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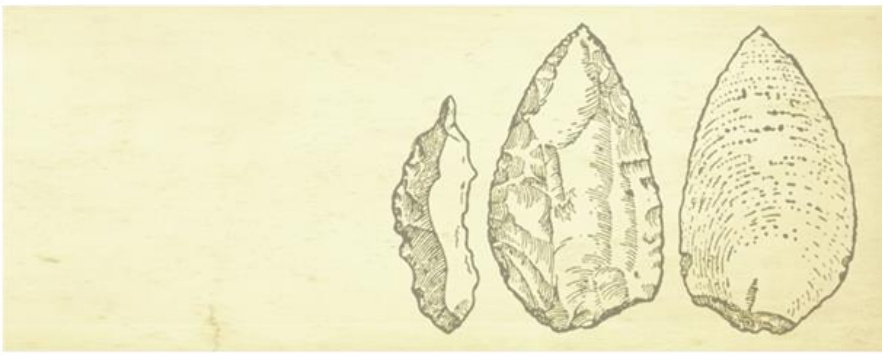

PHASE 1 HIA REPORT FELDSPAR MINING, FARM ROZYNEN BOSCH NO. 104, PORTIONS 4 AND 5, KAKAMAS SOUTH, NORTHERN CAPE

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.

PREPARED FOR:
ENVIROAFRICA

PREPARED BY:
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07 NOVEMBER 2019

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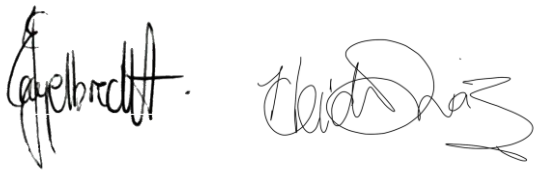
For this project, Mr Engelbrecht was responsible for the field survey of the development footprint, identification of heritage resources, and recommendations. Ms Fivaz was responsible for research and report compilation.

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: **Date: 2019-11-07**

J.A.C. Engelbrecht & H. Fivaz

UBIQUE Heritage Consultants

EXECUTIVE SUMMARY

Technical summary

Project description	
Project name	Feldspar mining on Portions 4 and 5 of Rozynen Bosch Farm No. 104, Kakamas South, Northern Cape
Description	Prospecting right and mining permit applications for feldspar stone.
Developer	
Witvlei Boerdery Trust	
Development type	Mining
Consultants	
Environmental	EnviroAfrica cc.
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 2920BB
Farm name	Rozynen Bosch No. 104
Closest town	Kakamas
GPS Co-ordinates	**29° 03' 27,8" S ; 20° 47' 41.0" E**
Development footprint size	50 ha

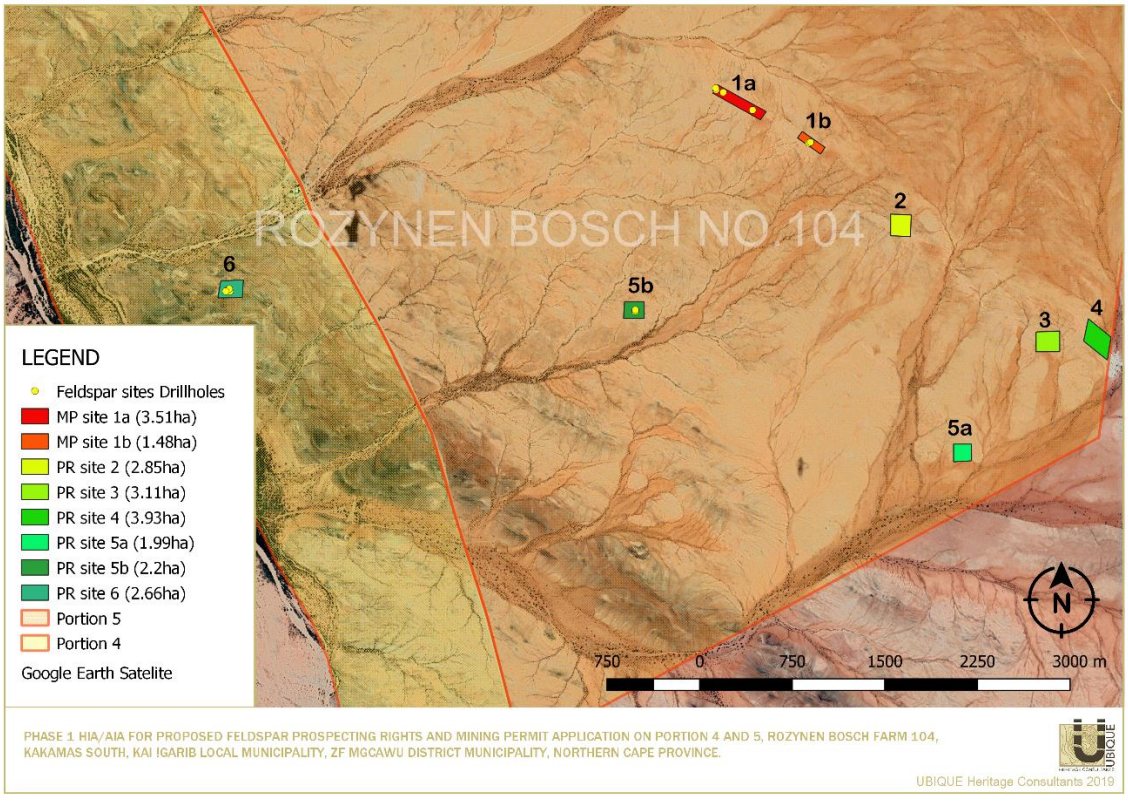


Figure 1 *Proposed feldspar mining, Rozynen Bosch No. 104, Portions 4 and 5, Kakamas South Settlement Kai !Garib Local Municipality. *MP= Mining Permit application site PR= Prospecting site*

Project description

UBIQUE Heritage Consultants were appointed by EnviroAfrica cc 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 prospecting and mining for feldspar on the Farm Rozynen Bosch No. 104 Portions 4 and 5, Kakamas South, on any sites, features, or objects of cultural heritage significance.

The project involves the applications for feldspar prospecting right and mining permits at six different site areas. These include:

- Site MP 1a (3.51 ha). The site has been mined previously. The mining permit application will be for the extension of existing mine.
- Site MP 1b (1.48 ha). A mining permit application will be made for this site.
- Site PR 2 (2.85 ha). Application for prospecting rights.
- Site PR 3 (3.11 ha). Application for prospecting rights.
- Site PR 4 (3.93 ha). Application for prospecting rights.
- Site PR 5a (1.99 ha). Application for prospecting rights.
- Site PR 5b (2.2 ha). After initial investigations yielded very poor feldspar deposits, the site will be excluded from the application and this HIA report.
- Site PR 6 (2.66 ha). After initial investigations yielded very poor feldspar deposits, the site will be excluded from the application and this HIA report.

The sites are located on the Farm Rozynen Bosch No. 104, situated about 35 km south-south-east of Kakamas and about 55 km north-west of Kenhardt in the Northern Cape Province.

Findings and Impact on Heritage Resources

Description	Development Impact		Mitigation	Field rating/ Significance
Archaeological				
1. No archaeological sites or material were identified within the mining footprint PR 4.	Nature	N/A	No mitigation required.	N/A
	Extent	N/A		
	Duration	N/A		
	Intensity	N/A		
	Potential of impact on irreplaceable resource	N/A		
	Consequence	N/A		
	Probability of impact	N/A		
	Significance	N/A		
2. A total of 12 incidences of archaeological material was recorded within and close to the mining footprints MP 1a, MP 1b, PR 2, PR 3, and PR 5a. These include surface scatters of lithic and historical artefacts.	Nature	Neutral	No mitigation required.	Field Rating IV C Low significance
	Extent	Low		
	Duration	Low		
	Intensity	Low		
	Potential of impact on irreplaceable resource	Low		
	Consequence	Low		
	Probability of impact	Low		
	Significance	Low		

Graves				
3. No formal or informal graves were identified.	Nature	N/A	No mitigation required.	N/A
	Extent	N/A		
	Duration	N/A		
	Intensity	N/A		
	Potential of impact on irreplaceable resource	N/A		
	Consequence	N/A		
	Probability of impact	N/A		
	Significance	N/A		
Paleontological				
4. Area of zero to low paleontological significance.	Nature	N/A	No mitigation required.	N/A
	Extent	N/A		
	Duration	N/A		
	Intensity	N/A		
	Potential of impact on irreplaceable resource	N/A		
	Consequence	N/A		
	Probability of impact	N/A		
	Significance	N/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 development footprint. No further mitigation is required. Therefore, from a heritage point of view, we recommend that the proposed mining development and permit applications can continue.

2. Due to the zero to 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 as the igneous rocks underlying the site are not fossiliferous. It is therefore recommended that the project be exempt from a full Paleontological Impact Assessment (Butler 2019).

3. 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 possible discovery of finds such as stone tool scatters, artefacts, human remains, or fossils are made, the operations must be stopped, and a qualified archaeologist must be contacted for an assessment of the find. UBIQUE Heritage Consultants and its personnel will not be held liable for such oversights or costs incurred as a result of such oversights.

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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

**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: 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;

- 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.

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 proposed application for prospecting rights and mining permits for feldspar on the Farm Rozynen Bosch No. 104 Portions 4 and 5, Kakamas South Settlement, in the Kai !Garib Local Municipality, Northern Cape. UBIQUE Heritage Consultants were appointed by EnviroAfrica cc 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 aim of the assessment is 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 both 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.

Although 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, 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:

- co-ordinate 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 development:**

- 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 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.

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 administrated by a local authority. Graves in the category located inside a formal cemetery administrated 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 co-operation 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 site of the proposed development. This entailed the scoping and scanning of historical texts/records as well as previous heritage studies and research around the study area.

By incorporating data from previous CRM reports done in the area and an archival search, the study area is contextualised. 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 from sources including those 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 sites of archaeological, historical or cultural interest, was completed.

UBIQUE Heritage Consultants inspected the proposed development and surrounding areas on the 9th of October 2019 and completed a controlled-exclusive, pre-planned, pedestrian 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 190 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	Any site, structure or feature regarded as important because of its age or uniqueness. Graves are always categorized as of a high importance. Likewise, any important object found within a specific context.

Heritage significance:

- Grade I	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	significance should be managed as part of the national estate
ii.	Provincial Grade II	significance should be managed as part of the provincial estate
iii.	Local Grade IIIA	should be included in the heritage register and not be mitigated (high significance)
iv.	Local Grade IIIB	should be included in the heritage register and may be mitigated (high/ medium significance)

v.	General protection A (IV A)	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.
Potential for impact on irreplaceable resources	Low	No irreplaceable resources will be impacted.
	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.

Criteria	Rating Scales	Notes
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 were 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 and cumulative impacts that the development of the proposed project 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 to protect, preserve, and develop 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 EnviroAfrica cc 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 feldspar prospecting and mining activities on the Farm Rozynen Bosch No. 104, Portions 4 and 5, Kakamas South, on any sites, features, or objects of cultural heritage significance.

The project involves the applications for feldspar prospecting right and mining permits at six different site areas, with a cumulative surface area of 21.73 ha. These include:

- Site MP 1a (3.51 ha). The site has been mined previously. The mining permit application will be for the extension of the existing mine.
- Site MP 1b (1.48 ha). A mining permit application will be made for this site.
- Site PR 2 (2.85 ha). Application for prospecting rights.
- Site PR 3 (3.11 ha). Application for prospecting rights.
- Site PR 4 (3.93 ha). Application for prospecting rights.
- Site PR 5a (1.99 ha). Application for prospecting rights.
- Site PR 5b (2.2 ha). After initial investigations yielded very poor feldspar deposits, the site will be excluded from the application and this HIA report.
- Site PR 6 (2.66 ha). After initial investigations yielded very poor feldspar deposits, the site will be excluded from the application and this HIA report.

The sites are situated about 35 km south-south-east of Kakamas and about 55 km north-west of Kenhardt in the Northern Cape Province.

