



## PHASE 1 HIA REPORT HOUSING DEVELOPMENT, PELLA, NORTHERN CAPE

PROPOSED HOUSING DEVELOPMENT ON REMAINDER OF ERF 1077,  
LOCATED BETWEEN SWARTKOPPIES STREET AND PELLA ROAD,  
PELLA, KHAI-MA LOCAL MUNICIPALITY, NAMAKWA DISTRICT MUNICIPALITY,  
NORTHERN CAPE PROVINCE

**PREPARED FOR:**  
ENVIROAFRICA

**PREPARED BY:**  
JAN ENGELBRECHT & HEIDI FIVAZ  
UBIQUE HERITAGE CONSULTANTS

24 APRIL 2019

**Client:** EnviroAfrica CC.

P.O. Box 5367, Helderberg, 7135  
Fax: 086 512 0154 / Tel: 021 8511616 /  
E-mail: admin@enviroafrica.co.za

**Contact Person:** Bernard de Witt  
E-mail: bernard@enviroafrica.co.za

**Heritage Consultant:** UBIQUE Heritage Consultants

**Contact Person:** Jan Engelbrecht (archaeologist and lead CRM specialist)  
Member of the Association of Southern African Professional  
Archaeologists: Member number: 297  
Cell: (+27) 0828456276  
E-mail: jan@ubiquecrm.com

Heidi Fivaz (archaeologist)  
Member of the Association of Southern African Professional  
Archaeologists: Member number: 433  
Cell: (+27) 0721418860  
E-mail: heidi@ubiquecrm.com

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. Desktop research completed by Sky-Lee Fairhurst.

**Declaration of independence:**

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

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



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

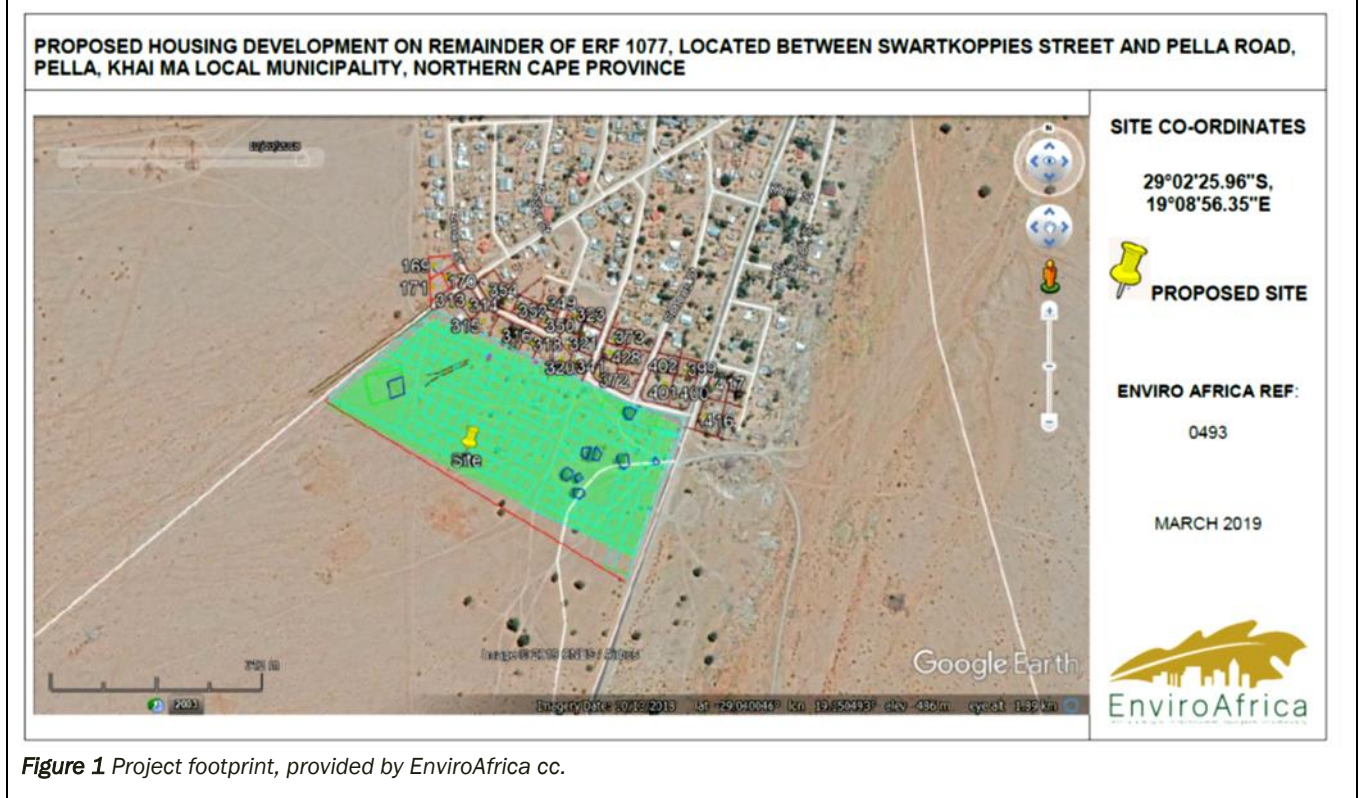
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## EXECUTIVE SUMMARY

### Technical summary

Project description	
Project name	Housing development, Pella, Northern Cape.
Description	Proposed housing development on Remainder of ERF 1077, on the Farm Pella Mission No. 39, located between Swartkoppies Street and Pella Road, Pella, Khâi-Ma Local Municipality, Namakwa District Municipality, Northern Cape Province.
Developer	
Khâi-Ma Municipality	
Consultants	
Environmental	EnviroAfrica cc.
Heritage and archaeological	UBIQUE Heritage Consultants
Paleontological	Banzai Environmental
Property details	
Province	Northern Cape
District municipality	Namakwa
Local municipality	Khâi-Ma
Topo-cadastral map	2919AA 1:50 000
Farm name	Pella Mission No. 39
Closest town	Pofadder
GPS Co-ordinates	29°02'25.96"S, 19°08'56.35"E
Development footprint size	10 ha



## 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 housing development on remainder of Erf 1077, Farm Pella Mission No. 39, Khâi-Ma Local Municipality, Northern Cape, on any sites, features, or objects of cultural heritage significance. The site is located between Swartkoppies Street and Pella Road, Pella, in the Khâi-Ma Local Municipality, Namakwa District Municipality, Northern Cape.

## Findings and Impact on Heritage Resources

Description	Development Impact		Mitigation	Field rating/ Significance
<b>Archaeological and Historical</b>				
1. No archaeological or historical heritage resources were identified within the development footprint.	Nature	N/A	No mitigation required.	N/A
	Extent	N/A		
	Duration	N/A		
	Intensity	N/A		
	Potential of impact on irreplaceable resource	N/A		
	Consequence	N/A		
	Probability of impact	N/A		
	Significance	N/A		
<b>Graves</b>				
2. A formal local cemetery is located within the development footprint.	Nature	Negative	50 m perimeter buffer zone around the cemetery.	Grade IIIA. High significance
	Extent	Medium		
	Duration	Low		
	Intensity	Medium		
	Potential of impact on irreplaceable resource	High		
	Consequence	Medium		
	Probability of impact	Medium		
	Significance	High		
<b>Paleontological</b>				
3. The area has low palaeontological significance.	Nature	Negative	No mitigation required.	N/A
	Extent	Low		
	Duration	High		
	Intensity	Low		
	Potential of impact on irreplaceable resource	Low		
	Consequence	Low		
	Probability of impact	Low		
	Significance	Low		

## 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 resources were identified. Therefore, no further mitigation is required, and from a heritage point of view, we recommend that the proposed development can continue.
2. The cemetery is of High Significance and should be protected. It is recommended that a perimeter buffer zone of 50m should be maintained and impact on the cemetery be monitored frequently.
3. Due to the low palaeontological significance of the area, it is consequently recommended that no further palaeontological heritage studies, ground truthing and specialist mitigation are required pending the discovery of newly discovered fossils. It is considered that the proposed development is deemed appropriate and feasible and will not lead to detrimental impacts on the palaeontological resources of the area (Butler 2019).
4. Although all possible care has been taken to identify sites of cultural importance during the investigation of study areas, it is always possible that hidden or sub-surface sites could be overlooked during the assessment. If during construction, any possible discovery of finds such as stone tool scatters, artefacts, human remains, or fossils are made, the operations must be stopped, and the ECO in charge of these developments ought to be alerted immediately. These discoveries ought to be protected (preferably in situ), and the ECO must report to SAHRA so that appropriate mitigation (e.g. recording, collection) can be carried out by a professional archaeologist or palaeontologist. SAHRA Contact details: South African Heritage Resources Agency, 111 Harrington Street, PO Box 4637, Cape Town 8000, South Africa. Email: Phone: +27 (0)21 462 4502. Fax: +27 (0)21 462 4509 Web: [www.sahra.org.za](http://www.sahra.org.za)). UBIQUE Heritage Consultants and its personnel will not be held liable for such oversights or costs incurred as a result of such oversights.

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## ABBREVIATIONS

AIA:	Archaeological Impact Assessment
ASAPA:	Association of South African Professional Archaeologists
BIA:	Basic Impact Assessment
CRM:	Cultural Resource Management

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

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

## GLOSSARY

Archaeological:	material remains, resulting from human activity, which is in a state of disuse and is in or on land and is older than 100 years, including artefacts, human and hominid remains and artificial features and structures; <ul style="list-style-type: none"><li>– 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;</li><li>– 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;</li><li>– features, structures and artefacts associated with military history, which are older than 75 years and the sites on which they are found.</li></ul>
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). The 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 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 the 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; <ul style="list-style-type: none"> <li>– a building or other structure which may include equipment, furniture, fittings and articles associated with or connected with such building or other structure;</li> <li>– 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;</li> <li>– an open space, including a public square, street or park; and</li> <li>– in relation to the management of a place, includes the immediate surroundings of a place.</li> </ul>

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

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

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

# 1. INTRODUCTION

## 1.1 Scope of study

The project involves the proposed housing development on the remainder of Erf 1077, located between Swartkoppies Street and Pella Road, Farm Pella Mission No. 39, Pella, Khâi-Ma Local Municipality, Namakwa District Municipality, Northern Cape Province. It includes activities listed in terms of the NEMA EIA Regulations 2014, and UBIQUE Heritage Consultants were appointed by EnviroAfrica cc as independent heritage specialists in accordance with the National Environmental Management Act 107 of 1998 (NEMA), and in compliance with Section 38 of the National Heritage Resources Act 25 of 1999 (NHRA), to conduct a cultural heritage assessment (AIA/HIA) of the development area.

