

**HIA FOR THE PROPOSED TOWNSHIP  
ESTABLISHMENT LOW INCOME HOUSING ON REM  
OF ERF 10 000, VRYHEID, KZN**

**FOR BIZYCON (PTY) LTD**

**DATE: 12 JULY 2023**

**By Gavin Anderson**

**Umlando: Archaeological Surveys and Heritage  
Management**

**PO Box 10153, Meerensee, 3901**

**Phone: 035-7531785      Cell: 0836585362**

**umlando@gmail.com**



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## Abbreviations

EIA	Early Iron Age
ESA	Early Stone Age
HIA	Heritage Impact Assessment
HP	Historical Period
IIA	Indeterminate Iron Age
ISA	Indeterminate Stone Age
KZNARI	KwaZulu-Natal Amafa & Research Institute
LIA	Late Iron Age
LSA	Late Stone Age
MSA	Middle Stone Age
PIA	Palaeontological Impact Assessment
SAHRA	South African Heritage Resources Agency

## INTRODUCTION

“Abaqulusi Local Municipality in conjunction with the Kwazulu-Natal Department of Human Settlements is considering the feasibility of undertaking residential developments of a numbers of areas with the Vryheid Area, one of which is Extension 16 Phase 2 housing development. About 2000 low-income residential units are being considered. As part of the packaging of the proposed development, environmental prefeasibility of the identified pieces of land is considered a necessary component to critically assess the potential impacts of the proposed development on the environment and vice versa.

The site is situated at the southern outskirts of the Vryheid Town, and just south of the Vryheid Airport and bordered by Bhekuzulu settlement on the southeast. The site is surrounded by formalised settlements and is to form part of the urban expansion of the Vryheid town. The site is bordered on the south by the road R34 and currently vacant. The site is about 138ha in extent.

The proposed development entails the township establishment for about 2000 low-income residential units and associated settlement infrastructure such as roads, electricity, water, and sanitation. It involves the subdivision of Portion 4 of the farm Uitvlucht No 1156

According to the layout, this will include:

- 92 Residential 1 erven with a minimum erf size of 900m<sup>2</sup>
- 112 Residential 2 erven with a minimum erf size of 500m<sup>2</sup>
- 1645 Residential 3 erven with a minimum erf size of 200m<sup>2</sup>
- 5 Business 2 erven
- 2 Community Facility erven (One Clinic and one Community Hall)
- 3 Creche erven

- 5 Education erven (Pre-Primary School, Primary School and Secondary School)
- 3 Worship erven
- 1 Municipal and Government erf (Wastewater Treatment Works, Package Plant site)
- 13 Public Open Space erven
- 1 Bus and Taxi Rank
- Roads” (Bizycon 2023:

Umlando was requested to undertake the KZNARI requested Phase 1 HIA of the proposed development. Figures 1 – 4 show the location of the development.

FIG. 1 GENERAL LOCATION OF THE PROPOSED DEVELOPMENT

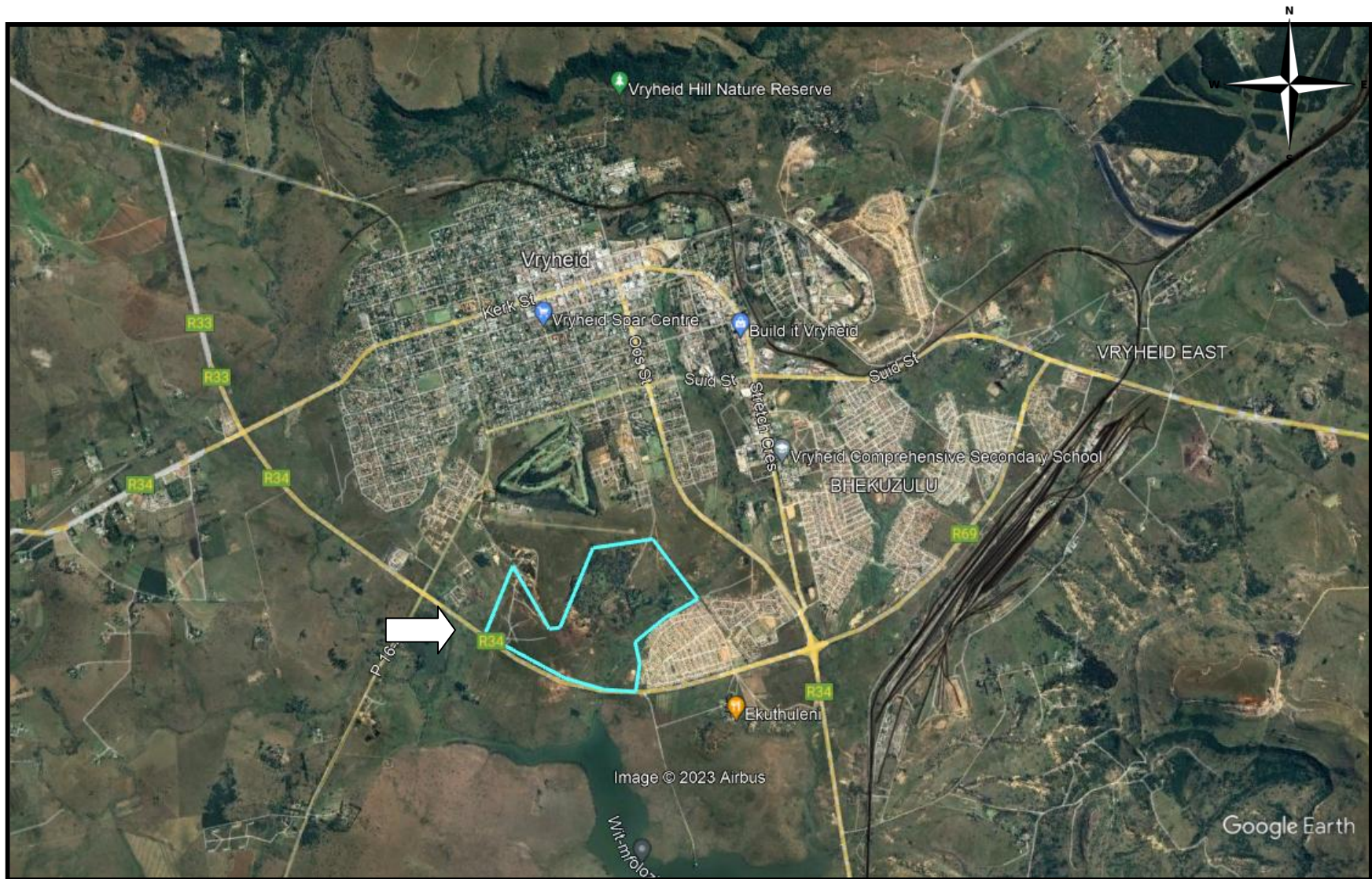
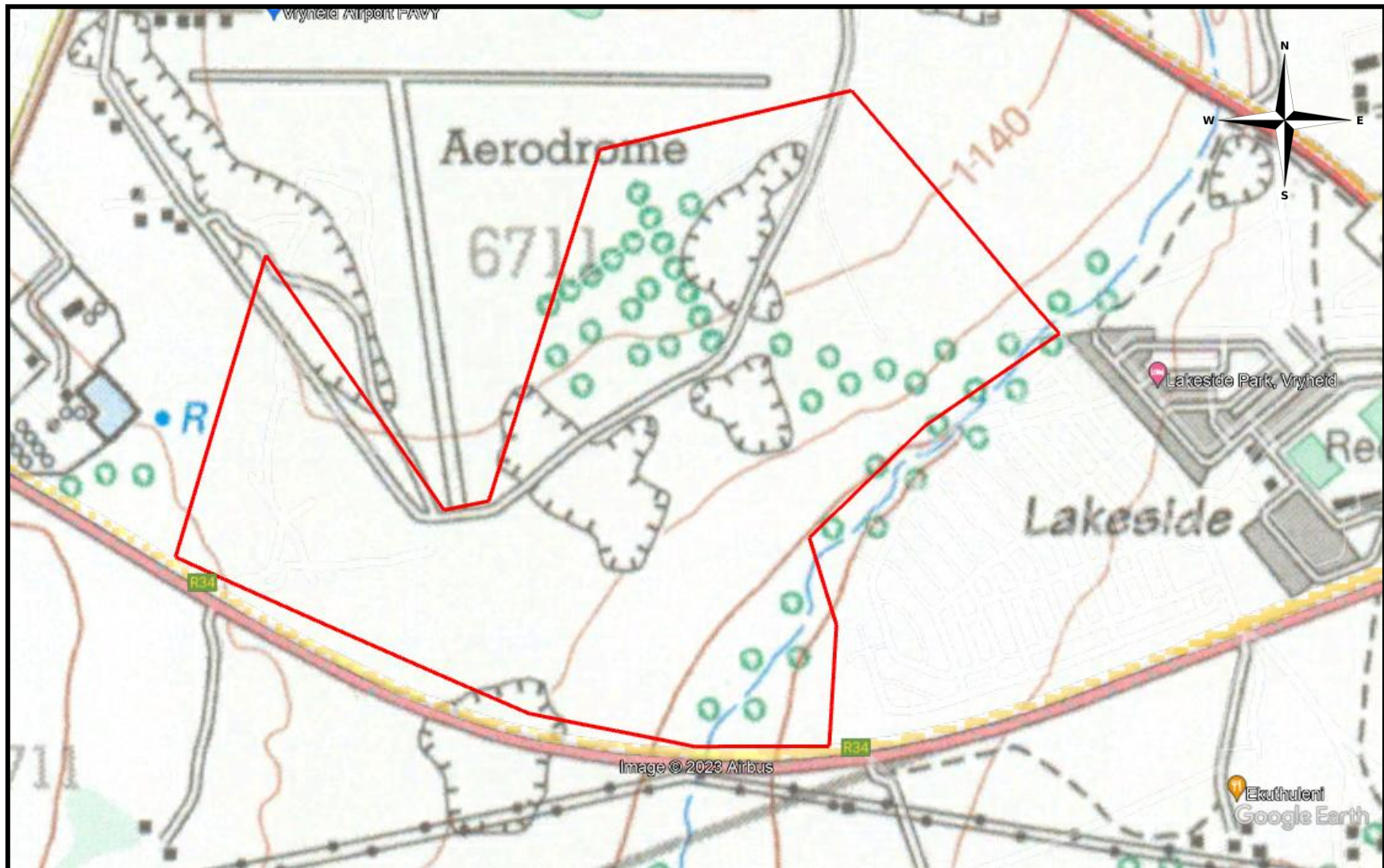


