

**PHASE 1 HIA FOR THE PROPOSED VRYHEID
MALL, KZN**

FOR LEAP

DATE: 27 FEBRUARY 2023

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Management**

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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

The developer (Princess Mkabayi (Pty) Ltd. Proposes to develop PRINCESS MKABAYI MIXED USE DEVELOPMENT, on Erf 6018, Vryheid, as an integrated development. The retail development will be divided into four distinct parts. Part 1 will comprise 141 730, 39 square metres (14, 173 hectares); Part 2 will comprise 40 649, 63 square metres (4, 065 hectares); Part 3 will comprise 16 389, 52 square metres (1, 639 hectares); Part 4 will comprise 31 492, 95 square metres (3, 149 hectares). The whole development footprint will be approximately 230 262, 49 square metres (23, 026 hectares).

This development will comprise of:

- A regional mall of 79, 200 square metres
- Free-standing and high-density apartments of 52, 000 square metres
- Motor show rooms of 6, 35r0 square metres
- A logistics park of 12, 750 square metres
- A hotel and casino of 14, 600 square metres
- An office park and AbaQulusi Council Chambers of 31, 500 square metres
- A site set aside for a future petrol station drive through and a décor retail show room of 12m 300 metres square (BID Document, Indiflora).

An initial Phase 1 HIA was undertaken by Hall (2022) and submitted on SAHRIS. The interim comment from KZNARI was that a Phase 1 HIA needs to be undertaken. There was no professional PIA in the report, rather general comment on potential palaeontology. There was no professional archaeological report for the study area either.

Umlando was requested by LEAP 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

