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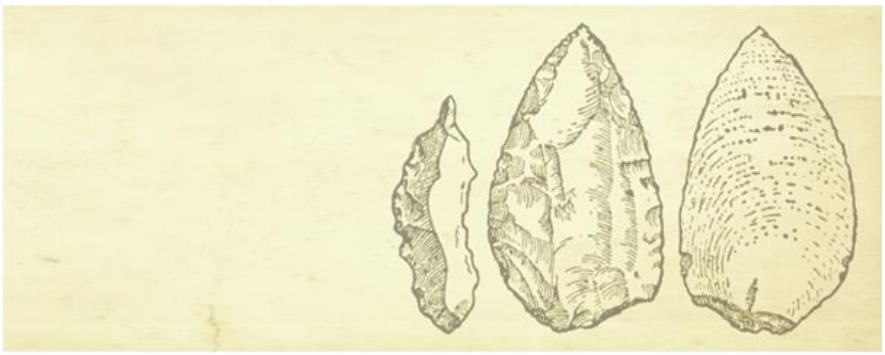

PHASE 1 HIA DESKTOP AND EXEMPTION RESIDENTIAL DEVELOPMENT THABAZIMBI EXTENSION 75

THE PROPOSED RESIDENTIAL DEVELOPMENT OF THABAZIMBI EXTENSION 75 ON PORTION 129, FARM DOORNHOEK 318KQ, THABAZIMBI LOCAL MUNICIPALITY, WATERBERG DISTRICT MUNICIPALITY, LIMPOPO PROVINCE

PREPARED FOR:

Naledzi Environmental Consultants (Pty) Ltd

PREPARED BY:

HEIDI FIVAZ & ANZEL VELDMAN
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15 AUGUST 2022

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Declaration of independence:

UBIQUE Heritage Consultants hereby confirm our independence as heritage specialists and declare that:

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

Signed: **Date: 2022-08-15**

J.A.C. Engelbrecht, H. Fivaz & A. Veldman

UBIQUE Heritage Consultants

SUMMARY OF SPECIALIST EXPERTISE

HEIDI FIVAZ

CRM ARCHAEOLOGIST & OBJECT CONSERVATOR

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

ANZEL VELDMAN

ARCHAEOLOGIST

Anzel Veldman has been informally part of UBIQUE Heritage Consultants since 2021. She is responsible for research and desktop studies. She holds a BA Culture and Arts Historical Studies degree (2006) and BA (Hons) Archaeology degree in 2009, both completed at UNISA. Mrs Veldman obtained her MA in Archaeology in 2015 from the University of Johannesburg, focusing on northwest Namibia's Later Stone Age archaeology.

JAN ENGELBRECHT

CRM ARCHAEOLOGIST

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

EXECUTIVE SUMMARY

Project description

UBIQUE Heritage Consultants were appointed by Naledzi Environmental Consultants (Pty) Ltd as independent heritage specialists to conduct a cultural heritage desktop assessment in accordance with Section 38 of the NHRA and the National Environmental Management Act 107 of 1998 (NEMA) and to determine the possibility of heritage and archaeological resources within the proposed development area Portion 129 of the farm Doornhoek 318KQ, Thabazimbi Local Municipality, Waterberg District, Limpopo Province.

Findings of Heritage Desktop Study

The study area is unlikely to produce any in-situ heritage resources. The site is currently zoned for agriculture; though it may lie fallow, previous cultivation occurred. In addition, evidence of building rubble and foundations and continuous movement through the proposed area means that the study area has been subject to various anthropogenic and faunal disturbances in the recent past.

The HIA Desktop Study found no Heritage and Archaeological Impact Assessments on the proposed development area. However, heritage sites and resources ranging from low to high significance have been documented on the periphery of a 5 -20 km radius from the study area. These sites provide the reader with the data necessary to anticipate the sites' probable significance that might accompany any projected heritage resource. The closest archaeological finds to the study area on Farm Doornhoek 318 KQ are attributed to the Late Iron Age and Historical periods.

The background study revealed that the most documented lithic material is of low and medium significance. These sites are predominantly open-air sites with low-density surface scatters or isolated occurrences. Due to the proposed development areas within the town and the previous and current informal occupation and surface disturbance, any above-ground lithic material would likely be out of context. Therefore, it is considered that the occurrence of lithic material within the development areas is low. However, the possibility of open-air Stone Age sites/occurrences in the development area should not be disregarded.

Iron Age sites have been recorded approximately 10 to 50 km around the proposed development area. However, the development area is situated within the townscape, which has already been disturbed. Therefore, the likelihood of such sites being present in the development area is low.

Archaeological traces of historical/colonial era features and artefacts attributed to the representation of the regional colonial farming history, colonial settlement, and the Anglo-Boer War have been recorded in the wider region. The area was established and occupied during the mid-1800s. Thus, the development areas' colonial-era material and features (such as middens, artefacts and structural features) are probable. However, any above-ground colonial material would likely be out of context due to the previous and current surface disturbance.

The probability of graves and burials is low. However, the likelihood of graves and burials should not be disregarded since graves and informal cemeteries can be expected anywhere in the landscape. For example, family cemeteries can be anticipated close to farmsteads, while informally marked graves containing fieldstone cairns and headstones may be found in the veldt.

The development is underlain by Tertiary to superficial Quaternary sediments. Underlying these surface deposits (at depth) is the Timeball Hill Formation of the Pretoria Group (Transvaal Supergroup). The PalaeoMap of the South African Heritage Resources Information System indicates that the Palaeontological Sensitivity of the superficial deposits is moderate. In this development, the Timeball Hill Formation sediments have a Very High Palaeontological Sensitivity but will not be impacted. Therefore, a Low Palaeontological Significance has been allocated to the proposed development. The project may be authorised, as the whole extent of the development footprint is not considered sensitive in terms of palaeontological heritage (Butler 2022 Appendix B).

Recommendations

A range of heritage sites occurs in the wider region. Every site is relevant to the Heritage Landscape, but it is projected that only a few sites in the study area could have conservation value. This recommendation is based on studies undertaken in the broader area of the proposed township development. The following conclusions apply:

1. Due to the disturbed nature of the study area, we recommend that the project be exempt from a complete AIA study with field assessment. This is, however, subject to agreement by the South African Heritage Resources Agency.

2. Limitations of this Desktop Scoping report are determined by the amount of information available on the South African Heritage Resources Information System (SAHRIS) and the clarity of satellite imaging. Surface or sub-surface archaeological sites, graves and informal cemeteries could be directly impacted during the proposed township development. Due to previous Heritage Assessments within the area, the probability of archaeological occurrences in the development area is considered low. However, it is also likely that the surface occurrences would be out of context due to the current conditions of the proposed development areas. A visual guide or rudimentary Chance Finds Protocol has been developed for this project. It is recommended that the developer refers to it during development.

3. The development footprint is not considered sensitive in terms of palaeontological heritage. Consequently, no further palaeontological heritage studies, ground truthing and/or specialist mitigation are required pending the discovery of newly discovered fossils. If fossil remains or trace fossils are discovered during any phase of construction, either on the surface or exposed by excavations, the Environmental Control Officer (ECO) in charge of these developments must report to SAHRA (Contact details: SAHRA, 111 Harrington Street, Cape Town. PO Box 4637, Cape Town 8000, South Africa. Tel: 021 462 4502. Fax: +27 (0)21 462 4509. Web: www.sahra.org.za) so a palaeontologist can carry out that mitigation.

4. Hidden or sub-surface sites may exist in the area. We recommend that if any evidence of archaeological sites or remains (e.g. remnants of stone-made structures, indigenous ceramics, bones, stone artefacts, ostrich eggshell fragments, charcoal and ash concentrations), fossils or other categories of heritage resources are uncovered during the development, SAHRA APM Unit (Natasha Higgitt/Phillip Hine 021 462 5402) must be alerted as per section 35(3) of the NHRA. If unmarked human burials are discovered, the SAHRA Burial Grounds and Graves (BGG) Unit (Thingahangwi Tshivhase/Mimi Seetelo 012 320 8490) must be alerted immediately as per section 36(6) of the NHRA. A professional archaeologist or palaeontologist must be contracted as soon as possible to inspect the findings. If the newly unearthed heritage resources are of high significance, a Phase 2 rescue operation may be required with permits issued by SAHRA. UBIQUE Heritage Consultants and its personnel will not be held liable for such oversights or costs incurred due to such oversights.

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ABBREVIATIONS

AIA:	Archaeological Impact Assessment
ASAPA:	Association of South African Professional Archaeologists
CRM:	Cultural Resource Management
EIA:	Early Iron Age
EMP:	Environmental Management Plan
ESA:	Earlier Stone Age
GPS:	Global Positioning System
HIA:	Heritage Impact Assessment
HWC:	Heritage Western Cape
IA:	Iron Age
IMP:	Integrated Management Plan
LSA:	Later Stone Age
MIA:	Middle Iron Age
MSA:	Middle Stone Age
NBKB:	Ngwao-Boswa Jwa Kapa Bokone (Northern Cape PHRA)
NHRA:	National Heritage Resources Act
PHRA:	Provincial Heritage Resource Agency
SADC:	Southern African Development Community
SAHRA:	South African Heritage Resources Agency
SAHRIS:	South African Heritage Resources Information System

GLOSSARY

Archaeological:	Material remains resulting from human activity in a state of disuse, older than 100 years, including artefacts, human and hominid remains and artificial features and structures.
Historic building:	Structures 60 years and older.
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:	Valuable, finite, non-renewable and irreplaceable resources that provide evidence of the origins of South African society
Mitigation:	Anticipating and preventing adverse impacts and risks, then to minimise them, rehabilitate or repair impacts to the extent feasible.
'Public monuments:	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 proposes establishing a residential township known as Thabazimbi Extension 75 on Portion 129, Farm Doornhoek 318KQ. The property is located within the jurisdiction of Thabazimbi Local Municipality along the Thabazimbi-Marakele Road (D1485), next to Zeldri Park (Thabazimbi Extension 32) and across from Akasia Park (Thabazimbi Extension 47). UBIQUE Heritage Consultants were appointed by Naledzi Environmental Consultants (Pty) Ltd as independent heritage specialists in accordance with the National Environmental Management Act 107 of 1998 (NEMA) and in compliance with Section 38 of the National Heritage Resources Act 25 of 1999 (NHRA), to conduct a cultural heritage desktop assessment (AIA/HIA) of the proposed development area.

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

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

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

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

1.2 Assumptions and limitations

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

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

Although all possible care has been taken during the intensive desktop study to identify sites of cultural importance within the development area, it is essential to note that some heritage sites may have been missed due to the limitations of the digital survey. The digital survey depends on available data sources and the visibility of heritage resources in satellite imagery. No field survey has been conducted, and all heritage sites/possibility of heritage features are based on the desktop study and digital survey. No sub-surface investigations (i.e. excavations or sampling) were undertaken since a permit from SAHRA is required for such activities. Therefore, should any heritage features and/or objects such as architectural features, stone tool scatters, artefacts, human remains, or fossils be uncovered or observed during construction, operations must be stopped, and a qualified archaeologist contacted for an assessment of the find. Observed or located heritage features and/or objects may not be disturbed or removed until the heritage specialist has been able to assess the significance of the site (or material) in question.

2. TERMS OF REFERENCE

2.1 Statutory Requirements

2.1.1 General

The principle is that the environment should be protected for present and future generations by preventing pollution, promoting conservation and practising ecologically sustainable development. With regard to spatial planning and related legislation at national and provincial levels, the following legislation may be relevant:

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

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

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

2.1.2 National Heritage Resources Act 25 of 1999

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

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

2.1.3 Heritage Impact Assessments/Archaeological Impact Assessments

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

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

2.1.5 Management of Graves and Burial Grounds

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

- **Graves older than 60 years, situated outside a formal cemetery administered by a local Authority are** protected in terms of Section 36 of the NHRA as well as the Human Tissues Act of 1983. Accordingly, such graves are the jurisdiction of SAHRA. The procedure for Consultation Regarding Burial Grounds and Graves (Section 36(5) of NHRA) is applicable to graves older than 60 years that are situated outside a formal cemetery administrated by a local authority. Graves in the category located inside a formal cemetery administrated by a local authority will also require the same authorisation as set out for graves younger than 60 years over and above SAHRA authorisation.

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

> (3) *(a)* No person may, without a permit issued by SAHRA or a provincial heritage resources authority—
>
> *(a)* destroy, damage, alter, exhume or remove from its original position or otherwise disturb the grave of a victim of conflict, or any burial ground or part thereof which contains such graves;
>
> *(b)* destroy, damage, alter, exhume, remove from its original position or otherwise disturb any grave or burial ground older than 60 years which is situated outside a formal cemetery administered by a local authority; or
>
> *(c)* bring onto or use at a burial ground or grave referred to in paragraph *(a)* or *(b)* any excavation equipment, or any equipment which assists in the detection or recovery of metals.
>
> (4) SAHRA or a provincial heritage resources authority may not issue a permit for the destruction or damage of any burial ground or grave referred to in subsection (3)*(a)* unless it is satisfied that the applicant has made satisfactory arrangements for the exhumation

and re-interment of the contents of such graves, at the cost of the applicant and in accordance with any regulations made by the responsible heritage resources authority.

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

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

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

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

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

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

3. STUDY APPROACH AND METHODOLOGY

3.1 Desktop study

The first step in the methodology was to conduct a desktop study of the heritage background of the area and the proposed development site. This entailed scoping and scanning historical texts/records, previous heritage studies, and research around the study area. The study area is contextualised by incorporating data from previous CRM reports in the area and an archival search. The objective is to extract data and information on the area in question, looking at archaeological sites, historical sites and graves. No archaeological site data was available for the project area. A concise account of the archaeology and history of the broader study area was compiled (sources listed in the bibliography).

3.1.1 Literature review

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

3.1.2 Definitions of heritage resources

The NHRA defines a heritage resource as any place or object of cultural significance, i.e., 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.

3.2 Determining significance

Heritage resources are considered of value if the following criteria apply:

a.	It is important in the community or pattern of South Africa's history;
b.	It has uncommon, rare or endangered aspects of South Africa's natural or cultural heritage;
c.	It has the potential to yield information that will contribute to an understanding of South Africa's natural or cultural heritage;
d.	It is vital in demonstrating the principal characteristics of a particular class of South Africa's natural or cultural places or objects;
e.	It exhibits particular aesthetic characteristics valued by a community or cultural group;
f.	It is essential in demonstrating a high degree of creative or technical achievement at a particular period;
g.	It has a strong or unique association with a particular community or cultural group for social, cultural or spiritual reasons;
h.	It has a strong or special association with the life or work of a person, group or organisation of importance in the history of South Africa;
i.	It is of significance relating to the history of slavery in South Africa.