FIG. 2: AERIAL OVERVIEW OF THE PROPOSED DEVELOPMENT





FIG. 3: TOPOGRAPHICAL MAP OF THE PROPOSED DEVELOPMENT<sup>1</sup>



<sup>1</sup> 2730DD Vryheid 1996

FIG. 4: SCENIC VIEWS OF THE STUDY AREA



**KWAZULU NATAL AMAFA AND RESEARCH INSTITUTE, ACT 05, 2018,**

The KwaZulu Natal Amafa And Research Institute, Act 05, 2018, Chapter 8 (pp 29 – 32) defines heritage resources.

**“General protection: Structures.**

37.(1)(a) No structure which is, or which may reasonably be expected to be older than 60 years, may be demolished, altered or added to without the prior written approval of the Institute having been obtained on written application to the Council.

(b) Where the Institute does not grant approval, the Institute must consider special protection in terms of sections 38, 39, 40, 41 and 43 of Chapter 9.

The Institute may, by notice in the *Gazette*, exempt—

(a) A defined geographical area; or

(b) defined categories of sites within a defined geographical area, from the provisions of subsection where the Institute is satisfied that heritage resources falling in the defined geographical area or category have been identified and are adequately protected in terms of sections 38, 39, 40, 41 and 43 of Chapter 9.

(3) A notice referred to in subsection (2) may, by notice in the *Gazette*, be amended or withdrawn by the Council.

**General protection: Graves of victims of conflict.**

38. No person may damage, alter, exhume, or remove from its original position

(a) the grave of a victim of conflict;

(b) a cemetery made up of such graves; or

(c) any part of a cemetery containing such graves, without the prior written approval of the Institute having been obtained on written application to the Council.

**General protection: Informal and private burial grounds**

39. (1) or burial ground older than 60 years, or deemed to be of heritage significance by a heritage authority -

- (a) not otherwise protected by this Act; and
- (b) not located in a formal cemetery managed or administered by a local authority, may be damaged, altered, exhumed, removed from its original position, or otherwise disturbed without the prior written approval of the Institute having been obtained on written application to the Council.

The Institute may only issue written approval once the Institute is satisfied that—

- (a) the applicant has made a concerted effort to consult with communities and individuals who by tradition may have an interest in the grave; and
- (b) the applicant and the relevant communities or individuals have reached agreement regarding the grave.

**General protection: Battlefield sites, archaeological sites, rock art sites, palaeontological sites, historic fortifications, meteorite or meteorite impact sites.—**

40 (1) No person may destroy, damage, excavate, alter, write or draw upon, or otherwise disturb any battlefield site, archaeological site, rock art site, palaeontological site, historic fortification, meteorite or meteorite impact site without the prior written approval of the Institute having been obtained on written application to the Council.

(2) Upon discovery of archaeological or palaeontological material or a meteorite by any person, all activity or operations in the general vicinity of such material or meteorite must cease forthwith and a person who made the discovery must submit a written report to the Institute without delay.

(3) The Institute may, after consultation with an owner or controlling authority, by way of written notice served on the owner or controlling authority, prohibit any activity considered by the Institute to be inappropriate within 50 metres of a rock art site.

(4) No person may exhume, remove from its original position or otherwise disturb, damage, destroy, own or collect any object or material associated with any battlefield site, archaeological site, rock art site, palaeontological site,

historic fortification, meteorite or meteorite impact site without the prior written approval of the Institute having been obtained on written application to the Council.

(5) No person may bring any equipment which assists in the detection of metals and archaeological and palaeontological objects and material, or excavation equipment onto any battlefield site, archaeological site, rock art site, palaeontological site, historic fortification, or meteorite impact site, or use similar detection or excavation equipment for the recovery of meteorites, without the prior written approval of the Institute having been obtained on written application to the Council.

(6)(a) The ownership of any object or material associated with any battlefield site, archaeological site, rock art site, palaeontological site, historic fortification, meteorite or meteorite impact site, on discovery, vests in the Provincial Government and the Institute is regarded as the custodian on behalf of the Provincial Government.

(b) The Institute may establish and maintain a provincial repository or repositories for the safekeeping or display of —

- (i) archaeological objects;
- (ii) palaeontological material;
- (iii) ecofacts;
- (iv) objects related to battlefield sites;
- (v) material cultural artefacts; or
- (vi) meteorites,

(7) The Institute may, subject to such conditions as the Institute may determine, loan any object or material referred to in subsection (6) to a national or provincial museum or institution.

(8) No person may, without the prior written approval of the Institute having been obtained on written application to the Institute, trade in, export or attempt to export from the Province ~

- (a) any category of archaeological object;

- (b) any palaeontological material;
- (c) any ecofact;
- (d) any object, which may reasonably be regarded as having been recovered from a battlefield site;
- (e) any material cultural artefact; or
- (f) any meteorite.

(9)(a) A person or institution in possession of an object or material, referred to in paragraphs (a) ~ (f) of subsection (8), must submit full particulars of such object or material, including such information as may be prescribed, to the Institute.

(b) An object or material referred to in paragraph (a) must, subject to paragraph (c) and the directives of the Institute, remain under the control of the person or institution submitting the particulars thereof.

(c) The ownership of any object or material referred to in paragraph (a) vests in the Provincial Government and the Institute is regarded as the custodian on behalf of the Provincial Government.”

## METHOD

The method for Heritage assessment consists of several steps.