4.1 Technical information

Project description	
Project name	Feldspar mining on Portions 4 and 5 of Rozynen Bosch Farm No. 104, Kakamas South, Northern Cape
Description	Prospecting right and mining permit applications for feldspar stone.
Developer	
Witvlei Boerdery Trust	
Contact information	Email: marie@isat.co.za
Development type	Mining
Landowner	
Witvlei Boerdery Trust	
Contact information	As above
Consultants	
Environmental	EnviroAfrica cc.
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 2920BB
Farm name	Rozynen Bosch No. 104
Closest town	Kakamas
GPS Co-ordinates	29° 03' 27,8" S; 20° 47' 41.0" E
Property size	4 000 ha
Development footprint size	50 ha
Land use	
Previous	Mining and agriculture
Current	Mining and agriculture
Rezoning required	No
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 form of development or barrier exceeding 300m in length.	No
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.	Yes
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}.	No
Any other development category, public open space, squares, parks, recreation grounds.	No

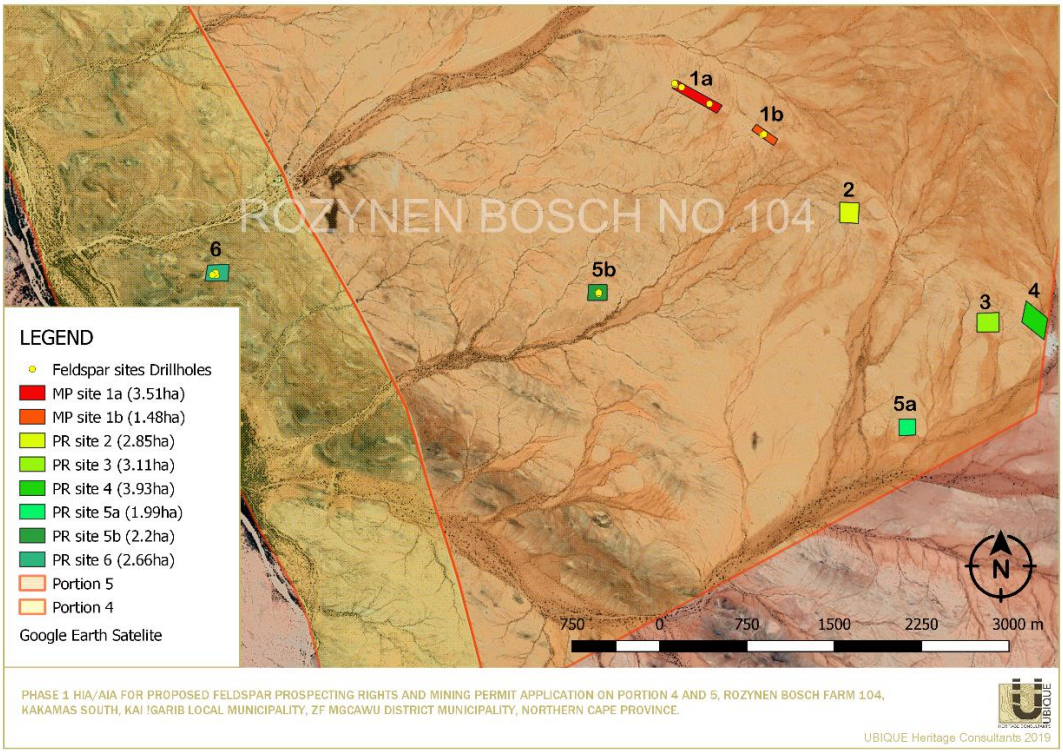


Figure 2 *Proposed feldspar mining, Rozynen Bosch No. 104, Portions 4 and 5, Kakamas South Settlement Kai !Garib Local Municipality. *MP= Mining Permit application site PR= Prospecting site*

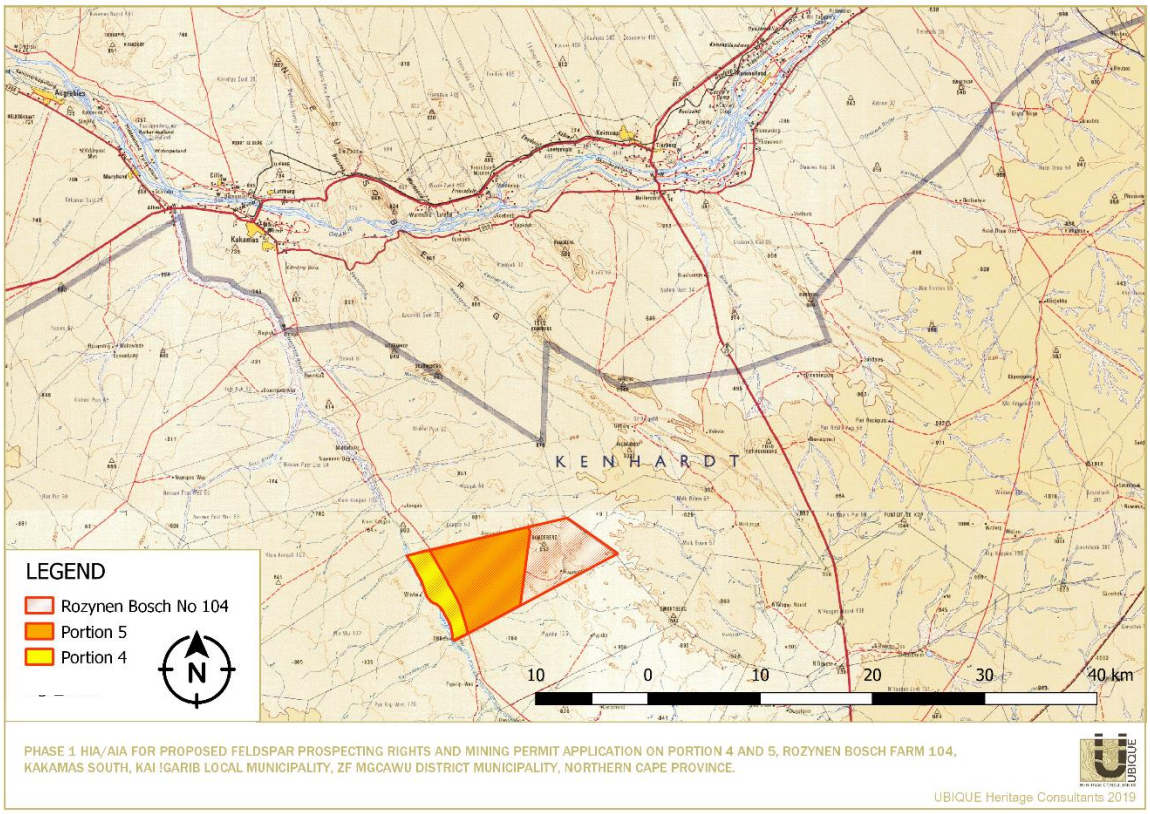


Figure 3 *Locality of the Farm Rozynen Bosch No. 104, Portions 4 and 5, Kakamas South, 1:250 000 Topo-cadastral map WGS2920, Chief Surveyor General.*

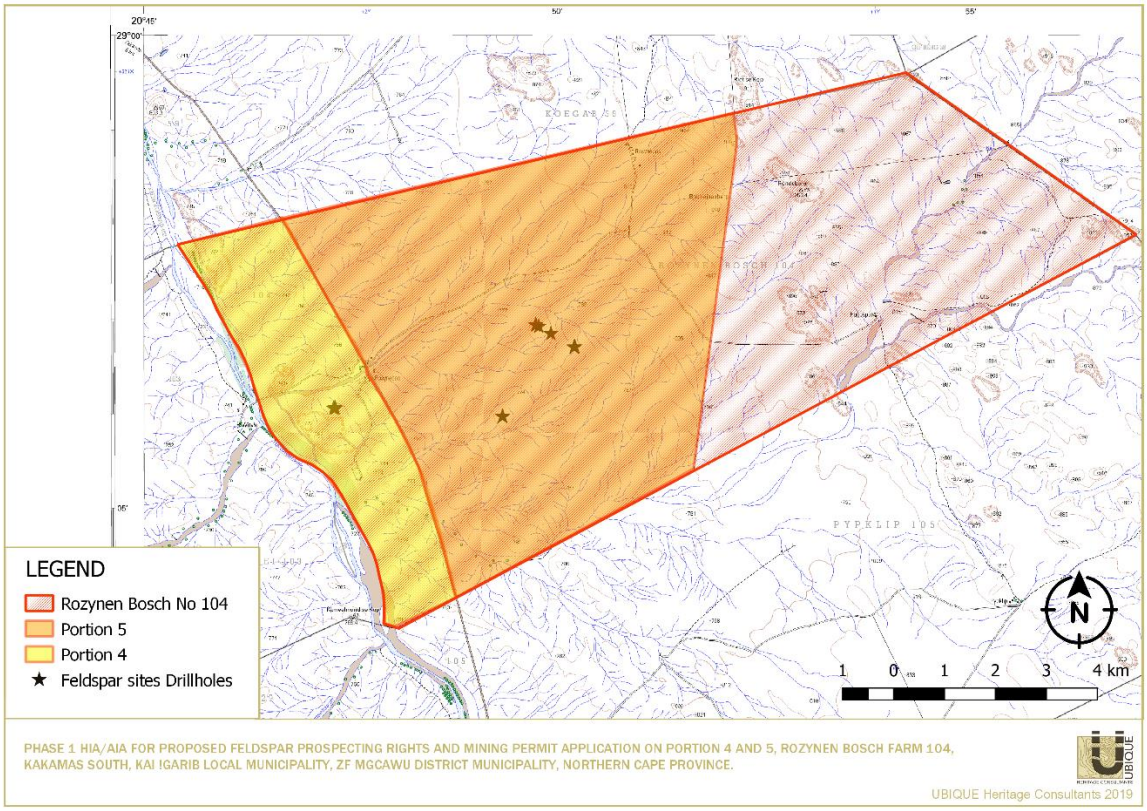


Figure 4 *Locality of the Farm Rozynen Bosch No. 104, Portions 4 and 5, Kakamas South, 1:50 000 Topo-cadastral map WGS2920BB, Chief Surveyor General.*

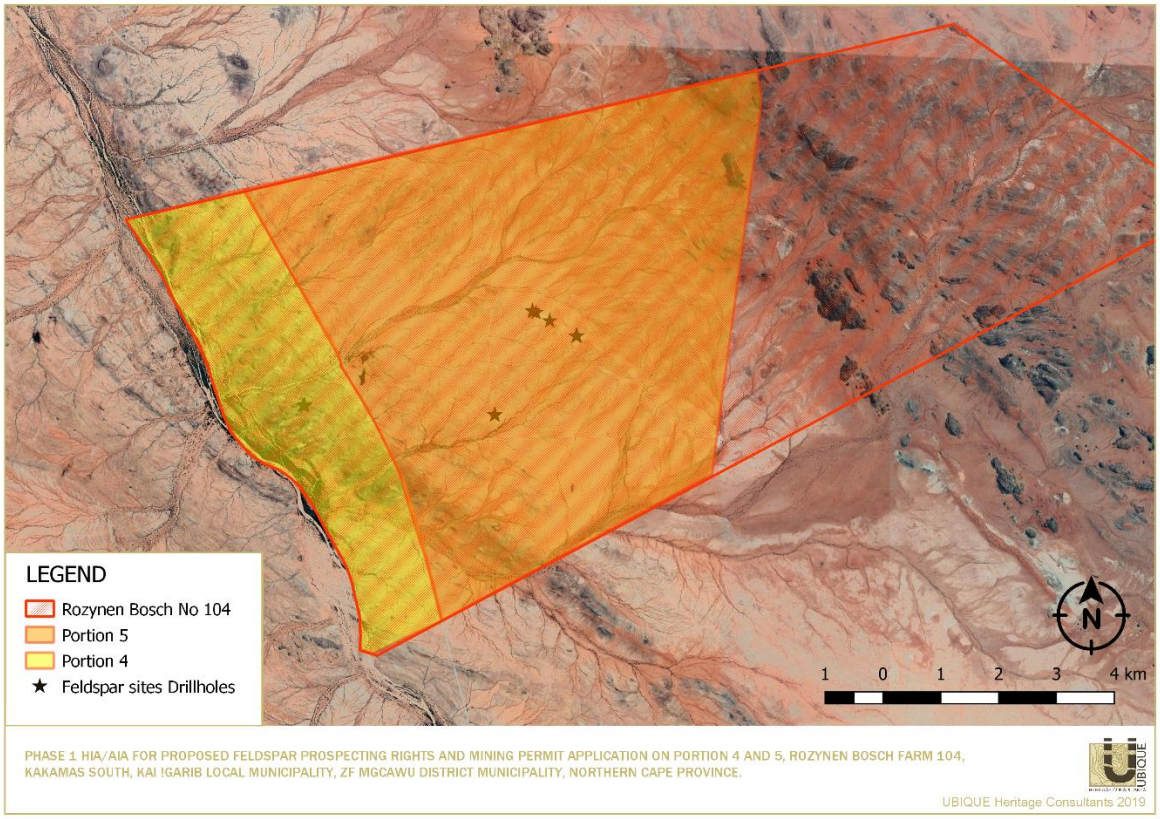


Figure 5 *Locality of the Farm Rozynen Bosch No. 104, Portions 4 and 5, Kakamas South, indicated on Google Earth Satellite imagery.*

4.2 Description of the affected environment

The Kai !Garib Local Municipality falls predominantly within the Nama-Karoo biome (Mucina & Rutherford 2006), and most of the vegetation type in the study area is typical Kalahari Karroid Shrubland interspersed with Arid Bushmanland Grassland. The landscape is characterised by flat plains with dwarf shrubs (*Salsola* sp.) and white grasses (*Stipagrostis* spp.). Karoo-related elements (shrubs) meet with northern floristic elements, indicating a transition to the Kalahari region and sandy soils (Mucina & Rutherford 2006). The landscape is characterised by flat sandy plains with intermittent rocky outcrops. There are quartzite and quartz gravel scattered on the footprint surface.

Water supply for the farm is retrieved from boreholes. There are several dry waterways or riverine crossing most of the sites from south to north and from west to east. There is minimal natural erosion across the site, as the area appears to be well-drained. Anthropogenic erosion occurs at and around existing mining sites 1A and 1B where deep excavations for feldspar are present. Close to sites 3 and 4, is another mined area.

The farm is bounded by the R365 secondary road towards the west, with a hilly area with dunes to the east, a dry riverine with dunes to the south, and a dry riverine and open veld to the north. The

site was accessed from the farmhouse to the west close to the R365 secondary road 29º 03' 27,8" South 20º 47' 41.0" East.






Figure 6 Views of the affected development area.

5. HISTORICAL AND ARCHAEOLOGICAL BACKGROUND

5.1 Region

The Northern Cape is rich in archaeological sites and landscapes that reflect the complex South African heritage from the Stone Age to Colonial history.

5.1.1 Stone Age

The Stone Age is the period in human history when lithic material was mainly used to produce tools (Coertze & Coertze 1996). In South Africa, the Stone Age can be divided into three periods. It is, however, important 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: >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.