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

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

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

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

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

## 1.2 Assumptions and limitations

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

The significance of the sites, structures and artefacts are determined using 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 concerning any number of these aspects. Cultural significance is site-specific and relates to the content and context of the site.

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

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

## 2.1. Statutory Requirements

### 2.1.1 General

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

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

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

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

### 2.1.2 National Heritage Resources Act 25 of 1999

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

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

### 2.1.3 Heritage Impact Assessments/Archaeological Impact Assessments

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

- the construction of a road, wall, power line, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length;
- the construction of a bridge or similar structure exceeding 50m in length;
- any development or other activity that will change the character of a site—
  - exceeding 5000m<sup>2</sup> 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 000m<sup>2</sup> 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** is 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) applies to graves older than 60 years that are situated outside a formal cemetery administered by a local authority. Graves in the category located inside a formal cemetery administered by a local authority will also require the same authorisation as set out for graves younger than 60 years over and above SAHRA authorisation.

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

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

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

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

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

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

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

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

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

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

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

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

## 3. STUDY APPROACH AND METHODOLOGY

### 3.1 Desktop study

The first step in the methodology was to conduct a desktop study of the heritage background of the area and the site of the proposed development. The desktop study entails 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 of the area.

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

#### 3.1.1 Literature review

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

### 3.2 Field study

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

#### 3.2.1 Systematic survey

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

UBIQUE Heritage Consultants inspected the proposed development and surrounding areas on the 11<sup>th</sup> of April 2019 and completed a controlled-exclusive, pre-planned, pedestrian survey. We conducted an inspection of the surface of the ground, wherever the surface was visible. The archaeological survey was done with no substantial attempt to clear brush, sand, deadfall, leaves or other material that may cover the surface and with no attempt 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), and Android Locus Maps application on Samsung Galaxy S9.



### 3.2.2 Recording significant areas

GPS points of identified significant areas were recorded with a handheld Garmin global positioning unit (Garmin eTrex 10) and Android Locus Maps application on Samsung Galaxy S9. Photographs were taken with a Samsung Galaxy S9. Detailed field notes were taken to describe observations. The layout of the area and plotted by GPS points, tracks and coordinates, were transferred to Google Earth and QGIS and maps were created.

### 3.2.3 Determining significance

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

#### *Cultural significance:*

- Low                      A cultural object being found out of context, not being part of a site or without any related feature/structure in its surroundings.
- Medium                Any site, structure or feature being regarded as less important due to several factors, such as date and frequency. Likewise, any important object found out of context.
- High                     Any site, structure or feature regarded as important because of its age or uniqueness. Graves are always categorised as of high importance. Likewise, any principal 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 unique association with a particular community or cultural group for social, cultural or spiritual reasons;
- h. its strong or unique 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 adverse 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 particularly vulnerable resource that will be impacted.
Consequence, (a combination of extent, duration, intensity, and the potential for impact on irreplaceable resources).	Low	A combination of any of the following: - Intensity, duration, extent and impact on irreplaceable resources are all rated low. - Intensity is low and up to two of the other criteria are rated medium. - Intensity is medium, and all three other criteria are rated low.
	Medium	Intensity is medium, and at least two of the other criteria are rated medium.
	High	Intensity and impact on irreplaceable resources are rated high, with any combination of extent and duration. Intensity is rated high, with all the other criteria being rated medium or higher.

Criteria	Rating Scales	Notes
Probability (the likelihood of the impact occurring)	Low	It is highly unlikely or less than 50 % likely that an impact will occur.
	Medium	It is between 50 and 70 % certain that the impact will occur.
	High	It is more than 75 % certain that the impact will occur, or it is definite that the impact will occur.
Significance (all impacts including potential cumulative impacts)	Low	Low consequence and low probability. Low consequence and medium probability. Low consequence and high probability.
	Medium	Medium consequence and low probability. Medium consequence and medium probability. Medium consequence and high probability. High consequence and low probability.
	High	High consequence and medium probability. High consequence and high probability.

### 3.3 Oral history

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

### 3.4 Report

The results of the desktop research and field survey are compiled in this report. The identified heritage resources and anticipated and cumulative impacts that the development of the proposed project may have on the identified heritage resources will be presented objectively. Alternatives, should any significant sites be impacted adversely by the proposed project, are offered. All effort will be made to ensure that all studies, assessments and results comply with the relevant legislation and the code of ethics and guidelines of the Association of South African Professional Archaeologists (ASAPA). The report aims to assist the developer in responsibly managing the documented heritage resources, 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

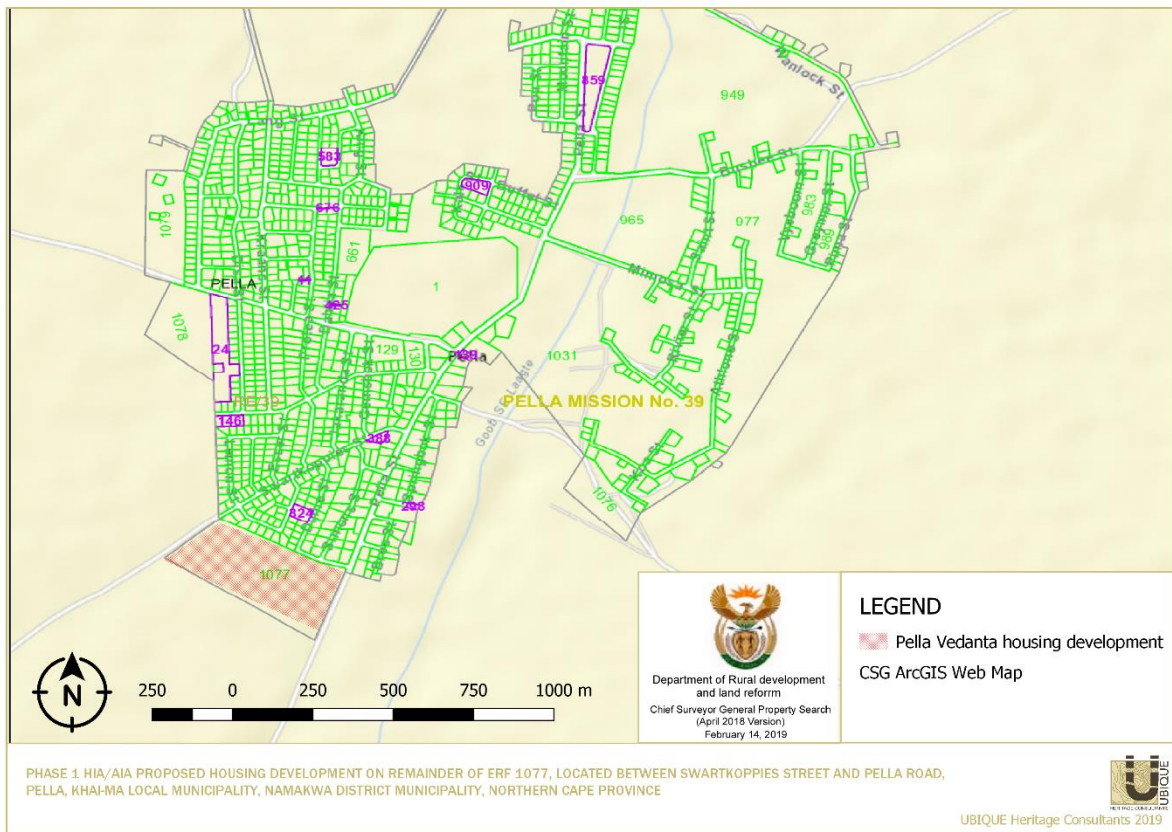
UBIQUE Heritage Consultants were appointed by EnviroAfrica cc. as independent heritage specialists in accordance with Section 38 of the NHRA and the National Environmental Management Act 107 of 1998 (NEMA), to conduct a cultural heritage assessment to determine the impact of the proposed housing development on remainder of Erf 1077, Farm Pella Mission No. 39, Khâi-Ma Local Municipality, Northern Cape, on any sites, features, or objects of cultural heritage significance. The site is located between Swartkoppies Street and Pella Road, Pella, in the Khâi-Ma Local Municipality, Namakwa District Municipality, Northern Cape.

The proposed project involves housing development with associated infrastructure such as water, electricity, sewage, solid waste removal. The total residential area to be developed would be approximately 10 ha.