The first step forms part of the desktop assessment. Here we would consult the database that has been collated by Umlando. This databases contains archaeological site locations and basic information from several provinces (information from Umlando surveys and some colleagues), most of the national and provincial monuments and battlefields in Southern Africa (<http://www.vuvuzela.com/googleearth/monuments.html>) and cemeteries in southern Africa (information supplied by the Genealogical Society of Southern Africa). We use 1<sup>st</sup> and 2<sup>nd</sup> edition 1:50 000 topographical and 1937 aerial photographs where available, to assist in general location and dating of buildings and/or graves. The database is in Google Earth format and thus used as a quick reference when undertaking desktop studies. Where required we would consult

with a local data recording centre, however these tend to be fragmented between different institutions and areas and thus difficult to access at times. We also consult with an historical architect, palaeontologist, and an historian where necessary.

The survey results will define the significance of each recorded site, as well as a management plan.

All sites are grouped according to low, medium, and high significance for the purpose of this report. Sites of low significance have no diagnostic artefacts or features. Sites of medium significance have diagnostic artefacts or features and these sites tend to be sampled. Sampling includes the collection of artefacts for future analysis. All diagnostic pottery, such as rims, lips, and decorated sherds are sampled, while bone, stone, and shell are mostly noted. Sampling usually occurs on most sites. Sites of high significance are excavated and/or extensively sampled. Those sites that are extensively sampled have high research potential, yet poor preservation of features.

### **Defining significance**

Heritage sites vary according to significance and several different criteria relate to each type of site. However, there are several criteria that allow for a general significance rating of archaeological sites.

These criteria are:

#### **1. State of preservation of:**

- 1.1. Organic remains:
  - 1.1.1. Faunal
  - 1.1.2. Botanical
- 1.2. Rock art
- 1.3. Walling
- 1.4. Presence of a cultural deposit

1.5. Features:

1.5.1. Ash Features

1.5.2. Graves

1.5.3. Middens

1.5.4. Cattle byres

1.5.5. Bedding and ash complexes

**2. Spatial arrangements:**

2.1. Internal housing arrangements

2.2. Intra-site settlement patterns

2.3. Inter-site settlement patterns

**3. Features of the site:**

3.1. Are there any unusual, unique or rare artefacts or images at the site?

3.2. Is it a type site?

3.3. Does the site have a very good example of a specific time period, feature, or artefact?

**4. Research:**

4.1. Providing information on current research projects

4.2. Salvaging information for potential future research projects

**5. Inter- and intra-site variability**

5.1. Can this particular site yield information regarding intra-site variability, i.e. spatial relationships between various features and artefacts?

5.2. Can this particular site yield information about a community's social relationships within itself, or between other communities?

**6. Archaeological Experience:**

6.1. The personal experience and expertise of the CRM practitioner should not be ignored. Experience can indicate sites that have potentially significant aspects, but need to be tested prior to any conclusions.

**7. Educational:**

7.1. Does the site have the potential to be used as an educational instrument?

7.2. Does the site have the potential to become a tourist attraction?



7.3. The educational value of a site can only be fully determined after initial test-pit excavations and/or full excavations.

#### **8. Other Heritage Significance:**

- 8.1. Palaeontological sites
- 8.2. Historical buildings
- 8.3. Battlefields and general Anglo-Zulu and Anglo-Boer sites
- 8.4. Graves and/or community cemeteries
- 8.5. Living Heritage Sites
- 8.6. Cultural Landscapes, that includes old trees, hills, mountains, rivers, etc related to cultural or historical experiences.

The more a site can fulfill the above criteria, the more significant it becomes. Test-pit excavations are used to test the full potential of an archaeological deposit. This occurs in Phase 2. These test-pit excavations may require further excavations if the site is of significance (Phase 3). Sites may also be mapped and/or have artefacts sampled as a form of mitigation. Sampling normally occurs when the artefacts may be good examples of their type, but are not in a primary archaeological context. Mapping records the spatial relationship between features and artefacts. Table 1 lists the grading system.

**TABLE 1: SAHRA GRADINGS FOR HERITAGE SITES**

<b>SITE SIGNIFICANCE</b>	<b>FIELD RATING</b>	<b>GRADE</b>	<b>RECOMMENDED MITIGATION</b>
<b>High Significance</b>	National Significance	Grade 1	Site conservation / Site development
<b>High Significance</b>	Provincial Significance	Grade 2	Site conservation / Site development
<b>High Significance</b>	Local Significance	Grade 3A / 3B	
<b>High / Medium Significance</b>	Generally Protected A		Site conservation or mitigation prior to development / destruction
<b>Medium Significance</b>	Generally Protected B		Site conservation or mitigation / test excavation / systematic sampling / monitoring prior to or during development / destruction
<b>Low Significance</b>	Generally Protected C		On-site sampling monitoring or no archaeological mitigation required prior to or during development / destruction

## RESULTS

### DESKTOP STUDY

The desktop study consisted of analysing various maps for evidence of prior habitation in the study area, as well as for previous archaeological surveys. There are no known heritage surveys near the study area.

The general area is known for its low number of archaeological sites (fig. 5). Anderson (2023) surveyed the adjacent property and noted a few isolated stone tools. That survey also noted that the area was heavily disturbed by sand borrow pits for the old brickwork factory.

The 1935 and 1944 aerial photographs indicate that there are buildings and a homestead within the study area (fig.'s 6 - 7). The 1948 topographical map indicates that these buildings are the original sewerage farm, brickworks, a few buildings and two homesteads (fig. 8).

The 1961 1:50 000 topographical map indicates that these buildings no longer exist and have been demolished (fig. 9).

In summary, the study area had buildings and homesteads predating 1935, but these were subsequently demolished. There could be isolated artefacts related to these buildings but they will be out of context. Any middens would also have been cleared. While homesteads tend to have graves, the two noted in the desktop are unlikely to have graves as they are close to the city and may have required burials that are more formal.