Each of the sub-divisions is formed by a group of industries where the assemblages share attributes or common traditions (Lombard et al. 2012). Prominent sites that exemplify these periods in the Nama-Karoo Biome are Rooidam and Bundu Farm (Earlier Stone Age and Middle Stone Age), and Biesje Poort 2, Bokvasmaak 3, Melkboom 1, Vlermuisgat, and Jagtpan 7 (Later Stone Age) (Lombard et al. 2012).

Within the region, Stone Age sites and complexes have been, and are still being investigated in some detail. This includes, but are not limited to, the landscape near Kathu, where numerous Stone Age sites have been documented and excavated, representing the longest preserved lithostratigraphic and archaeological sequence of human occupation at the pan through the ESA, MSA, and LSA and with evidence for 500 000-year-old hafted stone points; ancient specularite working (and mining) on the eastern side of Postmasburg, Doornfontein; and associated Ceramic Later Stone Age material, and also the older transitional ESA/MSA Fauresmith sites at Lyly Feld, Demaneng, Mashwening, King, Rust & Vrede, Paling, Gloucester and Mount Huxley (Beaumont 2004; Beaumont 2013; Beaumont & Morris 1990; Beaumont & Vogel 2006; Morris 2005; Morris & Beaumont 2004; Porat et al. 2010; Thackeray et al. 1983; Walker et al. 2014; Wilkins et al. 2012).

Beaumont et al. (1995) commented that thousands of square kilometres of Bushmanland are covered by low-density lithic scatters. It is therefore not surprising that Stone Age sites and lithic scatters were identified by CRM practitioners between the Garona substation and the Gariep/Orange River in numerous surveys conducted during the recent years. Scatters of MSA material have been recorded close to Griekwastad, Hotazel. Postmasburg and Kenhardt, Pofadder, Marydale, and in the Upington district (Dreyer 2006, 2012, 2014; Pelser & Lombard 2013; PGS Heritage 2009, 2010; Webley 2013). MSA and LSA tools, as well as rock engravings, were also found at Putsonderwater, Beeshoek and Bruce (Morris 2005; Snyman 2000; Van Vollenhoven 2012b; Van Vollenhoven 2014).

Archaeological surveys have shown rocky outcrops and hills, drainage lines, riverbanks and confluences to be prime localities for archaeological finds and specifically Stone Age sites since these areas were utilised for base camps close to water and hunting ranges. If any such features occur in the study area, Stone Age manifestations can be anticipated (Lombard 2011).

5.1.2 Historical period

The historical period within the region coincides with the incursion of white traders, hunters, explorers, and missionaries into the interior of South Africa. Buildings and structures associated with the early missionaries, travellers, and traders such as PJ Truter's and William Somerville (arriving in 1801), Donovan, Burchell and Campbell, James Read (arriving around 1870) William Sanderson, John Ryan and John Ludwig's (De Jong 2010; Snyman 2000) arrival during the 19th century, and the settlement of the first white farmers and towns, are still evident in the Northern Cape. Numerous heritage reports that provide a synthesis of the incursions of travellers, missionaries and the early European settlers have been captured on the SAHRIS database.

San hunter-gatherer groups 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).

According to Breutz (1953, 1954), and Van Warmelo (1935), several Batswana tribes, including the different Thlaping and Thlaro sections as well as other smaller groups, take their 18th and 19th century roots back to the area around Groblershoop, Olifantshoek, the Langeberg (Majeng) and Korannaberg ranges in the western part of the region. After Britain annexed Bechuanaland in 1885, the land of the indigenous inhabitants was limited to a few reserves. In 1895, when British Bechuanaland was incorporated into the Cape Colony, the land inside the reserves remained the property of the Tswana and could only be alienated with the consent of the British Secretary of State.

Because of its distance from the Cape Colony, this arid part of South Africa's interior was generally not colonised until relatively recent. According to history, the remote northern reaches of the Cape Colony were home to cattle rushers, gunrunners, river pirates and various manner of outlaws. Distribution of land to colonial farmers only occurred from the 1880s onwards when Government-owned land was surveyed, divided into farms, and transferred to farmers. More permanent large-scale settlement however only started in the late 1920s, and the first farmsteads were possibly built during this period. The region remained sparsely populated until the advent of the 20th century (De Jong 2010, Penn 2005).

The region has been the backdrop to various incidents of conflict. The arrival of large numbers of Great Trek Boers from the Cape Colony to the borders of Bechuanaland and Griqualand West in 1836 caused friction with many Tswana groups and the missionaries of the London Mission Society. The conflict between Boer and Tswana communities escalated in the 1860s and 1870s when the Korana and Griqua communities and the British government became involved. The

Northern Cape was critical in the Anglo-Boer War (1899-1902), and major battles took place within 120 km of Kimberley, including the battle of Magersfontein. Boer guerrilla forces roamed the entire Northern Cape region and skirmishes between Boer and Brits were regular occurrences. Furthermore, many graves in the region tell the story of battles fought during the 1914 Rebellion (Hopkins 1978).

5.2 Local

During 1778, Swedish-born traveller and explorer Hendrik Wikar reached the middle and lower reaches of the Orange River after a long land journey that started in Cape Town. As a deserter from the service of the Dutch East India Company, Wikar spent several years within the area and compiled a report of his experiences in exchange for a pardon (Ross 1975). He documented his encounters with Khoisan communities who called themselves the *Einiqua*, or *River People*. The *Einiqua* were divided into three "kraals": the *Namnykoa* near the Augrabies Falls, the *Kaukoa* on islands west of Keimoes, and the *Aukokoa* of Kanoneiland and other islands to the east. Their kraals consisted of considerable amount of sheep and cattle, and they collected plants, hunted game, and cultivated dagga but no other crops according to Wikar (Ross 1975). Amongst the pastoralist communities living on the islands were the *Anoe eis* people whom Wikar characterised as "Bushmen". They possessed no domesticated stock, subsisted by fishing, game-trapping, hunting and the gathering of plant foods (Morris & Beaumont 1991). Colonel Robert Jacob Gordon who visited the area in 1779, however remarked that they were actually *Einiqua* (i.e. Khoi) who had "lost their cattle as a result of an argument with the *Namneiqua* village (Morris & Beaumont 1991).

The First Korana War of 1868-9 was the result of increased competition for land and resources between the Trekboers and Khoisan groups. A special police regiment was sent to the Kenhardt area by the Cape Colonial Government to serve as a buffer between the conflicting groups and attempt to curb stock theft and Korana raiding parties. Kenhardt was initially the most remote white settlement in the North-Western Cape. The spread of white colonial settlement leads to the formal surveying and proclamation of farms, from the 1880s onwards. The town of Kakamas grew out of an irrigation scheme that was established in 1898 by the community (Van Schalkwyk 2013).

The study area, the Farm Rozynen Bosch No. 104, is situated south of the town of Kakamas, and north of Kenhardt.

Numerous Heritage Impact Assessments have been conducted in the wider Kakamas and Kenhardt landscape. These include, but are not limited to, studies involving agricultural developments at Steynmond Boerdery on Kakamas North Farm 339 (Beaumont 2007), and the Cillie cemetery and township extensions (Dreyer 2013; Van Schalkwyk 2013). De Jong (2010) and Morris (2016; 2017) assessed areas for intended agricultural development to the north and south of the Orange River on Kakamas North and Kakamas South Settlements respectively. Engelbrecht & Fivaz (2018c) have done impact assessments on Plot 1763, for a sand quarry that is situated amongst the new agricultural development under study for this report, for agricultural and irrigation development on adjacent property Plot 1178 (Engelbrecht & Fivaz 2018b), and for Plot 1567, northwest of the study area, earmarked for an aggregate quarry (Engelbrecht & Fivaz 2018a). Farther south towards Kenhardt, Heritage Impact Assessments were conducted on the Farm

Skeerhok (Orton 2017), Portion 1 of N' Rougas Zuid No 121 (Nilssen 2016), Piet Rooiputs, Ntrousgas Noord No.1 08, Ntrousgas Zuid No. 121 (Kaplan 2008), and the Farm Klein Zwart Bast 188 (Webley & Halkett 2012).

5.2.1 Stone Age

Scatters of stone artefacts around Kakamas have been reported by ACRM (2012), Beaumont (2008), Engelbrecht & Fivaz (2018b), Kaplan (2012; 2013; 2016; 2017), Morris (2011; 2012; 2017), and Van Schalkwyk (2010c; 2011; 2013), to name a few. The lithics documented are predominantly associated with the MSA, with a few localities attributed to the LSA. The incidences of lithics have little to no context and are primarily described as of poor preservation and of low significance (Morris 2012). ACRM (2012) noted that 95% of the tools documented are made from locally available, fine-grained banded ironstone, which is a favoured raw material on many sites in the Northern Cape. The remainder is in indurated shale, chert, quartzite and quartz, and hornfels.

Around Kenhardt expanses of gravel 'pavements' occur, which frequently contain stone artefacts in varying densities (Beaumont 1995, Halkett & Orton 2011, Orton 2014, Orton 2016). This background scatters are predominantly Middle Stone Age (MSA) but Early Stone Age (ESA) but Later Stone Age (LSA) artefacts also occur. Pelser (2011) further commented on the wide-spread distribution of lithics across the area, without distinct boundaries. Both formal and informal tools have been recorded; however, this surface scatters are without context.

Rock engravings also occur on several farms in Kenhardt and both geometric painted and representational engraved rock art along the Hartebeest River (Kaplan 2012, Orton 2016),

5.2.2 Historical period

According to De Jong (2011), the Anglo-Boer War (1899-1902) affected the Kenhardt region directly. Boer forces briefly occupied the towns of Prieska, Kenhardt, Kakamas and Upington by March 1900. British troops recaptured the towns by June 1900, ending the invasion. Rebel activity, as well as local militias, like the Border Scouts (Upington), Bushmanland Borderers (Kenhardt) and Namaqualand Border Scouts (from the west), were active in the area. The Border Scouts were responsible for a large area of the north-western Cape Colony, operating from Upington and Kenhardt. By January 1901 this group numbered 786 under the command of Major John Birbeck (AngloBoerWar.com).

De Jong (2011) described the remnants of a stone-walled structure which may have been a military-type enclosure, while Pelser (2011) recorded a small semi-circle of packed stone that might be related to either the Boer War or to the 1st Koranna War. Various incidents of surface scatter of historical material that may be associated with military activity in the area has been documented by Engelbrecht & Fivaz (2018a; 2018b; 2018c).

5.2.3 Oral history

No interviews with locals were conducted regarding the history of the area.

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 pedestrian survey was conducted in predominantly 30 m transects. Areas that have been severely disturbed were surveyed in wider transects or only scoped. The survey extended beyond the development footprints to take into consideration the full impact of the development by investigating probable areas on the landscape adjacent to the development footprints that may contain heritage.

The survey was conducted by a three-person team in one day.

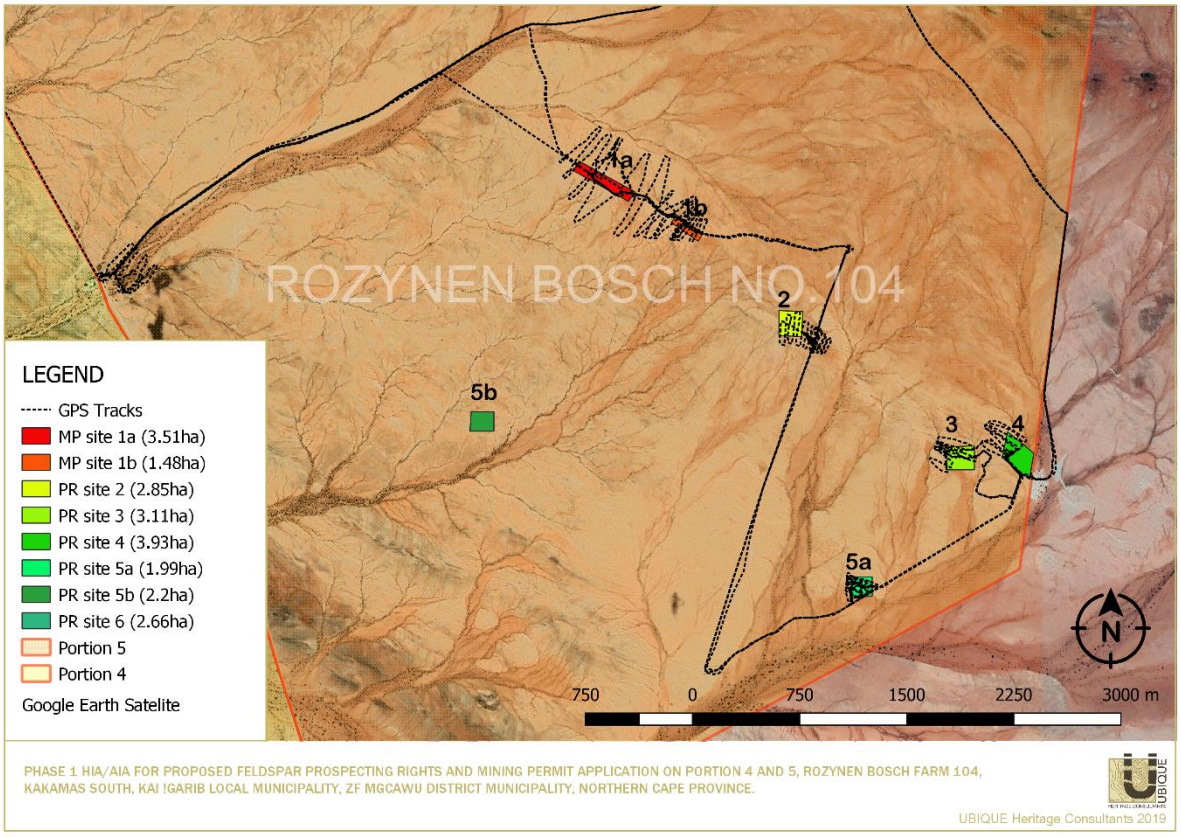


Figure 7 *Google Earth image showing survey tracks and surveyed areas, Portion 5 Rozynen Bosch No. 104, Kakamas South.*

6.2 Identified heritage resources

Heritage resources were recorded on and around Mining Permit sites 1a and 1b, as well as Prospecting sites 2, 3, and 5a on Portion 5 Rozynen Bosch No. 105.

