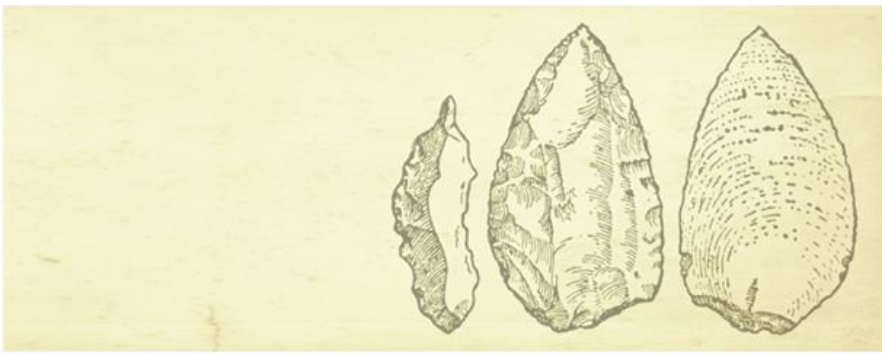
Appendix 8:

Phase 1 HIA: Heritage Desktop Study



PHASE 1 HIA HERITAGE DESKTOP STUDY MENAR CAPITAL PROSPECTING RIGHT NORTHERN CAPE

PROPOSED PROSPECTING RIGHT APPLICATION FOR IRON ORE AND MANGANESE ON VARIOUS PORTIONS OF THE FARMS GNOOLOOMA 416, MELTON 420, DIEPWATER 361, LA ROCHELLE 359 AND PLUMSTEAD 418, LOCATED 41 KM NORTH-WEST OF KATHU WITHIN THE TSANTSABANE AND JOE MOROLONG LOCAL MUNICIPALITIES, NORTHERN CAPE PROVINCE.

CaseID: 16605 (NC 30/5/1/1/2/12769 PR)

PREPARED FOR:

uKHOZI ENVIRONMENTALISTS (PTY) LTD
& MENAR CAPITAL (PTY) LTD

PREPARED BY:

HEIDI FIVAZ & SKY-LEE FAIRHURST
ELIZE BUTLER & JAN ENGELBRECHT
UBIQUE HERITAGE CONSULTANTS

20 SEPTEMBER 2021

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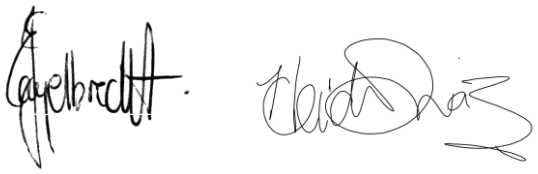
Declaration of independence:

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

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



Signed:
J.A.C. Engelbrecht, H. Fivaz &
UBIQUE Heritage Consultants

Date: 2021-08-10

SUMMARY OF SPECIALIST EXPERTISE

JAN ENGELBRECHT
CRM ARCHAEOLOGIST

Jan Engelbrecht is accredited by the Cultural Resources Management section of the Association of Southern African Professional Archaeologists (ASAPA) to undertake Phase1 AIAs and HIAs in South Africa. He is also a member of the Association for Professional Archaeologists (ASAPA). Mr Engelbrecht holds an honours degree in archaeology (specialising in the history of early farmers in southern Africa (Iron Age) and Colonial period) from the University of South Africa. He has 12 years of experience in heritage management. He has worked on projects as diverse as the Zulti South HIA project of Richards Bay Minerals, research on the David Bruce heritage site at Ubombo in Kwa-Zulu Natal, and various archaeological excavations and historical projects. He has worked with many rural communities to establish integrated heritage and land use plans and speaks Zulu fluently. Mr Engelbrecht established Ubique Heritage Consultants in 2012. The company moved from KZN to the Northern Cape and is currently based at Askham in the Northern Cape within the Mier local municipality in the Kgalagadi region. He had a significant military career as an officer, whereafter he qualified as an Animal Health Technician at Technikon RSA and UNISA. He is currently studying for his MA Degree in Archaeology.

HEIDI FIVAZ
ARCHAEOLOGIST &
OBJECT CONSERVATOR

Heidi Fivaz has been a part of UBIQUE Heritage Consultants since 2016 and took over ownership in 2018. She is responsible for project management, surveys, research and report compilation. She holds a B.Tech. Fine Arts degree (2000) from Tshwane University of Technology, a BA Culture and Arts Historical Studies degree (2012) from UNISA and received her BA (Hons) Archaeology in 2015 (UNISA). She has received extensive training in object conservation from the South African Institute of Object Conservation and specialises in glass and ceramics conservation. She is also a skilled artefact and archaeological illustrator. Ms Fivaz was awarded her MA in Archaeology (with distinction) in 2021 by the University of South Africa (UNISA), focusing on historical and industrial archaeology. She is a professional member of the Association of South African Archaeologists and has worked on numerous archaeological excavation and surveying projects over the past ten years.

SKY-LEE FAIRHURST
ARCHAEOLOGIST

Sky-Lee Fairhurst has been informally part of UBIQUE Heritage Consultants since 2019. She is responsible for research and desktop studies. Miss Fairhurst obtained her BA in Archaeology and Biblical archaeology in 2016 and her BA Hons in Archaeology (*cum laude*) at the University of South Africa (UNISA) in 2018, focussing on research themes such as gender, households and Late Iron Age settlements. She is currently pursuing her interest in southern African agropastoral societies as an MA Archaeology student at the University of South Africa (UNISA). She is skilled at artefacts and archaeological illustrations. Over the past nine years, she has obtained considerable excavation experience and has worked on various sites, including Historical, Iron Age sites and Palaeontological.

EXECUTIVE SUMMARY

Project description

UBIQUE Heritage Consultants were appointed by uKhozi Environmentalists (Pty) Ltd as independent heritage specialists to conduct a cultural heritage desktop assessment in accordance with Section 38 of the NHRA and the National Environmental Management Act 107 of 1998 (NEMA) and to fulfil the requirements of Menar Capital (Pty) Ltd's Prospecting Right Application in terms of the Mineral and Petroleum Resources Development Act (MPRDA), 2002 (Act 28 of 2002), and in response to SAHRA's interim comments for CaseID: 16605.

Menar Capital (Pty) Ltd is applying for the right to prospect for iron ore and manganese on portions 1,2,3,4 and the RE of the farm Gnoolooma 416, portions 1 and the RE of the farm Plumstead 418, portions 1 and the remaining extent of Melton 420 in the Tstantsabane Local Municipality, ZF Mgcawu District Municipality, and portions 1 and the remaining extent of the farm Diepwater 361 and the remaining extent of the farm La Rochelle 359 in the Joe Morolong Local Municipality, John Taolo Gaetsewe District, Northern Cape Province.

Findings of Heritage Desktop Study

The HIA Desktop Study has found that no Heritage or Archaeological Impact Assessments have been undertaken in or adjacent to the prospecting properties. However, heritage sites and resources ranging from low to high significance have been documented on the periphery of a 30-50 km radius from the study area. These sites provide the data necessary to anticipate the heritage resources and probable significance that might accompany any projected heritage resource.

The background study revealed that apart from very significant Stone Age sites towards the northeast, east, and southeast of the development footprint, the majority of the documented lithic material closer to the prospecting properties are of low and medium significance. Furthermore, these sites are predominantly open-air sites with low-density surface scatters. Therefore, the occurrence of lithic material within the development areas are considered highly probable.

A couple of rock-art sites have been recorded to the north and southeast of the study area, with only one incidence within the 50 km radius. Rock art, specifically engravings, may be present in open-air rocky outcrop sites, such as the hilly terrain on the farm Gnoolooma 416.

No Iron Age sites have been recorded near the development area, which would suggest that the likelihood of such sites being present in the development area is low.

Archaeological traces of historical features and artefacts attributed to the representation of the regional colonial farming history and colonial settlement can probably be found on all the farms.

Graves and informal cemeteries can be expected anywhere in the landscape. Family cemeteries can be anticipated close to farmsteads, while informally marked graves consisting of fieldstone cairns and headstones may be found in the veldt. The Environmental BAR (uKhozi 2021) mentions that gravesites are "scattered throughout the study area". These are ancestral graves on the southwestern part of the RE of the Farm La Rochelle 359 and Gnoolooma 416 Portion 4 close to the current farmstead.

The proposed prospecting area is predominantly underlain by Quaternary aged sediments of the Kalahari Group and the underlying Campbell Rand Subgroup (Ghaap Group, Transvaal Supergroup). The general low palaeontological sensitivity of the bedrocks and superficial sediments in the proposed development footprint indicates that the proposed development will have an overall LOW impact significance in terms of palaeontological heritage. Therefore, it is considered that the development will not lead to detrimental impacts on the palaeontological resources of the area (Butler 2021).

Recommendations

A range of heritage sites occur in the wider region, and similar sites should be anticipated within the study area. Every site is relevant to the Heritage Landscape, but it is projected that only a few sites in the study area could have conservation value. This recommendation is based on studies undertaken in the broader area of the mineral prospecting rights application's properties. The following conclusions apply:

1. The scoping study has revealed that several Stone Age occurrences/sites have been recorded in the region. No studies have been conducted on the earmarked properties or immediate vicinity of the MRA footprints. The possibility of open-air Stone Age sites/occurrences in the development area exists. We recommend that a site-specific field study be undertaken as soon as the prospecting right permit has been issued, and the final locations of the boreholes have been determined.

2. Various colonial/historical structures have been recorded in a ±50 km radius of the development area that represents the regional colonial farming history of the region. No studies have been conducted on the property or immediate vicinity of the development footprints. It is recommended that a site-specific field study should be undertaken as soon as the prospecting right permit has been issued and the final locations of the boreholes have been determined.

3. Formal and informal graveyards, as well as pre-colonial graves, occur widely across southern Africa. It is commonly recommended that these sites are preserved from development. Once the prospecting right permit has been issued, and the final locations of the boreholes have been determined, a field survey and public consultation should be undertaken to ensure that no gravesites are present in the vicinity. Any graveyard(s), grave(s) or burial(s) would likely be of High Local Significance. It is recommended that any site-specific graves be avoided with a 50 m buffer/safety zone. Furthermore, we recommend that a field survey be completed to ensure that all graves in the area are recorded and that the correct mitigation measures are implemented.

4. This basic assessment report represents an estimation of the probability of heritage sites/artefacts located on/near the development footprint, based on available data. Due to the lack of previous Heritage Assessments within the area, the probability of archaeological sites/occurrences located in the development area is considered highly probable. A visual guide or rudimentary Chance Finds Protocol has been developed for this project. It is recommended that the developer refers to it during the planning process to help establish the exact locations of the boreholes.

5. Due to the low palaeontological significance of the area, no further palaeontological heritage studies, ground-truthing and/or specialist mitigation are required. It is considered that the development of the proposed development is deemed appropriate and feasible and will not lead to detrimental impacts on the palaeontological resources. Therefore, it is recommended that the project be exempt from a full Paleontological Impact Assessment (Butler 2021, Appendix A).

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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
IA:	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 Menar Capital (Pty) Ltd's Prospecting Right Application to the Department of Mineral Resources and Energy (DMRE) to prospect for iron ore and manganese on various Portions of the Farms Gnoolooma 416, Melton 420, Diepwater 361, La Rochelle 359 and Plumstead 418, located 41 km North-West of Kathu within the Tsantsabane and Joe Morolong Local Municipalities, of the Northern Cape Province. UBIQUE Heritage Consultants were appointed by uKhozi Environmentalists (Pty) Ltd 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 desktop assessment (AIA/HIA) of the prospecting area.

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

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

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

The result of this investigation is presented within this heritage desktop report. It comprises the recording of previously identified heritage resources present/absent and offers recommendations for managing these resources within the context of the proposed development.

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 Basic Assessment process 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 intensive desktop study to identify sites of cultural importance within the development area, it is essential to note that some heritage sites may have been missed due to the limitations of the digital survey. The digital survey is dependent on available data sources and the visibility of heritage resources in satellite imagery. No field survey has been conducted, and all heritage sites/possibility of heritage features are based on the desktop study and digital survey. No sub-surface investigations (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 and screening report 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 and screening report should comply with the requirements of NEMA, including providing the assumptions and limitations associated with the study; the details, qualifications and expertise of the person who prepared the report; and a statement of competency.

2.1. Statutory Requirements

2.1.1. General

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

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

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

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

2.1.2. National Heritage Resources Act 25 of 1999

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

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

2.1.3. Heritage Impact Assessments/Archaeological Impact Assessments

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

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

2.1.4. Definitions of heritage resources

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

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

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

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

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

2.1.5. Management of Graves and Burial Grounds

- **Graves younger than 60 years** are protected in terms of Section 2(1) of the Removal of Graves and Dead Bodies Ordinance 7 of 1925 as well as the Human Tissues Act 65 of 1983.

- **Graves older than 60 years, situated outside a formal cemetery administered by a local Authority are** protected in terms of Section 36 of the NHRA as well as the Human Tissues Act of 1983. Accordingly, such graves are the jurisdiction of SAHRA. The procedure for Consultation Regarding Burial Grounds and Graves (Section 36(5) of NHRA) is applicable to graves older than 60 years that are situated outside a formal cemetery 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 reading of historical texts/records as well as previous heritage studies and research around the study area.

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.

The study area is contextualised by incorporating data from previous Cultural Resource Management (CRM) reports done in the area and an archival search. The objective of this is to extract data and information on the area in question, looking at archaeological sites, historical sites, and graves in the area. In addition, a concise account of the archaeology and history of the broader study area was compiled from available sources, including those listed in the bibliography.

3.1.2. 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 as 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 categorised 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.

3.1.3. 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. 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 out of character with the heritage resource and its setting.

Beneficial and adverse impacts can be direct or indirect and 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	Low	No irreplaceable resources will be impacted.

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

3.2. Report

The results of the desktop research 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 is presented objectively. Alternatives, should any significant sites be impacted adversely by the proposed project, are offered. All effort will be made to ensure that all studies, assessments and results comply with the

relevant legislation and the code of ethics and guidelines of the Association of South African Professional Archaeologists (ASAPA). The report aims to assist the developer in managing the documented heritage resources in a responsible manner and protecting, preserving, and developing them within the framework provided by the National Heritage Resources Act of 1999 (Act 25 of 1999).

4. PROJECT OVERVIEW

UBIQUE Heritage Consultants were appointed by uKhozi Environmentalists (Pty) Ltd as independent heritage specialists to conduct a cultural heritage desktop assessment in accordance with Section 38 of the NHRA and the National Environmental Management Act 107 of 1998 (NEMA) and to fulfil the requirements of Menar Capital (Pty) Ltd's Prospecting Right Application in terms of the Mineral and Petroleum Resources Development Act (MPRDA), 2002 (Act 28 of 2002), and in response to SAHRA's interim comments for CaseID: 16605.

Menar Capital (Pty) Ltd is applying for the right to prospect for iron ore and manganese on portions 1,2,3,4 and the RE of the farm Gnoolooma 416, portions 1 and the RE of the farm Plumstead 418, portions 1 and the remaining extent of Melton 420 in the Tstantsabane Local Municipality, ZF Mgcawu District Municipality, and portions 1 and the remaining extent of the farm Diepwater 361 and the remaining extent of the farm La Rochelle 359 in the Joe Morolong Local Municipality, John Taolo Gaetsewe District, Northern Cape Province. The area involved in the prospecting rights application is approximately 18,472,27 ha.

The proposed prospecting activities will establish the extent and the quality of the iron and manganese ore body through non-invasive (desktop study) and invasive (core drilling) methods. Core drilling will target areas identified through the non-invasive techniques for reserve determination and mine planning. Proposed drill holes are located on a grid of 500 m intervals. A maximum of 405 holes will be drilled, with no more than two holes actively drilled at any given time. The exact location and number of boreholes drilled will be determined by the geophysical and geological work carried out in Phase 1 of the prospecting programme. The prospecting activities will be undertaken over three years, with the potential for renewal depending on results and studies undertaken (uKhozi MSH929/0621 2021: 18). Infrastructure development will include temporary contractors yard (625m^2), earth sumps, laydown area, site office, parking area and possible access roads.