FIG. 5: LOCATION OF KNOWN HERITAGE SITES IN THE GENERAL AREA

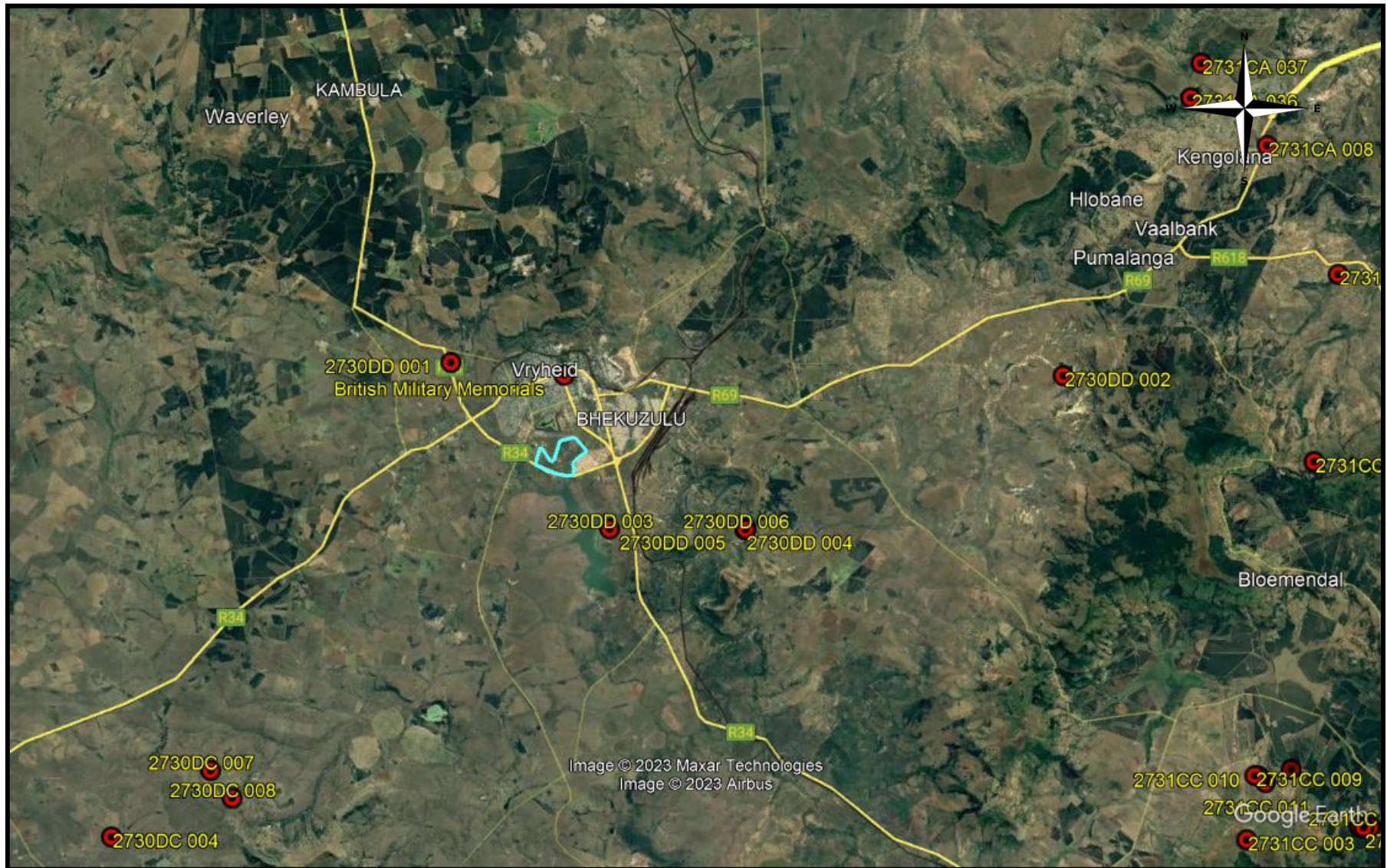
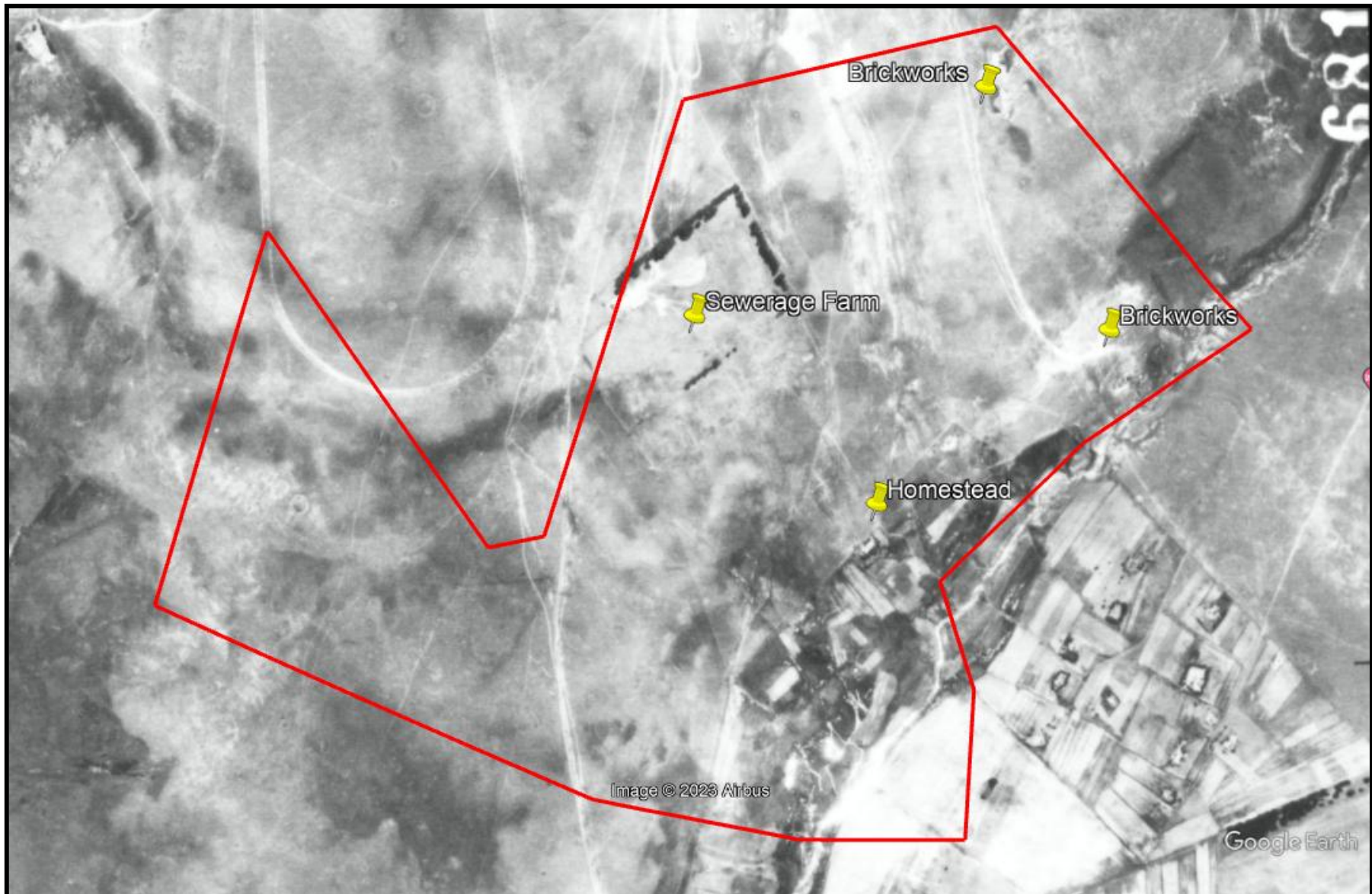


FIG. 6: LOCATION OF THE STUDY AREA IN 1935<sup>2</sup>



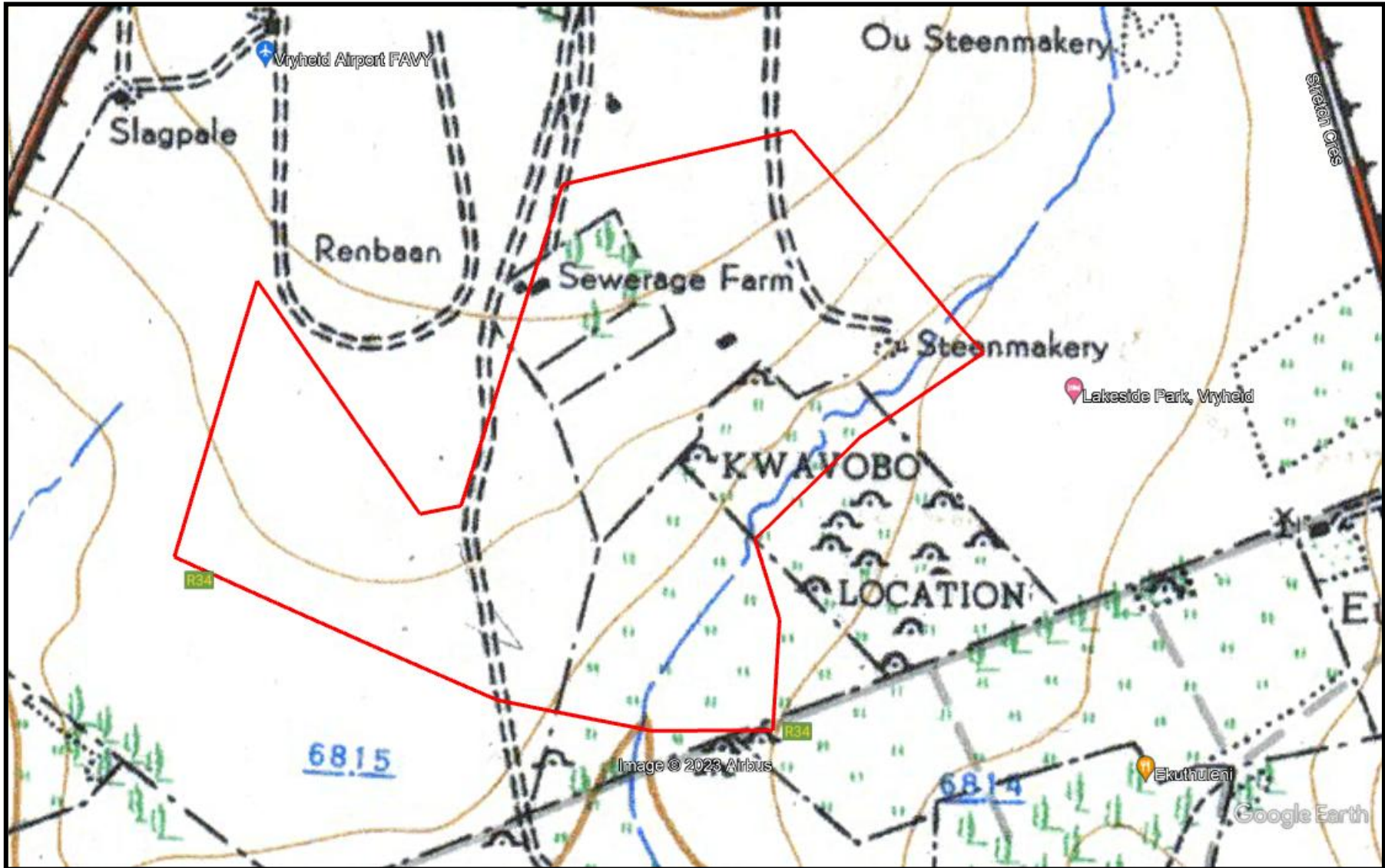
<sup>2</sup> 107\_076\_36366, 107\_077\_36359

