	Low	0-4 years (i.e. duration of construction phase).
	Medium	5-10 years.
	High	More than 10 years to permanent.
Intensity	Low	Where the impact affects the heritage resource in such a way that its significance and value are minimally affected.
	Medium	Where the heritage resource is altered, and its significance and value are measurably reduced.
	High	Where the heritage resource is altered or destroyed to the extent that its significance and value cease to exist.
	Low	No irreplaceable resources will be impacted.

Criteria	Rating Scales	Notes
Potential for impact on irreplaceable resources	Medium	Resources that will be impacted can be replaced, with effort.
	High	There is no potential for replacing a particular vulnerable resource that will be impacted.
Consequence, (a combination of extent, duration, intensity, and the potential for impact on irreplaceable resources).	Low	A combination of any of the following: - Intensity, duration, extent and impact on irreplaceable resources are all rated low. - Intensity is low and up to two of the other criteria are rated medium. - Intensity is medium and all three other criteria are rated low.
	Medium	Intensity is medium and at least two of the other criteria are rated medium.
	High	Intensity and impact on irreplaceable resources are rated high, with any combination of extent and duration. Intensity is rated high, with all the other criteria being rated medium or higher.
Probability (the likelihood of the impact occurring)	Low	It is highly unlikely or less than 50 % likely that an impact will occur.
	Medium	It is between 50 and 70 % certain that the impact will occur.
	High	It is more than 75 % certain that the impact will occur, or it is definite that the impact will occur.
Significance (all impacts including potential cumulative impacts)	Low	Low consequence and low probability. Low consequence and medium probability. Low consequence and high probability.
	Medium	Medium consequence and low probability. Medium consequence and medium probability. Medium consequence and high probability. High consequence and low probability.
	High	High consequence and medium probability. High consequence and high probability.

3.3 Oral history

Where possible, people from local communities would be interviewed to obtain information relating to the surveyed area.

3.4 Report

The results of the desktop research and field survey are compiled in this report. The identified heritage resources and anticipated direct, indirect, and cumulative impacts that the proposed project's development may have on the identified heritage resources will be presented objectively. Alternatives, should any significant sites be impacted adversely by the proposed project, are offered. All effort will be made to ensure that all studies, assessments and results comply with the relevant legislation and the code of ethics and guidelines of the Association of South African Professional Archaeologists (ASAPA). The report aims to assist the developer in managing the documented heritage resources in a responsible manner and protecting, preserving, and developing them within the framework provided by the National Heritage Resources Act of 1999 (Act 25 of 1999).

4. PROJECT OVERVIEW

UBIQUE Heritage Consultants were appointed by Eco Balance Planning Co. as independent heritage specialists in accordance with Section 38 of the NHRA and the National Environmental Management Act 107 of 1998 (NEMA) to conduct a cultural heritage assessment to determine the impact of the proposed agricultural development of Bakenrant, Plot 106, Kakamas-North of Kai !Garib Local Municipality, Z.F. Mgcawu District Municipality, Northern Cape, on any sites, features, or objects of cultural heritage significance.

The proposed project aims to develop four identified areas for the cultivation of grapes. Area 1 consists of 25.5 ha, Area 2 of 31.7 ha, Area 3 of 15 ha, and Area 4 of 35 ha.

4.1 Technical information

PROJECT PARTICULARS

Technical information

Project description	
Project name	HIA for the proposed agricultural development on Plot 106 Bakenrant
Description	Proposed vineyard development on Plot 106 Bakanrant near Kakamas
Developer	
Bakenrant Boerdery	
Development type	Agriculture
Landowner	
Contact information	Office: 054-451 8293
Consultants	
Environmental	Eco Balance Planning Co.
Heritage and archaeological	UBIQUE Heritage Consultants
Paleontological	Banzai Environmental
Property details	
Province	Northern Cape
District municipality	Z.F. MGCAWU
Local municipality	KAI !GARIB
Topo-cadastral map	1:50 000 2820CB
Farm name	Plot 106 Bakenrant
Closest town	Kakamas
GPS Co-ordinates	28° 37' 18.6" South 20° 27' 49.5" East
Property size	140ha
Development footprint size	64,7ha
Land use	
Previous	Agriculture/grazing

Current	Agriculture/grazing
Rezoning required	Yes
Sub-division of land	No
Development criteria in terms of Section 38(1) NHRA	
	Yes/No
Construction of a road, wall, power line, pipeline, canal or other linear forms of development or barrier exceeding 300m in length.	Yes
Construction of bridge or similar structure exceeding 50m in length.	No
Construction exceeding 5000m ² .	Yes
Development involving three or more existing erven or subdivisions.	No
Development involving three or more erven or divisions that have been consolidated within the past five years.	No
Rezoning of site exceeding 10 000m ² .	Yes
Any other development category, public open space, squares, parks, recreation grounds.	No

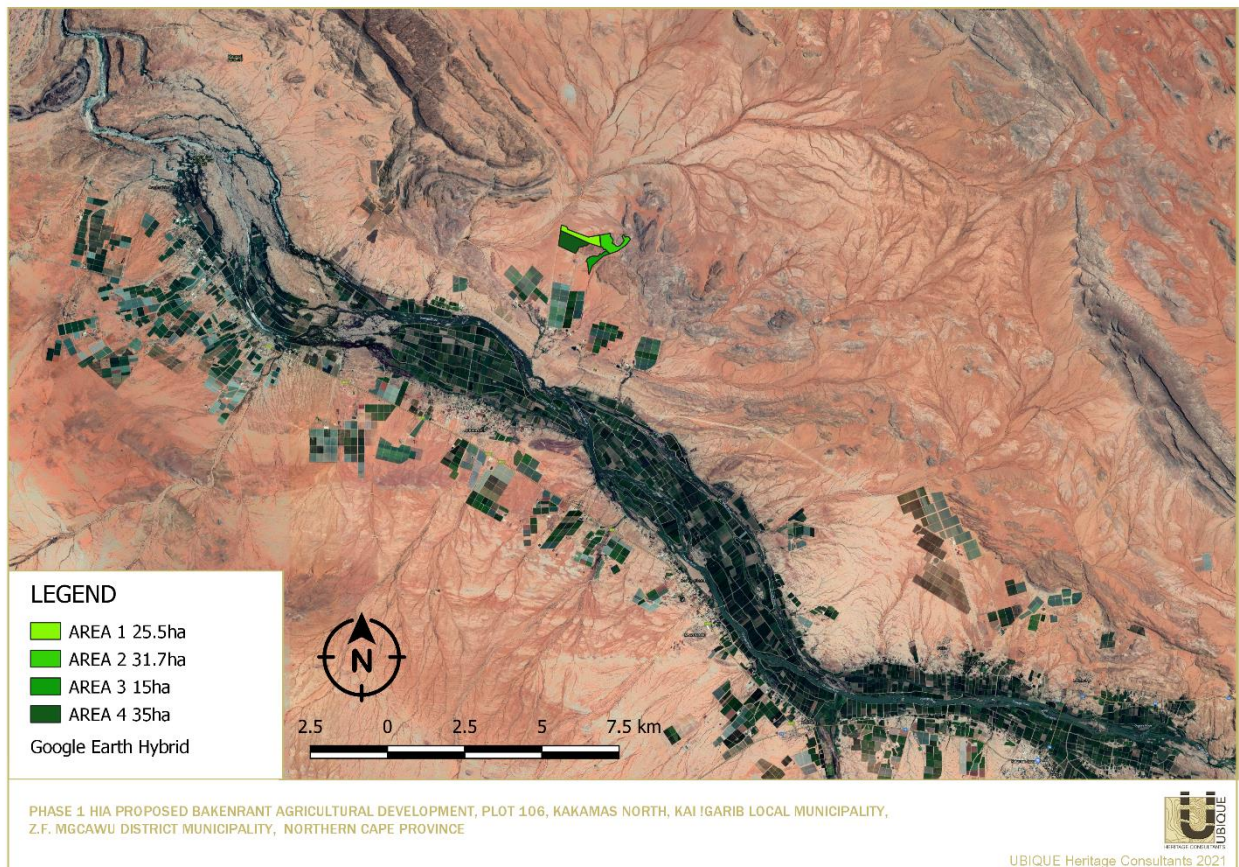


Figure 1 Regional locality of the development footprint, indicated on Google Earth Satellite imagery.

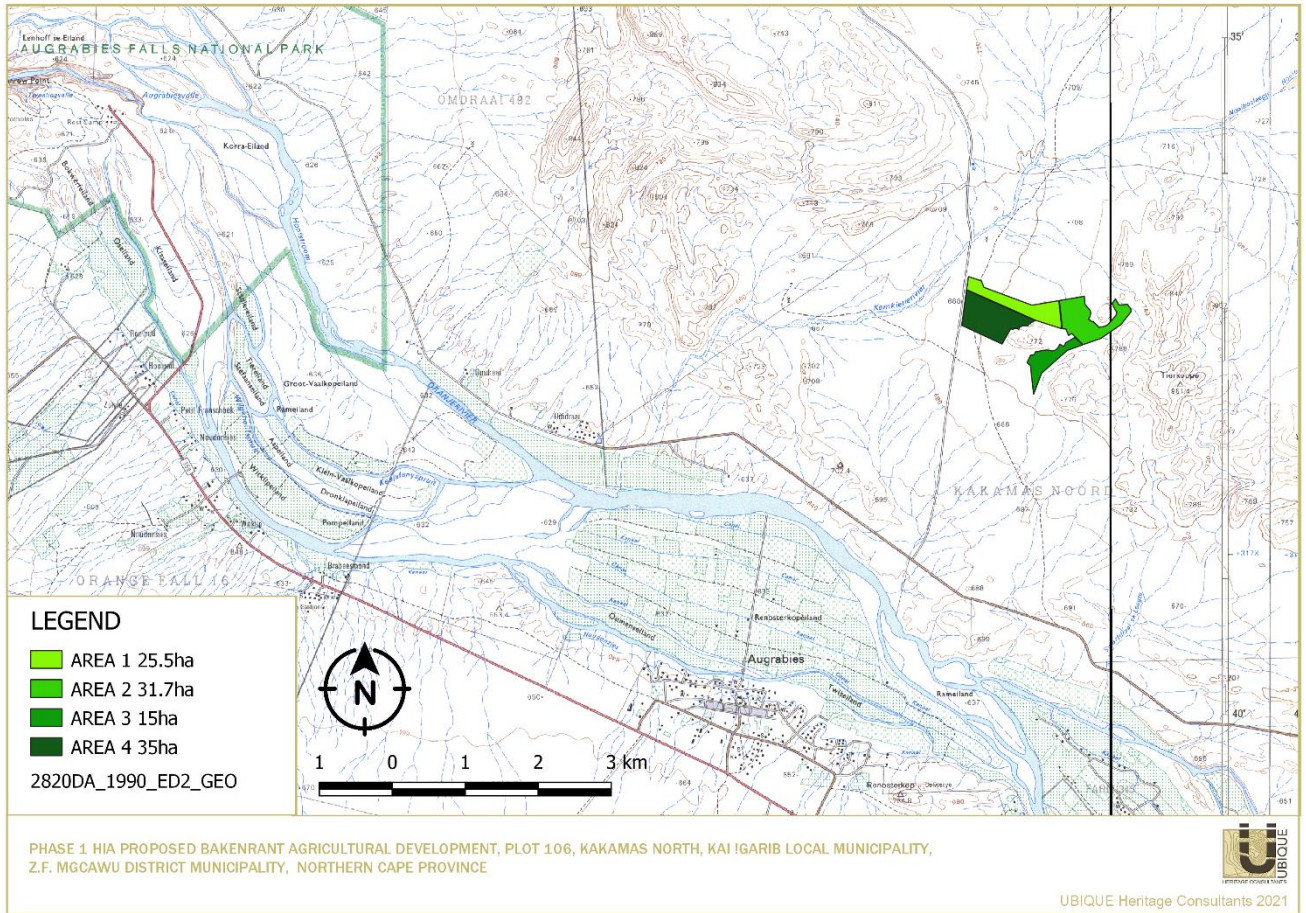


Figure 2 Locality of the development footprint, indicated on 1: 50 000 2820CB and 2820DA maps.

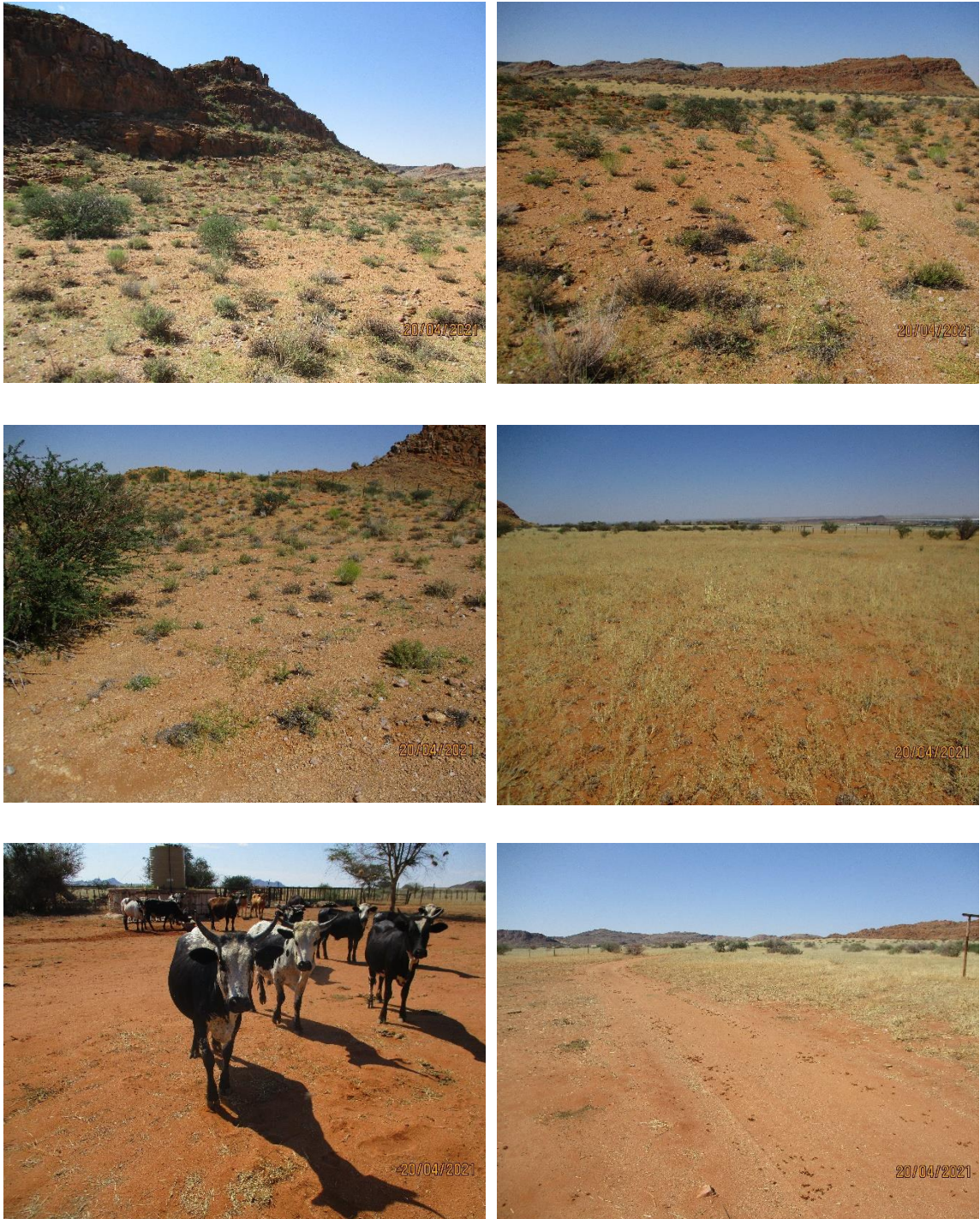
4.2 Description of the affected environment

The agricultural development in Kakamas-North falls within the Kalahari Karroid Shrubland vegetation type (SANBI 2021). The landscape is characterised by low karroid shrubland on flat, gravel plains. Karoo-related elements (shrubs) meet with northern floristic elements, indicating a transition to the Kalahari region and sandy soils (Mucina & Rutherford 2006). The following vegetation species were noticed on-site: *Boscia albitrunca* (Shepherds Tree), *Schmidtia kalahariensis* (Kalahari Sour Grass), *Setaria verticillate* (Bur Bristle Grass), *Stipagrostis obtusa* (Small Bushman Grass), *Stipagrostis uniplumis* (Silky Bushman Grass), *Anthepora pubescens* (Wool Grass), *Aristida adscensionis* (Annual Bristle Grass), *Acacia melifera* (Blackthorn acacia), *Rhigozum trichotomum* (Three-Thorn), *Acacia eriloba* (Camelthorn Tree), and *Aloe argenteicauda* (Rock Aloe).

The terrain in the study area consists of flat sandy plains combined with klipveld. It is mountainous in the central southwest and northeastern parts of the site and outside the development footprint. The terrain has a slight slope towards the west and southwest. Quartz, quartzite and hornfels are visible on the surface combined with some dolomite outcrops. There are several waterways throughout the site, mostly flowing from the higher ground towards the

southwest and west. These are all non-perennial small dry waterways. Minor natural erosion is visible on the slopes of the mountainous areas; however, no significant erosion on the development footprints. Neighbouring farm fences bound the development footprints to the north, south and east. The T1 gravel road towards Riemvasmaak settlement forms the western boundary. Various two-track roads give access to the different development areas.

Figure 3 Views of the affected development area.



5. HISTORICAL AND ARCHAEOLOGICAL BACKGROUND

5.1 Region

South Africa has a very long and varied history of human occupation (Deacon & Deacon 1999). This occupation has been dated to approximately 2mya (million years ago) (Mitchell 2002). Briefly, the archaeology of South Africa can be divided into three “major” periods, namely: the Stone Age, the Iron Age and the Historical period. Various archaeological and historical sites have been identified and documented throughout South Africa, including the Northern Cape Province.

The Northern Cape region was sparsely populated until the start of the 20th-century (De Jong 2010). Van Schalkwyk (2013) reported that the cultural landscape qualities of the larger region essentially consist of two components. First is a rural area in which human occupation is made up of a precolonial element (Stone Age) and a much later historical/colonial (farmer and industrial/mining) component. The second component is an urban landscape dating to the colonial period linked to the rural colonial landscape.

5.1.1 Stone Age

In southern Africa, the Stone Age can be divided into three periods. It is, however, critical to note that dates are relative and only provide a broad framework for interpretation. The division of the Stone Age, according to Lombard et al. (2012), is as follows:

- Earlier Stone Age (ESA): >2 000 000 - >200 000 years ago
- Middle Stone Age (MSA): <300 000 - >20 000 years ago
- Later Stone Age (LSA): <40 000 - until the historical period

In short, the Stone Age refers to humans that mainly utilised stone as their technological marker. Each sub-division is formed by industries where the assemblages share attributes or common traditions (Lombard et al., 2012). The history of the Northern Cape is reflected in a rich archaeological landscape with a wealth of pre-colonial archaeological sites. These sites yield some of the richest Stone Age scatters (Beaumont & Morris 1990; Kruger 2018; Lombard et al. 2012; Morris & Beaumont 2004). Numerous sites have been identified and documented across the region. These sites have been dated to the Earlier, Middle and ESA are characterised by flakes produced from pebbles, cobbles and percussive tools, and objects created later during this period such as large hand axes, cleavers and other bifacial tools (Klein 2000). The MSA is associated with small flakes, blades and points. The aforementioned is generally suggested to have been made and utilised for hunting activities and had numerous functions (Wurz 2013).

Furthermore, the LSA is characterised by microlithic stone tools, scrapers and flakes (Binneman 1995; Lombard et al. 2012). The LSA is also associated with rock art. Numerous LSA rock art sites, mainly rock engravings and paintings, have been identified in the Northern Cape (Beaumont 2008c; Kruger 2018; Morris 1988). These sites are commonly found on slopes, hilltops, rocky outcrops and occasionally in river beds (Kruger 2018). Banded ironstone occurs on several sites throughout the Northern Cape. It would appear to have been a favoured

raw material for making stone tools due to its superior flaking qualities (Kaplan 2012b). Beaumont et al. (1995) states, regarding the LSA, that “virtually all the ‘Bushmanland’ sites so far located appear to be ephemeral occupation by small groups in the hinterland on both sides of the [Orange] river”. This is believed to be in sharp contrast to the substantial herder encampments along the Orange River floodplain itself (Morris 2013a, b, c, d, e, & f). It has been noted by Beaumont et al. (1995:240-241) that a widespread low density of stone artefacts scatters from the Pleistocene age appears across areas of ‘Bushmanland’ to the south. Here, raw materials, mainly quartzite cobbles, were derived from the Dwyka glacial (Morris 2013a, b, c, d, e, & f). According to Morris (2013b & c), substantial MSA sites are relatively uncommon in Bushmanland. However, several sites have been recorded but yielded small samples.

Although the Northern Cape region seems to have been relatively sparsely populated by humans in the past (Kruger 2015a and b), the archaeological sites in this landscape are not scattered randomly (Kruger 2018). Previously conducted surveys have revealed signs of human occupation “mainly in the shelter of granite inselbergs (koppies) on red dunes which provided clean sand for sleeping, or around the seasonal pans” (Beaumont et al. 1995:264). Archaeological sites and MSA and LSA scatters and quarries frequently occur in low lying areas on plains between dune straights and outcrops along the Orange River; in other words, near water. They can likewise be found close to local sources of highly-prized raw materials such as previously mentioned banded iron formations (BIF), as well as jaspilite and specularite (Morris 2012; Kruger 2015; 2018).

According to Beaumont et al. (1995), thousands of square kilometres of Bushmanland are covered by low-density lithic scatters. Most of the studies and surveys that have been conducted throughout the Northern Cape have recorded Stone Age sites, and surface scatters of Stone Age artefacts (ranging from the ESA, MSA and LSA) throughout the Northern Cape. These include the districts of Groblershoop, Griekwastad, Hotazel, Kenhardt, Pofadder, Marydale, and Upington (Dreyer 2006, 2008a, 2008d, 2012, 2013; Engelbrecht & Fivaz 2019; Kaplan 2008, 2012, 2013 a & b; Kruger 2015; Morris 2012, 2013; Rossouw 2013; Van Ryneveld 2007; Van Vollenhoven 2014 and Webley 2013). Large rubbing stones, Acheulean hand axes (with secondary retouch) and scatters of core flakes have been found during previous investigations throughout the broader region (Dreyer 2008b & c, 2013 Revised, 2014). Van Ryneveld (2007) had documented low densities of MSA artefact scatters at several Quartz outcrops on the farm Bokspuits 118. An ancient specularite working site was recorded on the eastern side of Postmasburg, Doornfontein (Van Vollenhoven 2014). Associated Ceramic Later Stone Age material and older transitional ESA/MSA Fauresmith sites were documented at Lyly Feld, King, Mashwening, Demaneng, Rus & Vrede, Gloucester, Paling and Mount Huxley (Engelbrecht & Fivaz 2019). Moreover, MSA and LSA tools, along with rock engraving were found at Putsonderwater, Beeshoek and Bruce (Engelbrecht & Fivaz 2019). Numerous Stone Age sites have been identified, documented and excavated in the surrounding areas near Kathu, the Doornlaagte ESA site, and at the Wonderwerk Caves (Van Vollenhoven 2014; Dreyer 2015). The Stone Age sites and artefacts found and documented near the Kathu pans represent one of the most extended preserved Stone Age sequences in South Africa. They are yielding artefacts and sites from the ESA, MSA and LSA with evidence of 500 000-year-old hafted stone points (Engelbrecht & Fivaz 2019).

5.1.2 Iron Age

The Iron Age (IA) is characterised by the use of metal (Coertze & Coertze 1996: 346). There is some controversy about the periods within the IA. Van der Ryst & Meyer (1999) have suggested that there are two phases within the IA, namely:

- Early Iron Age (EIA) 200 – 1000 A.D
- Late Iron Age (LIA) 1000 – 1850 A.D

However, Huffman (2007) suggests instead that there are three periods within the Iron Age, these periods are:

- Early Iron Age (EIA) 250 – 900 A.D
- Middle Iron Age (MIA) 900 – 1300 A.D
- Late Iron Age (LIA) 1300 – 1840 A.D

Thomas Huffman believes that a Middle Iron Age should be included within this period; his dates have been widely accepted in the IA field of archaeology.

The South African Iron Age is generally characterised by farming communities that had domesticated animals, cultivated plants, manufactured and made use of ceramics and beads, smelted iron for weapons and manufactured tools (Hall 1987). Iron Age people were often mixed farmers/agropastoralists. These agropastoralists generally chose to live in areas with sufficient water for domestic use along with arable soil that could be cultivated with an iron hoe. Most Iron Age (IA) settlements built by agropastoralists were permanent settlements (with a few exceptions, of course), consisting of features such as houses, raised grain bins, storage pits, and animal kraals/byres. This is in contrast to the temporary camps of pastoralists and hunter-gatherers (Huffman 2007). It is evident in the archaeological record that IA groups had migrated with their material culture (Huffman 2002).

The majority of the IA groups in southern Africa preferred to occupy the central and eastern parts of southern African from about 200 AD. The San and Khoi remained in the western and southern parts (Huffman 2007; Van Vollenhoven 2014); it is, thus, very rare, but not uncommon, to find IA sites in the Northern Cape.