Levels of significance of the various types of heritage resources observed and recorded are determined by the following criteria:

CULTURAL & HERITAGE SIGNIFICANCE	
LOW	A cultural object found out of context, not part of a site or without any related feature/structure in its surroundings.
MEDIUM	Any site, structure or feature is regarded as less important due to several factors, such as date, frequency and uniqueness. Likewise, any important object found out of context.
HIGH	Any site, structure or feature is regarded as important because of its age or uniqueness. Graves are always categorised as of a high importance. Likewise, any important object found within a specific context.

Field Ratings or Gradings are assigned to indicate the level of protection required and who is responsible for national, provincial, or local protection.

FIELD RATINGS & GRADINGS	
National Grade I	Heritage resources with exceptional qualities to the extent that they are of national significance and should therefore be managed as part of the national estate.
Provincial Grade II	Heritage resources with qualities provincial or regional importance, although it may form part of the national estate, it should be managed as part of the provincial estate.
Local Grade IIIA	Heritage resources are of local importance and worthy of conservation. Therefore, it should be included in the heritage register and not be mitigated (high significance).
Local Grade IIIB	Heritage resources are of local importance and worthy of conservation. Therefore, it should be included in the heritage register and mitigated (high/ medium significance).
General Protection Grade IVA	The site/resource should be mitigated before destruction (high/ medium significance).
General protection Grade IVB	The site/resource should be recorded before destruction (medium significance).
General protection Grade IVC	Phase 1 is considered as sufficient recording, and it may be demolished (low significance).

3.3.1 Assessment of development impacts

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

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

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

CRITERIA	RATING SCALES	NOTES
Nature	POSITIVE	An evaluation of the type of effect the construction, operation and management of the proposed development would have on the heritage resource.
	NEGATIVE	
	NEUTRAL	
Extent	LOW	Site-specific affects only the development footprint.
	MEDIUM	Local (limited to the site and its immediate surroundings, including the surrounding towns and settlements within a 10 km radius);
	HIGH	Regional (beyond a 10 km radius) to national.
Duration	LOW	0-4 years (i.e. duration of construction phase).
	MEDIUM	5-10 years.
	HIGH	More than 10 years to permanent.
Intensity	LOW	Where the impact affects the heritage resource in such a way that its significance and value are minimally affected.
	MEDIUM	Where the heritage resource is altered, and its significance and value are measurably reduced.
	HIGH	Where the heritage resource is altered or destroyed to the extent that its significance and value cease to exist.
Potential for impact on irreplaceable resources	LOW	No irreplaceable resources will be impacted.
	MEDIUM	Resources that will be impacted can be replaced, with effort.
	HIGH	There is no potential for replacing a particular vulnerable resource that will be impacted.
Consequence	LOW	A combination of any of the following: • Intensity, duration, extent and impact on irreplaceable resources are all rated low. • Intensity is low and up to two of the other criteria are rated medium. • - Intensity is medium, and all three other criteria are rated low.
	MEDIUM	Intensity is medium, and at least two of the other criteria are rated medium.
	HIGH	Intensity and impact on irreplaceable resources are rated high, with any combination of extent and duration. Intensity is rated high, with all the other criteria being rated medium or higher.
Probability (the likelihood of the impact occurring)	LOW	It is highly unlikely or less than 50 % likely that an impact will occur.
	MEDIUM	It is between 50 and 70 % certain that the impact will occur.

CRITERIA	RATING SCALES	NOTES
	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 Report

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

4. PROJECT OVERVIEW

UBIQUE Heritage Consultants were appointed by Naledzi Environmental Consultants (Pty) Ltd 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, residential township to be known as Thabazimbi Extension 75 on Portion 129 of the farm Doornhoek 318KQ on any sites, features, or objects of cultural heritage significance.

The applicant owns the project site. The property is zoned for 'Agriculture' and currently lies fallow. By establishing the township, the applicant intends to generate an income from the property while addressing the high demand for housing in Thabazimbi. The intention is to establish a 2.4-hectare residential township comprising 35 stands with an internal road network on Portion 129 of the farm Doornhoek 318KQ which will tap into municipal services except for electricity which Eskom would provide.

4.1 Technical information

PROJECT DESCRIPTION	
Project name	Residential township development Thabazimbi Extension 75
Description	Proposed residential development on Extension 75, Farm Doornhoek 318KQ
DEVELOPER	
Bertie Joubert Eiendomme Lephalale CC	
Development type	Residential
LANDOWNER	
Private	
CONSULTANTS	
Environmental	Naledzi Environmental Consultants (Pty) Ltd
Heritage and archaeological	UBIQUE Heritage Consultants
Paleontological	Banzai Environmental
PROPERTY DETAILS	
Province	Limpopo
District municipality	Waterberg
Local municipality	Thabazimbi
Topo-cadastral map	1:50 000 2427CB
Farm name	Doornoek 318KQ
Closest town	Thabazimbi

GPS Co-ordinates	24°34'15.83"S; 27°25'14.65"E
PROPERTY SIZE	2.4 ha
DEVELOPMENT FOOTPRINT SIZE	2.4 ha
LAND USE	
Previous	Agriculture/grazing
Current	Agriculture/grazing
Rezoning required	Yes
Sub-division of land	No

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

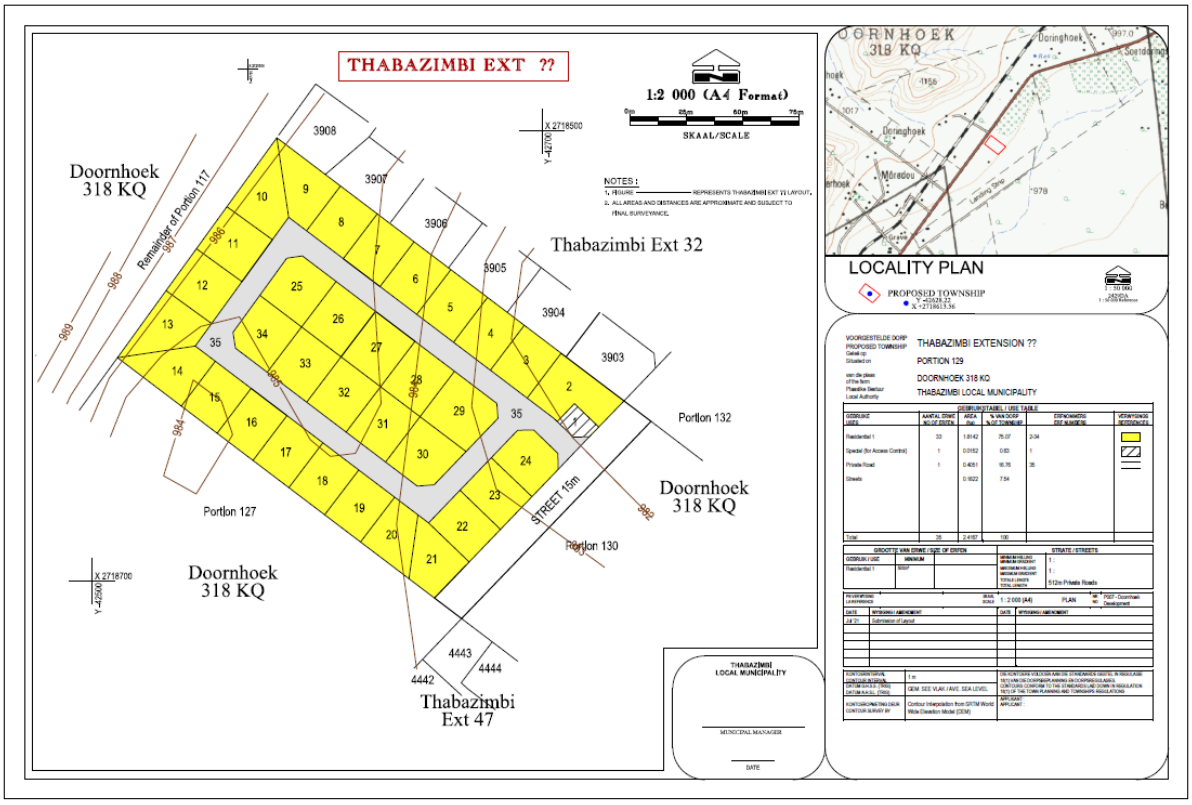

Figure 1 *Proposed Infill township establishment plan. Image provided by the client.*

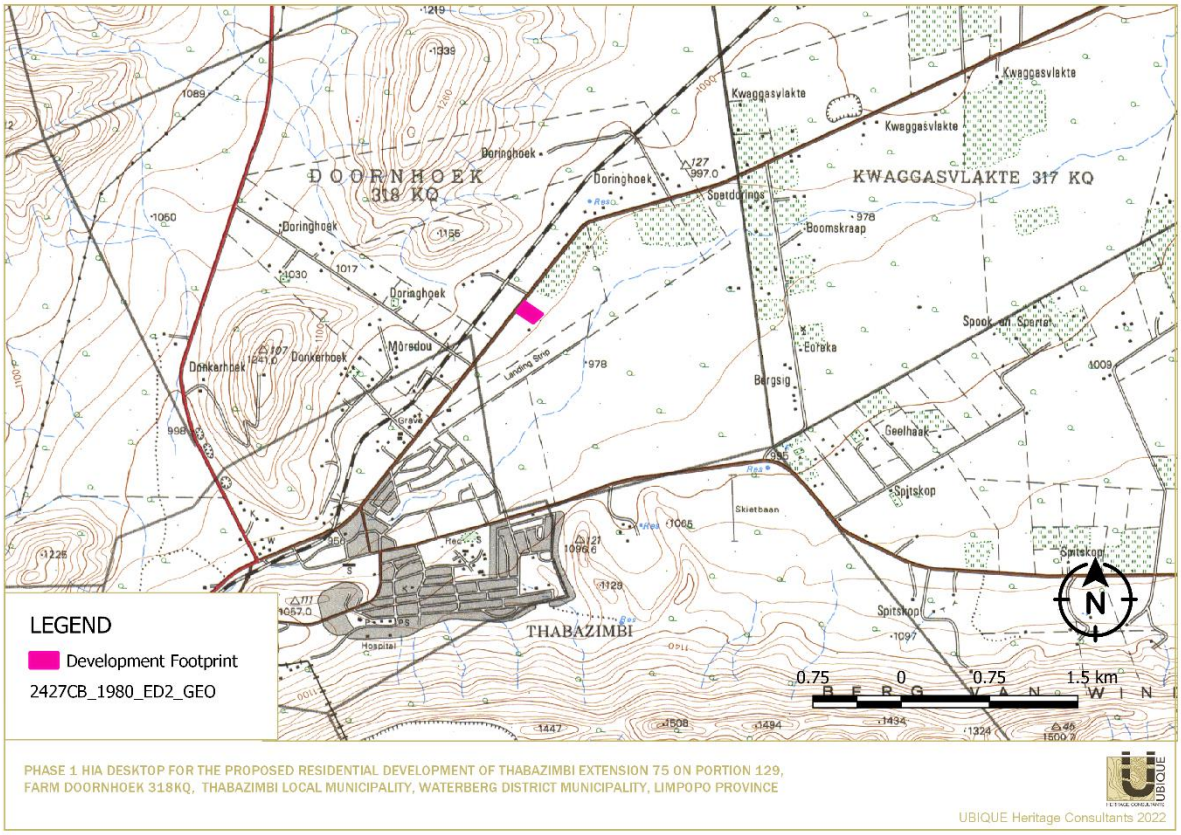

Figure 2 *Locality of the project indicted on 1:50 000 Topo-cadastral map 2427CB.*

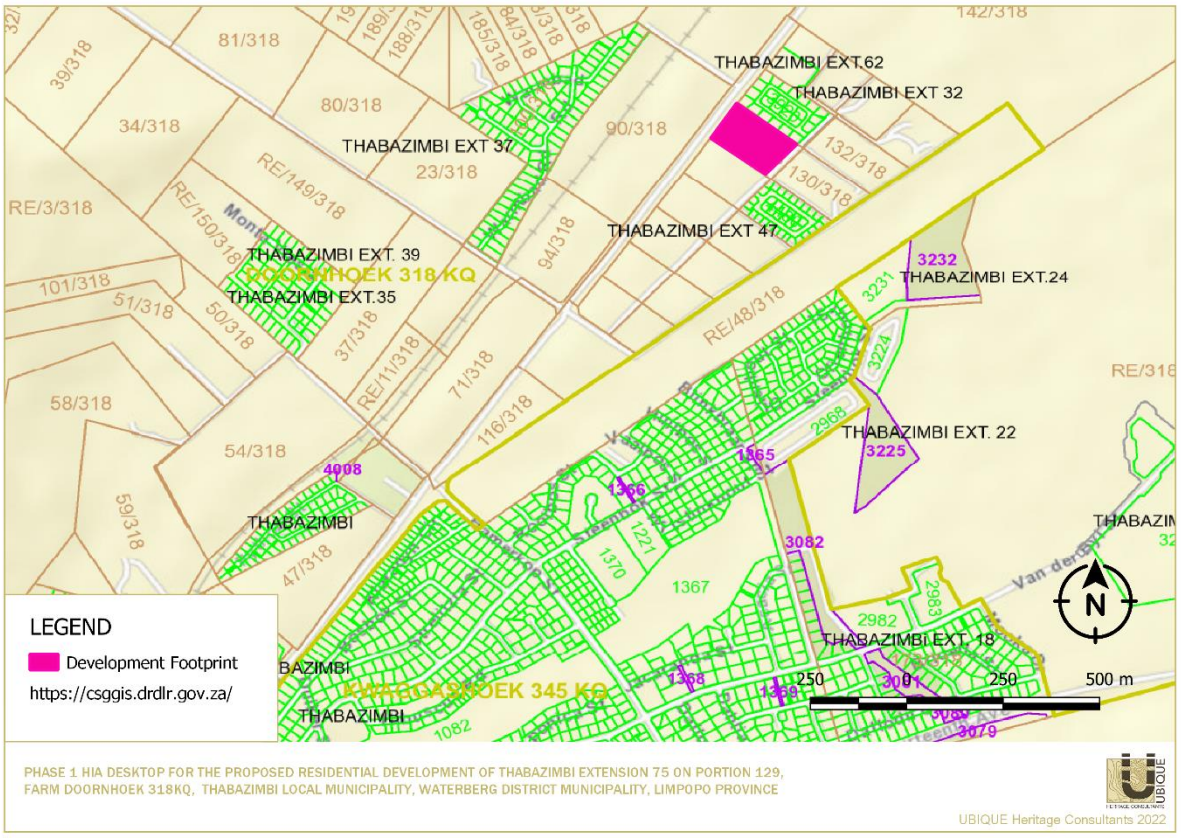

Figure 3 *Locality of the project, indicated on Property Search Chief-Surveyor General ArcGIS map (https://csggis.drdlr.gov.za/)*