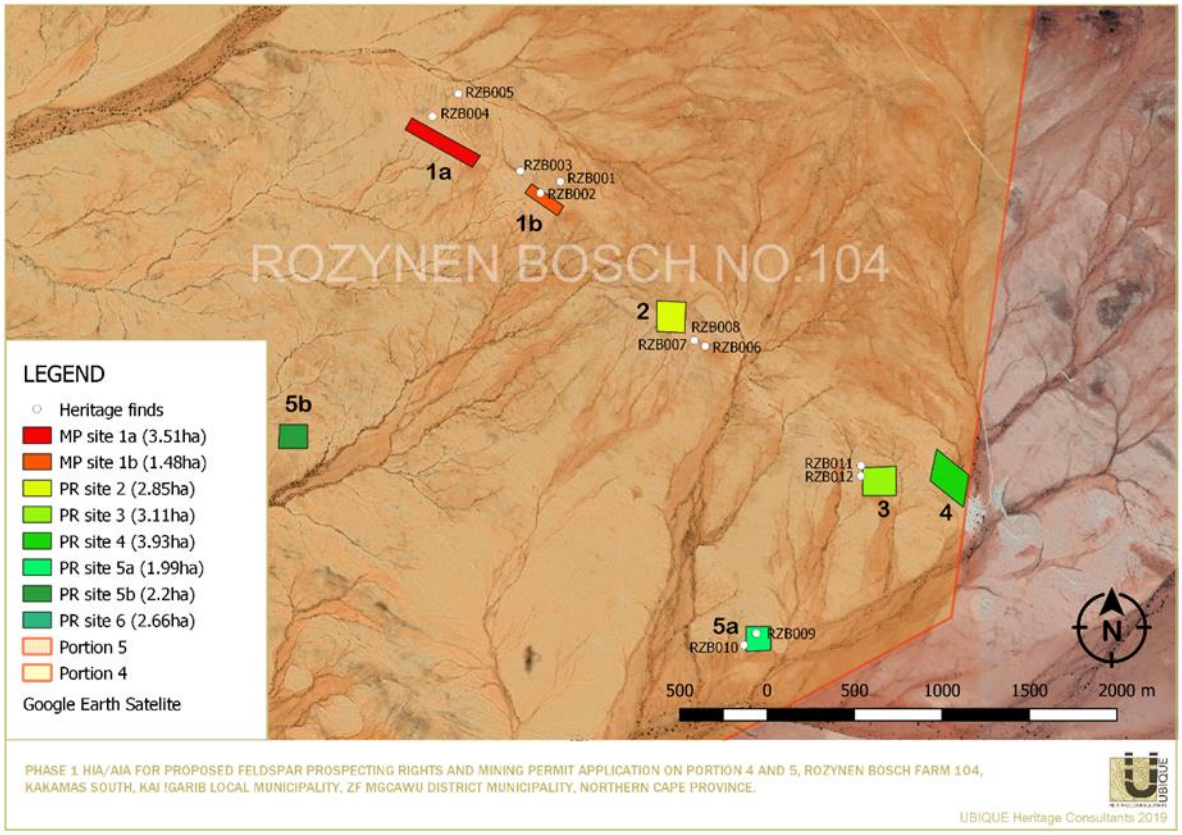


Figure 8 *Distribution of identified heritage resources across Portion 5 Rozynen Bosch No. 104, Kakamas South.*

MP 1a

Site	Description		Period	Location	Field rating/ Significance
Stone Age					
RZB004	Type lithics/s	Flake/debris	LSA	**29° 03' 02.3" S 20° 49'48.9" E**	Field Rating IV C Low significance
	Raw material	BIF and dolerite			
	N in m².	3 in 100 m²			
	Context	Surface scatter, no context			
	Additional	Isolated random flakes and debris			
RZB005	Type lithics/s	Chips and debris	LSA	**29° 02' 58.2" S 20° 49'54.4" E**	Field Rating IV C Low significance
	Raw material	BIF and dolerite			
	N in m².	3 in 100 m²			
	Context	Surface scatter, no context			
	Additional	Isolated random chips and debris			

RZB004

RZB005

Figure 9 *Heritage resources recorded at MP 1a*

MP 1b

Site	Description		Period	Location	Field rating/ Significance
Stone Age					
RZB001	Type lithic/s	Scraper	MSA	**29° 03' 14.4" S 20° 50' 16.0" E**	Field Rating IV C Low significance
	Raw material	Dolerite			
	N in m².	1 in 100 m²			
	Context	Surface scatter, no context			
	Additional	Isolated random scraper			
RZB002	Type lithic/s	Scraper	LSA	**29° 03' 16.5" S 20° 50' 11.8" E**	Field Rating IV C Low significance
	Raw material	BIF			
	N in m².	1 in 100 m²			
	Context	Surface scatter, no context.			
	Additional	Isolated random scraper			
RZB003	Type lithic/s	Flake	LSA	**29° 03' 12.4" S 20° 50' 07.5" E**	Field Rating IV C Low significance
	Raw material	BIF			
	N in m².	1 in 100 m²			
	Context	Surface scatter, no context			
	Additional	Isolated random flake			

RZB001

RZB002

RZB003

Figure 10 *Heritage resources recorded at MP 1b*

PR 2

Site	Description		Period	Location	Field rating/ Significance
Historical					
RZB006	Type of feature	Surface scatter	1905-1920	**29º 03' 44.8" S 20º 50'46.7" E**	Field Rating IV C Low significance
	Material	Interlocking machine soldered tin with trademarks (Bourneville Cadbury's England)			
	N in m².	N=1/ 1 m²			
	Context	No context			
	Additional				
RZB007	Type of feature	Surface scatter	ca. early 1900s	**29º 03' 43.9" S 20º 50'44.5" E**	Field Rating IV C Low significance
	Material	Historical fuel/oil tin with machine soldered seems with trademarks			
	N in m².	1 in 1 m² area.			
	Context	No context			
	Additional				
RZB008	Type of feature	Surface scatter.	ca 1860-1900s	**29º 03' 43.7" S 20º 50'44.3" E**	Field Rating IV C Low significance
	Material	Historical green liquor bottle, partial base of bottle			
	N in m².	1 in 1 m² area			
	Context	No context			
	Additional				

RZB006

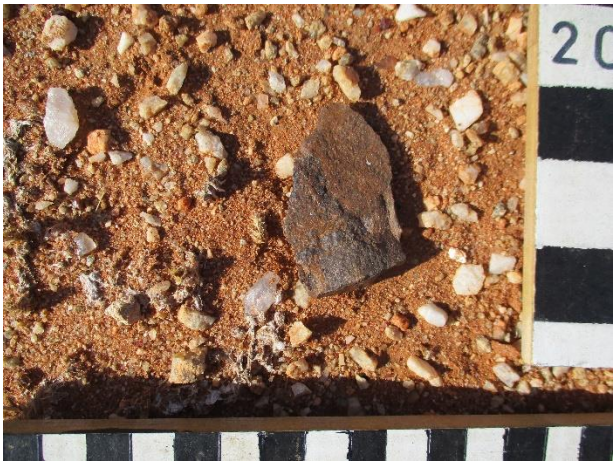
RZB007

RZB008

Figure 11 *Heritage resources recorded at PR 2*

PR 3

Site	Description		Period	Location	Field rating/ Significance
Stone Age					
RZB011	Type lithics/s	Bladelet	LSA	**29º 04' 06.9" S 20º 51'19.6" E**	Field Rating IV C Low significance
	Raw material	BIF			
	N in m².	1 in 100 1 m²			
	Context	Surface scatter, no context			
	Additional	Isolated random bladelet			
Historical					
RZB012	Type of feature	Surface scatter	ca. 1880>	**29º 03' 43.7" S 20º 50'44.3" E**	Field Rating IV C Low significance
	Material	Historical fired shotgun cartridge, metal casing 12 BR.			
	N in m².	1 in 1 m²			
	Context	No context			
	Additional				



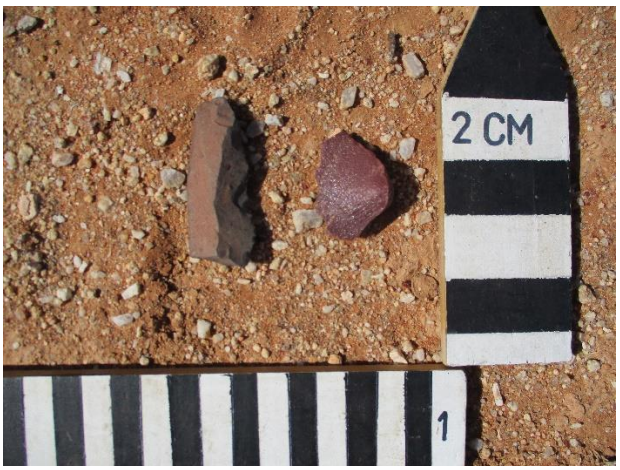
RZB011

RZB012

Figure 12 *Heritage resources recorded at PR 3*

PR 5a

Site	Description		Period	Location	Field rating/ Significance
Stone Age					
RZB009	Type lithics/s	Chips and scraper	LSA	**29° 04' 37.8" S 20° 50'57.5" E**	Field Rating IV C Low significance
	Raw material	Dolerite and quartzite			
	N in m².	2 in 100sqm			
	Context	Surface scatter, no context			
	Additional	Isolated random chips and scraper			
RZB010	Type lithics/s	Notched scrapers	LSA	**29° 04' 40.0" S 20° 50'54.8" E**	Field Rating IV C Low significance
	Raw material	Quartzite			
	N in m².	2 in 100sqm			
	Context	Surface scatter, no context			
	Additional	Isolated random scrapers			



RBZ009

RBZ010

Figure 13 *Heritage resources recorded at PR 5a*

6.3 Discussion

6.3.1 Archaeological features

Eight occurrences of lithic material were recorded across the surveyed area on or in close vicinity to the development footprints MP 1a (RZB004,RZB005), MP 1b (RZB001, RZB002, RZB003), PR 3 (RBZ011), and PR5a (RZB009, RZB010) on Portion 5, Farm Rozynen Bosch No. 104. The recorded lithic material consists of very low-density scatters with scrapers, a bladelet, untrimmed flakes, chips and debris, made predominantly of dolerite, quartzite, and banded-iron formation (BIF). The cultural material shows various degrees of weathering and is a combination of LSA and MSA artefacts. The lithics recorded are however without archaeological context and are deemed of minor importance, and impact from the development will be inconsequential.

Four occurrences of low concentration colonial period material were recorded close to PR 2 RZB006, RZB007, RZB008) and PR 3 (RZB012). The historical artefacts include late 19th century to early 20th century material such as a trademarked fuel/oil tin with machine soldered seems, a piece of thick historical glass, a fired shotgun cartridge and a trademarked Bournville Cadbury Cocoa tin dating between 1905 and 1920. Although the material could be useful in determining occupation dates and are located within, and borders development footprints, the material sample is small and without archaeological context. The development impact on these resources is, therefore, inconsequential.

These sites are given a 'General' Protection C (Field Rating IV C). This means these sites have been sufficiently recorded (in Phase 1). It requires no further action.

6.3.3 Graves

No formal or informal graves were identified in the study area.

6.3.4 Palaeontological resources

The proposed development is underlain by Quaternary to Recent sediments [Quaternary Gordonia Formation (Kalahari Group)] as well as the by Precambruim basement rocks of the Namaqua-Natal Province. The Kalahari Group and that of the Precambruim basement rocks of the Namaqua-Natal Province is of zero to low pal paleontological (Butler 2019). Elize Butler from Banzai Environmental conducted a full paleontological desktop study for this project (see Appendix 1).

7. 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:

4. No significant heritage sites or features were identified within the development footprint. No further mitigation is required. Therefore, from a heritage point of view, we recommend that the proposed mining development and permit applications can continue.

5. Due to the zero to 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 as the igneous rocks underlying the site are not fossiliferous. It is therefore recommended that the project be exempt from a full Paleontological Impact Assessment (Butler 2019).

6. 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 possible discovery of finds such as stone tool scatters, artefacts, human remains, or fossils are made, the operations must be stopped, and a qualified archaeologist must be contacted for an assessment of the find. UBIQUE Heritage Consultants and its personnel will not be held liable for such oversights or for costs incurred as a result of such oversights.

8. CONCLUSION

This HIA has identified no significant heritage resources on Farm Rozynen Bosch No. 104 Portions 4 and 5, Kakamas South Settlement, in the Kai !Garib Local Municipality, Northern Cape., ZF Mgcawu District Municipality, Northern Cape that will be impacted on negatively by the proposed development. From a heritage point of view, the permit applications and prospecting for feldspar mining may continue on the identified footprints.