4.1. Technical information

Project description	
Project name	Phase 1 HIA Heritage Desktop Study Menar Capital prospecting Rights Northern Cape
Description	Mineral prospecting rights application for iron ore and manganese on portions 1,2,3,4 and the RE of the farm Gnoolooma 416, portions 1 and the RE of the farm Plumstead 418, portions 1 and the remaining extent of Melton 420, portions 1 in the Tstantsabane Local Municipality, ZF Mgcawu District Municipality, and the remaining extent of the farm Diepwater 361 and the farm La Rochelle 359 in the Joe Morolong Local Municipality, John Taolo Gaetsewe District, Northern Cape Province.
Developer	
Menar Capital (Pty) Ltd	
Property details	
Province	Northern Cape
District municipality	ZF Mgcawu District Municipality John Taolo Gaetsewe District Municipality
Local municipality	Tstantsabane Local Municipality Joe Morolong Local Municipality

Topo-cadastral map	1:250 000 WGS 2227
Farm name	Gnoolooma 416 (Portions 1-4, RE), Plumstead 418 (Portion 1 & RE), Melton 420 (Portion 1 & RE), Diepwater 361 (Portion 1 & RE), La Rochelle 359 (RE)
Closest town	Kathu
Development footprint size	18,472,27 ha
Land use	
Previous	Livestock farming
Current	Livestock farming and vacant
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.	Yes
Construction of bridge or similar structure exceeding 50m in length.	No
Construction exceeding 5000m ².	Yes
Development involving three or more existing erven or subdivisions.	No
Development involving three or more erven or divisions that have been consolidated within the past five years.	No
Rezoning of site exceeding 10 000m ².	No
Any other development category, public open space, squares, parks, recreation grounds.	No

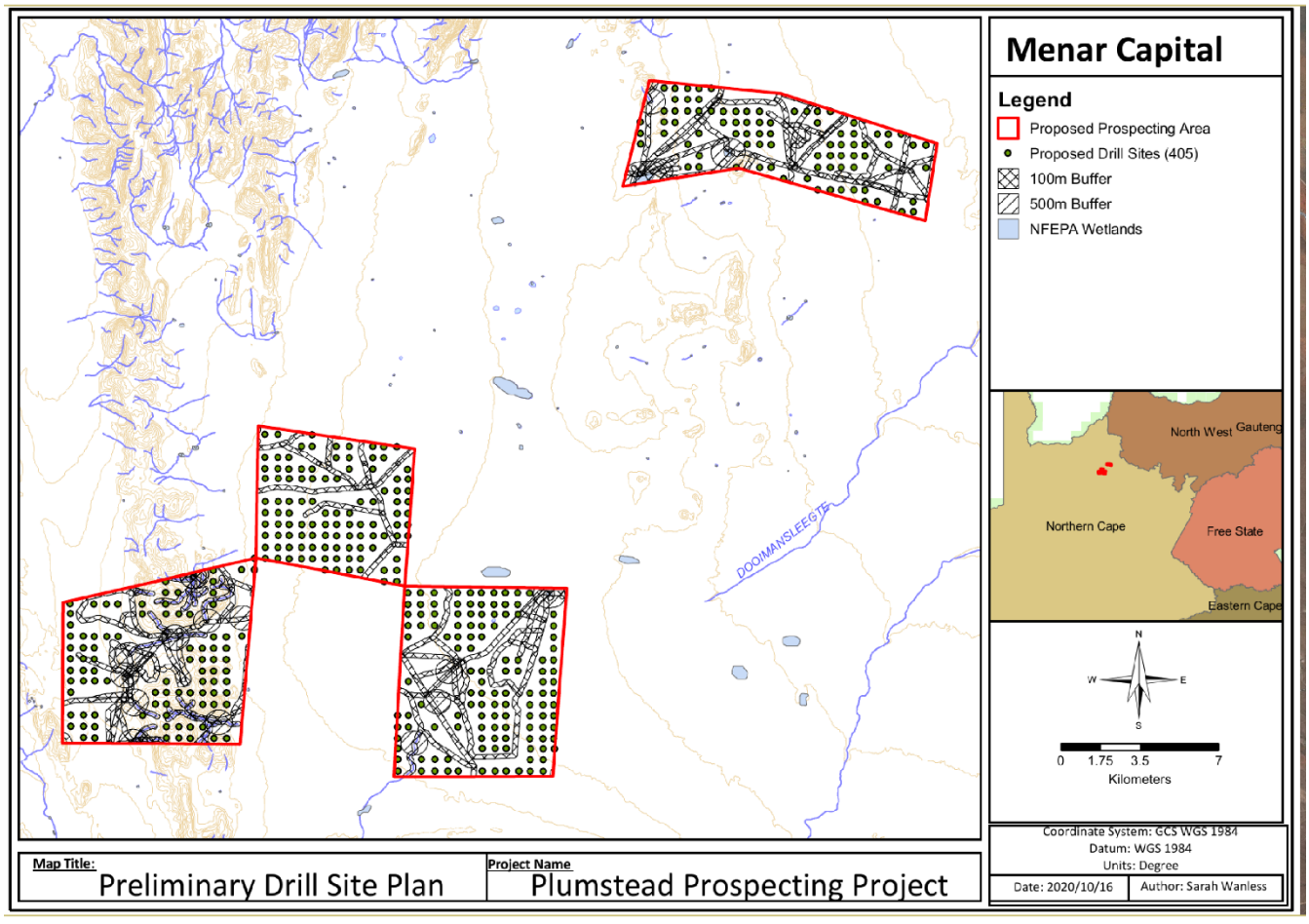

Figure 1 *Menar Capital (Pty) Ltd's iron ore and manganese Preliminary Drill Site Plan. Image provided by the client.*

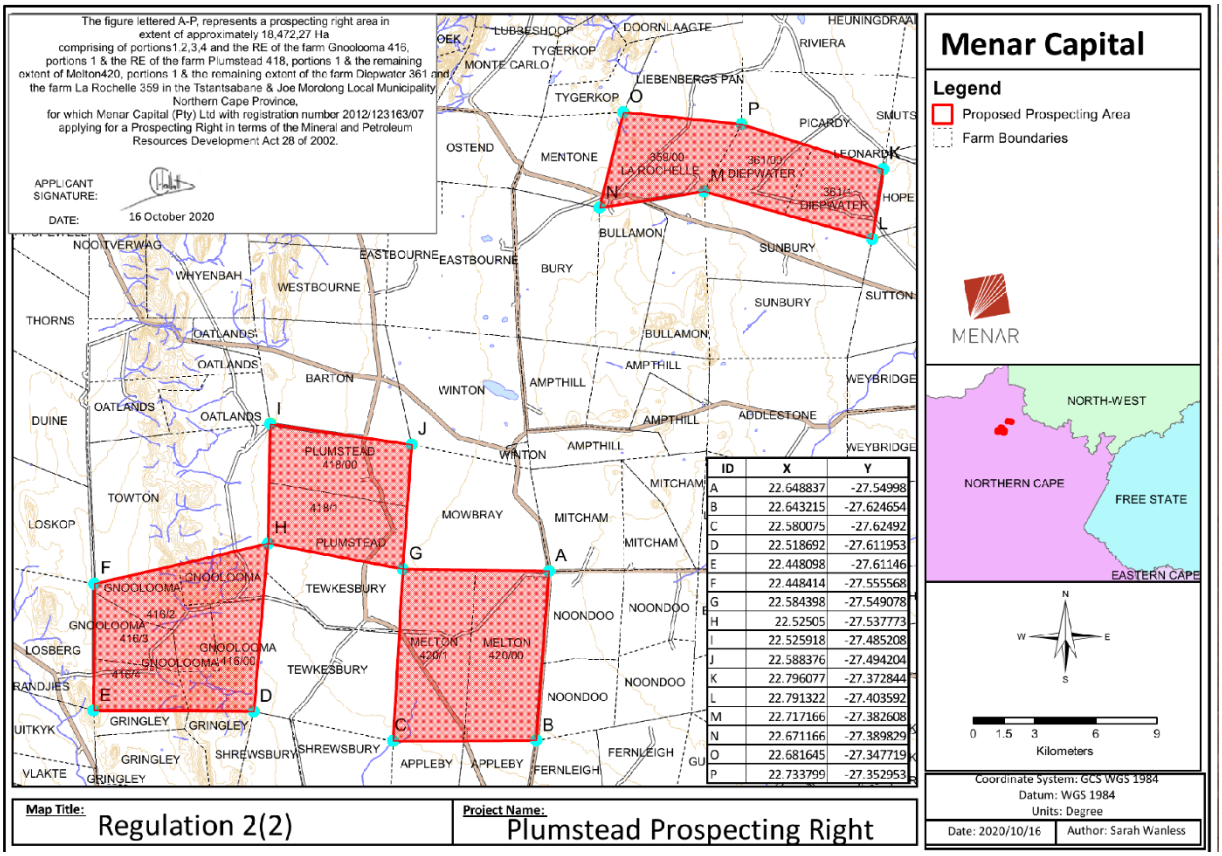

Figure 2 *Properties affecyed by Menar Capital (Pty) Ltd's mineral prospecting rights application. Image: provided by client.*

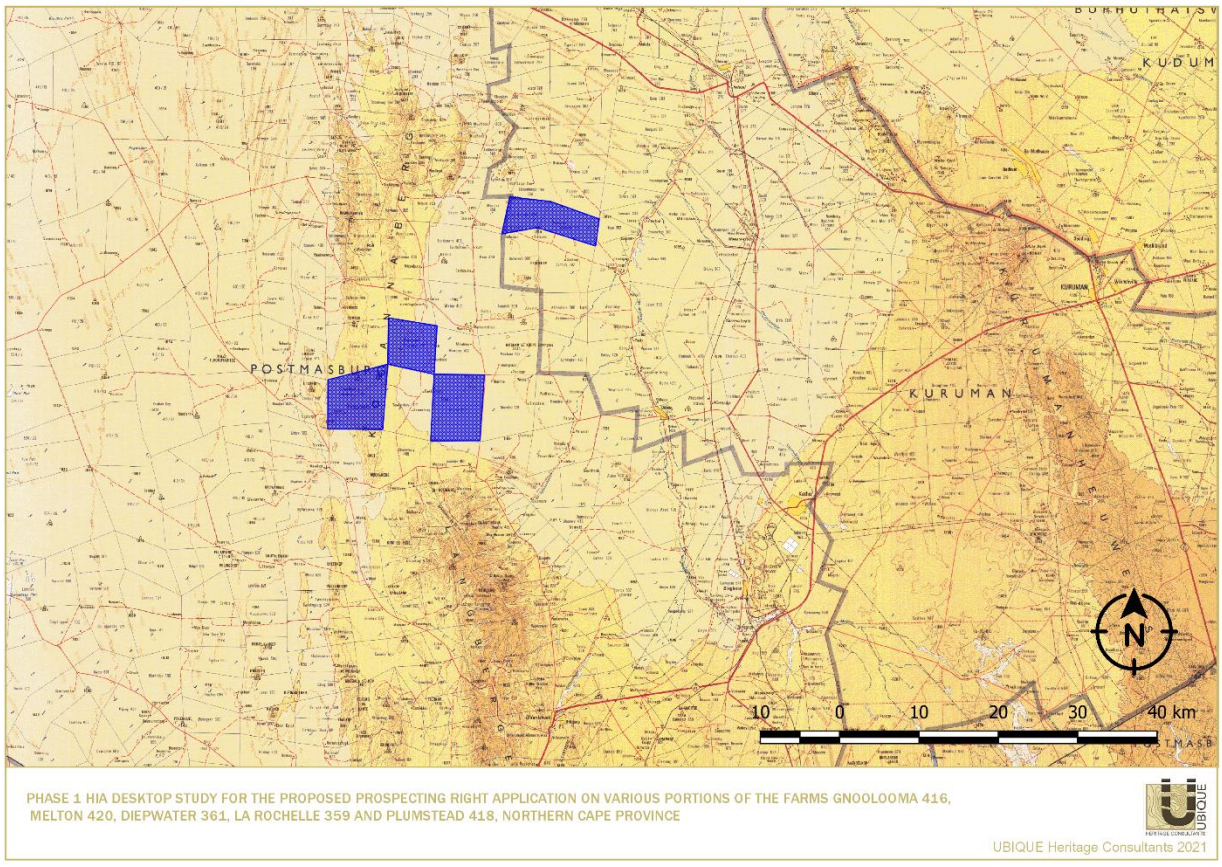

Figure 3 *Locality of the project indicted on 1:250 000 Topo-cadastral map WGS 2227.*

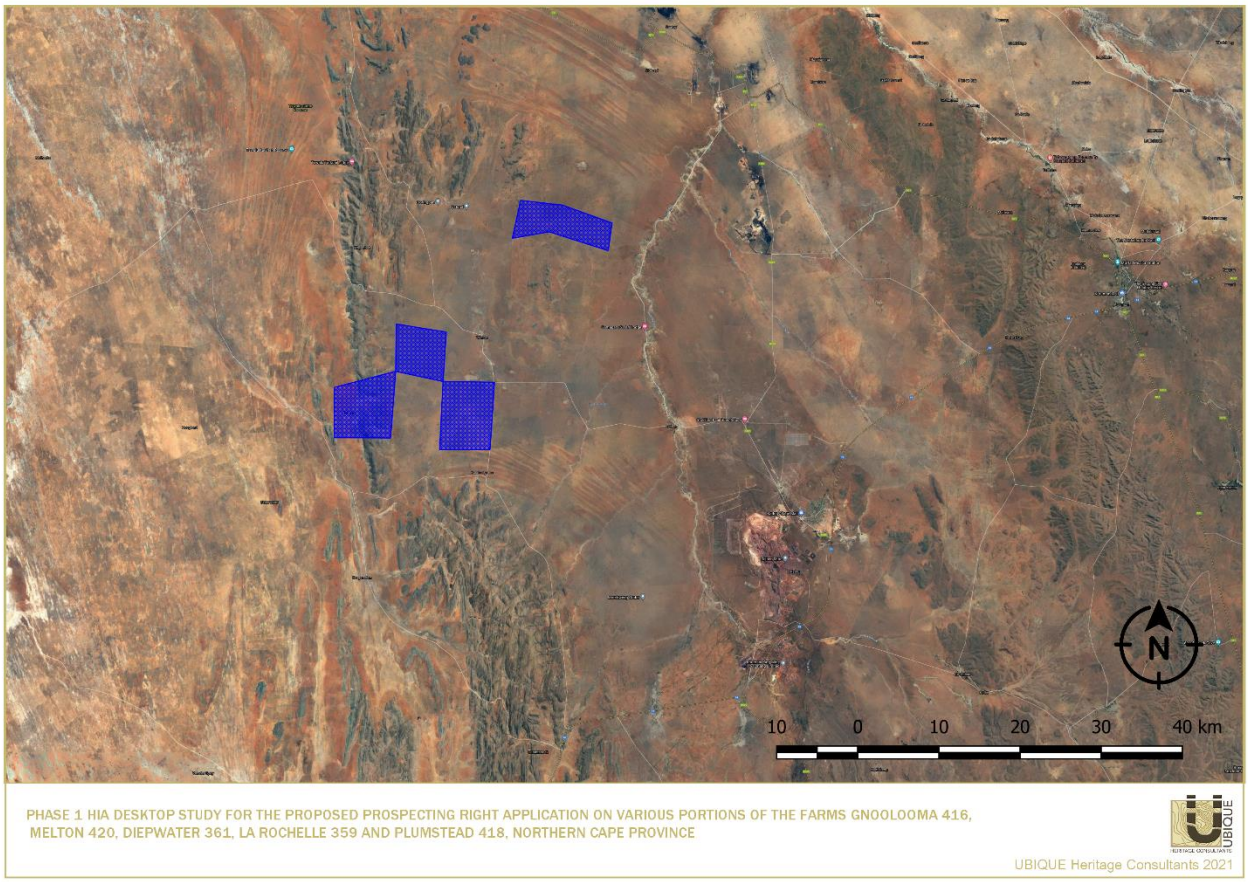

Figure 4 *Locality of the project, indicated on Google Earth Satellite imagery.*

4.2. Description of the affected environment

The prospecting areas fall predominantly in Kathu Bushveld vegetation type, characterised by a medium-tall tree layer with *Acacia erioloba* in places, but mostly open and including *Boscia albitrunca* as the prominent trees. The shrub layer consists of *A. mellifera*, *Diospyros lycioides* and *Lycium hirsutum*, and the grass layer is variable in cover. The landscape is typified by aeolian red sand and surface calcrete and deep sandy soils of Hutton and Clovelly soil forms (Mucina & Rutherford 2006).

According to the project BAR (uKhozi 2021): “most of the application area is vacant land, but infrastructure found inside the application area include gravel roads, fences, gates, houses, stores, power lines, and some informal dwellings”.

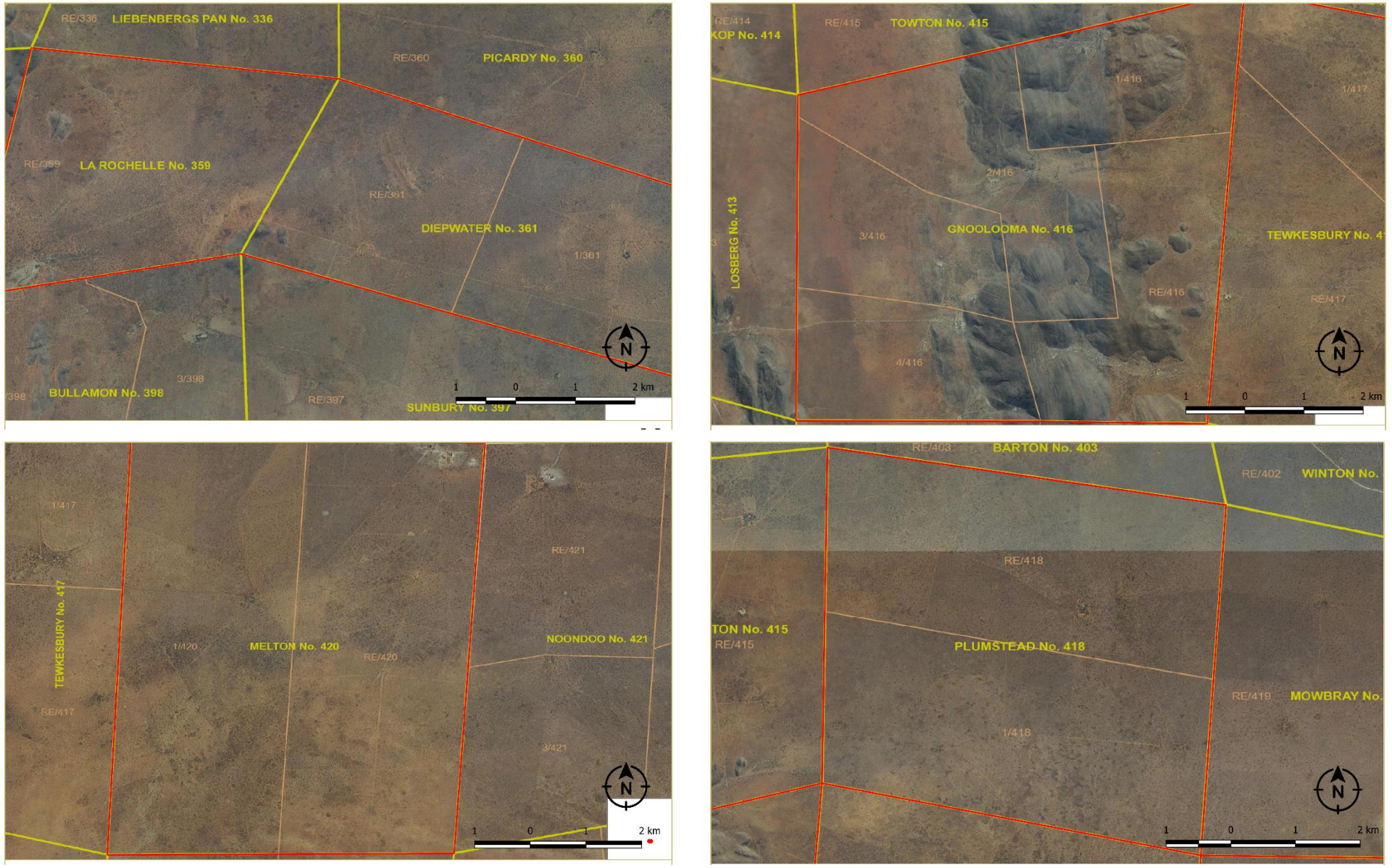

Figure 5 *Aerial views of the topography of the different affected properties.*

5. HISTORICAL AND ARCHAEOLOGICAL BACKGROUND

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

5.1. Region

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

5.1.1. Stone Age

The history of the Northern Cape is reflected in a rich archaeological landscape, with a wealth of pre-colonial archaeological sites. These sites yield some of the richest Stone Age scatters (Beaumont & Morris 1990; Kruger 2018; Lombard et al. 2012; Morris & Beaumont 2004). Numerous sites have been identified and documented across the region. These sites have been dated to the Earlier, Middle and Later Stone Age (Kruger 2018).