Figure 4 *Locality of the project indicted on Google Earth Hybrid satellite imagery.*

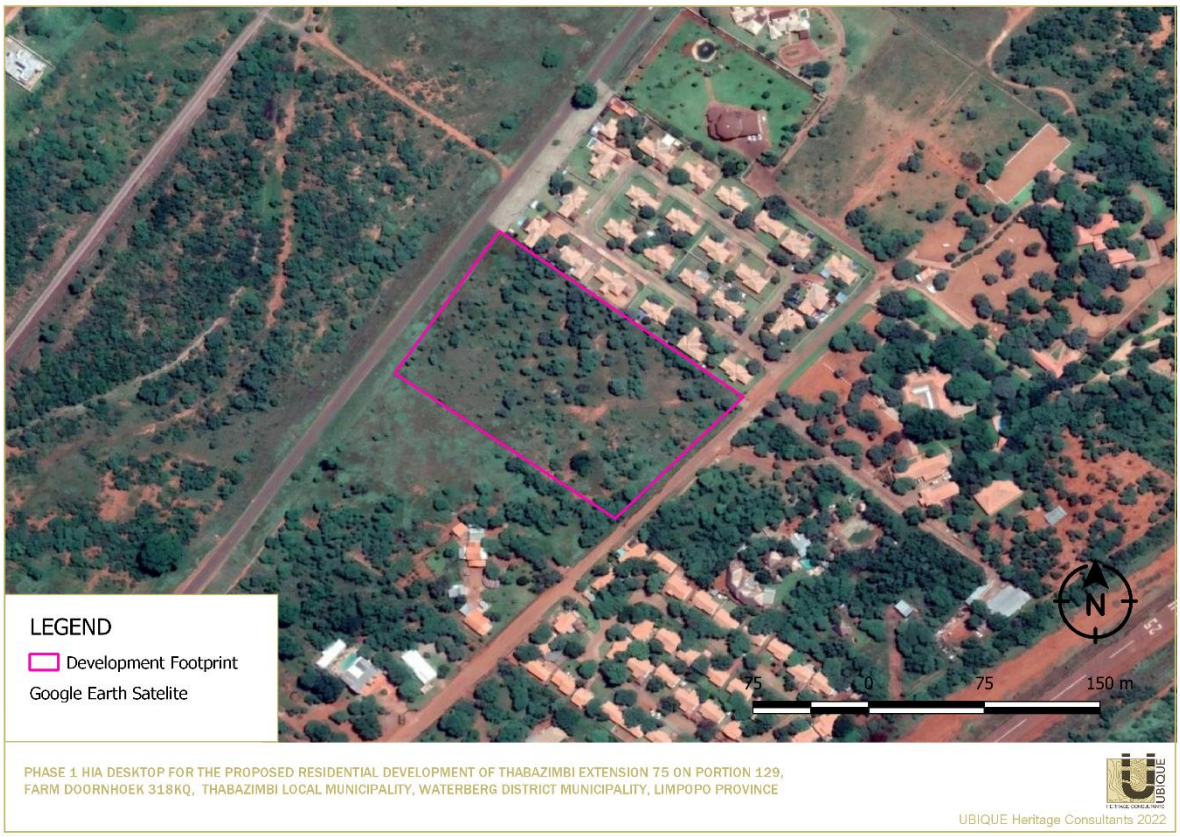

Figure 5 *Locality of the project and environment indicted on Google Earth satellite imagery*

4.2 Description of the affected environment

The development areas fall predominantly in the Western Sandy Bushveld vegetation type. The vegetation and landscape features of the Western Sandy Bushveld vary from tall open woodland to low woodland, with broad-leaved as well as microphyllous tree species prominent. Dominant species include *Acacia erubescens* on flat areas, *Combretum apiculatum* on shallow soils of gravelly upland sites and *Terminalia sericea* on deep sands, occurring on slightly undulating plains (Mucina & Rutherford 2006). The area shows various signs of disturbances. Grazing animals and previous agricultural activities with evidence of building foundations and rubble can be seen on-site.

Figure 6 *Vegetation types around the study area, SANBI Biodiversity Viewer (http://bgisviewer.sanbi.org/)*

Figure 7 Sample of photographs of the area. (Provided by Naledzi Environmental Consultants (Pty) Ltd)

5. HISTORICAL AND ARCHAEOLOGICAL BACKGROUND

The archaeology of South Africa is generally divided into the Earlier, Middle and Later Stone Ages (Lombard et al. 2012), the Iron Age (Huffman 2007), and the colonial/historical periods (e.g., Mitchell 2002). Hunter-gatherer lifeways are attested to in the Middle Stone Age record for at least the last 100 000 years (Wadley 2015). Such foraging groups continued to occupy the landscape throughout the Later Stone Age between 40 000 and 20 000 years ago, lasting until a couple of centuries. About 2000 years ago, during the final ceramic Later Stone Age, the first evidence for goats/sheep was found in southern Africa, possibly associated with Khoekhoe herding groups (e.g., Sadr 2008). These groups came into being as a combination of the migration of East African pastoralists who admixed with local hunter-gatherers (e.g., Choudhury et al. 2021). However, it is almost impossible to differentiate between San and Khoekhoe groups based on archaeological or genetic records. Presently these populations are referred to as Khoisan (Barnard 1992).

Archaeologically, the arrival of African farming communities from West Africa about 1700 years ago and their subsequent settlement, first in the north-eastern parts and later in much of southern Africa, is known as the Iron Age (Huffman 2007). These farmers encountered Khoisan communities (Mitchell 2002). The archaeology of farming communities of southern Africa encompasses three phases. The Early Iron Age, dated 200 – 900 CE, represents the arrival of farmers in southern Africa. The Middle Iron Age (900 – 1300 CE) is best associated with the onset of state formation in the Limpopo Valley of South Africa. Finally, the Late Iron Age (1300 – 1840 CE) marked the arrival and spread of ancestral Nguni- and Sotho-Tswana communities into southern Africa and the development of state-level societies, such as Great Zimbabwe and Mutapa (Huffman 2007; Badenhorst 2010).

The Late Iron Age, as an archaeological period, ended by the 1840s. By then, the ongoing *Mfecane* caused major socio-political disruptions in southern Africa. During the late 1600s and 1700s, Dutch settlers subjugated the Khoisan and established the Cape Colony. By the 1800s, a culmination of preceding tensions rooted in competition amongst local chiefdoms for trade at Delagoa Bay, increased demand for ivory by European traders, and droughts severely impacted maize-dependent communities. The steady rise of chiefdoms, such as the Mabhudu, Ndwande, Qwabe and Mtethwa, meant that rulers expanded their patronage networks by conquering a competitor's land and people. Smaller chiefdoms caught up in the conflict fled and either attacked or merged with neighbouring populations. This political unrest would be followed by a similar uprising, the Mfecane (ca. 1818-1840 CE) (Ross 1999; Bonner 2002; Chewins 2016). European traders, travellers, and missionaries encountered Khoisan and African farmers during this time. Subsequent relations, with negative and positive impacts, continued into the 20th century (e.g., Hall 1987).

5.1 Area of interest: Thabazimbi

Within the Sashe-Limpopo area, Stone- and Iron Age archaeological sites (e.g., Huffman et al. 2020; Wadley et al. 2016; Val et al. 2021) are common. The region was also home to varied cultural identities that interacted with one another throughout time (e.g. van Doornum 2008). Early Stone Age sites are not numerous within the study area (e.g., van Schalkwyk 1994; Wadley et al. 2016; Birkholtz & Birkholtz 2017). Middle and Later Stone Age occupations occur more towards the north of the Limpopo Province within the Waterberg plateau (Wadley et al., 2016; Val et al., 2021).

Thabazimbi is known for its iron ore, and Iron Age sites are relatively common in the area as the region provides ore for mining and fertile soil for crop cultivation. The Rhino Early Iron Age site is dated to 476–636 CE and 774–880 CE. Although the site included middens, granaries and pottery, the distribution of artefacts and features indicate that it was once a large settlement - some 150 m across. In this regard, Rhino Village was more extensive than a typical Early Iron Age homestead. At the same time, the distribution of granaries, middens and stone-filled pits conforms to the back arc of a single settlement. Thus, the site was probably home to a succession of hereditary leaders (Hufffman et al., 2020). Middle Iron Age sites are absent from the area. Late Iron Age sites in the vicinity of Thabazimbi include Madikwe Village, Rhenosterkloof 1, and more than 40 other sites within the Rooiberg Valley (Bandama 2013). These sites are associated with Sotho-Tswana and Nguni-speaking communities who have resided in the region since the 16th century. Before the arrival of Europeans, Bantu-speaking communities were organised in centralised states of varying sizes and survived through hunting, herding and agriculture while engaging in trade relations with one another (Huffman 2007; Stapleton 2010; Bandama 2013).

Existing socio-economic and political tension between chiefdoms and encroaching Europeans probably impacted chiefdoms residing in present-day Thabazimbi. During the mid-1820s, Mzilikazi became caught up in the Ndwandwe-Zulu conflict and began to absorb local Sotho- and Tswana-speaking communities residing in the former Transvaal province. By the mid-1830s, the Ndebele Kingdom of Mzilikazi constituted the main power on the western Highveld. Simultaneously, the 1830s also saw the expansion of Dutch-speaking migrants, who, after defeating Mzilikazi, seized power on the western Highveld and developed similar tributary relations with local Tswana and Sotho groups (Hall 1987; Stapleton 2010).

The first white farmers settled in this area in the late 1830s. By the 1850s, Boers controlled much of the former Transvaal (Bergh 1992). The Waterberg District was created in March 1866, and in 1877 the British annexed the region (Vig 2018). Between the 1840s and 1870s, several violent frontier conflicts took place in the Waterberg district. Boer commandos demanded cattle and labour from the local communities. Some local headmen, Makopane (Kekana) and Mankopane (Langa), who resisted, saw their people being slaughtered. In the Pedi wars between 1876 and

1879, Sekhukhune surrendered to Boer forces and the British (Mohlamme 1999; Stapleton 2010).

The discovery of gold in the Zuid Afrikaansche Republiek in 1886 caused regional economic power for the Boer republics of the Transvaal and the Orange Free State. By 1899, as the chances of a diplomatic settlement over matters diminished, the South African War (1899-1902) broke out (Stapleton 2010). The Waterberg commando was involved at Rhodes' Drift, near Tuli, to reinforce the Soutpansberg commando, and eventually, these commandos left for the southern borders of the Transvaal after losing against the British and Bangwata (Parsons 1999). Eight years after the South African War, the Union of South Africa was established shortly after World War I (1914-1918) broke out (Stapleton 2010). Before the Second World War (1939 – 1945), the Thabazimbi Iron Ore mine was established in 1934 by Iscor on the farm Kwaggashoek (Deats & Seligmann 1964). The modern-day town of Thabazimbi, meaning 'mountain of iron', was proclaimed in May 1953 (Raper 1987).

6. HERITAGE SENSITIVITY

The Heritage Screening tool (https://screening.environment.gov.za/) shows low significance with locations of very high and high sensitivity towards the northeast, east, southeast and southwest of the prosed project areas.

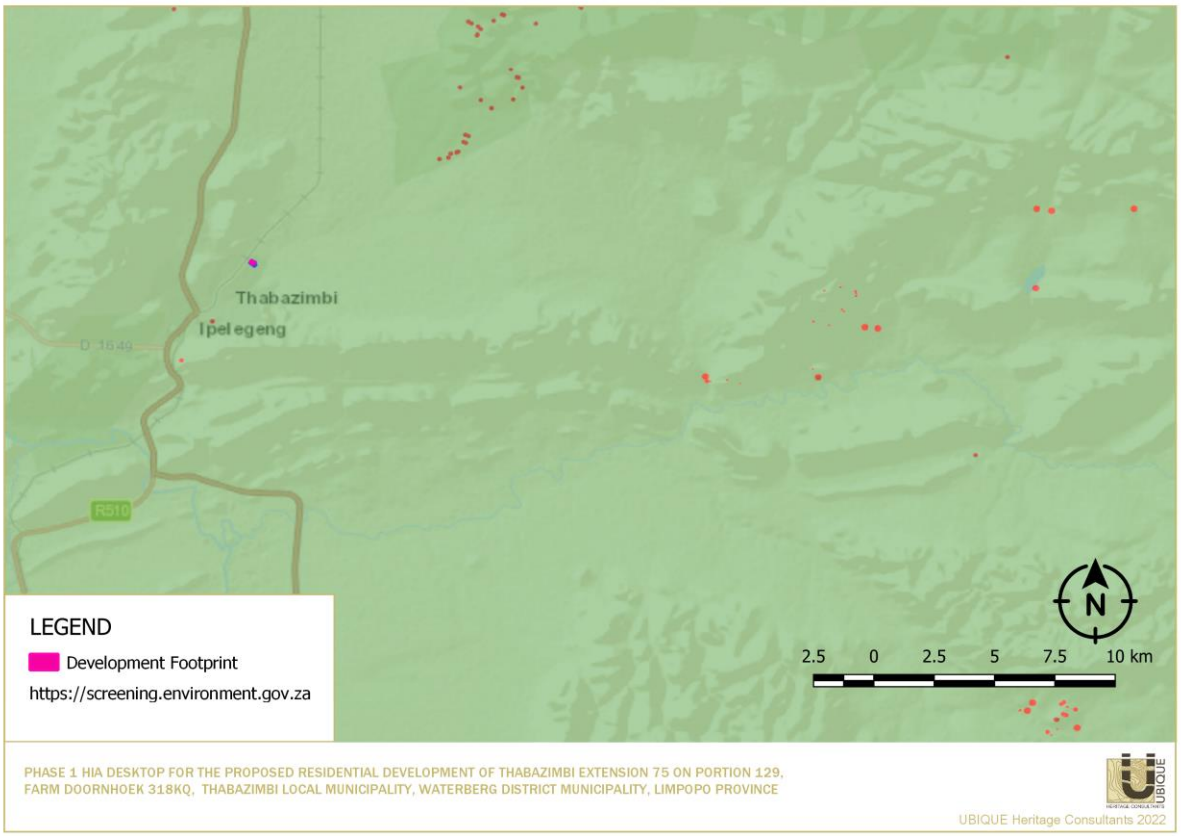

Figure 8 *The Project area indicated on the Heritage Screening tool (https://screening.environment.gov.za/)*

6.1 Summary of Local Heritage Resources: Thabazimbi

Numerous heritage and archaeological studies were undertaken in the immediate surroundings of the present study area. Assessments had been conducted on or directly adjacent to the proposed areas for development, such as the farms Doornhoek, Randstephne, Donkerpoort, Aapiesdoorn, Dwaalboom, Rhino Andalusite and Amandelbult Mines. Most assessments encountered minimal or no archaeological features (e.g., Fourie 2007, 2012; Maguire & van Wyk 2009; Birkholtz & Birkholtz 2017; Kruger 2021). Others did observe archaeological sites (e.g., Gaigher 2007; Miller 2011; van der Walt 2016). The Amandelbult and Rhino Andalusite Mine areas, located 5 km to 10 km south and west of the study area, have been extensively surveyed (e.g. Van Schalkwyk 1994;

Huffman 2006). The 1994 survey identified several (more than 50) archaeological and heritage sites, including Stone Age sites and occurrences, Early Iron Age sites, Late Iron Age stonewalled settlements, historic homesteads and settlements and cemeteries. Similarly, at the Rhino Andalusite Mine, several Early and Late Iron Age sites were recorded and excavated (Huffman 2006). The closest archaeological finds to the study area on Farm Doornhoek 318 KQ is of the Late Iron Age and Historical periods.