### 4.1 Technical information

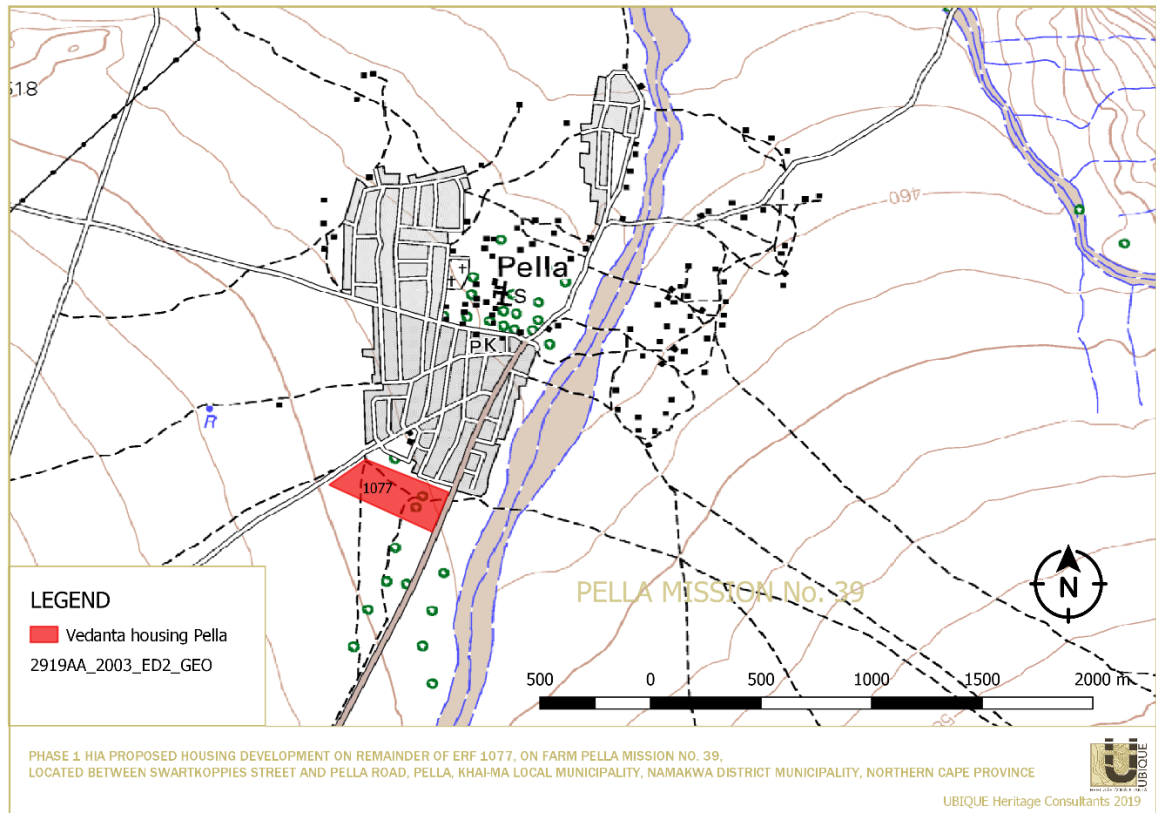
Project description	
Project name	Pella Settlement/town proposed housing development
Description	Phase 1 Archaeological/ Heritage Impact Assessment for proposed housing development, Pella, Khâi-Ma Local Municipality, Namakwa District Municipality, Northern Cape.
Developer	
Khâi-Ma Municipality	
Contact information	Tel: (+27)054 933 1000 Fax: (+27)054 933 0252
Development type	Civil: Housing Development (Low cost)
Landowner	
Contact information	See developer
Consultants	
Environmental	EnviroAfrica cc.
Heritage and archaeological	UBIQUE Heritage Consultants
Paleontological	Banzai Environmental
Property details	
Province	Northern Cape
District municipality	Namakwa
Local municipality	Khâi-Ma
Topo-cadastral map	2919AA 1:50 000
Farm name	Pella Mission No. 39
Closest town	Pella, Pofadder
GPS Co-ordinates	29° 02'25.96"S, 19° 08'56.35"E
Property size	10.8 ha
Development footprint size	10 ha
Land use	

Previous	Unknown
Current	Minor informal housing already exists on the property
Rezoning required	Yes
Sub-division of land	Yes
<b>Development criteria in terms of Section 38(1) NHRA</b>	
Construction of a road, wall, power line, pipeline, canal or other linear form of development or barrier exceeding 300m in length.	Yes/No
Construction of bridge or similar structure exceeding 50m in length.	Yes
Construction exceeding 5000m <sup>2</sup> .	No
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 <sup>2</sup> .	Yes
Any other development category, public open space, squares, parks, recreation grounds.	Yes

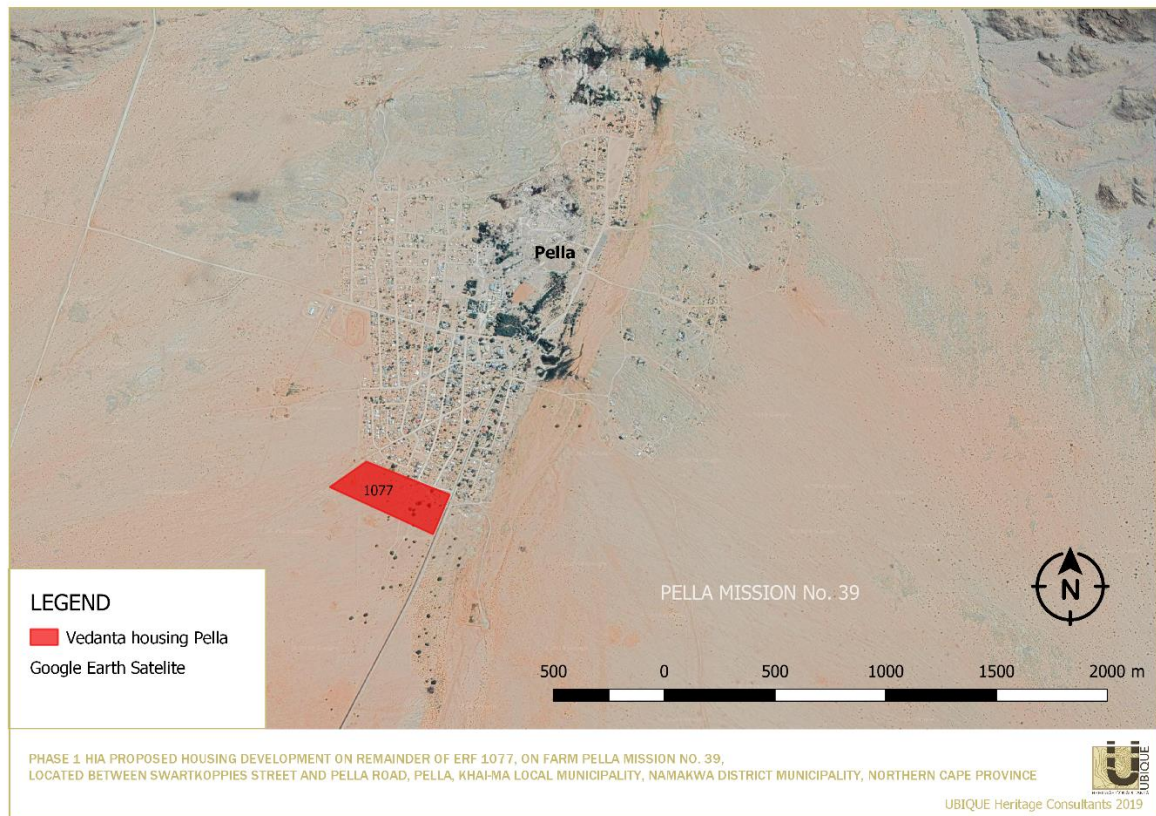


**Figure 2** Project footprint, represented by a red polygon, indicated on Chief Surveyor-General Property Search ArcGIS Web Map.

(<https://csg.esri-southafrica.com/portal/apps/webappviewer/index.html?id=34ec3dcf8d8642bb9ed7f795cbfe8faf>)



**Figure 3** Locality of proposed low-cost housing development on Farm Pella Mission No.39, Remainder of Erf 1077, Pella. 1:50 000 Topo-cadastral map WGS2919AA, Chief Surveyor General.



**Figure 4** Locality of proposed low-cost housing development on Farm Pella Mission No.39, Remainder of Erf 1077, Pella. Google Earth Satellite image.

## 4.2 Description of the affected environment

The Khâi-Ma Local Municipality consists of both the Nama-Karoo and Desert biomes (Mucina & Rutherford 2006), and most of the vegetation type in the study area is typical Eastern Gariep Plains Desert. The area is characterised by sloping plains that contrasts sharply with the surrounding rocky hills and mountains. It comprises of typical wash vegetation in the breaks between the mountains to the Orange River, and the grasslands are dominated by 'white grasses', spinescent (*Stipagrostis* species) on much of the flats, with additional shrubs and herbs in the drainage lines or on the more gravelly or loamy soils next to the mountains (Mucina & Rutherford 2006). The study area consists of quaternary sheet-wash alluvial deposits with red-yellow apedal, freely drained soils with a high base status (Mucina & Rutherford 2006). The development footprint includes several aged *Acacia eriloba* (Kameeldoringboom) trees.

The development site is situated approximately 10.8 km north of the N14 and lies immediately south of the town of Pella. The site is bounded in the east by the main road into Pella and in the west and south by open flat sandy plains. There are no significant waterways on this site, only minor alluvial streams which might be flowing over the sloped area during raining seasons. Minor erosion occurs just along the sidewalls of certain gravel roads entering the site. Disturbances on this site area mainly anthropogenic. Several places are used as dumping areas to dump refuse and building rubble. Other places are partly developed by informal dwellings or fencing around living spaces.







**Figure 5.** Views of the affected development area.

## 5. HISTORICAL AND ARCHAEOLOGICAL BACKGROUND

### 5.1 Region

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

#### 5.1.1 Stone Age

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

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

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

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

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

Archaeological surveys have shown rocky outcrops and hills, drainage lines, riverbanks and confluences to be prime localities for archaeological finds and specifically Stone Age sites since

these areas were utilised for base camps close to water and hunting ranges. If any such features occur in the study area, Stone Age manifestations can be anticipated (Lombard 2011).

### 5.1.2 Historical period

The historical period within the region coincides with the incursion of white traders, hunters, explorers, and missionaries into the interior of South Africa. Buildings and structures associated with the early missionaries, travellers, and traders' arrival during the 19th century, and the settlement of the first white farmers and towns, are still evident in the Northern Cape. Early colonists include 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) 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-17<sup>th</sup> 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 their separate areas (Penn 2005).

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

Because of its distance from the Cape Colony, this arid part of South Africa's interior was generally not colonised until relatively recent. According to history, the remote northern reaches of the Cape Colony were home to cattle rushers, gun-runners, 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 20<sup>th</sup> century (De Jong 2010, Penn 2005).

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

Several HIA and AIA reports have been conducted in and around the area of Pella and Aggeneys, Northern Cape. Some of these reports include, but are not limited to, studies for the development and construction of solar and photovoltaic (PV) solar energy facilities near Aggeneys (Orton 2015; Morris 2013), the cultivation of new lands at Klein Pella (Orton 2015), as well as the extensions of Gravel mines on Aroams 57 (Webley 2012). The majority of the artefact scatters, which include stone implements, grinding grooves and colonial/historical artefacts, have been documented to have low archaeological and cultural significance.

