HIA FOR THE PROPOSED MKOMANZI DRIFT HOUSING PROJECT

FOR WALLACE & GREEN (PTY) LTD

DATE: 27 MARCH 2022

By Gavin Anderson

Umlando: Archaeological Surveys and Heritage Management

PO Box 10153, Meerensee, 3901

Phone:035-7531785 Cell: 0836585362

umlando@gmail.com

EXECUTIVE SUMMARY

The site is situated in Ward 99 on PTN 280 of Farm Umkomanzi Drift No 1357 and measures 11,73 hectares. The site is currently zoned General Industry within the Craigieburn South Zone Scheme. Sites 396 and 397 are encumbered by existing dwellings. The scope is to develop the site as a Greenfield housing development.

A heritage survey was undertaken for the proposed uMkomanzi Drift housing project. The desktop noted two buildings that date between 1937 and 1967. However, both of these have been demolished by 2005.

There has been extensive earthmoving, or ground levelling, activity on the site, and thus parts of it could not be surveyed accurately.

No heritage sites occur within the study area and no further mitigation is required.

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Abbreviations

HP	Historical Period
IIA	Indeterminate Iron Age
LIA	Late Iron Age
EIA	Early Iron Age
ISA	Indeterminate Stone Age
ESA	Early Stone Age
MSA	Middle Stone Age
LSA	Late Stone Age
HIA	Heritage Impact Assessment
PIA	Palaeontological Impact Assessment

INTRODUCTION

The site is located south of Durban, approximately 4km away from Umkomaas and within 2km north of the N2 freeway. The site's southern boundary is interfaced by the R197 with Craigieburn Drive forming the connection back to the N2. The area is flanked by vacant/ undeveloped land in its immediate vicinity with affordable detached residential housing approximately 500m west from the study area with middle-income housing to the east. Along the R197, the interface consists of a fragmented form of buildings made of smaller-scale businesses, warehouses, and residential uses. The site is strategically located to the employment node 500m from its location and significant in that it lies central to the activities it surrounds.

The site is situated in Ward 99 on PTN 280 of Farm Umkomanzi Drift No 1357 and measures 11,73 hectares. The site is currently zoned General Industry within the Craigieburn South Zone Scheme. Sites 396 and 397 are encumbered by existing dwellings. The scope is to develop the site as a Greenfield housing development.

Umlando was requested to undertake an HIA of the proposed irrigation developments. Figures 1 – 6 show the location of the development.