FIG. 7: LOCATION OF THE STUDY AREA IN 1944<sup>3</sup>



<sup>3</sup> 73\_039\_06815

FIG. 8: LOCATION OF THE STUDY AREA IN 1948<sup>4</sup>



<sup>4</sup> 2730DD Vryheid 1948

FIG. 9: LOCATION OF THE STUDY AREA IN 1961<sup>5</sup>

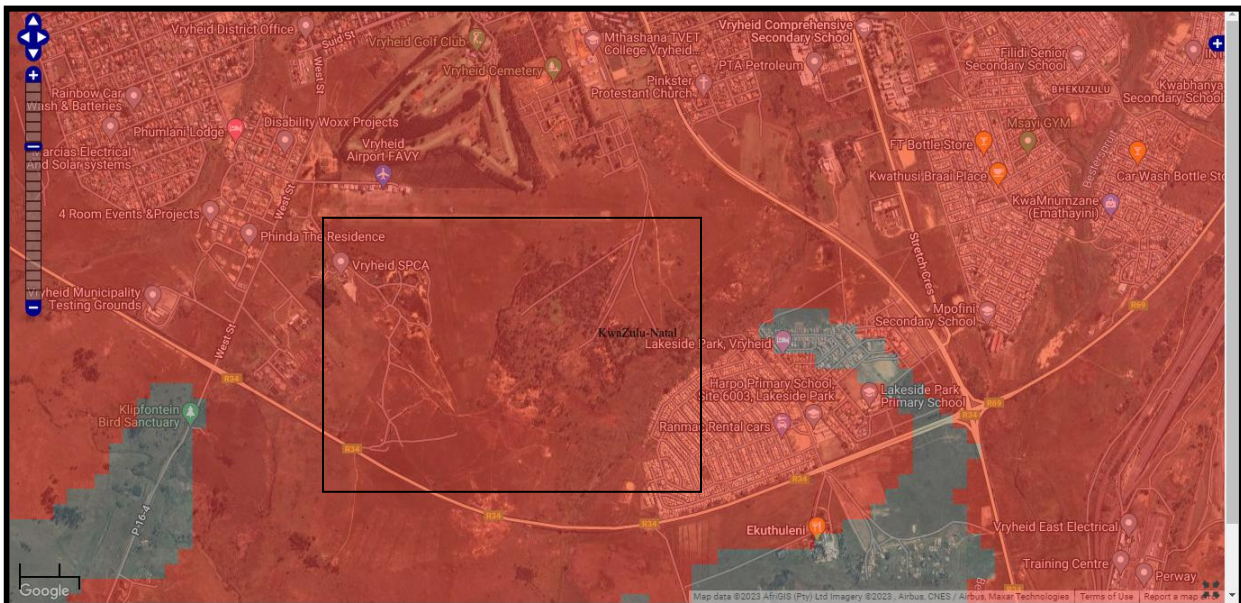


<sup>5</sup> 455\_016\_06736

## PALAEONTOLOGICAL SENSITIVITY

The area is in an area of high palaeontological sensitivity (fig. 10). The desktop PIA was undertaken by Dr A. Smith for the adjacent property (Appendix A). Since it is still the same geological formations, the results of that report can be assumed for this study area. The proposed development is underlain by Vryheid Formation rocks. Although the Vryheid Formation is flagged red by the SAHRIS Map, no significant fossils have been in found in this area. The chances of encountering significant fossils are **Low**, but **Not Zero**; consequently a **“Chance Find Protocol”** has been included.

**FIG. 10: PALAEONTOLOGICAL SENSITIVITY MAP**



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



## FIELD SURVEY

A field survey was undertaken on the 6 July 2023. Ground visibility was very good due to a recent grass burn. Much of the area has been heavily disturbed by sand borrow pits, agricultural fields, previous buildings that have been bulldozed in the 1960s, and subsurface servitudes. Fig. 11 shows the location of recorded sites, while Table 2 lists their location.

**TABLE 2: LOCATION OF SITES**

<b>Name</b>	<b>Latitude</b>	<b>Longitude</b>	<b>Comment</b>
<b>b1</b>	-27.791708817	30.805658914	Building 1935, 1944, 1948 maps
<b>b2</b>	-27.791615139	30.801813761	Building 1935, 1944, 1948 maps
<b>b3</b>	-27.790857611	30.797210948	1935, 1944, 1948 maps
<b>Brickworks</b>	-27.788378580	30.803083824	1935, 1944, 1948 maps
<b>Brickworks</b>	-27.792056443	30.805308898	1935, 1944, 1948 maps
<b>h1</b>	-27.792409854	30.802501437	Household 1935, 1944, 1948 maps
<b>h2</b>	-27.794016902	30.801181637	Household 1935, 1944, 1948 maps
<b>Sewerage farm</b>	-27.790590417	30.797673234	1935, 1944, 1948 maps
<b>VRY01</b>	-27.791180573	30.796532098	Ruins
<b>VRY02</b>	-27.789593300	30.802072200	Cairn
<b>VRY03</b>	-27.791432213	30.804799542	Brickworks
<b>VRY04a</b>	-27.795512631	30.800761653	Modern feature
<b>VRY04b</b>	-27.795903790	30.799525150	Modern feature
<b>VRY05</b>	-27.795648114	30.799868394	Foundations and built structure
<b>VRY06</b>	-27.791859778	30.798070202	Sewerage farm

FIG. 11: LOCATION OF RECORDED SITES



## VRV01

The site is located on the western border of the study area. The site consists of two-walled brick structure ~3m x 3m in size (fig. 12). The building is probably related to the sewerage works, but was recorded as its own site since it is the last remaining structure. The bricks do not have stamp markings. Some of the building remains still occur on the ground.

**Significance:** The site is of low significance.

**Mitigation:** No further mitigation is required. A permit to demolish the walling may be required.

**SAHRA Rating:** 3C

**FIG.12: WALLING AT VRV01**



**VRY02**

The site is located in the northern part of the study area. The site consists of a single filled circle of stones (fig. 13). The feature appears to be a foundation base for something like a water tank. Given the location of the feature, it is probably related to the brickwork factory.

**Significance:** The site is of low significance.

**Mitigation:** No further mitigation is required.

**SAHRA Rating:** 3C

**FIG. 13: STONE FEATURE AT VRY02**



### **VRV03**

The site is located in the northeastern area of the study area. The site is the remains of the old brickworks factory (fig. 14). All of the buildings have been demolished and made into several piles of rubble. A few foundations of smaller buildings still occur amongst the rubble. No intact features or middens were noted. Isolated artefacts dating to the 1950s and 1960s were observed.

**Significance:** The site is of low significance

**Mitigation:** No further mitigation is required.

**SAHRA Rating:** 3C

### **VRV04a - b**

The site is located in the centre of the study area. The site consists of consists of water channelling features that appear to be related to the underground pipeline (fig. 15). Three of these features occur.