### 5.2.1 Stone Age

Although some sites do have traces of Early Stone Age (ESA) and Middle Stone Age (MSA) artefacts, predominantly Later Stone Age (LSA) sites have been recorded in past surveys, specifically in the Aggeneys-Pofadder region (Morris 2013). Most of the AIA reports of the region reveal that the scatters of stone implements are widely distributed and do not appear to be concentrated in any specific locations. Scatters of stone artefacts in and around the areas under study, have been documented and recorded by Gaiger (2018), Higget & Nel (2012), Morris (2010; 2011; 2013), Ndivhuho (2018), Orton (2015), Orton & Webley (2013), Rossouw (2015; 2016), Smith (2012), Van Ryneveld (2017), Van Schalkwyk (2011), Webley (2012), Webley & Halkett (2012; 2017).

According to Beaumont et al. (1995) and Morris (2013), “virtually all the ‘Bushmanland’ (LSA) sites so far located appear to be ephemeral occupations by small groups in the hinterland on both sides of the [Orange] river”. These transient camps are in sharp contrast to the substantial herder encampments along the Orange River floodplain itself (Morris 2013). It has been noted by Beaumont et al. (1995: 240-241) that a widespread low-density scatters of stone artefacts from the Pleistocene age appears across areas of ‘Bushmanland’ to the south. Here, raw materials, mainly quartzite cobbles, were derived from the Dwyka till (Morris 2013). According to Morris (2013), substantial MSA sites are relatively uncommon in ‘Bushmanland’. However, several sites yielding small samples have been recorded.

Signs of human occupation are found “mainly in the shelter of granite inselbergs (koppies), on red dunes which provided clean sand for sleeping, or around the seasonal pans” (Beaumont et al. 1995: 264). Webley & Halkett (2012) conducted fieldwork for a new transmission line commencing at the Aggeneys substation and similarly observed that LSA sites were concentrated at the base of small koppies. Archaeological sites yielding large amounts of pottery near Aggeneys and east of the Pofadder region, suggests that herders moved into the Orange River hinterland following seasons of good rains. It is believed that herder groups would have settled at stronger flowing springs such as Pella and dispersed through periods of droughts to smaller springs in the region (Morris 2013).

Higher archaeological visibility is present at or around landscape features such as hills and rock outcrops (Morris 2013). At Bloemhoek near Aggeneys, Morris (2013) notes that several LSA artefacts occur at a shelter on the eastern side of a small hill, with a grinding groove on a boulder located at the northern side. There is a moderate to high density of scatters of LSA artefacts found by a cluster of two bedrock exposures (with a third nearby on the adjacent far Aggeneys) with hollows where water would remain after rain. Morris (2013) recorded several stone tools, pottery and ostrich eggshell (OES) flask fragments. LSA grinding grooves are located across the bedrock surfaces.

The majority of the reports revealed that quartz constitutes the primary raw materials used to produce artefacts in the vicinity of the study area, however, several samples of quartzite, as well as other materials, have been noted, including local dolerite as well as microliths knapped from siliceous material (Morris 2013; Orton 2015; Orton & Webley 2013; Smith 2012; Van Ryneveld 2017; Webley & Halkett 2012, 2017). Some of the finds include quartz flakes, cores and chunks and a few formal scrapers. To the south-west of Pella, on Portion 1 of the farm, Aroams 57, Webley & Halkett (2012) note that some of the quartzite flakes were side-struck and most of the flakes are relatively large. They suggest that the size of the artefacts indicate that they may be dated to the MSA, especially since the artefacts found here do not conform to LSA design or size. Webley & Halkett (2012) also recorded a small handaxe which may be attributed to the Fauresmith. During Van Ryneveld's (2017) survey of several drill positions on the farm Aroams 57 located near the Aggeneys Mountains, she recorded ESA, MSA and LSA lithic artefacts. Surface lithics were mainly found in a lagged surface context. Some of the finds include a variety of flakes and cores and are typically amorphous. The LSA scatters represented by both macrolithic and microlithic samples. At Drill Position BH0291 / Site ARS-02 on Farm Aroams 57 Portion 1, south-west of Pella and north-east of Aggeneys ESA stone implements are represented by rough bifacial tools, mainly handaxes from the Acheulean, as well as prepared cores and flakes, possibly indicative of a Victoria West Industry. The typology of the MSA implements recorded at Drill Position BH0281 / Site ARS-01, Drill Position BH0291 / Site ARS-02 and Drill Position BH0301 / Site ARS-04, remain amorphous. These were comprised mainly of flakes, and some rough blade or flake-blade types and cores (Van Ryneveld 2017).

During the final archaeological survey for the proposed Aggeneys solar energy facility, Orton (2015) recorded a background scatter that was slightly higher than elsewhere in the development footprint. As with some of the other sites, most of the artefacts that were recorded were, again, made from quartz. However, Orton (2015) does state that a few quartzite examples were present. Although the density of artefacts was still higher than the rest of the artefact scatters found during Orton's (2015) survey, this area's density was still very low with one artefact for every 50-100 m<sup>2</sup>. Apart from one small flake in clear quartz that can be almost certainly dated to the LSA, the majority of these artefact scatters most likely belong to the MSA (Orton 2015). A single large lower grindstone was recorded in the eastern part of the study area, right at the edge of the development layout (Orton 2015).

During Morris' (2010) survey of the northern slopes of Gamsberg (Gams), he identified a few isolated LSA flakes. Morris (2010) also recorded two stone cairns (possibly representing graves) north-west of the Gamsberg, where he identified a 'ceramic LSA' site, which included finds such as OES, pottery, stone implements made of quartz, glass and porcelain. It should be mentioned that

these isolated LSA settlements do not occur on the slopes of Gamsberg itself but instead can be found on the plains near little rocky outcrops. Another ‘ceramic LSA’ site to the north of the N14 linking Aggeneys to Pofadder consisted of pottery, stone implements, OES and glass (Morris 2010). Webley & Halkett (2012) states that these sites possibly represent transient settlement by transhumant herders or hunter-gatherers that moved through the area.

Smith (2012) reported at Farm 62 Zuurwater, Aggeneys that on the clean sand at the top of the dune just outside the footprint area were three OES fragments as well as a quartz core axe and a crystal quartz flake, possibly dating to the ESA.

A few other interesting prehistoric finds include a site of medium significance with a single considerable exposure of bedrock with bedrock grinding grooves and LSA implements outside the Farm Hartebees Vlei 86, near Aggeneys (Webley & Halkett 2017). Several grinding grooves have been recorded on rock outcrops in the Aggeneys/Gamsberg area, along with rock paintings on a boulder next to the Aggregate Quarry at Black Mountain Mine, Aggeneys. The motifs include simple finger paintings, two “Star” motifs and an indented oval shaped image (Webley & Halkett 2012). Recordings of engraved cupule sites have been made on Black Mountain Mining property, Aggeneys and at the foot of the Swartberg on Zuurwater 62 (Morris 2013), as well as grinding grooves and hollows with a number of artefact scatters, pottery and OES during the HIA for the proposed Namies wind facility near Aggeneys (Orton & Webley 2013).

### 5.2.2 Historical period

The town of Pella was initially known as Cammas Fonteyn (<https://www.sahistory.org.za/place/pella>). Pella was founded by the London Missionary Society (LMS) in 1814 after Jager Afrikaner sacked the first LMS mission at Warmbad in Namibia. The Mission survivors fled south to Cammas Fonteyn, where the resident LMS minister renamed the new station, Pella, after the eponymous town located east of the Jordan River. The Christians fled to this town in about 70 AD after Jerusalem was destroyed by the Romans (Orton 2015; <https://www.sahistory.org.za/place/pella>). The LMS minister and his family were murdered trying to escape a Bushman attack. Pella was thus subsequently abandoned within a decade of its founding. It was then taken over by the Rhenish Mission, who in turn abandoned it in 1869. In 1874 Pella was taken over by the Roman Catholics; however, they only formally obtained occupation rights from the government on the 9<sup>th</sup> of June in 1881 (Orton 2015; Rossouw 2015, 2016). The Roman Catholic Mission Station, Pella, Namaqualand District was declared a national monument with Provincial Heritage in 1991 (<https://sahris.sahra.org.za/declaredsites>).

In 1907 the missionaries started a fruit and vegetable garden along the banks of the Orange River directly north of Pella. The land they had used for cultivation was known as “Rooi-Pad”. They successfully cultivated a variety of plant foods here, and Rooi-Pad referred to the missionaries as Pella-Orange, also served as a mission (Orton 2015).



**Figure 6** Roman Catholic Church in Pella, a declared national monument.

According to Orton (2015), there is no established direct link between Pella and Klein Pella. Klein Pella was initially known as Jabiesiefontein. This name is believed to have derived from the Khoekhoe word 'tsawi' which means 'black ebony tree' (*Euclea pseudebenus*) and the Afrikaans word 'fontein' meaning spring. The farm's name was changed to Klein Pella after the establishment of Pella. However, the reason for this has not yet been traced (Orton 2015).

Military action in the area took place during the Anglo-Boer War in 1901. Approximately 60 Boers managed to invade Pella without any fighting taking place.

Several exciting finds have been recorded at sites near Aggeneys and Pella. Twentieth-century glass bottles and a rusted enamel basin were recorded during the final archaeological survey for the proposed Aggeneys solar energy facility (Orton 2015). Morris (2013) recorded Colonial-era stonewalling and a grave of similar age at Bloemhoek, near Aggeneys, south of the Loop 10 road, in PV Area 5. He also documented several glass pieces and porcelain fragments and believes that these indicate the continued use of temporary water sources during the colonial period well into the 1930s, before the introduction of bore-hole drilling in the region (Morris 2013).

