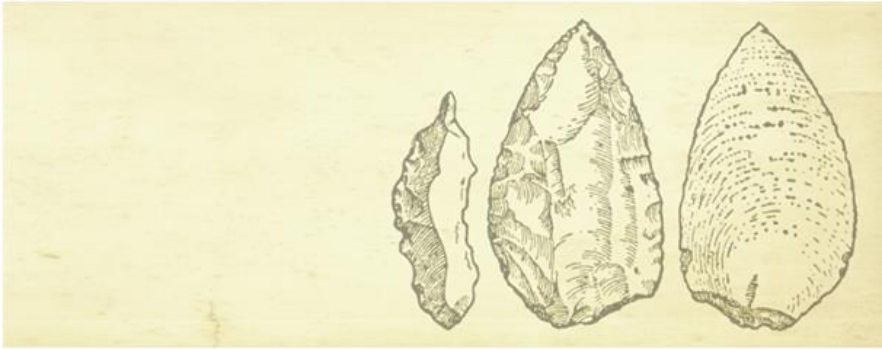

PHASE 1 HIA REPORT !KHEIS TOWNSHIP EXPANSION GROOTDRINK NORTHERN CAPE

PROPOSED TOWNSHIP EXPANSION ON ERF 131, GROOTDRINK, AND PLOT 2627, BOEGOEBERG SETTLEMENT (KENHARDT), ON THE FARM BOEGOEBERGNEDERSETTING RE/48, !KHEIS LOCAL MUNICIPALITY, ZF MGCAWU DISTRICT MUNICIPALITY, NORTHERN CAPE.

REFERENCE: NC/21/2018/PP (GROOTDRINK 370)/BH0067

PREPARED FOR:

ENVIROAFRICA

PREPARED BY:

HEIDI FIVAZ & JAN ENGELBRECHT

UBIQUE HERITAGE CONSULTANTS

29 JUNE 2020

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

Declaration of independence:

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

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

Signed: **Date: 2020-06-29**

J.A.C. Engelbrecht & H. Fivaz

UBIQUE Heritage Consultants

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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' 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 during 2012. The company moved from KZN to the Northern Cape and is currently based at Askham in the Northern Cape within the Dawid Kruiper 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 is responsible for 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 is currently completing her MA Archaeology at the University of South Africa (UNISA), with a focus 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.

UBIQUE HERITAGE CONSULTANTS

EXECUTIVE SUMMARY

Project description

UBIQUE Heritage Consultants were appointed by EnviroAfrica cc as independent heritage specialists in accordance with Section 38 of the NHRA and the National Environmental Management Act 107 of 1998 (NEMA), to conduct a cultural heritage assessment to determine the impact of the proposed township expansion on Erf 131, Grootdrink, and Plot 2627, Boegoeberg Settlement, !Kheis Local Municipality, ZF Mgcawu District Municipality, Northern Cape, on any sites, features, or objects of cultural heritage significance.

Findings and Impact on Heritage Resources

No heritage resources were identified within the development footprint. Lithic material and 20th-century munitions of low significance were recorded outside the planned development area. No heritage resources will be negatively affected by the proposed expansion of the Grootdrink settlement.

The proposed development is underlain by sediments of the Cenozoic Kalahari Group as well as the Boom River Formation of the Koras Group. Underlying these rocks are deposits of the Precambrian Transvaal Supergroup. According to the PalaeoMap of South African Heritage Resources Information System (SAHRIS), the Palaeontological Sensitivity of the Kalahari Group is low. The Boom River Formation is igneous rocks with an insignificant Palaeontological Sensitivity, and the Palaeontological Sensitivity of the Precambrian rocks of the Transvaal Supergroup is moderate. The cherts, dolomites and iron formations of the underlying Transvaal Supergroup are too deep to be affected by the proposed development (Butler 2020).

Recommendations

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

1. No significant heritage sites or features were identified within the surveyed sections of Erf 131, Boegoeberg Settlement RE/48, Grootdrink. No further mitigation is required for the proposed development on these properties. Therefore, from a heritage point of view, we recommend that the proposed development can continue.

2. The Early/Middle Stone Age and 20th-century cultural material identified on Plot 2627, Boegoeberg Settlement RE/48, Grootdrink, lie outside the development footprint and is not conservation worthy. No further mitigation is recommended with regards to these resources.

3. The Grootdrink cemetery is situated outside the development footprint. The site is graded as IIIB and is of High Local Significance. It is recommended that the graves be fenced off with the inclusion of a 50 m buffer/safety zone.

4. Due to the low to moderate palaeontological significance of the area, no further palaeontological heritage studies, ground-truthing and/or specialist mitigation are required. It is considered that the development of the proposed development is deemed appropriate and feasible and will not lead to detrimental impacts on the palaeontological resources of the area (Butler 2020). If fossil remains or trace fossils are discovered during any phase of construction, either on the surface or exposed by excavations the Chance Find Protocol (Appendix A/11) must be implemented by the Environmental Control Officer (ECO) in charge of these developments. These discoveries ought to be protected, and the ECO must report to SAHRA (Contact details: SAHRA, 111 Harrington Street, Cape Town. PO Box 4637, Cape Town 8000, South Africa. Tel: 021 462 4502. Fax: +27 (0)21 462 4509. Web: www.sahra.org.za) so that mitigation can be carried out by a palaeontologist (Butler 2020).

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

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ABBREVIATIONS

AIA:	Archaeological Impact Assessment
ASAPA:	Association of South African Professional Archaeologists
BIA:	Basic Impact Assessment
CRM:	Cultural Resource Management
ECO:	Environmental Control Officer
EIA:	Environmental Impact Assessment*
EIA:	Early Iron Age*
EMP:	Environmental Management Plan
ESA:	Earlier Stone Age
GPS:	Global Positioning System
HIA:	Heritage Impact Assessment
LIA:	Late Iron Age
LSA:	Later Stone Age
MEC:	Member of the Executive Council
MIA:	Middle Iron Age
MPRDA:	Mineral and Petroleum Resources Development Act
MSA:	Middle Stone Age
NEMA:	National Environmental Management Act
NHRA:	National Heritage Resources Act
OWC:	Orange River Wine Cellars
PRHA:	Provincial Heritage Resource Agency
SADC:	Southern African Development Community
SAHRA:	South African Heritage Resources Agency
SAHRIS:	South African Heritage Resources Information System

**Although EIA refers to both Environmental Impact Assessment and the Early Iron Age both are internationally accepted abbreviations it must be read and interpreted in the context it is used.*

GLOSSARY

Archaeological: material remains resulting from human activity which are in a state of disuse and are in or on land and are older than 100 years, including artefacts, human and hominid remains and artificial features and structures;

- rock art, being any form of painting, engraving or other graphic representation on a fixed rock surface or loose rock or stone, which was executed by human agency and is older than 100 years (as defined and protected by the National Heritage Resources Act (NHRA) (Act No. 25 of 1999) including any area within 10 m of such representation;
- wrecks, being any vessel or aircraft, or any part thereof, which were wrecked in South Africa, whether on land, in the internal waters, the territorial waters or in the culture zone of the Republic, as defined respectively in sections 3, 4 and 6 of the Maritime Zones Act, 1994 (Act No. 15 of 1994), and any cargo, debris or artefacts found or associated therewith, which is older than 60 years or which SAHRA considers to be worthy of conservation;
- features, structures and artefacts associated with military history, which are older than 75 years and the sites on which they are found.

Stone Age:	The first and longest part of human history is the Stone Age, which began with the appearance of early humans between 3-2 million years ago. Stone Age people were hunters, gatherers and scavengers who did not live in permanently settled communities. Their stone tools preserve well and are found in most places in South Africa and elsewhere.
Earlier Stone Age:	>2 000 000 - >200 000 years ago
Middle Stone Age:	<300 000 - >20 000 years ago
Later Stone Age:	<40 000 - until the historical period
Iron Age:	(Early Farming Communities). Period covering the last 1800 years, when immigrant African farmer groups brought a new way of life to southern Africa. They established settled villages, cultivated domestic crops such as sorghum, millet and beans, and herded cattle as well as sheep and goats. As they produced their own iron tools, archaeologists call this the Iron Age. Early Iron Age: AD 200 - AD 900 Middle Iron Age: AD 900 - AD 1300 Later Iron Age: AD 1300 - AD 1850
Historic:	Period of arrival of white settlers and colonial contact. AD 1500 to 1950
Historic building:	Structures 60 years and older.
Fossil:	Mineralised bones of animals, shellfish, plants and marine animals. A trace fossil is the track or footprint of a fossil animal that is preserved in stone or consolidated sediment.
Heritage:	That which is inherited and forms part of the National Estate (historic places, objects, fossils as defined by the National Heritage Resources Act 25 of 1999).
Heritage resources:	These mean any place or object of cultural significance, tangible or intangible.
Holocene:	The most recent geological period that commenced 10 000 years ago.
Palaeontology:	Any fossilised remains or fossil trace of animals or plants which lived in the geological past, other than fossil fuels or fossiliferous rock intended for industrial use, and any site that contains such fossilised remains or traces
Cumulative impacts:	"Cumulative Impact", in relation to an activity, means the past, current and reasonably foreseeable future impact of an activity, considered together with the impact of activities associated with that activity that may not be significant, but may become significant when added to existing and reasonably foreseeable impacts eventuating from similar or diverse activities.
Mitigation:	Anticipating and preventing negative impacts and risks, then to minimise them, rehabilitate or repair impacts to the extent feasible.
A 'place':	a site, area or region;

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

'Public monuments and memorials': mean all monuments and memorials—

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

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

1. INTRODUCTION

1.1 Scope of study

The project involves the expansion of the Grootdrink township on Erf 131, Grootdrink, and Plot 2627, Boegoeberg Settlement, in the !Kheis Local Municipality, ZF Mgcawu District Municipality, Northern Cape. UBIQUE Heritage Consultants were appointed by EnviroAfrica cc as independent heritage specialists in accordance with the National Environmental Management Act 107 of 1998 (NEMA), and in compliance with Section 38 of the National Heritage Resources Act 25 of 1999 (NHRA), to conduct a cultural heritage assessment (AIA/HIA) of the development area.

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

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

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

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

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

1.2 Assumptions and limitations

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

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

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

2. TERMS OF REFERENCE

An HIA/ AIA must address the following key aspects:

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

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

2.1. Statutory Requirements

2.1.1 General

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

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

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

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

2.1.2 National Heritage Resources Act 25 of 1999

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

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

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

2.1.3 Heritage Impact Assessments/Archaeological Impact Assessments

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

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

2.1.4 Definitions of heritage resources

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

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

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

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

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

2.1.5 Management of Graves and Burial Grounds

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

- **Graves older than 60 years, situated outside a formal cemetery administered by a local Authority are** protected in terms of Section 36 of the NHRA as well as the Human Tissues Act of 1983. Accordingly, such graves are the jurisdiction of SAHRA. The procedure for Consultation Regarding Burial Grounds and Graves (Section 36(5) of NHRA) is applicable to graves older than 60 years that are situated outside a formal cemetery 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 cooperation with the South African Police Service and in accordance with regulations of the responsible heritage resources authority—
(a) carry out an investigation for the purpose of obtaining information on whether or not such grave is protected in terms of this Act or is of significance to any community; and
(b) if such grave is protected or is of significance, assist any person who or community which is a direct descendant to make arrangements for the exhumation and re-interment of the contents of such grave or, in the absence of such person or community, make any such arrangements as it deems fit.

3. STUDY APPROACH AND METHODOLOGY

3.1 Desktop study

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

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

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

3.1.1 Literature review

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

3.2 Field study

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

3.2.1 Systematic survey

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

UBIQUE Heritage Consultants inspected the proposed development and surrounding areas on 18 & 19 May 2020 and completed a controlled-exclusive, pre-planned, pedestrian survey. We conducted an inspection of the surface of the ground, wherever the surface was visible. This was done with no substantial attempt to clear brush, sand, deadfall, leaves or other material that may cover the surface and with no effort to look beneath the surface beyond the inspection of rodent burrows, cut banks and other exposures fortuitously observed.

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

3.2.2 Recording significant areas

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

3.2.3 Determining significance

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

Cultural significance:

- Low	A cultural object being found out of context, not being part of a site or without any related feature/structure in its surroundings.
- Medium	Any site, structure or feature being regarded less important due to several factors, such as date and frequency. Likewise, any important object found out of context.
- High	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.