**Significance:** The site is of no significance

**Mitigation:** No further mitigation is required.

**SAHRA Rating:** N/A

FIG.14: BUILDING RBBLE AT VRY03



**FIG.15: WATER DRAINAGE FEATURE**



## **VR Y05**

The site is located just above the Transnet servitude and slightly southwest of 'h1' from the desktop study. The site consists of two features: an open 'oven' and floor foundations (fig. 16). The floor foundations are relatively intact and ~3m x 5m in size. The 'oven' is a bricked structure of two front walls attached to a chimney-like feature. The back of the chimney is closed.

Several artefacts occur around the feature and appear to be associated with it. The most notable is that of 'Epic Oil Mills Pty Ltd (Pretoria). The bottle is probably associated with the late 1940s advert for Epic Oil Mills salad oil (Mr G. De Kamper pers. Comm.) as seen in fig. 17. This would then date the features to the 1940s as well. The features are too small to be related to the brickworks or sewerage farm.

If the site dates to the late 1940s then it might be a domestic site as there are possible houses in fig. 7 - 8. This is the correct area for the 'KwaVobo Location' (fig. 8). If this is the case then the site is a rare example of peri-urban residential accommodation in Vryheid. No other sites of this kind have been recorded in the area.

**Significance:** The site is of medium significance.

**Mitigation:** Test-pit excavations should be undertaken around the features to assess the site's significance. The features need to be mapped and photographed. A permit will be required to damage/destroy the site.

**SAHRA Rating:** 3B



FIG.: 16: BOTTLES FROM VRY05



FIG 17: NEWSPAPER ADVERT RAND DAILY MAIL 1938<sup>6</sup>

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<sup>6</sup> G. De Kamper pers com

**VR Y06**

The site is located in the middle and northern part of the study area. The site consists of the original sewerage farm as it was referred to in the 1940s (fig. 18). All of the structures have been demolished with the exception of VR Y01. No intact middens and features were noted.

The development must note that this area is an old sewerage farm/works and it should be checked for potential health hazards.

**Significance:** The site is of low significance

**Mitigation:** No further mitigation is required.

**SAHRA Rating:** 3C

**FIG.:**



## MANAGEMENT PLAN

Most of the buildings that occurred within the study area have been demolished. Only remnants of foundations and two walls remain. While artefacts are scattered with the rubble, no formal middens were noted.

One site, VRY05, requires test-pit excavations, mapping and photographed. This needs to be undertaken in a phased approach and well ahead of any construction activity. The site is significant in that it is the only remaining house from the original 'KwaVobo Location'. This can provide insights into the people's lives and their interaction with the Vryheid community in the 1940s. A permit for the destruction of VRY05 will be required from KZNARI.

A Chance Find Protocol needs to be initiated for the palaeontology and form part of the EMPr.

## CONCLUSION

A heritage survey was undertaken for the proposed low cost housing project on Rem of Erf 10 000, Vryheid.

The desktop study noted that were two human settlements and several buildings within the study area from at least 1935 to early 1960s. By 1961 these these features had been demolished with only remnants remaining. Only one site has features that require further mitigation. This is a possible domestic house dating to the 1940s. It is a unique find in that it can provide insight into the 'KwaVobo' location' that was adjacent to Vryheid. This site will require excavations, mapping and photographs.

A Chance Find Protocol is required for the palaeontology.

A permit is required for VRY05 to be demolished. KZNARI must decide if the broken foundations and walling from the sewerage farm and brickworks require a permit.

## REFERENCES

Anderson G. 2023. Phase 1 HIA for the proposed Vryheid Mall, KZN. For LEAP

### Maps:

2730DD Vryheid 1944, 1996

73\_039\_06815

107\_076\_36366

107\_077\_36359

455\_016\_06736

### Database

KZN Museum

SAHRA

Umlando

### **EXPERIENCE OF THE HERITAGE CONSULTANT**

Gavin Anderson has a M. Phil (in archaeology and social psychology) degree from the University of Cape Town. Gavin has been working as a professional archaeologist and heritage impact assessor since 1995. He joined the Association of Professional Archaeologists of Southern Africa in 1998 when it was formed. Gavin is rated as a Principle Investigator with expertise status in Rock Art, Stone Age and Iron Age studies. In addition to this, he was worked on both West and East Coast shell middens, Anglo-Boer War sites, and Historical Period sites.

### **DECLARATION OF INDEPENDENCE**

I, Gavin Anderson, declare that I am an independent specialist consultant and have no financial, personal or other interest in the proposed development, nor the developers or any of their subsidiaries, apart from fair remuneration for work performed in the delivery of heritage assessment services. There are no circumstances that compromise the objectivity of my performing such work.

A handwritten signature in black ink, appearing to read 'Anderson', with a large, stylized initial 'A' that loops around the rest of the name. The signature is written over a faint horizontal line.

Gavin Anderson  
Archaeologist/Heritage Impact Assessor

**APPENDIX A**  
**PIA DESKTOP REPORT**

**DESKTOP PALEONTOLOGICAL  
ASSESSMENT FOR THE PROPOSED  
VRYHEID REGIONAL MALL, VRYHEID,  
ABAQULUSI MUNICIPALITY, KWAZULU  
-NATAL**

**FOR**

**UMLANDO: Archaeological Surveys & Heritage Management  
PO Box 102532, Meerensee, KwaZulu-Natal 3901  
phone (035)7531785 fax: 0865445631  
cell: 0836585362 / 0723481327  
Email:umlando@gmail.com**

**by**

**Dr Alan Smith**

**Alan Smith Consulting**

29 Browns Grove, Sherwood, Durban, 4091, South Africa

Telephone: 031 208 6896

**mailto:asconsulting@telkomsa.net**

**24 February 2023**



## Declaration of Independence

This report has been compiled by Dr Alan Smith (Pr. Sc. Nat.) of Alan Smith Consulting, Durban. The views expressed in this report are entirely those of the author, if not then the source has been duly acknowledged. No other interest was displayed during the decision making process for the Project.

Specialist: Dr Alan Smith

Signature:



## EXECUTIVE SUMMARY

Alan Smith Consulting was appointed by **UMLANDO: Archaeological Surveys & Heritage Management** to conduct a Desktop field assessment of the potential impacts to **Palaeontology Resources** that might occur through the activities of constructing the proposed Vryheid Regional Mall, Vryheid Abaqulusi Municipality, KwaZulu-Natal.

Section 38 of the National Resources Act No 25 of 1999 (Heritage Resources Management), requires a Palaeontological Impact Assessment (PIA) to assess any potential impacts to palaeontological heritage.