The expansion of early farmers/agropastoralists occurred in this region between 400 AD and 1100 AD. These early farmers settled in semi-permanent settlements (De Jong 2010). According to De Jong (2010), the EIA continued in the Lowveld until the 15th-century. However, it ended by 1100 AD on the escarpment. From the 15th-century onwards, the Highveld became active again, on account of the gradually warmer and wetter climate. This later phase (the LIA) was accompanied by extensive stone walled settlements, such as the Thlaping capital Dithakong, approximately 40 km north of Kuruman (De Jong 2010). The Sotho-Tswana and Nguni speaking societies are the descendants of the LIA mixed farming communities. They found that the region was already sparsely inhabited by LSA Khoisan groups (the “first people”). De Jong (2010) comments that many of them were eventually assimilated by LIA communities. Only a few had managed to survive. Some of the surviving groups included the

Korana and the Griqua. However, it should be mentioned that this contact period has often been referred to as the Ceramic LSA. It is often represented by sites such as the earlier mentioned Blinkklipkop specularite mine near Postmasburg and found cultural material at the Kathu Pan (De Jong 2010).

IA sites have been recorded in the northeastern part of the province. However, according to Kruger (2018), environmental factors delegated that the spread of IA farming westwards from the 17th-century was constrained mainly to the areas east of the Langeberg Mountains. Nevertheless, there has been evidence of an IA presence as far as the Upington area in the 18th-century (Kruger 2018). LIA people had briefly utilised the area close to the Orange River, as they had mined copper in the Northern Cape (Van Vollenhoven 2014).

5.1.3 Historical period

During the colonial frontier period, place names started becoming fixed, specifically in a cadastral sense, on maps and in farm names. Numerous names have Khoekhoegowab origin and, as Morris (2017) states, encapsulates vestiges of precolonial/indigenous social geography. Interestingly, Morris (2017) also states that genocide against the indigenous people is documented in the wider area. Certain mountainous areas (e.g. Gamsberg near Aggeneys and Namies) are likely to be massacre sites (Morris 2017).

The development of a rich colonial frontier can be seen in the archaeological record (Kruger 2018). It was not until relatively recently (because of its distance from the Cape Colony) that this arid part of South Africa's interior was colonised. The Historical period of the Northern Cape coincides with the incursion of white traders, hunters, explorers, and missionaries into the interior of South Africa (Engelbrecht & Fivaz 2019). The historical period started with the first recorded oral histories (Van Vollenhoven 2014). The documented records of this region dating from the 18th- and 1- centuries mainly pertain to areas south of and along the Orange River (Morris 2018a, b & c). Hendrick Wikar and Robert Gordon, who, according to Morris (2018a, b & c) and Morris & Beaumont (1991), were two of the earliest travellers, had followed the river as far as and even beyond the region during the 1770s. Wikar and Gordon provided descriptions of the terrain and the communities living along the river (Morris 2018a, b & c; Morris & Beaumont 1991). Some of the other early travellers, traders, and missionaries, who had arrived in the region during the 19th century, include PJ Truter, William Somerville, Cowan, Donovan, Burchell and Campbell (De Jong 2010). The London Mission Society (LMS) station near Kuruman was established in 1817 by James Read (De Jong 2010; Van Vollenhoven 2014). Various buildings and structures that have been documented and recorded can be associated with early travellers, traders, and missionaries. There is also evidence of the settlements of the first white farmers and towns in the Northern Cape. These historical buildings and structures have been captured on the SAHRIS database in areas such as Kakamas, Kenhardt, Keimoes and Upington.

The surveying, division and transference of Government-owned land to farmers mark the initial distribution of land to colonial farmers from the 1880s onward (De Jong 2010). It is believed that most of the farms were still government farms and were leased to farmers in 1875. The farms were only later sold to individuals (Van Vollenhoven 2014). During the late 1920s, more

permanent and large-scale settlements and possibly some of the first farmsteads started to appear in the region.

The region has been the backdrop to various incidents of conflict. Numerous factors such as population growth, increasing pressure on natural resources, the emergence of power blocs, attempts to control trade and the emergence of the Griquas, and penetration of the Korana and early white communities from the southwest resulted in a period of instability in South Africa. With the introduction of loan farms, in the second half of the 18th century, an influx of newcomers such as trekboers, European game hunters and livestock thieves contributed to the volatility and sociocultural stress and transformation in the region (Mlilo 2019).

The period known as the *Difaqane/Mfecane* began in the late 18th-century and effectively ended with the settlement of white farmers in the interior (De Jong 2010; Mlilo 2019). The *Difaqane/Mfecane* period also affected the Northern Cape Province around the 1820s, which was relatively later than the rest of southern Africa (De Jong 2010). This period was prompted by the incursion of displaced refugees associated with the Fokeng, Tlokwa, Hlakwana and Phuting groups (De Jong 2010).

Moreover, during the 1830s, the Voortrekkers had started migrating northwards from the Cape Colony. This migration was due to their dissatisfaction with British rule (Eldredge 1987). The Voortrekkers' migration is known as the "Groot Trek" (Great Trek). The Voortrekkers had come into conflict with Tswana groups and missionary groups who had settled near Bechuanaland and Griqualand West (Van Vollenhoven 2014). A series of wars and battles between the Voortrekkers, Zulu's and Sotho-Tswana communities eventually arose due to the migrations (De Bruyn 2019).

Between 1879-1880 the region was also caught up in the Koranna War. Further military activity in the area included the rise of the 'rebels' during the Anglo-Boer War and again in 1915 with the incursion of German troops (Morris 2018a, b & c). Numerous graves can be linked to the battles fought during the 1914 Rebellion (Engelbrecht & Fivaz 2019). It is believed that any military settlement, specifically those related to the Koranna Wars, would have been located closer to the Orange River (Webley & Halkett 2014).

It is known that San hunter-gatherers utilised the landscape for thousands of years, and Khoi herders moved into South Africa with their cattle and sheep approximately 2000 years ago. With the arrival of the Dutch settlers in the Cape in the mid-17th century, clashes between the Europeans and Khoi tribes in the Cape Peninsula resulted in the Goringhaiqua and Goraxouqua migrating north towards the Gariep/Orange River in 1680. These tribes became collectively known as the Korannas, living as small tribal entities in separate areas (Penn 2005).

Bushmanland was one of the last regions of the Cape Province to be settled by early European farmers. This was because the region was very arid, and it was situated quite far from Cape

Town and the produce markets. Many of the farms in the Bushmanland area were only allocated after the introduction of the windpump to South Africa in the 1870s. In other words, the windpump made the arid lands accessible and suitable for grazing (Webley & Halkett 2012b). Historical literature also confirms that San hunter-gatherers occupied Bushmanland during the early part of the 19th century. During the 19th century, *Basters* of mixed descent lived around the salt pans in Bushmanland. They were, however, driven away from the land as the farms were surveyed and made available to European farmers (Webley & Halkett 2012b). In the late 18th and early 19th centuries, with the introduction and implementation of the commando system, the Karoo 'Bushmen' were eventually destroyed or indentured into farm labour (ACRM 2015).

Several finds have been recorded at sites in the Northern Cape region. These include but are not limited to: 20th-century glass bottles and a rusted enamel basin (Orton 2015a); some colonial-era stonewalling (Morris 2013b); glass and porcelain fragments (Beaumont 2007; Morris 2013a & b); colonial farmsteads (Morris 2013; Van Ryneveld 2017a and b); heavily soldered Anglo-Boer War (1899-1902) food containers (Dreyer 2006; Beaumont 2007) and fired rifle cartridge shells (Dreyer 2014; Beaumont 2007); and numerous man-moved and stacked boulders (possibly representative of Boer positions during the Siege of Kimberly (Beaumont 2007).

Apart from a few exceptions, the archaeology along the Orange River has mainly focused on two areas; the Middle Orange River and the Richtersveld (Orton & Webley 2012). The Middle Orange River was densely inhabited during pre and proto colonial times (Mlilo 2019). The area is made up of several islands. Herders often chose to live on these islands due to their natural protection from stock thieves and wild animals. Small-stock farmers mainly occupied the vicinity along the Orange River. It was during the 1930s that the first great influx of people had started. These people had developed an extensive network of irrigation channels that supplied water for the development of vineyards and other cash crops (e.g. grain crops), cultivated in a narrow band along the Orange River leading to the region known as the Green Kalahari. Van Schalkwyk (2019) comments that this had resulted in numerous smaller hamlets and villages. These hamlets/villages had churches, cemeteries and shops.

According to Ross (1975), the first descriptions of the population of the Middle Orange River can be credited to the Swedish traveller Hendrick Wikar. Wikar started his long journey from Cape Town and eventually reached the middle and lower reaches of the Orange River. Wikar is believed to have been a deserter from the service of the Dutch East India Company. Thus, Wikar remained within the area for several years and compiled a report of his experiences in exchange for a pardon (Ross 1975). He recorded his encounters with the Khoisan groups who called themselves *Einiqua* or River People. The *Einiqua* were divided into three "kraals", namely the *Namnykoa* near the Augrabies Falls, the *Aukokoa* of Kanoneiland and the *Kaukoa* on islands west of Keimoes and other islands to the east (Engelbrecht & Fivaz 2020). Their kraals consisted of numerous sheep and cattle. The *Einiqua* had also hunted game, gathered plants, and cultivated dagga, but according to Wikar, no other crops (Ross 1975). The *Anoe e's* people, whom Wikar characterised as "Bushmen", were among the pastoralist groups living on the islands. As they had no domestic stock, these people had subsisted on fishing, game-trapping, hunting, and plant foods gathering (Morris & Beaumont 1991). However, Colonel

Robert Jacob Gordon, who visited the region in 1779, remarked that they were *Einiqua* who had lost their cattle because of an argument with the *Namneiqua* village (Morris & Beaumont 1991). The San and Khoekhoe hunter-gatherers in the region had reached a form of stability by the early 18th century (Mlilo 2019). The area west of the Langeberg and east of Upington was occupied by IA groups such as the BaTlaping. Their influence had reached as far down the river as Upington (Morris 1992).

De Jong (2010) classifies the cultural landscape along the Gariep/Orange River as predominantly historic farmland. From the 1880s onwards, irrigation of the Orange River played a central role in the economy of the area in the vicinity of Upington (Legassick 1996). Hunter-gatherers had shared the river's resources (Morris 1992). The beginning of irrigation in this area has been attributed to the *Basters*. By the 18th century, the *Basters* had focused on the Orange River (and Namaqualand) as a sanctuary from colonial rule (Mlilo 2019; Van der Walt 2015). They were regarded as "primitive pastoral people" who had "crude" ways to divert the river to their "little gardens" (Van der Walt 2015). The term "Basters" characterises a group of people of mixed percentage (white and Khoekhoe or slave and Khoekhoe). According to Van der Walt (2015), the term also implies an economic category that implies the possession of property and who is culturally European.

The construction and development of canal systems were vital for the irrigation of extensive vineyards and orchards and the expansion of major agricultural enterprises in the region (Engelbrecht & Fivaz 2018). The credit for formalising and extending the irrigation system belongs to Reverend C.H.W. Schröder, a missionary from the Dutch Reformed Church (DRC) and Special Magistrate for the Northern Border John H. Scott. By the time Schröder came to Upington in July 1883, there were people already living in the area of Keimoes who had planted fields and utilised irrigation. The irrigation scheme of the *Basters* can be attributed to Abraham September's innovation. Abraham September was born in slavery and became part of the *Baster* people of South Africa. It is interesting to note that Schröder and Scott had begun the canal from the very place Abraham September had selected. Legassick (1996) commented that "the small, white-painted, stone house where Abraham September lived when he undertook this work survives to this day, though the house and the land upon which it stands have long passed from the hands of the September family".

In 1882, the first 81 farms to be given out to the north of the Orange River from Kheis (opposite the present Groblershoop) to the Augrabies Falls were allocated almost exclusively to *Basters* (Morris 1992). The further division of these farms had commenced when the irrigation canal was completed. These farms were divided into "water-erven" for irrigation and "dry-erven" for establishing buildings (Van der Walt 2015). More white settlers started moving to the Gordonia region during the late 19th century. By the turn of the century, approximately 13 Afrikaner families had settled at Keimoes (De Beer 1992; Van der Walt 2015). Many farmers moved to new areas due to the aftermath of the scorched earth policy of the Anglo-Boer War. These farmers searched for greener pastures. Settlements next to the Gariep/Orange River provided adequate irrigation for crops (Engelbrecht & Fivaz 2020).

The Gariep/Orange River was referred to by Portuguese sailors as the St Anthonio, and on the maps from 1685, Simon van der Stel marked it as the Vigiiti Magna. In 1760, Jacobus Coetzee,

the elephant hunter, named the river: “de Groote Rivier” (the Great River). In 1761, land surveyor Carel Brink noted that the river is known to the local island inhabitants as the *Tyen Gariep* (Our River). The London Missionary Society’s (LMS) John Campbell spoke of the *Gariep*, *Gareeb*, and *Garib* as the name the Korannas used. The river’s contemporary name (Orange River) can be accredited to Robert Gordon. Gordon took his rowboat out to the middle of the river on the evening of the 17th of August 1779. He raised and toasted the Netherland’s flag and proclaimed the river in the name of the Prince van Oranje. From this day forward, the river was known (and indicated on maps) as the Orange River. However, the river is often referred to as the *Gariep* or *Grootrivier* (Engelbrecht & Fivaz 2020).

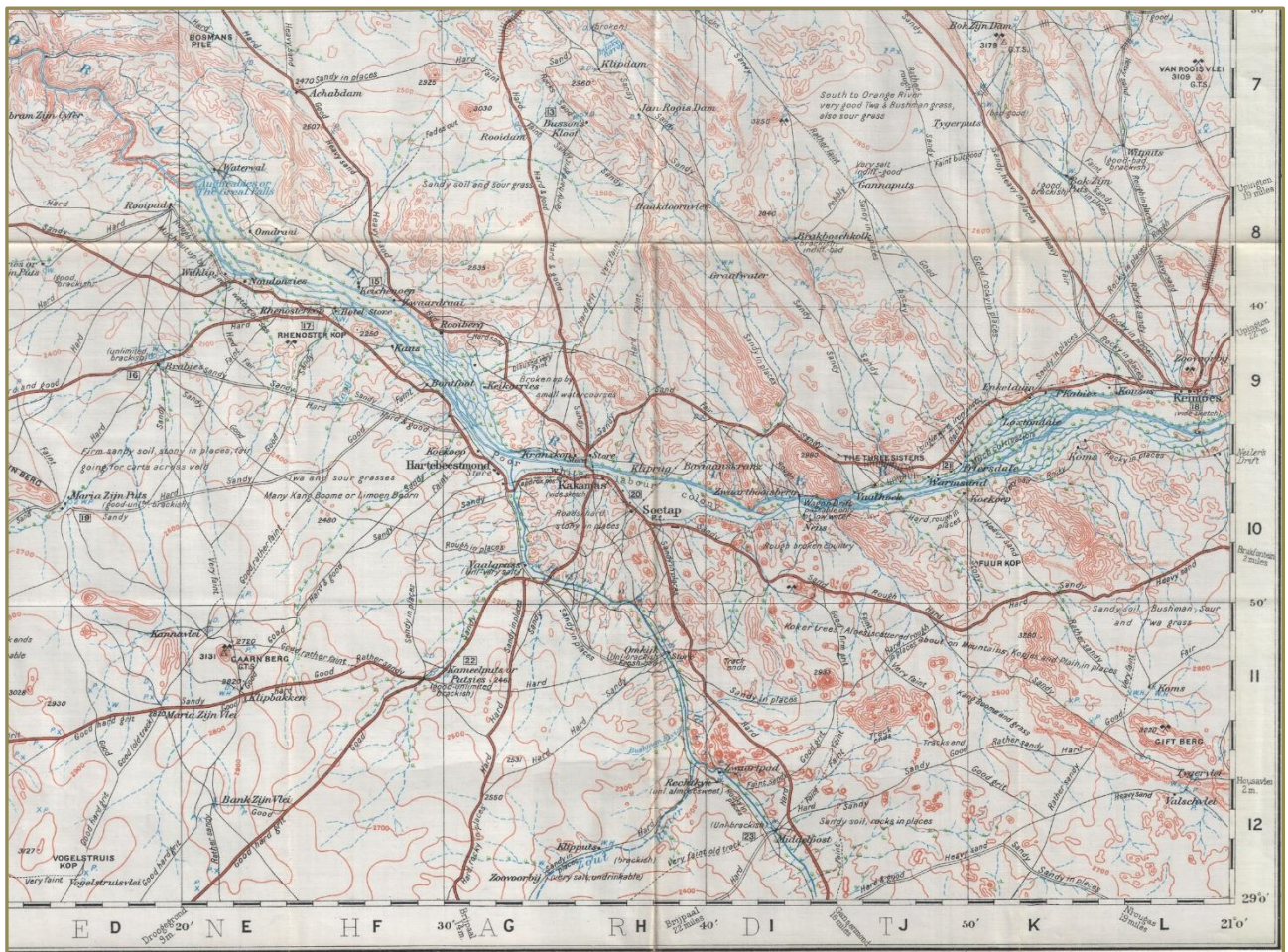


Figure 4 1910-1911 Imperial Map of Kakamas and surrounds, with the wagon routes indicated. Image from UCT digital collections, <https://digitalcollections.lib.uct.ac.za/>

5.2 Local

The desktop study revealed that no CRM work had been done directly on the proposed area for development. However, two studies were undertaken by ACRM (2020a and c) in close proximity to the area proposed development area. These two studies were done on farms located at the southern border(s) (both west and east of the borders) of the current study site.

Several reports have also been done on surrounding farms such as Padrooi 13, Rooipad, Orange Fall 16, Zwart Boois Berg, Riemvasmaak, Cnydas East 439, to name a few (Kaplan 2018; Orton 2012; Orton et al. 2013; Pelsler 2012; Rossouw 2019; Van Ryneveld 2007; van Schalkwyk 2013c). The majority of the reports recorded stone artefacts, with a few historical sites/artefacts and graves. It should also be mentioned that several studies often encountered no archaeological materials/remains (e.g. ACRM 2020 b; 2020 b; Dreyer 2008b; 2010; 2013a and b; Engelbrecht & Fivaz 2019c; Van Schalkwyk 2013b, c, d and e; 2016).

The Heritage Screening tool (<https://screening.environment.gov.za/>) was used to complement the study area’s heritage sensitivity assessment. The heritage screening map indicates that apart from a very few tiny sections of medium to high significance (indicated in red), the area surrounding the current study area has low heritage sensitivity, consistent with most assessment reports.

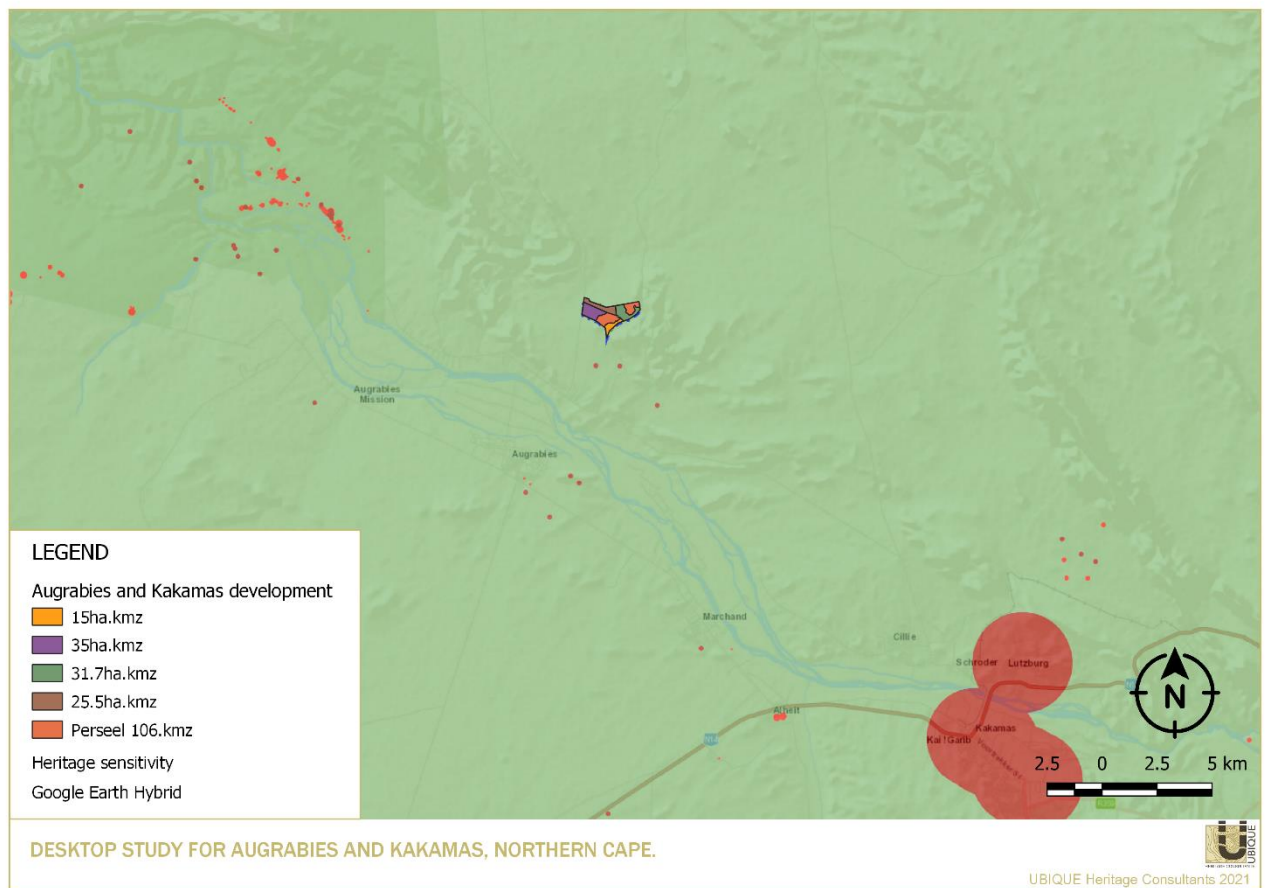


Figure 5 Heritage Screening tool (<https://screening.environment.gov.za/>) indicating projected heritage sensitivity around the study area.

5.2.1 Stone Age

Scatters of stone artefacts around Augrabies and Kakamas have been recorded by but not limited to ACRM (2016; 2017; 2018; 2020), Beaumont (2008 a and b), Engelbrecht & Fivaz

(2018; 2019 a, b, c, e), Kaplan (2012; 2013c; 2016; 2017), Kruger (2015 a; 2017), Morris (2011; 2012; 2017), Orton (2012), Orton et al. (2013), Orton and Webley (2012), Rossouw (2017; 2019), Van Schalkwyk (2010; 2011; 2013). The majority of the stone scatters, and implements can be ascribed to the MSA and LSA with a few occurrences of ESA implements. The incidences of lithics generally have little to no context and are primarily described as poor preservation and low heritage significance. ACRM (2012) noted that 95% of the tools documented are made from locally available, fine-grained banded ironstone, favoured raw material on many sites in the Northern Cape. The remainder is generally indurated shale, chert, quartzite and quartz, and hornfels.

The survey undertaken by ACRM (2020a) in 2019 for the AIA on the existing and proposed new vineyard development on Farm 355 Tierkop yielded artefacts located approximately 200 m away from the southernmost border of the current proposed development area, and the furthest being about 3 km south-southeast of the border. During this survey, ACRM (2020a) found marginal scatters and several stone tools and lithics dating to the LSA and MSA. The stone tools mainly comprise a few round quartz cores, flakes and chunks in quartz, quartzite, indurated shale, silcrete, and banded ironstone. They also noted several weathered flake tools (ACRM 2020a). Another survey was undertaken in 2020 by ACRM (2020c) for the agricultural development and proposed new vineyard development on Farm Oorkant. Here, ACRM (2020c) recorded a few isolated MSA and LSA stone tools, a small cobble hammerstone and a small piece of indigenous clay pottery. ACRM (2020c) recorded scatters of MSA and LSA implements on patches of quartz gravels alongside the drainage channel in the western portion of the survey area. They found a banded ironstone chunk approximately 72 m west from the southern portion of the current proposed development area (about 400 m north-northwest from the southernmost point).

On the Farm Orange Falls 16, located approximately 13 km southwest of the current study area, Rossouw (2019) and Kaplan (2018) undertook two different impact assessments. Rossouw (2019) reported a few singular, isolated and weathered lithics as surface occurrences. Kaplan (2018) recorded several archaeological resources, such as a minor scattering of *in situ* implements located on washed gravels between two small drainage channels. Most of the findings comprised single, isolated occurrences in a disturbed and secondary context. These were dated to the LSA and MSA. Kaplan (2018) noted only a few formal tools, including a broken tip of an MSA unifacial point, a flaked adze, two scrapers and a hammerstone. He observes a large number of cortex flakes, seven MSA blade tools and a quartz crystal bladelet core. According to Kaplan (2018), the large number of cortex flakes may be related to the widespread primary flaking and possibly other domestic activities around drainage channels during wetter periods when game may have been available. During an assessment of a portion of Farm Cnydas East 439, situated approximately 35 km north-east of the current study area, Van Ryneveld (2007) recorded various MSA artefacts' varying densities and lithics. The artefacts recorded were primarily produced from quartz, with a few made from raw materials such as fine-grained dolerite and jasperlite.