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

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

In short, the Stone Age refers to humans that mainly utilised stone as their technological marker. Each sub-division is formed by a group of industries where the assemblages share attributes or common traditions (Lombard et al. 2012). The ESA is characterised by flakes produced from pebbles, cobbles and percussive tools, as well as objects created later during this period, such as large hand axes, cleavers and other bifacial tools (Klein 2000). The MSA is associated with small flakes, blades and points. The aforementioned is generally suggested to have been made and utilised for hunting activities and had numerous functions (Wurz 2013).

Furthermore, the LSA is characterised by microlithic stone tools, scrapers and flakes (Binneman 1995; Lombard et al. 2012). The LSA is also associated with rock art. Numerous LSA rock art sites, mainly in rock engravings and paintings, have been identified in the Northern Cape (Beaumont 2008; Kruger 2018; Morris 1988). These sites are commonly found on slopes, hilltops, rocky outcrops and occasionally in river beds (Kruger 2018). Banded ironstone occurs on several sites throughout the Northern Cape. It would appear to have been a favoured raw material for making stone tools due to its superior flaking qualities (Kaplan 2012b). Beaumont et al. (1995) state, regarding the LSA, that "virtually all the 'Bushmanland' sites so far located appear to be ephemeral occupation by small groups in the hinterland on both sides of the [Orange] river". This is believed to be in sharp contrast to the substantial herder encampments along the Orange River floodplain itself (Morris 2013a, b, c, d, e, & f). It has been noted by Beaumont et al. (1995:240-241) that a widespread low density of stone artefacts scatters from the Pleistocene age appears across areas of 'Bushmanland' to the south. Here, raw materials, mainly quartzite cobbles, were derived from the Dwyka glacial till (Morris 2013a, b, c, d, e, & f). According to Morris (2013b & c), substantial MSA sites are relatively uncommon in Bushmanland. However, several sites have been recorded but yield small samples.

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

Some of the most significant sites of the South African Stone Age are located in the region, including Kathu Pan, Bestwood, Kathu Townlands, and the Wonderwerk Cave. In 1974 (Beaumont 1990), Kathu Pan was discovered when early Stone Age artefacts and the remains of now-extinct animals were observed in the exposed profiles of a sinkhole at Kathu Pan 1 (Beaumont 1990, Nilssen 2018, Orton 2020). The landscape around the town of Kathu is rich in archaeological material and sites. Numerous sites have been excavated, revealing that the area contained a long sequence of Stone Age occupations (ESA, MSA and LSA). Some of the excavations were done on the Farm Sims 462 (Kathu Pan 6, 8, 9, 10, 11), Kathu 465 (Kathu Pan 7), Uitkoms 463 (Reserve 2) and at the Kathu Townlands during the 1980s-1990. According to Beaumont (2006), various artefacts were found dating from the Howiesons Poort, "Late Pietersburg", Wilton and Oakhurst, Fauresmith and Acheulean, as well as an LSA ceramic that included coarse segment (Kathu Pan 11) (Beaumont 2006). The availability of a constant water supply at Kathu Pan is most likely responsible for the long sequence of occupations of the site and the quantity of Stone Age debris (Kruger 2012). The pan, which covers roughly 0.3 km, is a shallow depression with internal drainage and a high water table. The majority are filled in sinkholes formed within the calcretes of the Tertiary-aged Kalahari Group. As a result, Kathu Pan 1 has an extensive lithostratigraphic and archaeological sequence (Magoma 2013).

One of the reasons why the Kathu archaeological site complex is important is that recent research on the Stone Age implements from Kathu Pan was dated to 500 000 years ago. Thus, suggesting that early humans, possibly the *Homo heidelbergensis*, were hafting multicomponent implements about 200 000 years earlier than previously thought (Wilkins et al. 2012).

Kathu Townlands was first documented in 1980. The initial excavations took place in 1982 and 1990 (Beaumont 1990; Orton 2020). The southeastern part of the Kathu Townlands site was subjected to rigorous investigation during the Rooisands Mall project, revealing that deposits up to a metre deep are rich in artefacts (e.g. bifaces and debitage) and material consistent with its interpretation as a quarry site (Morris 2014). According to Morris (2014), the pedestrian survey and test pits at Uitkoms 1 revealed similar lithic densities and debitage found at Kathu Townlands 1.

The Bestwood sand quarries are known to have a lithic industry of well-made handaxes, retouched scrapers, occasional blades, a great diversity of core types, including choppers, polyhedrons, discoidal cores and unidirectional Levallois cores (Morris 2014). Scatters of ESA and MSA stone tools, cores and flakes were recorded at Farm Bestwood 459 (Dreyer 2008c; Van Schalkwyk 2010c). Beaumont (2013) reported on ESA waste flakes and irregular flakes, blades, blade cores, handaxe fragments, handaxe roughouts, and handaxes from the excavations undertaken at Bestwood 549 on the eastern outskirts of Kathu. Test excavations and auger tests were undertaken for the Kathu cemetery by Fourie et al. (2018) (Lylyveld 545, on the southern side of the town of Kathu), yielded MSA material such as flaking debris, complete flakes, cores and formal tools. A single side scraper was recorded on Lylyveld north by Birkholtz (2019).

5.1.2. Iron Age

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

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

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

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

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

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

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

The expansion of early farmers/agropastoralists occurred in this region between 400 AD and 1100 AD. These early farmers settled in semi-permanent settlements (De Jong 2010). According to De Jong (2010), there is evidence that the EIA continued in the Lowveld until the 15th-century. However, it ended by 1100 AD on the escarpment. From the 15th-century onwards, the Highveld became active again, considering the gradually warmer and wetter climate. This later phase (the LIA) was accompanied by extensive stone walled settlements, such as the Thlaping capital Dithakong, approximately 40 km north of Kuruman (De Jong 2010). The Sotho-Tswana and Nguni-speaking societies, the descendants of the LIA mixed farming communities, found that the region was already sparsely inhabited by LSA Khoisan groups (the "first people"). De Jong (2010) comments that many of them were eventually assimilated by LIA communities, and only a few had managed to survive. Some of the surviving groups included the Korana and the Griqua. However, it should be mentioned that this contact period has often been referred to as the Ceramic LSA. It is often represented by sites such as the earlier mentioned Blinkklipkop specularite mine near Postmasburg and finds at the Kathu Pan (De Jong 2010).

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

A site of interesting significance is Tswalu Kalahari Reserve. The North of Kuruman Project is an interdisciplinary research project directed by Dr Jayne Wilkins and Dr Benjamin Schoville in close collaboration with Dr Robyn Pickering of the University of Cape Town. The archaeological footprint at Tswalu consists of stone tool scatters, rock art sites, and Iron Age stonewalling (Tswalu n.d.). Previous reconnaissance done on and beyond Tswalu has revealed several LSA, MSA, EMSA and ESA lithic occurrences (Beaumont & Bednarik (2015). In addition, the human traces on the terrain attest to the lengthy history of humans in Africa (Tswalu n.d.).

5.1.3. Historical period

Until the onset of European exploration and eventual settlement at modern-day Cape Town during the 17th century (e.g., Giliomee & Mbenga 2007), the Northern Cape region was occupied by Khoisan communities (e.g., Barnard 1992; Beaumont et al. 1995; Parsons 2008), reflected by the material culture discussed in the preceding paragraphs.

The historical era of the Northern Cape is best described as an assortment of events that had a socio-political and socio-economic impact on the indigenous and settler communities. These included client-labour relationships, inter-marriages, political alliances, slavery, trading, criminality, skirmishes, raids, competition for scarce resources such as grazing pasture and water, and ultimately frontier warfare between all groups. Conflict and who fought with whom

depended on fluctuating political alliances and socio-political agendas (Anderson 1985; Penn 1995; Parkington et al. 2019).

During the colonial frontier period, place names started becoming fixed, specifically in a cadastral sense, on maps and farm names. As a result, numerous names have Khoekhoegowab origin and, as Morris (2017a and b) states, encapsulates vestiges of pre-colonial/indigenous social geography. Interestingly, Morris (2017a and b) also states that genocide against the indigenous people is documented in the wider area.

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

The surveying, division and transference of Government-owned land to farmers mark the initial distribution of land to colonial farmers from the 1880s onward (De Jong 2010). Most of the farms were still government property and were leased to farmers in 1875. The farms were only later sold to individuals (Van Vollenhoven 2014). During the late 1920s, more permanent and large-scale settlements and possibly some of the first farmsteads started to appear in the region.

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

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

displaced refugees associated with the Fokeng, Tlokwa, Hlakwana and Phuting groups (De Jong 2010).

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

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

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

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

5.1.4. A brief history of the Kalahari and the Kalahari San

The earliest southern African hunter-gatherers were the San (also referred to as the 'Bushmen'). The term 'Bushmen' is, however, a pejorative name coined by European colonists. Long before the advent of the Bantu-speaking people and thousands of years before Europeans, the San had inhabited South Africa (SAHO 2019). Evidence suggests that they had continuously lived in the Kalahari region as nomadic hunter-gatherers for about 20,000 years (NEW 2018).

Bantu-speakers such as the Tswana, Kgalagadi and Herero were 'newcomers' to the Kalahari (Britannica KD 2021). The Tswana moved west from the Limpopo basin into the northern and eastern Kalahari in the late 18th century. The Kgalagadi moved into the southern and western Kalahari, and Herero refugees from the conflict of 1904–07/8 in German South-West Africa (now

Namibia) fled into the western and northern Kalahari during the turn of the 20th century (Britannica KD 2021). The Kgalagadi were among the first people to enter the northern Kalahari. They coexisted peacefully with the Khoe-speaking population (the San/Bushmen) (San Parks 2021). Although they did not remain in the area, the name, they had given the region remained. The name Kalahari comes from the Kgalagadi term Makgadikgadi, which means “saltpans” or the “great thirstland” (San Parks 2021).

Until the 19th century, the southern Kalahari remained relatively out of reach of people. However, the ‘Basters’ and ‘coloured’ settlers migrated into San territory in the 1860s. It is presumed that the Koranas near the Orange River had interacted with the San groups during the previous century or two. The *Einiqua* may have also interacted with San tribes for centuries but had scattered by the mid-19th century (SASI 2021).

The Europeans first entered the Kalahari early in the 19th century as travellers, missionaries, traders and ivory hunters (Britannica KD 2021; San Parks 2021). Between 1904 and 1908, the German imperial army fought wars and committed genocide against numerous Namibian peoples, notably the Herero, Nama, and other San groups. The Nama-German battle had moved to South Africa, where violent battles were fought in southern Kalahari. As a result, the remaining San tribes were displaced, and different ethnic groups were ‘merged’. It also spurred colonial officials in South Africa to “occupy and ‘tame’ this frontier” (SASI 2021). Unfortunately, during the period of internal colonialism, many San tribes were uprooted and displaced. The demographics shifted even more rapidly after Nama rebels escaping the conflict in Namibia fleed to the country in 1904 (SASI 2021).

Interestingly, the numerous San engraving sites at Tswalu attest to the significance the earlier inhabitants placed on the Green Kalahari. It is believed that the area provided them with a safe haven. Nevertheless, cattle farming and hunting attempts eventually disrupted the link between the people and their surroundings during the 20th century (Tswalu n.d.).

During the 1920s, land expropriation, severe movement constraints, and hunger exacerbated by settlers’ over-hunting had affected the southern Kalahari San. After substantial debate in Parliament over the protection of the San, the government declared a National Park in 1931 (in their traditional territory between the Nossob and Au!ab rivers at the northern end of the Gordonia District). A park was eventually established; however, according to SASI (2021), it was established without any particular protections for the San people (SASI 2021).

Several thousand San people were still hunting game and gathering plant foods in the Kalahari Desert (in Namibia) during the 1950s. The !Kung group had lived in an area referred to as Nyae Nyae (near the border between Namibia and Botswana). Since the area they occupied was challenging to reach, they could continue their old way of life. The !Kung has maintained their way of life and avoided outside influences until about thirty years ago. The Department of Nature Conservation started taking over large sections of the traditional hunting lands of the Kalahari San in the 1960s. In 1970 the !Kung people lost 90% of their traditional land in Nyae Nyae (SAHO 2019).

5.2. Local

Minimal historical background could be found on the study areas. However, the histories of the surrounding towns provide some insight into the local history.

Figure 6 *Military map from the turn of the 19th-20th century of the area east of the study area. Image: https://digitalcollections.lib.uct.ac.za/*

The town of Hotazel is situated approximately 20 km northeast of the current development area (specifically from the farms Diepwater and La Rochelle). Anecdotal evidence states that a team of land surveyors who stayed in the area in 1915 deemed the place to be “hot as hell”, referring to the hot weather they experienced during their farm survey. There are two versions of what happened the night when they had decided on the town’s name. One states that the surveyors had decided on the name (Hotazel) over “a glass of Cape Smoke Brandy” (KS-Hotazel 2021), while another version suggests that they had a “raucous party out in the dunes one night” (SA-Hotazel 2021). Nevertheless, the farm was established and named Hotazel. It is believed that Hotazel was initially founded after a water diviner (seeking an underground stream) found a manganese-bearing black rock, and a mining company eventually bought the farm. Sometime in the 1950s, Hotazel was registered as a town. To date, manganese mining continues in the area (SA-Hotazel 2021).

The town of Kathu was established in the 1970s (De Jong 2010c; Go-Gaap n.d.). The area is known for its rich iron ore deposits. Robert Moffatt even referred to the hills in his journal as “glittering black rock” during his travels in 1834 (Go-Gaap n.d.). Kathu means “the town under the trees”, specifically after the Camel Thorn forest in which it is situated. The phrase “the town under the trees” was developed in early 1990 by an engineer working as part of a tourism marketing campaign. The meaning of the name “Kathu” has also been linked to a porridge prepared by the local inhabitants from the powder found in the pods of Camel Thorn trees (KATHU 2021).

According to De Jong (2010c), Edward Finnis was Olifantshoek’s first inhabitant in 1902, and in 1903, Michael Colley had opened a store here. The town, Olifantshoek, was officially founded in 1912. According to the historical narrative, Olifantshoek was named after an elephant tusk supposedly used to purchase the town's farm (Wikipedia 2021).

6. IDENTIFIED RESOURCES AND HERITAGE ASSESSMENTS

6.1. Heritage sensitivity in the region

The Heritage Screening tool (https://screening.environment.gov.za/) shows low to medium significance with locations of high sensitivity towards the east and southeast of the identified prospecting areas with smaller sites to the north and south.

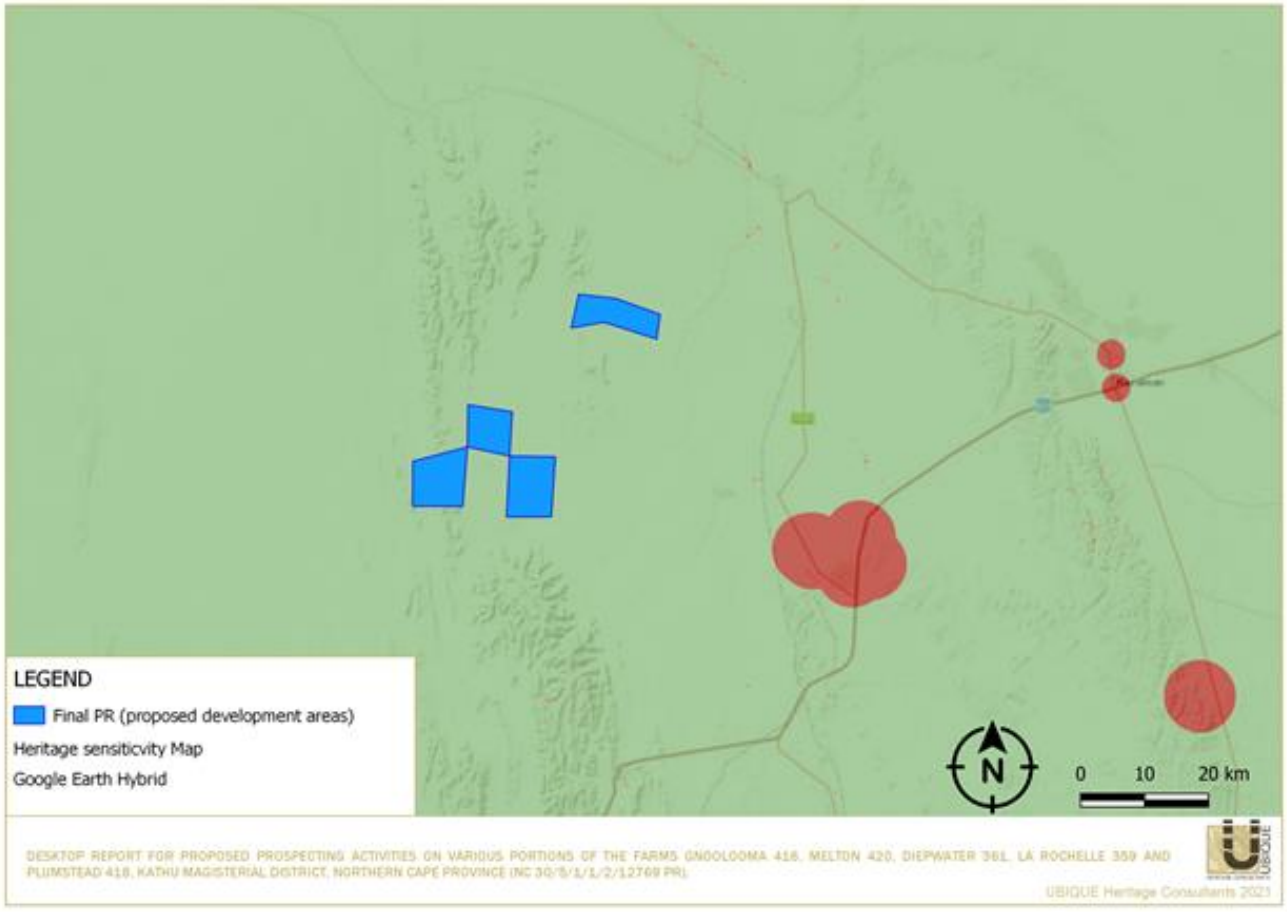

Figure 7 *The Project area indicated on the Heritage Screening tool (https://screening.environment.gov.za/)*

6.2. Identified heritage resources

The desktop study revealed that no Heritage Assessments had been conducted directly on or adjacent to the proposed areas for development. However, numerous studies were completed in the wider landscape (in a 50 km radius) at and around Kathu, Hotazel and Olifantshoek. The assessments reported on cultural material and features relating to the Stone Age, Iron Age and Historical/Colonial era, which appear to be consistent with the history of the Northern Cape. Several studies encountered very little and/or no archaeological materials/remains (e.g. Birkholtz 2019; Coetzee & George 2013; De Jong 2008; Dreyer 2008d, 2014a; Fourie 2014; Fourie & Van der Walt 2005; Kaplan 2010; Kruger 2015a; Pistorius 2008; Rossouw 2015; Van Ryneveld 2010; Van Schalkwyk 2010b; 2015, van Vollenhoven 2019c Webley & Halkett 2010a).

