HIA FOR THE PROPOSED SHAKASPRING SUBSIDISED HOUSING DEVELOPMENT, KWADUKUZA LOCAL MUNICIPALITY, KZN

FOR K2M ENVIRONMENTAL
DATE: 19 MAY 2023

By Gavin Anderson
Umlando: Archaeological Surveys and Heritage Management
PO Box 10153, Meerensee, 3901
Phone:035-7531785 Cell: 0836585362
umlando@gmail.com

INDEMNITY AND CONDITIONS RELATING TO THIS REPORT

The findings, results, observations, conclusions and recommendations given in this report are based on the author's best scientific and professional knowledge as well as available information. The report is based on survey and assessment techniques which are limited by time and budgetary constraints relevant to the type and level of investigation undertaken. Umlando reserves the right to modify aspects of the report including the recommendations if and when new information becomes available from ongoing research or further work in this field or pertaining to this investigation.

Although Umlando exercises due care and diligence in rendering services and preparing documents Umlando accepts no liability, and the client, by receiving this document, indemnifies Umlando against all actions, claims, demands, losses, liabilities, costs, damages and expenses arising from or in connection with services rendered, directly or indirectly by Umlando and by the use of the information contained in this document.

This report must not be altered or added to without the prior written consent of the author. This also refers to electronic copies of this report which are supplied for the purposes of inclusion as part of other reports, including main reports. Similarly, any recommendations, statements or conclusions drawn from or based on this report must make reference to this report. If these form part of a main report relating to this investigation or report, this report must be included in its entirety as an appendix or separate section to the main report.

COPYRIGHT

Copyright on all documents, drawings and records, whether manually or electronically produced, which form part of the submission and any subsequent report or project document, shall vest in Umlando.

The client, on acceptance of any submission by Umlando and on condition that the client pays to Umlando the full price for the work as agreed, shall be entitled to use for its own benefit:

- • The results of the project;
- • The technology described in any report; and
- • Recommendations delivered to the client.

Should the applicant wish to utilise any part of, or the entire report, for a project other than the subject project, permission must be obtained from Umlando to do so. This will ensure validation of the suitability and relevance of this report on an alternative project.

TABLE OF CONTENT

TABLE OF FIGURES

Abbreviations

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

INTRODUCTION

The proposed Shakaspring Subsidised Housing Development has been initiated by the KwaDukuza Local Municipality together with the Department of Human Settlements. The main aim is to provide suitable housing to beneficiaries within the KwaDukuza Local Municipality.

The proposed housing development is located on the REM of Portion 3 of Farm Lot 11 No.1676, which is situated on a portion of Ward's 5, 17 and 18 of the KwaDukuza Local Municipality

The majority of the site is vacant, except for the northern section of the site, which contains informal dwellings as well as substantial housing structures. There is also an existing community hall located in the central portion of the project area, which the proposed current development layout plan has accommodated. The site contains two channelled valley bottom wetlands as well as Critical Biodiversity Irreplaceable Areas which are located to the north of the site.

The total extent of the site is approximately 16.85 hectares and the proposed development will entail:

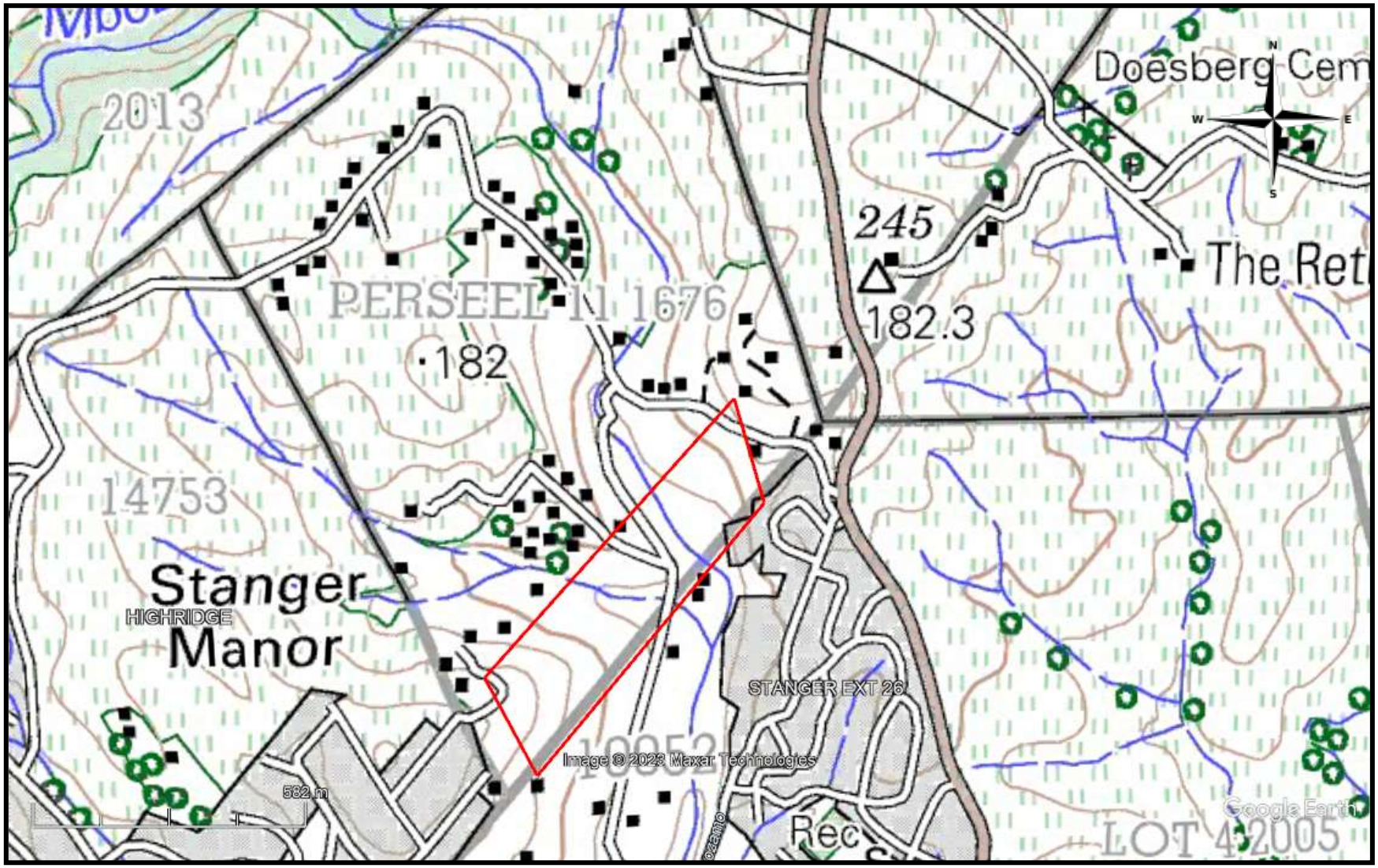
- Removal of approximately 7 hectares of indigenous grassland vegetation to allow for the construction of approximately 600 low-income residential units.
- Construction of pipelines for water supply with a diameter ranging from 90mm to 250mm.
- Construction of a water storage reservoir with a capacity of approximately 2Ml.

Umlando was requested to undertake the Phase 1 HIA of the proposed development in terms of a feasibility report. Figures 1 – 4 show the location of the development.

FIG. 1 GENERAL LOCATION OF THE PROPOSED DEVELOPMENT

FIG. 2: AERIAL OVERVIEW OF THE PROPOSED DEVELOPMENT

FIG. 3: TOPOGRAPHICAL MAP OF THE PROPOSED DEVELOPMENT (2000)[1]



[1]2931AD Stanger 2002

FIG. 4: SCENIC VIEWS OF THE STUDY AREA

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

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

"General protection: Structures.

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

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

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

(a) A defined geographical area; or

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

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

General protection: Graves of victims of conflict.

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

(a) the grave of a victim of conflict;

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

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

General protection: Informal and private burial grounds

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

(a) not otherwise protected by this Act; and

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

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

(a) the applicant has made a concerted effort to consult with communities and individuals who by tradition may have an interest in the grave; and

(b) the applicant and the relevant communities or individuals have reached agreement regarding the grave.

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

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

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

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

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

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

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

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

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

(i) archaeological objects;

(ii} palaeontological material;

(iii) ecofacts;

(iv) objects related to battlefield sites;

(v) material cultural artefacts; or

(vi) meteorites,

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

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

(a} any category of archaeological object;

{b) any palaeontological material;

(c) any ecofact;

{d) any object which may reasonably be regarded as having been recovered from a battlefield site;

(e) any material cultural artefact; or

{f) any meteorite.

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

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

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

METHOD

The method for Heritage assessment consists of several steps.

The first step forms part of the desktop assessment. Here we would consult the database that has been collated by Umlando. This databases contains archaeological site locations and basic information from several provinces (information from Umlando surveys and some colleagues), most of the national and provincial monuments and battlefields in Southern Africa (http://www.vuvuzela.com/googleearth/monuments.html) and cemeteries in southern Africa (information supplied by the Genealogical Society of Southern Africa). We use 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. There are no known heritage surveys near the study area.