On the farm Zwart Boois Berg Annex 475, which is located approximately 19 km west of the current study area, Orton et al. (2013) undertook archaeological mitigation of artefact scatters.

Orton et al. (2013) recovered a total of 559 lithic artefacts. Their analysis of the artefacts reveals that the majority of the artefacts can be dated to the MSA. They also note that the presence of chopper cores and platform cores suggest an older component from the ESA. At the same time, occasional artefacts with very little patination on their surface may be much younger (Orton et al., 2013).

During Pelser's (2012) survey for the HIA for the proposed PV solar power generation plant on the Farm Padrooi 13, he recorded several sites dating to the Stone Age near Augrabies Falls. These sites are represented by reasonably dense to minimal scatters of stone tools, dense scatters of quartz, and stone tools manufactured on the quartz. The tools were generally manufactured from materials such as felsite, hornfels and other materials types. According to Pelser (2012), the scatters can be dated to the MSA and LSA, with the possibility of ESA scatters. Interestingly, he recorded a single hand axe (possibly dating to the ESA) during his survey. During Orton's (2012) survey for the proposed Augrabies solar energy facility on the Farm Rooipad 15/9, he recorded several MSA and LSA scatters of stone artefacts. Orton (2012) notes that higher concentrations of LSA artefacts were found in some locations, which could indicate LSA campsites. Orton (2012) recorded a large scatter of artefacts focused around the slopes of a small rocky koppie. Orton (2012) remarks that although they are in low density, the size of the scatter may have some research value.

Roughly 20 km southeast of the proposed development site, Engelbrecht & Fivaz (2019a) recorded several ESA, MSA and LSA materials, such as chunks, scrapers, blades, cores, chips and flakes. They also found local ceramic sherds dating to the LSA. Furthermore, Engelbrecht & Fivaz (2019b) recorded several MSA/LSA artefacts, possible retouched flakes, cores, lithics, scraper, flakes, and banded ironstone concave side scraper during the survey for the proposed agricultural development on Plot 1178. Southeast of the current development area at Rozynen Bosch No. 104, Engelbrecht & Fivaz (2019e) found several MSA and LSA artefacts such as scrapers, notched scrapers, chips, flakes, and a bladelet.

David Morris had reported archaeological sites in the Riemvasmaak area, which included several significant fishbone and pottery rich sites located close to the river. They appear to be similar to the herder sites excavated by Webley and others in the Lower Orange River (Pelser 2012). Beaumont (2008a) recorded seven un-diagnostic quartzite artefacts during his survey for the areas flanking the Vredesvallei settlement at Riemvasmaak (approximately 28 km northwest away from the current area). He noted that on a low schist rise on the south edge of the valley, there was a 5 m wide circle of quartz slabs with a gap on its north side, possibly representing an old goat kraal base. Unfortunately, he does not know the age of the kraal (Beaumont 2008a). Rossouw (2017) reported surface scatters of Stone Age material during the HIA of the proposed new Koppie Riemvasmaak Residential development in Postmasburg. During Orton and Webley's (2012) survey for the proposed hydroelectric facilities near Riemvasmaak, they reported no ESA sites were found during their survey. However, during an earlier survey of the National Park, several isolated ESA artefacts and one scatter of such artefacts were present. They did record several MSA artefacts and surface scatters, noting that the majority are relatively light scatters often associated with naturally occurring pebbles of banded ironstone. They also comment that some of the MSA sites/scatters are denser and

may require mitigation. They also recorded several LSA sites close to or beneath trees on the silty plains along the river margins. These sites likely belong to the Khoekhoen. Some of the material they recorded includes OES and OES beads, flaked stone, pottery, quartz, flaked fine-grained black rock. They also note that a few rock shelters are present in the broader study area. Moreover, they recorded a lower grindstone with multiple grooves, five grinding hollows, and upper grindstones (Orton & Webley 2012).

During Kruger's (2015) AIA for the proposed PV power plant development on portion 40 of Farm Eenduin approximately 40 km east from the current study area, he found single MSA lithics (e.g. a broken point, a retouched side scraper and a flake tool) as well as a low density of MSA lithic occurrences (e.g. adzes, scrapers, blades, points and worked chunks and flakes). Kruger (2012) remarks that although there may be a few lithics from the LSA, lithics from the MSA appear to be the most prominent. Kruger's (2017) assessment for the proposed Sonfin Oseiland 1MWp PV Plant Development Project footprint area revealed that it is situated in surrounds that have been sterilised of potential heritage resources due to site clearing. However, Kruger (2017) does note that MSA lithics (such as two broken blades, a point and a flake tool) were documented in the areas surrounding the cleared footprint area.

Morris and Beaumont (1991) excavated two Stone Age sites at Renosterkop, east of the town of Augrabies. At Renosterkop 1, they found an open scatter of stone artefacts, OES beads, pottery and other materials. The lithics were predominantly informal, with a few retouched items such as scrapers and backed tools. Grindstones occurred and included one stone similar to those described by Webley (1990) for scraping skins. Renosterkop 2 was a small rock shelter where they had excavated two square metres and found that more recent material was evident in the upper deposits.

In contrast, material similar to Renosterkop 1 was present in lower deposits. A collection of MSA artefacts was found at the base, but the interface between the LSA and MSA was indeterminate, and the deposits were poorly stratified. Compared with other sites, the LSA material may relate to a later phase of herder occupation (Orton 2012).

During van Schalkwyk's (2013a) assessment for the proposed township development on the farm Kakamas Suid 28, he had identified a low density of stone tools dating to the MSA. In 2016, ACRM (2016) undertook a foot survey for the proposed vineyard development on Farm 1726 Renosterkop, Farm 1290 and Farm 1537. ACRM (2016) observed numerous archaeological resources, but they were spread unevenly and sparsely over the surrounding landscape and comprised single, isolated finds. The stone tools recorded by ACRM (2016) date to the LSA, with several MSA flakes, blade tools and points made from indurated shale, banded ironstone and quartzite. ACRM (2016) also found a possible quartz point and an anvil. They note, however, that there were no hammerstones or grindstones found near the anvil.

Moreover, ACRM (2016) found two small fragments of weathered ostrich eggshell (OES) (ACRM 2016). In 2017 ACRM (2017) surveyed the proposed citrus development at the Renosterkop

Extension (Kakamas South Settlement No. 2185 & 2193). ACRM (2017) only recorded small traces of archaeological resources spread sparsely over the surrounding landscape. The majority of the implements comprise single, isolated finds, which constitutes an extremely low density scatter of precolonial resources. The majority of the stone tools observed by ACRM (2017) are assigned to the LSA and a few to the MSA.

Additionally, they recorded three possible scrapers and remark that many of the flakes display secondary (scraper) retouch and are best described as unstandardised utilitarian tools. They also found one step-flaked piece on an older MSA flake as well as an anvil and a broken/split hammerstone. ACRM (2017) remarks that the anvil and a broken/split hammerstone could indicate low stone tool knapping levels across the affected landscape. Beaumont (2008b) recorded (lightly smoothed and fresh) stone artefacts of grey quartzite and banded ironstone during the survey on Kakamas South Farm 2092. According to Beaumont (2008b), the material is best referred to as two widely-spaced phases of the Acheulean. However, this interpretation is only speculative, given the almost complete absence of formal tools apart from the single exception (a relatively coarse straight-edged side-scraper based on a fresh flake).

On agricultural lot 2371 Kakamas South Settlement, Morris (2017d) reports the unexpected occurrence of a rock gong on a rocky granite-gneiss outcrop. Rock gongs (or lithophones) are rocks that ring when struck and are characterised by beating marks that reflect ancient use (Morris 2017 d). According to Morris (2017d), the find is significant as it is the first rock gong to be identified from this part of the Northern Cape and on granite-gneiss. They are often found in association with rock art and are a feature of the LSA, with alleged ritual connotations (Morris 2017d).

Another interesting prehistoric find in the greater vicinity was two kite-like features 22km north of Keimoes (Van der Walt & Lombard 2018). The prominent funnel-shaped features of undetermined age were constructed and shaped by organising local dolerite stones, sometimes incorporating in-situ dolerite outcrops/boulders. Kites are widely accepted as being utilised as hunting traps (Holzer et al. 2010 in Van der Walt & Lombard 2018). The ethnohistorical records documented various kinds of hunting traps used by San hunter-gatherers, but the use of these funnel-shaped stone features by Stone Age herding communities (who also hunted) cannot be conclusively discounted (Van der Walt & Lombard 2018).

Although the current proposed development area has received little attention, the area immediately west of Augrabies Falls has been subject to archaeological research by Professor Andrew Smith. Prof. Smith conducted informal surveys within the National Park and on river-bordering farms in the Kakamas area. He also excavated several caves (Zoovoorbij, Droegrond, Waterval), which produced MSA and LSA material (Pelser 2012). Smith (1995) recovered at Zoovoorbij (some 64 km east of Augrabies) a collection of MSA flakes stone artefacts from the lower levels of the excavation. The upper levels contained LSA material and artefacts such as bone and OES beads and a few potsherds. According to Pelser (2012), it was

evident to Prof. Smith that the Khoekhoen herders were dependent on being close to the Orange River, rich in resources. Prof. Smith's research also revealed that San hunter-gatherers lived in refuge situation deeper in the hinterland (Pelser 2012). Smith (1986; 1995) recorded pottery, sheep bones, informal stone artefact assemblage, retouches pieces, beads, a decorated flask mouth fragment at Waterval 1, near Augrabies Falls. The site was dated to 760 ± 40 BP (Pta-3847) and has been occupied by herders (Orton 2012). Assemblages that have been excavated from sites (Biesje Poort 2 and Bokvasmaak 3) in the Augrabies Falls area by Peter Beaumont have been analysed by Parsons (2007). The two sites were dated to around 1390 ± 70 BP (Pta-4772) and 120 ± 50 (Pta-4872) by Beaumont et al. (1995). Biesje Poort 2 yielded numerous retouched items. Beaumont et al. (1995) ascribed both sites to herders, but Parsons' (2007) analyses showed the relevant characteristics to be unclear and unreliable (Orton 2012).

5.2.1.1 Rock Art

None of the AIA/HIAs done in the vicinity of the proposed development area reported any rock art/engravings on the inspected sites. Rock art in the region is somewhat scarce, but it is not unheard of (Kaplan 2013). Kaplan (2013) (through personal observations) and Morris (1998) have reported that rock engravings occur along the Orange River. De Kock (2012) remarks that rock engravings may generally be located on flat rocky outcrops along the river.

However, the desktop study revealed that there are two known rock art sites recorded on the SAHRA database near Augrabies. The first (Augrabies sites RVM19 historical engravings) is located approximately 25 km northwest of the current study area. The second site (Augrabies sites RVM3 LSA engravings) is approximately 26 km north-northwest of the current study area (SAHRA 2021).

Full Site Name	Site ID	Site Reference	Province	Site Type	Coordinates	NiD
Augrabies sites RVM19 historical engravings	93896	RVM19	Northern Cape	Rock Art	-28.464711, 20.287494	361597
Augrabies sites RVM3 LSA engravings	93893	RVM3	Northern Cape	Rock Art	-28.395425, 20.386838	361594

5.2.2 Iron Age

It is rare, but not uncommon, to find sites associated with the 'Iron Age' of southern Africa in the Northern Cape. One such find was recorded by Rossouw (2017) during the HIA of the proposed new Koppie Riemvasmaak Residential development in the Postmasburg survey. Rossouw (2017) found a large concentration of open mining pits during the survey, located on

and around an iron-rich koppie situated southeast of the Boichoko Township. Rossouw (2017) notes that these mining pits may be related to the 18th-century interaction of the BaTlaping with groups along the Orange River. The dates coincide with Huffman's (2007) dates for the South African 'Later Iron Age'.

5.2.3 Historical/Colonial period

Unfortunately, very little information exists regarding the history of the Augrabies town. The Augrabies Falls National Park (established in 1966) overshadows the history of the town. Augrabies Falls is believed to have been named by the earlier mentioned Swedish traveller Hendrik Jakob Wilkar when he moved through the area in 1799 (Broberg 2016). The name "Augrabies" originally comes from the Nama (Khoe) word "Aukroerebis". "Aukroerebis" means a "Place of Great noise", referring to the thundering of the water downwards for 60 m to the base of the gorge (SA Venues 2012; Sanparks 2021; SAHO 2021; SA HAFNP 2021). The Upington Publicity Association petitioned the National Parks Board in 1954 to designate the waterfall as a National Park. However, the Department of Water Affairs objected to the proclamation of a National Park, even after its approval in 1955. Augrabies Falls National Park was later established on the 5th of August 1966, after negotiations (Eishsa 2010).

The town of Kakamas was laid out in 1931 and attained full municipal status in 1964 (Van Schalkwyk 2013). The name Kakamas originated with the Einiqua. However, there are several theories about the meaning of the word:

- Bad Grazing: before the canals and irrigation schemes were developed, the area was notorious for its poor grazing pastures.
- Angry/Charging Cow/Chasing Cows: this may derive from the Korana word *kagamas*, which could have become associated with the place because the river banks nearby had sloping banks making it an easy crossing place for cattle herds. Most herds were reluctant to enter the river and would turn on their herdsmen.
- Thakemas, meaning drink place. This would refer to the ease with which livestock could be herded to the area to drink
- Swimming water: Possibly the San word, given to the place because it was possible to swim across the river at this point (De Jong 2010).

The Kakamas area's water-related infrastructure was essential for agricultural development. Several water wheels and excavated tunnels, and irrigation furrows have been declared Provincial Heritage Sites. The hand-dug tunnels were remarkable engineering feats for the early 20th-century (Orton 2012). The town of Kakamas originated out of an irrigation scheme established by the community in 1898 for farmers that were left destitute by severe drought (1895-1897). Led by Rev. Schroder, the irrigation scheme included canals dug by hand, beginning at the upper end of Neus Island (Hopkins 1978; Van Vuuren 2011). The development of canal systems played an essential role in irrigating extensive vineyards and orchards within the region and developing substantial agricultural initiatives within the area.

The Kakamas settlement is also known for its pioneering development of a hydroelectric power generator, brought into operation in 1924 (Hopkins 1978). The building, which housed the old transformer in Voortrekker Street, was ear-marked as a museum (Morris 2010; 2017; SAHRA database).

De Jong (2010) classifies the cultural landscape of Kakamas as predominantly historic farmland. The affected area consists of working (operating) irrigation and grazing farms located in a typical Lower Orange River environment. These farms display heritage features that typically occur in the district, such as their large size, irrigation furrows and pipelines, fences, tracks, farmsteads, and irrigated fields. Farmsteads are clustered close to rivers and primary roads (De Jong 2010). According to De Jong (2010), this landscape class is of relatively low heritage sensitivity because it can absorb adverse effects of new development through some mitigation.

Very few HIA and AIAs reported on artefacts/sites associated with the Historical/Colonial period. During the assessment of a portion of the farm Cnydas East 439, Van Ryneveld (2007) recorded a historical complex and observed two historic structures, a kraal, wind pump, dam, and associated workers unit. Van Ryneveld (2007) comments that the two historical structures probably represent early farming occupation and activity at Cnydas East 439. The general area was devoid of associated historical artefacts. Furthermore, Van Ryneveld (2007) mentions that the associated stone kraal is still in use. The windpump and dam, situated near the two historic structures, are of more recent origin and associated with earlier prospecting activities on the property, post-dating 60 years of age and implication not protected by the NHRA (1999). In contrast, the workers' unit and its associated historical artefacts (such as metal, porcelain and glass) pre-date 60 years (Van Ryneveld 2007).

Pelser (2012) recorded a low stone wall (single row of stones) in front of a section of the outcrop during his survey on Padrooi 13. He found glass and metal such as tins in the vicinity of the stone feature. Pelser (2012) explains that they are unsure of the age and function of this feature and that it may be relatively recent and could have been used by herd boys. Orton (2012) recorded a 28 m by 6 m flat-roofed farm building that was most likely built in the early to the mid-20th century. The structure, however, has since then been added on and altered several times over the years. Orton (2012) also noted that the outbuildings were made of poles and reeds and a sheep dip, which is, however, of more recent age. These outbuildings have also been added to and altered.

Orton and Webley (2012) reported that an abundant amount of historical remains were found at Riemvasmaak. Unfortunately, according to Orton and Webley (2012), most of the remains are younger than 100 years of age and are thus not legally protected by the NHRA. Nevertheless, the sites related to the ancestors of the Riemvasmaak community. They were forcibly removed from the land in 1973 and 1974 during the Apartheid regime. Orton and Webley (2012) recorded ruins of structures, stone features (with indeterminate function), and artefacts such as metal objects, glass bottles, and a plastic bead. The majority of historical artefacts are quite recent (mid-20th century), but occasional ceramic fragments were undoubtedly originally of late 19th-century origin. However, they state that it is likely that these materials were only deposited during the early to the mid-20th century.

Kinahan (2003) had conducted fieldwork in Augrabies Falls. However, it was limited to the gorge where the archaeological material was infrequent. Kinahan (2003) noted that various historical remains (related to the Anglo-Boer war and the rebellion lead by Manie Maritz) dating to the late 19th and early 20th centuries are well preserved within the Falls. Situated in the western part of the Park is the Manie Maritz Fort. The fort is made up of piled stones. Unfortunately, it is still unclear whether the fort can be associated with Maritz (Orton 2012).

Beaumont (2008b) found a minor scatter of undiagnostic tin and glass fragments and what seemed to be some minor levelling of the ground surface. He remarks that these vestiges could likely be where a small group of people camped for a short time during the early 20th century while digging for diamonds nearby. Thus, leaving behind pieces of a spade and some sieve mesh (Beaumont 2008b).

During Engelbrecht and Fivaz's (2019a) survey of Plot 1763, Plot 2372, and Plot 2363, various surface scatters of material relating to the historical/colonial period, such as a hole-in-cap tin lid with lead solder and a tin can with folded/cramped hand-soldered seam, and cast-iron potsherds, a broken horseshoe, green and weathered clear glass, whiteware ceramics, and tin can with folded/crimped hand-soldered seam was recorded. At Rozyne Bosch No. 104, Engelbrecht and Fivaz (2019e) recorded surface scatters such as historical fuel/oil tin with machine soldered seams with trademarks, a historical green liquor bottle, the partial base of a bottle, a historical fired shotgun cartridge, and a metal casing 12 BR.

Just outside the town of Kakamas North on Lot 189 is a monument that commemorates First World War German troops killed in a battle against South African Union forces on the 4th of February 1915. Union troops assembled near Upington to launch an attack on German South-West Africa, while the German forces prepared an attack on Kakamas. A heavy battle ensued between two unevenly matched forces at Kakamas that resulted in seven dead, six wounded and sixteen prisoners of war amongst the Germans. The memorial was erected by the '*Volksbund Deutschen Kriegs-graberflrsorge*' (SAHRA database).

Heritage sites in and around the Augrabies and Kakamas landscape documented on the SAHRA database:

Site/Object Name	Coordinates	Archive Status	Declaration Type	Site type	Site Reference	Site ID
North Furrow, Kakamas, Gordonia District	-28.785592; 20.639647	National monument	Provincial heritage	Building	9/2/032/0005	28797
Battlefield, Kakamas, Gordonia District	-28.743329; 20.635730	National monument	Provincial heritage	Battlefield, Monuments & Memorials, Burial Grounds & Graves	9/2/032/0006	28798

Site/Object Name	Coordinates	Archive Status	Declaration Type	Site type	Site Reference	Site ID
Water wheel, near DR Church Parsonage, South Furrow, Kakamas	-28.772950; 20.622203	National monument	Provincial heritage	Building	9/2/032/0008	28799
Water wheel No. 2, Plot 103, South Furrow, Kakamas	-28.783353; 20.635208			Building	9/2/032/0009 /001	28793
Water wheel No. 2, Plot 103, South Furrow, Kakamas	-28.783353; 20.635208	National monument	Provincial heritage	Building	9/2/032/0009 /001	28793
Water Wheel No. 1, Plot 103, South Furrow, Kakamas	-28.783504; 20.635524	National monument	Provincial heritage	Building	9/2/032/0009 /004	28794
Water wheel, Plot 1057, North Furrow, Kakamas	-28.785597; 20.640039	National monument	Provincial heritage	Building	9/2/032/0009 /005	28792
Water wheel, Plot 68, North Furrow, Kakamas	-28.785335; 20.638437	National monument	Provincial heritage	Building	9/2/032/0009 /006	28791
Water Wheel, Plot 1467, South Furrow, Kakamas	-28.783988; 20.636358	National monument	Provincial heritage	Building	9/2/032/0009 /009	28788
Kakamas Museum, Voortrekker Street, Kakamas	-28.770215; 20.617134	National monument	Provincial heritage	Building	9/2/032/0010	28789

5.2.4 Graves/Burials

During Orton's (2012) survey, he recorded a single historic grave dating to 1955. At the time, the site was younger than 60 years and thus not protected under the NHRA. However, it should be noted that it is now older than 60 years and should therefore be protected under the NHRA. Orton (2012) also reported a large pile of rocks, seemingly placed on top of the degraded bedrock. Orton (2012) comments that although a burial on bedrock exposure is very unlikely, there have been reports of burial shafts dug into degraded bedrock covered with a cairn. He thus explains that the cairn is assumed to be similar to the other burial sites found within the region (Orton 2012). Nicholas Wiltshire (2018) recorded a possible gravesite on the soft, red sands at the base of Renosterkop Peak. According to Wiltshire (2018), the stones were deliberately arranged. He recorded no head or footstone, suggesting that this grave is not a Christian burial. ACRM (2019) also made a note of the grave mentioned above in their report.

Orton and Webley (2012) found several features likely to be graves during their survey for the proposed hydroelectric facilities near Riemvasmaak. However, they remark that they cannot

be certain about this interpretation without subsurface testing since these features could likely be historical features (constructed for various reasons) during the 20th century. They also found a memorial with an inscription: “*Eerste Landsdienskom Dept v Landbou 21.6.52 – 5.?.52*”. During Beaumont’s (2008a) survey, he examined a graveyard. There were about 50-60 burials. This graveyard was adequately fenced and contained headstones ranging from 2009 to 1959 with some unmarked interments that could still be older. Rossouw (2017) mentions that a large graveyard is located on the southern outskirts of the Boichoko Township

A collection of burials from the Kakamas area was excavated and analysed by Prof. Allan Morris. He had analysed the materials he collected in 1984 and 56 individuals exhumed by Dreyer and Meiring in 1936. The burial cairns and other information suggested that they belong to the Khoekhoen people, specifically the Einiqua. According to Pelser (2012), the historical data indicates that most graves to date to the 18th and early 19th centuries. The graves contained items such as trade beads and red ochre (Pelsers 2012).

Recorded graves/burials/cemeteries in and around the areas of study

Name	Cemetery ID	Site Type	Coordinates	URL Reference link
Northern Cape, KAKAMAS, NG Kerk, Muur van Herinnering		Graves/Burials	-28 46.494, 20 37.207	https://graves-at-eggssa.org/main.php?g2_itemId=2741778
Northern Cape, KAKAMAS, Soetap cemetery	3339	Graves/Burials	-28 46 55.19, 20 37 35.12	https://graves-at-eggssa.org/main.php?g2_itemId=406386
Northern Cape, KAKAMAS, Van Rensburg cemetery	4214	Graves/Burials	-28 47.459, 20 39.403	https://graves-at-eggssa.org/main.php?g2_itemId=1879921
Northern Cape, AUGRABIES, cemetery	3825	Graves/Burials	-28 40.200, 20 25.452	https://graves-at-eggssa.org/main.php?g2_itemId=1264697

6. IDENTIFIED RESOURCES AND HERITAGE ASSESSMENT

6.1 Surveyed area

The area surveyed for the impact assessment was dictated by the Google Earth map of the development footprints provided by the client. The proposed agricultural plots were surveyed by vehicle and on foot by a two-person team. The pedestrian survey was conducted in predominantly 30-50 m transects.

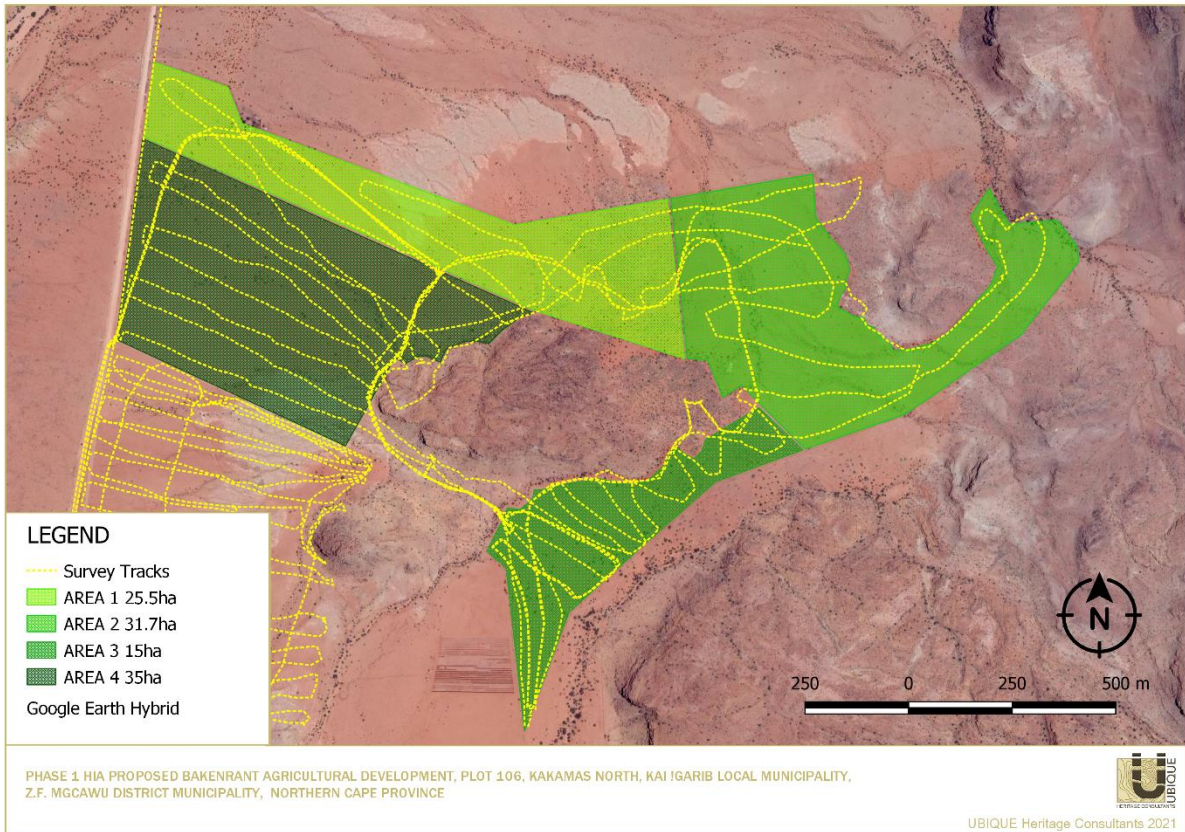


Figure 6 Survey tracks across the development footprint.