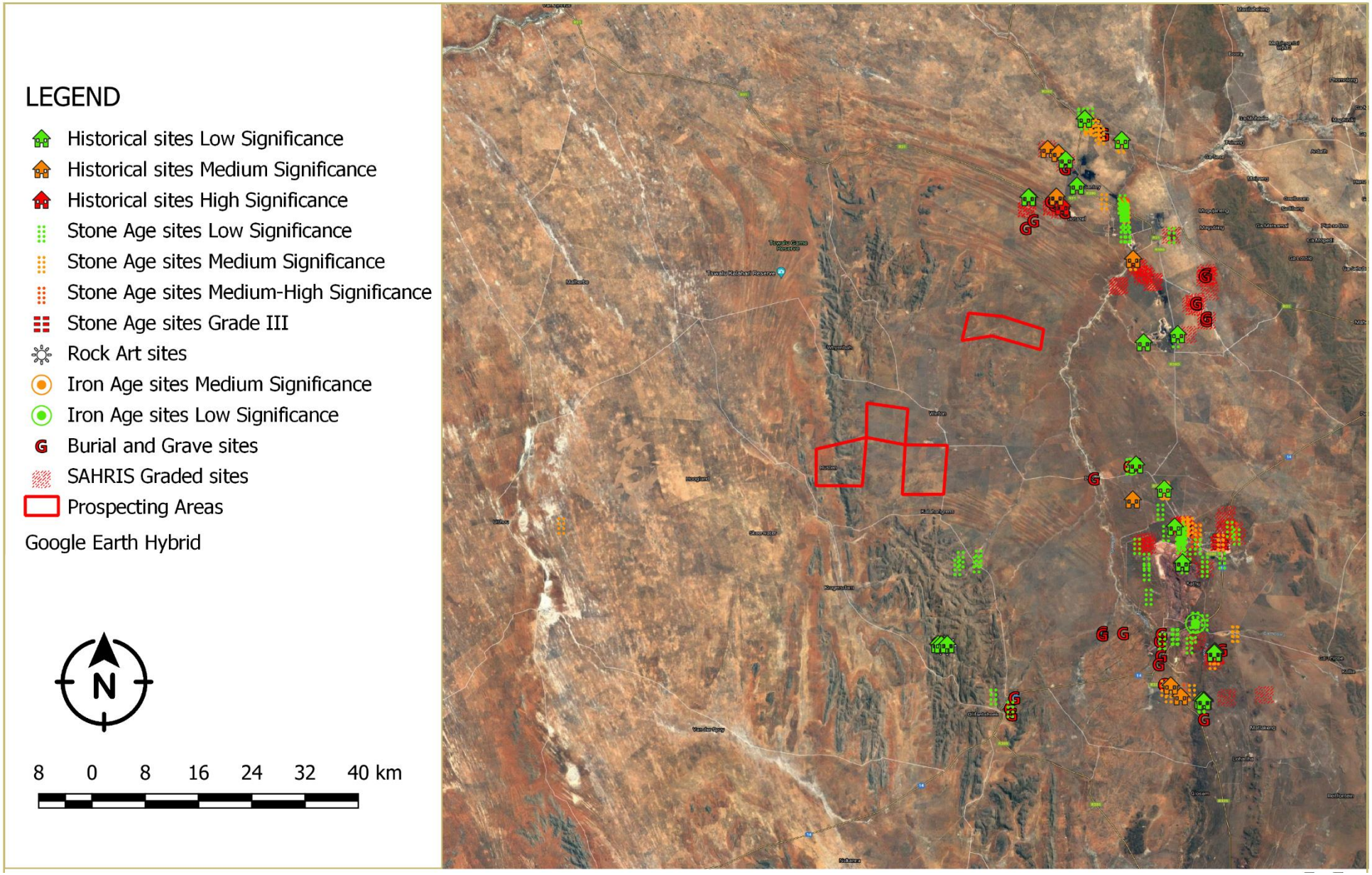

Figure 8 Map composite of heritage resources recorded from previous HIA/AIAs in the area.

6.3. Discussion

6.3.1. Stone Age

Scatters of stone artefacts have been reported by, but not limited to, Beaumont (2006, 2007a, b and c, 2008a and c, 2013), Birkholtz (2014, 2016; 2019), Fourie & Birkholtz (2010), De Bruyn & Birkholtz (2021), Dreyer (2006b, 2008c, 2012a), Fourie (2013a, b, c, 2015, 2020), Fourie et al. (2018), Hutten & Birkholtz (2014), Gaigher (2012); Küsel & van der Ryst (2009), Kaplan (2008b, 2014), Koortzen (2009), Kruger (2012, 2014, 2015b, 2019), Mabale (2009); Magoma (2013), Matenga (2021), Morris (2005, 2008, 2010a and b, 2014), Morris & Chazan (2019), Morris & Henderson (2018), Orton (2016), Pelser and van Vollenhoven (2011), Pelser (2012, 2018), Van der Walt (2020), Van Schalkwyk (2010a, c, d, 2012, 2016), Van Vollenhoven (2019b and e), Webley and Halkett (2010) and Webley and Tusenius (2018). However, most of the Stone Age artefacts reported in the assessments range between low to medium significance.

Stone Age sites were recorded in various locations to the north, northeast, and south of the study areas, most notably in open-air settings or sediments near rivers or pans. Stone Age debris is also commonly found around drainage lines and exposed surfaces (Kruger 2018). For example, Van Schalkwyk (2010d) noted that stone tools dating to the MSA and LSA occur in low densities on the rims of some of the pans on the farm Kathu 465. Moreover, Gaigher (2012) remarked that the surface scatters of stone tools on the Farm Wincanton 472 may have resulted from alluvial relocation from a more prominent site.

Recorded assemblages in the consulted HIA/AIAs include ESA, MSA, and LSA material. The documented occurrences predominantly contain low-density surface scatters of debris flakes, hammerstones, chunks, cores, retouched and utilised flakes, biface axes, various scrapers and points. For example, Dreyer (2006b) documented an ESA hand axe on the farm Hatnolls 458, De Bruyn & Birkholtz (2021) reported MSA and LSA scatters on the farm Demaneng 546, and Matenga (2021) found several MSA lithics such as flakes, micro-scapers, flake debitage, a core and scrapers. Furthermore, Morris (2010a) recorded low densities of ESA/MSA artefacts and a handaxe north of the town of Kathu. A low density of LSA stone tools was recorded on Erf 5168, Kathu, by Kaplan (2008b). Approximately 50 km southeast of the current development area, on Mashwening 557, Kathu, Magoma (2013) found several ESA and MSA scatters of stone tools. On the farm, Fuller 578, near Olifantshoek, Beaumont (2007a), recorded a sparse occurrence of immaculate Late Acheulean formal tools, handaxes and cleavers, blades.

The LSA assemblages recorded often include ceramics in association with the stone tools. For example, Fourie (2013a) recorded medium to high scatters of LSA lithics, with coarse pottery, faunal material and OES fragments on the Farm Wessels 227 and Portions 1 and 2 and the remaining extent of the Farm Dibiaghomo 226, near Black Rock.

A range of raw lithic materials has been recorded. This includes Banded Ironstone Formation (BIF), quartz (Gaigher 2012), quartzite, black chert, jaspilite (Beaumont 2007c), chalcedony, limestone (Kaplan 2014), indurated shale (Webley and Halkett 2010), and Hornfel pebbles (Koortzen 2009).

6.3.1.1. Rock Art

Although rock art has been found in the Northern Cape, only one assessment (in a 50 km radius of the current proposed development area) reported rock art (e.g. Birkholtz 2016). Birkholtz (2016) found a rock shelter with rock art during his survey for the remainder and portion 1 of The Farm Jenkins 562.

As mentioned earlier, the Tswalu rock art is quite significant. At the site, there are hundreds of engraved images of giraffes, eland, and human figures. Interestingly, these rock paintings are not isolated. There are also cupules carved into the rock and a pool that fills with water after heavy summer rains. In a clear sandy area (believed to have been utilised as an amphitheatre), near the carvings is a rock gong (Tswalu n.d.).

The table below provides a list of the known rock art sites on the SAHRA database.

Site/Object Name	Site ID	Nid	Coordinates	Site type	Site Reference	Province
Inglesby 7	34441	185358	-27.851944, 22.638611	Rock Art	ING007	Northern Cape
Inglesby 8	34442	185359	-27.852500, 22.648611	Rock Art	ING008	Northern Cape
Tierkop 3	93877	361575	-27.634249, 23.401110	Rock Art, Artefacts	TK3 - NC	Northern Cape
Tierkop 1	93878	361576	-27.658851, 23.398347	Rock Art, Artefacts	TK1 - NC	Northern Cape
Tierkop 5	93876	361574	-27.631292, 23.391808	Rock Art, Artefacts	TK5 - NC	Northern Cape
Ga-Mohana Hill	88069	334991	-27.385658, 23.344874	Archaeological, Artefacts, Rock Art, Geological	Ga-Mohana Hill	Northern Cape

6.3.2. Iron Age

According to the consulted HIA/AIAs, no EIA or MIA sites have been identified in the study area. LIA people occupied and utilised the region further west, mainly for copper mining in the Northern Cape, closer to the Orange River (Van Vollenhoven 2019). However, Iron Age sites are not unheard of in the area. Very few IA remains have been found/recorded in the study area. Iron Age potsherds reflecting Tswana settlement (possibly LIA) were recorded by Morris (2005) during the survey for the farms Bruce, King, Mokaning and Parson, between Postmasburg and Kathu, approximately 45 km southeast of the current development area. An IA (probable Tswana) ceramic scatter was found during the excavations on Sims 462 near Kathu (Reserve 1) (Beaumont 2006). There is also Iron Age stone walling present at Tswalu (Tswalu n.d.).

6.3.3. Historical Period

Several reports conducted within a 50 km radius of the current development area recorded several areas and artefacts relating to the Historical/Colonial period. For example, an old farmhouse, outbuildings and structures, and a demolished structure and several historical artefacts were documented by Fourie & Birkholtz (2010) near Hotazel. Other structures such as a farmstead consisting of a main house, a number of outbuildings and farming related features have been reported northwest of Hotazel (Van Schalkwyk 2016). A structure related to early mining on the farm (Farm Adams 328, Hotazel) was recorded by Pelser (2012). Furthermore,

Fourie (2013a) recorded farmsteads during the assessment of the Farm Wessels 227 and portions 1 and 2 and the remaining extent of the Farm Dibiaghomo 226, near Black Rock. Dirt tracks and foundations were noted near Hotazel, approximately 15 km northwest of the proposed development area (De Jong 2010a). Van Vollenhoven (2012) found several structures dating to the 1920s during his survey near Hotazel, approximately 21 km north (northwest) of the proposed development site. These include an old school building, a farmhouse and outbuildings, limestone houses and a wagon house. He also recorded an old shooting range. However, Van Vollenhoven (2012) believes that this structure is likely younger than 60 years. Coetzee (2021) recorded a windpump, circular cement water reservoir and a small angular structure near the eastern boundary of the study area for the proposed expansion of the East Manganese Mine on a portion intersecting Portion 1 of the Farm East 207 and Portion 1 of the Farm Gloria 266, Hotazel. Unfortunately, he states that the historical aerial images (dating to 1959. 1965, and 1972) are too low quality to identify the structures/features. However, Coetzee (2021) does speculate that the windpump, reservoir, and structure date to the same period as the farmhouse. The farmhouse can be seen in the 1959 aerial image.

Morris (2010a) recorded a cement floor (likely a temporary 'prefab' structure associated with pipeline/powerline construction in the later twentieth century (approx. 37 km west of the study area). A historical (earlier-mid 20th century) ash heap (associated with the farm) was recorded by Morris (2010b) during the assessment of the proposed Kathu-Sishen Solar Energy Facilities. Several structures were recorded by Magoma (2013), one of which appears to have a Cape Dutch design roughly 50 km southeast of the development area. Interestingly, he also recorded a structure that is believed to be a Pest Maintenance structure.

A historic farmstead older than 60 yrs and an associated low-density midden was recorded by Birkholtz (2016) during his survey for the remainder and Portion 1 of the Farm Jenkins 562, roughly 48 km southwest the development area. During the same survey, Birkholtz (2016) recorded five crescent-shaped stone structures. An old stone dam, made of local dolomite stone and a furrow leading to the spring at the farmhouse, has been recorded by Webley & Halkett (2010b) on the remainder of the farm Macarthy 559 (New), Olifantshoek. They also noted several other features such as an old threshing floor, an ash heap, a stone kraal, an old well sunk into calcrete covered with metal sheeting, a storehouse, a spring enclosed with brick structure and ruins of an old school during their survey. At the farm Inglesby 580 near Olifantshoek, Dreyer (2014b) found several house structures, an upper grindstone, stone kraals, foundations stones of a fireplace, and a floor with unbaked bricks. He further recorded a well and water extraction gear, an ash midden, a threshing floor and an irrigation furrow (Dreyer 2014b).

6.3.4. Graves and Burial Sites

The Environmental BAR (uKhozi 2021) mentions that gravesites are "scattered throughout the study area". The ancestral graves on the southwestern part of the RE of the Farm La Rochelle 359 and Gnoolooma 416 Portion 4 close to the current farmstead were pointed out by the landowners. However, no exact coordinates were provided. More unidentified graves could be present in the study area.

Numerous HIA/AIA reports recorded graves and cemeteries within a 50 km radius of the current development area. For example, de Jong (2010b) reported two cemeteries (Dibeng 1 and 2) in his HIA, one of which is approximately 22 km west of the current proposed development area.

Furthermore, several graves (of unknown age) and a cemetery have been recorded around Olifantshoek near the proposed Water Reticulation Development (Rossouw 2019) and at an allotment area that borders on the Skerpdraai and Diepkloof Townships (Beaumont 2007c). Additionally, two cemeteries were recorded by De Jong (2010c) during the HIA for the proposed land-use change to provide for the extension of the town of Olifantshoek (37 km southeast of the development area). At the same time, Dreyer (2014b) reported a cluster of graves and a fenced cemetery (wagon axels were used as corner posts) during his survey of the farm Ingleby 580 near Olifantshoek.

Approximately sixty unmarked graves and a cemetery were recorded by Küsel and Van der Ryst (2009) during their assessment of manganese mining areas on the farms Belgravia 264, Santoy 230, Gloria 226 and Nchwaning 267, at Black Rock. Van Vollenhoven (2019a) identified a possible grave consisting of a number of bricks placed in a rectangular similar to that of many graves. Fourie's (2013) surveys of the Farm Wessels 227 and Portions 1 and 2 and the remaining extent of the Farm Dibiaghomo 226, near Black Rock, recorded several cemeteries. Birkholtz and Fourie (2010) recorded a formal grave during the survey of Portions 1 and a portion of the remaining extent of the Farm Kongoni 311, Hotazel. Van Schalkwyk (2016) notes an informal burial place with three graves (fenced off) of the Lombard and Wiid families, dating to 1932. Van Vollenhoven (2012) reported graveyards at Olive Wood Farm and Belgravia farm and a grave at Epsom Farm near Hotazel. Graves and several unmarked graves were recorded during the proposed Kathu-Sishen Solar Energy Facilities (roughly 28 km west of the proposed development) (Morris 2010b).

Moreover, three small farm cemeteries and a large rectangular cemetery were recorded by Morris (2005) during his surveys of the farms Bruce, King, Mokaning and Parson, between Postmasburg and Kathu. Furthermore, another gravesite was documented by Pelser (2018) near Kathu, approximately 40km west of the development area. Finally, another possible grave (a rectangular stone feature) was logged by Birkholtz (2016), roughly 48 km southeast of the current development area.