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WEB

http://www.sahra.org.za/sahris

APPENDIX A

PALAEONTOLOGICAL DESKTOP ASSESSMENT OF THE PROPOSED FELDSPAR PROSPECTING RIGHTS AND MINING APPLICATION ON PORTION 4 AND 5 OF THE FARM ROZYNEN BOSCH NO. 104, KAKAMAS SOUTH, KAI! GARIB MUNICIPALITY, ZF MGCAWU DISTRICT MUNICIPALITY, NORTHERN CAPE

PALAEONTOLOGICAL DESKTOP ASSESSMENT OF THE PROPOSED FELDSPAR PROSPECTING RIGHTS AND MINING APPLICATION ON PORTION 4 AND 5 OF THE FARM ROZYNEN BOSCH NO. 104, KAKAMAS SOUTH, KAI! GARIB MUNICIPALITY, ZF MGCAWU DISTRICT MUNICIPALITY, NORTHERN CAPE

Compiled for:

UBIQUE Heritage Consultants

PO Box 51

Askham

8814

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20 October 2019

Prepared by:

BANZAI ENVIRONMENTAL (PTY) LTD

Declaration of Independence

General declaration:

I, Elize Butler, declare that –

I act as the independent Palaeontologist 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 is 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 from a heritage practitioner 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: Banzai Environmental (Pty) Ltd

CONTACT PERSON: Elize Butler

Tel: +27 844478759

Email: elizebutler002@gmail.com

SIGNATURE: 

The Palaeontological Impact Assessment report has been compiled taking into account the NEMA Appendix 6 requirements for specialist reports as indicated in the table below.

Table 1:Nema Requirements

NEMA Regs (2014) - Appendix 6	**Relevant section in report**
1. (1) A specialist report prepared in terms of these Regulations must contain- a) details of- i. the specialist who prepared the report; and ii. the expertise of that specialist to compile a specialist report including a curriculum vitae;	Page ii of Report – Contact details and company and Appendix 1
b) a declaration that the specialist is independent in a form as may be specified by the competent authority;	Page ii-iii
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 date, duration and season of the site investigation and the relevance of the season to the outcome of the assessment;	N/A Desktop assessment
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 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, Section 5
g) an identification of any areas to be avoided, including buffers;	Desktop assessment
h) a map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;	Section 5
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 or activities;	Section 10

k) any mitigation measures for inclusion in the EMPr;	Section 10
l) any conditions for inclusion in the environmental authorisation;	N/A
m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;	N/A
n) a reasoned opinion- i. as to whether the proposed activity, activities or portions thereof should be authorised; (iA) regarding the acceptability of the proposed activity or activities; and 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 10 – Conclusion
o) a description of any consultation process that was undertaken during the course of preparing the specialist report;	Not applicable.
p) a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	Not applicable. To date not comments regarding heritage resources that require input from a specialist have been raised.
q) any other information requested by the competent authority.	Not applicable.
2) Where a government notice *gazetted* 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.	Refer to section 2 and 3 compliance with SAHRA guidelines

EXECUTIVE SUMMARY

Mr C Bruwer owner of the farm Rozynen Bosch No. 104, plans to apply for a feldspar prospecting Rights and Mining Application on portion 4 and 5 of the farm Rozynen Bosch No. 104, Kakamas South, Kai! Garib Municipality, ZF Mgcawu District Municipality, Northern Cape. UBIQUE Heritage Consultants was appointed to conduct the Heritage Impact Assessment (HIA) for the proposed Rozynen prospecting and mining rights application.

The National Heritage Resources Act (No 25 of 1999, section 38) (NHRA), states that a Palaeontological Impact Assessment (PIA) is key to detect the presence of fossil material within the planned development footprint. This DIA is thus necessary to evaluate the effect of the construction on the palaeontological resources. Banzai Environmental (Pty) Ltd was in turn appointed to undertake the Palaeontological Desktop Assessment (DIA) assessing the palaeontological impact of the proposed development.

The proposed Rozynen 104 mining development is entirely underlain by Quaternary to Recent sediments [Quaternary Gordonia Formation (Kalahari Group)] as well as the by Precambruim basement rocks of the Namaqua-Natal Province. According to the SAHRIS PalaeoMap, a low palaeontological significance is allocated to the Kalahari Group, and that of the Precambruim basement rocks of the Namaqua-Natal Province is zero. **It is therefore considered that the construction and operation of the** proposed Rozynen 104 mining development, in the Northern Cape **are deemed appropriate and feasible and will not lead to detrimental impacts on the palaeontological resources of the area.** Thus, the construction and operation of the facility may be authorised as the whole extent of the development footprint is not considered sensitive in terms of palaeontological resources.

In the event that fossil remains are discovered during any phase of construction, either on the surface or exposed by fresh excavations, the **Chance Find Protocol** must be implemented by the ECO in charge of these developments. These discoveries ought to be secured (preferably *in situ*) and the ECO ought to alert SAHRA so that appropriate mitigation (*e.g.* documented and collection) can be undertaken by a professional palaeontologist.

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

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INTRODUCTION

Mr C Bruwer plans to apply for the feldspar prospecting Rights and Mining Application on portion 4 and 5 of the farm Rozynen 104, Kakamas South, Kai! Garib Municipality, ZF Mgcawu District Municipality, Northern Cape (Figure1-3).

The project involves the applications for feldspar prospecting right and mining permits at six different site areas. These include:

- Site MP 1a (3.51 ha). The site has been mined previously. The mining permit application will be for the extension of existing mine.
- Site MP 1b (1.48 ha). A mining permit application will be made for this site.
- Site PR 2 (2.85 ha). Application for prospecting rights.
- Site PR 3 (3.11 ha). Application for prospecting rights.
- Site PR 4 (3.93 ha). Application for prospecting rights.
- Site PR 5a (1.99 ha). Application for prospecting rights.
- Site PR 5b (2.2 ha). After initial investigations yielded very poor feldspar deposits, the site will be excluded from the application and this HIA report.
- Site PR 6 (2.66 ha). After initial investigations yielded very poor feldspar deposits, the site will be excluded from the application and this HIA report.

The sites are located on the Farm Rozynen Bosch No. 104, situated about 35 km south-south-east of Kakamas and about 55km north-west of Kenhardt in the Northern Cape Province.

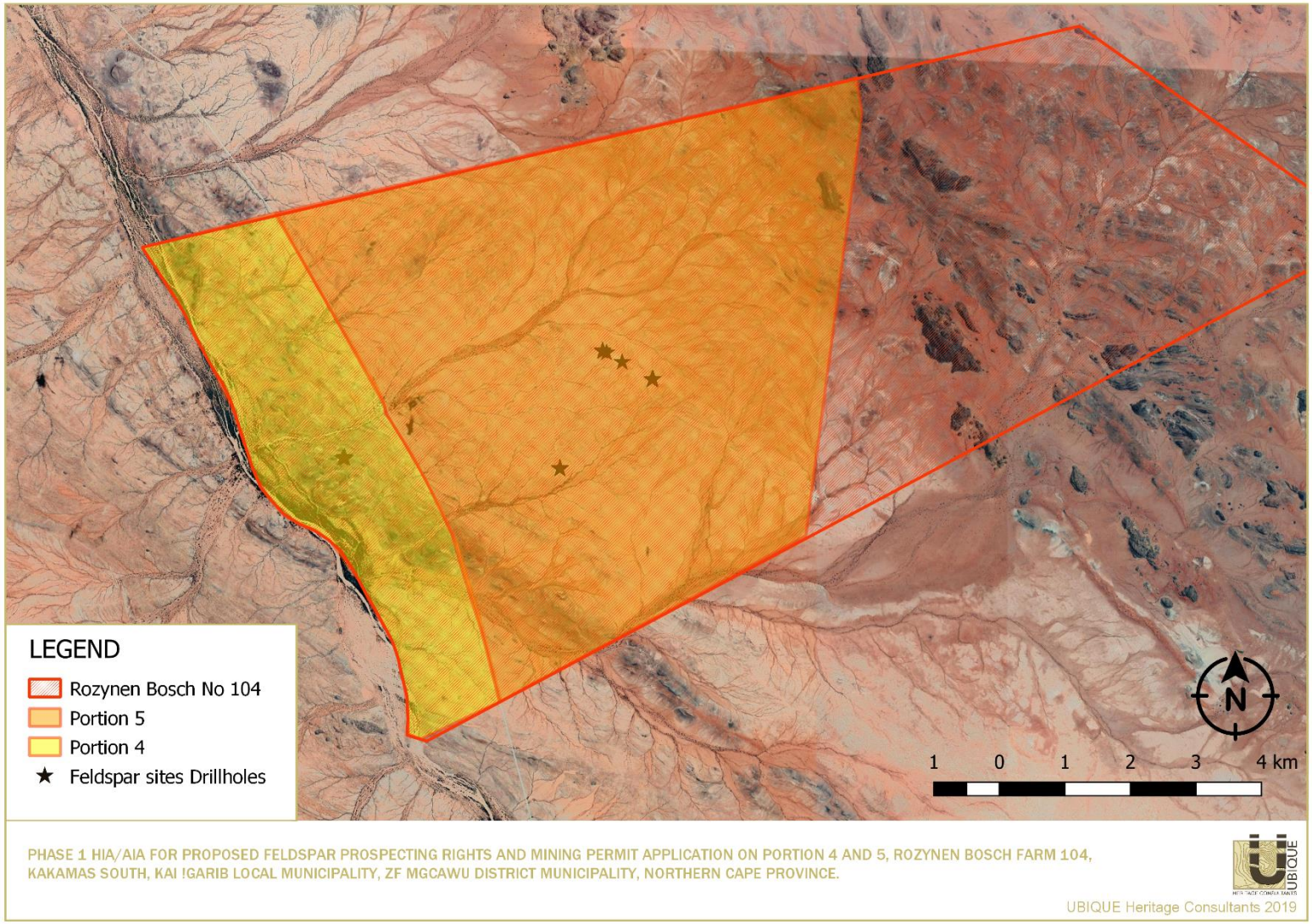

***Figure 14**: Proposed feldspar prospecting Rights and Mining Application on portion 4 and 5 on the farm Rozynen Bosch Farm 104, Kakamas South,* Kai! Garib Municipality, ZF Mgcawu District Municipality, Northern Cape Province. *Map provides by Ubique Heritage Consultants.*

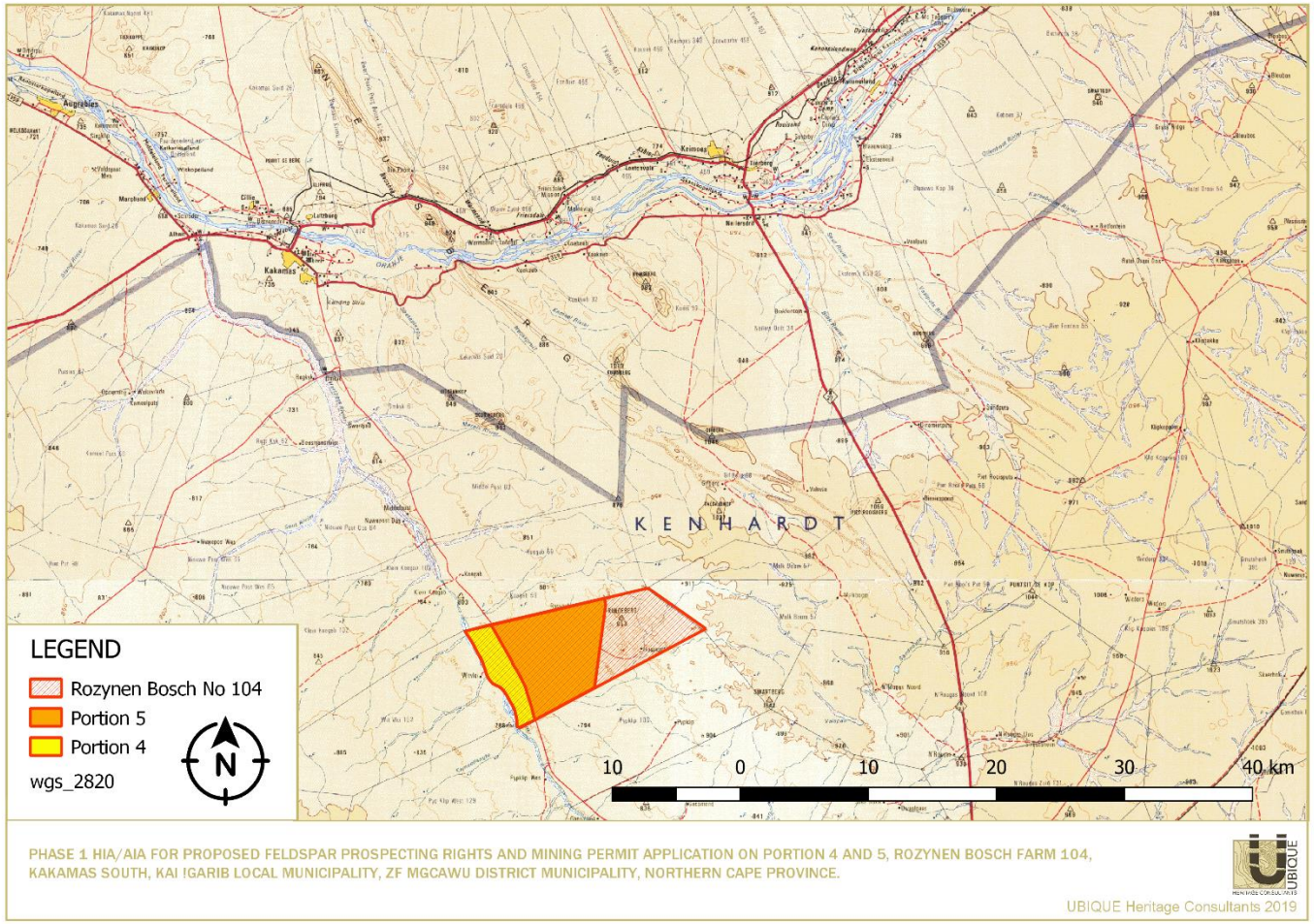

Figure 15: *Location of the proposed feldspar prospecting Rights and Mining Application on portion 4 and 5 on the farm Rozynen Farm 104, Kakamas South, Kai! Garib Municipality, ZF Mgcawu District Municipality, Northern Cape Province. Map provides by Ubique Heritage Consultants.*