3.2.4 Assessment of development impacts

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

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

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

Criteria	Rating Scales	Notes
Nature	Positive	An evaluation of the type of effect the construction, operation and management of the proposed development would have on the heritage resource.
	Negative	
	Neutral	
Extent	Low	Site-specific affects only the development footprint.
	Medium	Local (limited to the site and its immediate surroundings, including the surrounding towns and settlements within a 10 km radius);
	High	Regional (beyond a 10 km radius) to national.
Duration	Low	0-4 years (i.e. duration of construction phase).
	Medium	5-10 years.
	High	More than 10 years to permanent.
Intensity	Low	Where the impact affects the heritage resource in such a way that its significance and value are minimally affected.
	Medium	Where the heritage resource is altered, and its significance and value are measurably reduced.
	High	Where the heritage resource is altered or destroyed to the extent that its significance and value cease to exist.
Potential for impact on irreplaceable resources	Low	No irreplaceable resources will be impacted.
	Medium	Resources that will be impacted can be replaced, with effort.
	High	There is no potential for replacing a particular vulnerable resource that will be impacted.
Consequence, (a combination of extent, duration, intensity, and the potential for impact on irreplaceable resources).	Low	A combination of any of the following: - Intensity, duration, extent and impact on irreplaceable resources are all rated low. - Intensity is low and up to two of the other criteria are rated medium. - Intensity is medium and all three other criteria are rated low.
	Medium	Intensity is medium and at least two of the other criteria are rated medium.

Criteria	Rating Scales	Notes
	High	Intensity and impact on irreplaceable resources are rated high, with any combination of extent and duration. Intensity is rated high, with all the other criteria being rated medium or higher.
Probability (the likelihood of the impact occurring)	Low	It is highly unlikely or less than 50 % likely that an impact will occur.
	Medium	It is between 50 and 70 % certain that the impact will occur.
	High	It is more than 75 % certain that the impact will occur, or it is definite that the impact will occur.
Significance (all impacts including potential cumulative impacts)	Low	Low consequence and low probability. Low consequence and medium probability. Low consequence and high probability.
	Medium	Medium consequence and low probability. Medium consequence and medium probability. Medium consequence and high probability. High consequence and low probability.
	High	High consequence and medium probability. High consequence and high probability.

3.3 Oral history

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

3.4 Report

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

4. PROJECT OVERVIEW

UBIQUE Heritage Consultants were appointed by EnviroAfrica cc as independent heritage specialists in accordance with Section 38 of the NHRA and the National Environmental Management Act 107 of 1998 (NEMA), to conduct a cultural heritage assessment to determine the impact of the proposed development of Erf 131, Grootdrink, and Plot 2627, Boegoeberg Settlement, on any sites, features, or objects of cultural heritage significance.

The project entails the expansion of the Grootdrink community. A total of 370 new erven will be created. The project includes the formalisation of the existing informal houses located around the town. The size of the study area is 36 ha. The community of Grootdrink is located on the western bank of the Orange River, approximately 40 km northwest of Groblershoop within the !Kheis Local Municipal area.

4.1 Technical information

Project description	
Project name	!KHEIS LOCAL MUNICIPALITY TOWNSHIP EXPANSION: GROOTDRINK
Description	The expansion and upgrade of housing and infrastructure at Grootdrink township in the !Kheis Local Municipality and within the ZF Mgcawu District Municipality in the Northern Cape Province. Reference: NC/21/2018/PP
Developer	
!Kheis Local Municipality in cooperation with the Barzani group and Macroplan Regional and Town Planners	
Contact information	Grootdrink Community !Kheis Local Municipality, ZF Mgcawu District Municipality, Northern Cape Province.
Development type	Housing (Township expansion)
Landowner	
!Kheis Local Municipality	
Contact information	054-332 3642 054- 833 9500
Consultants	
Environmental	EnviroAfrica cc.
Heritage and archaeological	UBIQUE Heritage Consultants
Paleontological	Banzai Environmental
Property details	
Province	Northern Cape
District municipality	ZF Mgcawu
Local municipality	!Kheis
Topo-cadastral map	1:50 000 2821DA
Farm name	Erf 131 & Plot 2627 Boegoeberg Settlement RE/48
Closest town	Groblershoop
GPS Coordinates	28°33'47.80"S; 21°44'31.88"E 28°33'46.34"S: 21°44'27.56"E
Property size	

Development footprint size	36 ha
Land use	
Previous	Agriculture
Current	Agriculture and limited informal houses
Rezoning required	Yes
Sub-division of land	Yes

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

Figure 1 Proposed township expansion at Grootdrink, !Kheis Local Municipality. Image provided by Macroplan.

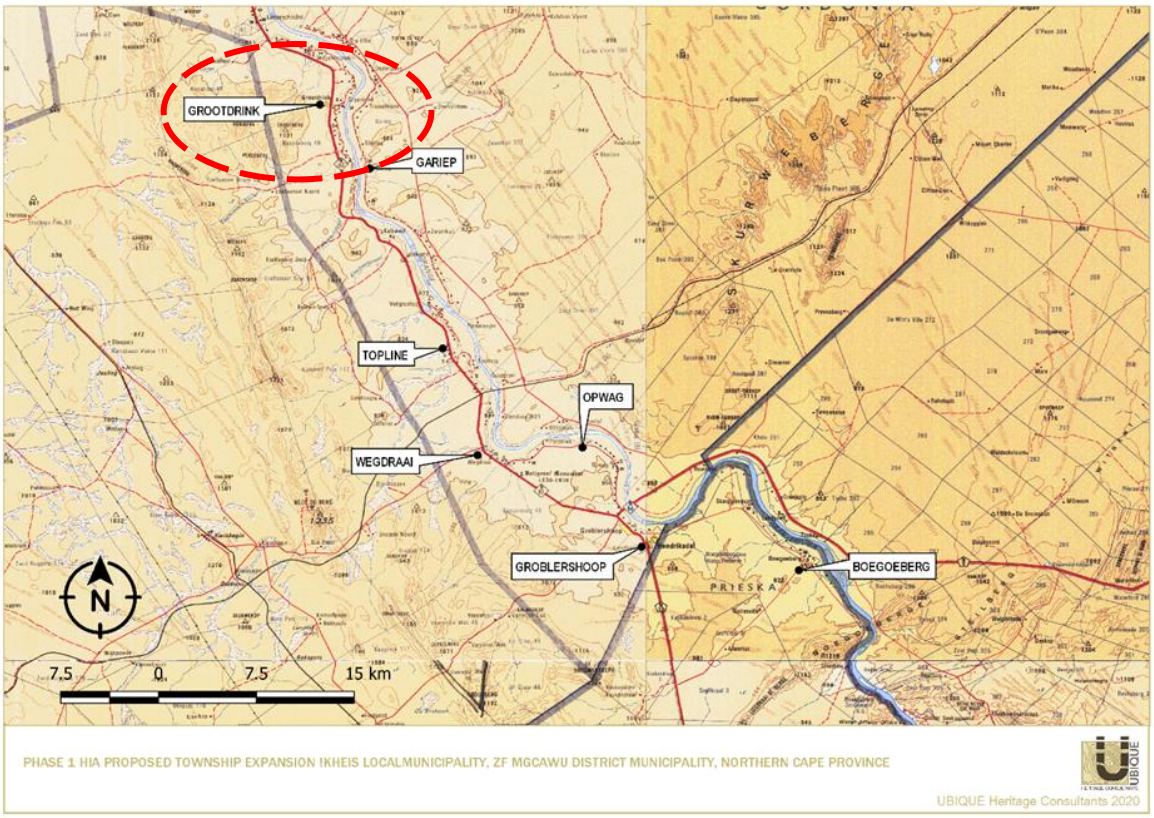

Figure 2 Regional locality of the development footprint, Grootdrink, !Kheis Local Municipality indicated on 1: 250 000 WGS2820-2920.

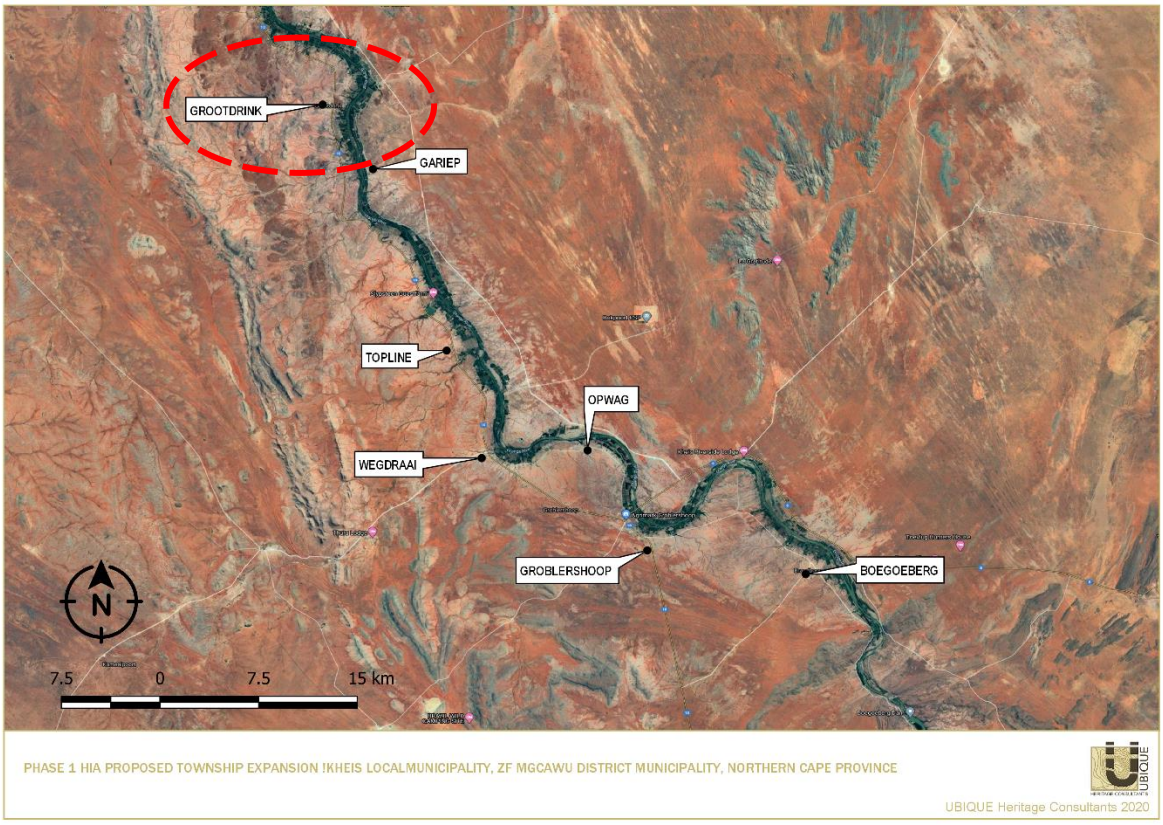

Figure 3 Regional locality of the development footprint, Grootdrink, !Kheis Local Municipality indicated on Google Earth Satellite imagery.