FIG. 1 GENERAL LOCATION OF THE PROPOSED DEVELOPMENT

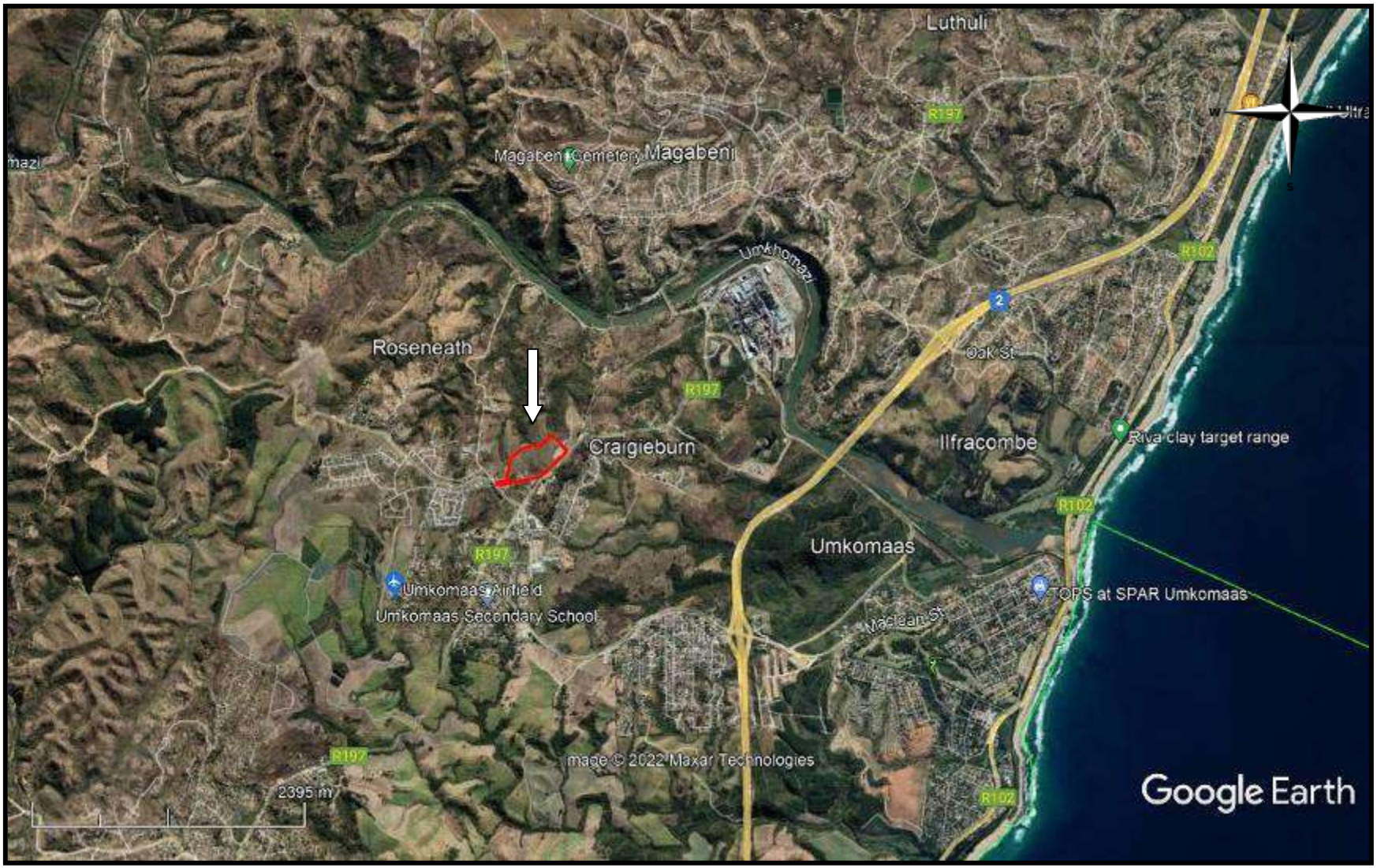

FIG. 2: AERIAL OVERVIEW OF THE PROPOSED DEVELOPMENT

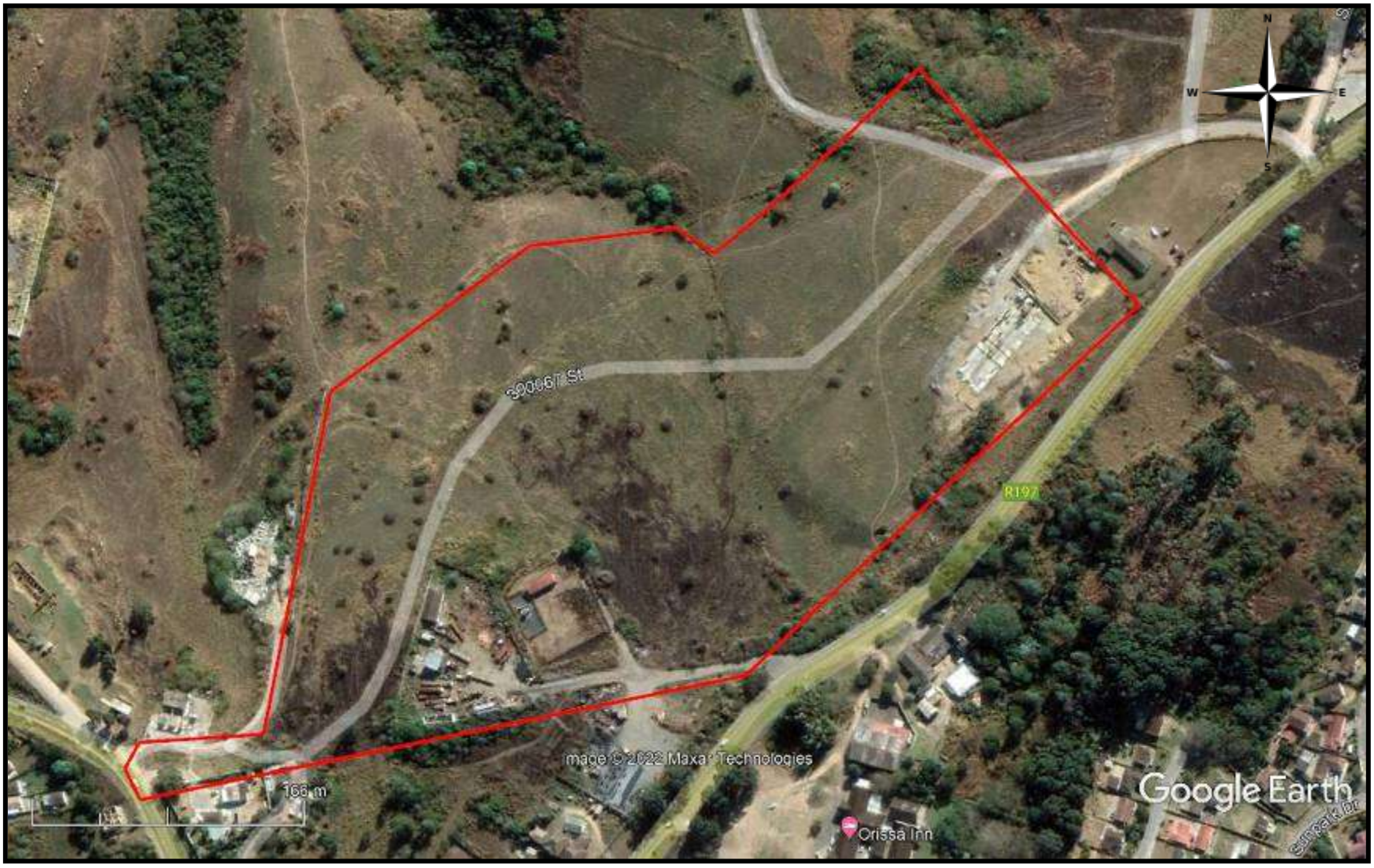

FIG. 3: TOPOGRAPHICAL MAP OF THE PROPOSED DEVELOPMENT (1996)