Recorded graves/burials/cemeteries

Name	Cemetery ID	Site Type	Coordinates	URL Reference link
Northern Cape, KATHU, Main cemetery	3383	Graves/Burials	-27 40.360, 23 4.531	https://graves-at-eggsa.org/main.php?g2_itemId=572253

Burial grounds and graves on SAHRA database

Site/Object Name	Coordinates	Site type	Grading	Site Reference	Province
Kathu-Sishen 05	-27.579860, 22.927790	Burial Grounds & Graves	Grade IIIa	KAT-SIS05	Northern Cape
Kathu-Sishen 06	-27.576530, 22.937060	Burial Grounds & Graves	Grade IIIa	KAT-SIS06	Northern Cape
Postmasburg to Kathu 01	-27.882100, 22.972417	Burial Grounds & Graves	Grade IIIa	POST-KATH01	Northern Cape
Postmasburg to Kathu 02	-27.966111, 23.041667	Burial Grounds & Graves	Grade IIIa	POST-KATH02	Northern Cape
Postmasburg to Kathu 03	-27.860278, 23.068889	Burial Grounds & Graves	Grade IIIa	POST-KATH03	Northern Cape
Postmasburg to Kathu 04	-27.834722, 22.918056	Burial Grounds & Graves	Grade IIIa	POST-KATH04	Northern Cape
Hotazel 069	-27.183800, 22.823900	Burial Grounds & Graves	Grade IIIb	HOT069	Northern Cape

Hotazel 070	-27.204283, 22.780933	Burial Grounds & Graves	Grade IIIb	HOT070	Northern Cape
Hotazel 073	-27.174750, 22.807850	Burial Grounds & Graves	Grade IIIb	HOT073	Northern Cape
Hotazel 082	-27.331161, 23.030094	Burial Grounds & Graves	Grade IIIa	HOT082	Northern Cape
Hotazel 083	-27.330400, 23.029647	Burial Grounds & Graves	Grade IIIa	HOT083	Northern Cape
Hotazel 098	-27.286194, 23.044944	Burial Grounds & Graves	Grade IIIa	HOT098	Northern Cape
Hotazel 101	-27.288861, 23.042833	Burial Grounds & Graves	Grade IIIa	HOT101	Northern Cape
Hotazel 105	-27.356500, 23.045139	Burial Grounds & Graves	Grade IIIa	HOT105	Northern Cape
Hotazel 107	-27.352861, 23.045417	Burial Grounds & Graves	Grade IIIa	HOT107	Northern Cape

6.3.5. Palaeontological Resources

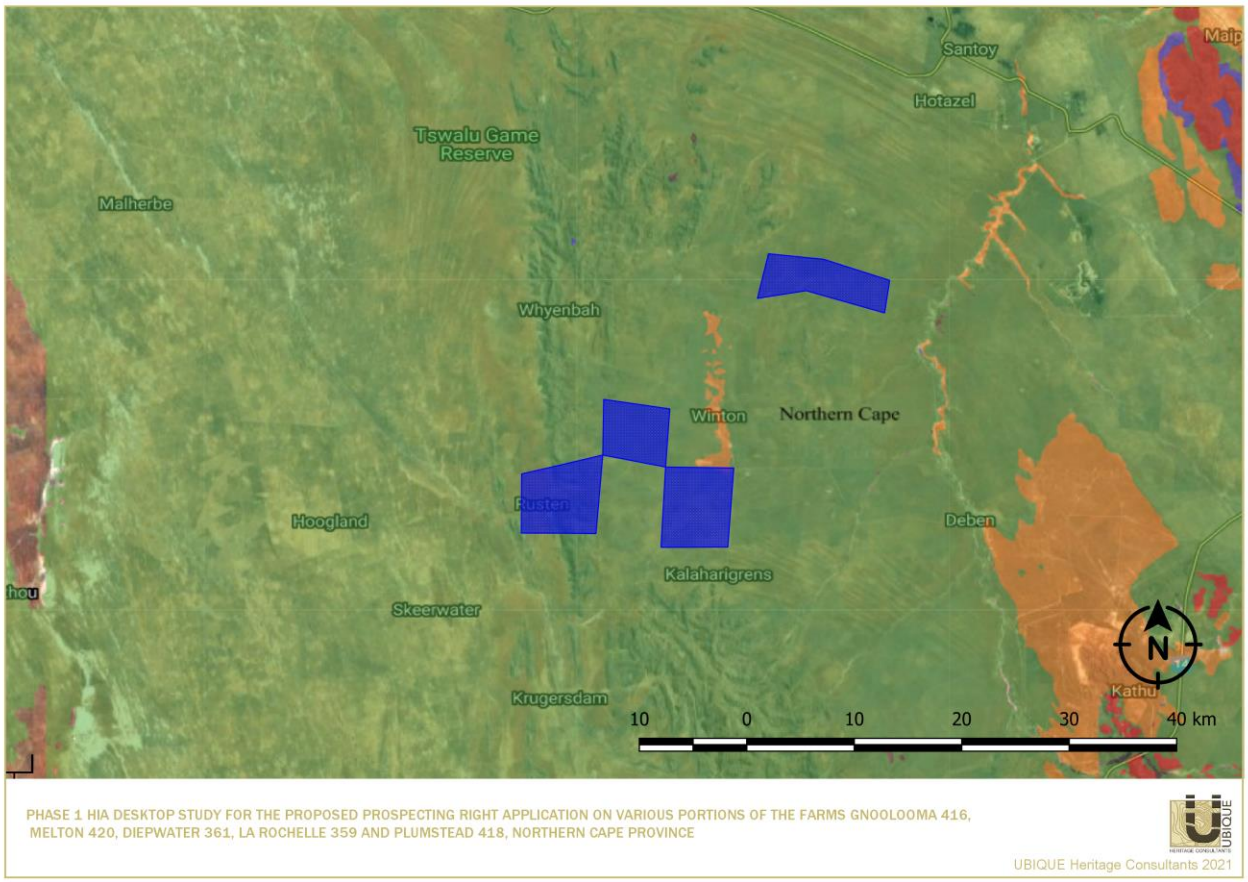

Figure 9 SAHRIS PalaeoSensitivity Map, indicating Moderate (green) and High (orange)) palaeontological significance in the study area, (https://sahris.sahra.org.za/map/palaeo).

The proposed development near Kathu in the Northern Cape is underlain by Quaternary aged sediments of the Kalahari Group and the underlying Campbell Rand Subgroup (Ghaap Group, Transvaal Supergroup). The general low palaeontological sensitivity of the bedrocks and superficial sediments in the proposed development footprint indicates that the proposed development will have an overall LOW impact significance in terms of palaeontological heritage (Butler 2021). Elize Butler from Banzai Environmental conducted a complete paleontological desktop study for this project (see Appendix 1).

7. CHANCE FIND PROTOCOL

According to the EAP, the exact location and number of boreholes will only be determined during the next phase of the proposed prospecting operation. As a field-based HIA will only be conducted before drilling commences, the following section aims to assist the developer to proactively identify and manage heritage resources while determining the exact locations of the prospecting boreholes. The Chance Find Protocol is not intended to replace heritage assessment or site interpretation. However, it is a visual guide of the most recognizable heritage resources that could be expected in the study area, based on the results of the Desktop Study.

7.1. Stone Age Finds

Stone tools dating from the ESA, MSA, and LSA could be expected within the study area. Low-density (low-density =< 10 lithics per m^2; high-density => 10 lithics per m^2) open-air surface scatters are the most common lithic occurrence documented by previous HIA/AIAs within the region. Stone tools can also be found in sediments near rivers or pans or on dunes or elevated outcrops around pans or water sources. Stone Age debris is also commonly found around drainage lines and exposed surfaces. Stone tools comprise any lithic material that has been shaped or flaked by cognisant anthropogenic activity. These include informal lithics like flakes or knapping waste or formally shaped tools like retouched flakes, scrapers, blades and handaxes.

Figure 10 *Selection of various formal and informal ESA, MSA, and LSA stone tools. LSA lithics may be accompanied by coarse low-fired earthenware (h, i, j). Photos: UBIQUE Heritage Consultants.*

The Later Stone Age period is characterised by the inclusion of coarse low-fired earthenware, which can often be found in association with lithics (Figure 10 (h, i, j,)). In addition, upper and lower grindstones might be present on settlement sites.

7.2. Historical Period Finds

The Historical or Colonial Period are tangible within the landscape as a variety of different features. For example, sites can vary from permanent settlements like farmscapes or ephemeral like military encampments. Any structure older than 60 years falls under the purview of the NHRA and should be assessed for its unique significance. Structures' construction can range from fieldstone, low-fired mud brick, or bricks and concrete. Middens are rubbish dumps often associated with the remains of structures or an encampment site located within the landscape. Middens can be identified by ash deposits and a concentrated surface distribution of artefacts, such as glass, ceramics, and metal.

Figure 11 *Various Historical structures (a-h) and artefacts (i-o). Photos: UBIQUE Heritage Consultants.*

7.3. Graves

Graves and informal cemeteries can be expected anywhere in the landscape. For example, family cemeteries can be anticipated close to farmsteads, while informal graves with fieldstone cairns or headstones could also be located seemingly random in the veldt. Formal graves, whether fenced or unfenced are easy to identify; however, fieldstone graves could become barely recognizable due to numerous reasons through time. Grave treatment range from marble, fieldstone, cement/concrete, and bricks.

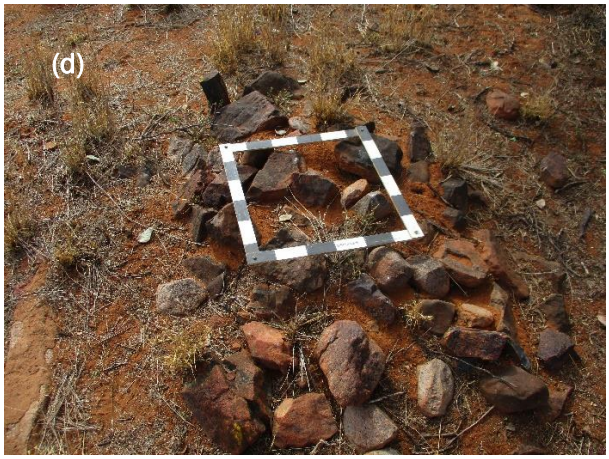

Figure 12 *Various grave treatments, formal and informal. Photos: UBIQUE Heritage Consultants.*

It is important to note that some burials may not have been marked on the surface, or the grave indicators may have been displaced. The unexpected excavation of sub-surface human remains is a rare but probable scenario.

Should it be impossible to avoid graveyard(s), grave(s) or burial(s) sites with the final drill hole locations, mitigation in the form of grave relocation could be undertaken. This is, however, a lengthy and costly process. Grave relocation specialists need to be employed to manage the liaison process with the communities and individuals who by tradition or familial association might have an interest in these graves or burial ground; as well as manage the permit acquisition from the SAHRA Burial Grounds and Graves (BGG) Unit and the arrangements for the exhumation and re-interment of the contents of the graves, at the cost of the applicant and in accordance with any regulations made by the responsible heritage resources authority.

Hidden or sub-surface sites may exist in the area. No sub-surface testing may be conducted without a permit, and therefore sites may be missed during the field assessment. We recommend that if any evidence of archaeological sites or remains (e.g. remnants of stone-made structures, indigenous ceramics, bones, stone artefacts, ostrich eggshell fragments, charcoal and ash concentrations), fossils or other categories of heritage resources are uncovered during prospecting, SAHRA APM Unit (Natasha Higgitt/Phillip Hine 021 462 5402) must be alerted as per section 35(3) of the NHRA. If unmarked human burials are discovered, the SAHRA Burial Grounds and Graves (BGG) Unit (Thingahangwi Tshivhase/Mimi Seetelo 012 320 8490) must be alerted immediately as per section 36(6) of the NHRA. A professional archaeologist or palaeontologist must be contracted as soon as possible to inspect the findings. If the newly unearthed heritage resources are of high significance, a Phase 2 rescue operation may be required with permits issued by SAHRA.

8. CONCLUSION

In conclusion, the HIA Desktop Study has found that no Heritage and Archaeological Impact Assessments have been undertaken in or in the area adjacent to the prospecting properties. However, heritage sites and resources ranging from low to high significance have been documented on the periphery of a 30-50 km radius from the study area. These sites provide the reader with the data necessary to anticipate the type of sites and probable significance that might accompany any projected heritage resource.

The background study revealed that apart from very significant Stone Age sites towards the northeast, east, and southeast of the development footprint, the majority of the documented lithic material closer to the prospecting properties are of low and medium significance. Furthermore, these sites are predominantly open-air sites with low-density surface scatters. Therefore, the occurrence of lithic material within the development areas are considered highly probable.

A couple of rock-art sites have been recorded to the north and southeast of the study area, with only one incidence within the 50 km radius. Rock art, specifically engravings, may be present in open-air rocky outcrop sites, such as the hilly terrain on the farm Gnoolooma 416.

No Iron Age sites have been recorded near the development area, which would suggest that the likelihood of such sites being present in the development area is low.

Archaeological traces of historical features and artefacts attributed to the representation of the regional colonial farming history and colonial settlement can probably be found on all the farms.

Graves and informal cemeteries can be expected anywhere in the landscape. Family cemeteries can be anticipated close to farmsteads, while informally marked graves consisting of fieldstone cairns and headstones may be found in the veldt. The Environmental BAR (uKhozi 2021) mentions that gravesites are “scattered throughout the study area”. These are ancestral graves on the southwestern part of the RE of the Farm La Rochelle 359 and Gnoolooma 416 Portion 4 close to the current farmstead.

Surface or sub-surface archaeological sites, graves and informal cemeteries could be directly impacted during the proposed borehole drilling. Therefore, site-specific surveys of the final location of the boreholes are recommended. However, the provided Chance Finds Protocol should assist the developer in avoiding possible sensitive areas.

The general low palaeontological sensitivity of the bedrocks and superficial sediments in the proposed development footprint indicates that the proposed development will have an overall LOW impact significance in terms of palaeontological heritage (Butler 2021).

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APPENDIX A

PALAEONTOLOGICAL DESKTOP ASSESSMENT FOR THE PROPOSED PROSPECTING RIGHT APPLICATION ON VARIOUS PORTIONS OF THE FARMS GNOOLOOMA 416, MELTON 420, DIEPWATER 361, LA ROCHELLE 359 AND PLUMSTEAD 418, NORTHERN CAPE PROVINCE

PALAEONTOLOGICAL DESKTOP ASSESSMENT FOR THE PROPOSED PROSPECTING RIGHT APPLICATION ON VARIOUS PORTIONS OF THE FARMS GNOOLOOMA 416, MELTON 420, DIEPWATER 361, LA ROCHELLE 359 AND PLUMSTEAD 418, NORTHERN CAPE PROVINCE

CaseID: 16605

(NC 30/5/1/1/2/12769 PR)

Compiled for:

UBIQUE Heritage Consultants

963 Bontebok Avenue

Allen's Nek 1709

info@ubiquecrm.com

Prepared by

Banzai Environmental

July 2021

Declaration of Independence

I, Elize Butler, declare that –

General declaration:

- I act as the independent palaeontological specialist in this application.
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favorable 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 favorable to the applicant or not.
- All the particulars furnished by me in this form are true and correct.
- I will perform all other obligations as expected a palaeontological specialist in terms of the Act and the constitutions of my affiliated professional bodies; and
- I realize that a false declaration is an offense 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 heritage impact assessment report has been compiled considering the National Environmental Management Act 1998 (NEMA) and Environmental Impact Regulations 2014 as amended, requirements for specialist reports, Appendix 6, as indicated in the table below.

Table 1: NEMA Table

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

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

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

EXECUTIVE SUMMARY

Banzai Environmental was appointed by UBIQUE Heritage Consultants to conduct the Palaeontological Desktop Assessment to assess the proposed Prospecting Right Application on various Portions of the Farms Gnoolooma 416, Melton 420, Diepwater 361, La Rochelle 359 and Plumstead 418, Northern Cape Province. To comply with the National Heritage Resources Act (No 25 of 1999, section 38) (NHRA), this PDA is necessary to confirm if fossil material could potentially be present in the planned development area and to evaluate the impact of the proposed development on the Palaeontological Heritage.

The proposed development near Kathu in the Northern Cape is underlain by Quaternary aged sediments of the Kalahari Group as well as According to this map the proposed development is largely underlain surface windblown sand as well as surface limestone with the western portion of the study area underlain by rocks of the Griqualand West Basin. The general low palaeontological sensitivity of the bedrocks and superficial sediments in the proposed development footprint, indicates that the proposed development will have an overall LOW impact significance in terms of palaeontological heritage. It is therefore considered that the development is will not lead to detrimental impacts on the palaeontological resources of the area. If fossil remains are discovered during any phase of construction, either on the surface or exposed by excavations the Environmental Control Officer (ECO) in charge of these developments must report to SAHRA (Contact details: SAHRA, 111 Harrington Street, Cape Town. PO Box 4637, Cape Town 8000, South Africa. Tel: 021 462 4502. Fax: +27 (0)21 462 4509. Web: www.sahra.org.za) so that correct mitigation can be carry out by a paleontologist.

It is consequently recommended that no further palaeontological heritage studies, ground-truthing and/or specialist mitigation are required pending the discovery of newly discovered fossils.

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Appendix A: CV

1. INTRODUCTION

Menar Capital (Pty) Ltd appointed uKhozi Environmentalists (Pty) Ltd to conduct an Environmental Authorisation (EA) Application to prospect for iron ore and manganese on various portions of the farms Gnoolooma 416, Melton 420, Diepwater 361, La Rochelle 359 and Plumstead 418, Kathu Magisterial District, Northern Cape Province (**Figure1-4**).

Information provided by uKhozi Environmentalists (Pty) Ltd:
The proposed prospecting activities will establish the extent and the quality of the iron and manganese ore body through non-invasive (desktop study) and invasive (core drilling) methods.
Non-invasive prospecting activities will consist of:

- Desktop studies
- Spatial Database Compilation
- Land Survey
- Remote sensing
- Geophysical survey

Data will be extracted and plotted into geological maps identifying areas for invasive prospecting resource determination.
Invasive prospecting activities will consist of:

- Establishment of the drill site and temporary contractors' yard
- Core drilling.
- Rehabilitation of boreholes
- Drill rig, machinery, and vehicle movement.
- Water Management.
- Ablution Facilities.
- Domestic Waste Management
- Storage and Handling of Dangerous goods

Following the invasive prospecting activities and laboratory analysis, data will be assessed in a pre-feasibility study to determine mining potential.
The invasive prospecting activities is not expected to exceed 1 ha in size and existing roads will be used as far as possible.