The Colonial Period Farm Aroams 1/57 farmstead, with the primary residence, related outbuildings and a stone built a rectangular dam, and an associated wind pump is approximately 100 years old. The Colonial Period primary residence is no longer in use but is still in a very fair condition. A low-density lens of mixed MSA and LSA artefacts is scattered around the farmstead (Van Ryneveld 2017). Another Colonial Period Farmstead has been recorded along the public gravel access road to the study site but on the adjacent property, Farm Remainder of Aroams 57 (Aroams RE/57). The residence pre-dates 60 years and is approximately 100 years old (Van Ryneveld 2017).

Occurrences of historical items, such as ceramics and glass have been recorded during the HIA for the proposed Namies wind facility (Orton & Webley 2013). At Letsoai CSP Site 2, near Aggeneys,

Webley & Halkett (2017) recorded a base of a bowl with the inscription: “*Société Ceramique, Maestricht, Made in Holland*”. Recovered from a gravel area, together with MSA quartz artefacts, this fragment was dropped or discarded after 1900, when the words “Made in Holland” were added to the inscription.

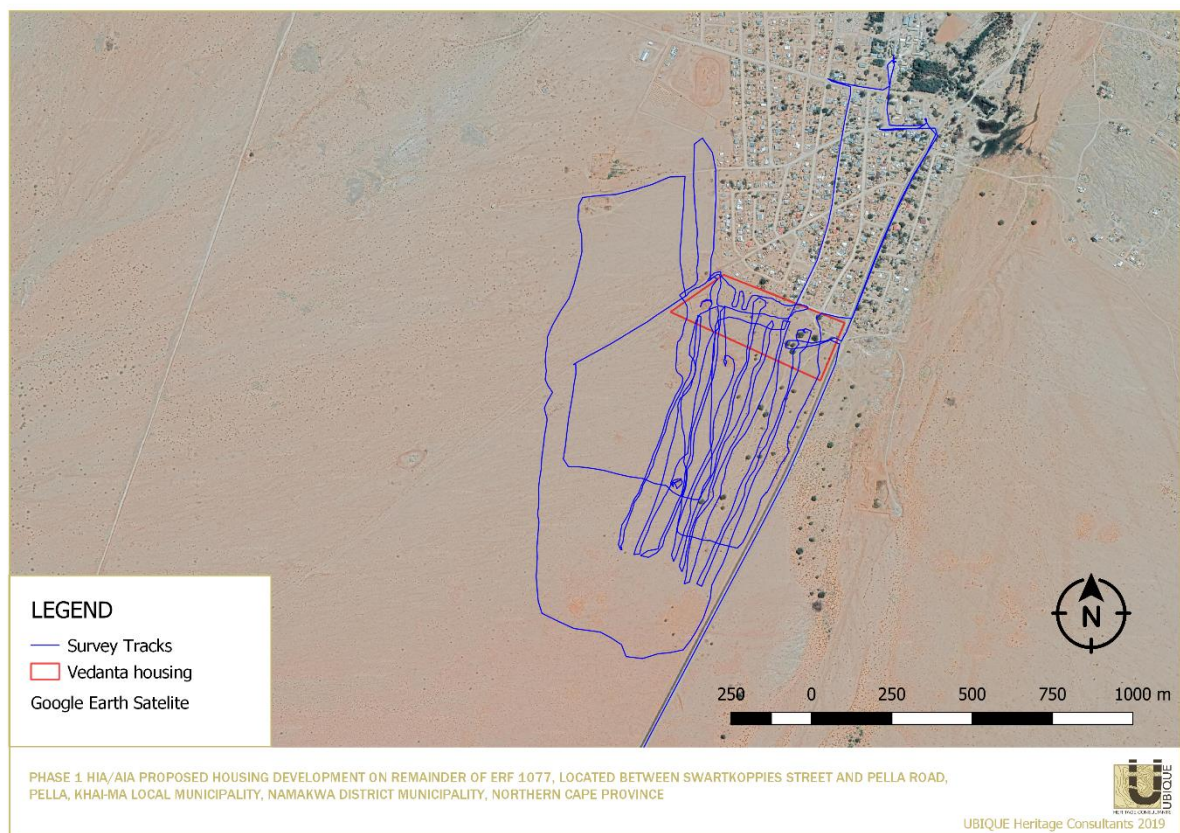
### 5.2.3 Oral history

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 footprint provided by the client. The site was approached from the northeast and surveyed in transects of approximately 30m. Developed areas were only scoped due to disturbances.



**Figure 7** Google Earth image showing survey track for a housing development project, Erf 1077, Pella.



## 6.2 Identified heritage resources

Description		Period	Location	Field rating/ Significance
Stone Age				
1.	Type lithic/s		29° 02'42.36" S 19° 08'48.26" E	Field Rating IV C  Low significance
	Raw material	Unworked OES		
	N in m <sup>2</sup> .	1 in 20 m <sup>2</sup> area		
	Context	Surface scatter, out of context		
	Additional	Well outside development footprint, towards the south.		
Historical				
2.	Type of feature	Roman Catholic Mission Church	1870-1880	29° 01'54.79" S 19° 09'13.94" E  Grade I.  High significance  (National Monument)
	Material			
	N in m <sup>2</sup> .			
	Context			
	Additional	Provincial Heritage site. Outside of the development footprint, located in town.		
Graves				
	Grave markers	Formal cemetery		29° 02'22.70" S 19° 08'51.67" E  Grade IIIA.  High significance
	Inscription			
	Orientation			
	Additional	The formal local cemetery lies within the development footprint.		

## 6.3 Discussion

### 6.3.1 Archaeological features

No archaeological features were found within the development footprint. One occurrence of an ostrich eggshell fragment was recorded to the south of the study area. The OES fragment is unworked and without archaeological context and is therefore insignificant.

No further action or mitigation is required.

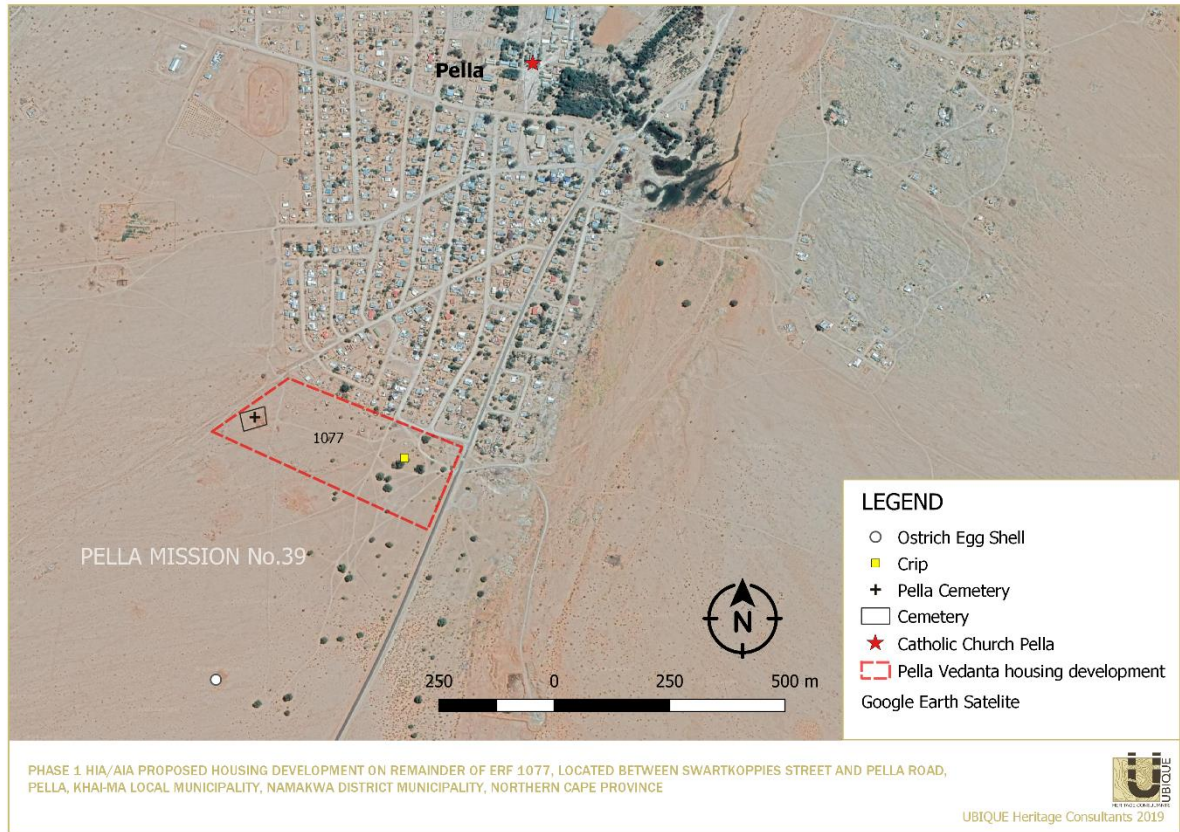


Figure 8 Recorded heritage within, and adjacent study area.



Figure 9 OES fragment found outside the development footprint.

### 6.3.2 Historical features

No significant historical features were identified within the study area. An old cement water trough/furrow is located in the north-eastern quadrant of the development footprint. It is however not historical and therefore of no significance.

No further action or mitigation is required.



**Figure 10** Old cement water trough or furrow.



**Figure 11** Local municipal cemetery.

### 6.3.3 Graves

The local municipal cemetery is situated within the south-western quadrant of the development area and lies within the impact zone. The cemetery is currently fenced, and the development is planned around it. However, care should be taken to minimise the effects of construction activities.

All graves are of high significance and care should be taken to protect them. The graves are of Local significance with Field Rating/Grade IIIA.

### 6.3.4 Palaeontological resources

Quaternary to Recent sediments [Quaternary Gordonia Formation (Kalahari Group)] entirely underlies the proposed housing development. According to the SAHRIS PalaeoMap, a low palaeontological significance is allocated to this group.

The impact of the development on the Fossil heritage is considered to be low (Butler 2019; Almond & Pether 2008). For the full paleontological desktop study conducted by Elize Butler from Banzai Environmental, see Appendix 1.