ARCHAEOLOGICAL RESOURCES RECORDED IN X KM RADIUS			
HIA/AIA	SITE	COORDINATES PROXIMITY TO STUDY AREA	HERITAGE RESOURCES
Doornhoek 318 KQ, Thabazimbi	2427CB-MHC001	-24.55180951; 27.40326583 10 km north	Possible historic era grave
Doornhoek 318 KQ, Thabazimbi	2427CB-MHC002	-24.55169686; 27.42762566 -24.55309697; 27.42622554 10 km north	Late Iron age Site consisting of cattle enclosure, grain bin platforms and lower grindstones and ceramics scattered over a large area
Doornhoek 318 KQ, Thabazimbi	2427CB-MHC003	-24.55153593; 27.42838740 10 km north	Late Iron Age smelting site and small scatters of iron slag occur
Doornhoek 318 KQ, Thabazimbi	2427CB-MHC004	-24.55513545; 27.42933154 10 km north	Late Iron Age smelting site and small scatters of iron slag occur
Doornhoek 318 KQ, Thabazimbi	2427CB-MHC005	-24.53476676; 27.43432045 10 km north	Possible historic era grave
Doornhoek 318 KQ, Thabazimbi	2427CB-MHC006	-24.54434761; 27.42542624 10 km north	Late Iron Age Small scatters of ceramics exposed through erosion
Doornhoek 318 KQ, Thabazimbi	2427CB-MHC007	-24.54610177; 27.42872536 -24.54845139, 27.43459404 10 km north	Late Iron Age Site consists of grain bin platforms, lower grindstones, ceramic- and slag scatters

ARCHAEOLOGICAL RESOURCES RECORDED IN X KM RADIUS

HIA/AIA	SITE	COORDINATES / PROXIMITY TO STUDY AREA	HERITAGE RESOURCES
Randstephne 455, Donkerpoort 448KQ, Waterval 443	PERREIRA GRAVE.	-24 37 03, 1; 27 36 22, 4 25 km east	Gravestone of one J.H. TO Perriera, Kruitmaker from 1881 ZAR, was murdered in 1901.
Randstephne 455, Donkerpoort 448KQ, Waterval 443	GATKOP CAVE	-24 37 04, 6; 27 39 08, 4 25 km east	In front of the cave is evidence of the site's continuous use for ancestral worship. An old notice erected by the Magistrate of 'Warmbad' (now Bela-Bela) warns of the presence of 'grotkoors', an illness resulting from inhalation of miasma from bat guano.
Randstephne 455, Donkerpoort 448KQ, Waterval 443	RANDSTEPHNE HOMESTEAD	-24 35 51, 9; 27 40 17, 8 25 km east	1920's era farmhouse
Randstephne 455, Donkerpoort 448KQ, Waterval 443	LABOURERS CEMETARY	-24 35 53, 8; 27 40 36, 3 25km east	Farm labourers Cemetary
Randstephne 455, Donkerpoort 448KQ, Waterval 443	CATTLE ENCLOSURES	-24 37 10, 1; 27 36, 29, 8 25 km east	Late Iron Age 1800s, five stonewalled cattle enclosures
Randstephne 455, Donkerpoort 448KQ, Waterval 443	PRE-COLONIAL MINE	-24 35 28, 4; 27 39, 46, 8 25 km east	Late Iron Age ore mining activities
Randstephne 455, Donkerpoort 448KQ, Waterval 443	LIVING ENCLOSURE.	-24 35 02,84; 27 40 04,62 25 km east	Small Iron Age village
Randstephne 455, Donkerpoort 448KQ, Waterval 443	SMELTING SITE.	-24 35 06, 1; 27 40 04, 97 25 km east	Metal slag and pieces of tuyere from the smelting site.
Randstephne 455, Donkerpoort 448KQ, Waterval 443	IRON AGE SETTLEMENT.	-24 37 08, 01; 27 36 54, 19 25 km east	Late Iron Age 1800s. Several stone-built enclosures present
Randstephne 455, Donkerpoort 448KQ, Waterval 443	BRIDGES	-24 37 10, 03; 27 36 24, 85 25 km east	Historic era bridges
Portion 6 of the Farm Aapiesdoorn 316 KQ.	LATE IRON AGE STONE WALLING	24° 35' 44.7044; 27° 23' 07.5013" E 5km west	Ephemeral stone walling

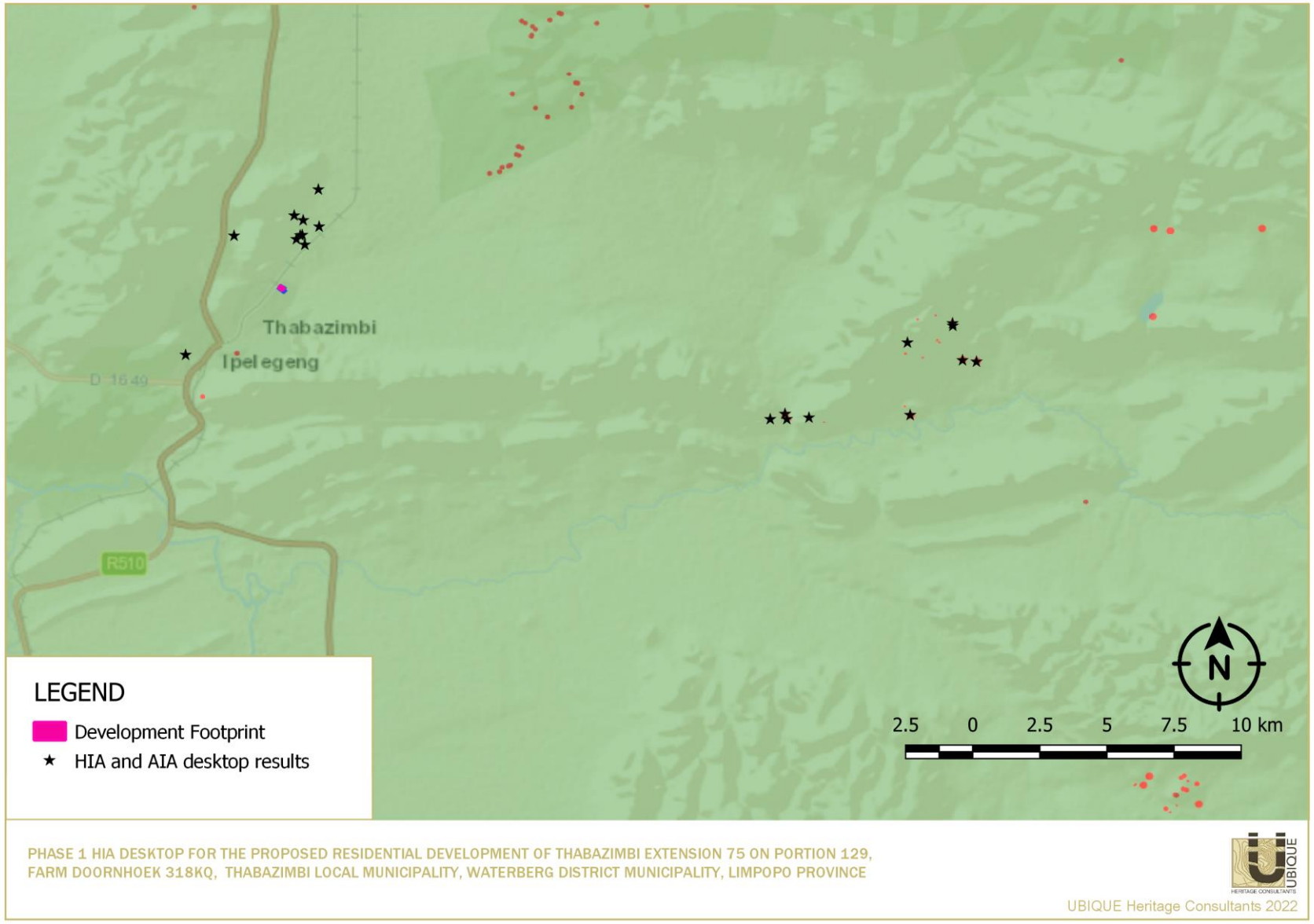

Figure 9 Heritage resources recorded from previous HIA/AIAs in the area, added to the Heritage Screening tool (https://screening.environment.gov.za/)

6.2 Summary of Palaeontological Heritage

According to the SAHRIS PaleoSensitivity Map, the development footprint falls in an area of moderate paleontological significance, and a desktop is required.

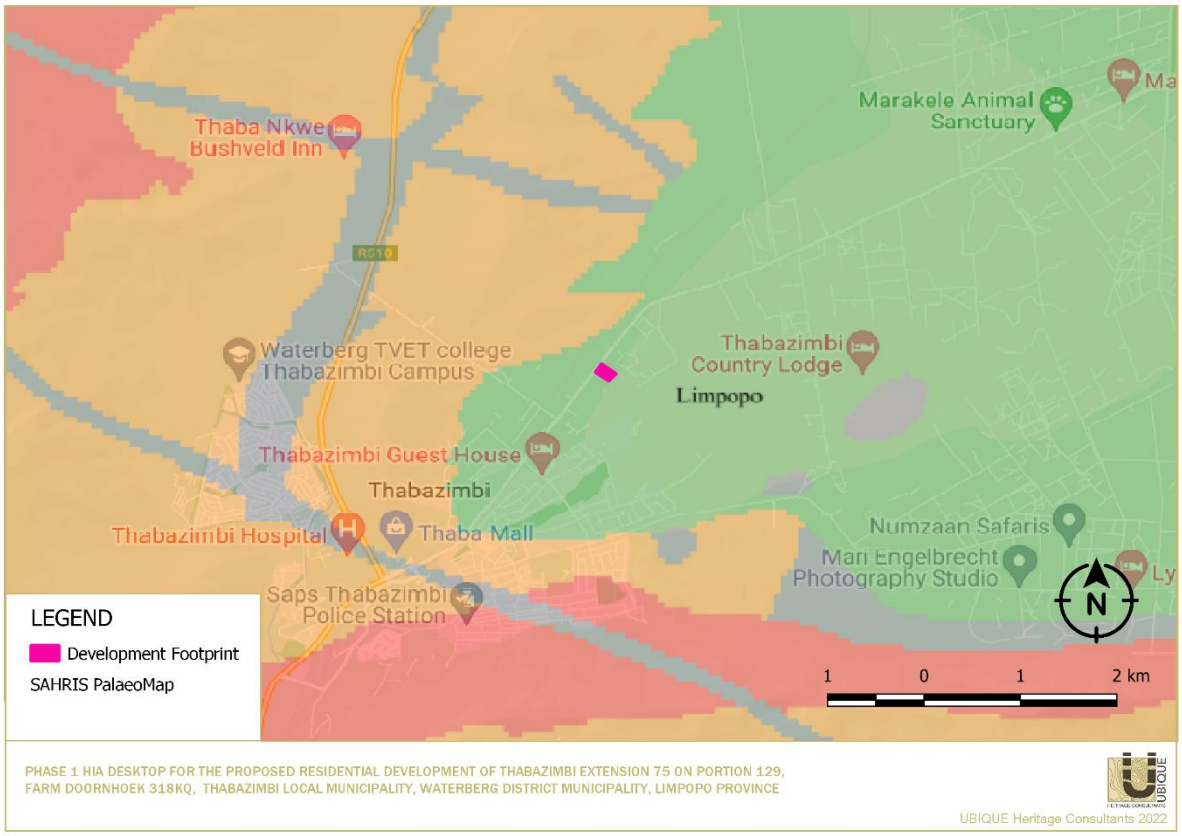

Figure 10 *The development footprint indicated on the SAHRIS PalaeoSensitivity Map: Where Blue is Low, Green is Moderate, Orange is High, and Red is Very High Palaeontological Sensitivity (https://sahris.sahra.org.za/map/palaeo)*

Elize Butler (2022 Appendix B) completed the palaeontological desktop on behalf of UBIQUE Heritage Consultants. She concluded that the development is underlain by Tertiary to superficial Quaternary sediments. Underlying these surface deposits (at depth) is the Timeball Hill Formation of the Pretoria Group (Transvaal Supergroup). The PalaeoMap of the South African Heritage Resources Information System indicates that the Palaeontological Sensitivity of the superficial deposits is moderate. In this development, the Timeball Hill Formation sediments have a Very High Palaeontological Sensitivity but will not be impacted. Therefore, a Low Palaeontological Significance has been allocated to the proposed development. The project may be authorised, as the whole extent of the development footprint is not considered sensitive in terms of palaeontological heritage (Butler 2022 Appendix B).