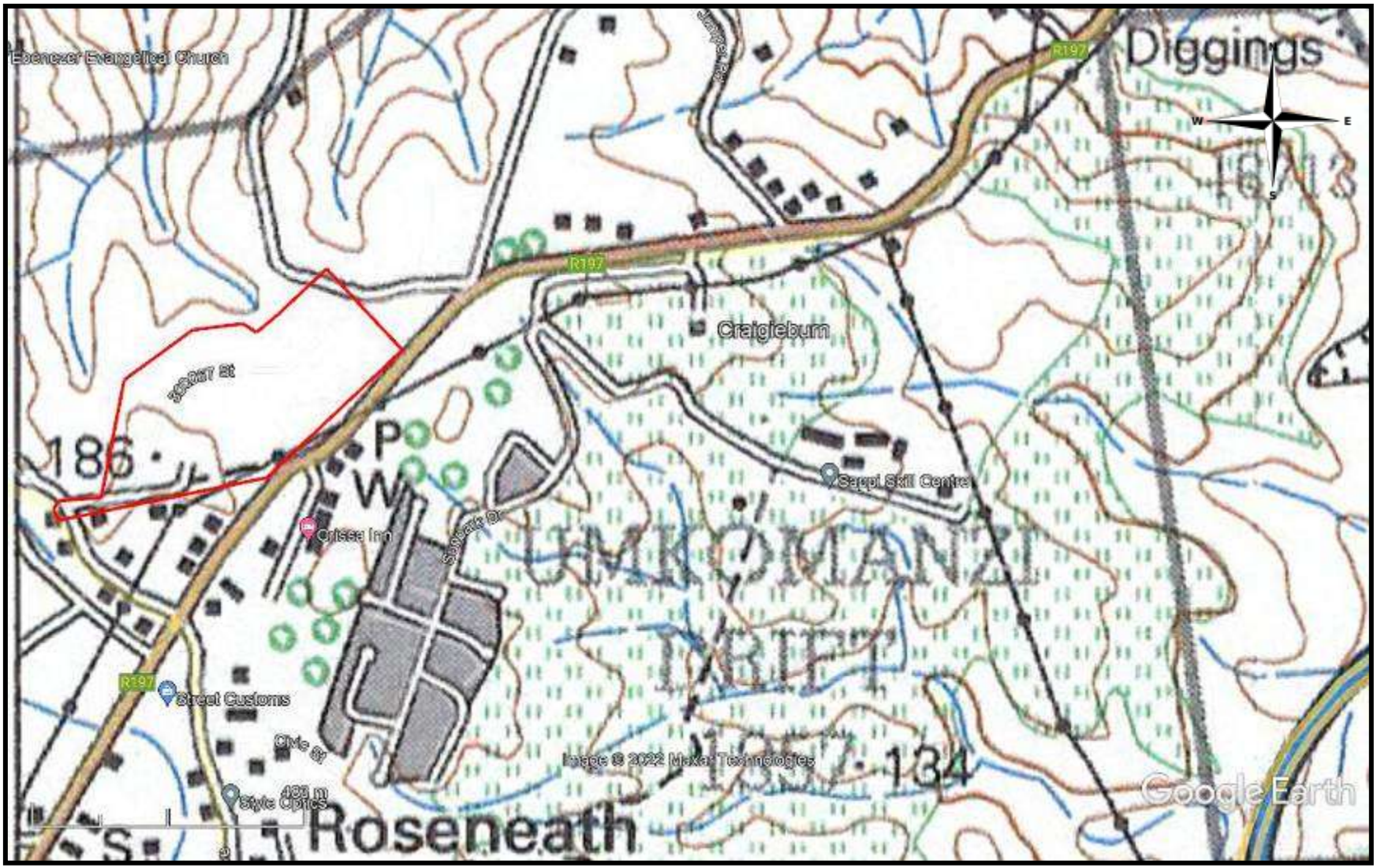

FIG. 4: SCENIC VIEWS OF THE STUDY AREA

KWAZULU NATAL AMAFA AND RESEARCH INSTITUTE, ACT 05, 2018

"General protection: Structures.—

- No structure which is, or which may reasonably be expected to be older than 60 years, may be demolished, altered or added to without the prior written approval of the Council having been obtained on written application to the Council.
- Where the Council does not grant approval, the Council must consider special protection in terms of sections 38, 39, 40, 41 and 43 of Chapter 9.
- The Council may, by notice in the *Gazette*, exempt—
- A defined geographical area; or
- defined categories of sites within a defined geographical area, from the provisions of subsection where the Council is satisfied that heritage resources falling in the defined geographical area or category have been identified and are adequately protected in terms of sections 38, 39, 40, 41 and 43 of Chapter 9.
- A notice referred to in subsection (2) may, by notice in the *Gazette*, be amended or withdrawn by the Council.

General protection: Graves of victims of conflict.—No person may damage, alter, exhume, or remove from its original position—

- the grave of a victim of conflict;
- a cemetery made up of such graves; or
- any part of a cemetery containing such graves, without the prior written approval of the Council having been obtained on written application to the Council.
- General protection: Traditional burial places.—
- No grave—
- not otherwise protected by this Act; and
- not located in a formal cemetery managed or administered by a local authority, may be damaged, altered, exhumed, removed from its original

position, or otherwise disturbed without the prior written approval of the Council having been obtained on written application to the Council.

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

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

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

- No person may destroy, damage, excavate, alter, write or draw upon, or otherwise disturb any battlefield site, archaeological site, rock art site, palaeontological site, historic fortification, meteorite or meteorite impact site without the prior written approval of the Council having been obtained on written application to the Council.
- Upon discovery of archaeological or palaeontological material or a meteorite by any person, all activity or operations in the general vicinity of such material or meteorite must cease forthwith and a person who made the discovery must submit a written report to the Council without delay.
- The Council may, after consultation with an owner or controlling authority, by way of written notice served on the owner or controlling authority, prohibit any activity considered by the Council to be inappropriate within 50 metres of a rock art site.
- No person may exhume, remove from its original position or otherwise disturb, damage, destroy, own or collect any object or material associated with any battlefield site, archaeological site, rock art site, palaeontological site, historic fortification, meteorite or meteorite impact site without the prior written approval of the Council having been obtained on written application to the Council.
- No person may bring any equipment which assists in the detection of metals and archaeological and palaeontological objects and material, or

excavation equipment onto any battlefield site, archaeological site, rock art site, palaeontological site, historic fortification, or meteorite impact site, or use similar detection or excavation equipment for the recovery of meteorites, without the prior written approval of the Council having been obtained on written application to the Council.