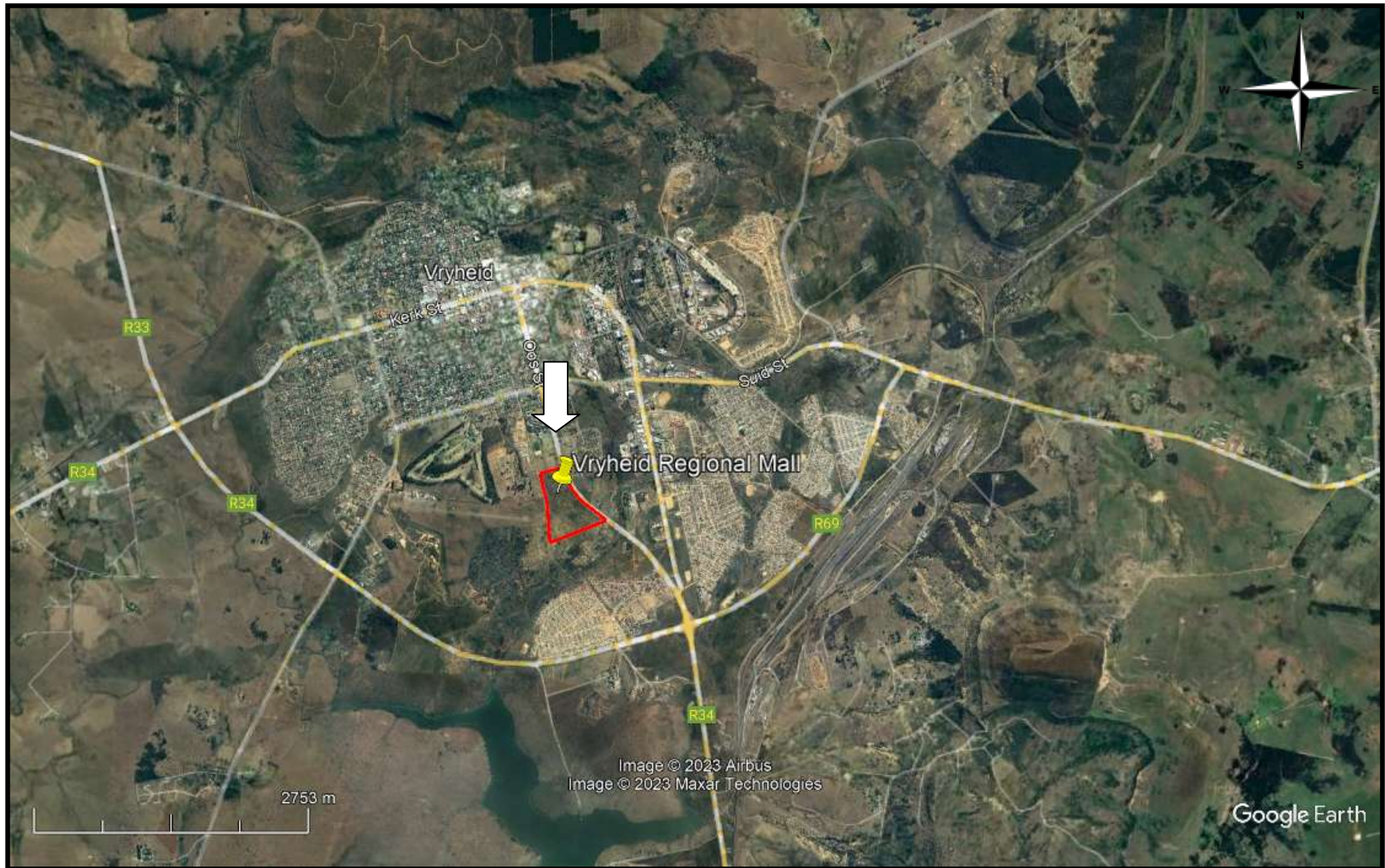


FIG. 2: AERIAL OVERVIEW OF THE PROPOSED DEVELOPMENT