7. CONCLUSION

In conclusion, the HIA Desktop Study has found no Heritage and Archaeological Impact Assessments on the proposed development area. However, heritage sites and resources ranging from low to high significance have been documented on the periphery of a 5 -20 km radius from the study area. These sites provide the reader with the data necessary to anticipate the sites' probable significance that might accompany any projected heritage resource.

The background study revealed that the most documented lithic material is of low and medium significance. These sites are predominantly open-air sites with low-density surface scatters or isolated occurrences. Due to the proposed development areas within the town and the previous and current informal occupation and surface disturbance, any above-ground lithic material would likely be out of context. Therefore, it is considered that the occurrence of lithic material within the development areas is low. However, the possibility of open-air Stone Age sites/occurrences in the development area should not be disregarded.

Iron Age sites have been recorded approximately 10 to 50 km around the proposed development area. However, the development area is situated within the townscape, which has already been disturbed. Therefore, the likelihood of such sites being present in the development area is low.

Archaeological traces of historical/colonial era features and artefacts attributed to the representation of the regional colonial farming history, colonial settlement, and the Anglo-Boer War have been recorded in the wider region. The area was established and occupied during the mid-1800s. Thus, the development areas' colonial-era material and features (such as middens, artefacts and structural features) are probable. However, any above-ground colonial material would likely be out of context due to the previous and current informal occupation and surface disturbance.

The probability of graves and burials is low. However, the likelihood of graves and burials should not be disregarded since graves and informal cemeteries can be expected anywhere in the landscape. For example, family cemeteries can be anticipated close to farmsteads, while informally marked graves containing fieldstone cairns and headstones may be found in the veldt.

A Low Palaeontological Significance has been allocated to the proposed development. The project may be authorised, as the whole extent of the development footprint is not considered sensitive in terms of palaeontological heritage

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APPENDIX A

ARCHAEOLOGICAL CHANCE FIND PROTOCOL

CHANCE FIND PROTOCOL

The following section aims to assist the developer in identifying and managing heritage resources during development proactively. The Chance Find Protocol is not intended to replace heritage assessment or site interpretation. However, it is a visual guide of the most recognisable heritage resources expected in the study area, based on the results of the Desktop Study.

STONE AGE FINDS

We can assume that stone tools dating from the ESA, MSA, and LSA may be present within the study area. Low-density (low-density =< 10 lithics per m^2; high-density => 10 lithics per m^2) open-air surface scatters are the most common lithic occurrence documented by previous HIA/AIAs within the region.

Stone tools can be present in sediments near rivers, pans, or elevated outcrops and rock shelters around water sources. Stone Age debris is also commonly found around drainage lines and exposed surfaces. Stone tools comprise any lithic material that has been shaped or flaked by cognisant anthropogenic activity. These include informal lithics like flakes or knapping waste or formally shaped tools like retouched flakes, scrapers, blades and handaxes.

The Later Stone Age period included coarse low-fired earthenware associated with the lithics. In addition, upper and lower grindstones might be present on settlement sites.

Figure 11 *Selection of various formal and informal ESA, MSA, and LSA stone tools. LSA lithics may be accompanied by coarse low-fired earthenware. Photos: UBIQUE Heritage Consultants.*

CHANCE FIND PROTOCOL

ROCK ART FINDS

Rock art can be present in open-air sites and shelters such as rock overhangs and caves. However, the conditions in shelters and caves are more conducive to preserving painted rock art, whereas engravings and petroglyphs are more likely to survive in open-air sites. Therefore, in the study area, the presence of rock art is improbable.

Different groups throughout southern Africa have left their mark on rocks. From Khoi-San and African groups depicting animals and scenes from their environment to travellers, settlers, missionaries and soldiers, writing their initials, names and dates, and drawings of flags, figures, and even a checkers/chessboard has been recorded.

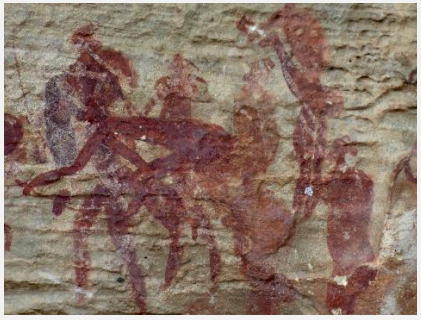

Figure 12 *Examples of rock art and historical graffiti. Photos: UBIQUE Heritage Consultants.*

CHANCE FIND PROTOCOL

IRON AGE FINDS

Iron Age settlement sites characteristically have circular scalloped stonewalled enclosures, livestock kraals and circular house structures. Generally, artefacts can be found around/inside the circular structures.

Middens are rubbish dumps associated with the remains of structures. More extensive communal middens are often present at Iron Age Sites. Middens are identifiable by ash deposits and concentrations of artefacts such as earthenware pottery, glass, clay, and Ostrich Eggshell (OES) beads and fresh-water shell beads, as well as faunal material. In addition, upper and lower grindstones might be present on the surface.

Figure 13 *Iron Age house structures, livestock kraals, upper grindstone, in situ potsherds, surface scatter potsherds and beads. Photos: UBIQUE Heritage Consultants.*

CHANCE FIND PROTOCOL

HISTORICAL PERIOD FINDS

The Historical Period manifests within the landscape as a variety of different features. For example, sites can vary from permanent settlements like farmscapes or ephemeral like military encampments. Any structure older than 60 years falls under the purview of the NHRA and should be assessed for its unique significance. Structures' construction can range from fieldstone, low-fired mud brick, or bricks and concrete.

Middens, or rubbish dumps, associated with structures or an encampment site can hold valuable archaeological information. Middens are identifiable in the landscape by ash deposits and concentrated surface distribution of artefacts, such as glass, ceramics, and metal.

Figure 14 *Various Historical structures. Photos: UBIQUE Heritage Consultants.*

CHANCE FIND PROTOCOL

Figure 15 *Various Historical artefacts (i-o). Photos: UBIQUE Heritage Consultants.*

GRAVES

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

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

Should it be impossible to avoid graveyard(s), grave(s) or burial(s) sites with the final development, mitigation in the form of grave relocation could be undertaken. This is, however, a lengthy and costly process. Grave relocation specialists must be employed to manage the liaison process with the communities and individuals who might be interested in these graves or burial grounds by tradition or familial association. They will manage the permit acquisition from the SAHRA Burial Grounds and Graves (BGG) Unit and the arrangements for the exhumation and re-interment of the contents of the graves.

CHANCE FIND PROTOCOL

Figure 16 *Various grave treatments, formal and informal. Photos: UBIQUE Heritage Consultants.*

WHAT TO DO

Hidden or sub-surface sites may exist in the area. Sub-surface testing cannot be conducted without a permit; therefore, sites may be missed during a field assessment.

Suppose any evidence of archaeological sites as discussed or other heritage resources are uncovered during development, the development activities should halt. SAHRA's APM Unit (Natasha Higgitt/Phillip Hine 021 462 5402) must be alerted per section 35(3) of the NHRA. In addition, if unmarked human burials are discovered, the SAHRA Burial Grounds and Graves (BGG) Unit (Thingahangwi Tshivhase 012 941 4960) must be alerted immediately as per section 36(6) of the NHRA.

A professional archaeologist or palaeontologist must be contracted as soon as possible to inspect the findings. If the newly unearthed heritage resources are of high significance, a Phase 2 rescue operation may be required with permits issued by SAHRA.

Contact UBIQUE Heritage Consultants: info@ubiquecrm.com / heidi@ubiquecrm.com / jan@ubiquecrm.com

APPENDIX B

PALAEONTOLOGICAL DESKTOP ASSESSMENT TOWNSHIP ESTABLISHMENT, THABAZIMBI, LIMPOPO PROVINCE

BANZAI ENVIRONMENTAL

PALAEONTOLOGICAL DESKTOP ASSESSMENT TOWNSHIP ESTABLISHMENT THABAZIMBI LIMPOPO PROVINCE

July 2022

COMPILED FOR:

UBIQUE HERITAGE CONSULTANTS

Declaration of Independence

I, Elize Butler, declare that –

General declaration:

- I act as the independent palaeontological specialist in this application
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant
- I declare that there are no circumstances that may compromise my objectivity in performing such work.
- I have expertise in conducting palaeontological impact assessments, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity.
- I will comply with the Act, Regulations, and all other applicable legislation.
- I will consider, 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 are 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 as a palaeontological specialist in terms of the Act and the constitutions of my affiliated professional bodies; and
- I realize that a false declaration is an offence in terms of regulation 71 of the Regulations and is punishable in terms of section 24F of the NEMA.

Disclosure of Vested Interest

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

PALAEONTOLOGICAL CONSULTANT: Banzai Environmental (Pty) Ltd

CONTACT PERSON: Elize Butler

Tel: +27 844478759

Email: elizebutler002@gmail.com

SIGNATURE: 

This Palaeontological Impact Assessment report has been compiled considering the National Environmental Management Act 1998 (NEMA) and Environmental Impact Regulations 2014 as amended, requirements for specialist reports, Appendix 6, as indicated in the table below.

Table 1: NEMA Table

Requirements of Appendix 6 – GN R326 EIA Regulations of 7 April 2017	Relevant section in report
1.(1) (a) (i) Details of the specialist who prepared the report	Page ii and Section 2 of Report – Contact details and company and Appendix A
(ii) The expertise of that person to compile a specialist report including a curriculum vitae	Section 2 – refer to Appendix A
(b) A declaration that the person is independent in a form as may be specified by the competent authority	Page ii of the report
(c) An indication of the scope of, and the purpose for which, the report was prepared	Section 4 – Objective
(cA) An indication of the quality and age of base data used for the specialist report	Section 5 – Geological and Palaeontological history
(cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	Section 9
(d) The duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment	Desktop 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 Approach and Methodology
(f) details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternative;	Section 1 and 10
(g) An identification of any areas to be avoided, including buffers	Section 5 No buffers or areas of sensitivity identified

Requirements of Appendix 6 – GN R326 EIA Regulations of 7 April 2017	Relevant section in report
(h) A map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;	Section 5 – Geological and Palaeontological history
(i) A description of any assumptions made and any uncertainties or gaps in knowledge;	Section 7.1 – Assumptions and Limitation
(j) A description of the findings and potential implications of such findings on the impact of the proposed activity, including identified alternatives, on the environment	Section 1 and 10
(k) Any mitigation measures for inclusion in the EMPr	Section 1 and 10
(l) Any conditions for inclusion in the environmental authorisation	Section 1 and 10
(m) Any monitoring requirements for inclusion in the EMPr or environmental authorisation	Section 1 and 10
(n)(i) A reasoned opinion as to whether the proposed activity, activities or portions thereof should be authorised and	Section 1 and 10
(n)(iA) A reasoned opinion regarding the acceptability of the proposed activity or activities; and	
(n)(ii) If the opinion is that the proposed activity, activities, or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan	Section 1 and 10
(o) A description of any consultation process that was undertaken during the course of carrying out the study	N/A
(p) A summary and copies if any comments that were received during any consultation process	N/A
(q) Any other information requested by the competent authority.	N/A
(2) Where a government notice by the Minister provides for any protocol or minimum information requirement to	Section 3 compliance with SAHRA guidelines

Requirements of Appendix 6 – GN R326 EIA Regulations of 7 April 2017	Relevant section in report
be applied to a specialist report, the requirements as indicated in such notice will apply.	

EXECUTIVE SUMMARY

Banzai Environmental was appointed by UBIQUE Heritage Consultants to conduct the Palaeontological Desktop Assessment (PDA) to assess the proposed Thabazimbi Extension 75 on Portion 129 of the farm Doornhoek 318KQ Thabazimbi Local Municipality, Waterberg District Municipality in Limpopo. In accordance with the National Environmental Management Act 107 of 1998 (NEMA) and to comply with the National Heritage Resources Act (No 25 of 1999, section 38) (NHRA), this PIA is necessary to confirm if fossil material could potentially be present in the planned development area, to evaluate the potential impact of the proposed development on the Palaeontological Heritage and to mitigate possible damage to fossil resources.

The development is underlain by Tertiary to superficial Quaternary sediments. Underlying these surface deposits (at depth) is the Timeball Hill Formation of the Pretoria Group (Transvaal Supergroup). The PalaeoMap of the South African Heritage Resources Information System indicates that the Palaeontological Sensitivity of the superficial deposits is moderate (Almond and Pether 2008, SAHRIS website). Sediments of the Timeball Hill Formation have a Very High Palaeontological Sensitivity but will not be impacted in this development.

A Low Palaeontological Significance has been allocated to the proposed development. The construction of the project may be authorised, as the whole extent of the development footprint is not considered sensitive in terms of palaeontological heritage. If fossil remains or trace fossils are discovered during any phase of construction, either on the surface or exposed by excavations, the Environmental Control Officer (ECO) in charge of these developments must report to SAHRA (Contact details: SAHRA, 111 Harrington Street, Cape Town. PO Box 4637, Cape Town 8000, South Africa. Tel: 021 462 4502. Fax: +27 (0)21 462 4509. Web: www.sahra.org.za) so that mitigation can be carried out by a palaeontologist.

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

Impact Summary

Environmental parameter	Issues	Rating prior to mitigation	Average	Rating post mitigation	Average
Construction of the residential development Loss of fossil heritage	Destroy or permanently seal-in fossils at or below the surface that are then no longer available for scientific study	30	Negative Medium impact	15	Negative Low impact

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Appendix A: CV

INTRODUCTION

Bertie Joubert Eiendomme Lephalale CC plans to develop a residential township known as Thabazimbi Extension 75 on Portion 129 of the Farm Doornhoek 318KQ. The project site is owned by the applicant. The property is zoned for 'Agriculture' and currently lies fallow. By establishing the township, the applicant intends to generate an income from the property while addressing the high demand for housing in Thabazimbi. The intention is to establish a 2.4-hectare residential township comprising 35 stands on Portion 129 of the farm Doornhoek 318KQ which will tap into municipal services except for electricity which would be provided by Eskom. The township will consist of the following:

- 33 "Residential 1" erven with varying sizes (500m^2 and 700m^2) for dwellings
- 1 'Special" erf for the purposes of a Guard House/Access Control " of approximately 150m^2;
- 1 "Private Road" erf for the internal road network with a way width of 5 meters within a 10m road
  road reserve.