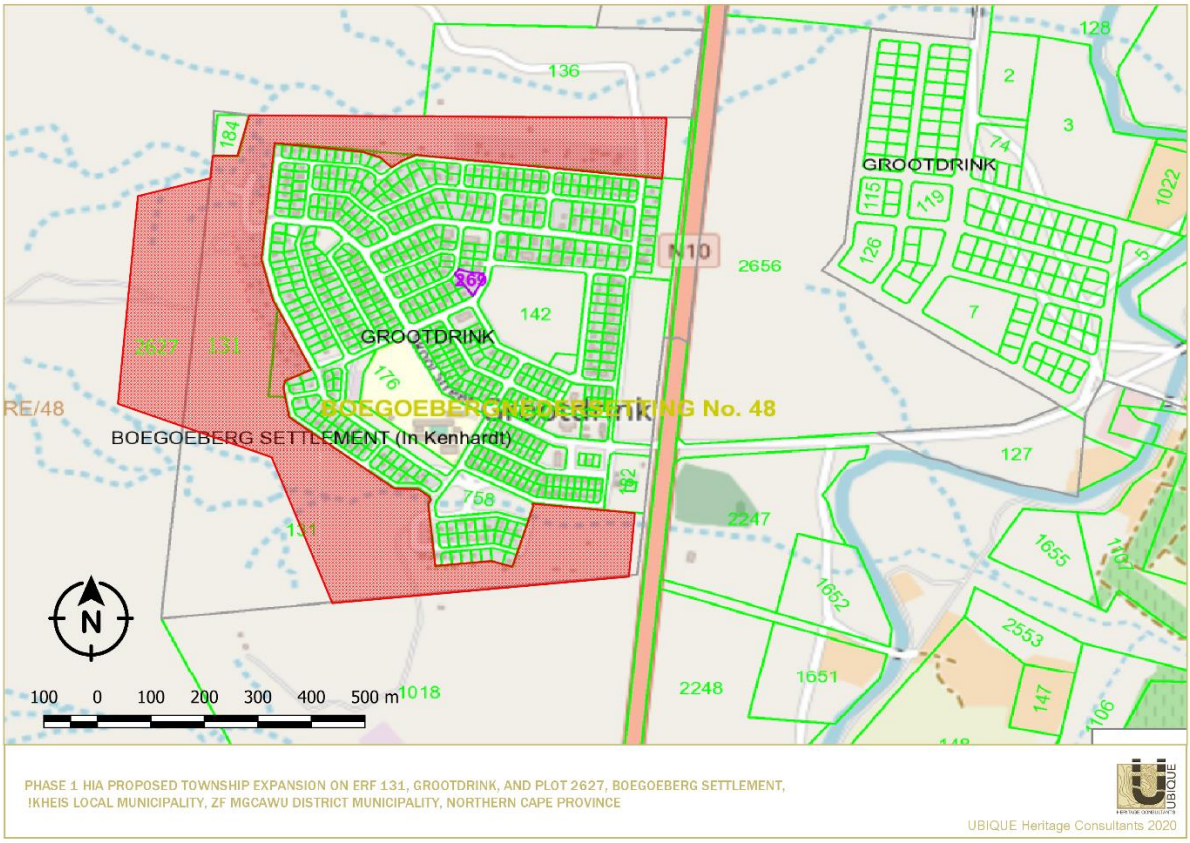

Figure 4 Locality of the development footprint, Grootdrink, !Kheis Local Municipality indicated on Chief Surveyor-General ArcGIS Web Map (source https://csg.esri-southafrica.com/)

Figure 5 Locality of the development footprint Grootdrink !Kheis Local Municipality indicated on Google Earth Satellite imagery.

4.2 Description of the affected environment

The development area falls within Bushmanland Arid Grassland. It is characterised by extensive to irregular plains on a slightly sloping plateau. The white grass (*Stipagrostis* species) dominated grassland gives this vegetation type the character of semidesert 'steppe'. In places, low shrubs of *Salsola* change the vegetation structure. Vegetation identified in the development footprint includes camel thorn trees *(Acacia erioloba*), blackthorn trees (*Acacia mellifera*), silky bushman grass (*Stipagrostis uniplumis*), three thorn/driedoring (*Rhigozum trichotomum*), skaapbossie (*Aizoon schellenbergii*), shepherd tree (*Boscia albitrunca*), suurgras (*Enneapogon desvauxii*), tall bushman grass (*Stipagrostis hirtigluma*), silky bushman grass (*Stipagrostis uniplumis*), kortbeen boesmangras (*Stipagrostis obtuse*), pencil milkbush (*Euphorbia lignose*) and hereroland aloe (*Aloe argenticuada*). The soils of the area are mostly red-yellow freely drained apedal soils (Mucina & Rutherford 2006). There are deposits of quartz, quartzite, calcrete, and dolomite on the surface.

The study area consists of flat open vacant fields with a few trees scattered throughout the footprint. The entire terrain slightly slopes from west to east towards the existing settlement and the N10 National road. The site is bounded by koppies and a formal cemetery in the north, in the south by privately-owned farmland. The N10 National Road lies to the east, and in the west is open fields and koppies. Several dry riverine or streams flow from west to east through the footprint, but there are no major waterways present. Some of the dry riverine eroded into quite large furrows, especially on the northern edge of the footprint, and several areas of the footprint show minor water erosion. Anthropogenic disturbances are prevalent throughout the footprint, such as dumping sites for garbage, rubble, stone and soil. The evidence of construction earthmoving machinery is visible in certain areas. Various informal houses are located around the site, as well as indications of overgrazing and the intentional removal of vegetation. Several two-track roads traverse the footprint. The site was accessed from the N10 National Road in the east.

Figure 6 *Views of the affected development area.*

5. HISTORICAL AND ARCHAEOLOGICAL BACKGROUND

5.1 Region

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

5.1.1 Stone Age

The Stone Age is the period in human history when lithic material was mainly used to produce tools (Coertze & Coertze 1996). In South Africa, the Stone Age can be divided into three periods. It is, however, important to note that dates are relative and only provide a broad framework for interpretation. The division of the Stone Age, according to Lombard et al. (2012) is as follows:

Earlier Stone Age: >2 000 000 - >200 000 years ago
Middle Stone Age: <300 000 - >20 000 years ago
Later Stone Age: <40 000 - until the historical period.

In short, the Stone Age refers to humans that mainly utilised stone as their technological marker. Each of the sub-divisions represents 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 are commonly inferred to have been made and utilised for hunting activities and had numerous functions (Wurz 2013). Lastly, 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 the form of 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 riverbeds (Kruger 2018). Banded ironstone occurs on several sites throughout the Northern Cape and appears to have been a favoured raw material for making stone tools due to its superior flaking qualities (Morris 2012). Prominent sites that exemplify these periods in the Nama-Karoo Biome are Rooidam and Bundu Farm (Earlier Stone Age and Middle Stone Age), and Biesje Poort 2, Bokvasmaak 3, Melkboom 1, Vlermuisgat, and Jagtpan 7 (Later Stone Age) (Lombard et al. 2012).

Within the region, Stone Age sites and complexes have been, and are still being investigated in some detail. For instance, in the Kathu landscape, the longest preserved lithostratigraphic and archaeological sequence of human occupation has been documented and excavated. Evidence of 500 000-year-old hafted stone points, ancient specularite working (and mining), and associated Ceramic Later Stone Age material have been recorded on the eastern side of Postmasburg and Doornfontein. Older transitional ESA/MSA Fauresmith sites at Lyly Feld, Demaneng, Mashwening, King, Rust & Vrede, Paling, Gloucester and Mount Huxley have been recorded (Beaumont 2004; Beaumont 2013; Beaumont & Morris 1990; Beaumont & Vogel 2006; Morris 2005; Morris & Beaumont 2004; Porat et al. 2010; Thackeray et al. 1983; Walker et al. 2014; Wilkins et al. 2012).

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

Archaeological surveys have shown that rocky outcrops, hills, drainage lines, riverbanks, and confluences, are prime localities for archaeological finds (Lombard 2011). Sites can likewise be found close to local sources of highly prized raw materials such as previously mentioned banded iron formations (BIF), as well as jasperlite and specularite (Morris 2012; Kruger 2015; 2018). If any such features occur in the study area, Stone Age manifestations can be anticipated.

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 AD
- Late Iron Age (LIA) 1000 – 1850 AD

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

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

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

The South African Iron Age consists of 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 were permanent settlements, 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). IA sites are scarce, but not unheard-of in the Northern Cape. IA sites have predominantly been recorded in the northeastern part of the province. Kruger (2018) suggested that environmental factors delegated the spread of IA farming westwards during the 17th century. Settlement in the Northern Cape was constrained mainly to the areas east of the Langeberg Mountains. The Later Iron Age (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, who are the descendants of the LIA mixed farming communities, moved into a region already sparsely inhabited by LSA Khoisan groups. De Jong (2010) commented that LIA communities eventually assimilated many LSA Khoisan groups, and only a few had managed to survive independently. Some of the surviving groups included the Koranna and the Griqua. This period of contact has often been referred to as the Ceramic LSA. It is represented by sites such as the earlier mentioned Blinkklipkop specularite mine near Postmasburg and Kathu Pan (De Jong 2010). LIA people briefly utilised the area close to the Orange River in the Northern Cape, mining copper, and there is even evidence of an IA presence as far as the Upington area in the 18th century (Kruger 2018; Van Vollenhoven 2014).

5.1.3 Historical period

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

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

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

The region has been the backdrop to various incidents of conflict. 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 Koranna and early white communities from the south-west resulted in a period of instability in the Northern Cape. 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 *Difaqane/Mfecane*, which began in the late-18th century, affected the Northern Cape Province around 1820, which was much later than the rest of southern Africa (De Jong 2010; Mlilo 2019). During this time, there was an incursion of displaced refugees associated with the Fokeng, Tlokwa, Hlakwana and Phuting groups into the northeast (De Jong 2010). The arrival of large numbers of Great Trek Boers from the Cape Colony to the borders of Bechuanaland and Griqualand West in 1836 caused friction with many Tswana groups and the missionaries of the London Mission Society. The conflict between Boer and Tswana communities escalated in the 1860s and 1870s when the Koranna and Griqua communities and the British government became involved. The Koranna wars took place during 1879-1880.

According to Breutz (1953, 1954), and Van Warmelo (1935), several Batswana tribes, including the different Thlaping and Thlaro sections as well as other smaller groups, take their 18th and 19th-century roots back to the area around Groblershoop, Olifantshoek, the Langeberg (Majeng) and Korannaberg ranges in the western part of the region. After Britain annexed Bechuanaland in 1885, the land of the indigenous inhabitants was limited to a few reserves. After the failed Tswana revolt in 1895, the British continued to divide the Tswana land up, and grant it to settling colonial farmers.

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

5.2 Local

During 1778, Swedish-born traveller and explorer Hendrik Wikar reached the middle and lower reaches of the Orange River after a long land journey that started in Cape Town. As a deserter from the service of the Dutch East India Company, Wikar spent several years within the area and compiled a report of his experiences in exchange for a pardon (Ross 1975). He documented his encounters with Khoisan communities who called themselves the *Einiqua*, or *River People*. The *Einiqua* were divided into three “kraals”: the *Namnykoa* near the Augrabies Falls, the *Kaukoa* on islands west of Keimoes, and the *Aukokoa* of Kanoneiland and other islands to the east. Their kraals consisted of a considerable amount of sheep and cattle, and they collected plants, hunted game, and cultivated dagga but no other crops, according to Wikar (Ross 1975). Amongst the

pastoralist communities living on the islands were the *Anoe eis* people whom Wikar characterised as "Bushmen". They possessed no domesticated stock, subsisted by fishing, game-trapping, hunting and the gathering of plant foods (Morris & Beaumont 1991). Colonel Robert Jacob Gordon who visited the area in 1779, however, remarked that they were actually *Einiqua* (i.e. Khoi) who had "lost their cattle as a result of an argument with the *Namneiqua* village (Morris & Beaumont 1991). The San and Khoekhoe hunter-gatherers in the region had reached a form of stability by the early 18th century (Mlilo 2019). The area west of the Langeberg and east of Upington was occupied by IA groups such as the BaTlaping. Their influence had reached as far down the river as Upington (Morris 1992).

By the 18th century, the *Basters* had focused on the Orange River (and Namaqualand) as destinations of sanctuary from colonial rule and social oppression present in the Cape Colony (Mlilo 2019; Van der Walt 2015). The term "*Baster*" characterises a group of people of mixed percentage (white and Khoekhoe or slave and Khoekhoe) who possessed property and who was culturally European. In 1882, the first 81 farms north of the Gariep/Orange River between Groblershoop and the Augrabies Falls were allocated almost exclusively to *Basters* (Morris 1992). During the late 19th century, more white people started moving to the Gordonia area, and by the turn of the century, some 13 Afrikaner families had settled at Keimoes (De Beer 1992; Van der Walt 2015). The aftermath of the scorched earth policy of the South African War (Anglo-Boer War), resulted in many farmers moving to new areas, in search of greener pastures, and settlement next to the Gariep/Orange River provided ample irrigation for one's crops.