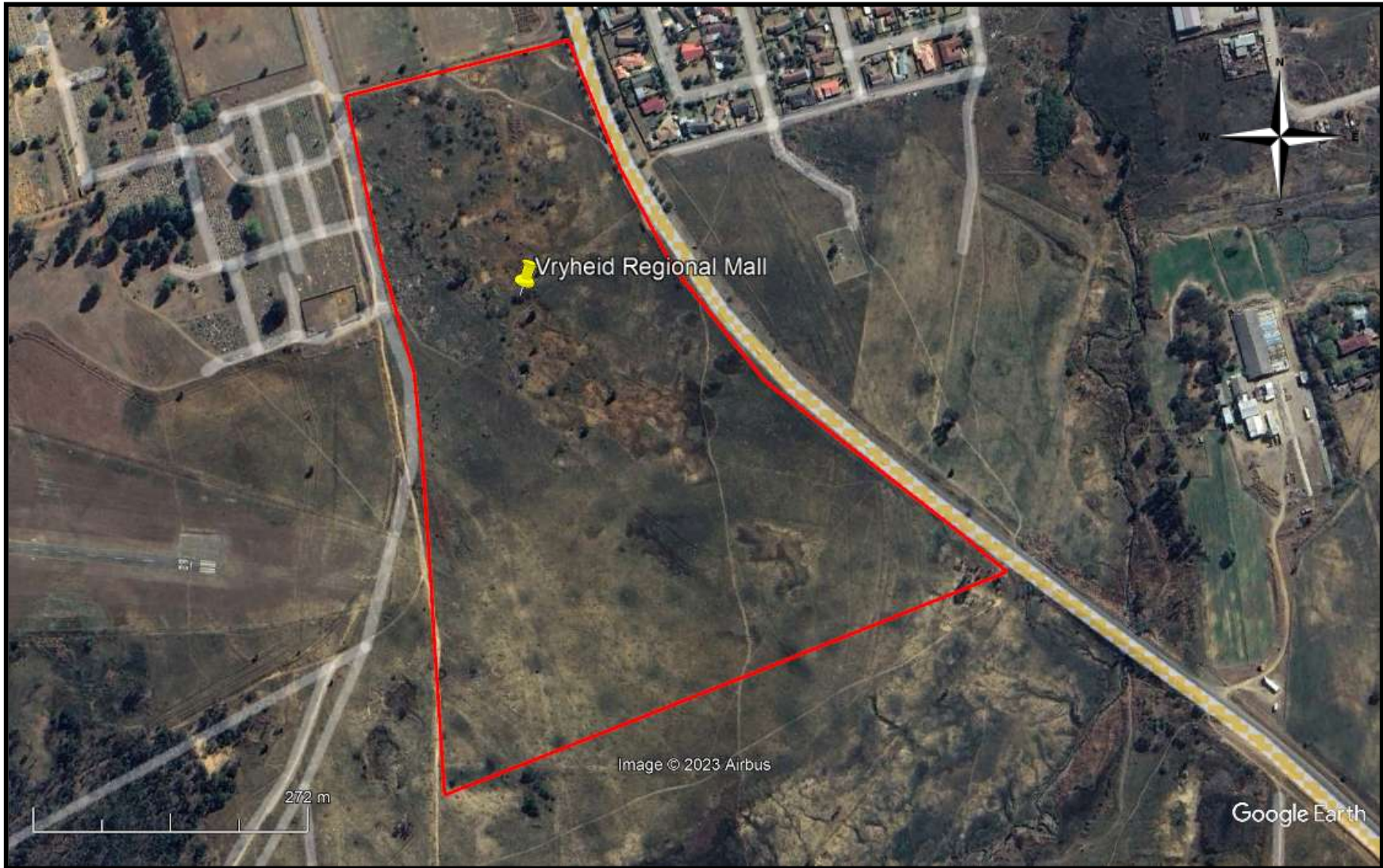


FIG. 3: TOPOGRAPHICAL MAP OF THE PROPOSED DEVELOPMENT (2000)