The development density will be low with a ratio of 13.74 units per ha and will be limited to a building height of 2-storeys. The township construction period will be 24 months[1].

[1]Information provided by Naledzi Environmental Consultants Pty Ltd.

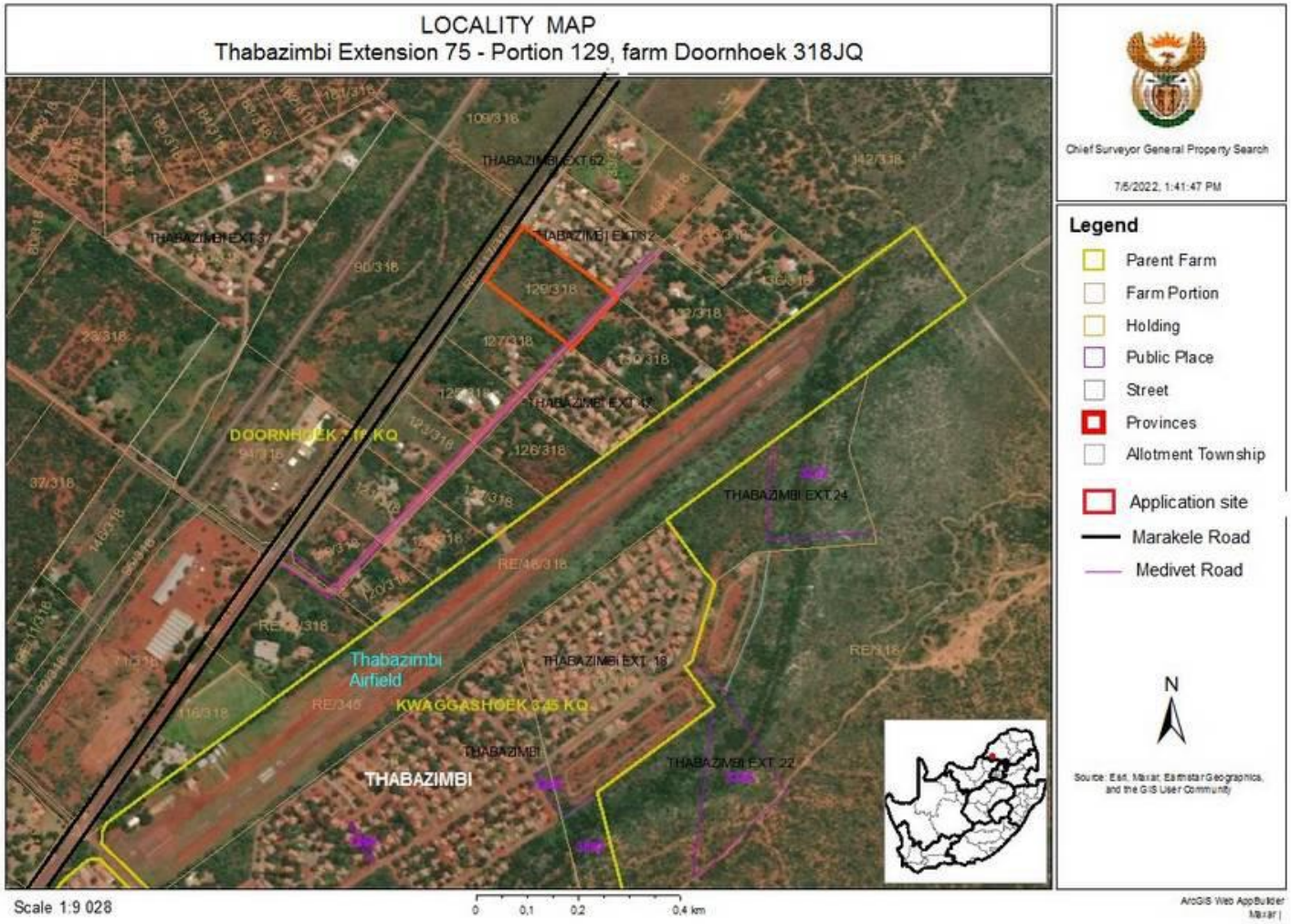


Figure 17: *Proposed Thabazimbi Extension 75 on Portion 129 of the Farm Doornhoek 318KQ in Limpopo.*

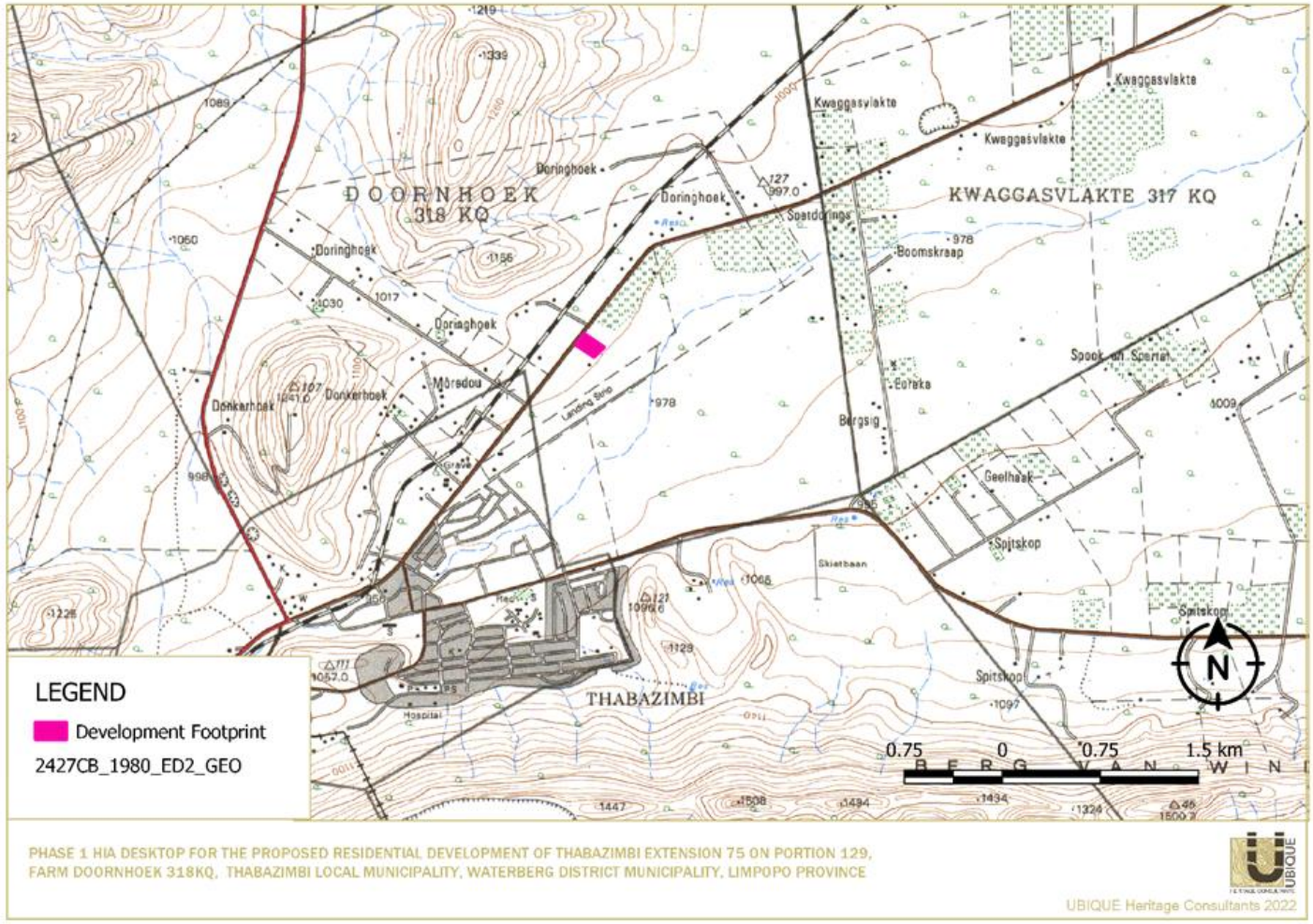


***Figure 18**: Topographical Image (sheet 2427 CB Thabazimbi) indicating the locality of the proposed residential development on Portion 129 of the farm Doornhoek 318KQ in Limpopo in the Northern Cape.*

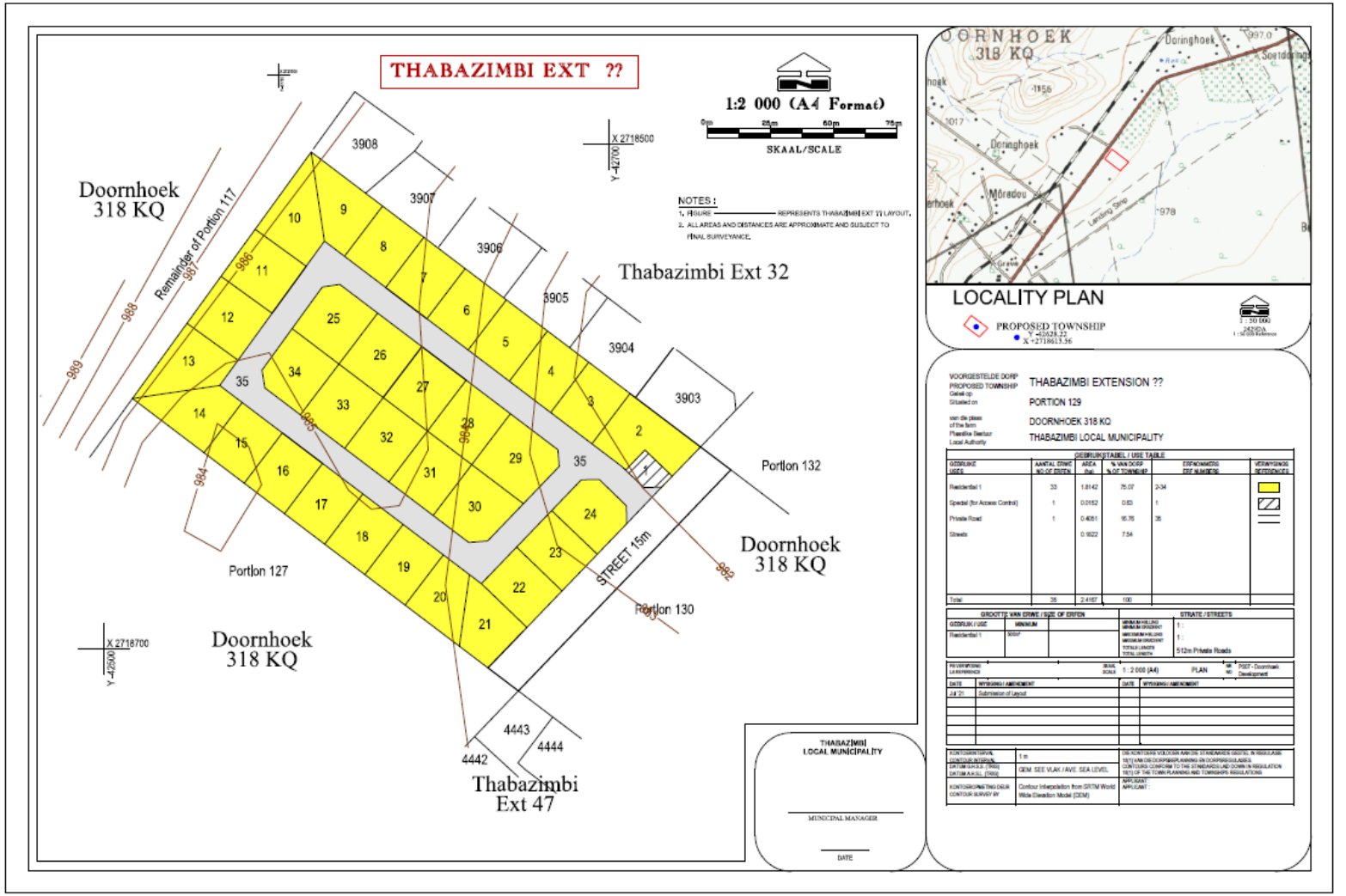


***Figure 19**: Proposed residential development, image provided by the client.*

QUALIFICATIONS AND EXPERIENCE OF THE AUTHOR

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

LEGISLATION

National Heritage Resources Act (25 of 1999)

Cultural Heritage in South Africa, including 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".

The identification, evaluation and assessment of any cultural heritage site, artefact or finds in the South African context is required and governed by the following legislation:

- National Environmental Management Act (NEMA) Act 107 of 1998
- National Heritage Resources Act (NHRA) Act 25 of 1999
- Notice 648 of the Government Gazette 45421- general requirements for undertaking an initial site sensitivity verification where no specific assessment protocol has been identified.

The next section in each Act is directly applicable to the identification, assessment, and evaluation of cultural heritage resources.

GNR 982 (Government Gazette 38282, 14 December 2014) promulgated under the National Environmental Management Act (NEMA) Act 107 of 1998

- Basic Assessment Report (BAR) – Regulations 19 and 23
- Environmental Impacts Assessment (EIA) – Regulation 23
- Environmental Scoping Report (ESR) – Regulation 21

- Environmental Management Programme (EMPr) – Regulations 19 and 23

National Heritage Resources Act (NHRA) Act 25 of 1999

- Protection of Heritage Resources – Sections 34 to 36
- Heritage Resources Management – Section 38

The NEMA (No 107 of 1998) states that an integrated EMP should (23:2 (b)) "*…identify, predict and evaluate the actual and potential impact on the environment, socio-economic conditions and cultural heritage*".

In agreement with legislative requirements, EIA rating standards, as well as SAHRA policies, the following comprehensive and legally compatible PIA reports have been compiled.

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

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

- The construction of a road, wall, power line, pipeline, canal or other similar forms of linear development or barrier exceeding 300 m in length;
- The construction of a bridge or similar structure exceeding 50 m in length;
- Any development or other activity which will change the character of a site—
  exceeding 5 000 m^2 in extent; or
- Involving three or more existing erven or subdivisions thereof; or
- Involving three or more erven or divisions thereof which have been consolidated within the past five years; or
- The costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority;
- The re-zoning of a site exceeding 10 000 m² in extent; or
- Any other category of development provided for in regulations by SAHRA or a Provincial heritage resources authority.