- The ownership of any object or material associated with any battlefield site, archaeological site, rock art site, palaeontological site, historic fortification, meteorite or meteorite impact site, on discovery, vest in the Provincial Government and the Council is regarded as the custodian on behalf of the Provincial Government."

METHOD

The method for Heritage assessment consists of several steps.

The first step forms part of the desktop assessment. Here we would consult the database that has been collated by Umlando. This databases contains archaeological site locations and basic information from several provinces (information from Umlando surveys and some colleagues), most of the national and provincial monuments and battlefields in Southern Africa (http://www.vuvuzela.com/googleearth/monuments.html) and cemeteries in southern Africa (information supplied by the Genealogical Society of Southern Africa). We use 1st and 2nd edition 1:50 000 topographical and 1937 aerial photographs where available, to assist in general location and dating of buildings and/or graves. The database is in Google Earth format and thus used as a quick reference when undertaking desktop studies. Where required we would consult with a local data recording centre, however these tend to be fragmented between different institutions and areas and thus difficult to access at times. We also consult with an historical architect, palaeontologist, and an historian where necessary.

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

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

Defining significance

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

These criteria are:

1. State of preservation of:

1.1. Organic remains:

1.1.1. Faunal

1.1.2. Botanical

1.2. Rock art

1.3. Walling

1.4. Presence of a cultural deposit

1.5. Features:

1.5.1. Ash Features

1.5.2. Graves

1.5.3. Middens

1.5.4. Cattle byres

1.5.5. Bedding and ash complexes

2. Spatial arrangements:

2.1. Internal housing arrangements

2.2. Intra-site settlement patterns

2.3. Inter-site settlement patterns

3. Features of the site:

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

3.2. Is it a type site?

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

4. Research:

4.1. Providing information on current research projects

4.2. Salvaging information for potential future research projects

5. Inter- and intra-site variability

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

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

6. Archaeological Experience:

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

7. Educational:

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

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

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

8. Other Heritage Significance:

8.1. Palaeontological sites

8.2. Historical buildings

8.3. Battlefields and general Anglo-Zulu and Anglo-Boer sites

8.4. Graves and/or community cemeteries

8.5. Living Heritage Sites

8.6. Cultural Landscapes, that includes old trees, hills, mountains, rivers, etc related to cultural or historical experiences.

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

TABLE 1: SAHRA GRADINGS FOR HERITAGE SITES

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

RESULTS

DESKTOP STUDY

The desktop study consisted of analysing various maps for evidence of prior habitation in the study area, as well as for previous archaeological surveys. Many archaeological sites occur in the general area. The two archaeological sites are open Middle and Late Stone Age sites of low significance (fig. 5). These sites probably extend into the development area as a continuation of the open stone tool scatter.

The 1937 (fig. 6) aerial photograph and 1937 topographical map (fig. 7) indicate that while there are settlements in the general area, none occur within the proposed area.

The 1967 (fig. 8) and 1976 (fig. 9) aerial photographs indicate that there are two buildings within the development area. Google imagery indicates that D2 was demolished between 2005 and 2009. The general area for D1 still exists and this dates between 1937 and 1967. There are no definite buildings on the 1967 map, rather an opened area.

The location of these buildings are shown in Table 2.

TABLE 2: LOCATION OF HISTORICAL BUILDINGS

Name	Latitude	Longitude	Description	Map
d1	-30.194869369	30.753776617	House	1967, 1976
d2	-30.195676650	30.751188889	House	1967