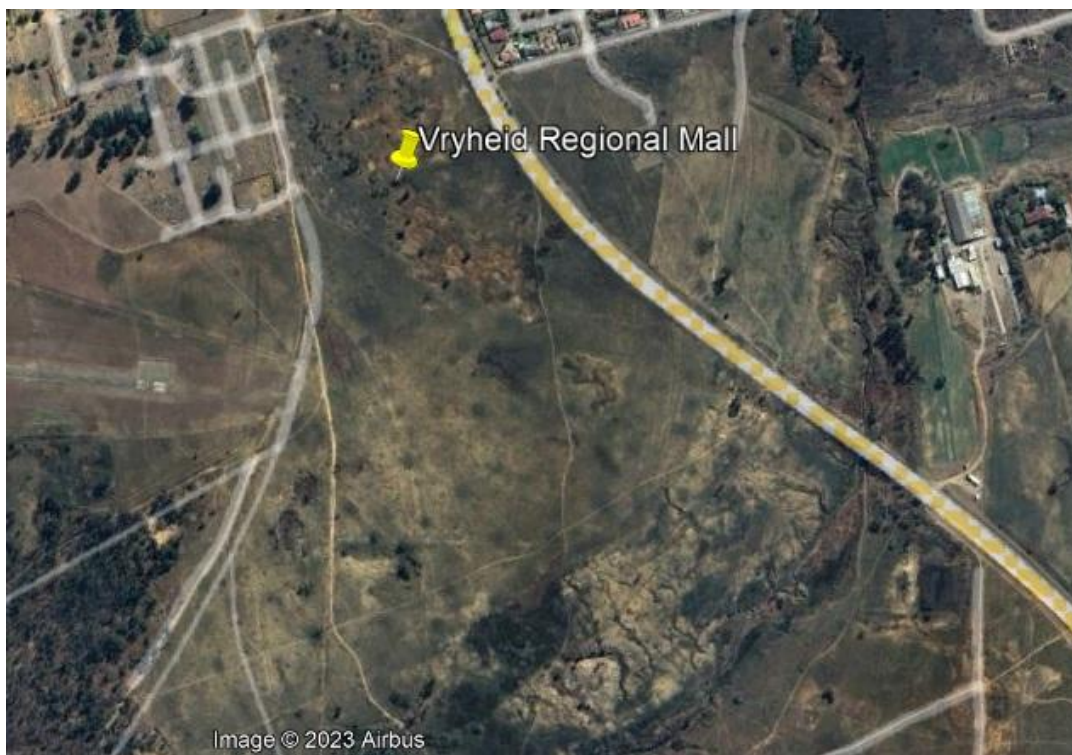
The proposed development is underlain by Vryheid Formation rocks. Although the Vryheid Formation is flagged red by the Sahrís Map, no significant fossils have been found in this area. The chances of encountering significant fossils are **Low**, but **Not Zero**; consequently, a **“Chance Find Protocol”** has been included.

## ACRONYMS

BA:	Basic Assessment
EDTEA:	(Department of) Economic Development, Tourism and Environmental Affairs
HIA:	Heritage Impact Assessment
PIA:	Palaeontological Impact Assessment
SAHRA:	South African Heritage Resource Agency
SAHRIS:	South African Heritage Resources Information System
WWTW:	Waste Water Treatment Works

## ***1. TERMS OF REFERENCE***

Alan Smith Consulting was requested by **UMLANDO: Archaeological Surveys & Heritage Management** to provide a Desk-Top Palaeo Impact Assessment for the proposed Vryheid Regional Mall, Vryheid, Abaqulusi Municipality, KwaZulu-Natal (Figure 1). This report is to meet the requirements of the National Environmental Management Act (Act 107 of 1998) [as amended] Environmental Impact Assessment (EIA) regulations, Appendix 6.



*Figure 1: Location of the proposed Vryheid Regional Mall.*

## ***2. SCOPE AND PURPOSE OF REPORT***

A Palaeontological Impact Assessment (PIA) is a means of identifying any significant palaeontological material before development begins, so that these can be managed in such a way as to allow the development to proceed (if appropriate) without undue impacts to the fragile heritage of South Africa. This

Desktop investigation fulfills the requirements of the heritage authorities (SAHRA), such that a comment can be issued by them for consideration by the competent authority (EDTEA), who will review the Basic Assessment (BA) and grant or refuse authorisation. The PIA report will outline any management and/or mitigation requirements that will need to be complied with from a heritage point of view and that should be included in the conditions of authorisation, should this be granted.

### 3. METHODOLOGY

Geological maps, a literature review and personal experience (see Section 9) were used in this research.

### 4. GEOLOGY

The entire site is underlain by the Vryheid Formation lithology (Figure 2).

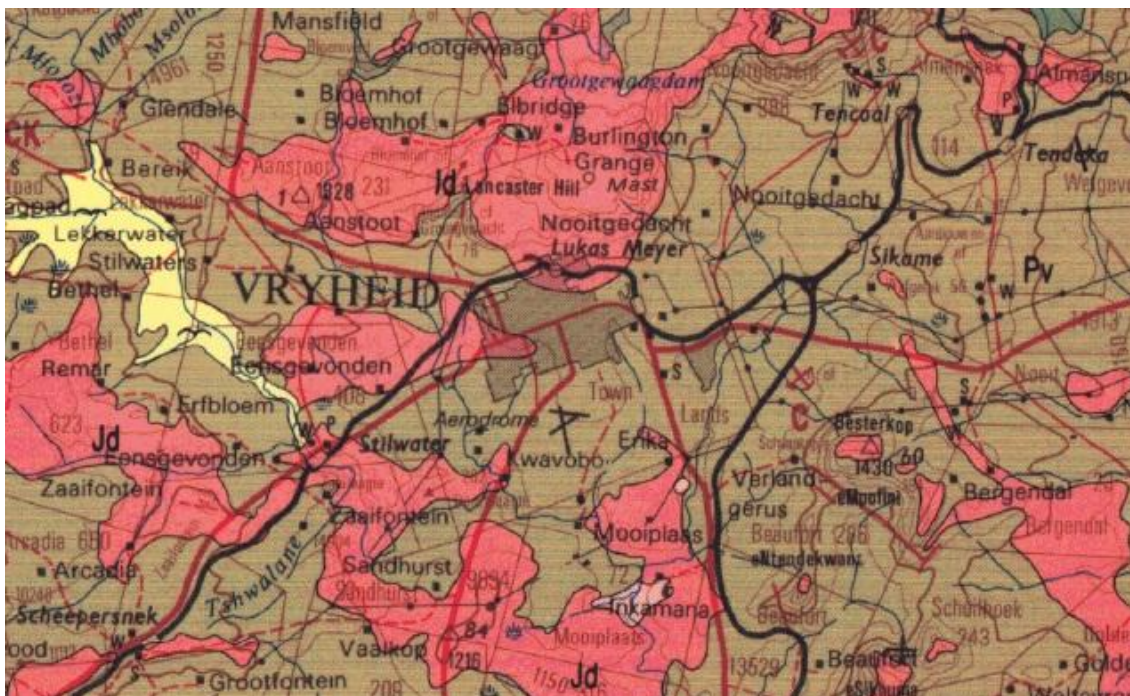


Figure 2: Approximate area of the proposed Vryheid Regional Mall. Extract from the 125 000 scale Geological Map: Vryheid2730. PV (light brown) designates the Vryheid Formation.

### ***Vryheid Formation***

The Vryheid Formation is part of the Karoo Supergroup. The Vryheid Formation forms the central part of the Ecca Group (old Middle Ecca) which immediately follows the Permo-Carboniferous Dwyka Group, which is the base of the Karoo Supergroup. The Dwyka Group represents the Late Palaeozoic Glaciation. This is succeeded by the Permian aged Vryheid Formation which is Kungurian Stage in age, ie 260Ma (Green and Smith, 2012). It comprises predominantly coarse-grained sandstone and siltstones, interbedded with dark shales and economic coal beds. In this region, the Vryheid Formation is interpreted as shallow marine, deltaic, fluvial and floodplain deposits. These deltas (now deltaic deposits) built out into the ancient Karoo Sea, a massive inland sea which was located within the central part of the ancient Gondwana Supercontinent (Johnson et al, 2009). Coal seams developed within swamp deposits which developed on this deltaic and fluvial architecture.

## **5. PALAEOLOGY**

The colour coding used in the Sahrís Palaeosensitivity Map is shown in Table 1. The Vryheid Formation is flagged red.

**Table 1: Summary of SAHRIS categories**

<b>Colour</b>	<b>Sensitivity</b>	<b>Required Action</b>
<b>RED</b>	VERY HIGH	field assessment and protocol for finds is required
<b>ORANGE/YELLOW</b>	HIGH	desktop study is required and based on the outcome of the desktop study, a field assessment is likely
<b>GREEN</b>	MODERATE	desktop study is required
<b>BLUE</b>	LOW	no palaeontological studies are required however a protocol for finds is required

## Vryheid Formation Palaeontology

The SAHRIS Palaeosensitivity Map considers the Vryheid Formation as a **Very High Palaeosensitivity Zone** (Table 1). In practise, no significant fossils have been reported from the Vryheid Formation in this area, however invertebrate trace fossils are common (Tavener Smith, 1983; Mason and Christie, 1985; Hastie et al., 2019).