Since the 1880s, the irrigation of the Orange River played a central role in the economic advancement of the area around Upington (Legassick 1996). The development of the canal systems was integral in irrigating extensive vineyards and orchards and the expansion of substantial agricultural enterprises within the area (Engelbrecht & Fivaz 2018). Dutch Reformed Church missionary Reverend C.H.W. Schröder and Special Magistrate for the Northern Border John H. Scott, are credited with formalising and extending the irrigation system. However, when Schröder first came to Upington in July 1883, there were already people in the area of Keimoes that used irrigation and planted fields. Moolman (1946) and Legassick (1996) mentions how the *Baster* farmers diverted river water to their gardens, albeit crudely. The *Basters*' irrigation scheme has been attributed to the ingenuity of Abraham September. Legassick (1996) commented that "the small, white-painted, stone house where Abraham September lived when he undertook this work survives to this day, though the house and the land upon which it stands have long passed from the hands of the September family".

The early Portuguese sailors referred to the Gariep/Orange River as the St Anthonio, and Simon van der Stel marked it as the Vigiti Magna on maps from 1685. The elephant hunter Jacobus Coetzee called it the "*de Groote Rivier*" (the Great River) in 1760 and land-surveyor Carel Brink noted in 1761 that the river is known to the local island inhabitants as the Tyen Gariep (*Our River*). The missionary Campell also spoke of the Gariep, Gareeb, and Garib, as the name the Korannas used. On the evening of 17 August 1779, Robert Gordon took his rowboat out to the middle of the river, raised and toasted the Netherland's flag, and proclaimed the river in the name of the Prince van Oranje. Maps from this date forward name the river as the Orange River (Oranjeriver), but colloquially it is still known as the Gariep or Grootrivier. !Kheis Municipality is named in recognition

of the first permanent residents of the area. !Kheis is a Khoi name meaning "a place where you live", or "a home".

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

5.3 Grootdrink and Gariep

Very little HIA and AIA reports have been conducted at and around the current study areas of Grootdrink and Gariep, Northern Cape. The reports include studies involving Prospecting rights applications (Van Schalkwyk 2019), and the construction of proposed solar parks (Morris 2014). The majority of the artefact scatters, which include low densities of lithic scatters and a colonial/historic building have been documented to have low archaeological and cultural significance.

5.3.1 Stone Age

Some of the sites surrounding the areas under study had traces of stone artefacts. The reports, in general, revealed that the scatters of stone implements are very widely distributed.

During his surveys on the Farms Zonderhuis 402, Onder Plaats 401 and Namakwari 656, Van Schalkwyk (2019) recorded several low-density MSA surface scatters. Van Schalkwyk (2019) notes that the tools are very rough and informal, and only a few are typical, i.e. blades and scrapers. Furthermore, the documented stone artefacts are mostly made from banded ironstone formation (BIF), although some quartzite and hardened shale flakes were recorded (Van Schalkwyk 2019). During Morris' (2014) survey on the Farm Namakwari 656, he also noted that there were very low densities of isolated stone artefacts, with exceptions occurring in locales where tillite is exposed at the surface. He recorded several flakes, rare and widely dispersed (one from the MSA) in the northern area in the dune sand vicinity adjacent to !Kheis Solar 2. On an eroded surface at !Kheis Solar 1, Morris (2014) documented widely distributed individual flakes. Sediments consisting of Dwyka tillite, rich in raw materials that were opportunistically exploited, were recorded at the eastern end of the area Kheis Solar 1 about 8 km NE from the Grootdrink study area and ±10 km NE from the Gariep study area. He notes that the artefacts densities often exceeded 1/m² and could be found over much of the area where the sediments were exposed. These low densities of lithic material were graded as low archaeological and cultural significance.

Scatters of ESA, MSA and LSA lithic assemblages are common in the broader area around Grootdrink and Gariep. For example, in Van der Walt's (2016) report for the proposed establishment of the Ilanga CSP 9 facility near Upington and Karos, he included a table of

previously recorded sites. These sites range between ±20-40 km NW of the Gariep and Grootdrink study areas. These heritage features include: ESA, MSA and LSA open-air sites on ridges; scatters of MSA flakes with faceted striking platforms; low densities of MSA and LSA scatters of flakes of banded ironstone formation (BIF) and quartzite; an MSA blade with secondary retouch on quartz; LSA and MSA artefact scatters around several small seasonal depressions/pans; an MSA banded BIF core. Moreover, during Beaumont's (2006) review for the planned extension of the Karos Township Phase 1 HIA, he recorded only a few ESA cores and flakes. Several MSA and LSA lithic surface scatters were recorded by Ghaiger (2012) during his survey for the proposed establishment of the Karoshoek Valley Solar Park components. According to Van Der Walt (2016), Van Schalkwyk (2011) and Van Der Walt (2014) also recorded LSA flakes and cores near Karoshoek.

5.3.2 Historical period

Military topographic maps from 1908 and 1913 show a sparsely populated area, with a few tracks across the sandy plains, a pont (a flat-bottomed ferry pulled with cables or ropes across the river) at Grootdrink, and a police post at Zwartkop. The Grootdrink halt was described as a place where "200 horses can be watered at a time at the river". The store had an average of "10 000lbs forage, chiefly oats and wheat and small quantity of mealies" on hand. The 1913 map further indicates the presence of several "kraal ruins" between the main road and the riverbank, on the Farm Sterkboom.

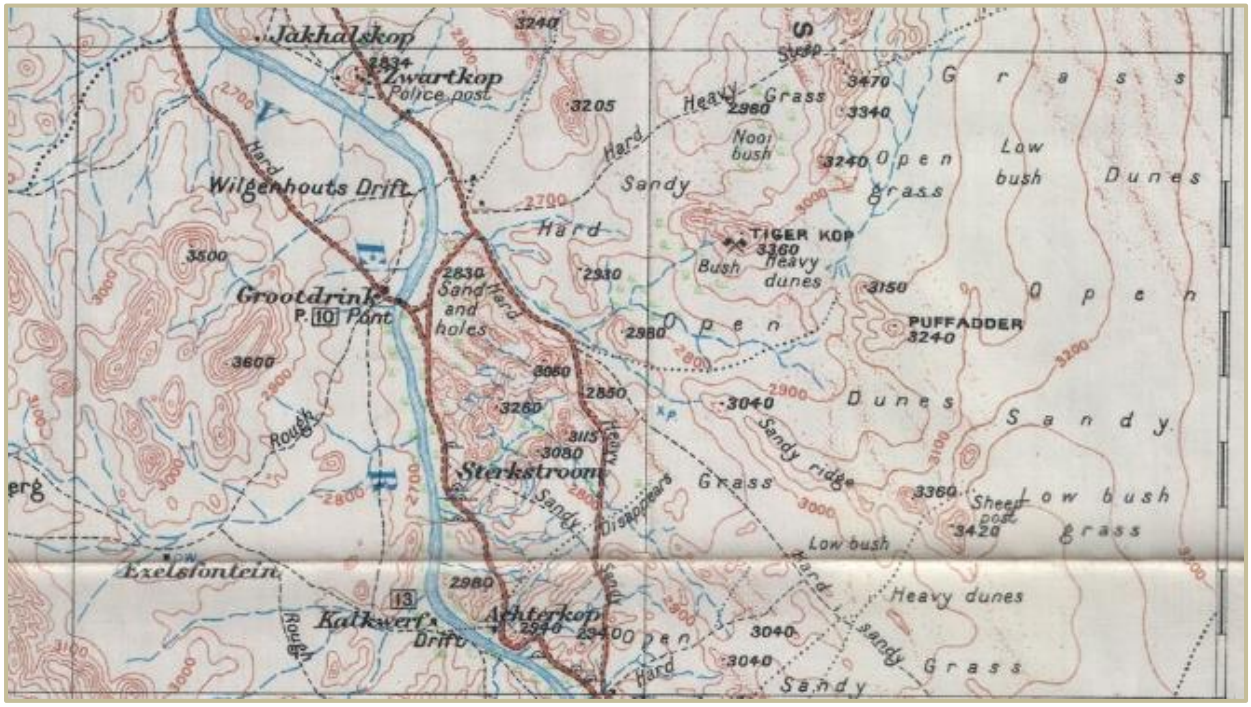

Figure 7 Detail of 1913 Topographical map of Upington, available at https://digitalcollections.lib.uct.ac.za/

Small-stock farmers occupied this area of the Orange River until the first significant influx of people during the 1930s. The extensive network of irrigation channels supplied water for the development of vineyards and other cash crops (e.g. grain crops), cultivated in a narrow band along the Orange River. This led to the region becoming known as the Green Kalahari. Van Schalkwyk (2019) comments that the result was numerous smaller hamlets and villages with churches, cemeteries, and shops. Through a comparison of aerial photographs from 1944 to recent Google Earth imagery, Van Schalkwyk (2019) shows how the landscape utilisation changed from empty grazing to the intensive cultivation taking place on the banks of the Orange River.

It is not uncommon to find colonial-era structures/artefacts in the region. Morris (2014) documented an old farmstead at the northern end of !Kheis Solar 3, approximately 8 km east of the Grootdrink site and about 7.5 km from Gariep site. This farmstead consists of the ruins of the main house and some outbuildings, built in the Karoo style, which is one of the typical styles found in the countryside and many towns. Morris (2014) notes that the ash midden near the structure contained surface scatters of early 20th-century cultural material. Van der Walt's (2016) noted a cement brick feature consisting of one room in his report, Van Der Walt (2016) notes that Gaigher (2012) recorded porcelain along the Orange River near Karos approximately 30 km NW from the Grootdrink study area. Without any unusual or unique features, these commonly graded as low significance.

5.2.3 Oral history

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

6. IDENTIFIED RESOURCES AND HERITAGE ASSESSMENT

6.1 Surveyed area

The area surveyed for the impact assessment was dictated by the Google Earth map of the development footprints provided by the client.

The pedestrian survey was conducted in predominantly 40-50 m transects. Areas that have been severely disturbed were surveyed in wider transects or only scoped. The survey extended beyond the development footprints to take into consideration the full impact of the development by investigating probable areas on the landscape adjacent to the development footprints that may contain heritage.

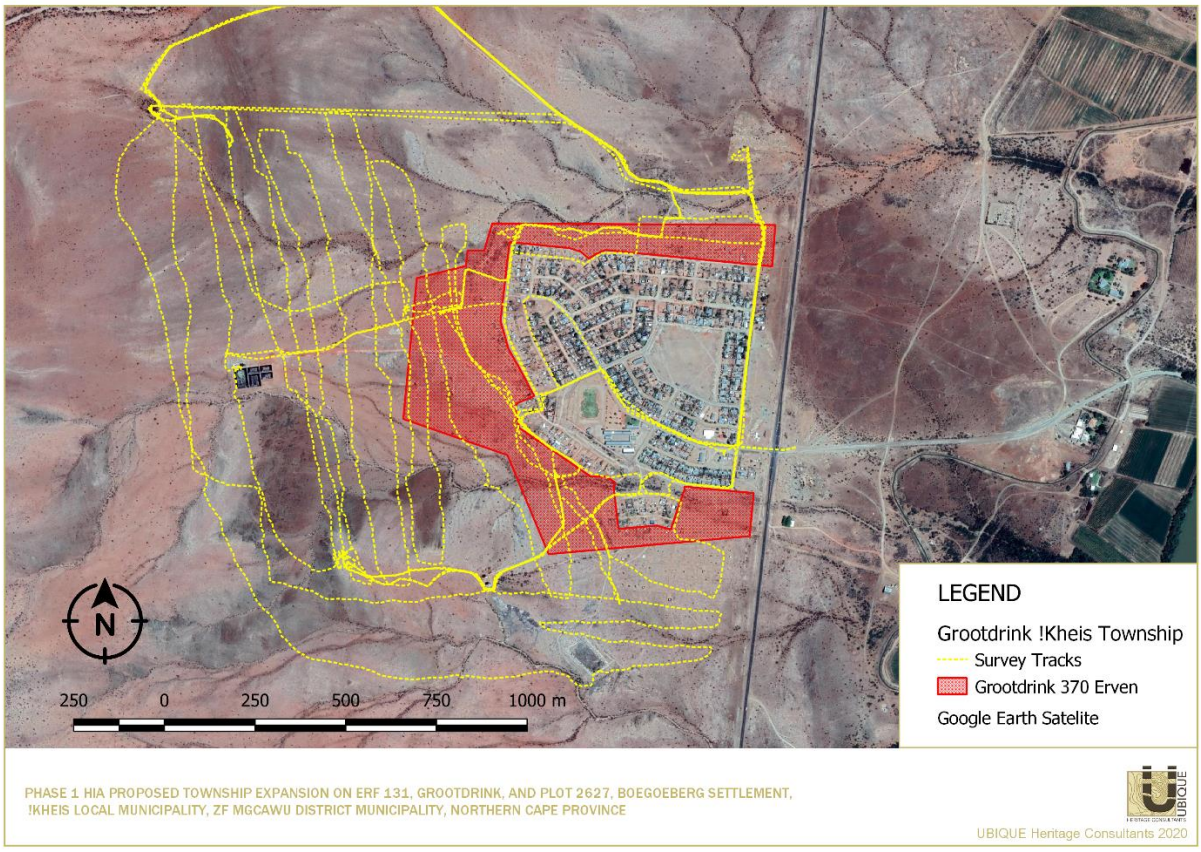

Figure 8 Survey tracks across the development footprint.