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

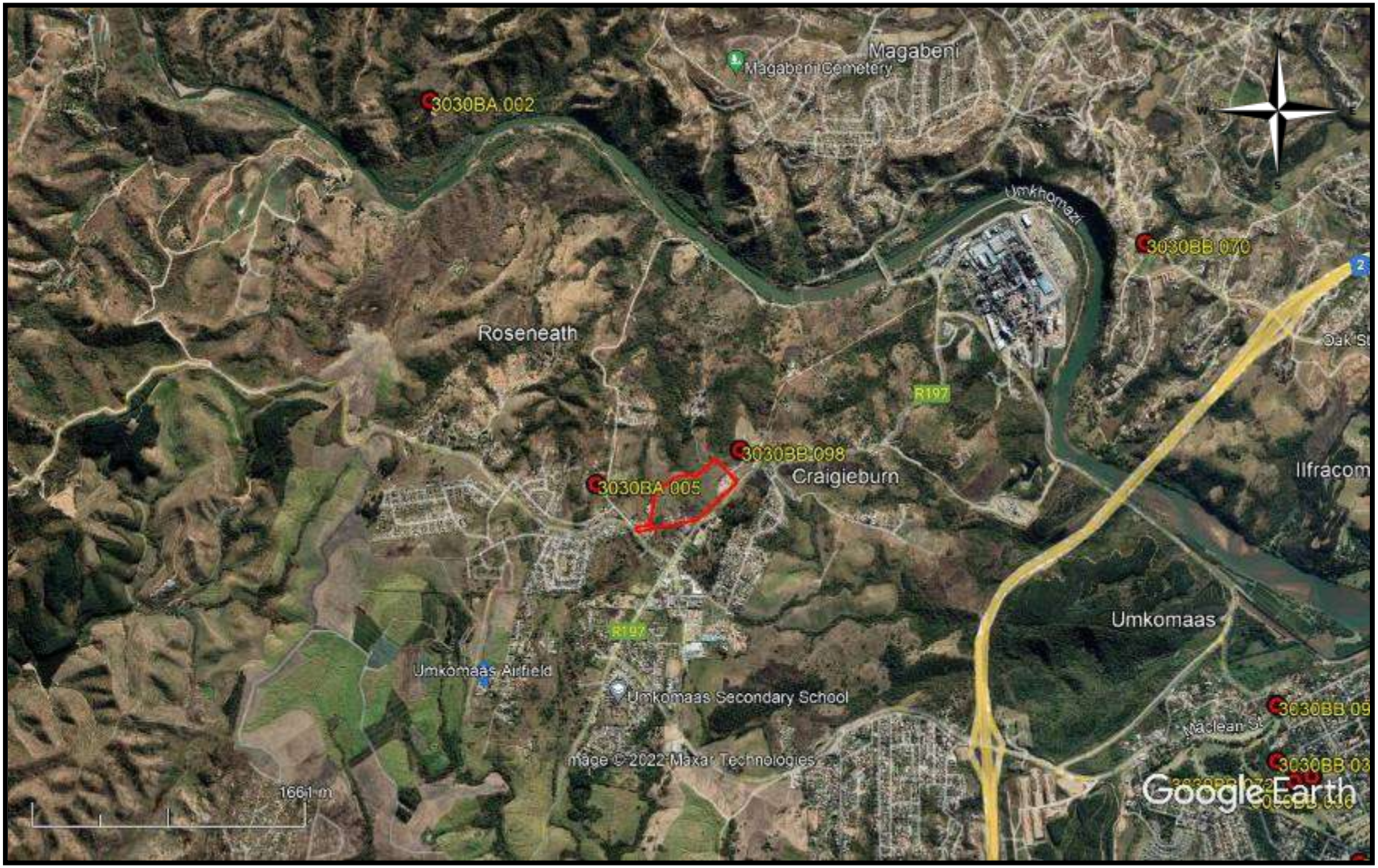

FIG. 6: LOCATION OF THE STUDY AREA IN 1937

FIG. 7: LOCATION OF THE STUDY AREA IN 1937

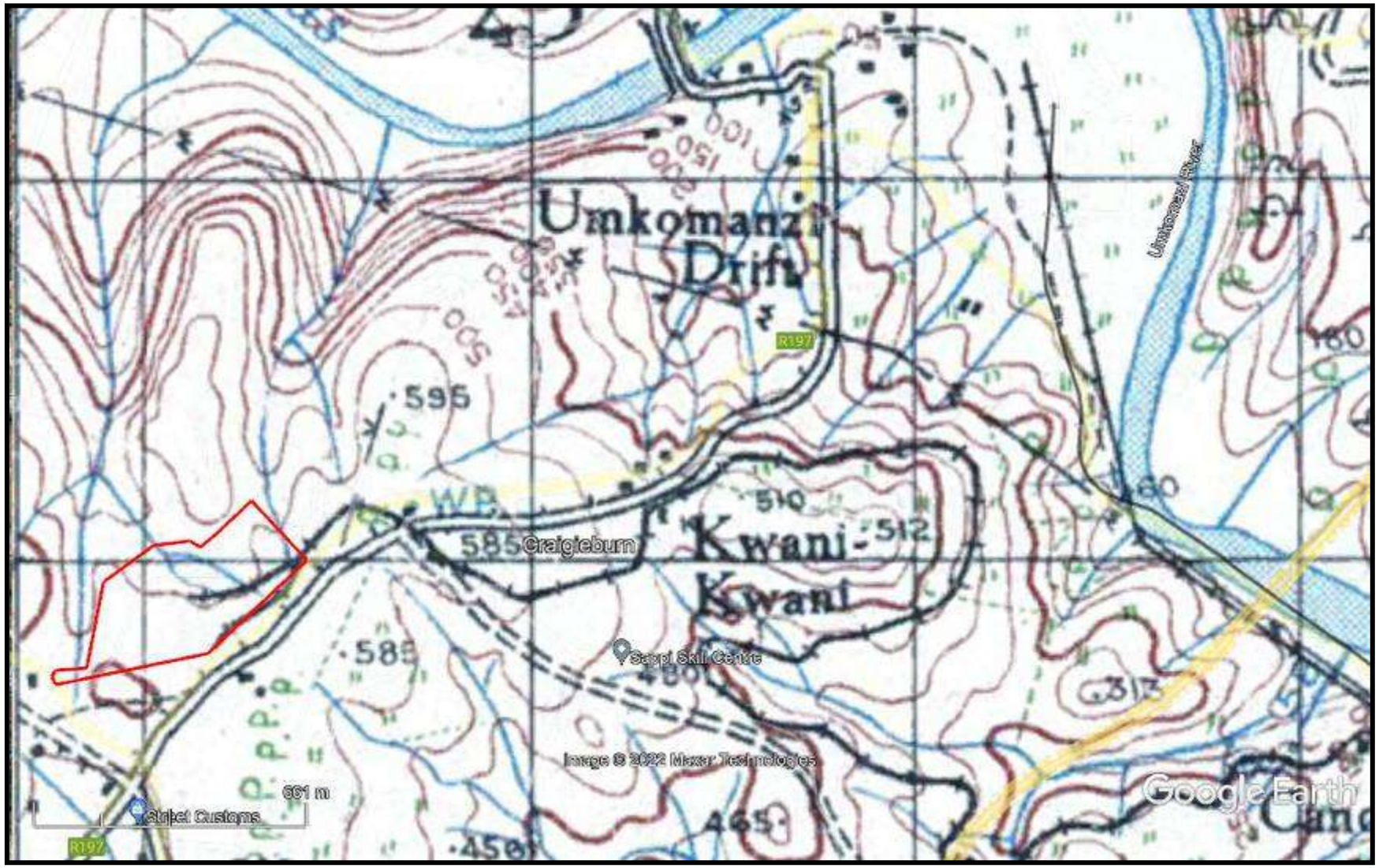

FIG. 8: LOCATION OF THE STUDY AREA IN 1967

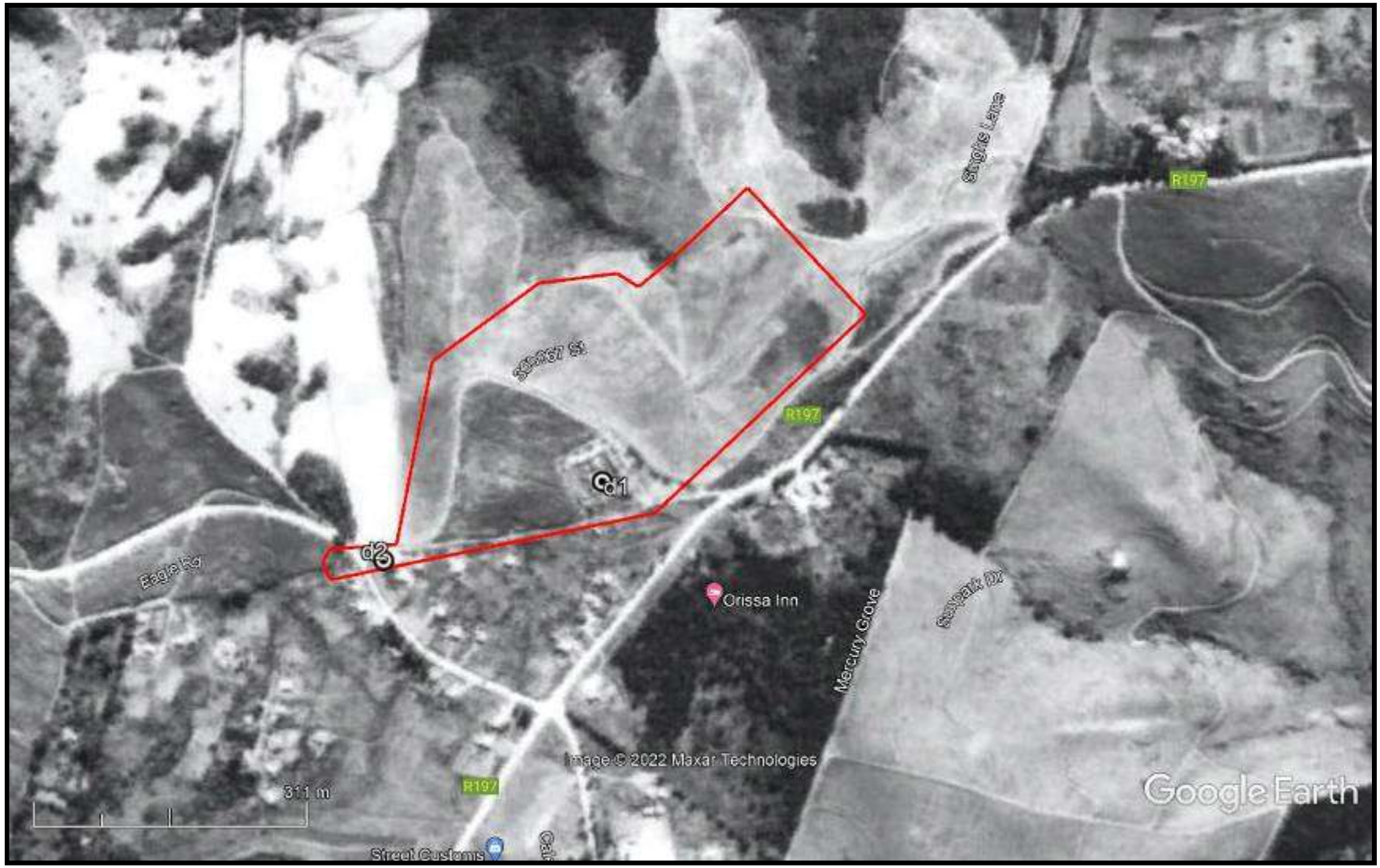

FIG. 9: LOCATION OF THE STUDY AREA IN 1976

PALAEONTOLOGICAL SENSITIVITY

The development is in an area of medium palaeontological sensitivity (fig. 10). Dr A. Smith undertook a desktops study for the development (Appendix A). He states: Although paleontological material is unlikely to be encountered in the soil during the Tranquility Memorial Park project, a “Chance Find Protocol” has been included. No further **palaeontological work** is required unless the “Chance Find Protocol” is triggered.

FIG. 10: PALAEONTOLOGICAL SENSITIVITY MAP

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

FIELD SURVEY

A field survey was undertaken in March 2022. Ground visibility was good; however, some form of development, or earthworks, has already occurred on parts of the site (11). It is currently not known if this is related to the housing development, or some other activity. The earthmoving does not show on the 2021 Google Earth imagery.