## 7. RECOMMENDATIONS

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

5. No significant heritage resources were identified. Therefore, no further mitigation is required, and from a heritage point of view, we recommend that the proposed development can continue.
6. The cemetery is of High Significance and should be protected. It is recommended that a perimeter buffer zone of 50m should be maintained and impact on the cemetery be monitored frequently.
7. Due to the zero palaeontological significance of the area, it is consequently recommended that no further palaeontological heritage studies, ground truthing and/or specialist mitigation are required pending the discovery of newly discovered fossils. It is considered that the proposed development is deemed appropriate and feasible and will not lead to detrimental impacts on the palaeontological resources of the area (Butler 2019).
8. Although all possible care has been taken to identify sites of cultural importance during the investigation of study areas, it is always possible that hidden or sub-surface sites could be overlooked during the assessment. If during construction, any possible

discovery of finds such as stone tool scatters, artefacts, human remains, or fossils are made, the operations must be stopped, and the ECO in charge of these developments ought to be alerted immediately. These discoveries ought to be protected (preferably in situ), and the ECO must report to SAHRA so that appropriate mitigation (e.g. recording, collection) can be carried out by a professional archaeologist or palaeontologist. SAHRA Contact details: South African Heritage Resources Agency, 111 Harrington Street, PO Box 4637, Cape Town 8000, South Africa. Email: Phone: +27 (0)21 462 4502. Fax: +27 (0)21 462 4509 Web: [www.sahra.org.za](http://www.sahra.org.za)). UBIQUE Heritage Consultants and its personnel will not be held liable for such oversights or costs incurred as a result of such oversights.

## 8. CONCLUSION

This HIA has identified no significant heritage resources on the remainder of Erf 1077, Farm Pella Mission No. 39, Khâi-Ma Local Municipality, Northern Cape as set out in the report. In the development footprint are no archaeological, historical or cultural sites, or paleontological resources apart from the cemetery, that will be impacted negatively by the proposed development.

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## WEB

- <http://www.sahra.org.za/sahris>
- <https://www.sahistory.org.za/place/pella>

# APPENDIX A

PALAEONTOLOGICAL DESKTOP ASSESSMENT OF THE PROPOSED VEDANTA HOUSING DEVELOPMENT, PELLA MISSION 39, KHÂI-MA LOCAL MUNICIPALITY, NAMAQWA DISTRICT MUNICIPALITY, NORTHERN CAPE.

**PALAEONTOLOGICAL DESKTOP ASSESSMENT OF THE PROPOSED VEDANTA HOUSING  
DEVELOPMENT, PELLA MISSION 39, KHÂI-MA LOCAL MUNICIPALITY, NAMAKWA DISTRICT  
MUNICIPALITY, NORTHERN CAPE.**

**Compiled for:**

UBIQUE Heritage Consultants

PO Box 51

Askham

8814

[www.ubiquecrm.com](http://www.ubiquecrm.com)

**17 April 2018**

**Prepared by:**

**BANZAI ENVIRONMENTAL (PTY) LTD**

## Declaration of Independence

General declaration:

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

**Disclosure of Vested Interest**

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

**PALAEONTOLOGICAL CONSULTANT:**

Banzai Environmental (Pty) Ltd

**CONTACT PERSON:**

Elize Butler

Tel: +27 844478759

Email: elizebutler002@gmail.com

SIGNATURE:

A handwritten signature in black ink, appearing to read 'Elize Butler', with a period at the end.

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

**Table 1:** Nema Requirements

NEMA Regs (2014) - Appendix 6	Relevant section in report
1. (1) A specialist report prepared in terms of these Regulations must contain- a) details of- i. the specialist who prepared the report; and ii. the expertise of that specialist to compile a specialist report including a curriculum vitae;	Page ii of Report – Contact details and company and Appendix 1
b) a declaration that the specialist is independent in a form as may be specified by the competent authority;	Page ii-iii
c) an indication of the scope of, and the purpose for which, the report was prepared;	Section 4 – Objective
(cA) an indication of the quality and age of base data used for the specialist report;	Section 5 – Geological and Palaeontological history
(cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	Section 9
d) the date, duration and season of the site investigation and the relevance of the season to the outcome of the assessment;	N/A Desktop assessment
e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;	Section 7 Methodology
f) details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives;	Section 1, Section 5
g) an identification of any areas to be avoided, including buffers;	Desktop assessment
h) a map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;	Section 5

i) a description of any assumptions made and any uncertainties or gaps in knowledge;	Section 7.1.- Assumptions and Limitation
j) a description of the findings and potential implications of such findings on the impact of the proposed activity, including identified alternatives on the environment or activities;	Section 10
k) any mitigation measures for inclusion in the EMPr;	Section 10
l) any conditions for inclusion in the environmental authorisation;	N/A
m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;	N/A
n) a reasoned opinion- i. as to whether the proposed activity, activities or portions thereof should be authorised; (iA) regarding the acceptability of the proposed activity or activities; and ii. if the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan;	Section 10 - Conclusion
o) a description of any consultation process that was undertaken during the course of preparing the specialist report;	Not applicable.
p) a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	Not applicable. To date not comments regarding heritage resources that require input from a specialist have been raised.
q) any other information requested by the competent authority.	Not applicable.
2) Where a government notice <i>gazetted</i> by the Minister provides for any protocol or minimum information requirement to be applied to a specialist report, the requirements as indicated in such notice will apply.	Refer to section 2 and 3 compliance with SAHRA guidelines

## EXECUTIVE SUMMARY

EnviroAfrica CC appointed UBIQUE Heritage Consultants to conduct the Heritage Impact Assessment (HIA) for the proposed Vedanta Pella Housing development on the remainder of Erf 1077 located between Swartkoppies Street and Pella Road, Pella Mission 39, Khai-Ma Local Municipality, Northern Cape. Banzai Environmental (Pty) Ltd was in turn appointed to undertake the Palaeontological Desktop Assessment (DIA) assessing the palaeontological impact of the proposed development. The National Heritage Resources Act (No 25 of 1999, section 38) (NHRA), states that a Palaeontological Impact Assessment (PIA) is key to detect the presence of fossil material within the planned development footprint. This DIA is thus necessary to evaluate the effect of the construction on the palaeontological resources.

The proposed Vedanta housing development is entirely underlain by Quaternary to Recent sediments [Quaternary Gordonia Formation (Kalahari Group)]. According to the SAHRIS PalaeoMap, a low palaeontological significance is allocated to this group. It is consequently recommended that no further palaeontological heritage studies, ground truthing and/or specialist mitigation are required pending the discovery of newly discovered fossils. It is considered that the development of the proposed development is deemed appropriate and feasible and will not lead to detrimental impacts on the palaeontological resources of the area.

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

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



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## 1 INTRODUCTION

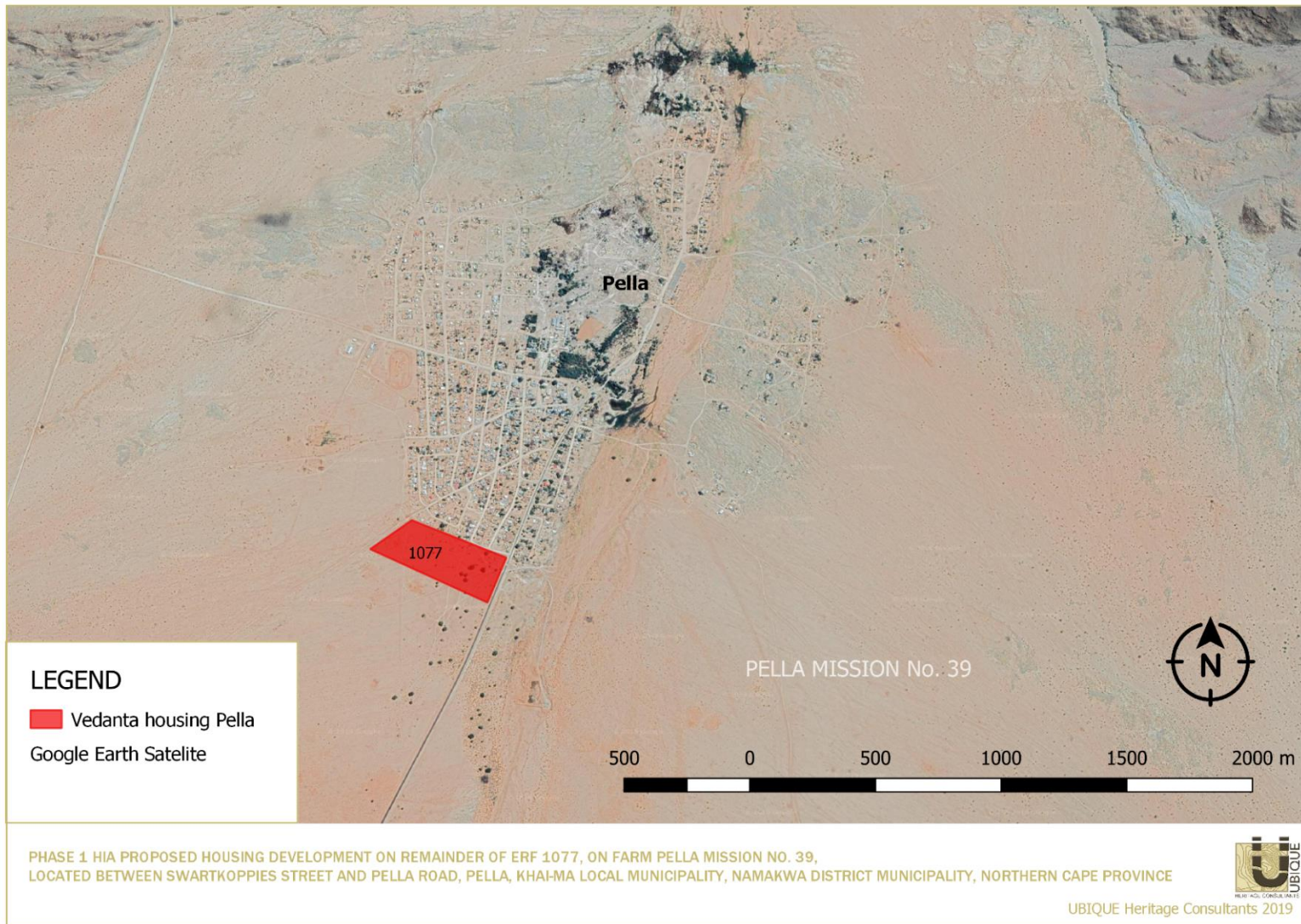
The Khai-Ma local Municipality, Northern Cape plans the development of houses and associated infrastructure such as electricity, sewage, solid waste removal as well as water on the remainder of Erf 1077 between Swartkoppies Street and Pella Road, Pella Mission 39, Khai-Ma Local Municipality. EnviroAfrica was appointed by the Municipality to submit an application and public participation process in terms of the National Environmental Management Act, 1998 (Act No 107 of 1998) as amended (NEMA), Environmental Impact Assessment Regulations, 2014.