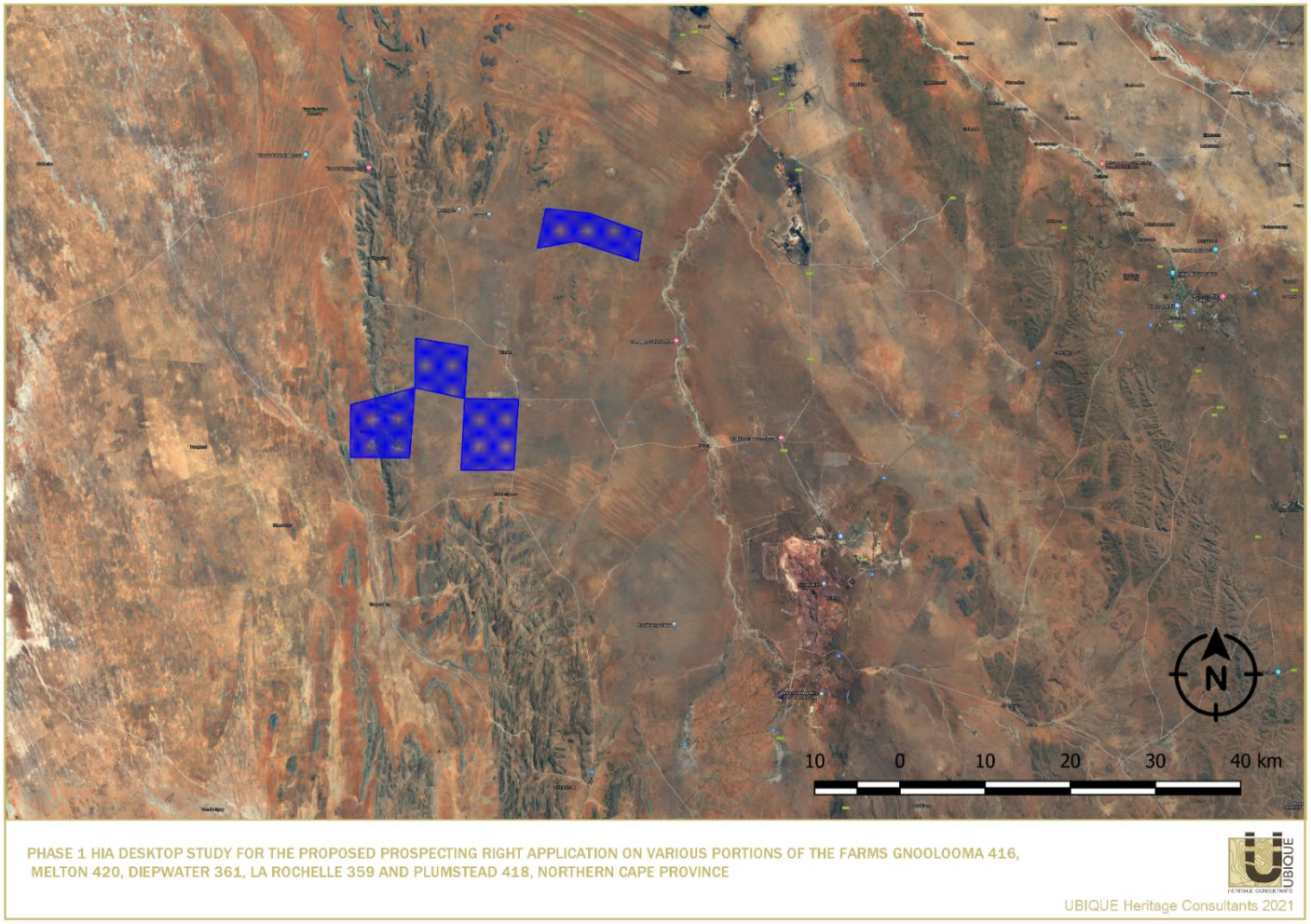


***Figure 13**:Google Earth (2021) image of the proposed prospecting locality on various portions of the farms Gnoolooma 416, Melton 420, Diepwater 361, La Rochelle 359 and Plumstead 418, Kathu Magisterial District, Northern Cape Province. Locality Map.*

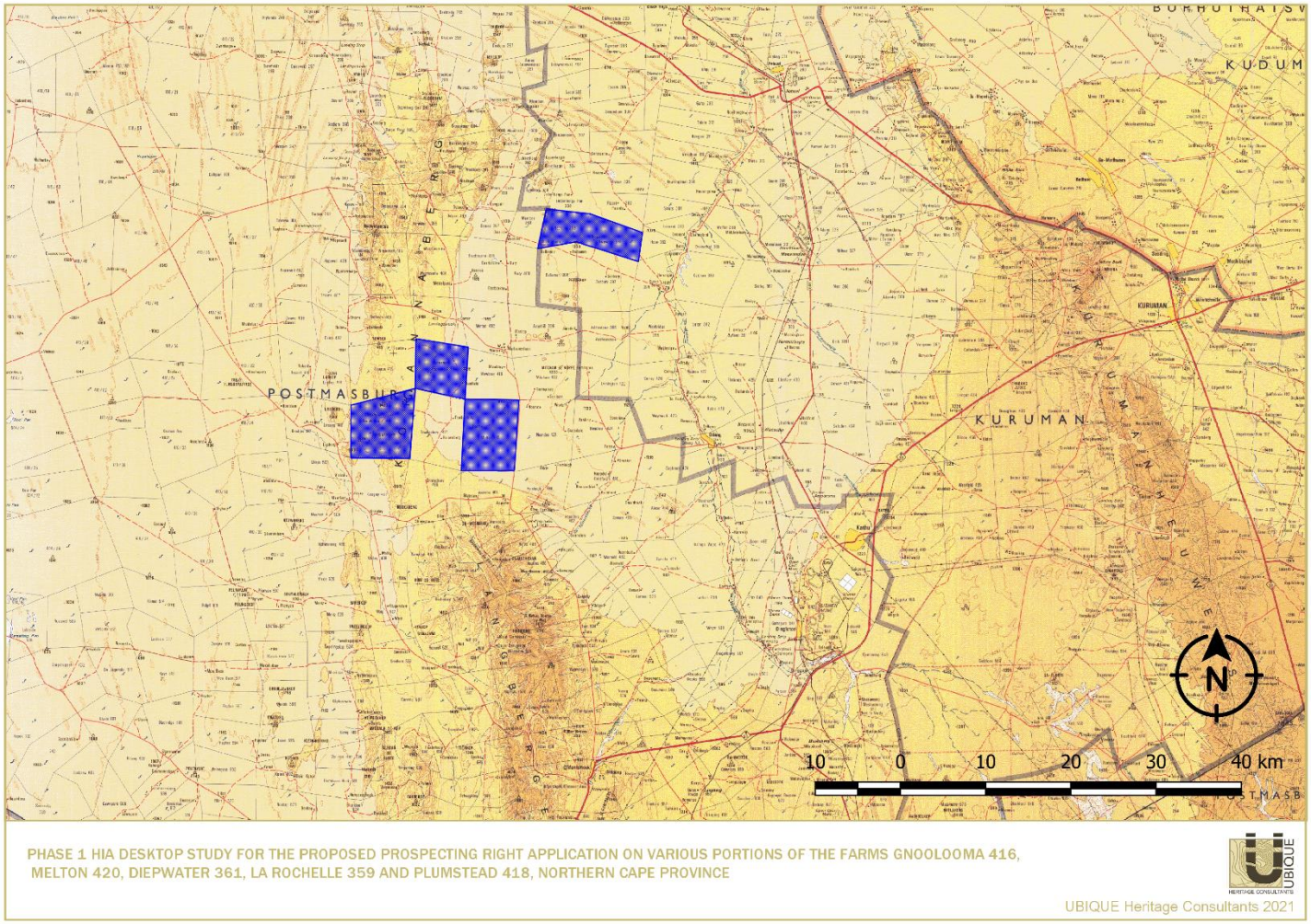


***Figure 14**:Regional setting of the proposed iron ore and manganese prospecting.*

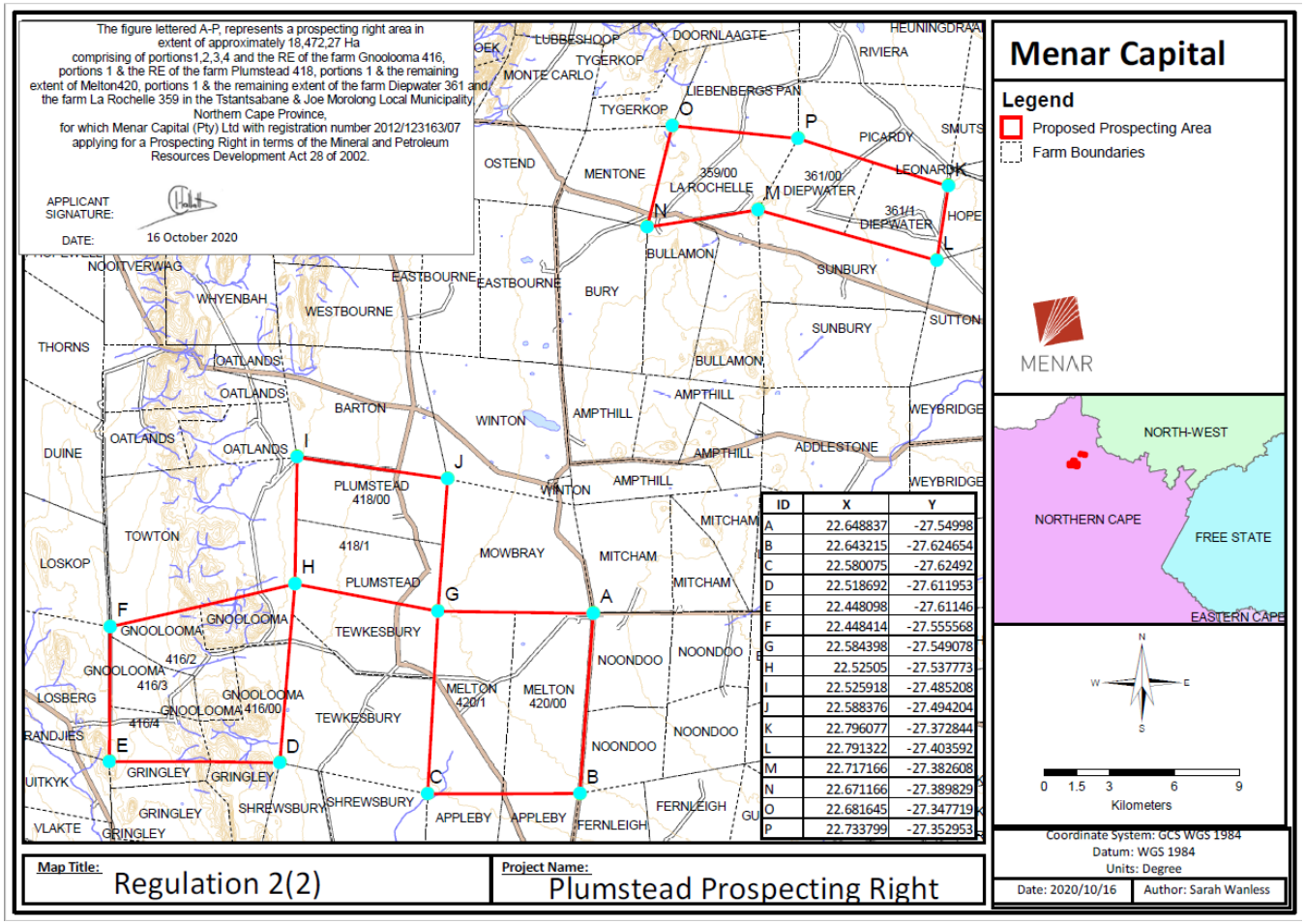


***Figure 15**: Regulation 2.2.*

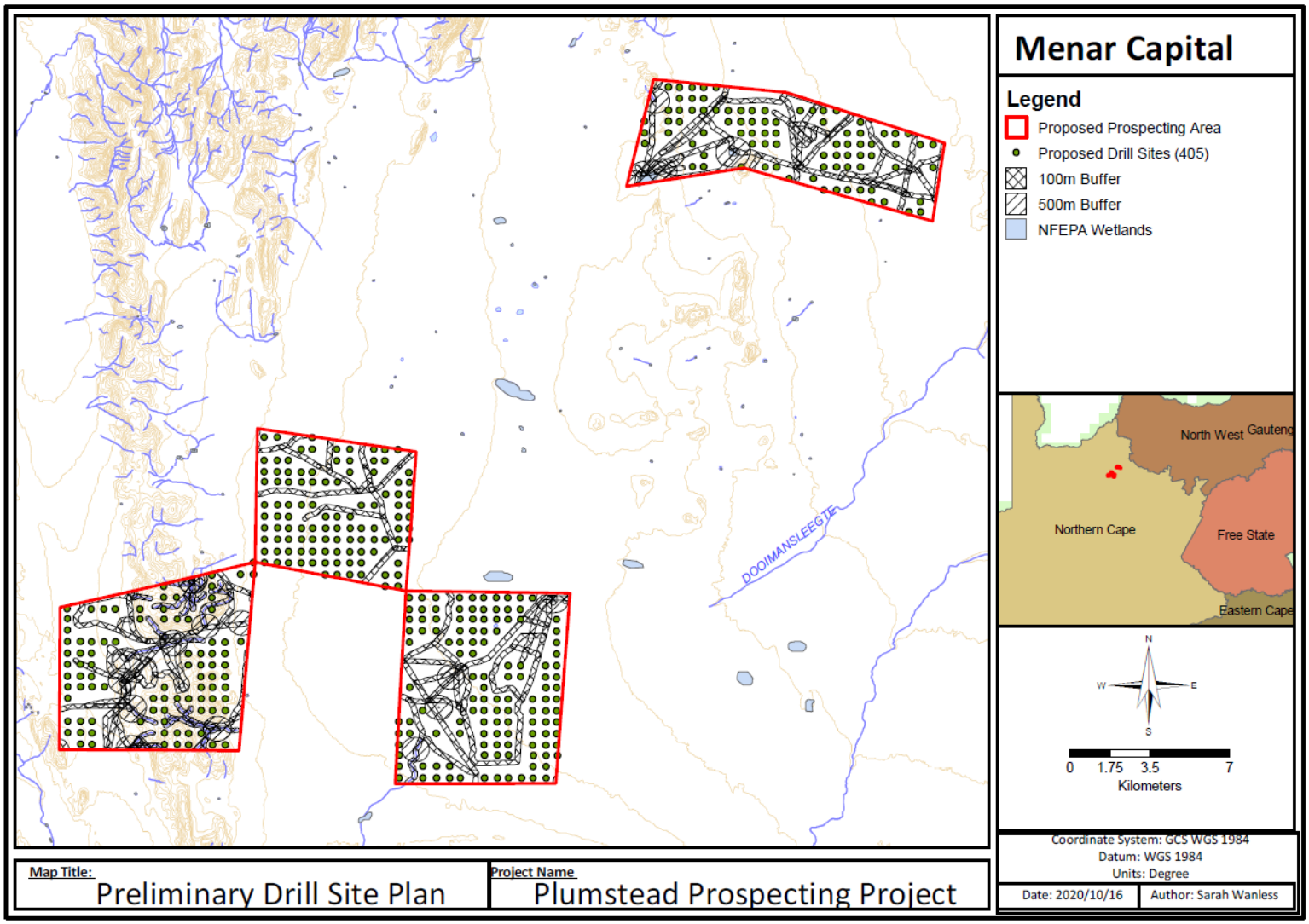


***Figure 16**:Preliminary Drill Site Plan.*

Palaeontological Desktop Assessment to assess the proposed Prospecting Right Application on various Portions of the Farms Gnoolooma 416, Melton 420, Diepwater 361, La Rochelle 359 And Plumstead 418, Northern Cape Province

2. QUALIFICATIONS AND EXPERIENCE OF THE AUTHOR

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

3. LEGISLATION

3.1. National Heritage Resources Act (25 of 1999)

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

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

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

the construction of a road, wall, power line, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length;

the construction of a bridge or similar structure exceeding 50m in length;

any development or other activity which will change the character of a site—

a. (exceeding 5 000 m^2 in extent; or
b. involving three or more existing erven or subdivisions thereof; or
c. involving three or more erven or divisions thereof which have been consolidated within the past five years; or
d. the costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority

e. the re-zoning of a site exceeding 10 000m² in extent;

or any other category of development provided for in regulations by SAHRA or a Provincial heritage resources authority.

4. OBJECTIVE

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

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

The terms of reference of a PIA are as follows:

General Requirements:

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

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

Submit a comprehensive overview of all appropriate legislation, guidelines.

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

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

Provide Palaeontological and geological history of the affected area;

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

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

f. **Direct impacts** are impacts that are caused directly by the activity and generally occur at the same time and at the place of the activity.

g. **Indirect impacts** of an activity are indirect or induced changes that may occur as a result of the activity.

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

A 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).

5. GEOLOGICAL AND PALAEONTOLOGICAL HISTORY

The proposed development is depicted on the 1: 250 000 2722 Kuruman (1979) Geological Map (Council for Geosciences, Pretoria) (**Error! Reference source not found.**5). According to this map, the proposed development is largely underlain surface windblown sand (Qs) as well as surface limestone (Tl) with the western portion of the study area underlain by rocks of the Griqualand West Basin (**Figure 5-10**). Although a short explanation is printed on the Geological Map itself, a thorough sheet explanation is not supplied. This map is outdated and out of print. Recent modifications to the stratigraphic subdivision and alignments of the Precambruim rocks present in the Kathu area has been finalized. Eriksson *et al.* (2006) conducted stratigraphic studies on the Transvaal Supergroup, while Moen (2006) conducted the study for the Olifantshoek Supergroup.

Simplified regional geological maps based on Cairncross and Beukes (2013) and Smith and Beukes (2016) were published. These geological maps (**Figure 6-8**) indicates that the proposed development is located on the western side of the Maremane Dome (a major N-S trending anticline in the Early Proterozoic bedrocks of the Ghaap Group, Transvaal Supergroup). The Maremane Dome contain carbonate rocks of the Campbell Rand Subgroup (Ghaap Group, Transvaal Supergroup) overlain by the Kalahari Group.

In the past, the shallow marine carbonates of the Campbell Rand Subgroup (Ghaap Group) were included in the Ghaapplato Formation. It is about 2.6 to 2.5 Ga (billion years old) and was deposited on the shallow submerged shelf of the Kaapvaal Craton. This carbonate platform is very thick (about 1.6 -2.5 km) and comprise of cherts with minor tuffs and siliciclastic rocks as well as dolostones and dolomitic limestones.

Recurring changes in sea level were triggered by changing depositional cycles in shallow water facies. Stromatolitic limestones and dolostones, laminated calcilutites, oolites, cherts, with subordinate siliclastics (siltstones and shales) and minor tuffs (Beukes 1980, Beukes 1986, Sumner 2002, Eriksson *et al.* 2006, Sumner & Beukes 2006) are present. The Campbellrand carbonate bedrocks in the area are karstified and probably not exposed at the surface.