6.2 Identified heritage resources

Stone Age Resources Identified

Point ID & Site Name	Description	Period	Location	Field rating/ Significance/ Recommended Mitigation
WP 005 BKR001 Plot 106	Type of feature	MSA/ Early LSA	28° 37' 18.6" S 20° 27' 49.5" E	Field Rating IV C
	Material			Low significance
	N in m ² .			No Mitigation Required
	Context			
Additional	Outside development footprint			



Figure 7 Distribution of identified heritage resources, Plot 106 Kakamas-North.

6.3 Discussion

6.3.1 Archaeological features

6.3.1.1 Prehistorical

Only one occurrence of lithic material was recorded outside to the south of the project development footprint (BKR001). The low-density surface scatter included chunks, chips, one bladelet and possible scrapers from cryptocrystalline silicates (CCS) and Banded Ironstone Formation (BIF).

The lithic material shows various degrees of weathering and is without substantial archaeological context or matrix, and is therefore deemed of minor scientific importance and not conservation worthy (NCW). It is also situated outside the designated project area.

The material is given a 'General' Protection C (Field Rating IV C). This means that it has been sufficiently recorded (in Phase 1). It requires no further action.



BKR001

Figure 8 Photographic selection of the lithic material recorded.

6.3.2 Palaeontological resources

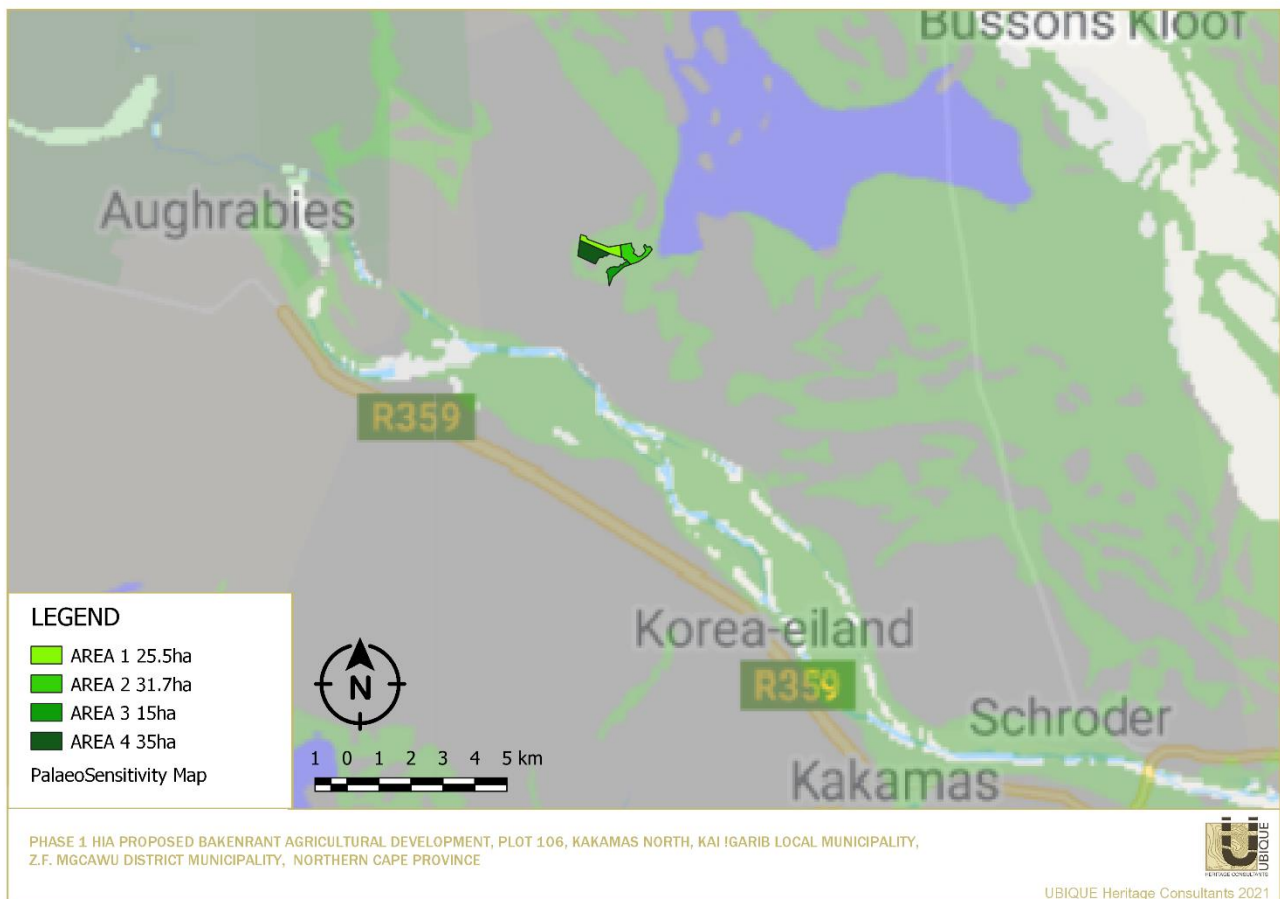


Figure 9 SAHRIS PalaeoSensitivity Map, indicating Moderate (green), Low (blue), Insignificant/Zero (grey), and Unknown (clear) palaeontological significance in the study area, (<https://sahris.sahra.org.za/map/palaeo>).

The development footprint is underlain by the ancient Precambrian basement rocks of the Namaqua-Natal Province, mantled by sediments of the Gordonia Formation (Kalahari Group). A low Palaeontological Significance has been allocated to the proposed development as the Palaeontological Sensitivity of the Gordonia Formation is low. The ancient Precambrian basement rocks are zero. These rocks are approximately one to two billion years old and completely unfossiliferous (Butler 2021).

Elize Butler from Banzai Environmental conducted a desktop study of the development footprint (see Appendix A).

7. ASSESSMENT OF THE IMPACT OF THE DEVELOPMENT

Description	Development Impact	Mitigation	Field rating/ Significance
Archaeological			
1. The one occurrence of lithic material on Bakenrant Plot 106, located outside the development footprints (BKR001).	Nature	Neutral	No mitigation required.
	Extent	Low	
	Duration	Low	
	Intensity	Low	
	Potential of impact on irreplaceable resource	Low	
	Consequence	Low	
	Probability of impact	Low	
	Significance	Low	
Paleontological			
2. The Palaeontological Sensitivity of the Gordonia Formation (Kalahari Group) is low, and the sensitivity of the ancient Precambrian basement rocks are zero	Nature	Neutral	No mitigation required. Chance Finds Protocol provided.
	Extent	Low	
	Duration	Low	
	Intensity	Low	
	Potential of impact on irreplaceable resource	Low	
	Consequence	Low	
	Probability of impact	Low	
	Significance	Low	
			N/A

The significance of the lithic material recorded at BKR001 is not conservation worthy, and therefore, in the unlikely event that impact should occur, the negative impact is negligible.

With regards to the impact on palaeontological resources, the scarcity of fossil heritage at the proposed development footprint indicates that the impact of the development footprint will be of low significance in palaeontological terms. Therefore, it is considered that the proposed development is deemed appropriate and feasible and will not lead to detrimental impacts on the palaeontological reserves of the area (Butler 2021).

8. RECOMMENDATIONS

Based on the assessment of the potential impact of the development on the identified heritage, the following recommendations are made, taking into consideration any existing or potential sustainable social and economic benefits:

1. No significant heritage sites or features were identified within the surveyed sections of the areas earmarked for agricultural developments. Therefore the proposed development can continue.
2. The cultural material recorded (BKR001) to the south of the proposed development footprints is of low significance and will not be affected by the development.
3. Due to the low palaeontological significance of the area, no further palaeontological heritage studies, ground-truthing and/or specialist mitigation are required. It is considered that the development of the proposed development is deemed appropriate and feasible and will not lead to detrimental impacts on the palaeontological resources of the area (Butler 2020). If fossil remains or trace fossils are discovered during any phase of construction, either on the surface or exposed by excavations the Chance Find Protocol (Appendix A/11) must be implemented by the Environmental Control Officer (ECO) in charge of these developments. These discoveries ought to be protected, and the ECO must report to SAHRA (Contact details: SAHRA, 111 Harrington Street, Cape Town. PO Box 4637, Cape Town 8000, South Africa. Tel: 021 462 4502. Fax: +27 (0)21 462 4509. Web: www.sahra.org.za) so that mitigation can be carried out by a palaeontologist (Butler 2020).
4. Although all possible care has been taken to identify sites of cultural importance during the investigation of study areas, it is always possible that hidden or sub-surface sites could be overlooked during the assessment. If during construction, any evidence of archaeological sites or remains (e.g. remnants of stone-made structures, indigenous ceramics, bones, stone artefacts, ostrich eggshell fragments, charcoal and ash concentrations), fossils or other categories of heritage resources are found during the proposed development, SAHRA APM Unit (Natasha Higgitt/Phillip Hine 021 462 5402) must be alerted as per section 35(3) of the NHRA. If unmarked human burials are uncovered, the SAHRA Burial Grounds and Graves (BGG) Unit (Thingahangwi Tshivhase/Mimi Seetelo 012 320 8490) must be alerted immediately as per section 36(6) of the NHRA. Depending on the nature of the finds, a professional archaeologist or palaeontologist must be contacted as soon as possible to inspect the findings. If the newly discovered heritage resources prove to be of archaeological or palaeontological significance, a Phase 2 rescue operation may be required subject to permits issued by SAHRA. UBIQUE Heritage Consultants and its personnel will not be held liable for such oversights or costs incurred as a result of such oversights.

9. CONCLUSION

This HIA identified no significant heritage resources that may be impacted negatively by the proposed development. The development of four parcels of land for agricultural purposes Bakenrant Plot 106, Kakamas-North, Kai !Garib Local Municipality, Z.F. Mgcawu District Municipality, Northern Cape may continue, provided the recommendations stipulated within this report, and the subsequent decision by SAHRA, are followed.

10. BIBLIOGRAPHY

- ACRM. 2015. *Archaeological Impact Assessment, Proposed borrow pit (Karusa R354) on the Farm Karreebosch 200/1 near Sutherland, Northern Cape*. Unpublished report. Agency for Cultural Resource Management: Rondebosch.
- ACRM. 2016. *Archaeological Impact Assessment: Proposed vineyard development on Farm 1726 Renosterkop, Farm 1290 & Farm 1537 Augrabies Northern Cape*. Unpublished report. ACRM: Rondebosch.
- ACRM 2017. *Archaeological Impact Assessment: Proposed citrus development, Renosterkop Extension (Kakamas South Settlement No. 2185 & 2193) Augrabies, Northern Cape*. Unpublished report. ACRM: Rondebosch.
- ACRM. 2020a. *Archaeological Impact Assessment: Existing illegal and proposed new vineyard development on Farm 355 Tierkop, Kakamas North, near Augrabies Kai! Garib Municipality, Northern Cape*. Unpublished report. ACRM: Rondebosch.
- ACRM. 2020b. *Archaeological Impact Assessment: Application, Illegal vineyard development on Arendsnes (Portion 30 of the Farm Zeekoesteeek No. 9), near Augrabies, Kai! Garib Municipality, Northern Cape*. Unpublished report. ACRM: Rondebosch.
- ACRM. 2020c. *Archaeological Impact Assessment: Illegal agricultural development and proposed new vineyard development on the Farm Oorkant, Kakamas North Settlement No 341, near Augrabies, Kai! Garib Municipality, Northern Cape*. Unpublished report. ACRM: Rondebosch.
- Beaumont, P. 2007. *Phase 1 Heritage Impact Assessment Report on the Farm Eureka 200 near Kimberley, Frances Baard District Municipality, Northern Cape Province*. Unpublished report. McGregor Museum: Kimberley.
- Beaumont, P. B. 2008a. *Phase 1 Archaeological Impact Assessment report on areas flanking the Vredesvallei settlement at Riemvasmaak, near Kakamas, Siyanda District Municipality, Northern Cape Province*. Unpublished report. McGregor Museum: Kimberley.
- Beaumont, P.B. 2008b. *Phase 1 Archaeological Impact Assessment Report on Kakamas South Farm 2092 Near Augrabies, Siyanda District Municipality, Northern Cape Province*. Unpublished report. McGregor Museum: Kimberley.
- Beaumont, P.B. 2008c. *Phase I Archaeological Impact Assessment Report on a Portion of the Farm 292 near Groblershoop, Karoo district Municipality, Northern Cape*. Unpublished report.
- Beaumont, P.B., Smith, A.B. & Vogel, J.C. 1995. Before the Einiqua: the archaeology of the frontier zone. In Smith, A.B. (Ed.). *Einiqualand: Studies of the Orange River frontier*. University of Cape Town Press: Cape Town.
- Beaumont, P.B. & Morris, D. 1990. *Guide to archaeological sites in the Northern Cape*. McGregor Museum: Kimberley.

- Binneman, J. F. 1995. *Symbolic construction of communities during the Holocene Later Stone Age in the South-Eastern Cape*. Unpublished PhD thesis. Johannesburg: University of the Witwatersrand.
- Broberg, G. 2016. In the Shadow of Thunberg and Sparrman Hendrik Jacob Wikar at the Cape. *Svenska Linnésällskapets årskrift*: 53-70.
- Butler, E. 2021. Palaeontological Desktop Assessment For The Proposed Agricultural Development, On Plot 106 Bakenrant, ZF Mgcawu District Municipality, Kai !Garib Local Municipality, Near Kakamas, In The Northern Cape.
- Coertze, P.J. & Coertze, R.D. 1996. *Verklarende vak woordeboek vir Antropologie en Argeologie*. R.D. Coertze: Pretoria.
- De Bruyn, C. 2019. *Heritage Impact Assessment for the proposed mining rights on the farm Waterkloof 95 located between Griekwastad and Groblershoop in The Pixley Ka Seme District Municipality within the Northern Cape Province*. Unpublished report. NGT. Johannesburg, Northcliff.
- De Jong, R.C. 2010. *Heritage impact assessment report: proposed manganese and iron ore mining right application in respect of the remainder of the farm Paling 434, Hay registration division, Northern Cape*. Unpublished report. Cultmatrix: Pretoria.
- Deacon, H.J. & Deacon, J. 1999. *Human Beginnings in South Africa: Uncovering the secrets of the Stone Age*. David Phillips Publishers: Cape Town.
- Dreyer, J. 2006. *First phase archaeological and cultural heritage assessment of the proposed Concentrated Solar Thermal Plant (CSP) at the farms Olyvenhouts Drift, Upington, Bokpoort 390 and Tampansrus 294/295, Groblershoop, Northern Cape*. Unpublished EIA report. Bohlweki Consultants: Johannesburg.
- Dreyer, J. 2008a. *First Phase archaeological and cultural heritage assessment of the proposed upgrading of the R358 road and borrow pit sites between Pofadder and Onseepkans, Northern Cape*. Unpublished report. Bloemfontein.
- Dreyer, C. 2008b. *First phase archaeological and cultural heritage assessment of the proposed water flow measuring weir site in the Orange River at Blouputs, Northern Cape*. Unpublished report
- Dreyer, J. 2008c. *First phase archaeological and cultural heritage assessment of the proposed residential developments at a portion of the remainder of the farm Bestwood 459RD, Kathu, Northern Cape*. Unpublished report. EIA Report for Cultmatrix cc (Heritage Consultants) Pretoria and Rock Environmental Consulting, Pretoria.
- Dreyer, J. 2008d. *First phase archaeological and cultural heritage assessment of the proposed Bourke Project, ballast site and crushing plant at Bruce Mine, Dingleton, near Kathu, Northern Cape*. Unpublished report. EIA Report for MILNEX 189 cc, Schweizer Reneke.
- Dreyer, C. 2010. *First phase archaeological and heritage assessment of the borrow pit for the proposed upgrading of the road from the mission gate to Riemvasmaak, Northern Cape*. Unpublished report.
- Dreyer, J. 2012. *First phase archaeological and cultural heritage assessment of the proposed water pipeline from Sanddraai 391 to Bokpoort 390, Groblershoop, Northern Cape*. Unpublished EIA Report. SSI Engineers & Environmental 14 Consultants: Sandhurst.
- Dreyer, C. 2013a. *First phase archaeological and heritage assessment of the proposed new cemetery at Augrabies, Kakamas District, Northern Cape*. Unpublished report.
- Dreyer, C. 2013 b. *First phase archaeological and heritage assessment of the proposed new extensions to the cemetery at Cillie near Kakamas, Northern Cape*. Unpublished report.
- Dreyer, J. 2013 (Revised). *First phase archaeological & heritage assessment of the proposed Garona – Ferrum transmission line, Northern Cape*. Unpublished report. EIA Report for Envirolution Consultants, Johannesburg.

- Dreyer, J. 2014. *First phase archaeological & heritage assessment of the proposed Ferrum (Kathu) – Nieuwehoop (Kenhardt) 400kV transmission line, Northern Cape*. Unpublished report. EIA Report for Envirolution Consulting, Mondeor, Johannesburg.
- Dreyer, J. 2015. *First Phase Archaeological & Heritage Assessment Of The Proposed Bokpoort II 300mw Combined 2 X 75 Pv & 150 Mw Csp Tower Solar Development On The Remainder Of The Farm Bokpoort 390, Groblershoop, Northern Cape Province*. Unpublished report.
- Dreyer, T.F. & Meiring, A.J.D. 1937. A preliminary report on an expedition to collect Hottentot skulls. *Soologiese Navorsing van die Nasionale Museum, Bloemfontein* 1(7): 81-88.
- Eldredge, E.A. 1987. Drought, famine and disease in nineteenth-century Lesotho. *African Economic History*, (16): 61-93.
- Engelbrecht, J. & Fivaz, H. 2018. *Phase 1 HIA Report Plot 1178 Kakamas South, Northern Cape*. Unpublished report. UBIQUE Heritage Consultants: Roodepoort.
- Engelbrecht, J. & Fivaz, H. 2019a. *Phase 1 Hia Report Agricultural Development Plot 1763, 2372, And 2363 Kakamas South, Northern Cape Proposed Agricultural Development, Plot 1763, 2372, And 2363, Kakamas South Settlement, Kai !Garib Municipality, Z.F. Mgcawu District Municipality, Northern Cape*. Unpublished report. UBIQUE heritage Consultants: Roodepoort.
- Engelbrecht, J. & Fivaz, H. 2019b. *Phase 1 Hia Report Plot 1178 Kakamas South Northern Cape Proposed Agricultural Development (Triple D Farms), Plot 1178, Kakamas South Settlement, Kai !Garib Municipality, Mgcawu District Municipality, Northern Cape*. Unpublished report. UBIQUE heritage Consultants: Roodepoort.
- Engelbrecht, J. & Fivaz, H. 2019c. *Phase 1 Hia Report Sand Quarry Kakamas South Northern Cape Proposed Development Of Sand Quarry, Plot 1763, Kakamas South Settlement, Kai !Garib Municipality, Mgcawu District Municipality, Northern Cape*. Unpublished report. UBIQUE heritage Consultants: Roodepoort.
- Engelbrecht, J. & Fivaz, H. 2019d. *Phase 1 HIA report Farm 387 portion 18 Groblershoop Northern Cape. Version 2*. Unpublished report. UBIQUE Heritage Consultants. Roodepoort.
- Engelbrecht, J. & Fivaz, H. 2019e. *Phase 1 Hia Report Feldspar Mining, Farm Rozynen Bosch No. 104, Portions 4 And 5, Kakamas South, Northern Cape Proposed Feldspar Prospecting Rights And Mining Permit Application, Farm Rozynen Bosch No. 104, Portion 4 And 5, Kakamas South Settlement, Kai !Garib Municipality, Z.F. Mgcawu District Municipality, Northern Cape*. Unpublished report. UBIQUE heritage Consultants: Roodepoort.
- Engelbrecht, J. & Fivaz, H. 2020. *Phase 1 HIA report !Kheis township expansion Groblershoop, Northern Cape*. Unpublished report. UBIQUE Heritage Consultants: Roodepoort.
- Hall, M. 1987. *The changing past: farmers, kings and traders in southern Africa. 200-1860*. Cape Town: David Philip.
- Huffman, T. 2002. Regionality in the Iron Age: the case of the Sotho-Tswana. *Southern African Humanities*, 14: 1-22.
- Huffman, T. 2007. *Handbook to the Iron Age*. Pietermaritzburg: University of Kwazulu-Natal Press.
- Kaplan, J. 2008. *Phase 1 Archaeological Impact Assessment proposed construction of a Water Treatment Plant and Supply Pipeline from Keimoes to Kenhardt, Northern Cape Province*. Unpublished report. Agency for Cultural Resource Management: Riebeeck West.
- Kaplan, J. 2012a. *Archaeological Impact Assessment: The Proposed Keren Energy Kakamas Solar Farm on ERF 1654 Kakamas Northern Cape Province*. Unpublished report. Agency for Cultural Resource Management: Rondebosch.
- Kaplan, J. 2012b. *Archaeological Impact Assessment, the proposed Keren Energy Keimoes Solar Farm on Erf 666 Keimoes, Northern Cape Province*. Unpublished report. Agency for Cultural Resource Management: Rondebosch.

- Kaplan, J. 2013a. *Archaeological Impact Assessment, the proposed upgrading of the Louisvale Road Waste Water Treatment Works in Louisvale, Upington, Northern Cape Province*. Unpublished report. Agency for Cultural Resource Management: Rondebosch.
- Kaplan, J. 2013b. *Archaeological Impact Assessment the proposed upgrading of the KWW Upington Effluent Management Facility, Northern Cape Province*. Unpublished report. Report prepared for EnviroAfrica cc. ACRM: Cape Town.
- Kaplan, J. 2013c. *Archaeological Impact Assessment Proposed Low Cost Housing Project in Kakamas, Northern Cape Province*. Unpublished report. Agency for Cultural Resource Management: Rondebosch.
- Kaplan, J. 2016. *Archaeological Impact Assessment Proposed housing development on Erf 1612, Kakamas, Northern Cape*. Unpublished report. Agency for Cultural Resource Management: Rondebosch.
- Kaplan, J. 2017. *Archaeological Impact Assessment Proposed Packing Shed, Portion of Erf 1731 Kakamas South, Northern Cape*. Unpublished report. Agency for Cultural Resource Management: Rondebosch.
- Kaplan, J. 2018. *Archaeological Impact Assessment: Proposed development of agricultural land on Portion 13 of Orange Falls Farm No. 16, Augrabies Northern Cape*. Unpublished report. ACRM: Rondebosch.
- Kinahan, J. 2003. *Archaeological assessment of potential dam sites on the lower Orange River (Violsdrif & Komsberg)*. Unpublished report prepared for Burmeister & Partners. Windhoek: Quaternary Research Services
- Klein, R. G. 2000. The Earlier Stone Age of Southern Africa. *The South African Archaeological Bulletin*, 27(172): 107-122.
- Kruger, N. 2015a. *Proposed Photovoltaic power plant development on Portion 40 of the farm Eenduin, Kai Garib Local Municipality, Siyana District Municipality Northern Cape Province*. Unpublished report. Albebbaran SA (Pty) Ltd. Pretoria.
- Kruger, N. 2015b. *Archaeological Impact Assessment (AIA) of a Demarcated surface portion on the Farm Avondale 410 for the proposed Avondale 1 Photovoltaic Power Plant & 132kV Power Lines development, //Khara Hais Local Municipality, ZF Mgcauw district Municipality, Northern Cape Province*. Unpublished report. Pretoria.
- Kruger, N. 2017. *Proposed Sonfin Oseiland 1MWP PV Plant development project on a portion of the Farm Reingeluk 107, Kai Garib Local Municipality, Siyana District Municipality Northern Cape Province*. Unpublished report. Albebbaran SA (Pty) Ltd. Pretoria.
- Kruger, N. 2018. *Archaeological Impact Assessment (AIA) for the Biesieputs Prospecting Project on a portion of the farm Biesieputs 67 in the ZF Mgcauw District Municipality, Northern Cape Province*. Unpublished report. Pretoria.
- Lombard, M., Wadley, L., Deacon, J., Wurz, S., Parsons, I., Mohapi, M. Swart, J. & Mitchell, P. 2012. South African and Lesotho Stone Age sequence updated. *South African Archaeological Bulletin* 67: 123-144.
- Mitchell, P. 2002. *The archaeology of Southern Africa*. Cambridge: Cambridge University Press.
- Mlilo, T. 2019. *Phase 1 Archaeological Impact Assessment Report for Prospecting right application for various minerals (NC12177PR and NC12215PR) in ZF Mgcauw Magisterial District in Kai! Garib Local Municipality Northern Cape Province*. Unpublished report. Integrated Specialists Services (PTY) LTD: Midrand.
- Morris, D. 1988. Engraved in Place and Time: A Review of Variability in the Rock Art of the Northern Cape and Karoo. *The South African Archaeological Bulletin*, 43(148): 109-120.
- Morris, D. 2011. *Heritage Impact Assessment of the proposed new power-line route south of the river to Kakamas, Northern Cape*. Unpublished Report. McGregor Museum: Kimberley.