No heritage sites were recorded within the study area. There is an existing memorial Park adjacent o the property with a cemetery to the north of the access road (fig., 12).

A house occurs within the compound noted on the 1967 aerial imagery. However, this house post dates 1970s and is more recent in age (fig 13).

RECOMMENDATIONS & MITIGATION

No further mitigation is required.

CONCLUSION

A heritage survey was undertaken for the proposed uMkomanzi Drift housing project. The desktop noted two buildings that date between 1937 and 1967. However, both of these have been demolished by 2005.

There has been extensive earthmoving, or ground levelling, activity on the site, and thus parts of it could not be surveyed accurately.

No heritage sites occur within the study area and no further mitigation is required.

FIG. 11: EARTHWORKS AT THE DEVELKOPMENT SITE

FIG. 12: CEMETERY ADJACENT TO THE STUDY AREA

FIG. 13: HOUSE WITHIN THE COMPOUND

REFERENCES

1:50 000 Topographical Maps

3030BB Umkomaas 1937, 1993

Aerial Photographs

117B_052_35310

573_022_09358

766_0C1_00260

Database

KZN Museum

SHARIS

Umlando

EXPERIENCE OF THE HERITAGE CONSULTANT

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

DECLARATION OF INDEPENDENCE

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

Gavin Anderson
Archaeologist/Heritage Impact Assessor

APPENDIX A

PIA DESKTOP STUDY

UMKOMANZI DRIFT, ETHEKWINI MUNICIPALITY, KWAZULU-NATAL

FOR

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

by

Dr Alan Smith
Alan Smith Consulting
29 Browns Grove, Sherwood, Durban, 4091, South Africa
Telephone: 031 208 6896
asconsulting@telkomsa.net

7 April, 2022

Declaration of Independence

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

Specialist: Dr Alan Smith

Signature: 

EXECUTIVE SUMMARY

Alan Smith Consulting was appointed by **UMLANDO: Archaeological Surveys & Heritage Management** to conduct a Desk-Top field assessment of the potential impacts to **Palaeontology Resources** that might occur through the activities of the proposed

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

The chances of encountering fossils are **Very Low,** but **Not Zero**; consequently a ***"Chance Find Protocol"*** has been included.

ACRONYMS

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

1. TERMS OF REFERENCE

Alan Smith Consulting was requested by **UMLANDO: Archaeological Surveys & Heritage Management** to provide a Desk-Top Palaeo Impact Assessment for the proposed Tranquility Memorial Park, uMkomanzi Drift, eThekwini (Figure 1). This report is to meet the requirements of the National Environmental Management Act (Act 107 of 1998) [as amended] Environmental Impact Assessment (EIA) regulations, Appendix 6.

Figure 1: Location of the proposed Tranquility Memorial Park project.

2. SCOPE AND PURPOSE OF REPORT

A Palaeontological Impact Assessment (PIA) is a means of identifying any significant palaeontological material before development begins, so that these can be managed in such a way as to allow the development to proceed (if appropriate) without undue impacts to the fragile heritage of South Africa. This Desk-Top investigation fulfills the requirements of the heritage authorities (SAHRA), such that a comment can be issued by them for consideration by the competent authority (EDTEA), who will review the Basic Assessment (BA) and grant or refuse authorisation. The PIA report will outline any management and/or mitigation requirements that will need to be complied with from a

heritage point of view and that should be included in the conditions of authorisation, should this be granted.

3. METHODOLOGY

Geological maps, a literature review and personal experience (see Section 10) were used in this research.

4. GEOLOGY

The Pietermaritzburg Formation and Dwyka Group are likely to be present on this site (Figure 2).

Figure 2: Approximate area of the Tranquility Memorial Park project. Extract from the 125 000 Geological Map: Port Shepstone 3030. According to this map the Pietermaritzburg Formation (Pp: Brown, Dwyka Group (C-Pd:Greenish) and probably the dolerite, sills or dykes, are present (Jd: Red).

Dwyka Group

The Dwyka Group is a lithified glacial deposit (Tillite) which accumulated in the southern African region of the Gondwana Supercontinent during the global Late Palaeozoic Glaciation (Visser, 1990), otherwise known locally as the Dwyka Glaciation. This global glaciation began at 327 Ma and ended about 260 Ma (Fielding et al., 2008).

The Dwyka Group comprises two Formations, but here it comprises only the Elandsvlei Formation which is characterized by massive debrites. This sediment, ranging from boulder to silt, was freed by a melting ice sheet retreating across the Karoo Sea.

Pietermaritzburg Formation

The Pietermaritzburg Formation is very dark blue (when fresh) and crops out as a massive siltstone (Figure 3). These rocks belong to the Karoo Sequence. The Pietermaritzburg Formation is Lower Permian in age and was deposited within the Karoo Sea in the centre of the Gondwana Supercontinent, during the Late Paleozoic Glaciation melting phase. This unit was deposited under low energy conditions (Bordy et al., 2017).

Figure 3: Example of what the Pietermaritzburg Formation might look like in this area.

Karoo Dolerite

The Karoo Dolerite is represented by dykes and sills, within this area. It is part of the Karoo Large Igneous Province (LIP). The Karoo LIP is a sequence of lavas up to 4.5 km thick which was erupted 184 Ma (million years ago). This igneous deposit was extruded as a "Continental Flood Basalt", a process that has never been witnessed by mankind.

This process takes place by fissure eruption and triggered the break-up of the Gondwana supercontinent (Hastie et al., 2014).