The following activities were triggered in terms of NEMA EIA Regulations 2014:

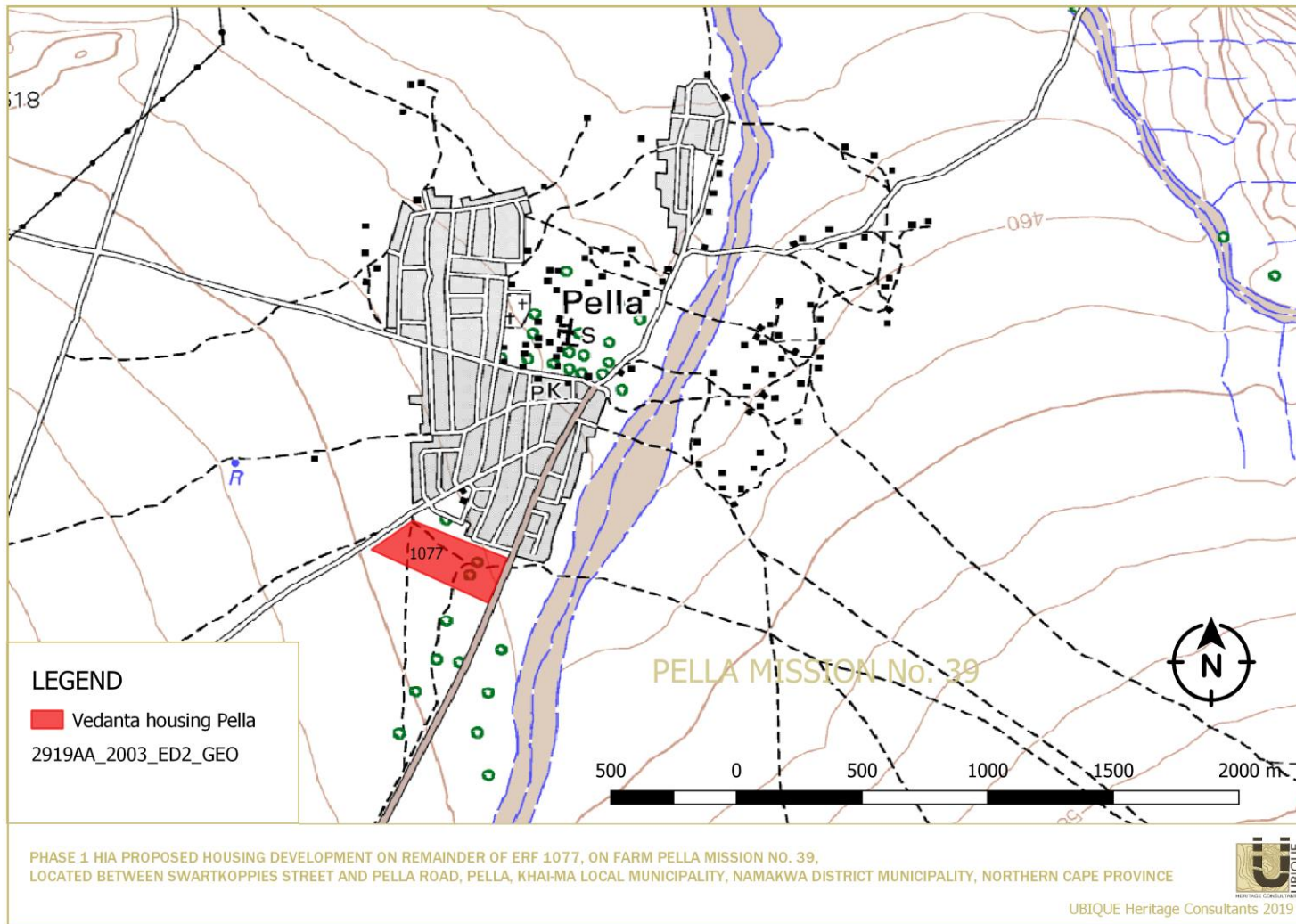
- Government Notice R327 (Listing Notice 1): Activity No. **9; 10; 24; 27**
- Government Notice R324 (Listing Notice 3): Activity No. **4; 12**

*\*(Note that the listed activities may change during the course of the NEMA Application process. Registered I&APs will be notified of any changes).*

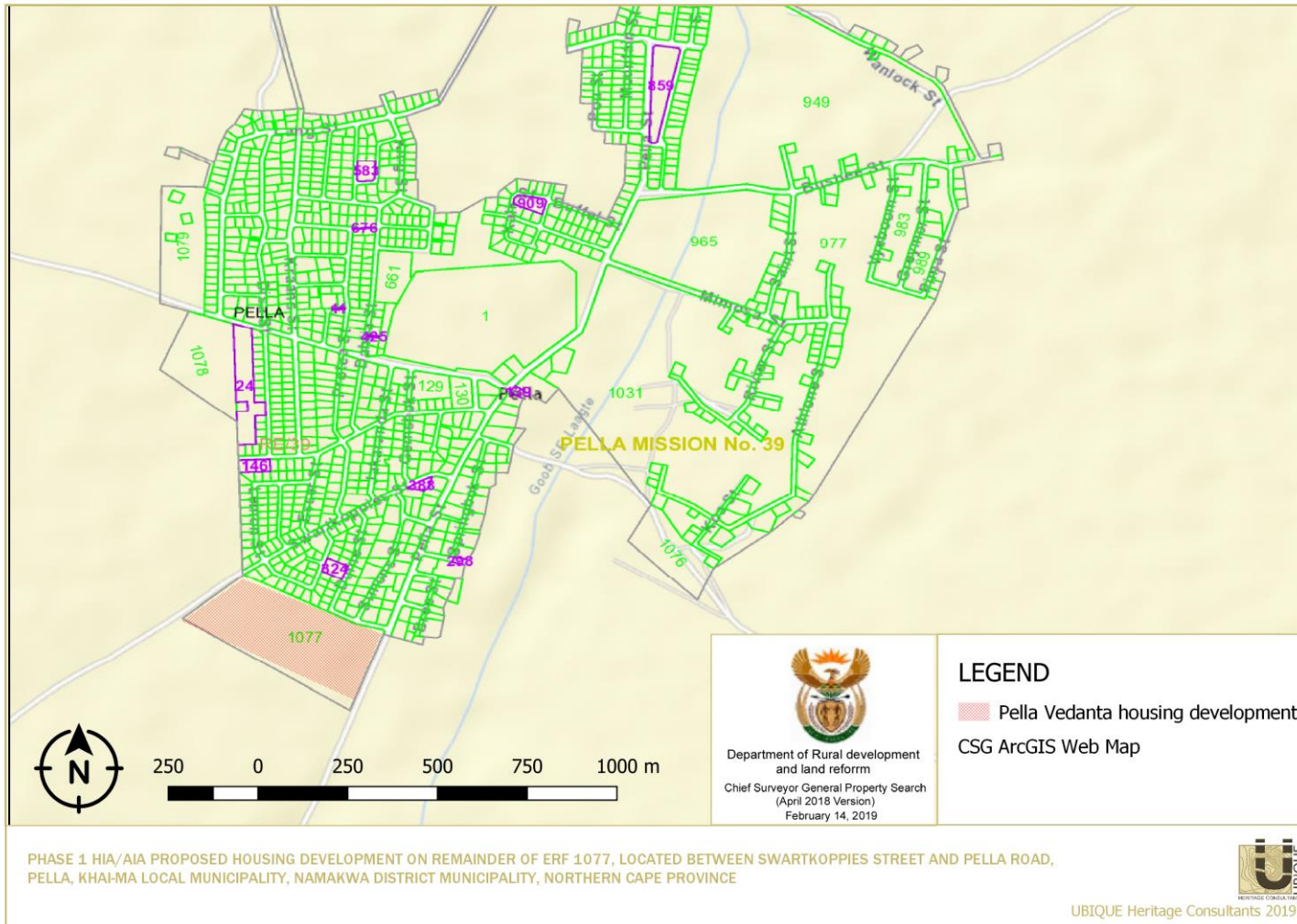
The proposed housing development is 10 ha in extent.



**Figure 12:** Proposed Vedanta housing development on the remainder of Erf 1077, on Pella Mission 39, located between Swartkoppies Street and Pella Road, Pella, Khai-Ma Local Municipality. Map provided by Ubiqum Heritage Consultants



**Figure 13:** Topographical map of the proposed Vedanta housing development on the remainder of Erf 1077, on Pella Mission 39, located between Swartkoppies Street and Pella Road, Pella, Khai-Ma Local Municipality. Map provided by Ubique Heritage.



**Figure 14:** ArcGIS Web Map of the proposed Vedanta Pella housing development on the remainder of Erf 1077, Pella Mission 39, located between Swartkoppies Street and Pella Road, Pella, Khai-Ma Local Municipality. Map provided by Ubiqum Heritage Consultants

## 2 QUALIFICATIONS AND EXPERIENCE OF THE AUTHOR

The author (Elize Butler) has an MSc in Palaeontology from the University of the Free State, Bloemfontein, South Africa. She has been working in Palaeontology for more than twenty-four years. She has extensive experience in locating, collecting and curating fossils, including exploration field trips in search of new localities in the Karoo Basin. She has been a member of the Palaeontological Society of South Africa for 13 years. She has been conducting PIAs since 2014.