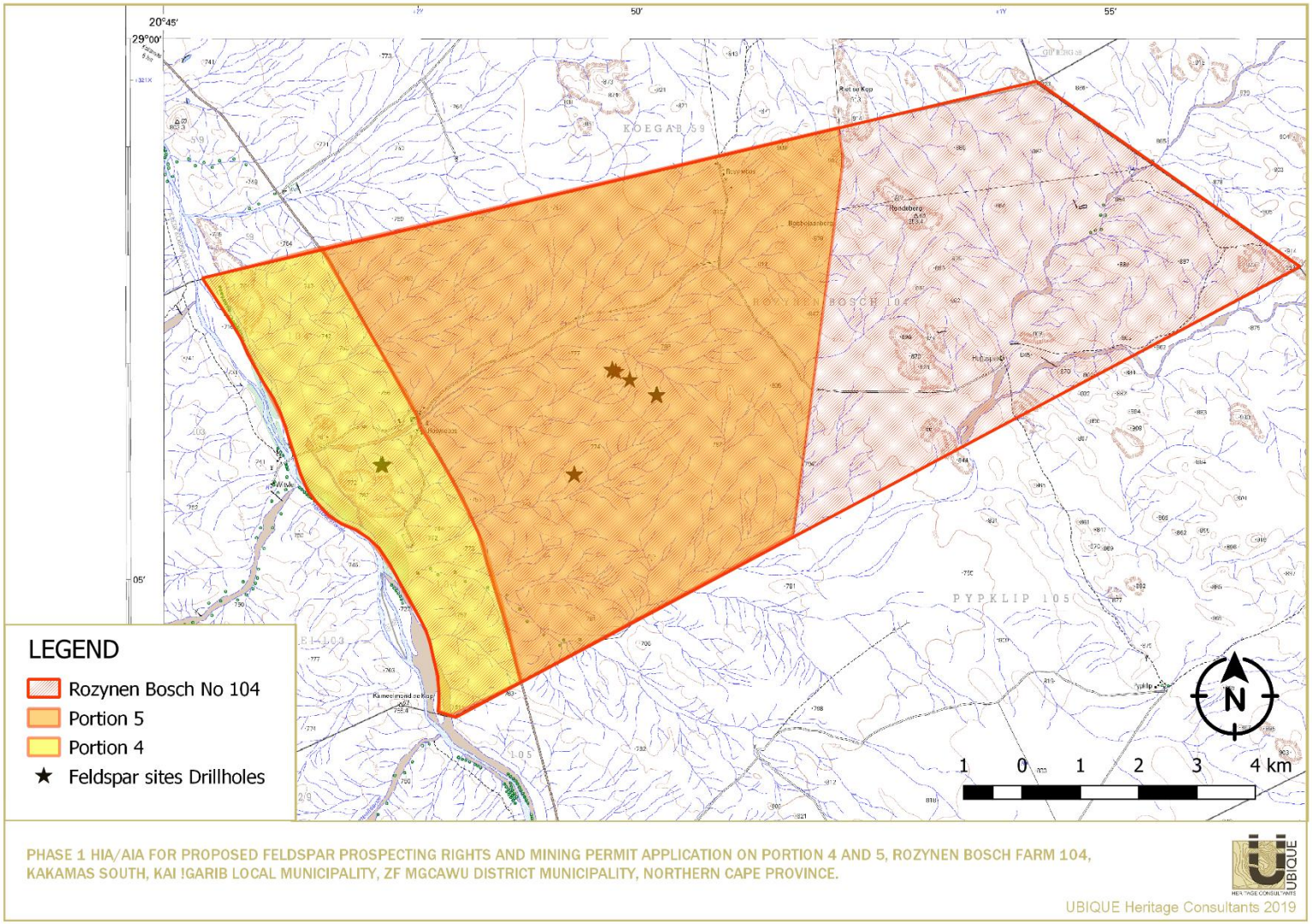

***Figure 16**: Extract of the 1:50 000 2920 BB Pypklip topographical map indicating the locality of the proposed feldspar prospecting Rights and Mining Application on portion 4 and 5 of Rozynen Farm 104, Kakamas South, Kai! Garib Municipality, ZF Mgcawu District Municipality, Northern Cape Province. Map provides by Ubique Heritage Consultants.*

QUALIFICATIONS AND EXPERIENCE OF THE AUTHOR

The author (Elize Butler) has an MSc in Palaeontology from the University of the Free State, Bloemfontein, South Africa. She has been working in Palaeontology for more than twenty-four years. She has extensive 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 for 13 years. She 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 DIA forms part of the Heritage Impact Assessment (HIA) and adhere to the conditions of the Act. According to **Section 38 (1)**, an 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 300 m in length;
- the construction of a bridge or similar structure exceeding 50 m in length;
- any development or other activity which will change the character of a site—
- (exceeding 5 000 m^2 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 re-zoning of a site exceeding 10 000 m^2 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 DPIA 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 for a DPIA 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:

a. **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.
b. **Indirect impacts** of an activity are indirect or induced changes that may occur as a result of the activity.
c. **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 PALAEONTOLOGICAL HERITAGE

The proposed feldspar prospecting Rights and Mining Application on portion 4 and 5 of Rozynen Farm 104, Kakamas South, Kai! Garib Municipality, ZF Mgcawu District Municipality, Northern Cape Province is underlain by Precambruim basement rocks of the Namaqua-Natal Province and are overlain by the Gordonia Formation (Fm) of the Kalahari Group (Figure 4).

The Namaqua-Natal Province consists of highly metamorphosed sediments and volcanic rocks (amphibolites, gneisses, quartzites and schists) plus major granitic and gabbroic (norite) intrusions, and are dated between 2050 and 1000 Ma (million years ago). These rocks are igneous in origin and consist mainly of biotite-rich rocks, granites and gneisses of the Vyfbeker Metamorphic Suite (**Mhu** and **Mke**) (Cornell et al., 2006) and are completely unfossiliferous. The basement rocks in the proposed development area are overlain by Late Cenozoic superficial sediments (**Tec** and **qv** in Figure 4). The Kalahari deposits are approximate Ca 65 – 2.5 million years old (Ma).

The Cenozoic Kalahari Group is the most widespread body of terrestrial sediments in southern Africa. The Kalahari Group range in thickness from a few metres to more than 180m (Partridge et al., 2006). The youngest formation of the Kalahari group is the Gordonia Formation which is generally termed Kalahari sand and comprises of red aeolian sands that cover most of the Kalahari Group sediments. The pan sediments of the area originated from the Gordonia Formation and contain 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 fossil assemblages of the Kalahari are generally very low in diversity and occur over a wide range, and thus the palaeontological diversity of this Group is low. These fossils represent terrestrial plants and animals with a close resemblance to living forms. In the past palaeontologists did not concentrate their research on Cenozoic superficial deposits although they sometimes comprise of important fossil biotas. Fossils assemblages may comprise of bones, horn corns and mammalian teeth; reptile skeletons as well as fragments of ostrich eggs. Microfossils, non- marine mollusc shells are also known.

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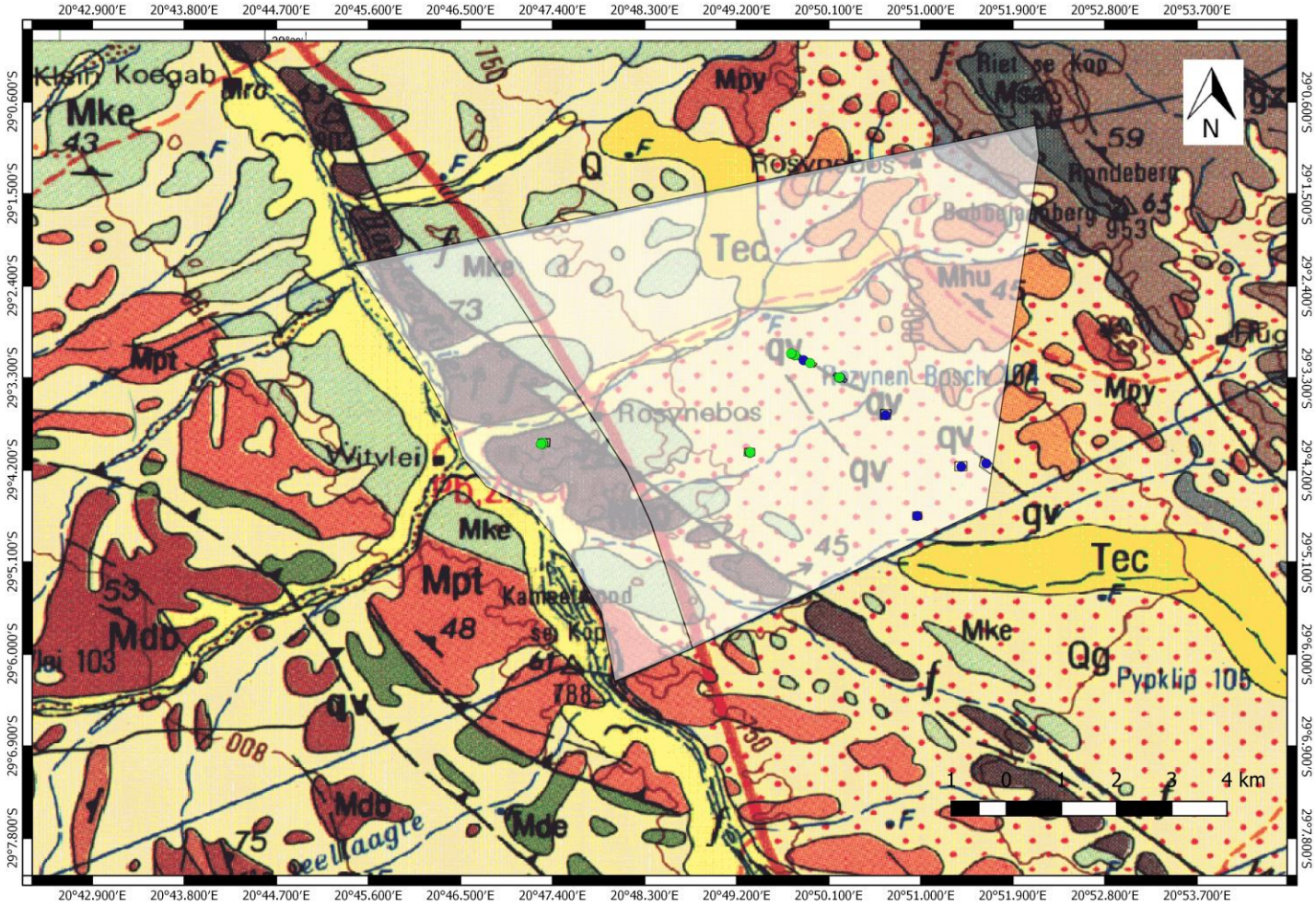
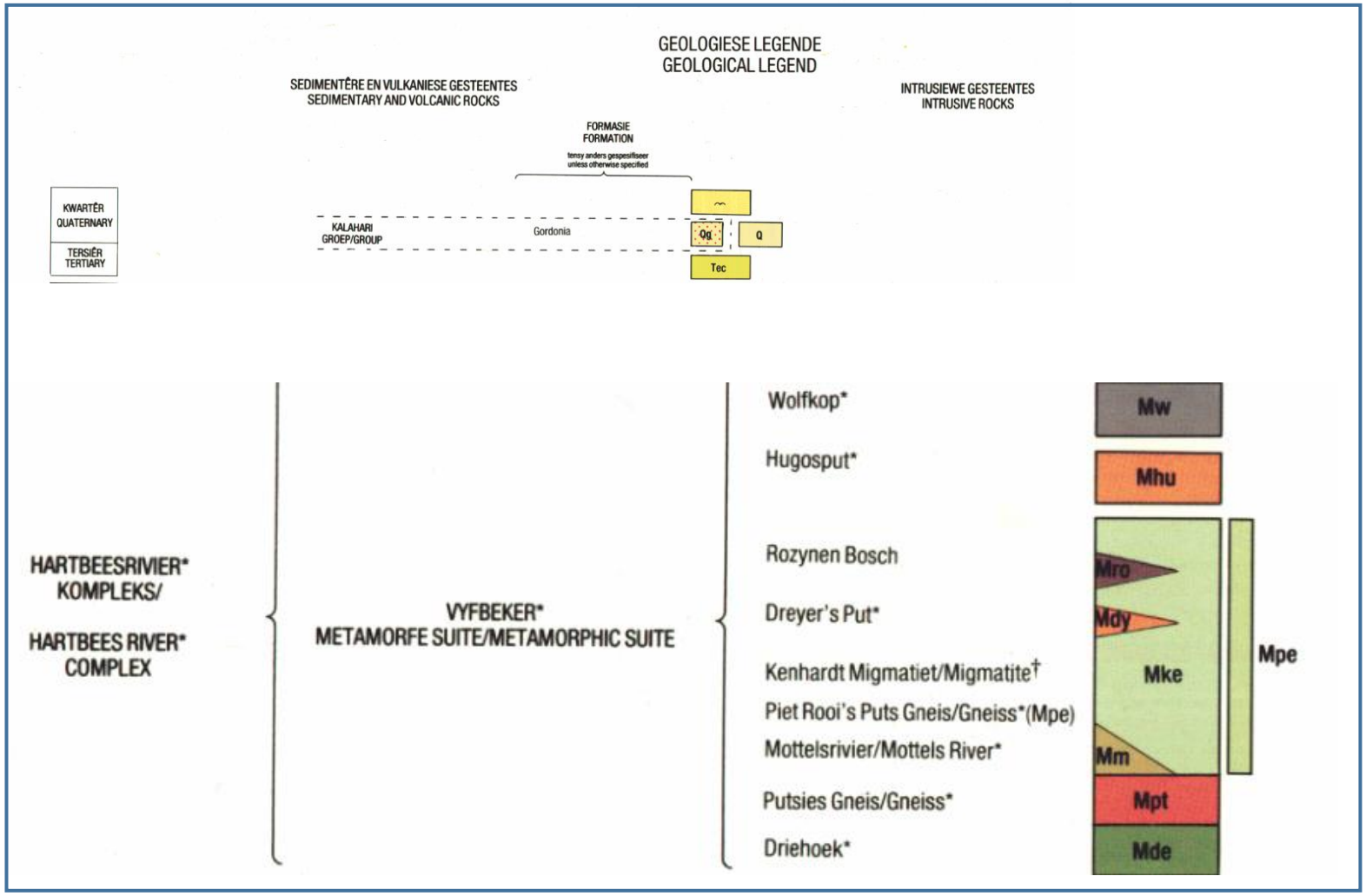