6.2 Identified heritage resources

HERITAGE RESOURCES RECORDING

Stone Age Resources Identified

Point ID & Site Name	Description		Period	Location	Field rating/ Significance/ Recommended Mitigation
WP 001 GRDK001 Boegoeberg Settlement RE/48/2627	Type lithic/s	Chunks and flakes debris	ESA/ MSA	**28° 33' 01.2" S 21° 44' 33.2" E**	Field Rating IV C Low significance No mitigation
	Raw material	BIF			
	N in m².	3/200m²			
	Context	Scatter. No context			
	Additional	Located on a koppie, outside footprint			
WP 003 GRDK004 Boegoeberg Settlement RE/48/2627	Type lithic/s	Flakes and chips debris	ESA/ MSA	**28° 34' 02.2" S 21° 44' 18.1" E**	Field Rating IV C Low significance No mitigation
	Raw material	BIF			
	N in m².	3/200m²			
	Context	Scatter. No context			
	Additional	Random scatter			

Historical Period Resources Identified

Point ID & Site Name	Description		Period	Location	Field rating/ Significance/ Recommended Mitigation
WP 001 GRDK002 Boegoeberg Settlement RE/48/2627	Type of feature	Surface scatter	Recent past 1960-1980's	**28° 33' 01.2" S 21° 44' 33.2" E**	Field Rating IV C Low significance No mitigation
	Material	Ammunition rests			
	N in m².	5/10m²			
	Context	No context. Outside footprint.			
	Additional	Old shooting range. R1/ 7.62mm ammunition			
WP 004 GRDK005 Boegoeberg Settlement RE/48/2627	Type of feature	Surface scatter	Recent past: 1960's to current	**28° 33' 20.7" S 21° 44' 06.7" E**	Field Rating IV C Low significance No mitigation
	Material	Ammunition rests			
	N in m².	2/10m²			
	Context	No context. Outside footprint, on high ground			

Graves Identified

Point ID & Site Name	Description		Period	Location	Field rating/ Significance/ Recommended Mitigation
WP 002 GRDK003 Boegoeberg Settlement RE/48/2627	Grave markers	Cemetery	1960's to current	**28° 33' 21.2" S 21° 44' 59.1" E**	Field Rating of Local Grade IIIB High/medium significance Mitigation Required: fencing
	Inscription	Cemetery			
	Graves' Orientation	East/West			
	Dimensions/ Extent	Approximately 2-3 ha. Outside development footprint.			
	Additional	Grootdrink town cemetery			

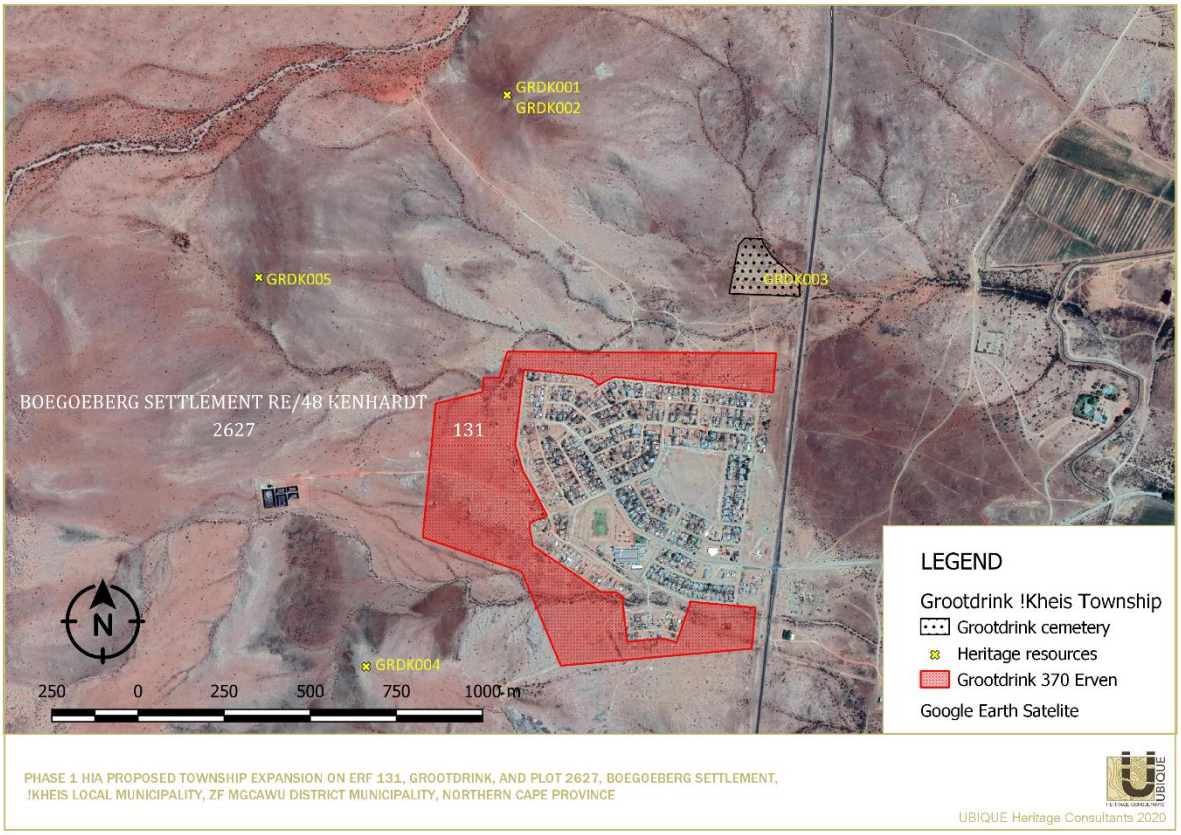

Figure 9 *Distribution of identified heritage resources across Plot 2627 Boegoeberg Settlement No. 48, Kenhardt.*

6.3 Discussion

6.3.1 Archaeological features

No archaeological resources were recorded within the development footprint. Two isolated low-density scatters with banded ironstone formation (BIF) chunks, flakes and chips were located to the north (GRDK001) and southwest (GRDK004) of the development footprint. The found lithic material shows various degrees of weathering and are without substantial archaeological context or matrix, and are therefore deemed of minor scientific importance, and not conservation worthy (NCW).

Two locales with mid- to late-20th century spent ammunition were recorded on elevated ground. These sites (GRDK002 and GRDK005) have no heritage significance and is not conservation worthy (NCW).

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

6.3.2 Graves

The formal cemetery of the Grootdrink settlement is located approximately 250 m to the northeast of the proposed development site. The area is currently between 2 and 3 ha in size and unfenced. No other graves were found in the vicinity of the development footprint.

These sites are given a 'Local Grade IIIB" rating. This means the graves should be included in the heritage register and may be mitigated (high/ medium significance).

Figure 10 Photographic selection of archaeological material recorded.

Figure 11 *Selection of photographs of the Grootdrink town cemetery.*

6.3.3 Palaeontological resources

The Grootdrink study area is underlain by sediments of the Cenozoic Kalahari Group as well as the Boom River Formation of the Koras Group. Underlying these rocks are rocks of the Precambrian Transvaal Supergroup. According to the SAHRIS PalaeoMap, the Palaeontological Sensitivity of the Kalahari Group is low, the Boom River Formation is igneous rocks with an insignificant Palaeontological Sensitivity, and the Palaeontological Sensitivity of the Precambrian rocks of the Transvaal Supergroup is moderate. The cherts, dolomites and iron formations of the underlying Transvaal Supergroup, are too deep to affect the proposed development. The igneous rocks of the Boom River Formation are unfossiliferous (Butler 2020). Elize Butler from Banzai Environmental conducted a full paleontological desktop study for this project (see Appendix 1).

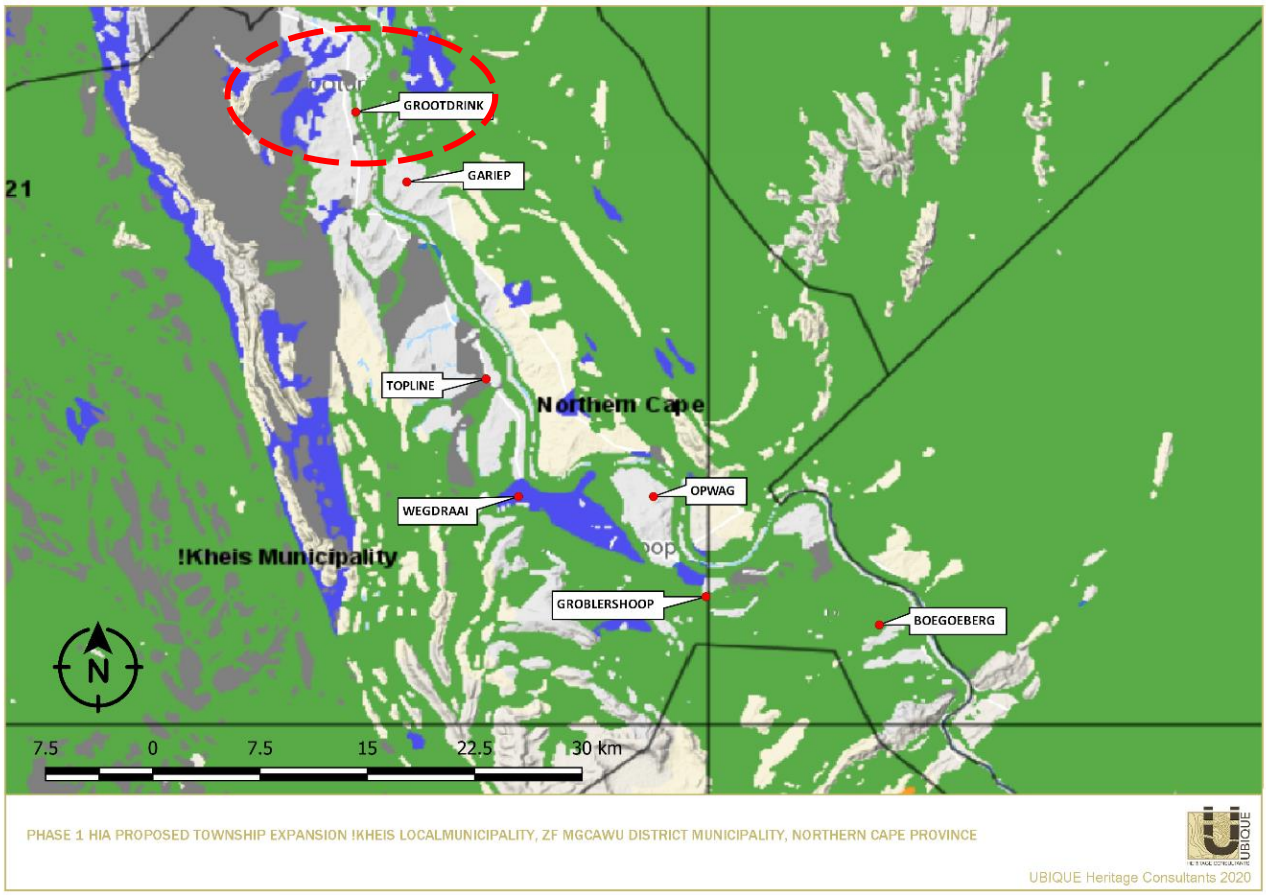

Figure 12 SAHRIS PalaeoSensitivity Map, indicating Low (blue) and Insignificant/Zero (grey) palaeontological significance in the study area (https://sahris.sahra.org.za/map/palaeo).