Groenewald (2018) pointed out that the aquatic reptile, *Mesosaurus* (earliest known reptile fossil from the Karoo Basin), as well as the fish, *Palaeoniscus capensis*, have been recorded in the Whitehill Formation in the southern part of the Main Karoo Basin (MacRae, 1999) which is correlated with the Vryheid Formation (Johnson et al., 2009). The Whitehill Formation is not connected to the Vryheid Formation and is more than 500 km to the southwest within the Main Karoo Basin. The Vryheid Formation *may* be a temporal correlative of the Whitehill Formation, however as they are not physically connected they probably represent different depositional environments, even if they are correlatives. What is known is that the Vryheid Formation in this area had a completely different source region to the Whitehill Formation of the Cape (Hastie et al., 2019).

Economic coal seams are known from the Vryheid Formation in this region (Tavener Smith, 1982; Hastie et al., 2019). This part of the stratigraphy is known as the “Natal Coal Measures” and hosts many large coal mines. Coal has been mined for more than 100 years. Coal comprises compressed plant remains and thus constitutes a fossil bed. Plants such as *glossopteris*, *gangamopteris* and *sigillaria* can be recognized, but these are common.

## 6. SUMMARY

The chance of significant fossils being found on this site is **Low**, but not **Zero**. A “**Chance Find Protocol**” has therefore been included to cover this eventuality. No further palaeontological work is required, unless triggered by the “**Chance Find Protocol**” in which a suitably qualified palaeontologist must be consulted. The “Chance Find Protocol” must form part of the Environmental Management Programme (EMPr) for the site,

## 7. CHANCE FIND PROTOCOL

This Chance Find Protocol must be included in the site EMPr.

If any fossils are found, a Palaeontologist must be notified immediately by the ECO and/or EAP and a site visit must be arranged at the earliest possible time with the Palaeontologist.

In the case of the ECO or the Site Manager becoming aware of suspicious looking palaeo-material:

- The construction must be halted in that specific area and the Palaeontologist must be given enough time to reach the site and remove the material before excavation continues.
- Mitigation will involve the attempt to capture all rare fossils and systematic collection of all fossils discovered. This will take place in conjunction with descriptive, diagrammatic and photographic recording of exposures, also involving sediment samples and samples of both representative and unusual sedimentary or biogenic features. The fossils and contextual samples will be processed (sorted, sub-sampled, labeled, and boxed) and documentation consolidated, to create an archive collection from the excavated sites for future researchers.

### **Functional responsibilities of the Developer**

1. At full cost to the project, and guided by the appointed Palaeontological Specialist, ensure that a representative archive of palaeontological samples and other records is assembled to characterize the palaeontological occurrences affected by the excavation operation.

2. Provide field aid, if necessary, in the supply of materials, labour and machinery to excavate, load and transport sampled material from the excavation areas to the sorting areas, removal of overburden if necessary, and the return of discarded material to the disposal areas.

3. Facilitate systematic recording of the stratigraphic and palaeo-environmental features in exposures in the fossil-bearing excavations, by

described and measured geological sections, and by providing aid in the surveying of positions where significant fossils are found.

4. Provide safe storage for fossil material found routinely during excavation operations by construction personnel. In this context, isolated fossil finds in disturbed material qualify as “normal” fossil finds.

5. Provide covered, dry storage for samples and facilities for a work area for sorting, labeling and boxing/bagging samples.

6. Costs of basic curation and storage until collected. Documentary record of palaeontological occurrences must be done.

7. The contractor will, in collaboration with the Palaeontologist, make the excavation plan available to the appointed specialist, in which appropriate information regarding plans for excavations and work schedules must be indicated on the plan of the excavation sites. This must be done in conjunction with the appointed specialist.

8. Initially, all known specific palaeontological information will be indicated on the plan. This will be updated throughout the excavation period.

9. Locations of samples and measured sections are to be pegged, and routinely and accurately surveyed. Sample locations, measured sections, etc., must be recorded three-dimensionally if any “significant fossils” are recorded during the time of excavation.



## 8. REFERENCES

Green, A.N., Smith, A.M. (2012). Can ancient shelf sand ridges be mistaken for Gilbert-type deltas? Examples from the Vryheid Formation, Ecca group, KwaZulu-Natal, South

Africa. *J. Afr. Earth Sci.* 76, 27–33.

Hastie, W; Watkeys, MK; Smith, AM, (2019). Tectonic significance of the sedimentary and palaeocurrent record at the eastern edge of the Karoo Basin. *Journal of African Earth Sciences* 158 (2019) 103543.

Johnson MR, Anhaeusser CR and Thomas RJ (Eds). (2009). *The Geology of South Africa*. GSSA, Council for Geoscience, Pretoria.

MacRae C. (1999). *Life Etched in Stone*. Geological Society of South Africa, Linden, South Africa.

*Mason, TR and Christie AC, (1986). Palaeoenvironmental significance of Ichnogenus Diplocraterion torell from the Permian Vryheid Formation of the Karoo Supergroup, South Africa. <https://www.sciencedirect.com/science/journal/00310182> to Palaeogeography, Palaeoclimatology, Palaeoecology on ScienceDirect, 52.*

Sahris Palaeosensitivity Map: <https://sahris.sahra.org.za/map/palaeo>

*Tavener Smith, (1982). Prograding coastal facies associations in the Vryheid formation (Permian) at Effingham quarries near Durban, South Africa. <https://www.sciencedirect.com/science/journal/00370738> to Sedimentary Geology on ScienceDirect*

<https://www.sciencedirect.com/science/journal/00370738/32/1> to table of contents for this volume/issue, May 1982, Pages 111-14



## 9. DETAILS OF SPECIALIST

### Dr Alan Smith

Private Consultant: Alan Smith Consulting, 29 Brown's Grove,  
Sherwood, Durban, 4091

&

Honorary Research Fellow: Discipline of Geology, School of  
Agriculture, Earth and Environmental Sciences, University of KwaZulu-  
Natal, Durban.

**Role:** Specialist Palaeontological Report production

### **Expertise of the specialist:**

- PhD in Geology (University of KwaZulu-Natal), Pr. Sc. Nat., I.A.H.S.
- Expert in Vryheid Formation (Ecca Group) in northern KZN, this having been the subject of PhD.
- Scientific Research experience includes: Fluvial geomorphology, palaeoflood hydrology, Cretaceous deposits.
- Experience includes understanding Earth Surface Processes in both fluvial and coastal environments (modern & ancient).
- Alan has published in both national and international, peer-reviewed journals. He has published + 50 journal articles with +600 citations (detailed CV available on request).
- Attended and presented scientific papers and posters at numerous international and local conferences (UK, Canada, South Africa) and is actively involved in research.

Selected recent palaeo-related work includes:

- Desktop PIA: Proposed middle income housing units on Portion 23 of Farm Lot H Weston 13026, Bruntville, Mpofana Local Municipality. Client: UMLANDO.
- Desktop PIA: Proposed ByPass Pipeline for Ulundi bulk water pipeline upgrade. Client: UMLANDO.
- Fieldwork PIA: Bhokuzulu Epangweni KZN water reticulation project, Cathkin Park. Client: Mike Webster, HSG Attorneys.
- Fieldwork PIA: Mpungoze water supply scheme, Empangeni. Client: Enviropro.
- Fieldwork PIA: Helpmekaar Dam. Client: Afzelia environmental consultants.

- Desktop PIA: Zuka valley, Ballito. Client: Mike Webster, HSG Attorneys.
- Mevamhlope proposed quarry palaeontology report. Client: Enviropro.
- Desktop PIA: Proposed Lovu Desalination site. Client: eThembeni Cultural Heritage.
- Desktop PIA: Tinley Manor phase 2 North & South banks: eThembeni Cultural Heritage
- Desktop PIA: Tongaat. Client: eThembeni Cultural Heritage.
- Palaeontological Assessment Reports (3) to Scatec Solar SA (Pty) Ltd on an Appraisal of Inferred Palaeontological Sensitivity for a Potential Photo Voltaic Park at (1) Farm Roilyf near Groblershoop, N Cape; (2) Farm Riet Fountain No. Portions 1 and 6, 18km SE of De Aar, N Cape; and (3) Dreunberg, near Burgersdorp, Eastern Cape. Client: Sustainable Development Projects.