OBJECTIVE

The aim of a PIA is to decrease the effect of the development on potential fossils at the development site.

According to the "SAHRA Archaeology, Palaeontology and Meteorites (APM) Guidelines: Minimum Standards for the Archaeological and Palaeontological Components of Impact Assessment Reports," the purpose of the PIA is: 1) to identify the palaeontological importance of the rock formations in the footprint; 2) to evaluate the palaeontological magnitude of the formations; 3) to clarify the impact on fossil heritage, and 4) to suggest how the developer might protect and lessen possible damage to fossil heritage.

The palaeontological status of each rock section is calculated as well as the possible impact of the development on fossil heritage by a) the palaeontological importance of the rocks, b) the type of development, and c) the quantity of bedrock removed.

When the development footprint has a moderate to high palaeontological sensitivity, a field-based assessment is necessary. The desktop and the field survey of the exposed rock determine the impact and significance of the planned development, and recommendations for further studies or mitigation are made. Destructive impacts on palaeontological heritage usually only occur during the construction phase. At the same time, the excavations will change the current topography and destroy or permanently seal-in fossils at or below the ground surface. Fossil Heritage will then no longer be accessible for scientific research.

Mitigation usually precedes construction or may occur during construction when potentially fossiliferous bedrock is exposed. Mitigation comprises the collection and recording of fossils. For the excavation of any fossils, a permit from SAHRA must be obtained, and the material will have to be housed in a permitted institution. When mitigation is applied correctly, a positive impact is possible because our knowledge of local palaeontological heritage may be increased.
The terms of reference of a PIA are as follows:

General Requirements:

- Adherence to the content requirements for specialist reports in accordance with Appendix 6 of the EIA Regulations 2014, as amended.
- Adherence to all applicable best practice recommendations, appropriate legislation, and authority requirements.
- Submit a comprehensive overview of all appropriate legislation and 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 the Palaeontological and geological history of the affected area.

Identify sensitive areas to avoid (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 result from the incremental impact of the proposed activity on a common resource when added to the impacts of other past, present, or reasonably foreseeable future activities.

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

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

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

GEOLOGICAL AND PALAEONTOLOGICAL HISTORY

The proposed Thabazimbi Extension 75 on Portion 129 of the farm Doornhoek 318KQ in Limpopo is depicted on the 1:250 000 Thabazimbi 2426 Geological map (1974) (Council of Geoscience, Pretoria) (Figure 4; Table 2). The development is underlain by Tertiary to superficial Quaternary sediments that include red and -black soil, ferricrete (Qrf), surface conglomerate, as well as fan conglomerate (QR), surface limestone and calcrete. Underlying these surface deposits is the Timeball Hill Formation of the Pretoria Group (Transvaal Supergroup). Recently updated geology maps by the Council of Geoscience (Pretoria) indicate that the proposed development is underlain by alluvium, colluvium, eluvium and gravel (Figure 5). The PalaeoMap of the South African Heritage Resources Information System indicates that the Palaeontological Sensitivity of the superficial deposits is moderate (Figure 6). Sediments of the Timeball Hill Formation have a Very High Palaeontological Sensitivity but will not be impacted in this development.

A geotechnical report was conducted for this study:

Van der Walt, M., 2021. Phase I Geotechnical Investigation: Portion 129 of the Farm Doornhoek 318-LQ, Thabazimbi.

This study found that the sediments mantling the underlying Timeball Hill Formation (Pretoria Group, Transvaal Supergroup) comprise "a thick layer of sandy hillwash underlain by a pebble marker, both classed as Recent Deposits. No residual soil or rock was encountered in the test pits. A dense to very dense ferricrete layer was generally encountered below the transported soil to the maximum excavated depth of the test pits. No boulders or sub/rock outcrop was observed on the surface during the investigation… a pebble marker was encountered across the site, and this represents the most recent major geological marker in the soil profile and occurs at the base of the transported soil. This is generally a zone of high permeability as it contains abundant gravel."
The test pits had a maximum depth of 2m, which exceeds the depth of the Thabazimbi development.

The fossil assemblages of the Tertiary to Quaternary are generally Low in diversity and occur over a wide range. These fossils represent terrestrial plants and animals with a close resemblance to living forms. Fossil assemblages include bivalves, diatoms, gastropod shells, ostracods, and trace fossils. The palaeontology of superficial deposits has been relatively neglected in the past. Fossils may comprise bones, horn corns as well as mammalian teeth. Tortoise remains have also been uncovered, as well as trace fossils which include termite and insect burrows and mammalian trackways. Amphibian and crocodile skeletons have been uncovered where the depositional settings in the past were wetter.

These superficial deposits are very important because palaeoclimatic changes are reflected in the different geological formations (Hunter et al., 2006). During the climate fluctuations in the Cenozoic Era, most geomorphologic features in southern Africa were formed (Maud, 2012). Barnosky (2005) indicated that various warming and cooling events occurred in the Cenozoic but stated that climatic changes during the last 1.8 Ma were the most drastic climate changes relative to all climate variations in the past. Climate variations that occurred in this period were both drier and wetter than the present and resulted in changes in river flow patterns, sedimentation processes and vegetation variation (Tooth et al., 2004).

The Timeball Hill Formation mantled by the superficial sediments comprises of conglomerates, diamictite, quartzite, and minor lavas with lacustrine and fluvial-deltaic mudrocks, while the overlying Klapperkop Member of the Timeball Hill Formation consists of conglomerate, quartzite, shale and siltstone (Groenewald 2014). Catuneanu & Eriksson (2002) is of the opinion that the Timball Hill Formation was deposited within a deep marine basin (Figure 7).

The Timeball Hill Formation is known to contain stromatolites and is associated with thin carbonate interbeds within turbidite sequences in the lower part of the formation (Catuneanu & Eriksson 2002). Stromatolites have not been recorded from the overlying fluvial-deltaic Klapperkop Quartzite Member. Other subunits in the Pretoria Group comprising stromatolites possibly also contain organic-walled microfossils.

Stromatolites are layered mounds, columns and sheet-like sedimentary rocks. These structures were originally formed by the growth of layer upon layer of cyanobacteria, a single-celled photosynthesizing microbe. Cyanobacteria are prokaryotic cells (the simplest form of modern carbon-bases life). Stromatolites are first found in Precambrian rocks and are known as the earliest known fossils. The oxygen atmosphere that we depend on was generated by numerous cyanobacteria photosynthesizing during the Archaean and Proterozoic Era.

Stromatolites and oolites from the Transvaal Supergroup have been described by various authors (Eriksson and Altermann, 1998). Detailed descriptions of South African Archaean stromatolites are available in the literature (Altermann, 1995; Altermann, 2001; Buick, 2001; and Schopf, 2006).

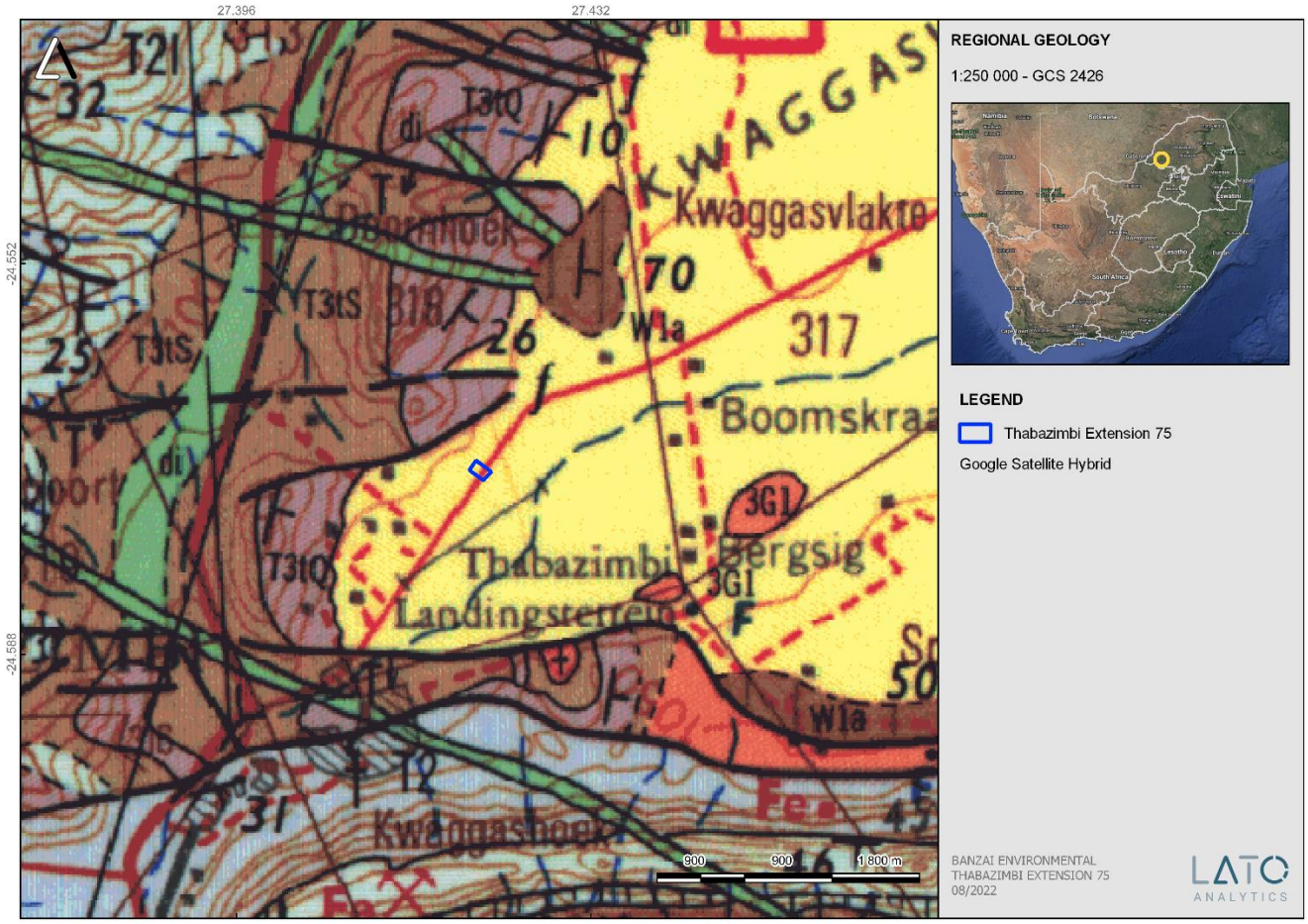
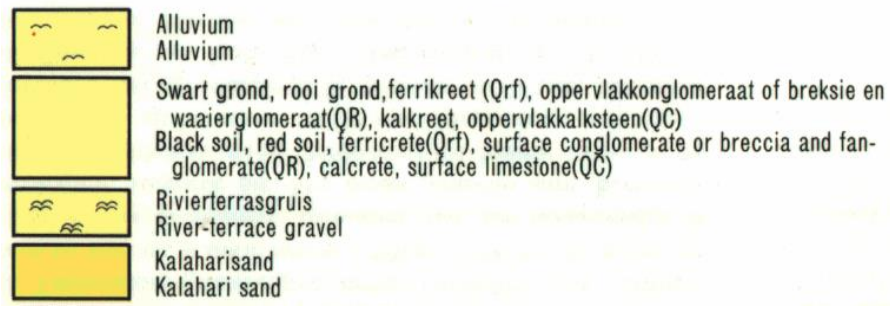


Figure 20: Extract of the 1:250 000 Thabazimbi 2426 (1974) Geological map (Council of Geoscience, Pretoria) indicating the surface geology of the proposed development, underlain by the Tertiary to Quaternary superficial deposits underlain by the Timeball Hill Formation of the Pretoria Group (Transvaal Supergroup).

Table 2: Legend of the 1:250 000 Thabazimbi 2426 Geological map (1974) (Council of Geoscience, Pretoria)



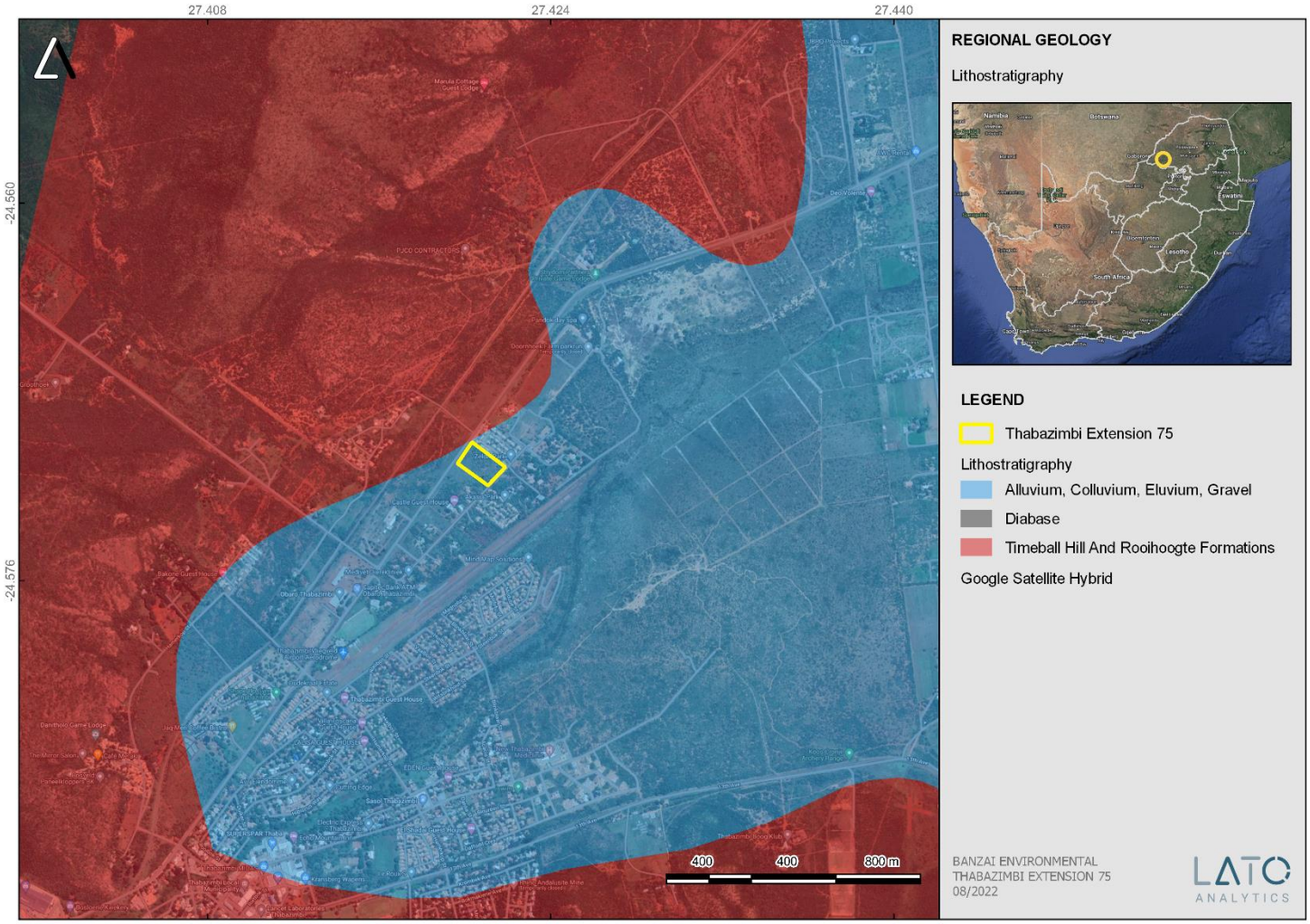


***Figure 21**: Updated geology of the proposed development indicated that the proposed development is underlain by alluvium, colluvium, eluvium and gravel.*