***Figure 17**: The proposed feldspar prospecting Rights and Mining Application on portion 4 and 5 of Rozynen Farm 104, Kakamas South, Kai! Garib Municipality, ZF Mgcawu District Municipality, Northern Cape Province is underlain by Precambruim basement rocks of the Namaqua-Natal Province and are overlain by the Gordonia Formation (Fm) of the Kalahari Group. Map was drawn in QGIS Desktop 2.28.18*

Clarification of the Legend



PRECAMBRIAN BASEMENT ROCKS

- Green (Mke) = Kenhardt Migmatite
- Red (Mpt) = Putsies Gneiss

LATE CAENOZOIC SUPERFICIAL SEDIMENTS

- Pale yellow with red stipple (qv) = aeolian sands of the Gordonia Formation (Kalahari Group)
- Dark yellow (Tec) = calcrete

Mining Activities

Lead (Pb)

Zink (Zn)

Copper (Cu)

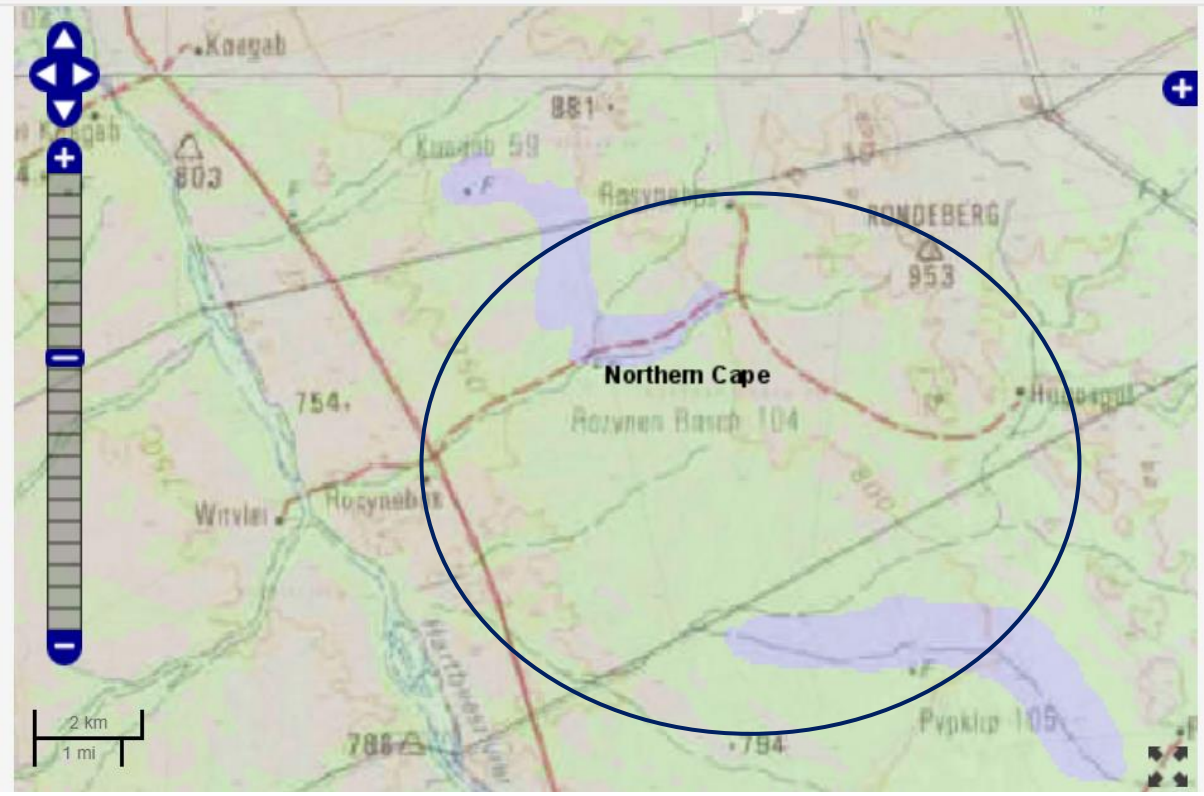


Figure 18: Extract of the 1 in 250 000 SAHRIS PalaeoMap map (Council of Geosciences). Approximate location of the proposed development is indicated in dark blue

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 palaeosensitivity map (Figure 5), there is very little chance of finding fossils in this area.

GEOGRAPHICAL LOCATION OF THE SITE

Rozynen Bosch 104 is situated approximately 35km south-south-east of Kakamas and about 55km north-west of Kenhardt in the Northern Cape Province in the semi-arid Bushmanland region. The development area is mostly undisturbed and flat, with low grasses and shrubs without any large outcrops.

METHODS

A desktop study was assembled to evaluate the possible risk to palaeontological heritage (this includes fossils as well as trace fossils) in the proposed development area. In compiling the desktop report aerial photos, Google Earth 2018, topographical and geological maps and other reports from the same area as well as the author's experience were used to assess the proposed development footprint.

Assumptions and limitations

The accuracy of DIA is reduced by several factors which may include the following: the databases of institutions are not always up to date, and relevant locality and geological information were not accurately documented in the past. Various remote areas of South Africa have not been assessed by palaeontologists and data is based on aerial photographs alone. Geological maps concentre on the geology of an area, and the sheet explanations were never intended to focus on palaeontological heritage.

Similar Assemblage Zones, but in different areas is used to provide information on the presence of fossil heritage in an unmapped area. Desktop studies of similar geological formations and Assemblage Zones generally **assume** that exposed fossil heritage is present within the development area. The accuracy of the Palaeontological Impact Assessment is thus improved considerably by conducting a field-assessment.

ADDITIONAL INFORMATION CONSULTED

In compiling this report, the following sources were consulted:

- The Palaeosensitivity Map from the SAHRIS website.
- 2920 BB Pypklip Topographical map
- Geological Map 1: 250 000 2920 Kenhardt.
- A Google Earth map with polygons of the proposed development was obtained from *Ubique Heritage*.
- Other Impact Assessments consulted in the are Almond 2014a-d; Almond 2016a-b, Almond 2017 (see references).

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
- 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 are used:

Table 2: The rating system

NATURE		
Include a brief description of the impact of environmental parameter being assessed in the context of the project. This criterion includes a brief written statement of the environmental aspect being impacted upon by a particular action or activity. The Nature of the Impact is the possible descruction 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 will 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

FINDINGS AND RECOMMENDATIONS

The proposed Rozynen 104 mining development is entirely underlain by Quaternary to Recent sediments [Quaternary Gordonia Formation (Kalahari Group)] as well as the by Precambruim basement rocks of the Namaqua-Natal Province. According to the SAHRIS PalaeoMap, a low palaeontological significance is allocated to this Kalahari Group, and that of the Precambruim basement rocks of the Namaqua-Natal Province is zero. **It is therefore considered that the construction and operation of the** proposed Rozynen 104 mining development, in the Northern Cape **are deemed appropriate and feasible and will not lead to detrimental impacts on the palaeontological resources of the area.** Thus, the construction and operation of the facility may be authorised as the whole extent of the development footprint is not considered sensitive in terms of palaeontological resources.

In the event that fossil remains are discovered during any phase of construction, either on the surface or exposed by fresh excavations, the **Chance Find Protocol** must be implemented by the ECO in charge of these developments. These discoveries ought to be secured (preferably *in situ*) and the ECO

ought to alert SAHRA so that appropriate mitigation (*e.g.* documented and collection) can be undertaken by a professional palaeontologist.

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

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CHANCE FINdS PROTOCOL

The following procedure will only be followed in the event that fossils are uncovered during excavation.

LEGISLATION

Cultural Heritage in South Africa (includes all heritage resources) is protected by the **National Heritage Resources Act (Act 25 of 1999) (NHRA).** According to Section 3 of the Act, all Heritage resources 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 and are the property of the State. It is thus the responsibility of the State to manage and conserve fossils on behalf of the citizens of South Africa. Palaeontological resources may not be excavated, 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.

BACKGROUND

A fossil is the naturally preserved remains (or traces) of plants or animals embedded in rock. These plants and animals lived in the geologic past millions of years ago. Fossils are extremely rare and irreplaceable. By studying fossils, it is possible to determine the environmental conditions that existed in a specific geographical area millions of years ago.

INTRODUCTION

This informational document is intended for workmen and foremen on construction sites. It describes the actions to be taken when mining or construction activities accidentally uncover fossil material.

It is the responsibility of the Environmental Control Officer (ECO) of the project to train the workmen and foremen in the procedure to follow when a fossil is accidentally uncovered. In the absence of the

ECO, a member of the staff must be appointed to be responsible for the proper implementation of the chance find protocol as not to compromise the conservation of fossil material.

CHANCE FIND PROCEDURE

- If a chance find is made the person responsible for the find must immediately **stop working** and all work must cease in the immediate vicinity of the find.
- The person who made the find must immediately **report** the find to his/her direct supervisor which in turn must report the find to his/her manager and the ECO or site manager. The ECO must report the find to the relevant Heritage Agency (South African Heritage Research Agency, 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). The information to the Heritage Agency must include photographs of the find, from various angles, as well as the GPS coordinates.
- A preliminary report must be submitted to the Heritage Agency within **24 hours** of the find and must include the following: 1) date of the find; 2) a description of the discovery and a 3) description of the fossil and its context (depth and position of the fossil), GPS co-ordinates.
- Photographs (the more, the better) of the discovery must be of high quality, in focus, accompanied by a scale. It is also important to have photographs of the vertical section (side) where the fossil was found.

Upon receipt of the preliminary report, the Heritage Agency will inform the ECO (site manager) whether a rescue excavation or rescue collection by a palaeontologist is necessary.

- The site must be secured to protect it from any further damage. **No attempt** should be made to remove material from their environment. The exposed finds must be stabilized and covered by a plastic sheet or sandbags. The Heritage agency will also be able to advise on the most suitable method of protection of the find.
- In the event that the fossil cannot be stabilized the fossil may be collected with extreme care by the ECO (site manager). Fossils finds must be stored in tissue paper and in an appropriate box while due care must be taken to remove all fossil material from the rescue site.
- Once Heritage Agency has issued the written authorization, the developer may continue with the development.

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Appendix: 1: CV

ELIZE BUTLER

PROFESSION: Palaeontologist

YEARS' EXPERIENCE: 25 years in Palaeontology

EDUCATION: B.Sc Botany and Zoology, 1988

University of the Orange Free State

B.Sc (Hons) Zoology, 1991

University of the Orange Free State

Management Course, 1991

University of the Orange Free State

M. Sc. *Cum laude* (Zoology), 2009

University of the Free State

Dissertation title: The postcranial skeleton of the Early Triassic non-mammalian Cynodont *Galesaurus planiceps*: implications for biology and lifestyle

Registered as a PhD fellow at the Zoology Department of the UFS

2013 to current

Dissertation title: A new gorgonopsian from the uppermost D*aptocephalus Assemblage Zone*, in the Karoo Basin of South Africa

MEMBERSHIP

Palaeontological Society of South Africa (PSSA) 2006-currently

EMPLOYMENT HISTORY

Part time Laboratory assistant	Department of Zoology & Entomology University of the Free State Zoology 1989-1992
Part time laboratory assistant	Department of Virology University of the Free State Zoology 1992
Research Assistant	National Museum, Bloemfontein 1993 – 1997
Principal Research Assistant and Collection Manager	National Museum, Bloemfontein 1998–currently

TECHNICAL REPORTS

TECHNICAL REPORTS

1. **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.
2. **Butler, E. 2014.** Palaeontological Impact Assessment for the proposed upgrade of existing water supply infrastructure at Noupoort, Northern Cape Province. 2014. Bloemfontein.
3. **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.
4. **Butler, E. 2015.** Palaeontological impact assessment of the proposed mixed land developments at Rooikraal 454, Vrede, Free State. Bloemfontein.
5. **Butler, E. 2015.** Palaeontological exemption report of the proposed truck stop development at Palmiet 585, Vrede, Free State. Bloemfontein.
6. **Butler, E. 2015.** Palaeontological impact assessment of the proposed Orange Grove 3500 residential development, Buffalo City Metropolitan Municipality East London, Eastern Cape. Bloemfontein.
7. **Butler, E. 2015.** Palaeontological Impact Assessment of the proposed Gonubie residential development, Buffalo City Metropolitan Municipality East London, Eastern Cape Province. Bloemfontein.