- Morris, D. 2012. *Archaeological Impact Assessment, Phase I: 15km Water Pipeline across farms Sanddraai 391 and Bokpoort 390 near Groblershoop, Northern Cape*. Unpublished Report. McGregor Museum: Kimberley.
- Morris, D. 2013a. *RE Capital 3 Solar Development on the property Dyason's Klip west of Upington, Northern Cape: Archaeological Impact Assessment – proposed 'central' development footprint*. Unpublished report. McGregor Museum: Kimberley.
- Morris, D. 2013b. *Heritage Impact Assessment: Proposed Aggeneys Photovoltaic Solar Energy Facility at Bloemhoek near Aggeneys, Northern Cape Province*. Unpublished report. McGregor Museum: Kimberley.
- Morris, D. 2013c. *Heritage Impact Assessment for Four Proposed Photovoltaic Solar Energy Facilities on the farm Zuurwater near Aggeneys, Northern Cape Province (Expanded Survey)*. Unpublished report. McGregor Museum: Kimberley.
- Morris, D. 2013d. *RE Capital 3 Solar Development on the property Dyason's Klip west of Upington, Northern Cape: Scoping phase Heritage Input*. Unpublished report. McGregor Museum: Kimberley.
- Morris, D. 2013e. *AES Solar PV Installation on the property Dabenoris 44 near Aggeneys, Northern Cape: Scoping phase Heritage Input*. Unpublished report. McGregor Museum: Kimberley.
- Morris, D. 2013f. *Proposed development of the Upington Solar Thermal Plants Two and Three within Portion 3 of the Farm McTaggarts Camp 435, west of Upington, Northern Cape: Scoping phase heritage input*. Unpublished report. Kimberley: McGregor Museum. McGregor Museum: Kimberley.
- Morris, D. 2017a. *Skuitdrift 1 solar PV energy Facility near Pofadder, Northern Cape*. Unpublished report. McGregor Museum Kimberley.
- Morris, D. 2017b. *Skuitdrift 2 solar PV energy Facility near Pofadder, Northern Cape*. Unpublished report. McGregor Museum Kimberley.
- Morris, D. 2017c. *Heritage Impact Assessment of proposed sand mining in the bed of the Hartebees River on Lot 1768 Kakamas South, near Kakamas, Northern Cape*. Unpublished Report. McGregor Museum: Kimberley.
- Morris, D. 2017d. *Heritage Impact Assessment of Agricultural Lot 2371 Kakamas South Settlement, near Kakamas, Northern Cape*. Unpublished Report. McGregor Museum: Kimberley.
- Morris, D. 2018a. *Heritage Impact Assessment of proposed sand mining in the bed of a spruit on Olywenhoutsdrift-Suid, near Louisvale, Northern Cape*. Unpublished report. McGregor Museum: Kimberley.
- Morris, D. 2018b. *Heritage Impact Assessment of proposed sand mining in the bed of the Donkerhoekspruit on Jannelsepan, near Louisvale, Northern Cape*. Unpublished report. McGregor Museum: Kimberley.
- Morris, D. 2018c. *Heritage Impact Assessment at the site of proposed irrigation development on the farm Openwater near Upington, Northern Cape*. Unpublished report. McGregor Museum, Kimberley.
- Morris, D. & Beaumont, P.B. 1991. !Nawabdanas: archaeological sites at Renosterkop, Kakamas District, Northern Cape. *South African Archaeological Bulletin* 46:115-124.
- Morris, D. & Beaumont, P. 2004. *Archaeology in the Northern Cape: Some key sites*. SA3 Post-Conference Excursion, 8-10 April 2004. McGregor Museum: Kimberley.
- Orton, J. 2012. *Heritage Impact Assessment for the Proposed Augrabies solar energy facility, Kenhardt Magisterial District, Northern Cape*. Unpublished report.
- Orton, J. 2015a. *Final Archaeological Survey for the proposed Aggeneys Solar Energy facility, Namakwaland Magisterial District, Northern Cape*. Unpublished Report. ASHA Consulting: Cape Town.

- Orton, J. and Webley, L. 2012. *Heritage Impact Assessment for proposed Hydroelectric facilities near Riemvasmaak, Northern Cape*. Unpublished report. ACO associates. Cape Town.
- Orton, J., Flear W, and Webley, L. 2013. *Archaeological mitigation of artefact scatters on Zwart Boois Ber Annex 475, Kakamas, Northern Cape*.
- Parsons, I. 2007. Hunter-gatherers or herders? Reconsidering the Swartkop and Doornfontein Industries, Northern Cape Province, South Africa. *Before Farming* 2007/4: Article 3.
- Pelser, A. J. 2012. *A report on an Archaeological Impact Assessment (AIA) for the proposed Photo-Voltaic Solar Power Generation plant on the farm Padrooi 13, near the Augrabies Falls National Park in the Northern Cape*. Unpublished report. Archaetnos: Groenkloof.
- Rossouw, L. 2013. *Phase 1 Heritage Impact Assessment of a proposed new road at Blaauwskop near Uppington, NC Province*. Unpublished report. Langenhovenpark.
- Rossouw, L. 2017. *Phase 1 Heritage Impact Assessment of the proposed new Koppie Riemvasmaak Residential development in Postmasburg, NC Province*. Unpublished report.
- Rossouw, L. 2019. *Phase 1 Heritage Impact Assessment Report Farm Orange Fall no 16 Agricultural Development, Augrabies, Northern Cape Province*. Unpublished report.
- Smith, A.B. 1986. Competition, Conflict and Clientship: Khoi and San Relationships in the Western Cape. *South African Archaeological Society Goodwin Series* 5: 36-41.
- Smith, A.B. 1995. Archaeological observations along the Orange River and its hinterland. In: Smith A.B. (ed.) *Einiqualand: studies of the Orange River frontier*: 265-300.
- Van der Ryst, M.M. & Meyer, A. 1999. *Die Ystertydperk. Bergh, J.S. (red.). Geskiedenisatlas van Suid-Afrika. Die vier noordelike provinsies*. Pretoria: J.L. van Schaik.
- Van Ryneveld, K. 2007. *Phase 1 Archaeological Impact Assessment – Portion of the farm Cnydas East 439, Uppington district, Northern Cape*. Unpublished report. Archaeomaps.
- Van Ryneveld, K. 2007. *Phase 1 archaeological impact assessment: Portion of the farm Bokspuits 118, Groblershoop, Northern Cape, South Africa*. Unpublished report.
- Van Ryneveld, K. 2017a. *Phase 1 Archaeological & Cultural Heritage Impact Assessment Prospecting Right Application (without Bulk Sampling), farm Aroams 57 Portion 1, near Aggeneys, Namakwa District Municipality, Northern Cape*. Unpublished report. ArchaeoMaps: Eastern Cape.
- Van Ryneveld, K. 2017b. *Phase 1 Archaeological & Cultural Heritage Impact Assessment Koa Valley Prospecting Right Application (without Bulk Sampling), Portions of the Farms Haramoep 53, Oonab-Noord 609, Amam 46 and Nooisabes 51, near Springbok / Aggeneys, Namakwa District Municipality, Northern Cape*. Unpublished report. ArchaeoMaps: Eastern Cape.
- Van Schalkwyk, J.A. 2010. *Archaeological impact survey report for the Land Use Change on a Section of the Farm Kakamas North, Gordonia District. Northern Cape Province*. Unpublished report. CULTMATRIX Consultants: Pretoria.
- Van Schalkwyk, J.A. 2011. *Heritage impact assessment report for the proposed establishment of the Inca Solar PV Power Plant, Kakamas region, Northern Cape Province*. Unpublished report 2011/JvS/030. Pretoria.
- Van Schalkwyk, J. 2013a. *Cultural heritage impact assessment for the proposed township development on a section of the farm Kakamas suid 28, Augrabies, Kai !Garib Municipality, Northern Cape Province*. Unpublished report. Pretoria.
- Van Schalkwyk, J. 2013b. *Cultural heritage impact assessment for the the proposed township development on a section of the farm Kakamas North 481, Lutzburg, Kai !Garib Municipality, Northern Cape Province*. Unpublished report. Pretoria.
- Van Schalkwyk, J. 2013c. *Heritage impact assessment for the proposed resort development on a section of the Farm Orange Fall 16, Kai !Garib Municipality, Northern Cape province*. Unpublished report. Pretoria.

- Van Schalkwyk, J. 2013d. *Cultural heritage impact assessment for the proposed township development on a section of the Farm Kakamas Suid 28, Marchand, Kai !Garib Municipality, Northern Cape Province*. Unpublished report. Pretoria.
- Van Schalkwyk, J. 2013e. *Cultural heritage impact assessment for the proposed township development on a section of the Farm Kakamas Noord 481, Cillie, Kai !Garib Municipality, Northern Cape Province*. Unpublished report. Pretoria.
- Van Schalkwyk, J. 2013. *Cultural Heritage Impact Assessment for the proposed township development on a section of the farm Neilers Draft 34, Lennertsville, Kai !Garib Municipality, Northern Cape Province*. Unpublished report. Pretoria.
- Van Schalkwyk, J. 2016. *Cultural heritage impact assessment for the development of the proposed Lutzburg solar power plant on the remaining extent of Portion 2 of The Farm Ruby Vale No 266 Registration Division Gordonia, Northern Cape Province*. Unpublished report. Pretoria.
- Van Schalkwyk, J. A. 2019. *Phase 1 Cultural Heritage Impact Assessment: Prospecting right application with bulk sampling on various portions of the Farms Zonderhuis 402, Onder Plaats 401 and Namakwari 656, Siyanda District Municipality, Northern Cape Province*. Unpublished report. Pretoria.
- Van Vollenhoven, A. C. 2014. *A report on a cultural heritage impact assessment for the proposed exploration activities at the Jacomynspan Project, Northern Cape Province*. Unpublished report. Archaetnos: Groenkloof.
- Van Vollenhoven, A. C. 2014. *A report on a basic heritage assessment for the proposed Eskom Fibre-Groblershoop 132 Kv power line, Northern Cape Province*. Unpublished report. Archaetnos: Groenkloof.
- Webley, L. and Halkett, D. 2012. *Heritage Impact Assessment: Proposed Loeriesfontein Photo-Voltaic Solar Power Plant on Portion 5 of the Farm Klein Rooiberg 227, Northern Cape Province*. Unpublished report. ACO Associates.
- Webley, L. 2013. *Heritage impact assessment for proposed construction of the ESKOM Groblershoop Substation and the Garona-Groblershoop 132 kV powerline, Groblershoop, Northern Cape*. Unpublished report. ACO Associates cc: St James.
- Wiltshire, N. 2018. *Heritage Management Plan: Possible grave site 891 at the base of Renosterkop Peak, Augrabies, Northern Cape Province*. Unpublished report. CTS Heritage: Cape Town.
- Wurz, S., 2013. Technological trends in the Middle Stone Age of South Africa between MIS 7 and MIS 3. *Current Anthropology*, 54(S8): S305-S319.

WEB

<https://sahris.sahra.org.za/declaredsites> (Accessed 20/04/2021).

<https://sahris.sahra.org.za/allsitesfinder> (Accessed 20/04/2021).

<https://www.sahistory.org.za/place/augrabies-fall-national-park-northern-cape> (SAHO 2021) (Accessed 23/04/2021).

<https://www.sa-venues.com/game-reserves/augrabies.php> (SA Venues 2012) (Accessed 23/04/2021).

www.sanparks.org.za (Sanparks 2021) (Accessed 23/04/2021).

<https://southafrica.co.za/history-augrabies-falls-national-park.html> (SA HAFNP 2021) (Accessed 24/04/2021).

<https://graves-at-eggssa.org/main.php> (Accessed 20/04/2021).

<http://www.eishsa.co.za/minisites/augrabies-falls.html> (Eishsa 2010). (Accessed 03/05/2021)

APPENDIX A

PALAEONTOLOGICAL DESKTOP ASSESSMENT FOR THE PROPOSED AGRICULTURAL DEVELOPMENT, ON PLOT 106 BAKENRANT, ZF MGCAWU DISTRICT MUNICIPALITY, KAI !GARIB LOCAL MUNICIPALITY, NEAR KAKAMAS, IN THE NORTHERN CAPE



**PALAEONTOLOGICAL DESKTOP ASSESSMENT FOR THE PROPOSED
AGRICULTURAL DEVELOPMENT, ON PLOT 106 BAKENRANT, ZF MGCAWU DISTRICT
MUNICIPALITY, KAI !GARIB LOCAL MUNICIPALITY, NEAR KAKAMAS, IN THE
NORTHERN CAPE**

**Compiled for:
UBIQUE Heritage Consultants**

Prepared by
Banzai Environmental
May 2021

Declaration of Independence

I, Elize Butler, declare that –

General declaration:

- I act as the independent palaeontological specialist in this application.
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant.
- I declare that there are no circumstances that may compromise my objectivity in performing such work.
- I have expertise in conducting palaeontological impact assessments, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity.
- I will comply with the Act, Regulations and all other applicable legislation.
- I will take into account, to the extent possible, the matters listed in section 38 of the NHRA when preparing the application and any report relating to the application.
- I have no, and will not engage in, conflicting interests in the undertaking of the activity.
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority.
- I will ensure that information containing all relevant facts in respect of the application is distributed or made available to interested and affected parties and the public and that participation by interested and affected parties are facilitated in such a manner that all interested and affected parties will be provided with a reasonable opportunity to participate and to provide comments on documents that are produced to support the application.
- I will provide the competent authority with access to all information at my disposal regarding the application, whether such information is favourable to the applicant or not.
- All the particulars furnished by me in this form are true and correct.
- I will perform all other obligations as expected a palaeontological specialist in terms of the Act and the constitutions of my affiliated professional bodies; and
- I realise that a false declaration is an offence in terms of regulation 71 of the Regulations and is punishable in terms of section 24F of the NEMA.

Disclosure of Vested Interest

I do not have and will not have any vested interest (either business, financial, personal or other) in the proposed activity proceeding other than remuneration for work performed in terms of the Regulations.

PALAEONTOLOGICAL CONSULTANT:

CONTACT PERSON:

Banzai Environmental (Pty) Ltd

Elize Butler

Tel: +27 844478759

Email: elizebutler002@gmail.com

SIGNATURE:

A handwritten signature in black ink that reads "Elize Butler". The signature is written in a cursive style with a large initial 'E' and 'B'.

The heritage impact assessment report has been compiled considering the National Environmental Management Act 1998 (NEMA) and Environmental Impact Regulations 2014 as amended, requirements for specialist reports, Appendix 6, as indicated in the table below.

Table 1: NEMA Table

Requirements of Appendix 6 – GN R326 EIA Regulations of 7 April 2017	Relevant section in report	Comment where not applicable.
1.(1) (a) (i) Details of the specialist who prepared the report	Page ii and Section 2 of Report – Contact details and company and Appendix A	-
(ii) The expertise of that person to compile a specialist report including a curriculum vita	Section 2 – refer to Appendix A	-
(b) A declaration that the person is independent in a form as may be specified by the competent authority	Page ii of the report	-
(c) An indication of the scope of, and the purpose for which, the report was prepared	Section 4 – Objective	-
(cA) An indication of the quality and age of base data used for the specialist report	Section 5 – Geological and Palaeontological history	-
(cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	Section 9	-
(d) The duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment	Section 1 and 10	
(e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used	Section 7 Approach and Methodology	-
(f) details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives;	Section 1 and 10	
(g) An identification of any areas to be avoided, including buffers	Section 1 and 10	
(h) A map superimposing the activity including the associated structures and infrastructure on the	Section 5 – Geological and	

Requirements of Appendix 6 – GN R326 EIA Regulations of 7 April 2017	Relevant section in report	Comment where not applicable.
environmental sensitivities of the site including areas to be avoided, including buffers;	Palaeontological history	
(i) A description of any assumptions made and any uncertainties or gaps in knowledge;	Section 7.1 – Assumptions and Limitation	-
(j) A description of the findings and potential implications of such findings on the impact of the proposed activity, including identified alternatives, on the environment	Section 1 and 10	
(k) Any mitigation measures for inclusion in the EMPr	None	
(l) Any conditions for inclusion in the environmental authorisation	None	
(m) Any monitoring requirements for inclusion in the EMPr or environmental authorisation	None	
(n)(i) A reasoned opinion as to whether the proposed activity, activities or portions thereof should be authorised and	Section 1 and 10	
(n)(iA) A reasoned opinion regarding the acceptability of the proposed activity or activities; and		
(n)(ii) If the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan	Section 1 and 10	-
(o) A description of any consultation process that was undertaken during the course of carrying out the study	N/A	Not applicable. A public consultation process will be conducted as part of the EIA and EMPr process.
(p) A summary and copies if any comments that were received during any consultation process	N/A	
(q) Any other information requested by the competent authority.		Not applicable.

Requirements of Appendix 6 – GN R326 EIA Regulations of 7 April 2017	Relevant section in report	Comment where not applicable.
(2) Where a government notice by the Minister provides for any protocol or minimum information requirement to be applied to a specialist report, the requirements as indicated in such notice will apply.	Section 3 compliance with SAHRA guidelines	

EXECUTIVE SUMMARY

Banzai Environmental was appointed by UBIQUE Heritage Consultants to conduct the Palaeontological Desktop Assessment to assess the proposed vineyard development on Plot 106, ZF MGCAWU District Municipality, KAI !GARIB Local Municipality, near Kakamas in the Northern Cape. To comply with the National Heritage Resources Act (No 25 of 1999, section 38) (NHRA), this Palaeontological Impact Assessment is necessary to confirm if fossil material is present in the planned development and to evaluate the impact of the proposed development on the Palaeontological Heritage.

The development footprint is underlain by the ancient Precambrian basement rocks of the Namaqua-Natal Province, mantled by sediments of the Gordonia Formation (Kalahari Group). A low Palaeontological Significance has been allocated to the proposed development as the Palaeontological Sensitivity of the Gordonia Formation is low, while that of the ancient Precambrian basement rocks are zero. These rocks are approximately one to two billion years old and completely unfossiliferous. It is therefore recommended that no further palaeontological heritage studies, ground-truthing and/or specialist mitigation are required pending the discovery of newly discovered fossils.

If fossil remains are discovered during any phase of construction, either on the surface or below, the ECO in charge of these developments must be alerted immediately. These discoveries should be protected (if possible, *in situ*), and the ECO must report to SAHRA so that appropriate mitigation can be carried out by a professional palaeontologist. SAHRA Contact details: South African Heritage Resources Agency, 111 Harrington Street, PO Box 4637, Cape Town 8000, South Africa. Email: Phone: +27 (0)21 462 4502. Fax: +27 (0)21 462 4509 Web: www.sahra.org.za)

Preceding any collection of fossil material, the specialist would need to apply for a collection permit from SAHRA. Fossil material must be housed in an approved collection (museum or university) and all fieldwork and reports should meet the minimum standards for palaeontological impact studies developed by SAHRA.

TABLE OF CONTENT

1 INTRODUCTION 1

2 QUALIFICATIONS AND EXPERIENCE OF THE AUTHOR 6

3 LEGISLATION..... 6

3.1 National Heritage Resources Act (25 of 1999) 6

4 OBJECTIVE..... 7

5 GEOLOGICAL AND PALAEONTOLOGICAL HISTORY 8

6 GEOGRAPHICAL LOCATION OF THE SITE 2

7 METHODS 2

7.1 Assumptions and Limitations 2

8 ADDITIONAL INFORMATION CONSULTED..... 3

9 IMPACT ASSESSMENT METHODOLOGY..... 3

9.1 Summary of Impact Tables 7

10 FINDINGS AND RECOMMENDATIONS 7

11 REFERENCES 8

List of Figures

Figure 1: Locality Map 3

Figure 2: Project Layout 4

Figure 3: Topographical Map of the proposed development..... 5

Figure 4: Extract of the 1:250 000 2820 Upington Geological Map (Council of Geoscience, Pretoria) indicating the locality of the proposed vineyard near Kakamas in the Northern Cape. Legend: White with yellow dashes (Qg) - Gordonia Formation of the Kalahari Group and outcrops of the Riemvasmaak granite-gneiss (pink, Mrm) and Omdraai Formation (Mo) (Biesjespoort Group) of the Namaqua-Natal Metamorphic Province..... 10

Figure 5: Extract of the 1 in 250 000 SAHRIS PalaeoMap map (Council of Geosciences) indicating the location of the proposed development 1

List of Tables

Table 1: NEMA Table iv

Table 2: Technical Information 1

Table 3: Legend to Map and surrounding geology (Modified from the 1:250 000 2820 Upington Geological Map (1988) (Council for Geosciences, Pretoria)..... 1

Table 4: The Rating System..... 4

Appendix A: CV

» **INTRODUCTION**

The owner of Bakenrant Boerdery (Mr Frans Burger) proposes the development of a vineyard on Plot 106 Bakenrant near Kakamas in the Northern Cape (Figure 1-3). The proposed development is currently utilised as Agriculture/grazing.

Table 2: Technical Information

PROJECT PARTICULARS

Technical information

Project description	
Project name	HIA for the proposed agricultural development on Plot 106 Bakenrant
Description	Proposed vineyard development on Plot 106 Bakanrant near Kakamas
Developer	
Bakenrant Boerdery Mr. Frans Burger	
Development type	Agriculture
Landowner	
Contact information	Office: 054-451 8293
Consultants	
Environmental	Eco Balance
Heritage and archaeological	UBIQUE Heritage Consultants
Paleontological	Banzai Environmental
Property details	
Province	Northern Cape
District municipality	ZF MGCAWU
Local municipality	KAI !GARIB
Topo-cadastral map	1:50 000 2820CB
Farm name	Plot 106 Bakenrant
Closest town	Kakamas
GPS Co-ordinates	28° 37' 18.6" South 20° 27' 49.5" East
Property size	140ha
Development footprint size	64,7ha
Land use	
Previous	Agriculture/grazing
Current	Agriculture/grazing
Rezoning required	Yes

Sub-division of land	No
Development criteria in terms of Section 38(1) NHRA	
Yes/No	
Construction of a road, wall, power line, pipeline, canal or other linear forms of development or barrier exceeding 300m in length.	Yes
Construction of bridge or similar structure exceeding 50m in length.	No
Construction exceeding 5000m ² .	Yes
Development involving three or more existing erven or subdivisions.	No
Development involving three or more erven or divisions that have been consolidated within the past five years.	No
Rezoning of site exceeding 10 000m ² .	Yes
Any other development category, public open space, squares, parks, recreation grounds.	No

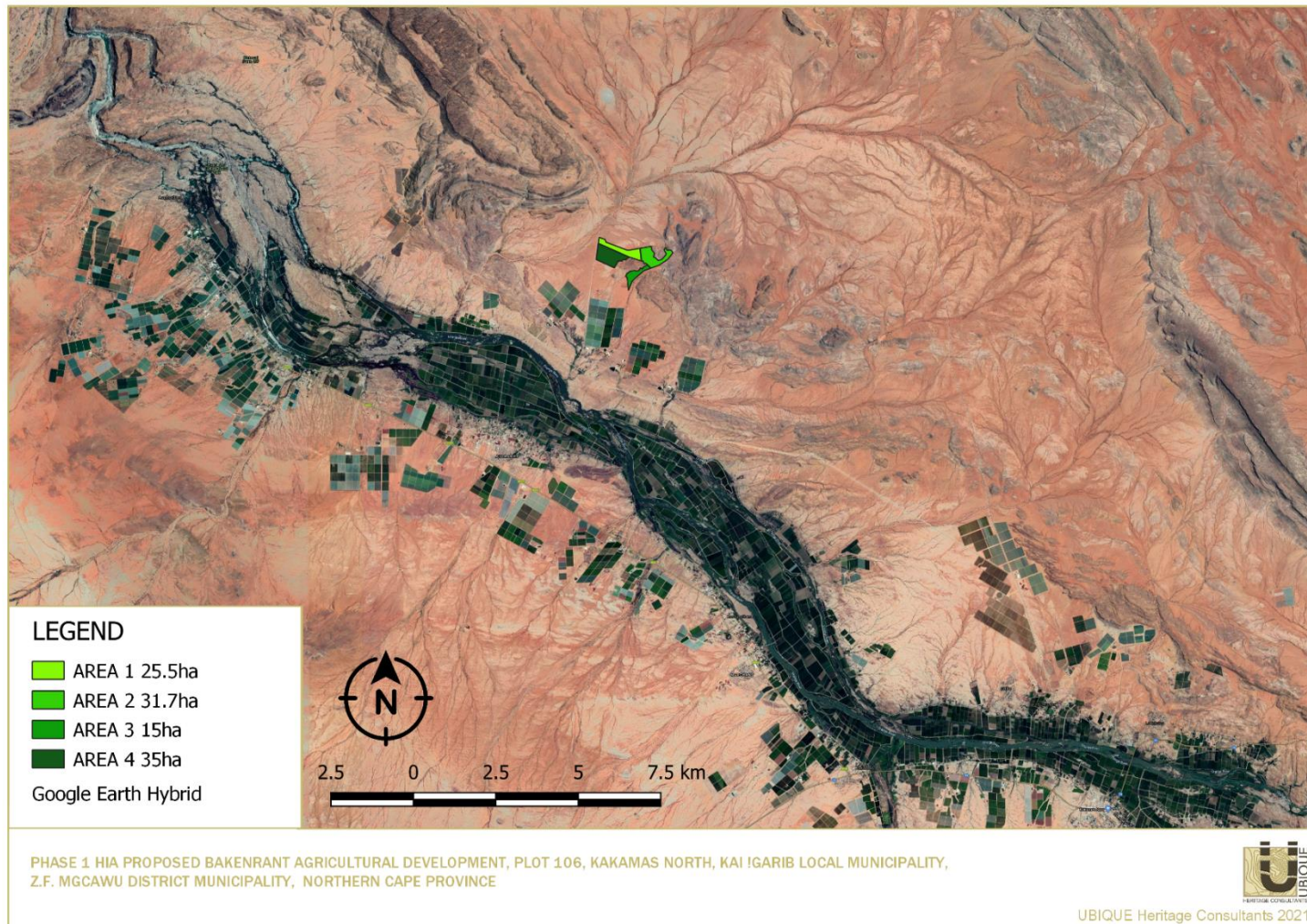


Figure 10:Locality Map.