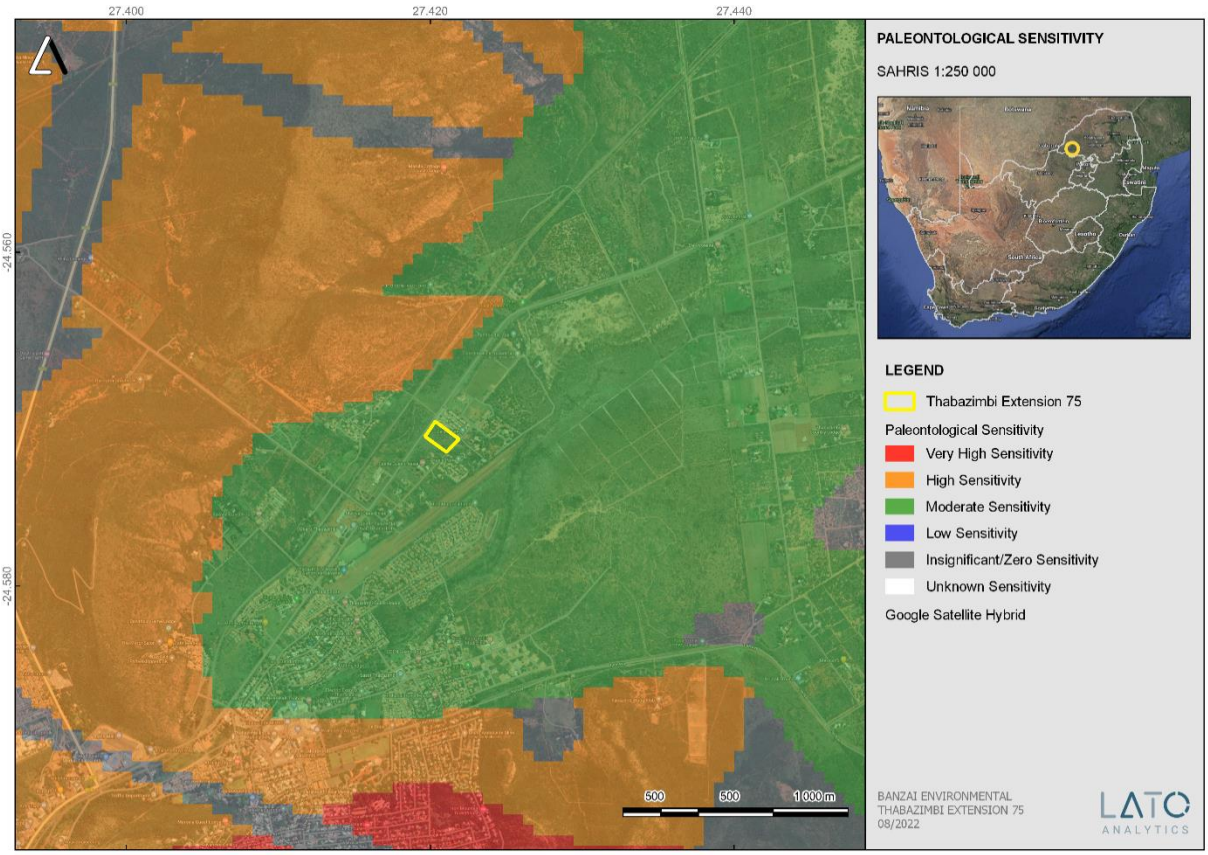


***Figure 22**: Extract of the SAHRIS PalaeoMap map (Council of Geosciences) indicating the proposed development in yellow. According to the SAHRIS Palaeosensitivity map (**Figure 6),** the proposed development is underlain by sediments with Moderate (green) Palaeontological Sensitivity.*

Table 3: Palaeontological Sensitivity on SAHRIS

Colour	Sensitivity	Required Action
RED	VERY HIGH	Field assessment and protocol for finds is required
ORANGE/YELLOW	HIGH	A desktop study is required, and based on the outcome of the desktop study; a field assessment is likely
GREEN	**MODERATE**	**A 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.

The colours on the PalaeoMap indicate the following degrees of sensitivity: red = very highly sensitive; orange/yellow = high; green = moderate; blue = low; grey = insignificant/zero.

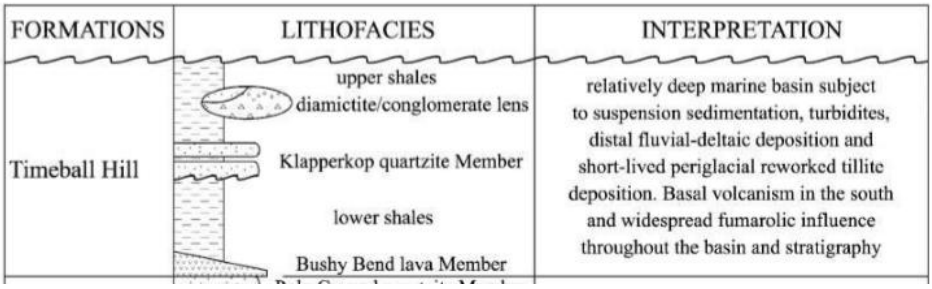


***Figure 23**: Stratigraphy and depositional settings if the Timeball Hill Formation at the base of the Pretoria succession (Catuneanu and Eriksson 2002).*

GEOGRAPHICAL LOCATION OF THE SITE

The property is situated within the jurisdiction of Thabazimbi Local Municipality along the Thabazimbi-Marakele Road (D1485), next to Zeldri Park (Thabazimbi Extension 32) and across from Akasia Park (Thabazimbi Extension 47)[1].

[1]Information provided by Naledzi Environmental Consultants (Pty) Ltd.

Table 4: GPS coordinates

	Latitude	Longitude
Northern corner	24°34'12.44"S	27°25'13.14"E
Western corner	24°34'15.73"S	27°25'10.76"E
Southern Corner	24°34'19.15"S	27°25'15.91"E
Eastern corner	24°34'16.33"S	27°25'18.69"E

METHODS

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

Assumptions and Limitations

When conducting a PIA, several factors can affect the accuracy of the assessment. The focal point of geological maps is the geology of the area, and the sheet explanations were not meant to focus on palaeontological heritage. Many inaccessible regions of South Africa have not been reviewed by palaeontologists, and data is generally based on aerial photographs. Locality and geological information of museums and universities databases have not been kept up to date, or data collected in the past have not always been accurately documented.

Comparable Assemblage Zones in other areas are used to provide information on the existence of fossils in an area which was not yet been documented. When similar Assemblage Zones and geological formations for Desktop studies are used, it is generally **assumed** that exposed fossil heritage is present within the footprint.

ADDITIONAL INFORMATION CONSULTED

In compiling this report, the following sources were consulted:

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

1: 250 000 Thabazimbi 2426 (1988 Council of Geoscience, Pretoria)

A Google Earth map with polygons of the proposed development was obtained from Naledzi Environmental Consultants (Pty) Ltd.

PIAs in the area include Bamford (2019) and Fourie 2021.

IMPACT ASSESSMENT METHODOLOGY

Impact Rating System

Impact assessment must take into account 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 project phases:

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

3	Probable	The impact will likely occur (Between a 50% to 75% chance of occurrence).
4	Definite	Impact will certainly occur (Greater than a 75% chance of occurrence).
DURATION		
This describes the duration of the impacts. Duration indicates the lifetime of the impact as a result of the proposed activity.		
1	Short term	The impact will either disappear with mitigation or will be mitigated through natural processes in a span shorter than the construction phase (0 – 1 years), or the impact will last for the period of a relatively short construction period and a limited recovery time after construction, thereafter it will be entirely negated (0 – 2 years).
2	Medium term	The impact will continue or last for some time after the construction phase but will be mitigated by direct human action or by natural processes thereafter (2 – 10 years).
3	Long term	The impact and its effects will continue or last for the entire operational life of the development, but will be mitigated by direct human action or by natural processes thereafter (10 – 30 years).
4	Permanent	The only class of impact that will be non-transitory. Mitigation either by man or natural process will not occur in such a way or such a time span that the impact can be considered indefinite.
INTENSITY/ MAGNITUDE		
Describes the severity of an impact.		
1	Low	Impact affects the quality, use and integrity of the system/component in a way that is barely perceptible.
2	Medium	Impact alters the quality, use and integrity of the system/component but system/component still continues to function in a moderately modified way and maintains general integrity (some impact on integrity).
3	High	Impact affects the continued viability of the system/ component and the quality, use, integrity and

		functionality of the system or component is severely impaired and may temporarily cease. High costs of rehabilitation and remediation.
4	Very high	Impact affects the continued viability of the system/component and the quality, use, integrity and functionality of the system or component permanently ceases and is irreversibly impaired. Rehabilitation and remediation often impossible. If possible rehabilitation and remediation often unfeasible due to extremely high costs of rehabilitation and remediation.
REVERSIBILITY		
This describes the degree to which an impact can be successfully reversed upon completion of the proposed activity.		
1	Completely reversible	The impact is reversible with implementation of minor mitigation measures.
2	Partly reversible	The impact is partly reversible but more intense mitigation measures are required.
3	Barely reversible	The impact is unlikely to be reversed even with intense mitigation measures.
4	Irreversible	The impact is irreversible and no mitigation measures exist.
IRREPLACEABLE LOSS OF RESOURCES		
This describes the degree to which resources will be irreplaceably lost as a result of a proposed activity.		
1	No loss of resource	The impact will not result in the loss of any resources.
2	Marginal loss of resource	The impact will result in marginal loss of resources.
3	Significant loss of resources	The impact will result in significant loss of resources.
4	Complete loss of resources	The impact is result in a complete loss of all resources.
CUMULATIVE EFFECT		
This describes the cumulative effect of the impacts. A cumulative impact is an effect which in itself may not be significant but may become significant if added to other existing or potential impacts emanating from other similar or diverse activities as a result of the project activity in question.		

1	Negligible cumulative impact	The impact would result in negligible to no cumulative effects.
2	Low cumulative impact	The impact would result in insignificant cumulative effects.
3	Medium cumulative impact	The impact would result in minor cumulative effects.
4	High cumulative impact	The impact would result in significant cumulative effects

SIGNIFICANCE

Significance is determined through a synthesis of impact characteristics. Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. The calculation of the significance of an impact uses the following formula: (Extent + probability + reversibility + irreplaceability + duration + cumulative effect) x magnitude/intensity.

The summation of the different criteria will produce a non-weighted value. By multiplying this value with the magnitude/intensity, the resultant value acquires a weighted characteristic which can be measured and assigned a significance rating.

Points	Impact significance rating	Description
6 to 28	Negative low impact	The anticipated impact will have negligible negative effects and will require little to no mitigation.
6 to 28	Positive low impact	The anticipated impact will have minor positive effects.
29 to 50	Negative medium impact	The anticipated impact will have moderate negative effects and will require moderate mitigation measures.
29 to 50	Positive medium impact	The anticipated impact will have moderate positive effects.
51 to 73	Negative high impact	The anticipated impact will have significant effects and will require significant mitigation measures to achieve an acceptable level of impact.
51 to 73	Positive high impact	The anticipated impact will have significant positive effects.
74 to 96	Negative very high impact	The anticipated impact will have highly significant effects and are unlikely to be able to be mitigated adequately. These impacts could be considered "fatal flaws".
74 to 96	Positive very high impact	The anticipated impact will have highly significant positive effects.

Table 6: Impact Summary

Environmental parameter	Issues	Rating prior to mitigation	Average	Rating post mitigation	Average
Construction of the residential development Loss of fossil heritage	Destroy or permanently seal-in fossils at or below the surface that are then no longer available for scientific study	30	Negative Medium impact	15	Negative Low impact

FINDINGS AND RECOMMENDATIONS

The development is underlain by Tertiary to superficial Quaternary sediments that include red-black soil, ferricrete, surface conglomerate as well as fan conglomerate, surface limestone and calcrete. Underlying these surface deposits is the Timeball Hill Formation of the Pretoria Group (Transvaal Supergroup). Recently updated geology mapped by the Council of Geoscience (Pretoria) indicates that the proposed development is underlain by alluvium, colluvium, eluvium and gravel. The PalaeoMap of the South African Heritage Resources Information System indicates that the Palaeontological Sensitivity of the superficial deposits is moderate (Almond and Pether 2008, SAHRIS website). Sediments of the Timbal Hill Formation have a Very High Palaeontological Sensitivity but will not be impacted in this development.

A Low Palaeontological Significance has been allocated to the proposed medium residential development. The construction and operation of the project may be authorised, as the whole extent of the development footprint is not considered sensitive in terms of palaeontological heritage. If fossil remains or trace fossils are discovered during any phase of construction, either on the surface or exposed by excavations, the Environmental Control Officer (ECO) in charge of these developments must report to SAHRA (Contact details: SAHRA, 111 Harrington Street, Cape Town. PO Box 4637, Cape Town 8000, South Africa. Tel: 021 462 4502. Fax: +27 (0)21 462 4509. Web: www.sahra.org.za) so that mitigation can be carried out by a palaeontologist.

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

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