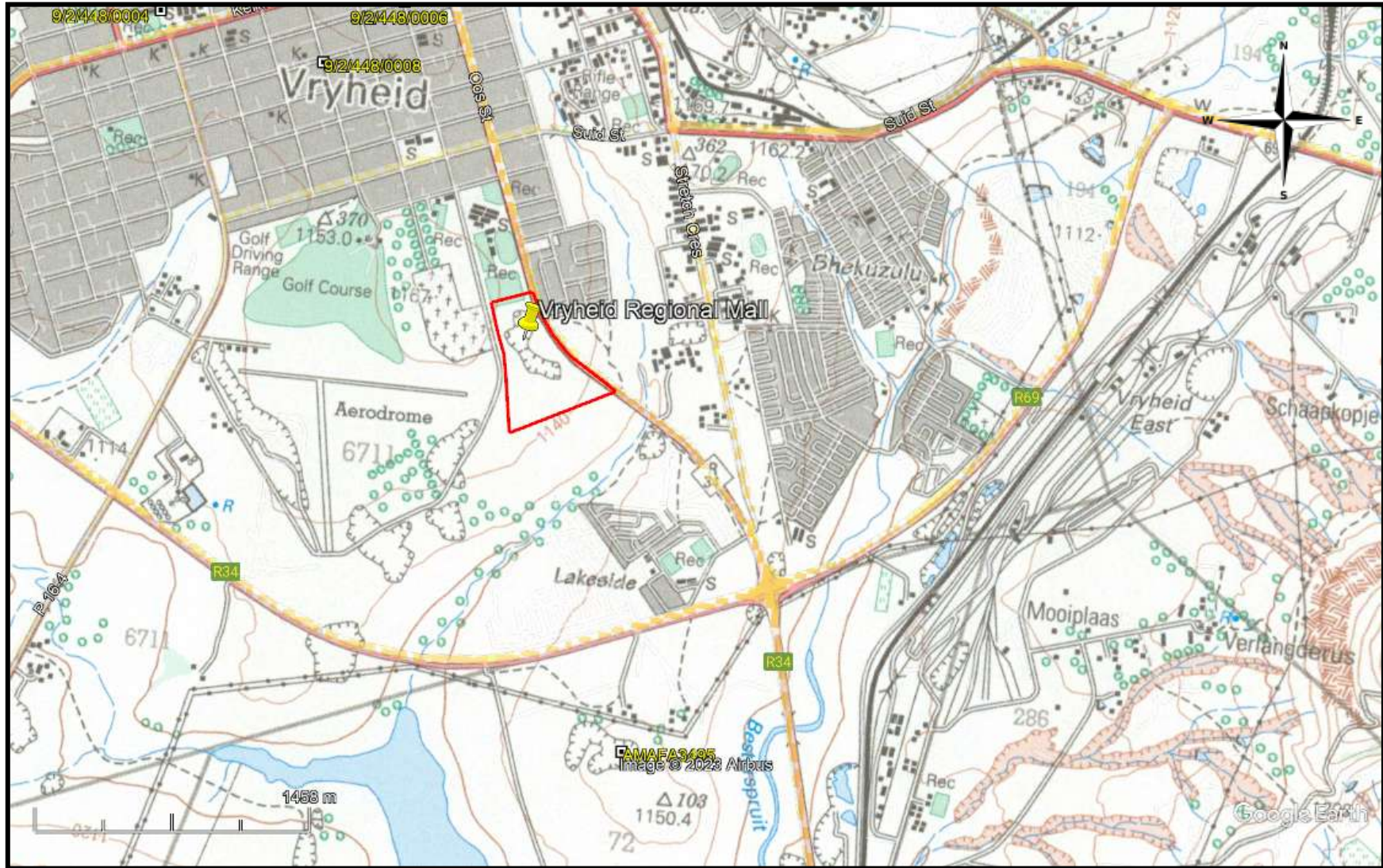


FIG. 4: SCENIC VIEWS OF THE STUDY AREA



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 database 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 1st and 2nd 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

SITE SIGNIFICANCE	FIELD RATING	GRADE	RECOMMENDED MITIGATION
High Significance	National Significance	Grade 1	Site conservation / Site development
High Significance	Provincial Significance	Grade 2	Site conservation / Site development
High Significance	Local Significance	Grade 3A / 3B	
High / Medium Significance	Generally Protected A		Site conservation or mitigation prior to development / destruction
Medium Significance	Generally Protected B		Site conservation or mitigation / test excavation / systematic sampling / monitoring prior to or during development / destruction
Low Significance	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. The general area is known to have Stone Age, Late Iron Age and Historical Period sites (fig. 5). In addition to this, there are 2nd Anglo-Boer War sites and listed buildings in and around Vryheid. No surveys have occurred near the study area; however, the general area is known to be archaeologically sensitive.

The 1935 aerial photograph indicates that there is a possible house and kraal (fig. 6). This photograph also shows several excavation areas with paths leading directly to the 'diggings'

The 1944 aerial photograph indicates that there are no built structures within the study area (fig. 7). The 'diggings' have increased slightly in size.

The 1948 topographical map shows that there are no features within the study area (fig. 8). There are two "Brickworks" to the east and south of the study area, and this could explain the 'diggings' within the study area.

The 1961 aerial map indicates that the excavations have increased substantially and there are no buildings within the study area (fig. 9).

The desktop study suggests that much of the study area has been disturbed by previous excavations and/or borrow pits. These excavations are still visible today and would result in depressions on the landscape.

The study area is unlikely to yield any significant sites and will probably only yield isolated stone tools and pottery shards.