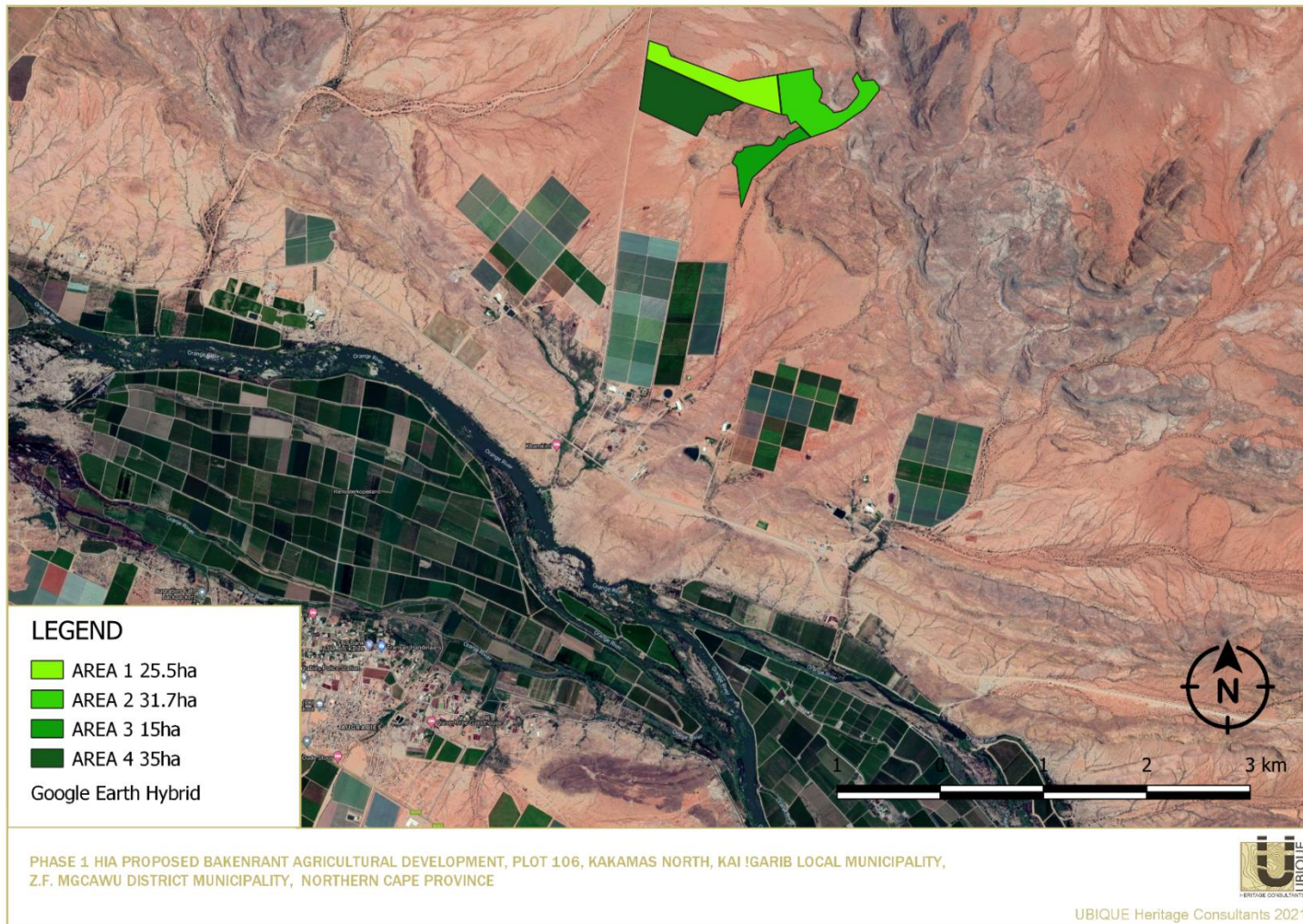


Figure 11: Project Layout.

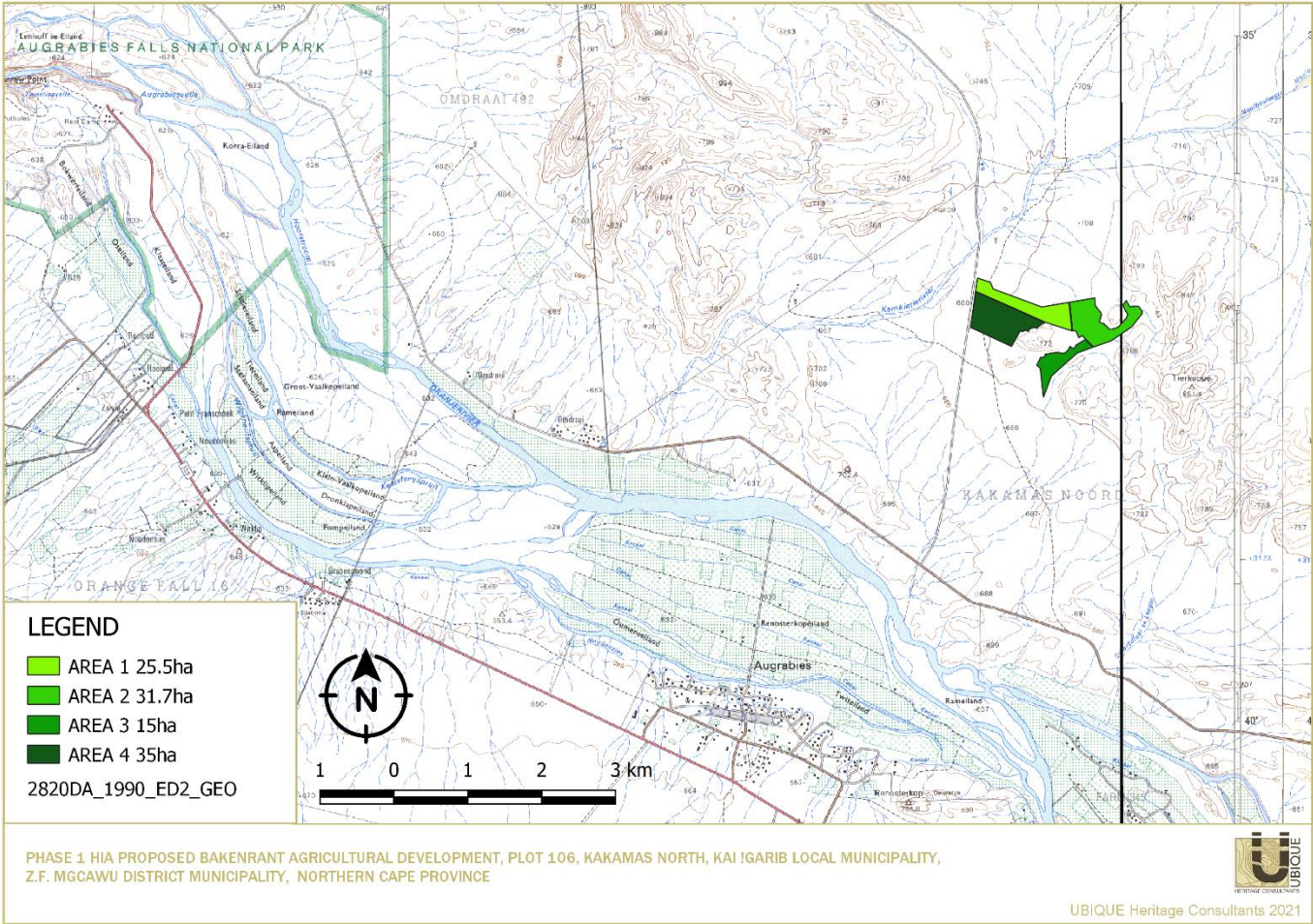


Figure 12: Topographical Map of the proposed development.

» QUALIFICATIONS AND EXPERIENCE OF THE AUTHOR

This present study has been conducted by Mrs Elize Butler. She has conducted approximately 300 palaeontological impact assessments for developments in the Free State, KwaZulu-Natal, Eastern, Central, and Northern Cape, Northwest, Gauteng, Limpopo, and Mpumalanga. She has an MSc (*cum laude*) in Zoology (specialising in Palaeontology) from the University of the Free State, South Africa and has been working in Palaeontology for more than twenty-five years. She has experience in locating, collecting, and curating fossils, including exploration field trips in search of new localities in the Karoo Basin. She has been a member of the Palaeontological Society of South Africa (PSSA) since 2006 and has been conducting PIAs since 2014.

» LEGISLATION

○ National Heritage Resources Act (25 of 1999)

Cultural Heritage in South Africa, includes all heritage resources, is protected by the National Heritage Resources Act (Act 25 of 1999) (NHRA). Heritage resources as defined in Section 3 of the Act include **“all objects recovered from the soil or waters of South Africa, including archaeological and palaeontological objects and material, meteorites and rare geological specimens”**.

Palaeontological heritage is unique and non-renewable and is protected by the NHRA. Palaeontological resources may not be unearthed, broken moved, or destroyed by any development without prior assessment and without a permit from the relevant heritage resources authority as per section 35 of the NHRA.

This Palaeontological Impact Assessment forms part of the Heritage Impact Assessment (HIA) and adhere to the conditions of the Act. According to **Section 38 (1)**, a HIA is required to assess any potential impacts to palaeontological heritage within the development footprint where:

- the construction of a road, wall, power line, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length;
- the construction of a bridge or similar structure exceeding 50m in length;
- any development or other activity which will change the character of a site—
 - a. (exceeding 5 000 m² in extent; or
 - b. involving three or more existing erven or subdivisions thereof; or
 - c. involving three or more erven or divisions thereof which have been consolidated within the past five years; or
 - d. the costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority

- e. the re-zoning of a site exceeding 10 000m² in extent;
or any other category of development provided for in regulations by SAHRA or a Provincial heritage resources authority.

» **OBJECTIVE**

The objective of a Palaeontological Impact Assessment (PIA) is to determine the impact of the development on potential palaeontological material at the site.

According to the “SAHRA APM Guidelines: Minimum Standards for the Archaeological and Palaeontological Components of Impact Assessment Reports” the aims of the PIA are: 1) to **identify** the palaeontological status of the exposed as well as rock formations just below the surface in the development footprint 2) to estimate the **palaeontological importance** of the formations 3) to determine the **impact** on fossil heritage; and 4) to recommend how the developer ought to protect or mitigate damage to fossil heritage.

The terms of reference of a PIA are as follows:

General Requirements:

Adherence to the content requirements for specialist reports in accordance with Appendix 6 of the EIA Regulations 2014, as amended.

Adherence to all applicable best practice recommendations, appropriate legislation and authority requirements.

Submit a comprehensive overview of all appropriate legislation, guidelines.

Description of the proposed project and provide information regarding the developer and consultant who commissioned the study.

Description and location of the proposed development and provide geological and topographical maps.

Provide Palaeontological and geological history of the affected area;

Identification sensitive areas to be avoided (providing shapefiles/kmls) in the proposed development.

Evaluation of the significance of the planned development during the Pre-construction, Construction, Operation, Decommissioning Phases and Cumulative impacts. Potential impacts should be rated in terms of the direct, indirect and cumulative:

- f. **Direct impacts** are impacts that are caused directly by the activity and generally occur at the same time and at the place of the activity.
- g. **Indirect impacts** of an activity are indirect or induced changes that may occur as a result of the activity.

- h. Cumulative impacts** are impacts that result from the incremental impact of the proposed activity on a common resource when added to the impacts of other past, present or reasonably foreseeable future activities.

Fair assessment of alternatives (infrastructure alternatives have been provided).

Recommend mitigation measures to minimise the impact of the proposed development; and

Implications of specialist findings for the proposed development (such as permits, licenses etc).

» **GEOLOGICAL AND PALAEOONTOLOGICAL HISTORY**

The proposed development of a vineyard on Plot 106 Bakenrant near Kakamas in the Northern Cape is depicted on the 1:250 000 2820 Upington Geological Map (1988) (Council of Geoscience). The development is underlain by the Gordonia Formation of the Kalahari Group, outcrops of the Riemvasmaak granite-gneiss (pink, Mrm) and Omdraai Formation (blue, Mo) (Biesjespoort Group) of the Namaqua-Natal Metamorphic Province (Figure 4). The Riemvasmaak granite-gneiss and Omdraai Formation (Namaqua-Natal Metamorphic Province) is Mid Proterozoic/Mokolian in age (Cornell et al. 2006, Moen 2007). These rocks are about one to two billion years old and totally unfossiliferous (Almond & Pether 2008). The entire development is probably mantled by red-brown, wind-blown sand and dunes of the Gordonia Formation (Kalahari Group).

The youngest formation of the Kalahari group is the Gordonia Formation which is generally termed Kalahari sand and comprises of red aeolian sands that covers most of the Kalahari Group sediments. The pan sediments of the area originated from the Gordonia Formation and contains white to brown fine-grained silts, sands and clays. Some of the pans consist of clayey material mixed with evaporates that shows seasonal effects of shallow saline groundwaters. Quaternary alluvium, aeolian sands, surface limestone, silcrete, and terrace gravels are also included in the Kalahari Group (Kent 1980). The Cenozoic sands and calcretes of the Kalahari Group range in thickness from a few metres to more than 180m (Partridge et al., 2006).

Partridge *et al.*, (2006) describes numerous types of superficial deposits of Late Cenozoic (Miocene to Pliocene to Recent) age throughout the Karoo Basin. Sands and gravel in the development footprint has a possible fluvial origin. These fossils represent terrestrial plants and animals with a close resemblance to living forms. Fossil assemblages include bivalves, diatoms, gastropod shells, ostracods and trace fossils. The palaeontology of the Quaternary superficial deposits has been relatively neglected in the past. Late Cenozoic calcrete may comprise of bones, horn cores as well as mammalian teeth. Tortoise remains have also been uncovered as well as trace fossils which includes termite and insect's burrows and mammalian trackways. Amphibian and crocodile remains have been uncovered where the depositional settings in the past were wetter.

Almond and Pether 2008 allocated a low significance to the Kalahari Group because fossil assemblages are generally rare and low in diversity and occur over a wide-ranging geographic area. In the past palaeontologists did not focus on Cenozoic superficial deposits although they sometimes comprise of significant fossil biotas.

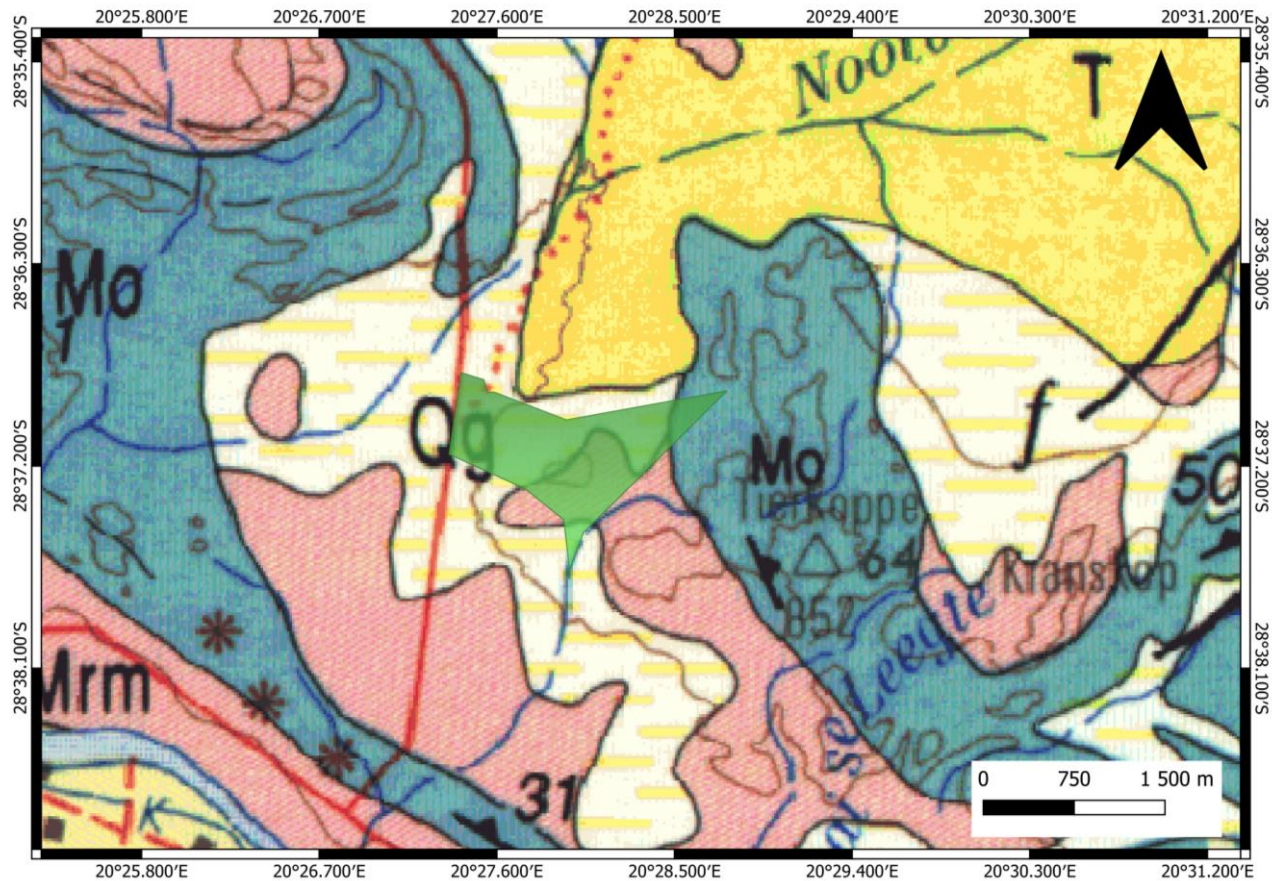


Figure 13: Extract of the 1:250 000 2820 Upington Geological Map (Council of Geoscience, Pretoria) indicating the locality of the proposed vineyard near Kakamas in the Northern Cape. Legend: White with yellow dashes (Qg) - Gordonia Formation of the Kalahari Group and outcrops of the Riemvasmaak granite-gneiss (pink, Mrm) and Omdraai Formation (Mo) (Biesjespoort Group) of the Namaqua-Natal Metamorphic Province.

Legend to 1:250 000 2820 Uptington Geological Map

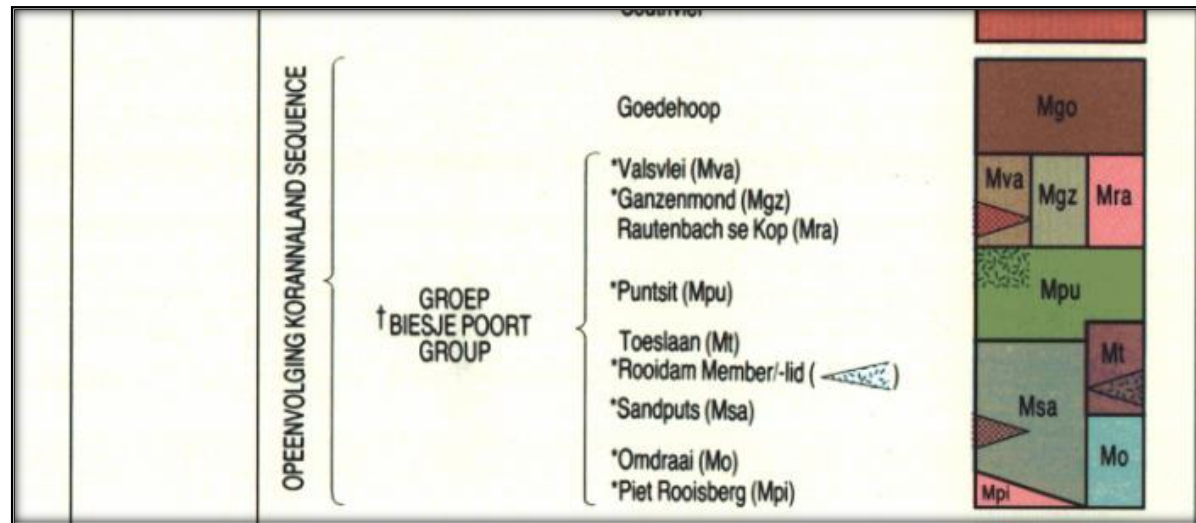
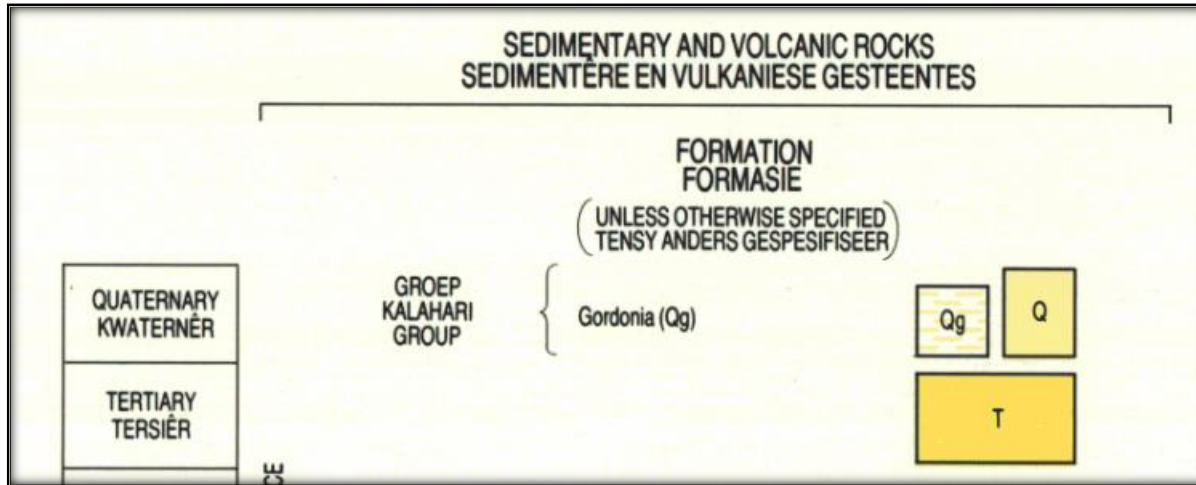



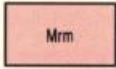


Table 3: Legend to Map and surrounding geology (Modified from the 1:250 000 2820 Upington Geological Map (1988) (Council for Geosciences, Pretoria).