At the western side of the Maremane Dome (Campbell Rand carbonates, Asbesheuwels Banded Iron Formation and Koegas quartzites and iron formation), a major unconformity exists at the base of the Palaeoproterozoic Elim Group (basal Keis Supergroup). This unconformity is (about 2.2-2.0 Ga) cuts the folded Ghaap Group succession and is associated with the development of manganese and iron ores. These ores are mined in the Sishen – Postmasburg region of Griqualand West. These ores are associated with the palaeokarst-related Manganore Formation overlying the Campbell Rand Subgroup carbonates of the Maremane Dome as well as the Gamagara Formation at the base of the Elim Group. In the past the Elim Group was included in the Olifantshoek Group (Schalkwyk 2005, Van Niekerk 2006, Da Silva 2011, Cairncross & Beukes 2013, Smith & Beukes 2016). In the greater Kathu region, the Postasburg group comprise of basaltic to andesitic lavas of the Ongeluk Formation (dated to 2.2 Ga) that crops out south of the Gamagara River.

In the Sishen/Kathu region, the older Precambrian rocks are mantled by the late Cretaceous to Late Caenozoic aeolian sands, clays, calcretes and gravels of the Kalahari Group Group [approximately Ca 65 – 2.5 million years old (Ma)]. Studies have shown that the Kalahari Group sediments that overlie the Precambrian rocks are about 80 m thick (Haddon, 2005). The earliest Kalahari beds are assigned to the Wessels Formation (basal gravels) and Budin Formation (calcareous clays) and are probably Late Cretaceous in age (Partridge *et al.* 2006).

The top 15 m of the Kalahari sediments consist of clays, calcretised siltstones, and pebbly horizons with the occurrence of solution hollows along joint surfaces (10 m from the surface). Calcretised silcretes with *in situ* brecciations are present close to the surface. Thick pedogenic calcretes (Plio-Pleistocene Mokalanen Formation**)** are mapped along the Ga-Mogara drainage line and underlies the Kalahari sands in this area, thus indicating the seasonally arid climates over the last five million years (Truter *et al.* 1938; Boardman and Visser 1958). Surface limestones may be up to 20 m thick and are locally conglomeratic with clasts of reworked calcrete and foreign pebbles. These limestones might be secondarily silicified.

Pleistocene Kalahari sands (Gordonia Formation) has been described to mantle thick calcretes and down wasted surface gravels (Almond 2013). He described a range of calcrete types, namely brecciated, gravelly, honeycomb, silicified, and karstified facies, the latter with an associated sand- or gravel-infilled solution hollows. Unconsolidated, reddish-brown aeolian sands of the Quaternary Gordonia Formation are present in the Sishen area. These sands are Late Pliocene / Early Pleistocene to Recent in age due to the Middle to Later Stone Age stone tools (Dingle *et al*., 1983, p. 291) found in them. Recent studies have dated the Pliocene - Pleistocene boundary from 1.8Ma back to 2.588 Ma and placed the Gordonia Formation almost completely within the Pleistocene Epoch.

The fossil assemblages of the Kalahari are generally high in diversity that occur over a wide range. These fossils represent terrestrial plants and animals with a close resemblance to living forms. Fossil assemblages include bivalves, diatoms, gastropod shells, ostracods and trace fossils. Late Cenozoic calcrete may comprise of bones, horn corns as well as mammalian teeth. Tortoise remains have also been uncovered as well as trace fossils which includes termite and insect's burrows and mammalian trackways. Amphibian and crocodile remains have been uncovered where the depositional settings in the past were wetter. Fossils are mostly associated with ancient lakes, pans and river systems.

Table 2: Fossil Heritage probably present in the development footprint. Table modified from Palaeotechnical Report (Almond and Pether 2009).

Subgroup/ sequence	**Group**	**Formation**	**Fossil Heritage**
Tertiary-Quaternary	Kalahari	-	Terrestrial organisms include trace fossils, ostracods, bivalves, gastropod shells, diatoms and trace fossils. Late Cenozoic calcrete may comprise of bones, horn corns as well as mammalian teeth. Tortoise remains have also been uncovered as well as trace fossils which includes termite and insect's burrows and mammalian trackways.
Griqualand West Super Group	Campbell Rand Subgroup	Ghaapplato	Stromatolites eg Cyanobacterial microfossils

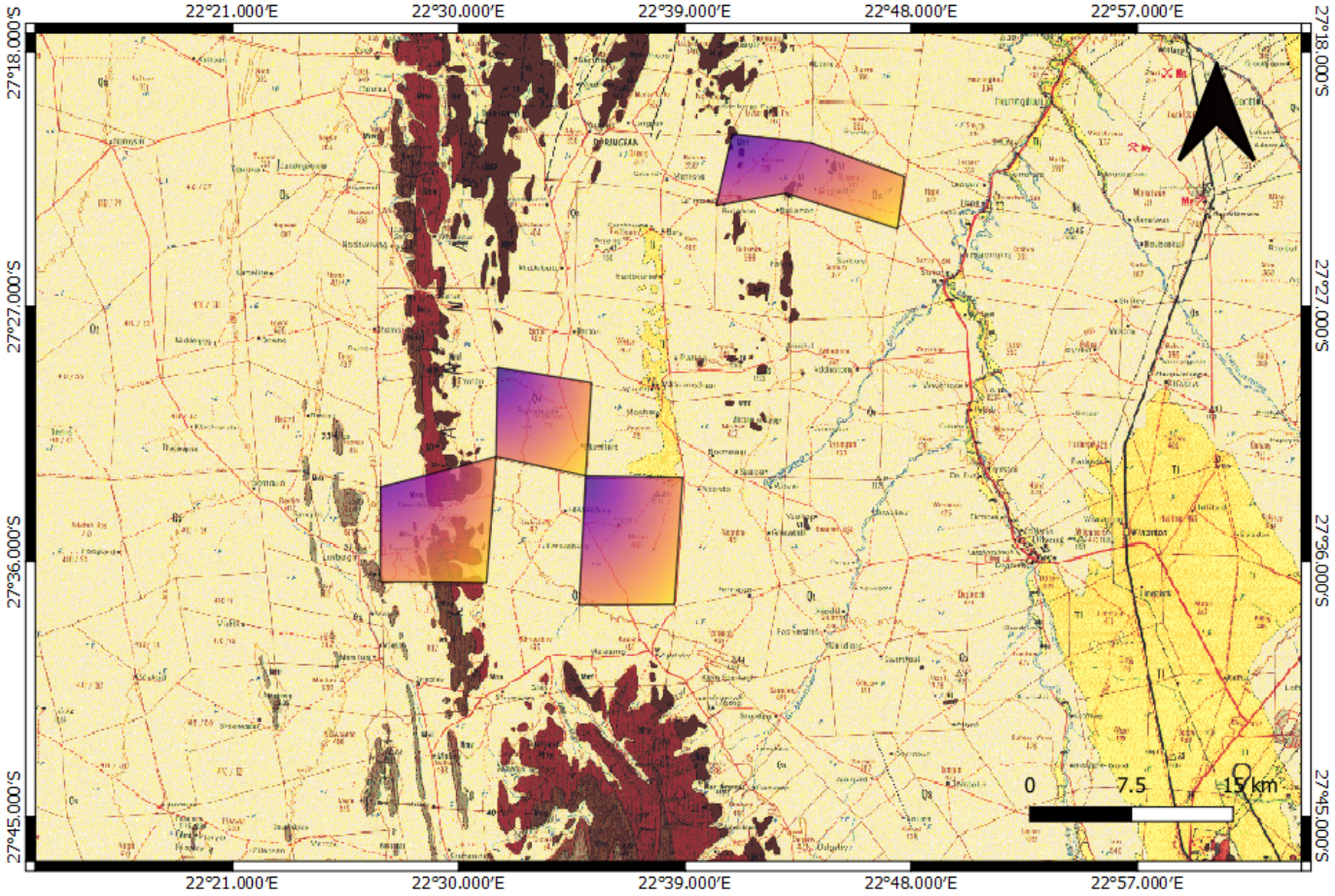


Figure 17: Extract of the 1:250 000 2722 Kuruman Geological Map (1976) (Council of Geoscience, Pretoria) indicating the locality of the proposed vineyard and game farm on Plot 337 and 396 near Kakamas in the Northern Cape.

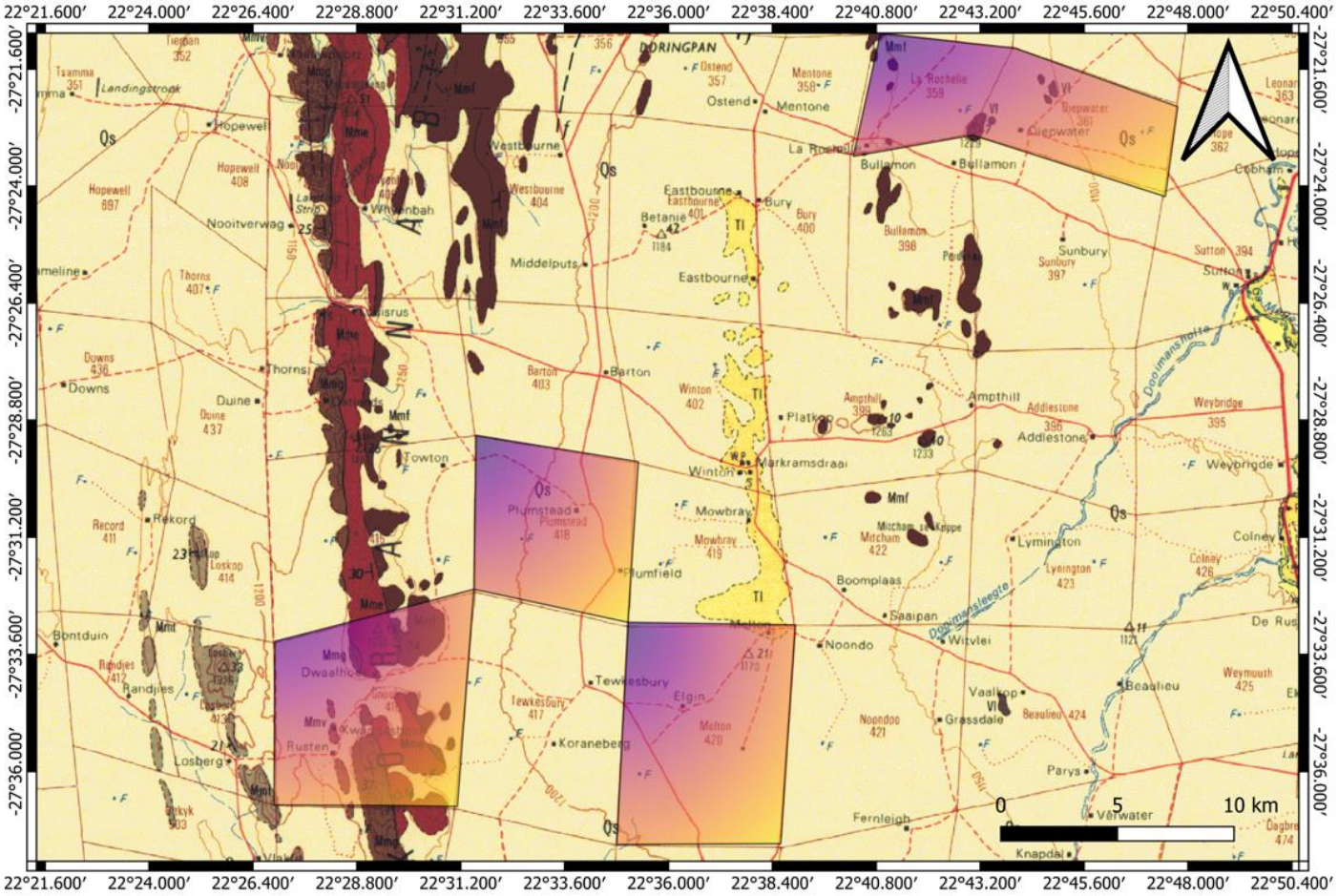


Figure 18:Close up view of the geology of the proposed development. A portion of Diepwater 361 (northeast) is underlain by the Matsap Subgroup of the of the Volop Group, the eastern tip of Melton 420 is underlain by surface limestone (Tl), while Gnoolooma in the west is underlain by sediments of the Matsap Subgroup (Glen Lyon (Mmg) and Mme Ellies Rus) while the rest of the development is underlain by surface windblown sand (Qs)

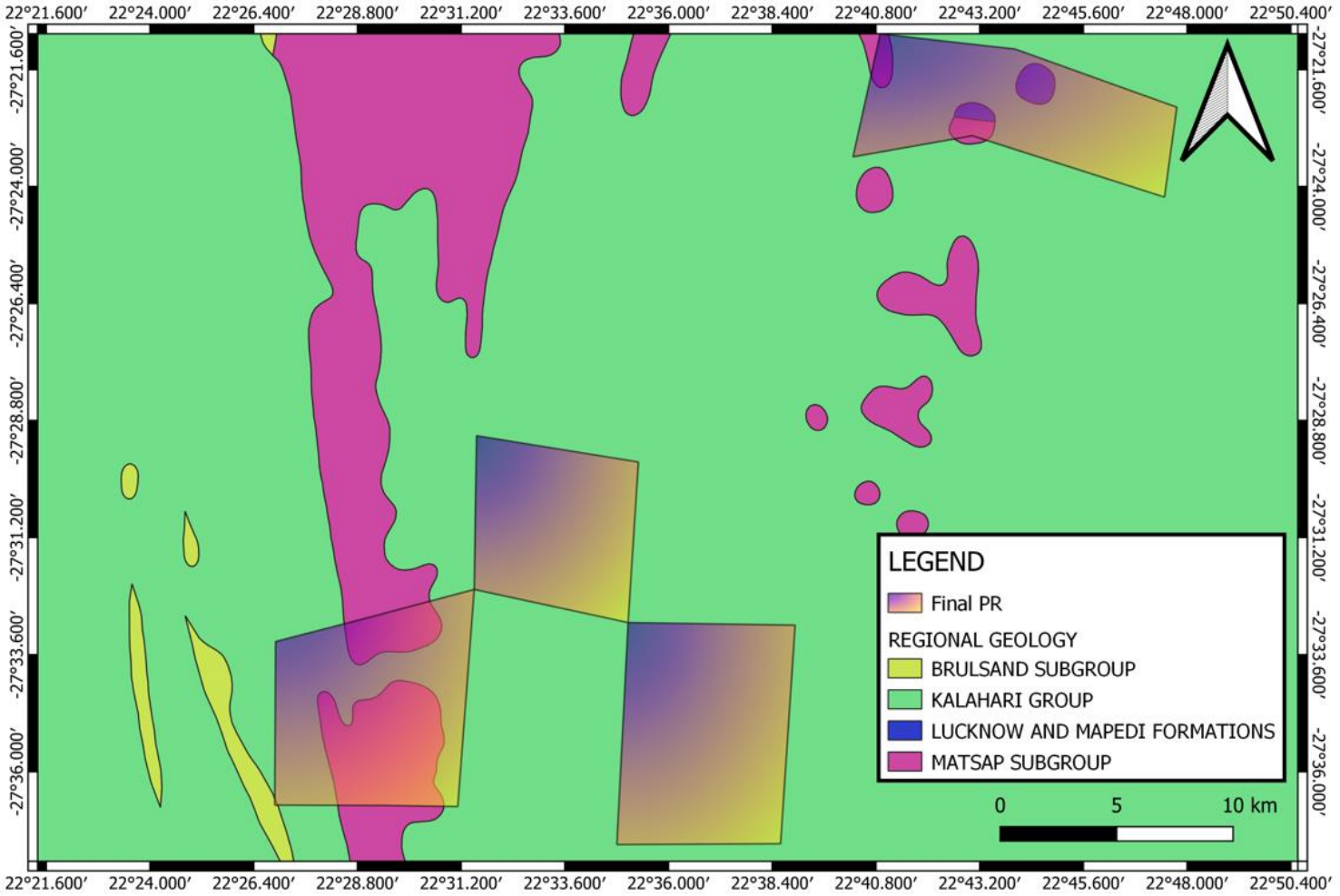
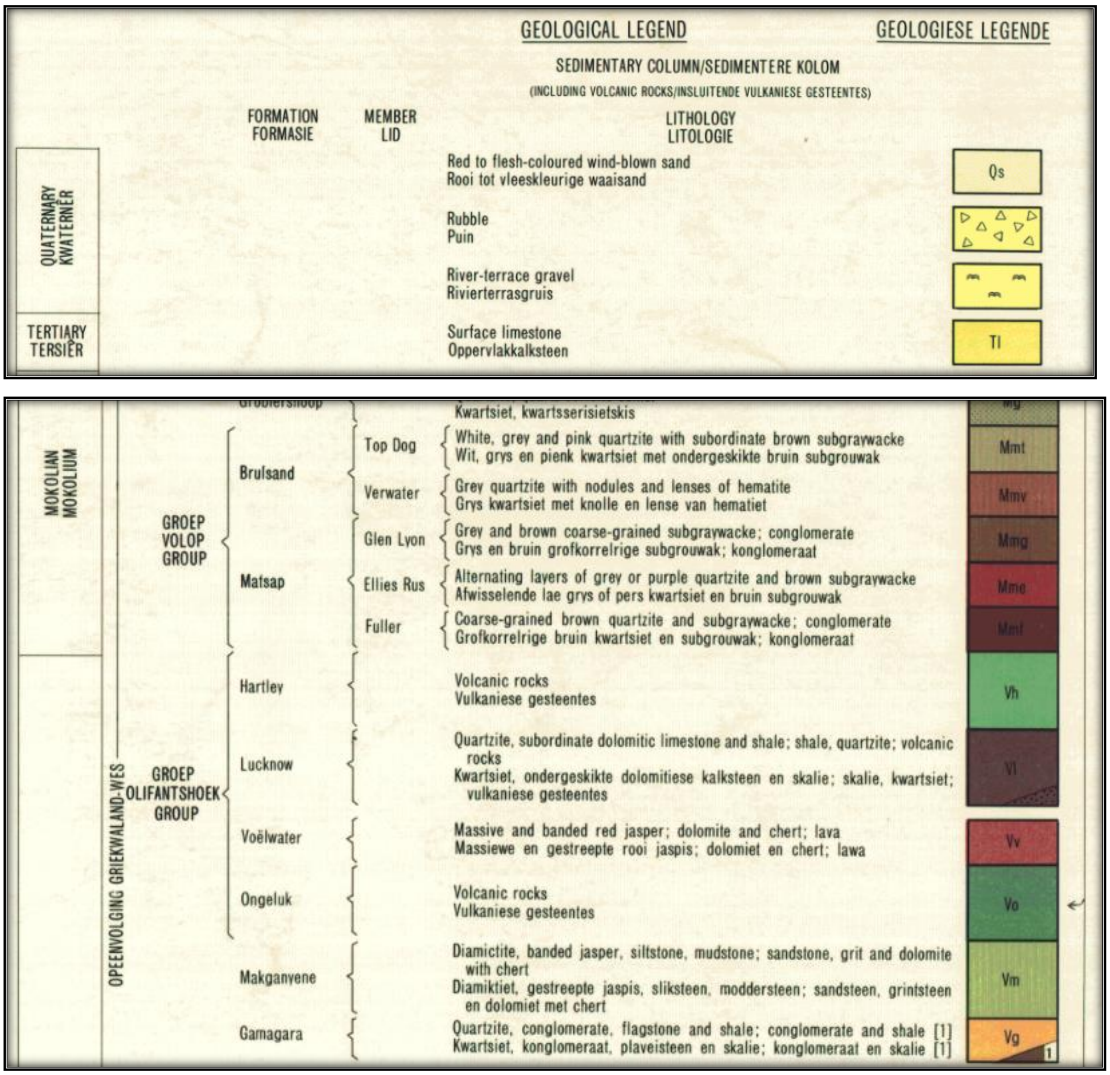
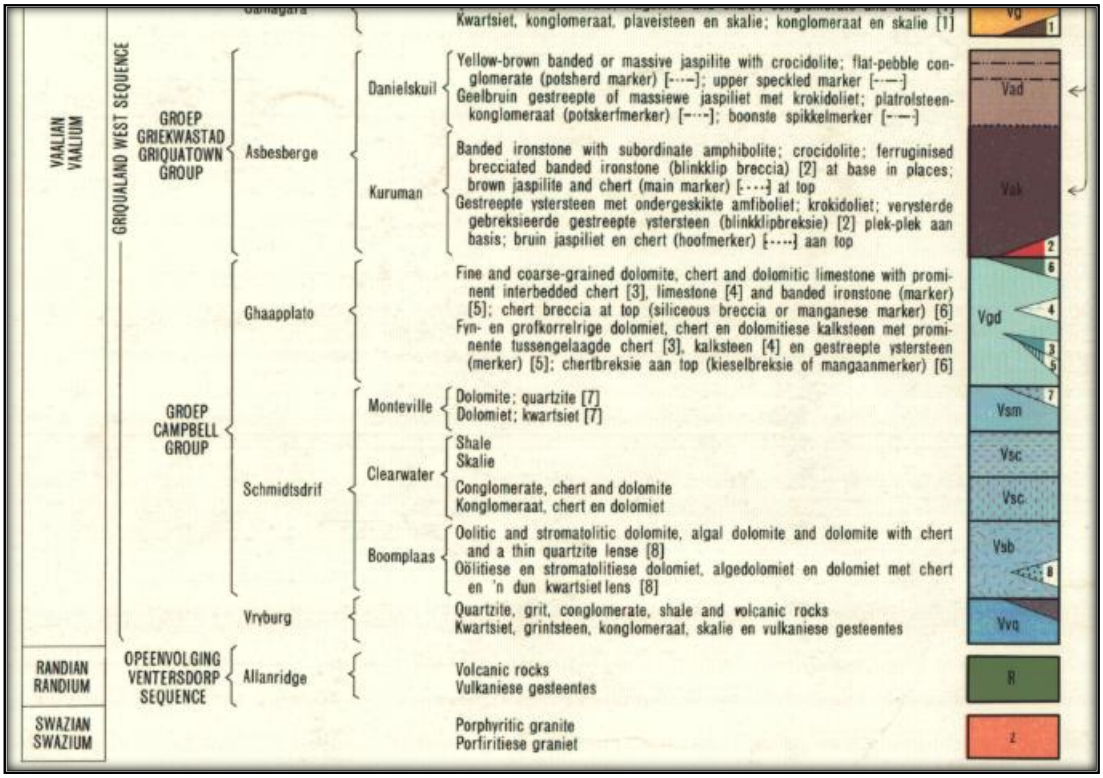