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

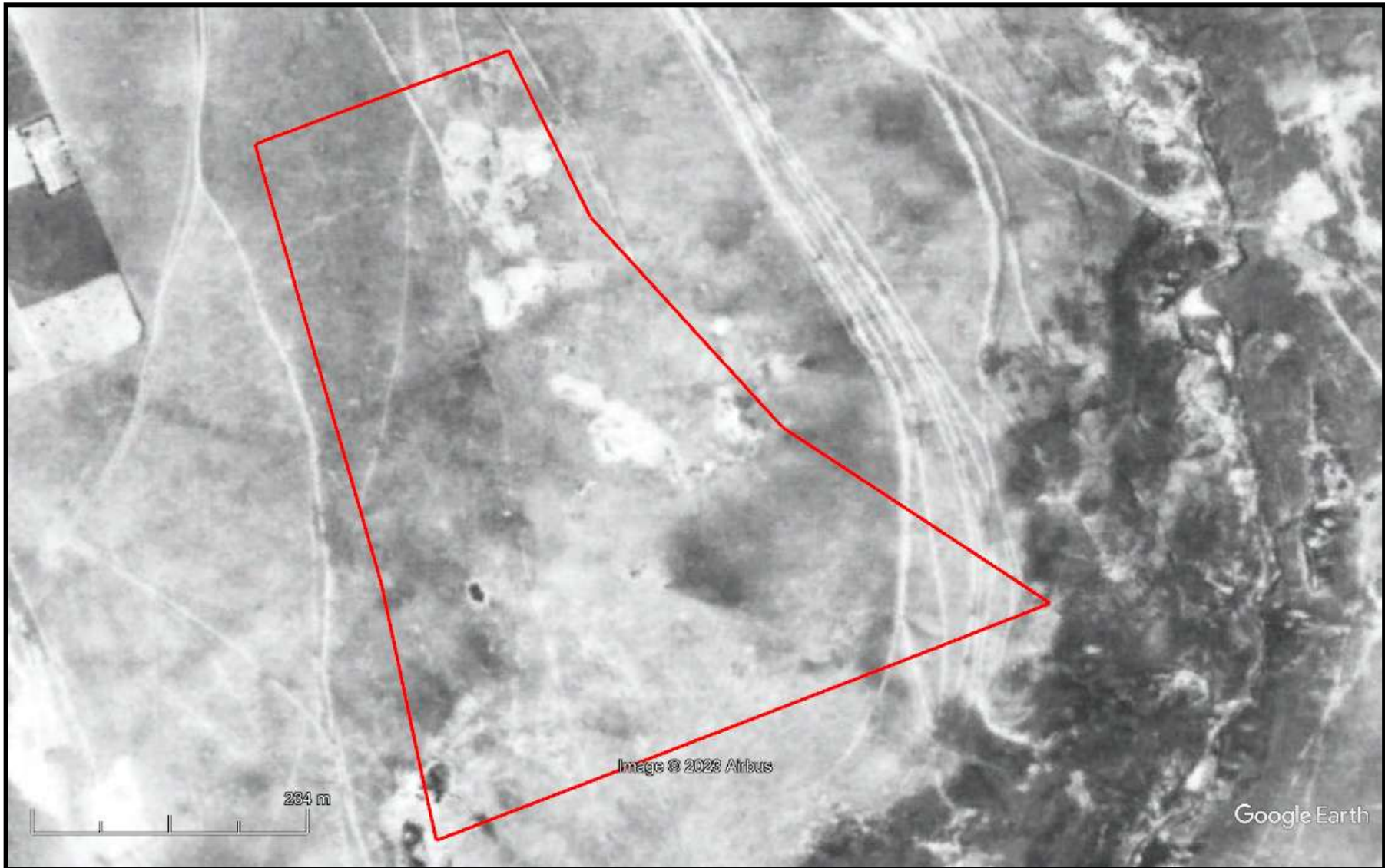


FIG. 6: LOCATION OF THE STUDY AREA IN 1935¹



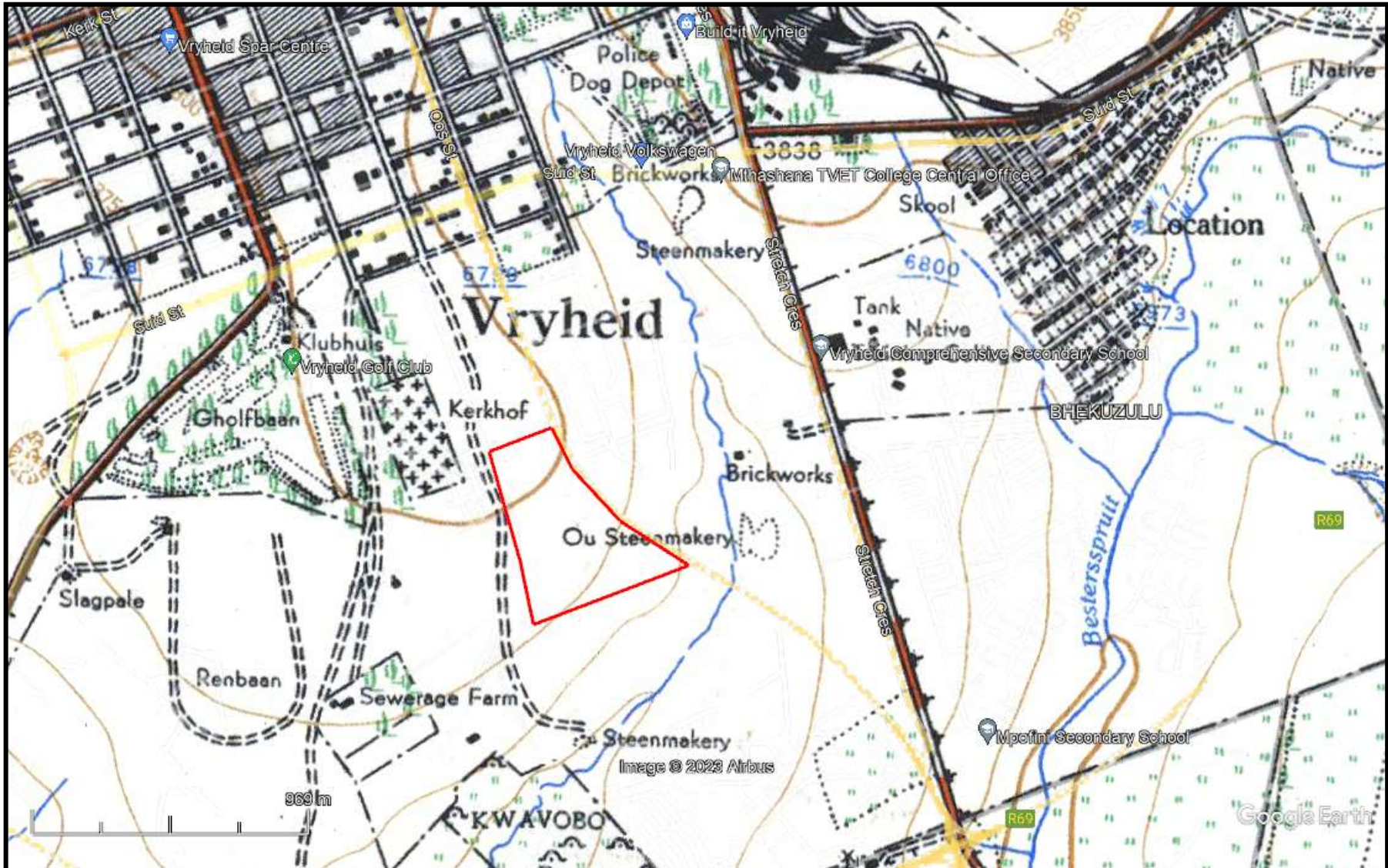
¹ 107_077_36359

FIG. 7: LOCATION OF THE STUDY AREA IN 1944²



² 73_038_06799

FIG. 8: LOCATION OF THE STUDY AREA IN 1948³



³ 2729DD Vryheid

FIG. 9: LOCATION OF THE STUDY AREA IN 1961⁴



⁴ 455_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 (Appendix A). 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 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 27 February 2023. Ground visibility was mostly good. The study area is highly disturbed with modern rubbish dumps along the western side. More than half, if not more, of the study area has been used for sand borrow pits, or the 'diggings' from the maps. These are areas where the sand has been removed down to bedrock. The soil is ~50cm deep and then it reaches the Sandstone of the Vryheid Formation. There are a few raised mounds; however, these are the result of older termite mounds.