Symbol	Lithology	Stratigraphy	Age
	Red-brown, wind-blown sand and dunes	Gordonia Formation, Kalahari Group	Quaternary
	Calcrete		Tertiary
	Leucocratic, quartz-microcline gneiss, amphibole gneiss, quartzite	Omdraai Formation (Mo) of the Biesjespoort Group	Mokolian and older
	Pink-weathering granite gneiss with a granular or augen texture	Riemvasmaak granite gneiss	

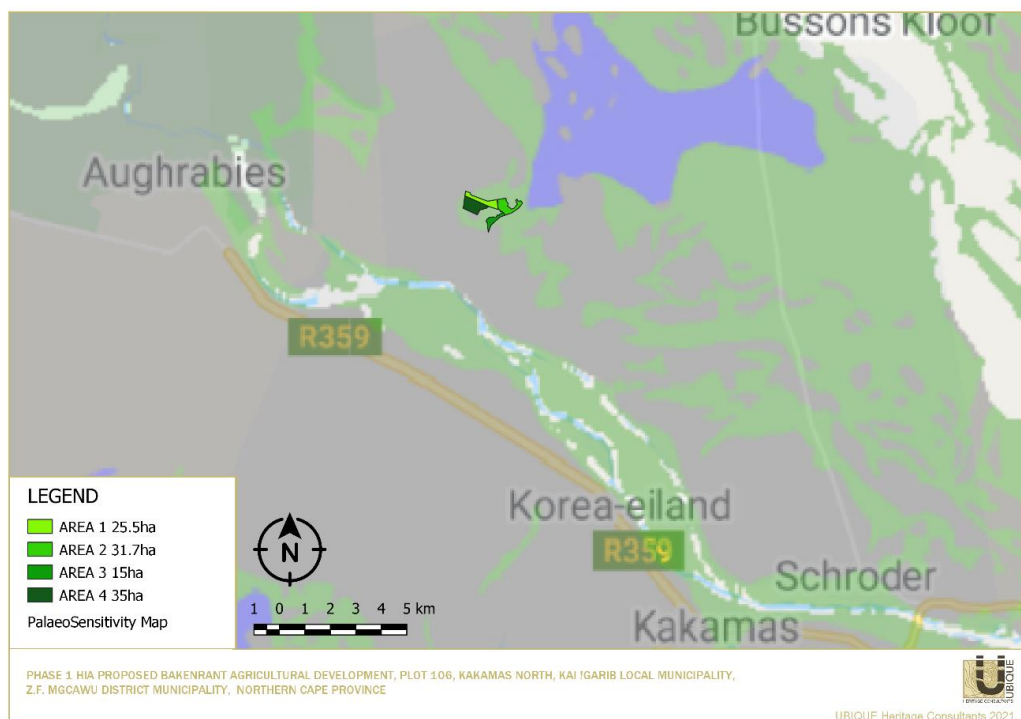


Figure 14: Extract of the 1 in 250 000 SAHRIS PalaeoMap map (Council of Geosciences) indicating the location of the proposed development.

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.

According to the SAHRIS palaeo sensitivity map (Figure 4) there is a moderate chance in the green area to find fossils.

» **GEOGRAPHICAL LOCATION OF THE SITE**

The GPS coordinates of the proposed development is 28°37' 18.6" S 20° 27' 49.5"E (Figure 1-3) and the development footprint will be 64,7ha in extent.

» **METHODS**

The aim of a desktop study is to evaluate the risk to palaeontological heritage in the proposed development. This include all trace fossils and fossils. All available information is consulted to compile a desktop study and includes: Palaeontological Impact Assessment reports in the same area; aerial photos and Google Earth images, topographical as well as geological maps.

○ **Assumptions and Limitations**

The focal point of geological maps is the geology of the area and the sheet explanations were not meant to focus on palaeontological heritage. Many inaccessible regions of South Africa have never been reviewed by palaeontologists and data is generally based on aerial photographs alone. Locality and geological information of museums and universities databases have not been kept up to date or data collected in the past have not always been accurately documented.

Comparable Assemblage Zones in other areas is sourced to provide information on the existence of fossils in an area which was not documented in the past. When using similar Assemblage Zones and geological formations for Desktop studies it is generally **assumed** that exposed fossil heritage is present within the footprint. **A field-assessment will thus improve the accuracy of the desktop assessment.**

» **ADDITIONAL INFORMATION CONSULTED**

In compiling this report the following sources were consulted:

Geological map 1:100 000, Geology of the Republic of South Africa (Visser 1984),
1: 250 000 2820 Upington (1988) Geological map (Council of Geoscience, Pretoria),
A Google Earth map with polygons of the proposed development was obtained from Unique Heritage Consultants.

» **IMPACT ASSESSMENT METHODOLOGY**

Impact assessment must take account of the nature, scale and duration of impacts on the environment whether such impacts are positive or negative. Each impact is also assessed according to the following project phases:

- Construction;
- Operation; and
- Decommissioning.

Where necessary, the proposal for mitigation or optimisation of an impact should be detailed. A brief discussion of the impact and the rationale behind the assessment of its significance should also be included. The rating system is applied to the potential impacts on the receiving environment and includes an objective evaluation of the mitigation of the impact. In assessing the significance of each impact, the following criteria is used:

Table 4: The Rating System-

NATURE		
The Nature of the Impact is the possible destruction of fossil heritage		
GEOGRAPHICAL EXTENT		
This is defined as the area over which the impact will be experienced.		
1	Site	The impact will only affect the site.
2	Local/district	Will affect the local area or district.
3	Province/region	Will affect the entire province or region.
4	International and National	Will affect the entire country.
PROBABILITY		
This describes the chance of occurrence of an impact.		
1	Unlikely	The chance of the impact occurring is extremely low (Less than a 25% chance of occurrence).
2	Possible	The impact may occur (Between a 25% to 50% chance of occurrence).
3	Probable	The impact will likely occur (Between a 50% to 75% chance of occurrence).
4	Definite	Impact will certainly occur (Greater than a 75% chance of occurrence).
DURATION		
This describes the duration of the impacts. Duration indicates the lifetime of the impact as a result of the proposed activity.		
1	Short term	The impact will either disappear with mitigation or will be mitigated through natural processes in a span shorter than the construction phase (0 – 1 years), or the impact will last for the period of a relatively short construction period and a limited recovery time after construction, thereafter it will be entirely negated (0 – 2 years).
2	Medium term	The impact will continue or last for some time after the construction phase but will be mitigated by direct human action or by natural processes thereafter (2 – 10 years).
3	Long term	The impact and its effects will continue or last for the entire operational life of the development, but will be mitigated by direct human action or by natural processes thereafter (10 – 30 years).

4	Permanent	The only class of impact that will be non-transitory. Mitigation either by man or natural process will not occur in such a way or such a time span that the impact can be considered indefinite.
INTENSITY/ MAGNITUDE		
Describes the severity of an impact.		
1	Low	Impact affects the quality, use and integrity of the system/component in a way that is barely perceptible.
2	Medium	Impact alters the quality, use and integrity of the system/component but system/component still continues to function in a moderately modified way and maintains general integrity (some impact on integrity).
3	High	Impact affects the continued viability of the system/component and the quality, use, integrity and functionality of the system or component is severely impaired and may temporarily cease. High costs of rehabilitation and remediation.
4	Very high	Impact affects the continued viability of the system/component and the quality, use, integrity and functionality of the system or component permanently ceases and is irreversibly impaired. Rehabilitation and remediation often impossible. If possible rehabilitation and remediation often unfeasible due to extremely high costs of rehabilitation and remediation.
REVERSIBILITY		
This describes the degree to which an impact can be successfully reversed upon completion of the proposed activity.		
1	Completely reversible	The impact is reversible with implementation of minor mitigation measures.
2	Partly reversible	The impact is partly reversible but more intense mitigation measures are required.
3	Barely reversible	The impact is unlikely to be reversed even with intense mitigation measures.
4	Irreversible	The impact is irreversible and no mitigation measures exist.
IRREPLACEABLE LOSS OF RESOURCES		
This describes the degree to which resources will be irreplaceably lost as a result of a proposed activity.		
1	No loss of resource	The impact will not result in the loss of any resources.

2	Marginal loss of resource	The impact will result in marginal loss of resources.
3	Significant loss of resources	The impact will result in significant loss of resources.
4	Complete loss of resources	The impact is result in a complete loss of all resources.
CUMULATIVE EFFECT		
This describes the cumulative effect of the impacts. A cumulative impact is an effect which in itself may not be significant but may become significant if added to other existing or potential impacts emanating from other similar or diverse activities as a result of the project activity in question.		
1	Negligible cumulative impact	The impact would result in negligible to no cumulative effects.
2	Low cumulative impact	The impact would result in insignificant cumulative effects.
3	Medium cumulative impact	The impact would result in minor cumulative effects.
4	High cumulative impact	The impact would result in significant cumulative effects
SIGNIFICANCE		
Significance is determined through a synthesis of impact characteristics. Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. The calculation of the significance of an impact uses the following formula: (Extent + probability + reversibility + irreplaceability + duration + cumulative effect) x magnitude/intensity. The summation of the different criteria will produce a non-weighted value. By multiplying this value with the magnitude/intensity, the resultant value acquires a weighted characteristic which can be measured and assigned a significance rating.		
Points	Impact significance rating	Description
6 to 28	Negative low impact	The anticipated impact will have negligible negative effects and will require little to no mitigation.
6 to 28	Positive low impact	The anticipated impact will have minor positive effects.
29 to 50	Negative medium impact	The anticipated impact will have moderate negative effects and will require moderate mitigation measures.
29 to 50	Positive medium impact	The anticipated impact will have moderate positive effects.
51 to 73	Negative high impact	The anticipated impact will have significant effects and will require significant mitigation measures to achieve an acceptable level of impact.
51 to 73	Positive high impact	The anticipated impact will have significant positive effects.
74 to 96	Negative very high impact	The anticipated impact will have highly significant effects and are unlikely to be able to be mitigated adequately. These impacts could be considered "fatal flaws".

74 to 96	Positive very high impact	The anticipated impact will have highly significant positive
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(Extent (1) + probability (2) + reversibility (4) + irreplaceability (4) + duration (4) + cumulative effect) (1) x magnitude/intensity (1) = 16

- **Summary of Impact Tables**

Loss of fossil heritage will be a negative impact. Only the site will be affected by the proposed development. The expected duration of the impact is assessed as potentially permanent to long term. In the absence of mitigation procedures, the damage or destruction of any palaeontological materials will be permanent. Impacts on palaeontological heritage during the construction phase could potentially occur and are regarded as having a negatable probability. The magnitude of the impact on the fossil heritage will be low. The significance of the impact occurring will be low.

» **FINDINGS AND RECOMMENDATIONS**

The development footprint is underlain by the ancient Precambrian basement rocks of the Namaqua-Natal Province, mantled by sediments of the Gordonia Formation (Kalahari Group). A low Palaeontological Significance has been allocated to the proposed development as the Palaeontological Sensitivity of the Gordonia Formation is low, while that of the ancient Precambrian basement rocks are zero. These rocks are approximately one to two billion years old and entirely unfossiliferous. It is consequently recommended that no further palaeontological heritage studies, ground-truthing and/or specialist mitigation are required pending the discovery of newly discovered fossils. It is considered that the development of the proposed development is deemed appropriate and feasible and will not lead to detrimental impacts on the palaeontological resources of the area.

If fossil remains are discovered during any phase of construction, either on the surface or below, the ECO in charge of these developments must be alerted immediately. These discoveries should be protected (if possible, *in situ*), and the ECO must report to SAHRA so that appropriate mitigation can be carried out by a professional palaeontologist. SAHRA Contact details: South African Heritage Resources Agency, 111 Harrington Street, PO Box 4637, Cape Town 8000, South Africa. Email: Phone: +27 (0)21 462 4502. Fax: +27 (0)21 462 4509 Web: www.sahra.org.za)

Preceding any collection of fossil material, the specialist would need to apply for a collection permit from SAHRA. Fossil material must be housed in an approved collection (museum or university) and all fieldwork and reports should meet the minimum standards for palaeontological impact studies developed by SAHRA.

» REFERENCES

- ALMOND, J., PETHER, J, and GROENEWALD, G. 2013. South African National Fossil Sensitivity Map. SAHRA and Council for Geosciences.
- COLE, DI 2005. Catalogue of South African Lithostratigraphic Units 8: 33-36.
- CORNELL, DH et al. 2006. The Namaqua-Natal Province. In: Johnson, M.R., Anhaeusser, C.R. & Thomas, R.J. (Eds.) The geology of South Africa, pp 325-379. Geological Society of South Africa, Johannesburg & Council for Geoscience, Pretoria.
- DE WIT, MCJ, MARSHALL, TR & PARTRIDGE, TC 2000. Fluvial deposits and drainage evolution. In: Partridge, T.C. & Maud, R.R. (Eds.) The Cenozoic of southern Africa, pp.55-72. Oxford University Press, Oxford.
- DINGLE, RV, SIESSER, WG & NEWTON, AR 1983. Mesozoic and Tertiary geology of southern Africa. viii + 375 pp. Balkema, Rotterdam.
- HADDON, IG 2000. Kalahari Group sediments. In: Partridge, T.C. & Maud, R.R. (Eds.) The Cenozoic of southern Africa, pp. 173-181. Oxford University Press, Oxford.
- KLEIN, RG 1984. The large mammals of southern Africa: Late Pliocene to Recent. In: Klein, R.G. (Ed.) Southern African prehistory and paleoenvironments, pp 107-146. Balkema, Rotterdam.
- MOEN, HFG 2007. The geology of the Upington area. Explanation to 1: 250 000 geology Sheet 2820 Upington, 160 pp. Council for Geoscience, Pretoria
- PARTRIDGE, TC, BOTHA, GA & HADDON, IG 2006. Cenozoic deposits of the interior. In: Johnson, M.R., Anhaeusser, C.R. & Thomas, R.J. (Eds.) The geology of South Africa, pp. 585-604. Geological Society of South Africa, Marshalltown.
- SG 2.2 SAHRA APMHOB Guidelines, 2012. Minimum standards for palaeontological components of Heritage Impact Assessment Reports, Pp 1-15.

Appendix A – Elize Butler CV

Butler, E. 2014. Palaeontological Impact Assessment of the proposed development of private dwellings on portion 5 of farm 304 Matjesfontein Keurboomstrand, Knysna District, Western Cape Province. Bloemfontein.

Butler, E. 2014. Palaeontological Impact Assessment for the proposed upgrade of existing water supply infrastructure at Noupoort, Northern Cape Province. 2014. Bloemfontein.

Butler, E. 2015. Palaeontological impact assessment of the proposed consolidation, re-division and development of 250 serviced erven in Nieu-Bethesda, Camdeboo local municipality, Eastern Cape. Bloemfontein.

Butler, E. 2015. Palaeontological impact assessment of the proposed mixed land developments at Rooikraal 454, Vrede, Free State. Bloemfontein.

Butler, E. 2015. Palaeontological exemption report of the proposed truck stop development at Palmiet 585, Vrede, Free State. Bloemfontein.

Butler, E. 2015. Palaeontological impact assessment of the proposed Orange Grove 3500 residential development, Buffalo City Metropolitan Municipality East London, Eastern Cape. Bloemfontein.

Butler, E. 2015. Palaeontological Impact Assessment of the proposed Gonubie residential development, Buffalo City Metropolitan Municipality East London, Eastern Cape Province. Bloemfontein.

Butler, E. 2015. Palaeontological Impact Assessment of the proposed Ficksburg raw water pipeline. Bloemfontein.

Butler, E. 2015. Palaeontological Heritage Impact Assessment report on the establishment of the 65 mw Majuba Solar Photovoltaic facility and associated infrastructure on portion 1, 2 and 6 of the farm Witkoppies 81 HS, Mpumalanga Province. Bloemfontein.

Butler, E. 2015. Palaeontological Impact Assessment of the proposed township establishment on the remainder of portion 6 and 7 of the farm Sunnyside 2620, Bloemfontein, Mangaung metropolitan municipality, Free State, Bloemfontein.

Butler, E. 2015. Palaeontological Impact Assessment of the proposed Woodhouse 1 photovoltaic solar energy facilities and associated infrastructure on the farm Woodhouse729, near Vryburg, North West Province. Bloemfontein.

Butler, E. 2015. Palaeontological Impact Assessment of the proposed Woodhouse 2 photovoltaic solar energy facilities and associated infrastructure on the farm Woodhouse 729, near Vryburg, North West Province. Bloemfontein.

Butler, E. 2015. Palaeontological Impact Assessment of the proposed Orkney solar energy farm and associated infrastructure on the remaining extent of Portions 7 and 21 of the farm Wolvehuis 114, near Orkney, North West Province. Bloemfontein.

Butler, E. 2015. Palaeontological Impact Assessment of the proposed Spectra foods broiler houses and abattoir on the farm Maiden Manor 170 and Ashby Manor 171, Lukhanji Municipality, Queenstown, Eastern Cape Province. Bloemfontein.

Butler, E. 2016. Palaeontological Impact Assessment of the proposed construction of the 150 MW Noupoot concentrated solar power facility and associated infrastructure on portion 1 and 4 of the farm Carolus Poort 167 and the remainder of Farm 207, near Noupoot, Northern Cape. Prepared for Savannah Environmental. Bloemfontein.

Butler, E. 2016. Palaeontological Impact Assessment of the proposed Woodhouse 1 Photovoltaic Solar Energy facility and associated infrastructure on the farm Woodhouse 729, near Vryburg, North West Province. Bloemfontein.

Butler, E. 2016. Palaeontological Impact Assessment of the proposed Woodhouse 2 Photovoltaic Solar Energy facility and associated infrastructure on the farm Woodhouse 729, near Vryburg, North West Province. Bloemfontein.

Butler, E. 2016. Proposed 132kV overhead power line and switchyard station for the authorised Solis Power 1 CSP project near Upington, Northern Cape. Bloemfontein.

Butler, E. 2016. Palaeontological Impact Assessment of of the proposed Senqu Pedestrian Bridges in Ward 5 of Senqu Local Municipality, Eastern Cape Province. Bloemfontein.

Butler, E. 2016. Recommendation from further Palaeontological Studies: Proposed Construction of the Modderfontein Filling Station on Erf 28 Portion 30, Founders Hill, City Of Johannesburg, Gauteng Province. Bloemfontein.

Butler, E. 2016. Recommendation from further Palaeontological Studies: Proposed Construction of the Modikwa Filling Station on a Portion of Portion 2 of Mooihoek 255 Kt, Greater Tubatse Local Municipality, Limpopo Province. Bloemfontein.

Butler, E. 2016. Recommendation from further Palaeontological Studies: Proposed Construction of the Heidedal filling station on Erf 16603, Heidedal Extension 24, Mangaung Local Municipality, Bloemfontein, Free State Province. Bloemfontein.

Butler, E. 2016. Recommended Exemption from further Palaeontological studies: Proposed Construction of the Gunstfontein Switching Station, 132kv Overhead Power Line (Single Or Double Circuit) and ancillary infrastructure for the Gunstfontein Wind Farm Near Sutherland, Northern Cape Province. Savannah South Africa. Bloemfontein.

Butler, E. 2016. Palaeontological Impact Assessment of the proposed Galla Hills Quarry on the remainder of the farm Roode Krantz 203, in the Lukhanji Municipality, division of Queenstown, Eastern Cape Province. Bloemfontein.

Butler, E. 2016. Chris Hani District Municipality Cluster 9 water backlog project phases 3a and 3b: Palaeontology inspection at Tsomo WTW. Bloemfontein.

Butler, E. 2016. Palaeontological Impact Assessment of the proposed construction of the 150 MW Noupoot concentrated solar power facility and associated infrastructure on portion 1 and 4 of the farm Carolus Poort 167 and the remainder of Farm 207, near Noupoot, Northern Cape. Savannah South Africa. Bloemfontein.

Butler, E. 2016. Palaeontological Impact Assessment of the proposed upgrading of the main road MR450 (R335) from the Motherwell to Addo within the Nelson Mandela Bay Municipality and Sunday's river valley Local Municipality, Eastern Cape Province. Bloemfontein.

Butler, E. 2016. Palaeontological Impact Assessment construction of the proposed Metals Industrial Cluster and associated infrastructure near Kuruman, Northern Cape Province. Savannah South Africa. Bloemfontein.

Butler, E. 2016. Palaeontological Impact Assessment for the proposed construction of up to a 132kv power line and associated infrastructure for the proposed Kalkaar Solar Thermal Power Plant near Kimberley, Free State and Northern Cape Provinces. PGS Heritage. Bloemfontein.

Butler, E. 2016. Palaeontological Impact Assessment of the proposed development of two burrow pits (DR02625 and DR02614) in the Enoch Mgijima Municipality, Chris Hani District, Eastern Cape.

Butler, E. 2016. Ezibeleni waste Buy-Back Centre (near Queenstown), Enoch Mgijima Local Municipality, Eastern Cape. Bloemfontein.

Butler, E. 2016. Palaeontological Impact Assessment for the proposed construction of two 5 Mw Solar Photovoltaic Power Plants on Farm Wildebeestkuil 59 and Farm Leeuwbosch 44, Leeudoringstad, North West Province. Bloemfontein.

Butler, E. 2016. Palaeontological Impact Assessment for the proposed development of four Leeuwberg Wind farms and basic assessments for the associated grid connection near Loeriesfontein, Northern Cape Province. Bloemfontein.

Butler, E. 2016. Palaeontological impact assessment for the proposed Aggeneys south prospecting right project, Northern Cape Province. Bloemfontein.

Butler, E. 2016. Palaeontological impact assessment of the proposed Motuoane Ladysmith Exploration right application, Kwazulu Natal. Bloemfontein.

Butler, E. 2016. Palaeontological impact assessment for the proposed construction of two 5 MW solar photovoltaic power plants on farm Wildebeestkuil 59 and farm Leeuwbosch 44, Leeudoringstad, North West Province. Bloemfontein.

Butler, E. 2016: Palaeontological desktop assessment of the establishment of the proposed residential and mixed use development on the remainder of portion 7 and portion 898 of the farm Knopjeslaagte 385 Ir, located near Centurion within the Tshwane Metropolitan Municipality of Gauteng Province. Bloemfontein.

Butler, E. 2017. Palaeontological impact assessment for the proposed development of a new cemetery, near Kathu, Gamagara local municipality and John Taolo Gaetsewe district municipality, Northern Cape. Bloemfontein.

Butler, E. 2017. Palaeontological Impact Assessment Of The Proposed Development Of The New Open Cast Mining Operations On The Remaining Portions Of 6, 7, 8 And 10 Of The Farm Kwaggafontein 8 In The Carolina Magisterial District, Mpumalanga Province. Bloemfontein.

Butler, E. 2017. Palaeontological Desktop Assessment for the Proposed Development of a Wastewater Treatment Works at Lanseria, Gauteng Province. Bloemfontein.

Butler, E. 2017. Palaeontological Scoping Report for the Proposed Construction of a Warehouse and Associated Infrastructure at Perseverance in Port Elizabeth, Eastern Cape Province.

Butler, E. 2017. Palaeontological Desktop Assessment for the Proposed Establishment of a Diesel Farm and a Haul Road for the Tshipi Borwa mine Near Hotazel, In the John Taolo Gaetsewe District Municipality in the Northern Cape Province. Bloemfontein.

Butler, E. 2017. Palaeontological Desktop Assessment for the Proposed Changes to Operations at the UMK Mine near Hotazel, In the John Taolo Gaetsewe District Municipality in the Northern Cape Province. Bloemfontein.

Butler, E. 2017. Palaeontological Impact Assessment for the Development of the Proposed Ventersburg Project-An Underground Mining Operation near Ventersburg and Henneman, Free State Province. Bloemfontein.

Butler, E. 2017. Palaeontological desktop assessment of the proposed development of a 3000 MW combined cycle gas turbine (CCGT) in Richards Bay, Kwazulu-Natal. Bloemfontein.

Butler, E. 2017. Palaeontological Impact Assessment for the Development of the Proposed Revalidation of the lapsed General Plans for Elliotdale, Mbhashe Local Municipality. Bloemfontein.

Butler, E. 2017. Palaeontological assessment of the proposed development of a 3000 MW Combined Cycle Gas Turbine (CCGT) in Richards Bay, Kwazulu-Natal. Bloemfontein.

Butler, E. 2017. Palaeontological Impact Assessment of the proposed development of the new open cast mining operations on the remaining portions of 6, 7, 8 and 10 of the farm Kwaggafontein 8 10 in the Albert Luthuli Local Municipality, Gert Sibande District Municipality, Mpumalanga Province. Bloemfontein.

Butler, E. 2017. Palaeontological Impact Assessment of the proposed mining of the farm Zandvoort 10 in the Albert Luthuli Local Municipality, Gert Sibande District Municipality, Mpumalanga Province. Bloemfontein.

Butler, E. 2017. Palaeontological Desktop Assessment for the proposed Lanseria outfall sewer pipeline in Johannesburg, Gauteng Province. Bloemfontein.

Butler, E. 2017. Palaeontological Desktop Assessment of the proposed development of open pit mining at Pit 36W (New Pit) and 62E (Dishaba) Amandelbult Mine Complex, Thabazimbi, Limpopo Province. Bloemfontein.

Butler, E. 2017. Palaeontological impact assessment of the proposed development of the sport precinct and associated infrastructure at Merrifield Preparatory school and college, Amathole Municipality, East London. PGS Heritage. Bloemfontein.

Butler, E. 2017. Palaeontological impact assessment of the proposed construction of the Lehae training and fire station, Lenasia, Gauteng Province. Bloemfontein.

Butler, E. 2017. Palaeontological Desktop Assessment of the proposed development of the new open cast mining operations of the Impunzi mine in the Mpumalanga Province. Bloemfontein.

Butler, E. 2017. Palaeontological Desktop Assessment of the construction of the proposed Viljoenskroon Munic 132 KV line, Vierfontein substation and related projects. Bloemfontein.

Butler, E. 2017. Palaeontological Desktop Assessment of the proposed rehabilitation of 5 ownerless asbestos mines. Bloemfontein.

Butler, E. 2017. Palaeontological Desktop Assessment of the proposed development of the Lephale coal and power project, Lephale, Limpopo Province, Republic of South Africa. Bloemfontein.

Butler, E. 2017. Palaeontological Impact Assessment of the proposed construction of a 132KV powerline from the Tweespruit distribution substation (in the Mantsopa local municipality) to the Driedorp rural substation (within the Naledi local municipality), Free State province. Bloemfontein.

Butler, E. 2017. Palaeontological Desktop Assessment of the proposed development of the new coal-fired power plant and associated infrastructure near Makhado, Limpopo Province. Bloemfontein.