5. PALAEONTOLOGY

The colour coding used in the Sahris Palaeosensitivity Map are shown in Table 1. The proposed Tranquility Memorial Park falls under a green coded which requires a desk-top PIA study (Figure 4).

Table 1: Summary of SAHRIS categories

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

Figure 4: Palaeosensitivity of the rock underlying the proposed Tranquility Memorial Park . Extract from Sahris Palaeosensitivity Map).

Dwyka Group

The Dwyka Group is believed to have formed in a glacio-marine setting. Occasional trace fossils (no palaeontological value) have been found. No body fossils have been recorded from this lithology.

Pietermaritzburg Formation

The Pietermaritzburg Formation may contain scattered, fragmentary plant fossils and invertebrate trace fossils, all of which are diagnostic of marine conditions (eg. *Helminthopsis*) (Bordy et al., 2017). Potentially it could contain body fossils, but to the writer's knowledge none have been found.

Karoo Dolerite

At his locality, this is an intrusive igneous rock and by definition is not fossiliferous.

6. SUMMARY

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

7. CHANCE FIND PROTOCOL

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

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

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

- The construction must be halted in that specific area and the Palaeontologist must be given enough time to reach the site and remove the material before excavation continues.

- Mitigation will involve the attempt to capture all rare fossils and systematic collection of all fossils discovered. This will take place in conjunction with descriptive, diagrammatic and photographic recording of exposures, also involving sediment samples and samples of both representative and unusual sedimentary or biogenic features. The fossils and contextual samples will be processed (sorted, sub-sampled, labeled, and boxed) and documentation consolidated, to create an archive collection from the excavated sites for future researchers.

Functional responsibilities of the Developer

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

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

3. Facilitate systematic recording of the stratigraphic and palaeo-environmental features in exposures in the fossil-bearing excavations, by described and measured geological sections, and by providing aid in the surveying of positions where significant fossils are found.

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

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

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

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

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

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

8. CONCLUSIONS

Although paleontological material is unlikely to be encountered in the soil during the Tranquility Memorial Park project, a "Chance Find Protocol" has been included. No further **palaeontological work** is required unless the "Chance Find Protocol" is triggered.

9. REFERENCES

Bordy EM, Spelman S, Cole DI& Mtbembi P (2017). Lithostratigraphy of the Pietermaritzburg Formation (Ecca Group, Karoo Supergroup), South Africa. South African Journal of Geolog,y 120: 293-302

Fielding, C.R., Frank, T.D., Birgenheier, L.P., Rygel, M.C., Jones, A.T. and Roberts, J., 2008. Stratigraphic record and facies associations of the late Paleozoic ice age in eastern Australia (New South Wales and Queensland). Geological Society of America, Special Paper, 441, 41–58.

Hastie, WW; Watkeys, MK; Aubourg, C (2014). Magma flow in dyke swarms of the Karoo LIP: Implications for the mantle plume hypothesis. Gondwana Research 25 (2014) 736–755.

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

10. DETAILS OF SPECIALIST

Dr Alan Smith, Pr. Sc. Nat., I.A.H.S.
Private Consultant: ***Alan Smith Consulting, 29 Brown's Grove, Sherwood, Durban, 4091***

&

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

Expertise of the specialist:

- PhD in Geology (University of KwaZulu-Natal),
- Msc in Palaeontology (University of KwaZulu-Natal).
- Expert in Vryheid Formation (Ecca Group) in northern KZN, this having been the subject of PhD.
- Scientific Research experience includes: Stromatolite Research, Fluvial geomorphology, palaeoflood hydrology, Cretaceous deposits.
- Experience includes understanding Earth Surface Processes in both fluvial and coastal environments (modern & ancient).
- Alan has published in both national and international, peer-reviewed journals. He has published + 50 journal articles with +550 citations (detailed CV available on request).
- Attended and presented scientific papers and posters at numerous international and local conferences (UK, Canada, South Africa) and is actively involved in research.

Selected recent palaeo-related work includes:

- Desktop PIA: Proposed middle income housing units on Portion 23 of Farm Lot H Weston 13026, Bruntville, Mpofana Local Municipality. Client: UMLANDO.
- Desktop PIA: Proposed ByPass Pipeline for Ulundi bulk water pipeline upgrade. Client: UMLANDO.
- Fieldwork PIA: Bhekuzulu Epangweni KZN water reticulation project, Cathkin Park. Client: Mike Webster, HSG Attorneys.
- Fieldwork PIA: Mpungoze water supply scheme, Empangeni. Client: Enviropro.
- Fieldwork PIA: Helpmekaar Dam. Client: Afzelia environmental consultants.
- Desktop PIA: Zuka valley, Ballito. Client: Mike Webster, HSG Attorneys.
- Mevamhlope proposed quarry palaeontology report. Client: Enviropro.
- Desktop PIA: Proposed Lovu Desalination site. Client: eThembeni Cultural Heritage.

- Desktop PIA: Tinley Manor phase 2 North & South banks: eThembeni Cultural Heritage
- Desktop PIA: Tongaat. Client: eThembeni Cultural Heritage.
- Palaeontological Assessment Reports (3) to Scatec Solar SA (Pty) Ltd on an Appraisal of Inferred Palaeontological Sensitivity for a Potential Photo Voltaic Park at (1) Farm Rooilyf near Groblershoop, N Cape; (2) Farm Riet Fountain No. Portions 1 and 6, 18km SE of De Aar, N Cape; and (3) Dreunberg, near Burgersdorp, Eastern Cape. Client: Sustainable Development Projects.