The borrow pits allowed for an analysis of the lag Stone Age deposit that rests on the Sandstone (fig. 11). The survey noted the following stone tools (fig. 12):

- 2 x quartzite utilised flakes
- Quartz irregular core

The flakes can date to the Late Stone Age or Late Middle Stone Age. The irregular core probably dates to the Late Stone Age.

The stone tools are isolated finds and of low significance. The paucity of stone tools suggests that the area is of low significance.

The deflations suggested by Hall (2022) are thus not related to Iron Age and/or Historical Period houses, but to the 19th century sand borrow pits. The soils are also not conducive for Iron Age farming.

No further heritage mitigation is required

FIG. 11: SAND BORROW PITS



FIG. 12: STONE TOOLS FROM THE STUDY AREA



MANAGEMENT PLAN

The stone tools are of very low significance and of very low density. They form part of the standard generic lag layer with no special tools present.

There is a very low chance of fossiliferous material occurring within the study area.

No further management is required. If any artefacts, fossils, or human remains are located, then they need to be reported to KZNARI immediately. Alternatively, they can be photographed and sent to the ECO, who can then send it to the HIA and./or PIA consultant for initial comment.

In the highly unlikely chance that human remains are observed, then the SAPS and KZNARI need to be informed immediately. A 50m radius around the bones needs to be made as a buffer for zone. This can be reduced after an on site visit.

CONCLUSION

A heritage PHASE 1 survey was undertaken for the proposed Vryheid Mall. The desktop study noted that the area was highly disturbed since 1935, presumably as a source for the he two brick making facilities. Two possible features were noted on the 1935 map; however, these no longer exist.

Isolated artefacts were found, but these are of low significance and do not constitute a site.

The study area is rated as having very high palaeontological sensitivity. However, this part of the Vryheid Formation tends to yield very little fossiliferous material. A Chance Find Protocol was initiated for the palaeontology, and should extend to the heritage as well.

No further mitigation is required.

REFERENCES

Hall, S. 2022. Phase I Heritage Assessment of Princess Mkabayi Mixed Use Development. Erf 6018, Vryheid

Maps:

2729DD Vryheid 1946 19

107_077_36359

73_038_06799

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 'G. Anderson', with a horizontal line underneath.

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

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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 Desk-Top 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 in 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.