Butler, E. 2017. Palaeontological Impact Assessment of the proposed construction of a Photovoltaic Solar Power station near Collett substation, Middelburg, Eastern Cape. Bloemfontein.

Butler, E. 2017. Palaeontological Impact Assessment for the proposed township establishment of 2000 residential sites with supporting amenities on a portion of farm 826 in Botshabelo West, Mangaung Metro, Free State Province. Bloemfontein.

Butler, E. 2017. Palaeontological Desktop Assessment for the proposed prospecting right project without bulk sampling, in the Koa Valley, Northern Cape Province. Bloemfontein.

Butler, E. 2017. Palaeontological Desktop Assessment for the proposed Aroams prospecting right project, without bulk sampling, near Aggeneys, Northern Cape Province. Bloemfontein.

Butler, E. 2017. Palaeontological Impact Assessment of the proposed Belvior aggregate quarry II on portion 7 of the farm Maidenhead 169, Enoch Mgijima Municipality, division of Queenstown, Eastern Cape. Bloemfontein.

Butler, E. 2017. PIA site visit and report of the proposed Galla Hills Quarry on the remainder of the farm Roode Krantz 203, in the Lukhanji Municipality, division of Queenstown, Eastern Cape Province. Bloemfontein.

Butler, E. 2017. Palaeontological Impact Assessment of the proposed construction of Tina Falls Hydropower and associated power lines near Cumbu, Mthlontlo Local Municipality, Eastern Cape. Bloemfontein.

Butler, E. 2017. Palaeontological Desktop Assessment of the proposed construction of the Mangaung Gariep Water Augmentation Project. Bloemfontein.

Butler, E. 2017. Palaeontological Impact Assessment of the proposed Belvoir aggregate quarry II on portion 7 of the farm Maidenhead 169, Enoch Mgijima Municipality, division of Queenstown, Eastern Cape. Bloemfontein.

Butler, E. 2017. Palaeontological Impact Assessment of the proposed construction of the Melkspruit-Rouxville 132KV Power line. Bloemfontein.

Butler, E. 2017 Palaeontological Desktop Assessment of the proposed development of a railway siding on a portion of portion 41 of the farm Rustfontein 109 is, Govan Mbeki local municipality, Gert Sibande district municipality, Mpumalanga Province. Bloemfontein.

Butler, E. 2017. Palaeontological Impact Assessment of the proposed consolidation of the proposed Ilima Colliery in the Albert Luthuli local municipality, Gert Sibande District Municipality, Mpumalanga Province. Bloemfontein.

Butler, E. 2017. Palaeontological Desktop Assessment of the proposed extension of the Kareerand Tailings Storage Facility, associated borrow pits as well as a storm water drainage channel in the Vaal River near Stilfontein, North West Province. Bloemfontein.

Butler, E. 2017. Palaeontological Desktop Assessment of the proposed construction of a filling station and associated facilities on the Erf 6279, district municipality of John Taolo Gaetsewe District, Ga-Segonyana Local Municipality Northern Cape. Bloemfontein.

Butler, E. 2017. Palaeontological Desktop Assessment of the proposed of the Lephalale Coal and Power Project, Lephalale, Limpopo Province, Republic of South Africa. Bloemfontein.

Butler, E. 2017. Palaeontological Desktop Assessment of the proposed Overvaal Trust PV Facility, Buffelspoort, North West Province. Bloemfontein.

Butler, E. 2017. Palaeontological Impact Assessment of the proposed development of the H2 Energy Power Station and associated infrastructure on Portions 21; 22 And 23 of the farm Hartebeestspruit in the Thembisile Hani Local Municipality, Nkangala District near Kwamhlanga, Mpumalanga Province. Bloemfontein.

Butler, E. 2017. Palaeontological Impact Assessment of the proposed upgrade of the Sandriver Canal and Klippan Pump station in Welkom, Free State Province. Bloemfontein.

Butler, E. 2017. Palaeontological Impact Assessment of the proposed upgrade of the 132kv and 11kv power line into a dual circuit above ground power line feeding into the Urania substation in Welkom, Free State Province. Bloemfontein.

Butler, E. 2017. Palaeontological Desktop Assessment of the proposed Swaziland-Mozambique border patrol road and Mozambique barrier structure. Bloemfontein.

Butler, E. 2017. Palaeontological Impact Assessment of the proposed diamonds alluvial & diamonds general prospecting right application near Christiana on the remaining extent of portion 1 of the farm Kaffraria 314, registration division HO, North West Province. Bloemfontein.

Butler, E. 2017. Palaeontological Desktop Assessment for the proposed development of Wastewater Treatment Works on Hartebeesfontein, near Panbult, Mpumalanga. Bloemfontein.

Butler, E. 2017. Palaeontological Desktop Assessment for the proposed development of Wastewater Treatment Works on Rustplaas near Piet Retief, Mpumalanga. Bloemfontein.

Butler, E. 2018. Palaeontological Impact Assessment for the Proposed Landfill Site in Luckhoff, Letsemeng Local Municipality, Xhariep District, Free State. Bloemfontein.

Butler, E. 2018. Palaeontological Impact Assessment of the proposed development of the new Mutsho coal-fired power plant and associated infrastructure near Makhado, Limpopo Province. Bloemfontein.

Butler, E. 2018. Palaeontological Impact Assessment of the authorisation and amendment processes for Manangu mine near Delmas, Victor Khanye local municipality, Mpumalanga. Bloemfontein.

Butler, E. 2018. Palaeontological Desktop Assessment for the proposed Mashishing township establishment in Mashishing (Lydenburg), Mpumalanga Province. Bloemfontein.

Butler, E. 2018. Palaeontological Desktop Assessment for the Proposed Mlonzi Estate Development near Lusikisiki, Ngquza Hill Local Municipality, Eastern Cape. Bloemfontein.

Butler, E. 2018. Palaeontological Phase 1 Assessment of the proposed Swaziland-Mozambique border patrol road and Mozambique barrier structure. Bloemfontein.

Butler, E. 2018. Palaeontological Desktop Assessment for the proposed electricity expansion project and Sekgame Switching Station at the Sishen Mine, Northern Cape Province. Bloemfontein.

Butler, E. 2018. Palaeontological field assessment of the proposed construction of the Zonnebloem Switching Station (132/22kV) and two loop-in loop-out power lines (132kV) in the Mpumalanga Province. Bloemfontein.

Butler, E. 2018. Palaeontological Field Assessment for the proposed re-alignment and decommissioning of the Firham-Platrand 88kv Powerline, near Standerton, Lekwa Local Municipality, Mpumalanga province. Bloemfontein.

Butler, E. 2018. Palaeontological Desktop Assessment of the proposed Villa Rosa development In the Buffalo City Metropolitan Municipality, East London. Bloemfontein.

Butler, E. 2018. Palaeontological field Assessment of the proposed Villa Rosa development In the Buffalo City Metropolitan Municipality, East London. Bloemfontein.

Butler, E. 2018. Palaeontological desktop assessment of the proposed Mookodi – Mahikeng 400kV line, North West Province. Bloemfontein.

Butler, E. 2018. Palaeontological Desktop Assessment for the proposed Thornhill Housing Project, Ndlambe Municipality, Port Alfred, Eastern Cape Province. Bloemfontein.

Butler, E. 2018. Palaeontological desktop assessment of the proposed housing development on portion 237 of farm Hartebeestpoort 328. Bloemfontein.

Butler, E. 2018. Palaeontological desktop assessment of the proposed New Age Chicken layer facility located on holding 75 Endicott near Springs in Gauteng. Bloemfontein.

Butler, E. 2018 Palaeontological Desktop Assessment for the development of the proposed Leslie 1 Mining Project near Leandra, Mpumalanga Province. Bloemfontein.

Butler, E. 2018. Palaeontological field assessment of the proposed development of the Wildealskloof mixed use development near Bloemfontein, Free State Province. Bloemfontein.

Butler, E. 2018. Palaeontological Field Assessment of the proposed Megamor Extension, East London. Bloemfontein

Butler, E. 2018. Palaeontological Impact Assessment of the proposed diamonds Alluvial & Diamonds General Prospecting Right Application near Christiana on the Remaining Extent of Portion 1 of the Farm Kaffraria 314, Registration Division HO, North West Province. Bloemfontein.

Butler, E. 2018. Palaeontological Impact Assessment of the proposed construction of a new 11kV (1.3km) Power Line to supply electricity to a cell tower on farm 215 near Delportshoop in the Northern Cape. Bloemfontein.

Butler, E. 2018. Palaeontological Field Assessment of the proposed construction of a new 22 kV single wood pole structure power line to the proposed MTN tower, near Britstown, Northern Cape Province. Bloemfontein.

Butler, E. 2018. Palaeontological Exemption Letter for the proposed reclamation and reprocessing of the City Deep Dumps in Johannesburg, Gauteng Province. Bloemfontein.

Butler, E. 2018. Palaeontological Exemption letter for the proposed reclamation and reprocessing of the City Deep Dumps and Rooikraal Tailings Facility in Johannesburg, Gauteng Province. Bloemfontein.

Butler, E. 2018. Proposed Kalabasfontein Mine Extension project, near Bethal, Govan Mbeki District Municipality, Mpumalanga. Bloemfontein.

Butler, E. 2018. Palaeontological Desktop Assessment for the development of the proposed Leslie 1 Mining Project near Leandra, Mpumalanga Province. Bloemfontein.

- Butler, E.** 2018. Palaeontological Desktop Assessment of the proposed Mookodi – Mahikeng 400kV Line, North West Province. Bloemfontein.
- Butler, E.** 2018. Environmental Impact Assessment (EIA) for the Proposed 325mw Rondekop Wind Energy Facility between Matjiesfontein And Sutherland In The Northern Cape Province.
- Butler, E.** 2018. Palaeontological Impact Assessment of the proposed construction of the Tooverberg Wind Energy Facility, and associated grid connection near Touws River in the Western Cape Province. Bloemfontein.
- Butler, E.** 2018. Palaeontological impact assessment of the proposed Kalabasfontein Mining Right Application, near Bethal, Mpumalanga.
- E. Butler.** 2019. Palaeontological Desktop Assessment of the proposed Westrand Strengthening Project Phase II.
- E. Butler.** 2019. Palaeontological Field Assessment for the proposed Sirius 3 Photovoltaic Solar Energy Facility near Upington, Northern Cape Province
- E. Butler.** 2019. Palaeontological Field Assessment for the proposed Sirius 4 Photovoltaic Solar Energy Facility near Upington, Northern Cape Province
- E. Butler.** 2019. Palaeontological Field Assessment for Heuningspruit PV 1 Solar Energy Facility near Koppies, Ngwathe Local Municipality, Free State Province.
- E. Butler.** 2019. Palaeontological Field Assessment for the Moeding Solar Grid Connection, North West Province.
- E. Butler.** 2019. Recommended Exemption from further Palaeontological studies for the Proposed Agricultural Development on Farms 1763, 2372 And 2363, Kakamas South Settlement, Kai! Garib Municipality, Mgcawu District Municipality, Northern Cape Province.
- E. Butler. 2019.** Recommended Exemption from further Palaeontological studies: of Proposed Agricultural Development, Plot 1178, Kakamas South Settlement, Kai! Garib Municipality
- E. Butler. 2019.** Palaeontological Desktop Assessment for the Proposed Waste Rock Dump Project at Tshipi Borwa Mine, near Hotazel, Northern Cape Province:
- E. Butler. 2019.** Palaeontological Exemption Letter for the proposed DMS Upgrade Project at the Sishen Mine, Gamagara Local Municipality, Northern Cape Province
- E. Butler. 2019.** Palaeontological Desktop Assessment of the proposed Integrated Environmental Authorisation process for the proposed Der Brochen Amendment project, near Groblershoop, Limpopo
- E. Butler. 2019.** Palaeontological Desktop Assessment of the proposed updated Environmental Management Programme (EMPr) for the Assmang (Pty) Ltd Black Rock Mining Operations, Hotazel, Northern Cape
- E. Butler. 2019.** Palaeontological Desktop Assessment of the proposed Kriel Power Station Lime Plant Upgrade, Mpumalanga Province
- E. Butler. 2019.** Palaeontological Impact Assessment for the proposed Kangala Extension Project Near Delmas, Mpumalanga Province.
- E. Butler. 2019.** Palaeontological Desktop Assessment for the proposed construction of an iron/steel smelter at the Botshabelo Industrial area within the Mangaung Metropolitan Municipality, Free State Province.
- Palaeontological Desktop Assessment to assess the proposed vineyard development on Plot 106, Z.F. MGCWU District Municipality, KAI !GARIB Local Municipality, near Kakamas in the Northern Cape*

E. Butler. 2019. Recommended Exemption from further Palaeontological studies for the proposed agricultural development on farms 1763, 2372 and 2363, Kakamas South settlement, Kai! Garib Municipality, Mgcawu District Municipality, Northern Cape Province.

E. Butler. 2019. Recommended Exemption from further Palaeontological Studies for Proposed formalisation of Gamakor and Noodkamp low cost Housing Development, Keimoes, Gordonia Rd, Kai !Garib Local Municipality, ZF Mgcawu District Municipality, Northern Cape Province.

E. Butler. 2019. Recommended Exemption from further Palaeontological Studies for proposed formalisation of Blaauwskop Low Cost Housing Development, Kenhardt Road, Kai !Garib Local Municipality, ZF Mgcawu District Municipality, Northern Cape Province.

E. Butler. 2019. Palaeontological Desktop Assessment of the proposed mining permit application for the removal of diamonds alluvial and diamonds kimberlite near Windsorton on a certain portion of Farm Zoelen's Laagte 158, Registration Division: Barkly Wes, Northern Cape Province.

E. Butler. 2019. Palaeontological Desktop Assessment of the proposed Vedanta Housing Development, Pella Mission 39, Khâi-Ma Local Municipality, Namakwa District Municipality, Northern Cape.

E. Butler. 2019. Palaeontological Desktop Assessment for The Proposed 920 Kwp Groenheuwel Solar Plant Near Augrabies, Northern Cape Province

E. Butler. 2019. Palaeontological Desktop Assessment for the establishment of a Super Fines Storage Facility at Amandelbult Mine, Near Thabazimbi, Limpopo Province

E. Butler. 2019. Palaeontological Impact Assessment for the proposed Sace Lifex Project, Near Emalahleni, Mpumalanga Province

E. Butler. 2019. Palaeontological Desktop Assessment for the proposed Rehau Fort Jackson Warehouse Extension, East London

E. Butler. 2019. Palaeontological Desktop Assessment for the proposed Environmental Authorisation Amendment for moving 3 Km Of the Merensky-Kameni 132KV Powerline

E. Butler. 2019. Palaeontological Impact Assessment for the proposed Umsobomvu Solar PV Energy Facilities, Northern and Eastern Cape

E. Butler. 2019. Palaeontological Desktop Assessment for six proposed Black Mountain Mining Prospecting Right Applications, without Bulk Sampling, in the Northern Cape.

E. Butler. 2019. Palaeontological field Assessment of the Filling Station (Rietvlei Extension 6) on the Remaining Portion of Portion 1 of the Farm Witkoppies 393JR east of the Rietvleidam Nature Reserve, City of Tshwane, Gauteng

E. Butler. 2019. Palaeontological Desktop Assessment Of The Proposed Upgrade Of The Vaal Gamagara Regional Water Supply Scheme: Phase 2 And Groundwater Abstraction

E. Butler. 2019. Palaeontological Desktop Assessment Of The Expansion Of The Jan Kempdorp Cemetry On Portion 43 Of Farm Guldenskat 36-Hn, Northern Cape Province

E. Butler. 2019. Palaeontological Desktop Assessment of the Proposed Residential Development On Portion 42 Of Farm Geldunskat No 36 In Jan Kempdorp, Phokwane Local Municipality, Northern Cape Province

E. Butler. 2019. Palaeontological Impact Assessment of the proposed new Township Development, Lethabo Park, on Remainder of Farm Roodepan No 70, Erf 17725 And Erf 15089,

Palaeontological Desktop Assessment to assess the proposed vineyard development on Plot 106, Z.F. MGCWU District Municipality, KAI !GARIB Local Municipality, near Kakamas in the Northern Cape

Roodepan Kimberley, Sol Plaatjies Local Municipality, Frances Baard District Municipality, Northern Cape

E. Butler. 2019. Palaeontological Protocol for Finds for the proposed 16m WH Battery Storage System in Steinkopf, Northern Cape Province

E. Butler. 2019. Palaeontological Exemption Letter of the proposed 4.5WH Battery Storage System near Midway-Pofadder, Northern Cape Province

E. Butler. 2019. Palaeontological Exemption Letter of the proposed 2.5ml Process Water Reservoir at Gloria Mine, Black Rock, Hotazel, Northern Cape

E. Butler. 2019. Palaeontological Desktop Assessment for the Establishment of a Super Fines Storage Facility at Gloria Mine, Black Rock Mine Operations, Hotazel, Northern Cape:

E. Butler. 2019. Palaeontological Desktop Assessment for the Proposed New Railway Bridge, and Rail Line Between Hotazel And The Gloria Mine, Northern Cape Province

E. Butler. 2019. Palaeontological Exemption Letter Of The Proposed Mixed Use Commercial Development On Portion 17 Of Farm Boegoeberg Settlement Number 48, !Kheis Local Municipality In The Northern Cape Province

E. Butler. 2019. Palaeontological Desktop Assessment of the Proposed Diamond Mining Permit Application Near Kimberley, Sol Plaatjies Municipality, Northern Cape Province

E. Butler. 2019. Palaeontological Desktop Assessment of the Proposed Diamonds (Alluvial, General & In Kimberlite) Prospecting Right Application near Postmasburg, Registration Division; Hay, Northern Cape Province

E. Butler. 2019. Palaeontological Desktop Assessment of the proposed diamonds (alluvial, general & in kimberlite) prospecting right application near Kimberley, Northern Cape Province.

E. Butler. 2019. Palaeontological Phase 1 Impact Assessment of the proposed upgrade of the Vaal Gamagara regional water supply scheme: Phase 2 and groundwater abstraction

E. Butler. 2019. Palaeontological Desktop Assessment of the proposed seepage interception drains at Duvha Power Station, Emalahleni Municipality, Mpumalanga Province

E. Butler. 2019. Palaeontological Desktop Assessment letter for the Proposed PV Solar Facility at the Heineken Sedibeng Brewery, near Vereeniging, Gauteng.

E. Butler. 2019. Palaeontological Phase 1 Assessment letter for the Proposed PV Solar Facility at the Heineken Sedibeng Brewery, near Vereeniging, Gauteng.

E. Butler. 2019. Palaeontological field Assessment for the Proposed Upgrade of the Kolomela Mining Operations, Tsantsabane Local Municipality, Siyanda District Municipality, Northern Cape Province, Northern Cape

E. Butler. 2019. Palaeontological Desktop Assessment of the proposed feldspar prospecting rights and mining application on portion 4 and 5 of the farm Rozynen 104, Kakamas South, Kailash Municipality, Zf Mgcau District Municipality, Northern Cape

E. Butler. 2019. Palaeontological Phase 1 Field Assessment of the proposed Summerpride Residential Development and Associated Infrastructure on Erf 107, Buffalo City Municipality, East London.

E. Butler. 2019. Palaeontological Desktop Impact Assessment for the proposed re-commission of the Old Balgray Colliery near Dundee, Kwazulu Natal.

Palaeontological Desktop Assessment to assess the proposed vineyard development on Plot 106, Z.F. MGCAWU District Municipality, KAI !GARIB Local Municipality, near Kakamas in the Northern Cape

E. Butler. 2019. Palaeontological Phase 1 Impact Assessment for the Proposed Re-Commission of the Old Balgray Colliery near Dundee, Kwazulu Nata.l

E. Butler. 2019. Palaeontological Desktop Assessment for the Proposed Environmental Authorisation and Amendment Processes for Elandsfontein Colliery.

E. Butler. 2019. Palaeontological Impact Assessment and Protocol for Finds of a Proposed New Quarry on Portion 9 (of 6) of the farm Mimosa Glen 885, Bloemfontein, Free State Province

E. Butler. 2019. Palaeontological Impact Assessment and Protocol for Finds of a proposed development on Portion 9 and 10 of the Farm Mimosa Glen 885, Bloemfontein, Free State Province

E. Butler. 2019. Palaeontological Exemption Letter for the proposed residential development on the Remainder of Portion 1 of the Farm Strathearn 2154 in the Magisterial District of Bloemfontein, Free State

E. Butler. 2019. Palaeontological Field Assessment for the Proposed Nigel Gas Transmission Pipeline Project in the Nigel Area of the Ekurhuleni Metropolitan Municipality, Gauteng Province

E. Butler. 2019. Palaeontological Desktop Assessment for five Proposed Black Mountain Mining Prospecting Right Applications, Without Bulk Sampling, in the Northern Cape.

E. Butler. 2019. Palaeontological Desktop Assessment for the Proposed Environmental Authorisation and an Integrated Water Use Licence Application for the Reclamation of the Marievale Tailings Storage Facilities, Ekurhuleni Metropolitan Municipality - Gauteng Province.

E. Butler. 2019. Palaeontological Impact Assessment for the Proposed Sace Lifex Project, near Emalahleni, Mpumalanga Province.

E. Butler. 2019. Palaeontological Desktop Assessment for the proposed Golfview Colliery near Ermelo, Msukaligwa Local Municipality, Mpumalanga Province

E. Butler. 2019. Palaeontological Desktop Assessment for the Proposed Kangra Maquasa Block C Mining development near Piet Retief, in the Mkhondo Local Municipality within the Gert Sibande District Municipality

E. Butler. 2019. Palaeontological Desktop Assessment for the Proposed Amendment of the Kusipongo Underground and Opencast Coal Mine in Support of an Environmental Authorization and Waste Management License Application.

E. Butler. 2019. Palaeontological Exemption Letter of the Proposed Mamatwan Mine Section 24g Rectification Application, near Hotazel, Northern Cape Province

E. Butler. 2020. Palaeontological Field Assessment for the Proposed Environmental Authorisation and Amendment Processes for Elandsfontein Colliery

E. Butler. 2020. Palaeontological Desktop Assessment for the Proposed Extension of the South African Nuclear Energy Corporation (Necsa) Pipe Storage Facility, Madibeng Local Municipality, North West Province

E. Butler. 2020. Palaeontological Field Assessment for the Proposed Piggery on Portion 46 of the Farm Brakkefontien 416, Within the Nelson Mandela Bay Municipality, Eastern Cape

E. Butler. 2020. Palaeontological field Assessment for the proposed Rietfontein Housing Project as part of the Rapid Land Release Programme, Gauteng Province Department of Human Settlements, City of Johannesburg Metropolitan Municipality

E. Butler. 2020. Palaeontological Desktop Assessment for the Proposed Choje Wind Farm between Grahamstown and Somerset East, Eastern Cape

E. Butler. 2020. Palaeontological Desktop Assessment of the Proposed Prospecting Right Application for the Prospecting of Diamonds (Alluvial, General & In Kimberlite), Combined with A Waste License Application, Registration Division: Gordonia And Kenhardt, Northern Cape Province

E. Butler. 2020. Palaeontological Impact Assessment for the Proposed Clayville Truck Yard, Ablution Blocks and Wash Bay to be Situated on Portion 55 And 56 Of Erf 1015, Clayville X11, Ekurhuleni Metropolitan Municipality, Gauteng Province

E. Butler. 2020. Palaeontological Desktop Assessment for the Proposed Hartebeesthoek Residential Development

E. Butler. 2020. Palaeontological Desktop Assessment for the Proposed Mooiplaats Educational Facility, Gauteng Province

E. Butler. 2020. Palaeontological Impact Assessment for the Proposed Monument Park Student Housing Establishment

E. Butler. 2020. Palaeontological Field Assessment for the Proposed Standerton X10 Residential and Mixed-Use Developments, Lekwa Local Municipality Standerton, Mpumalanga Province

E. Butler. 2020. Palaeontological Field Assessment for the Rezoning and Subdivision of Portion 6 Of Farm 743, East London

E. Butler. 2020. Palaeontological Field Assessment for the Proposed Matla Power Station Reverse Osmosis Plant, Mpumalanga Province

**CONFERENCE CONTRIBUTIONS
NATIONAL**

PRESENTATION

Butler, E., Botha-Brink, J., and F. Abdala. A new gorgonopsian from the uppermost *Dicynodon Assemblage Zone*, Karoo Basin of South Africa. 18th the Biennial conference of the PSSA 2014. Wits, Johannesburg, South Africa.

INTERNATIONAL

Attended the Society of Vertebrate Palaeontology 73th Conference in Los Angeles, America. October 2012.

CONFERENCES: POSTER PRESENTATION

NATIONAL

Butler, E., and J. Botha-Brink. Cranial skeleton of *Galesaurus planiceps*, implications for biology and lifestyle. University of the Free State Seminar Day, Bloemfontein. South Africa. November 2007.

Butler, E., and J. Botha-Brink. Postcranial skeleton of *Galesaurus planiceps*, implications for biology and lifestyle. 14th Conference of the PSSA, Matjesfontein, South Africa. September 2008:

Butler, E., and J. Botha-Brink. The biology of the South African non-mammaliaform cynodont *Galesaurus planiceps*. 15th Conference of the PSSA, Howick, South Africa. August 2008.

INTERNATIONAL VISITS

Natural History Museum, London

July 2008

Paleontological Institute, Russian Academy of Science, Moscow

November 2014