7. ASSESSMENT OF THE IMPACT OF THE DEVELOPMENT

Description	Development Impact		Mitigation	Field rating/ Significance
Archaeological				
1. Surface scatters of MSA/ELSA lithic material, and incidences of 20th-century munitions were recorded outside the development footprint.	Nature	Neutral	No mitigation required.	Field Rating IV C Low significance
	Extent	Low		
	Duration	Low		
	Intensity	Low		
	Potential of impact on irreplaceable resource	Low		
	Consequence	Low		
	Probability of impact	Low		
	Significance	Low		
Graves				
2. The formal Grootdrink cemetery.	Nature	Neutral	Sites should be included in the heritage register and may be mitigated. Buffer zone and fencing.	Field Rating of Local Grade IIIB High significance
	Extent	Medium		
	Duration	Low		
	Intensity	Low		
	Potential of impact on irreplaceable resource	Low		
	Consequence	High		
	Probability of impact	Low		
	Significance	Medium		
Paleontological				
3. The Palaeontological Sensitivity of the Kalahari Group is low, the Boom River Formation is insignificant, and the Precambrian rocks of the Transvaal Supergroup is moderate.	Nature	Neutral	No mitigation required. Chance Finds Protocol provided.	N/A
	Extent	Low		
	Duration	High		
	Intensity	Low		
	Potential of impact on irreplaceable resource	Low		
	Consequence	Low		
	Probability of impact	Low		
	Significance	Low		

The impact of the development will have no negative effect on any heritage resources within the development footprint. The burial grounds are well outside the development footprint and should not be affected by the proposed project. The probability of the development impacting on palaeontological heritage during the construction phase is regarded as minimal, and the significance of the impact occurring, low.

8. RECOMMENDATIONS

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

1. No significant heritage sites or features were identified within the surveyed sections of Erf 131, Boegoeberg Settlement RE/48, Grootdrink. No further mitigation is required for the proposed development on these properties. Therefore, from a heritage point of view, we recommend that the proposed development can continue.

2. The Early/Middle Stone Age and 20th-century cultural material identified on Plot 2627, Boegoeberg Settlement RE/48, Grootdrink, lie outside the development footprint and is not conservation worthy. No further mitigation is recommended with regards to these resources.

3. The Grootdrink cemetery is situated outside the development footprint. The site is graded as IIIB and is of High Local Significance. It is recommended that the graves be fenced off with the inclusion of a 50 m buffer/safety zone.

4. Due to the low palaeontological significance of the area, no further palaeontological heritage studies, ground-truthing and/or specialist mitigation are required. It is considered that the development of the proposed development is deemed appropriate and feasible and will not lead to detrimental impacts on the palaeontological resources of the area (Butler 2020). If fossil remains or trace fossils are discovered during any phase of construction, either on the surface or exposed by excavations the Chance Find Protocol (Appendix A/11) must be implemented by the Environmental Control Officer (ECO) in charge of these developments. These discoveries ought to be protected, and the ECO must report to SAHRA (Contact details: SAHRA, 111 Harrington Street, Cape Town. PO Box 4637, Cape Town 8000, South Africa. Tel: 021 462 4502. Fax: +27 (0)21 462 4509. Web: www.sahra.org.za) so that mitigation can be carried out by a palaeontologist (Butler 2020).

5. Although all possible care has been taken to identify sites of cultural importance during the investigation of study areas, it is always possible that hidden or sub-surface sites could be overlooked during the assessment. If during construction, any evidence of archaeological sites or remains (e.g. remnants of stone-made structures, indigenous ceramics, bones, stone artefacts, ostrich eggshell fragments, charcoal and ash concentrations), fossils or other categories of heritage resources are found during the proposed development, SAHRA APM Unit (Natasha Higgitt/Phillip Hine 021 462 5402) must be alerted as per section 35(3) of the NHRA. If unmarked human burials are uncovered, the SAHRA Burial Grounds and Graves (BGG) Unit (Thingahangwi Tshivhase/Mimi Seetelo 012 320 8490), must be alerted immediately as per section 36(6) of the NHRA. A professional archaeologist or palaeontologist, depending on the nature of the finds, must be contacted as soon as possible to inspect the findings. If

the newly discovered heritage resources prove to be of archaeological or palaeontological significance, a Phase 2 rescue operation may be required subject to permits issued by SAHRA. UBIQUE Heritage Consultants and its personnel will not be held liable for such oversights or costs incurred as a result of such oversights.

9. CONCLUSION

This HIA has identified no heritage resources that will be impacted negatively by the proposed development. The proposed expansion of the Grootdrink township on Erf 131, Grootdrink, and Plot 2627, Boegoeberg Settlement, in the !Kheis Local Municipality, ZF Mgcawu District Municipality, Northern Cape, may continue.

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APPENDIX A

PALAEONTOLOGICAL DESKTOP ASSESSMENT FOR THE PROPOSED GROOTDRINK TOWNSHIP EXPANSION, !KHEIS LOCAL MUNICIPALITY, ZF MGCAWU DISTRICT MUNICIPALITY, NORTHERN CAPE PROVINCE

PALAEONTOLOGICAL DESKTOP ASSESSMENT FOR THE PROPOSED GROOTDRINK TOWNSHIP EXPANSION, !KHEIS LOCAL MUNICIPALITY, ZF MGCAWU DISTRICT MUNICIPALITY, NORTHERN CAPE PROVINCE

Reference: NC/21/2018/PP
(Grootdrink 370) / BH0067

Issue Date: **13 June 2020**

Client: **UBIQUE Heritage Consultants**

Declaration of Independence

I, Elize Butler, declare that –

General declaration:

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

Disclosure of Vested Interest

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

PALAEONTOLOGICAL CONSULTANT: Banzai Environmental (Pty) Ltd

CONTACT PERSON: Elize Butler

Tel: +27 844478759

Email: elizebutler002@gmail.com

SIGNATURE:

This Palaeontological 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 vitae	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	Desktop Study	
(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 5	No buffers or areas of sensitivity identified
(h) A map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;	Section 5 – Geological and Palaeontological history	

Requirements of Appendix 6 – GN R326 EIA Regulations of 7 April 2017	Relevant section in report	Comment where not applicable.
(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	Section 11	
(l) Any conditions for inclusion in the environmental authorisation		None required
(m) Any monitoring requirements for inclusion in the EMPr or environmental authorisation	Section 11	
(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 of any comments that were received during any consultation process	N/A	
(q) Any other information requested by the competent authority.	N/A	Not applicable.
(2) Where a government notice by the Minister provides for any protocol or minimum information requirement to be applied to a specialist report, the requirements as indicated in such notice will apply.	Section 3 compliance with SAHRA guidelines	

EXECUTIVE SUMMARY

Banzai Environmental was appointed by UBIQUE Heritage Consultants to conduct the Palaeontological Desktop Assessment (PDA) to assess the proposed Grootdrink Township Expansion in !Kheis Local Municipality, ZF Mgcawu District Municipality, Northern Cape Province. The National Heritage Resources Act (No 25 of 1999, section 38) (NHRA), states that a Palaeontological Impact Assessment (PIA) is necessary to determine the presence of fossil material within the planned development. This PDA is thus necessary to evaluate the effect of the construction on the palaeontological resources.

The proposed development is underlain by sediments of the Cenozoic Kalahari Group as well as the Boom River Formation of the Koras Group. Underlying these rocks are rocks of the Precambrian Transvaal Supergroup. According to the PalaeoMap of South African Heritage Resources Information System the Palaeontological Sensitivity of the Kalahari Group is low, The Boom River Formation is igneous rocks with an insignificant Palaeontological Sensitivity and the Palaeontological Sensitivity of the Precambrian rocks of the Transvaal Supergroup is moderate. The cherts, dolomites and iron formations of the underlying Transvaal Supergroup are too deep to affect the proposed development and the igneous rocks of the Boom River Formation is unfossiliferous.

If fossil remains or trace fossils are discovered during any phase of construction, either on the surface or exposed by excavations the **Chance Find Protocol** must be implemented by the Environmental Control Officer (ECO) in charge of these developments. These discoveries ought to be protected and the ECO must report to SAHRA (Contact details: SAHRA, 111 Harrington Street, Cape Town. PO Box 4637, Cape Town 8000, South Africa. Tel: 021 462 4502. Fax: +27 (0)21 462 4509. Web: www.sahra.org.za) so that mitigation can be carried out by a palaeontologist.

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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- **INTRODUCTION**

The Barzani Group appointed Macroplan Town and Regional Planners to proceed with the completion of the Town Planning process for the proposed Grootdrink Township Expansion on Erf 131, Grootdrink, and Plot 2627, Boegoeberg Settlement, !Kheis Local Municipality, ZF Mgcawu District Municipality, Northern Cape Province (Figure 1-2). UBIQUE Heritage Consultants was appointed to conduct the Heritage Impact Assessment while Banzai Environmental was in turn appointed to conduct the Palaeontological Desktop Study.

The proposed Grootdrink Township Expansion comprises of the creation of new erven, as well as the formalisation of the existing informal houses that are located around the town. The Grootdrink Township Expansion will accommodate 370 erven on 36 Ha. This project will fill an urgent need for residential erven in the sub-economic market.

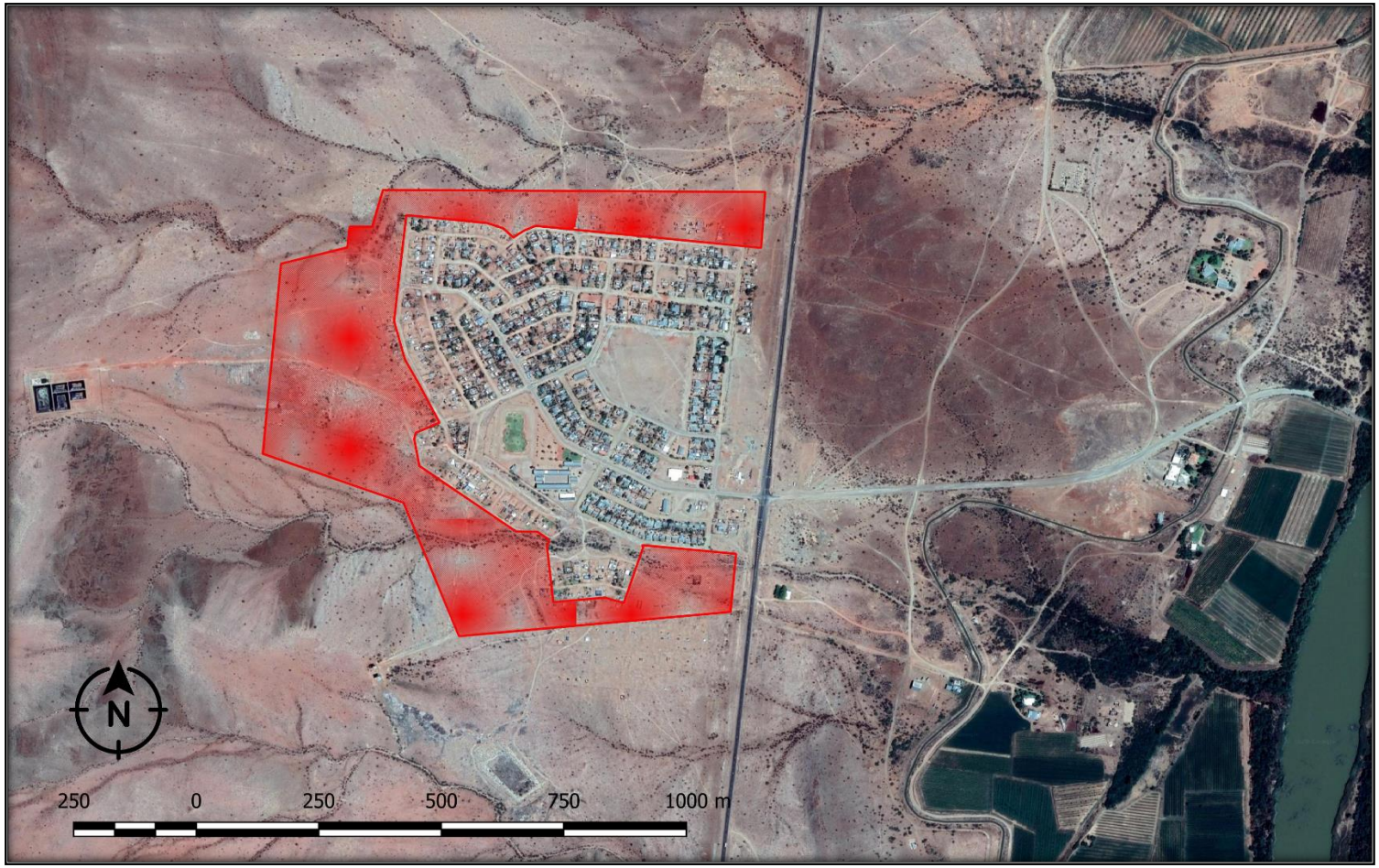

***Figure 13**: Google Earth Image of the proposed Grootdrink Township Expansion on Erf 131, Grootdrink, and Plot 2627, Boegoeberg Settlement, !Kheis Local Municipality, ZF Mgcawu District Municipality, Northern Cape Province, Northern Cape Province. Map modified from Ubique Consultants*