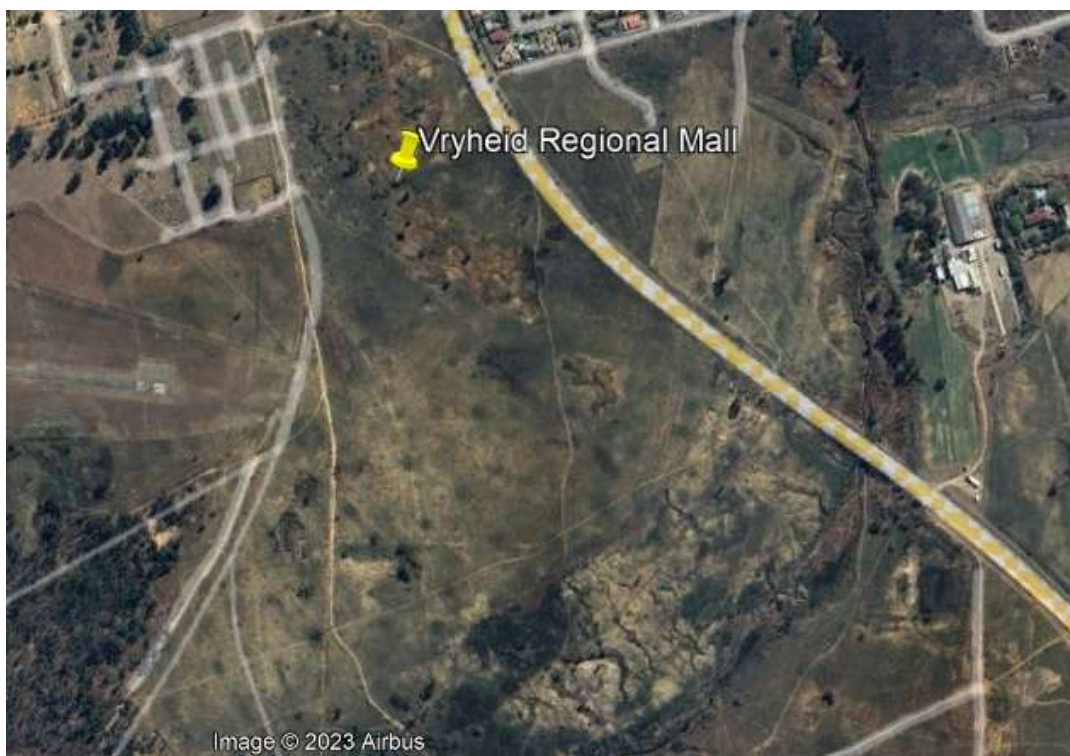


Figure 1: Location of the proposed Vryheid Regional Mall.

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

Desk-Top 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).

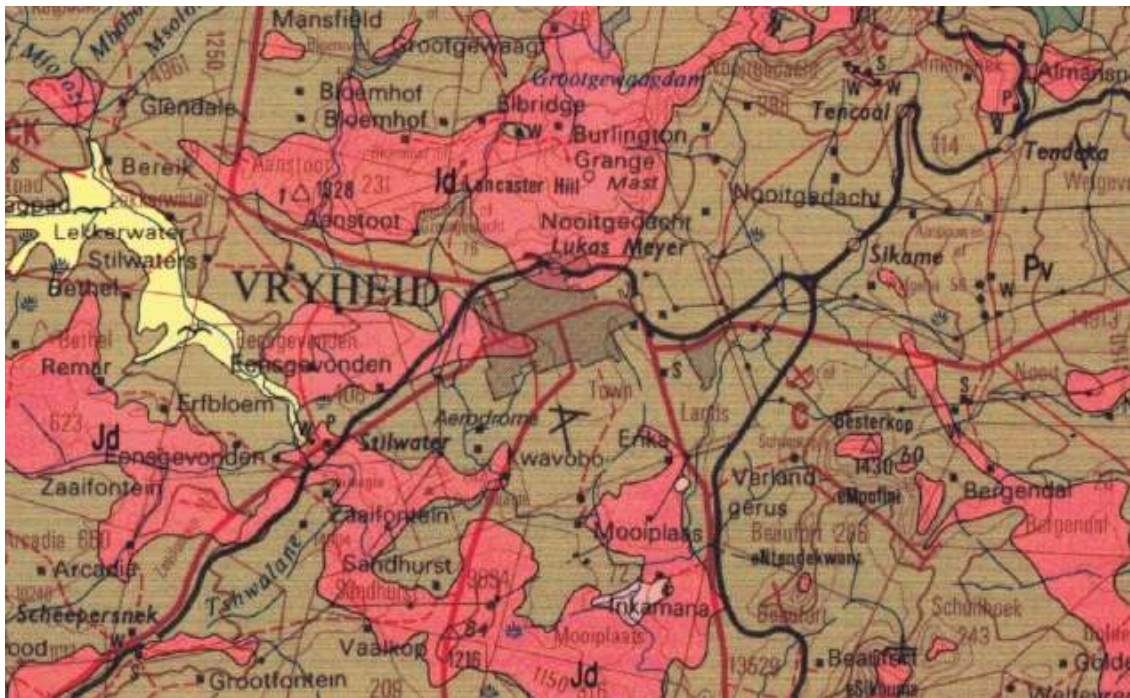


Figure 2: Approximate area of the proposed Vryheid Regional Mall. Extract from the 125 000 scale Geological Map: Vryheid2730. PV (light brown) designates the Vryheid Formation.

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. PALAEOONTOLOGY

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

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

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

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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.

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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: Bhekuzulu 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 Rooilyf 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.