8. **Butler, E. 2015.** Palaeontological Impact Assessment of the proposed Ficksburg raw water pipeline. Bloemfontein.
9. **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.
10. **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.
11. **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.
12. **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.
13. **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.
14. **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.
15. **Butler, E. 2016.** Palaeontological Impact Assessment of the proposed construction of the 150 MW Noupoort 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 Noupoort, Northern Cape. Prepared for Savannah Environmental. Bloemfontein.
16. **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.
17. **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.
18. **Butler, E. 2016.** Proposed 132kV overhead power line and switchyard station for the authorised Solis Power 1 CSP project near Upington, Northern Cape. Bloemfontein.
19. **Butler, E. 2016.** Palaeontological Impact Assessment of of the proposed Senqu Pedestrian Bridges in Ward 5 of Senqu Local Municipality, Eastern Cape Province. Bloemfontein.
20. **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.
21. **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.

22. **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.
23. **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. Savannaha South Africa. Bloemfontein.
24. **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.
25. **Butler, E. 2016.** Chris Hani District Municipality Cluster 9 water backlog project phases 3a and 3b: Palaeontology inspection at Tsomo WTW. Bloemfontein.
26. **Butler, E. 2016.** Palaeontological Impact Assessment of the proposed construction of the 150 MW Noupoort 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 Noupoort, Northern Cape. Savannaha South Africa. Bloemfontein.
27. **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.
28. **Butler, E. 2016.** Palaeontological Impact Assessment construction of the proposed Metals Industrial Cluster and associated infrastructure near Kuruman, Northern Cape Province. Savannaha South Africa. Bloemfontein.
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30. **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.
31. **Butler, E. 2016.** Ezibeleni waste Buy-Back Centre (near Queenstown), Enoch Mgijima Local Municipality, Eastern Cape. Bloemfontein.
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33. **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.
34. **Butler, E. 2016.** Palaeontological impact assessment for the proposed Aggeneys south prospecting right project, Northern Cape Province. Bloemfontein.
35. **Butler, E. 2016.** Palaeontological impact assessment of the proposed Motuoane Ladysmith Exploration right application, Kwazulu Natal. Bloemfontein.

36. **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.
37. **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.
38. **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.
39. **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.
40. **Butler, E. 2017.** Palaeontological Desktop Assessment for the Proposed Development of a Wastewater Treatment Works at Lanseria, Gauteng Province. Bloemfontein.
41. **Butler, E. 2017.** Palaeontological Scoping Report for the Proposed Construction of a Warehouse and Associated Infrastructure at Perseverance in Port Elizabeth, Eastern Cape Province.
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51. **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.

52. **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.

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

54. **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.

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

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

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

58. **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.

59. **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.

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

61. **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.

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

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

64. **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.
65. 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.
66. 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.
67. Butler, E. 2017. Palaeontological Desktop Assessment of the proposed construction of the Mangaung Gariep Water Augmentation Project. Bloemfontein.
68. **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.
69. **Butler, E. 2017.** Palaeontological Impact Assessment of the proposed construction of the Melkspruit-Rouxville 132KV Power line. Bloemfontein.
70. **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.
71. **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.
72. **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.
73. **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.
74. **Butler, E. 2017.** Palaeontological Desktop Assessment of the proposed of the Lephalale Coal and Power Project, Lephalale, Limpopo Province, Republic of South Africa. Bloemfontein.
75. **Butler, E. 2017.** Palaeontological Desktop Assessment of the proposed Overvaal Trust PV Facility, Buffelspoort, North West Province. Bloemfontein.
76. **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.
77. **Butler, E. 2017.** Palaeontological Impact Assessment of the proposed upgrade of the Sandriver Canal and Klippan Pump station in Welkom, Free State Province. Bloemfontein.

78. **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.
79. **Butler, E. 2017.** Palaeontological Desktop Assessment of the proposed Swaziland-Mozambique border patrol road and Mozambique barrier structure. Bloemfontein.
80. **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.
81. **Butler, E. 2017.** Palaeontological Desktop Assessment for the proposed development of Wastewater Treatment Works on Hartebeesfontein, near Panbult, Mpumalanga. Bloemfontein.
82. **Butler, E. 2017.** Palaeontological Desktop Assessment for the proposed development of Wastewater Treatment Works on Rustplaas near Piet Retief, Mpumalanga. Bloemfontein.
83. **Butler, E. 2018.** Palaeontological Impact Assessment for the Proposed Landfill Site in Luckhoff, Letsemeng Local Municipality, Xhariep District, Free State. Bloemfontein.
84. **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.
85. **Butler, E. 2018.** Palaeontological Impact Assessment of the authorisation and amendment processes for Manangu mine near Delmas, Victor Khanye local municipality, Mpumalanga. Bloemfontein.
86. **Butler, E. 2018.** Palaeontological Desktop Assessment for the proposed Mashishing township establishment in Mashishing (Lydenburg), Mpumalanga Province. Bloemfontein.
87. **Butler, E. 2018.** Palaeontological Desktop Assessment for the Proposed Mlonzi Estate Development near Lusikisiki, Ngquza Hill Local Municipality, Eastern Cape. Bloemfontein.
88. **Butler, E. 2018.** Palaeontological Phase 1 Assessment of the proposed Swaziland-Mozambique border patrol road and Mozambique barrier structure. Bloemfontein.
89. **Butler, E. 2018.** Palaeontological Desktop Assessment for the proposed electricity expansion project and Sekgame Switching Station at the Sishen Mine, Northern Cape Province. Bloemfontein.
90. **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.
91. **Butler, E. 2018.** Palaeontological Field Assessment for the proposed re-alignment and de-commisioning of the Firham-Platrand 88kv Powerline, near Standerton, Lekwa Local Municipality, Mpumalanga province. Bloemfontein.
92. **Butler, E. 2018.** Palaeontological Desktop Assessment of the proposed Villa Rosa development In the Buffalo City Metropolitan Municipality, East London. Bloemfontein.
93. **Butler, E. 2018.** Palaeontological field Assessment of the proposed Villa Rosa development In the Buffalo City Metropolitan Municipality, East London. Bloemfontein.

94. **Butler, E. 2018.** Palaeontological desktop assessment of the proposed Mookodi – Mahikeng 400kV line, North West Province. Bloemfontein.
95. **Butler, E. 2018.** Palaeontological Desktop Assessment for the proposed Thornhill Housing Project, Ndlambe Municipality, Port Alfred, Eastern Cape Province. Bloemfontein.
96. **Butler, E. 2018.** Palaeontological desktop assessment of the proposed housing development on portion 237 of farm Hartebeestpoort 328. Bloemfontein.
97. **Butler, E. 2018.** Palaeontological desktop assessment of the proposed New Age Chicken layer facility located on holding 75 Endicott near Springs in Gauteng. Bloemfontein.
98. **Butler, E. 2018** Palaeontological Desktop Assessment for the development of the proposed Leslie 1 Mining Project near Leandra, Mpumalanga Province. Bloemfontein.
99. **Butler, E. 2018.** Palaeontological field assessment of the proposed development of the Wildealskloof mixed use development near Bloemfontein, Free State Province. Bloemfontein.
100. **Butler, E. 2018.** Palaeontological Field Assessment of the proposed Megamor Extension, East London. Bloemfontein
101. **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.
102. **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.
103. **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.
104. **Butler, E. 2018.** Palaeontological Exemption Letter for the proposed reclamation and reprocessing of the City Deep Dumps in Johannesburg, Gauteng Province. Bloemfontein.
105. **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.
106. **Butler, E.** 2018. Proposed Kalabasfontein Mine Extension project, near Bethal, Govan Mbeki District Municipality, Mpumalanga. Bloemfontein.
107. **Butler, E.** 2018. Palaeontological Desktop Assessment for the development of the proposed Leslie 1 Mining Project near Leandra, Mpumalanga Province. Bloemfontein.
108. **Butler, E.** 2018. Palaeontological Desktop Assessment of the proposed Mookodi – Mahikeng 400kV Line, North West Province. Bloemfontein.
109. **Butler, E.** 2018. Environmental Impact Assessment (EIA) for the Proposed 325mw Rondekop Wind Energy Facility between Matjiesfontein And Sutherland In The Northern Cape Province.
110. **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.

111. **Butler, E.** 2018. Palaeontological impact assessment of the proposed Kalabasfontein Mining Right Application, near Bethal, Mpumalanga.
112. **E. Butler.** 2019. Palaeontological Desktop Assessment of the proposed Westrand Strengthening Project Phase II.
113. **E. Butler**. 2019. Palaeontological Field Assessment for the proposed Sirius 3 Photovoltaic Solar Energy Facility near Upington, Northern Cape Province
114. **E. Butler.** 2019. Palaeontological Field Assessment for the proposed Sirius 4 Photovoltaic Solar Energy Facility near Upington, Northern Cape Province
115. **E. Butler**. 2019. Palaeontological Field Assessement for Heuningspruit PV 1 Solar Energy Facility near Koppies, Ngwathe Local Municipality, Free State Province.
116. **E. Butler**. 2019. Palaeontological Field Assessment for the Moeding Solar Grid Connection, North West Province.
117. **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.
118. **E. Butler. 2019.** Recommended Exemption from further Palaeontological studies: of Proposed Agricultural Development, Plot 1178, Kakamas South Settlement, Kai! Garib Municipality
119. E. Butler. 2019. Palaeontological Desktop Assessment for the Proposed Waste Rock Dump Project at Tshipi Borwa Mine, near Hotazel, Northern Cape Province:
120. **E. Butler. 2019**. Palaeontological Exemption Letter for the proposed DMS Upgrade Project at the Sishen Mine, Gamagara Local Municipality, Northern Cape Province
121. **E. Butler. 2019.** Palaeontological Desktop Assessment of the proposed Integrated Environmental Authorisation process for the proposed Der Brochen Amendment project, near Groblershoop, Limpopo
122. 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
123. **E. Butler. 2019**. Palaeontological Desktop Assessment of the proposed Kriel Power Station Lime Plant Upgrade, Mpumalanga Province
124. **E. Butler.** 2019. Palaeontological Impact Assessment for the proposed Kangala Extension Project Near Delmas, Mpumalanga Province.
125. **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.
126. **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.
127. **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.

128. **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.
129. **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.
130. **E. Butler. 2019**. Palaeontological Desktop Assessment of the proposed Vedanta Housing Development, Pella Mission 39, Khâi-Ma Local Municipality, Namakwa District Municipality, Northern Cape.
131. **E. Butler. 2019**. Palaeontological Desktop Assessment for The Proposed 920 Kwp Groenheuwel Solar Plant Near Augrabies, Northern Cape Province
132. **E. Butler. 2019.** Palaeontological Desktop Assessment for the establishment of a Super Fines Storage Facility at Amandelbult Mine, Near Thabazimbi, Limpopo Province
133. **E. Butler. 2019.** Palaeontological Impact Assessment for the proposed Sace Lifex Project, Near Emalahleni, Mpumalanga Province
134. **E. Butler. 2019.** Palaeontological Desktop Assessment for the proposed Rehau Fort Jackson Warehouse Extension, East London
135. **E. Butler. 2019.** Palaeontological Desktop Assessment for the proposed Environmental Authorisation Amendment for moving 3 Km Of the Merensky-Kameni 132KV Powerline
136. **E. Butler. 2019.** Palaeontological Impact Assessment for the proposed Umsobomvu Solar PV Energy Facilities, Northern and Eastern Cape
137. **E. Butler. 2019.** Palaeontological Desktop Assessment for six proposed Black Mountain Mining Prospecting Right Applications, without Bulk Sampling, in the Northern Cape.
138. **E. Butler. 2019.** Palaeontological field Assessment of the Filling Station (Rietvlei Extension 6) on the Remaininng Portion of Portion 1 of the Farm Witkoppies 393JR east of the Rietvleidam Nature Reserve, City of Tshwane, Gauteng
139. **E. Butler. 2019.** Palaeontological Desktop Assessment Of The Proposed Upgrade Of The Vaal Gamagara Regional Water Supply Scheme: Phase 2 And Groundwater Abstraction
140. **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
141. **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
142. **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, Roodepan Kimberley, Sol Plaatjies Local Municipality, Frances Baard District Municipality, Northern Cape

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

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

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

146. **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:

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

148. **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

149. **E. Butler.** 2019. Palaeontological Desktop Assessment Of The Proposed Diamond Mining Permit Application Near Kimberley, Sol Plaatjies Municipality, Northern Cape Province

150. **E. Butler.** 2019. Palaeontological Desktop Assessment Of The Proposed Diamonds (Alluvial, General & In Kimberlite) Prospecting Right Application Near Near Postmasburg, Registration Division; Hay, Northern Cape Province