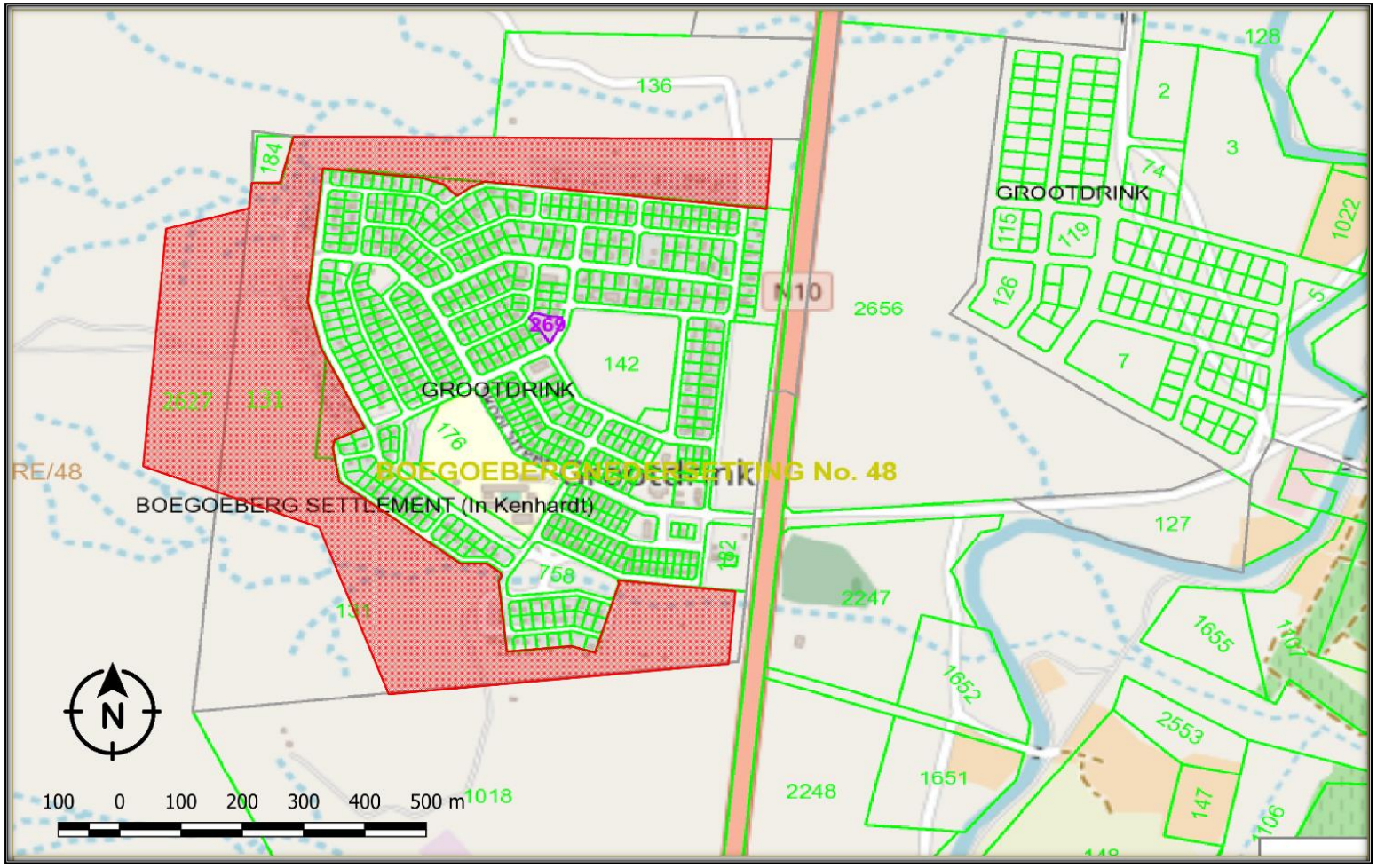

***Figure 14**: Topographical map indicating the locality of the proposed Grootdrink Township Expansion on Erf 131, Grootdrink, and Plot 2627, Boegoeberg Settlement, !Kheis Local Municipality, ZF Mgcawu District Municipality, Northern Cape Province, Northern Cape Province. Map modified from Ubique Consultants.*

- **QUALIFICATIONS AND EXPERIENCE OF THE AUTHOR**

The author (Elize Butler) has an MSc in Palaeontology from the University of the Free State, Bloemfontein, South Africa. She has been working in Palaeontology for more than twenty-four years. She has extensive experience in locating, collecting and curating fossils, including exploration field trips in search of new localities in the Karoo Basin. She has been a member of the Palaeontological Society of South Africa for 14 years. She has been conducting PIAs since 2014.

- **LEGISLATION**

  - **National Heritage Resources Act (25 of 1999)**

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

Palaeontological heritage is unique and non-renewable and is protected by the NHRA. Palaeontological resources may not be unearthed, moved, broken 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 Desktop Assessment forms part of the Heritage Impact Assessment (HIA) and adheres to the conditions of the Act. According to **Section 38 (1)**, an HIA is required to assess any potential impacts to palaeontological heritage within the development footprint where:

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

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

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

(exceeding 5 000 m^2 in extent; or

involving three or more existing erven or subdivisions thereof; or

involving three or more erven or divisions thereof which have been consolidated within the past five years; or

the costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority

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

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

- **OBJECTIVE**

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

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

The terms of reference of a PIA are as follows:

General Requirements:

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

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

Submit a comprehensive overview of all appropriate legislation, guidelines;

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

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

Provide Palaeontological and geological history of the affected area;

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

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

a. **Direct impacts** are impacts that are caused directly by the activity and generally occur at the same time and at the place of the activity.
b. **Indirect impacts** of an activity are indirect or induced changes that may occur as a result of the activity.
c. **Cumulative impacts** are impacts that result from the incremental impact of the proposed activity on a common resource when added to the impacts of other past, present or reasonably foreseeable future activities.

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

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

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

- **GEOLOGICAL AND PALAEONTOLOGICAL HISTORY**

The proposed Grootdrink Township Expansion on Erf 131, Grootdrink, and Plot 2627, Boegoeberg Settlement, !Kheis Local Municipality, ZF Mgcawu District Municipality, Northern Cape Province is depicted on the 1:250 000 Upington Geological Map (Council of Geoscience, Pretoria). The proposed development is underlain by sediments of the Cenozoic Kalahari Group as well as the Boom River Formation of the Koras Group. Underlying these rocks are rocks of the Precambrian Transvaal Supergroup. According to the PalaeoMap of South African Heritage Resources Information System the Palaeontological Sensitivity of the Kalahari Group is low, The Boom River Formation is igneous rocks with an insignificant Palaeontological Sensitivity and the Palaeontological Sensitivity of the Precambrian rocks of the Transvaal Supergroup is moderate. The cherts, dolomites and iron formations of the underlying Transvaal Supergroup are too deep to affect the proposed development and the igneous rocks of the Boom River Formation are unfossiliferous. The Transvaal Supergroup and Boom River Formation will thus not be discussed further in this report.

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

Partridge *et al*., (2006) describes numerous types of superficial deposits of Late Caenozoic (Miocene to Pliocene to Recent) age throughout the Karoo Basin. Sands and gravel in the development footprint have a possible fluvial origin.

The fossil assemblages of the Kalahari are generally very low in diversity and 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. The palaeontology of the Quaternary superficial deposits has been relatively neglected in the past. 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 include termite and insect's burrows and mammalian trackways. Amphibian and crocodile remains have been uncovered where the depositional settings in the past were wetter.

***Table 2**: Fossil heritage of rocks represented in the proposed Boegoeberg Township Development (Almond and Pether, 2008)*

GEOLOGICAL UNIT	ROCK TYPES & AGE	FOSSIL HERITAGE	PALAEONT-OLOGICAL SENSITIVITY	RECOMMENDED MITIGATION
OTHER LATE CAENOZOIC TERRESTRIAL DEPOSITS OF THE INTERIOR (Most too small to be indicated on 1: 250 000 geological maps)	Fluvial, pan, lake and terrestrial sediments, including diatomite (diatom deposits), pedocretes, spring tufa / travertine, cave deposits, peats, colluvium, soils, surface gravels including downwasted rubble MOSTLY QUATERNARY TO HOLOCENE (Possible peak formation 2.6-2.5 Ma)	Bones and teeth of wide range of mammals (*e.g.* mastodont proboscideans, rhinos, bovids, horses, micromammals), reptiles (crocodiles, tortoises), ostrich egg shells, fish, freshwater and terrestrial molluscs (unionid bivalves, gastropods), crabs, trace fossils (*e.g.* termitaria, horizontal invertebrate burrows, stone artefacts), petrified wood, leaves, rhizoliths, diatom floras, peats and palynomorphs. calcareous tufas at edge of Ghaap Escarpment might be highly fossiliferous (*cf* Taung in NW Province – abundant Makapanian Mammal Age vertebrate remains, including australopithecines)	LOW Scattered records, many poorly studied and of uncertain age	Any substantial fossil finds to be reported by ECO to SAHRA
Gordonia Formation (Qs) KALAHARI GROUP *plus* SURFACE CALCRETES (Tl / Qc)	Mainly aeolian sands *plus* minor fluvial gravels, freshwater pan deposits, calcretes PLEISTOCENE to RECENT	Calcretised rhizoliths & termitaria, ostrich egg shells, land snail shells, rare mammalian and reptile (*e.g.* tortoise) bones, teeth (e.g. doline infills) freshwater units associated with diatoms, molluscs, stromatolites *etc.*	LOW	Any substantial fossil finds to be reported by ECO to SAHRA