## 3 LEGISLATION

### 3.1 National Heritage Resources Act (25 of 1999)

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

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

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

- the construction of a road, wall, power line, pipeline, canal or other similar form of linear development or barrier exceeding 300 m in length;
- the construction of a bridge or similar structure exceeding 50 m in length;
- any development or other activity which will change the character of a site—
- (exceeding 5 000 m<sup>2</sup> in extent; or
- involving three or more existing erven or subdivisions thereof; or
- involving three or more erven or divisions thereof which have been consolidated within the past five years; or
- the costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority
- the re-zoning of a site exceeding 10 000 m<sup>2</sup> in extent;

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

#### 4 OBJECTIVE

The objective of a DPIA is to determine the impact of the development on potential palaeontological material at the site.

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

The terms of reference of a DPIA are as follows:

##### **General Requirements:**

- Adherence to the content requirements for specialist reports in accordance with Appendix 6 of the EIA Regulations 2014, as amended;
- Adherence to all applicable best practice recommendations, appropriate legislation and authority requirements;
- Submit a comprehensive overview of all appropriate legislation, guidelines;
- Description of the proposed project and provide information regarding the developer and consultant who commissioned the study,
- Description and location of the proposed development and provide geological and topographical maps
- Provide Palaeontological and geological history of the affected area.
- Identification sensitive areas to be avoided (providing shapefiles/kmls) in the proposed development;
- Evaluation of the significance of the planned development during the Pre-construction, Construction, Operation, Decommissioning Phases and Cumulative impacts. Potential impacts should be rated in terms of the direct, indirect and cumulative:
  - a. **Direct impacts** are impacts that are caused directly by the activity and generally occur at the same time and at the place of the activity.
  - b. **Indirect impacts** of an activity are indirect or induced changes that may occur as a result of the activity.

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

- Fair assessment of alternatives (infrastructure alternatives have been provided):
- Recommend mitigation measures to minimise the impact of the proposed development; and
- Implications of specialist findings for the proposed development (such as permits, licenses etc).

## 5 GEOLOGICAL AND PALAEOLOGICAL HERITAGE

The proposed Vedanta housing development on the remainder of Erf 1077, Pella Mission 39, located between Swartkoppies Street and Pella Road, Pella, Khai-Ma Local Municipality is entirely underlain by Quaternary to Recent sediments [Quaternary Gordonia Formation (Kalahari Group)].

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 contained white to brown fine-grained silts, sands and clays. Some of the pans consist of clayey material mixed with evaporates that shows seasonal effects of shallow saline groundwaters. Quaternary alluvium, aeolian sands, surface limestone, silcrete, and terrace gravels are also included in the Kalahari Group (Kent 1980)

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. Outcrops of bedrock in the immediate area are inliers of metamorphic rocks (gneiss) and intrusive granites that are of Mokolian (Mid-Proterozoic) age. These rocks are approximately 1 to 2.05 billion years old and completely unfossiliferous. These basement rocks also underlie the Quaternary superficial sediments.

The fossil assemblages of the Kalahari are generally very low in diversity and occur over a wide range, and thus the palaeontological diversity of this Group is low (SAHRIS website). 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 have been relatively neglected in the past. Late Cenozoic calcrete may comprise of bones, horn cores as well as mammalian teeth. Tortoise remains have also been uncovered as well as trace fossils which 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.

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

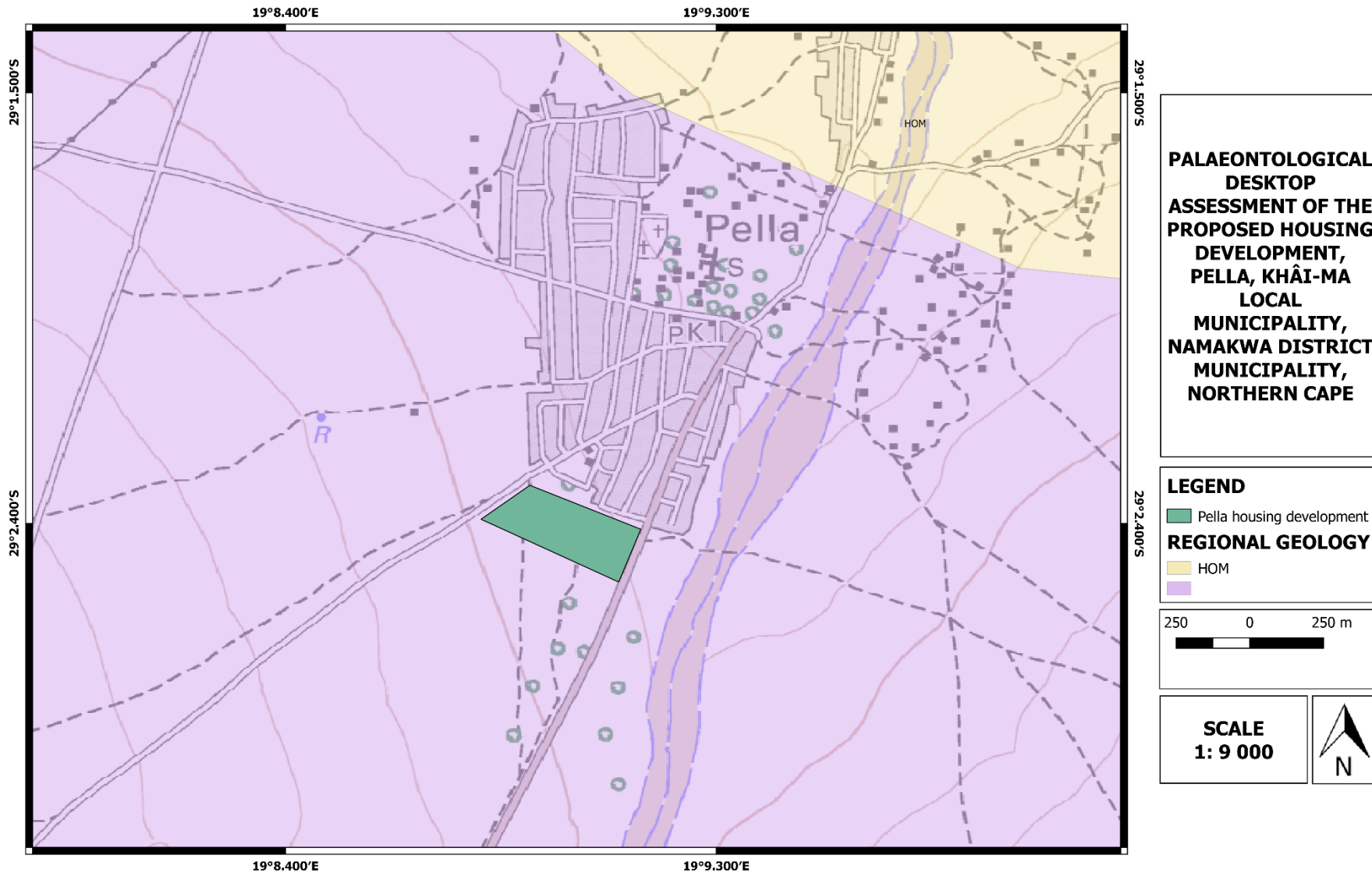


Figure 15: The proposed Vedanta housing development on the remainder of Erf 1077, Pella Mission 39, located between Swartkoppies Street and Pella Road, Pella, Khai-Ma Local Municipality is entirely underlain by Quaternary to Recent sediments [Quaternary Gordonia Formation (Kalahari Group)]. Map was drawn with QGIS Desktop 2.18.18.

## 6 GEOGRAPHICAL LOCATION OF THE SITE

Proposed Vedanta housing development is situated on the remainder of Erf 1077, Pella Mission 39, located between Swartkoppies Street and Pella Road, Pella, Khai-Ma Local Municipality. This development is mapped on the 1: 50 000 2919AA topographical Map and the GPS coordinates of the development is 29°02'25.96"S, 19°08'56.35"E

## 7 METHODS

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

### 7.1 Assumptions and limitations

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

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

## 8 ADDITIONAL INFORMATION CONSULTED

In compiling this report, the following sources were consulted:

- The Palaeosensitivity Map from the SAHRIS website.

- 2919 AA Topographical map
- Geological Map 1: 250 000 2919 Pofadder.
- A Google Earth map with polygons of the proposed development was obtained from *Ubique Heritage*.
- Vedanta Pella Housing BID

## 9 IMPACT ASSESSMENT METHODOLOGY

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

- Construction
- Operation
- Decommissioning

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

**Table 2:** The rating system

NATURE		
Include a brief description of the impact of the environmental parameter being assessed in the context of the project. This criterion includes a brief written statement of the environmental aspect being impacted upon by a particular action or activity.		
The Nature of the Impact is the possible 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).
<b>DURATION</b>		
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.
<b>INTENSITY/ MAGNITUDE</b>		
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 results 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

## 10 FINDINGS AND RECOMMENDATIONS

The proposed Vedanta housing development on the remainder of Erf 1077, Pella Mission 39, located between Swartkoppies Street and Pella Road, Pella, Khai-Ma Local Municipality is entirely underlain by Quaternary to Recent sediments [Quaternary Gordonina Formation (Kalahari Group)]. According to the SAHRIS PalaeoMap, a low palaeontological significance is allocated to this group.

It is consequently recommended that no further palaeontological heritage studies, ground truthing and/or specialist mitigation are required pending the discovery of newly discovered fossils. It is considered that the development of the proposed Development is deemed appropriate and feasible and will not lead to detrimental impacts on the palaeontological resources of the area.

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

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



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**Appendix: 1: CV**

**ELIZE BUTLER**

**PROFESSION:** Palaeontologist

**YEARS' EXPERIENCE:** 25 years in Palaeontology

**EDUCATION:** B.Sc Botany and Zoology, 1988

University of the Orange Free State

B.Sc (Hons) Zoology, 1991

University of the Orange Free State

Management Course, 1991

University of the Orange Free State

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

University of the Free State

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

Registered as a PhD fellow at the Zoology Department of the UFS 2013 to current

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

**MEMBERSHIP**

Palaeontological Society of South Africa (PSSA) 2006-currently

**EMPLOYMENT HISTORY**

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