Figure 19: Surface geology of the proposed development (shape files obtained from the Council of Geosciences, Pretoria, Map drawn by QGIS 3.16).

Legend of the 1:250 000 2722 Kuruman Geological Map (1976) (Council of Geoscience, Pretoria)





Qs – Red to flesh-coloured wind-blown sand (beige). Kalahari Group. Quaternary.

Vo – Amygdaloidal andesitic lava with interbeds of tuff, agglomerate, chert and red jasper (green). Ongeluk Formation, Olifantshoek Group, Transvaal Supergroup.

Tl – Surface limestone (yellow). Kalahari Group.

Mmt- Top Dog Member; Brulsand Fm, Volop Group; white, grey and pink quartzite with subordinate brown subgraywacke

Mmv- Verwater Member, Brulsand Fm, Volop Group; Grey Quartzite with nodules and lenses of hamatite

Mmg- Glen Lyon Member, Matsap Fm, Volop Group; Grey and brown coarse-grained subgraywacke; conglomerate

Mme- Ellies Rus, Member, Matsap Fm, Volop Group; alternating layers of grey or purple quartzite and brown subgraywacke

Vad – Danielskuil Formation, Asbesberge Subgroup, Griqualand West Group, Transvaal Supergroup. yellow-brown banded or massive jaspilite and crocodolite.

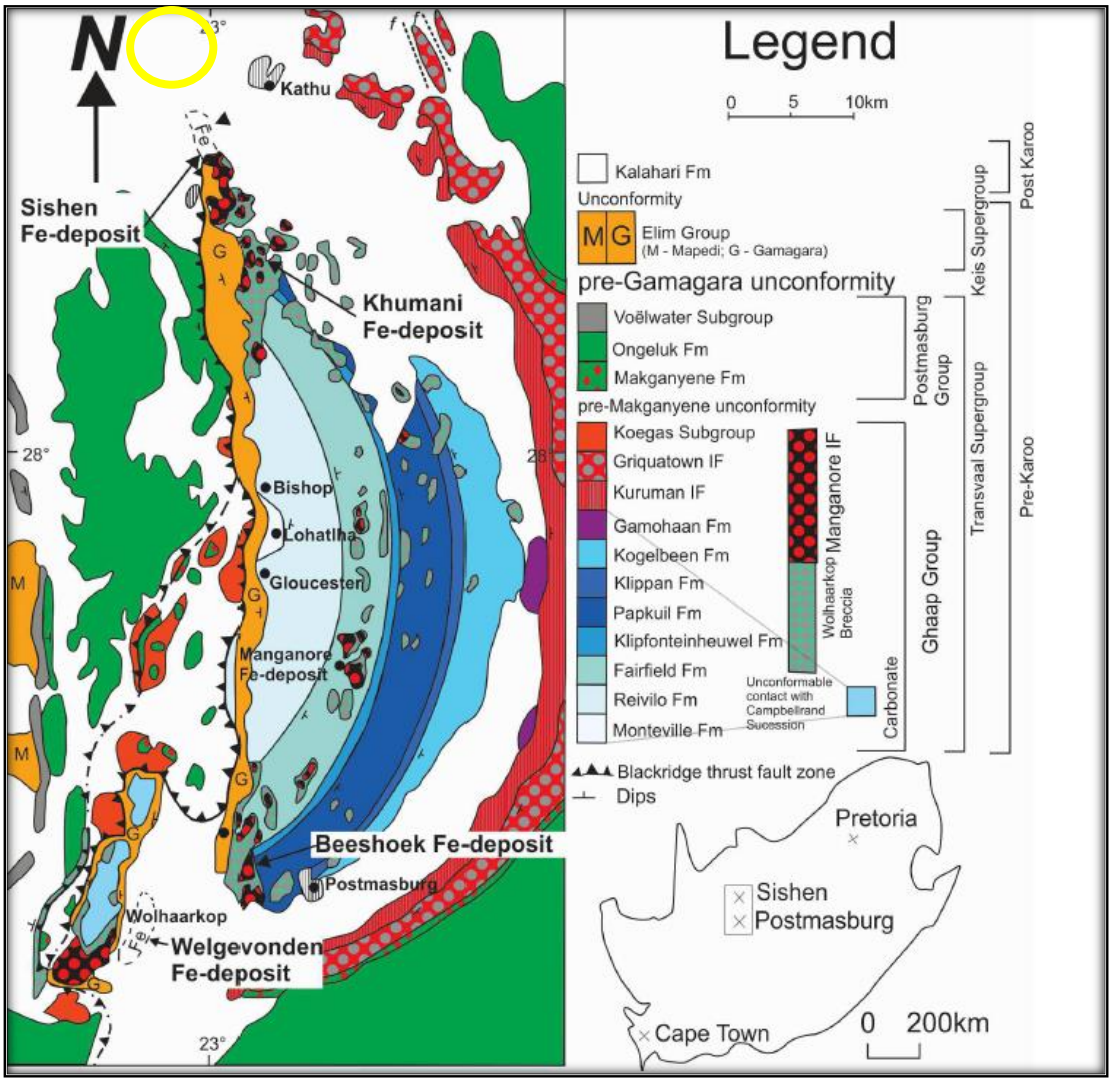


***Figure 20**: Updated Regional Geology of the Maremane Dome in the Northern* Cape (taken from Smith & Beukes 2016). *The approximate location of the proposed development is indicated by the yellow circle.*

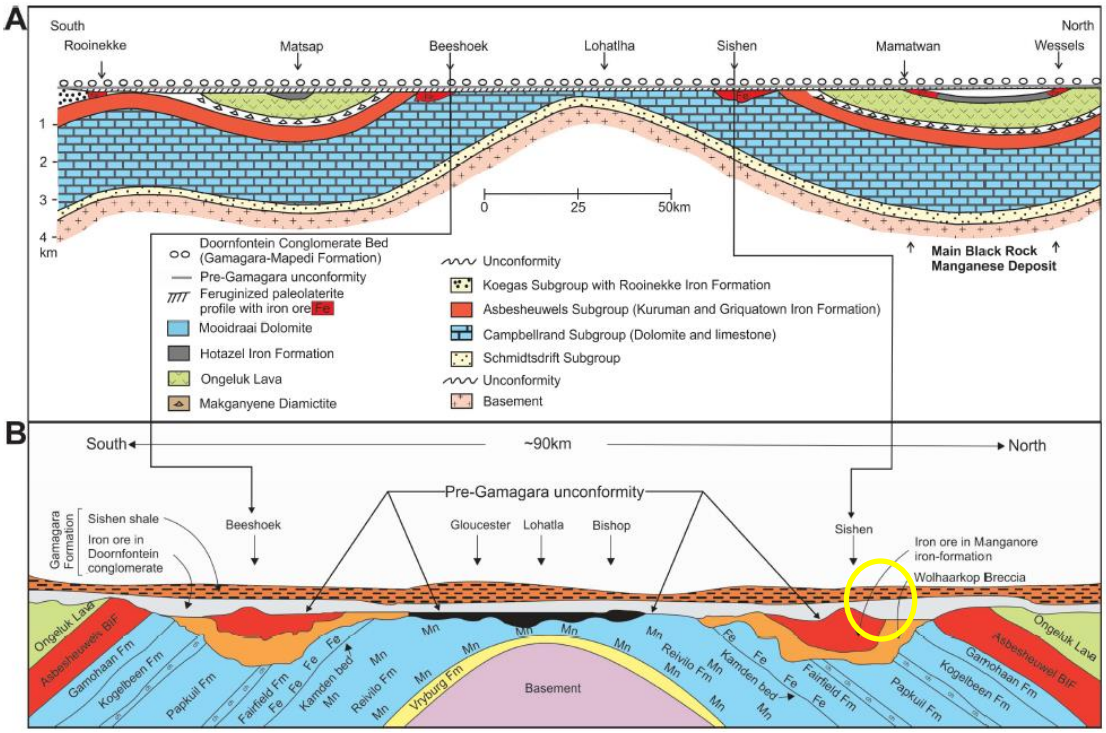


***Figure 21**: Schematic north-south cross section through (A) the western margin of the Griqualand West and (B) the Maremane Dome (modified after Cairncross et al, 1997; Van Deventer, 2009). Sub-surface dips of lithology are exaggerated for illustration purposes (taken from Smith & Beukes 2016). The approximate location of the proposed development is indicated by the yellow circle.*

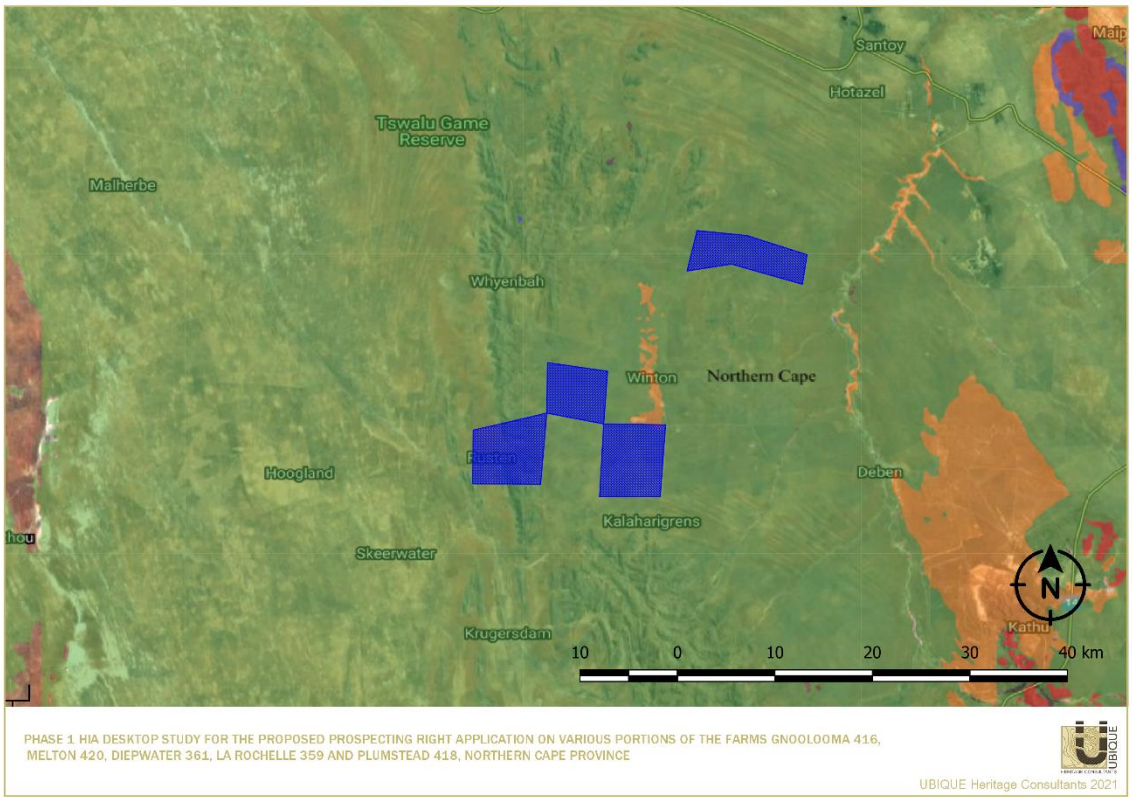


Figure 22: Extract of the 1 in 250 000 SAHRIS PalaeoMap map (Council of Geosciences) indicating the location of the proposed development.

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

According to the SAHRIS palaeo sensitivity map (**Figure 10**) there is a moderate chance of finding fossils in the green area (Kalahari Group) and a relative high possibility of finding fossils in the surface

limestone. Literature does not indicate fossil finds in this area and as this area is extremely small, the possibility of finding fossils in this area is small.

6. GEOGRAPHICAL LOCATION OF THE SITE

The proposed study area for the prospecting for iron ore and manganese is located on Portions 1, 2, 3, 4 and the Remaining Extent (RE) of the Farm Gnoolooma 416, Portions 1 & the RE of the Farm Plumstead 418, Portions 1 & the RE of the Farm Melton 420, Portions 1 & the RE of the Farm Diepwater 361 and the RE of the Farm La Rochelle 359, situated in the Tsantsabane and Joe Morolong Local Municipalities, Northern Cape Province (Figure 1-3).

7. METHODS

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

7.1. Assumptions and Limitations

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

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

8. ADDITIONAL INFORMATION CONSULTED

In compiling this report the following sources were consulted:

Geological map 1:100 000, Geology of the Republic of South Africa (Visser 1984),

1: 250 000 2722 Kuruman Geological Map (1976) (Council of Geoscience, Pretoria)

A Google Earth map with polygons of the proposed development was obtained from Unique Heritage Consultants.

9. IMPACT ASSESSMENT METHODOLOGY

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

- Construction;
- Operation; and
- Decommissioning.

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

Table 3: The Rating System-

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

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

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

		These impacts could be considered "fatal flaws".
74 to 96	Positive very high impact	The anticipated impact will have highly significant positive

(**Extent (1) + probability (2) + reversibility (4) + irreplaceability (4) + duration (4) + cumulative effect) (2) x magnitude/intensity (1) = 17**

9.1. Summary of Impact Tables

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

10. FINDINGS AND RECOMMENDATIONS

The proposed development near Kathu in the Northern Cape is underlain by Quaternary aged sediments of the Kalahari Group as well as According to this map the proposed development is largely underlain surface windblown sand as well as surface limestone with the western portion of the study area underlain by rocks of the Griqualand West Basin. The general low palaeontological sensitivity of the bedrocks and superficial sediments in the proposed development footprint, indicates that the proposed development will have an overall LOW impact significance in terms of palaeontological heritage. It is therefore considered that the development is will not lead to detrimental impacts on the palaeontological resources of the area. If fossil remains are discovered during any phase of construction, either on the surface or exposed by excavations the Environmental Control Officer (ECO) in charge of these developments must report to SAHRA (Contact details: SAHRA, 111 Harrington Street, Cape Town. PO Box 4637, Cape Town 8000, South Africa. Tel: 021 462 4502. Fax: +27 (0)21 462 4509. Web: www.sahra.org.za) so that correct mitigation can be carry out by a paleontologist.

It is consequently recommended that no further palaeontological heritage studies, ground-truthing and/or specialist mitigation are required pending the discovery of newly discovered fossils.

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Appendix A – Elize Butler CV

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