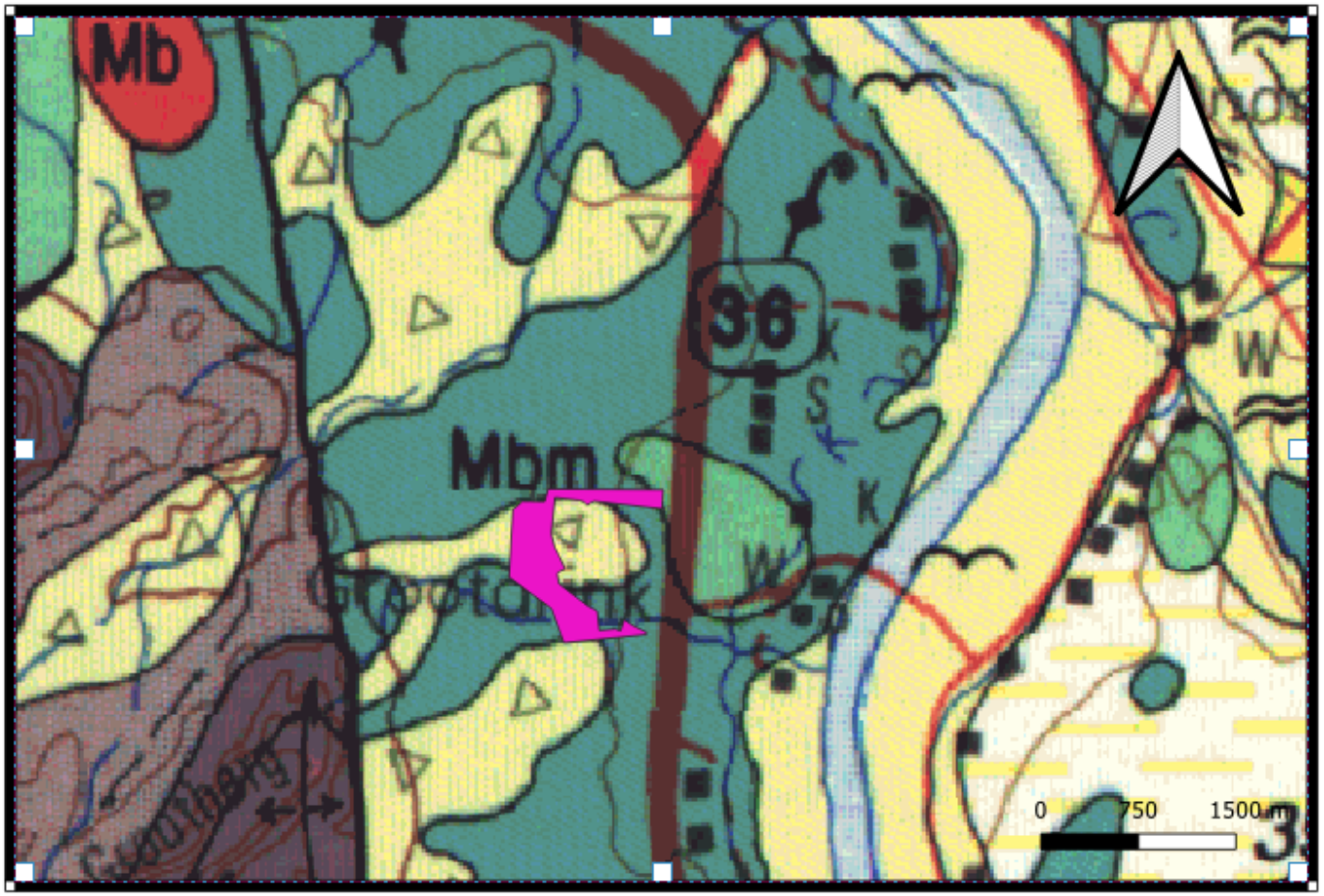

Figure 15: *Extract of the 1:250 000 2820 Upington geological map (Council for Geoscience, Pretoria) indicating the surface geology on Erf 131, Grootdrink, and Plot 2627, Boegoeberg Settlement, !Kheis Local Municipality, ZF Mgcawu District Municipality, Northern Cape Province,.*

Legend to Map and short explanation.

Q- Kalahari Group, Gordonia Formation-Sand and sandy soil

Mbm- Koras Group, Boom Rivier Formation-Andesitic to basaltic lava

- **GEOGRAPHICAL LOCATION OF THE SITE**

The Grootdrink Township expansion is located approximately 40 km northwest of Groblershoop on the eastern side of the Orange River within the !Kheis Local Municipal , ZF Mgcawu District Municipality. Gariep is the only settlement situated on the eastern side of the Orange River while the rest of the villages are located to the west of the Orange River.

***Table 3**: Geographical location of Grootdrink Township Expansion.*

No.	Town	Total Size of the study area	Total Erven	Property Descriptions	Title Deed Numbers	Coordinates	Ownership
4	Grootdrink	36ha	370	Erf 131, Grootdrink	T11369/1994	28°33'47.80"S; 21°44'31.88"E	!Kheis Local Municipality
				Plot 2627, Boegoeberg Settlement	T115758/2004	28°33'46.34"S: 21°44'27.56"E	!Kheis Local Municipality

- **METHODS**

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

  - **Assumptions and Limitations**

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

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

- **ADDITIONAL INFORMATION CONSULTED**

In compiling this report the following sources were consulted:

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

1: 250 000 2820 Upington geological map (Council for Geoscience, Pretoria);

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

- **IMPACT ASSESSMENT METHODOLOGY**

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

- Construction;
- Operation; and
- Decommissioning.

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

Table 4: The rating system

NATURE		
The Nature of the Impact is the possible destruction of fossil heritage		
GEOGRAPHICAL EXTENT		
This is defined as the area over which the impact will be experienced.		
1	Site	The impact will only affect the site.
2	Local/district	Will affect the local area or district.
3	Province/region	Will affect the entire province or region.
4	International and National	Will affect the entire country.
PROBABILITY		
This describes the chance of occurrence of an impact.		
1	Unlikely	The chance of the impact occurring is extremely low (Less than a 25% chance of occurrence).
2	Possible	The impact may occur (Between a 25% to 50% chance of occurrence).

3	Probable	The impact will likely occur (Between a 50% to 75% chance of occurrence).
4	Definite	Impact will certainly occur (Greater than a 75% chance of occurrence).
DURATION		
This describes the duration of the impacts. Duration indicates the lifetime of the impact as a result of the proposed activity.		
1	Short term	The impact will either disappear with mitigation or will be mitigated through natural processes in a span shorter than the construction phase (0 – 1 year), 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

- **Summary of Impact Tables**

The proposed development is underlain by sediments of the Cenozoic Kalahari Group as well as the Boom River Formation of the Koras Group. Underlying these rocks are rocks of the Precambrian Transvaal Supergroup. According to the PalaeoMap of South African Heritage Resources Information System the Palaeontological Sensitivity of the Kalahari Group is low, The Boom River Formation is igneous rocks with an insignificant Palaeontological Sensitivity and the Palaeontological Sensitivity of the Precambrian rocks of the Transvaal Supergroup is moderate. The expected duration of the impact is assessed as potentially permanent to long term. In the absence of mitigation procedures (should fossil material be present within the affected area) the damage or destruction of any palaeontological materials will be permanent. Impacts on palaeontological heritage during the construction phase could potentially occur but are regarded as having a low probability. The significance of the impact occurring will be low.

- **FINDINGS AND RECOMMENDATIONS**

The proposed development is underlain by sediments of the Cenozoic Kalahari Group as well as the Boom River Formation of the Koras Group. Underlying these rocks are rocks of the Precambrian Transvaal Supergroup. According to the PalaeoMap of South African Heritage Resources Information System the Palaeontological Sensitivity of the Kalahari Group is low, The Boom River Formation is igneous rocks with an insignificant Palaeontological Sensitivity and the Palaeontological Sensitivity of the Precambrian rocks of the Transvaal Supergroup is moderate. The cherts, dolomites and iron formations of the underlying Transvaal Supergroup are too deep to affect the proposed development and the igneous rocks of the Boom River Formation are unfossiliferous.

If fossil remains or trace fossils are discovered during any phase of construction, either on the surface or exposed by excavations the **Chance Find Protocol** must be implemented by the Environmental Control Officer (ECO) in charge of these developments. These discoveries ought to be protected and the ECO must report to SAHRA (Contact details: SAHRA, 111 Harrington Street, Cape Town. PO Box 4637, Cape Town 8000, South Africa. Tel: 021 462 4502. Fax: +27 (0)21 462 4509. Web: www.sahra.org.za) so that mitigation can be carried out by a palaeontologist.

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.

- **CHANCE FINDS PROTOCOL**

A following procedure will only be followed if fossils are uncovered during excavation.

  - **Legislation**

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

Palaeontological heritage is unique and non-renewable and is protected by the NHRA and are the property of the State. It is thus the responsibility of the State to manage and conserve fossils on behalf of the citizens of South Africa. Palaeontological resources may not be excavated, broken, moved, or destroyed by any development without prior assessment and without a permit from the relevant heritage resources authority as per section 35 of the NHRA.

- **Background**

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

- **Introduction**

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

It is the responsibility of the Environmental Site Officer (ESO) or site manager of the project to train the workmen and foremen in the procedure to follow when a fossil is accidentally uncovered. In the absence of the ESO, a member of the staff must be appointed to be responsible for the proper implementation of the chance find protocol as not to compromise the conservation of fossil material.

- **Chance Find Procedure**

- If a chance find is made the person responsible for the find must immediately **stop working** and all work that could impact that finding must cease in the immediate vicinity of the find.
- The person who made the find must immediately **report** the find to his/her direct supervisor which in turn must report the find to his/her manager and the ESO or site manager. The ESO or site manager must report the find to the relevant Heritage Agency (South African Heritage Research Agency, SAHRA). (Contact details: SAHRA, 111 Harrington Street, Cape Town. PO Box 4637, Cape Town 8000, South Africa. Tel: 021 462 4502. Fax: +27 (0)21 462 4509. Web: www.sahra.org.za). The information to the Heritage Agency must include photographs of the find, from various angles, as well as the GPS co-ordinates.
- A preliminary report must be submitted to the Heritage Agency within **24 hours** of the find and must include the following: 1) date of the find; 2) a description of the discovery and a 3) description of the fossil and its context (depth and position of the fossil), GPS co-ordinates.
- Photographs (the more the better) of the discovery must be of high quality, in focus, accompanied by a scale. It is also important to have photographs of the vertical section (side) where the fossil was found.

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

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

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CURRICULUM VITAE

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Part time Laboratory assistant	Department of Zoology & Entomology University of the Free State Zoology 1989-1992
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25. **Butler, E. 2016.** Chris Hani District Municipality Cluster 9 water backlog project phases 3a and 3b: Palaeontology inspection at Tsomo WTW. Bloemfontein.
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32. **Butler, E. 2016.** Palaeontological Impact Assessment for the proposed construction of two 5 Mw Solar Photovoltaic Power Plants on Farm Wildebeestkuil 59 and Farm Leeuwbosch 44, Leeudoringstad, North West Province. Bloemfontein.
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55. **Butler, E. 2017.** Palaeontological Desktop Assessment of the construction of the proposed Viljoenskroon Munic 132 KV line, Vierfontein substation and related projects. Bloemfontein.
56. **Butler, E. 2017.** Palaeontological Desktop Assessment of the proposed rehabilitation of 5 ownerless asbestos mines. Bloemfontein.
57. **Butler, E. 2017.** Palaeontological Desktop Assessment of the proposed development of the Lephalale coal and power project, Lephalale, Limpopo Province, Republic of South Africa. Bloemfontein.
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63. **Butler, E. 2017.** Palaeontological Desktop Assessment for the proposed Aroams prospecting right project, without bulk sampling, near Aggeneys, Northern Cape Province. Bloemfontein.
64. **Butler, E. 2017.** Palaeontological Impact Assessment of the proposed Belvior aggregate quarry II on portion 7 of the farm Maidenhead 169, Enoch Mgijima Municipality, division of Queenstown, Eastern Cape. Bloemfontein.
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79. **Butler, E. 2017.** Palaeontological Desktop Assessment of the proposed Swaziland-Mozambique border patrol road and Mozambique barrier structure. Bloemfontein.
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177. Palaeontological Desktop Assessment for the Proposed Choje Wind Farm between Grahamstown and Somerset East, Eastern Cape
178. Palaeontological Desktop Assessment of the Proposed Prospecting Right Application for the Prospecting of Diamonds (Alluvial, General & In Kimberlite), Combined with A Waste License Application, Registration Division: Gordonia And Kenhardt, Northern Cape Province
179. Palaeontological Impact Assessment for the Proposed Clayville Truck Yard, Ablution Blocks and Wash Bay to be Situated on Portion 55 And 56 Of Erf 1015, Clayville X11, Ekurhuleni Metropolitan Municipality, Gauteng Province
180. Palaeontological Desktop Assessment for the Proposed Hartebeesthoek Residential Development
181. Palaeontological Desktop Assessment for the Proposed Mooiplaats Educational Facility, Gauteng Province
182. Palaeontological Impact Assessment for the Proposed Monument Park Student Housing Establishment
183. Palaeontological Field Assessment for the Proposed Standerton X10 Residential and Mixed-Use Developments, Lekwa Local Municipality Standerton, Mpumalanga Province
184. Palaeontological Field Assessment for the Rezoning and Subdivision of Portion 6 Of Farm 743, East London
185. Palaeontological Field Assessment for the Proposed Matla Power Station Reverse Osmosis Plant, Mpumalanga Province

CONFERENCE CONTRIBUTIONS

NATIONAL

PRESENTATION

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

INTERNATIONAL

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

CONFERENCES: POSTER PRESENTATION

NATIONAL

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

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

INTERNATIONAL VISITS

Natural History Museum, London July 2008

Paleontological Institute, Russian Academy of Science, Moscow November 2014