The general area has a low number of archaeological sites, while several Historical Period sites are located within the town of Stanger. (fig. 5). The archaeological sites are located on the hill tops and consist of Stone and Late Iron Age sites.

The 1937 aerial photograph indicates that study area consists of cultivated lands and grassland, with one building on the eastern side (fig. 7).

The 1968 1:50 000 topographical map indicates that there is one structure within the study area (fig. 8). This is the same building as in fig. 7. This building no longer exists and has been replaced by the community hall that was built in 2016. The study area has also been converted to cultivated lands.

Stanger is famous for being the location of KwaDukuza. “King Shaka [kaSenzangakhona] chose KwaDukuza as his new capital, where Stanger Town now stands, because he knew that the area was well watered and had good for grazing his vast herds of cattle. The new settlement began in July 1825, and was occupied by September. King Shaka called it, 'Dukuza' (the maze). It was a massive, oval shaped settlement comprised of a huge central enclosure (kraal) for the royal cattle and about 2,000 or more beehive shaped huts around it. His massive royal hut was built alongside a small spring and stream” (https://www.sahistory.org.za/place/kwadukuza-timeline#). It was abandoned in 1828 after his assignation.

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

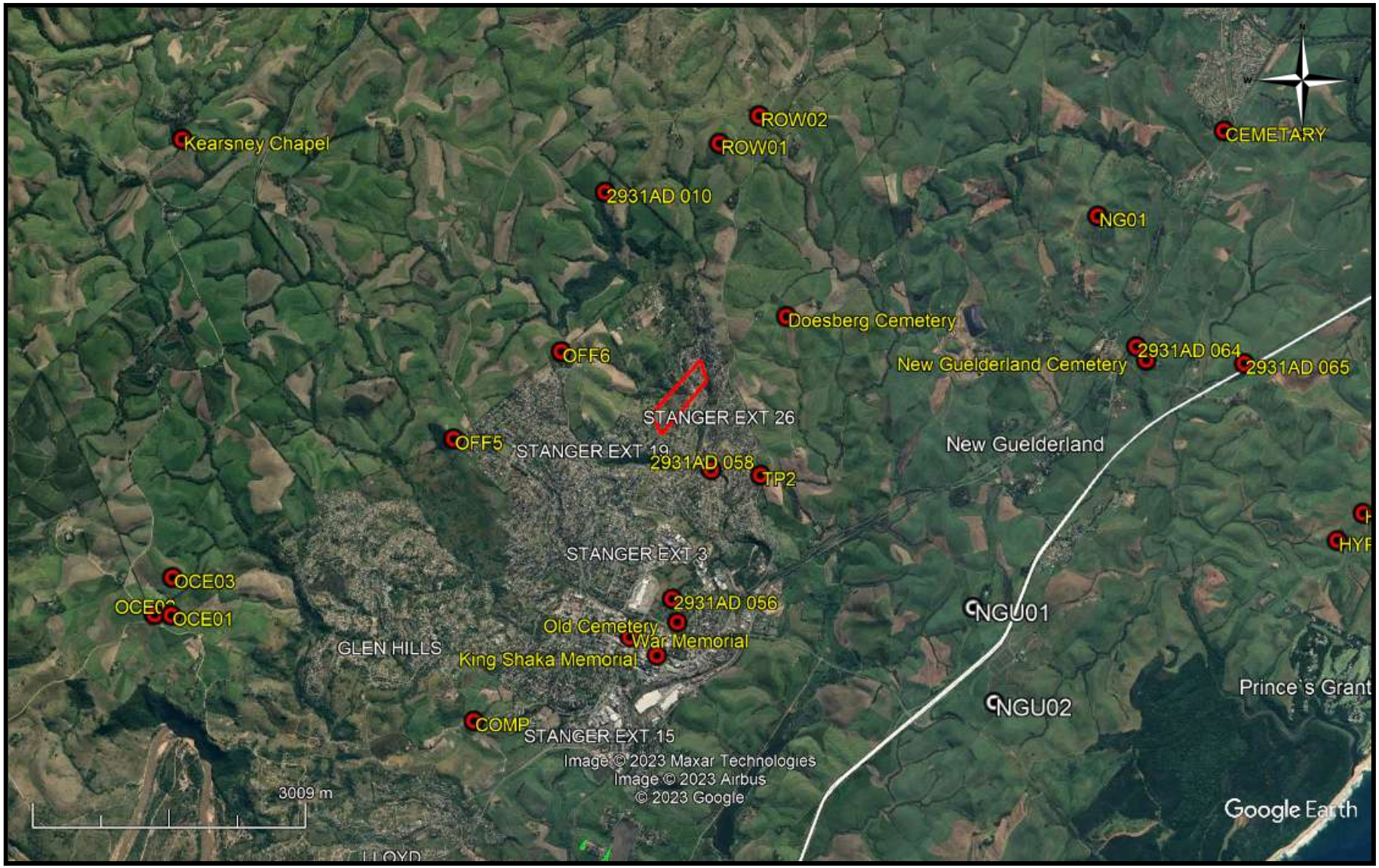
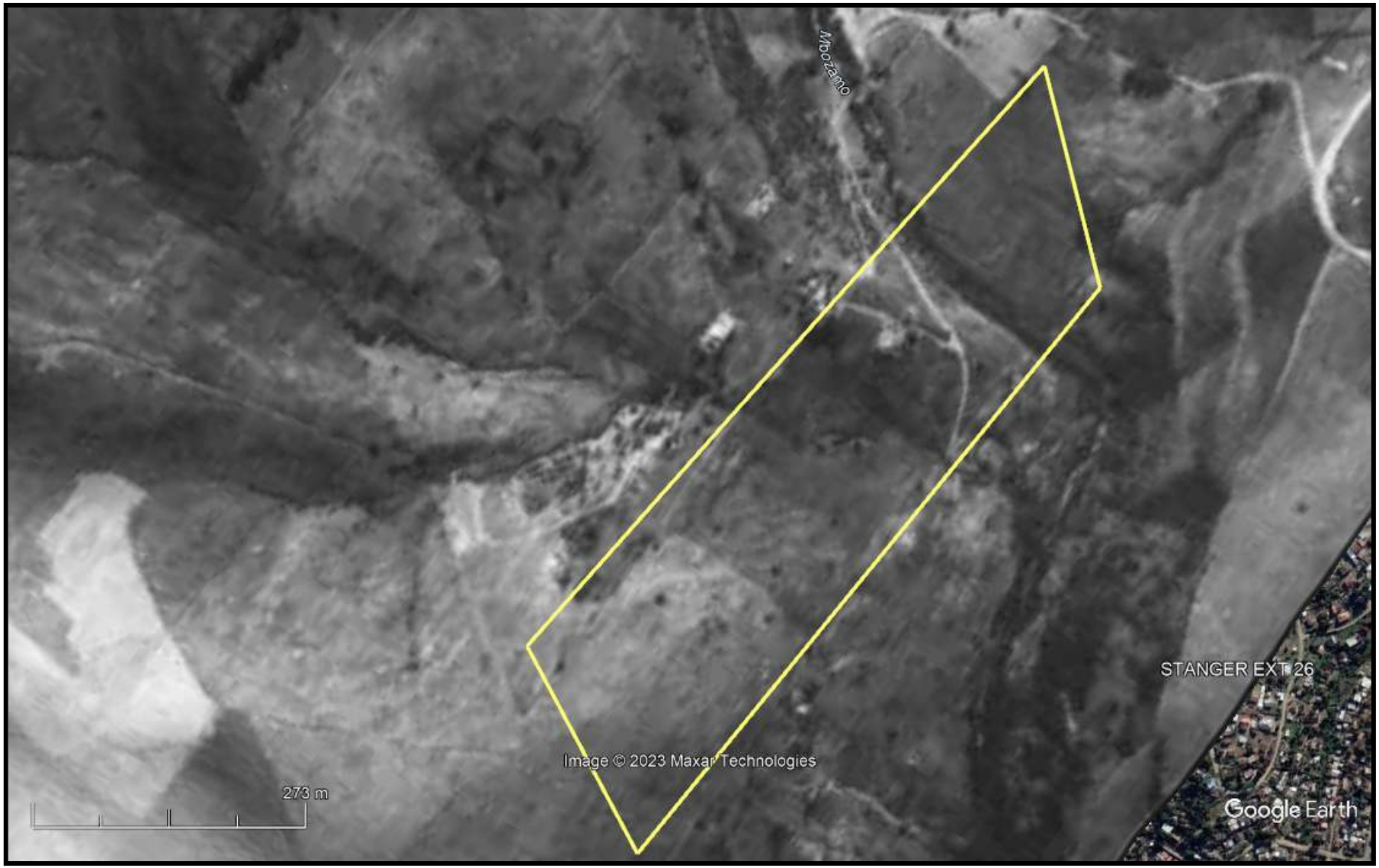
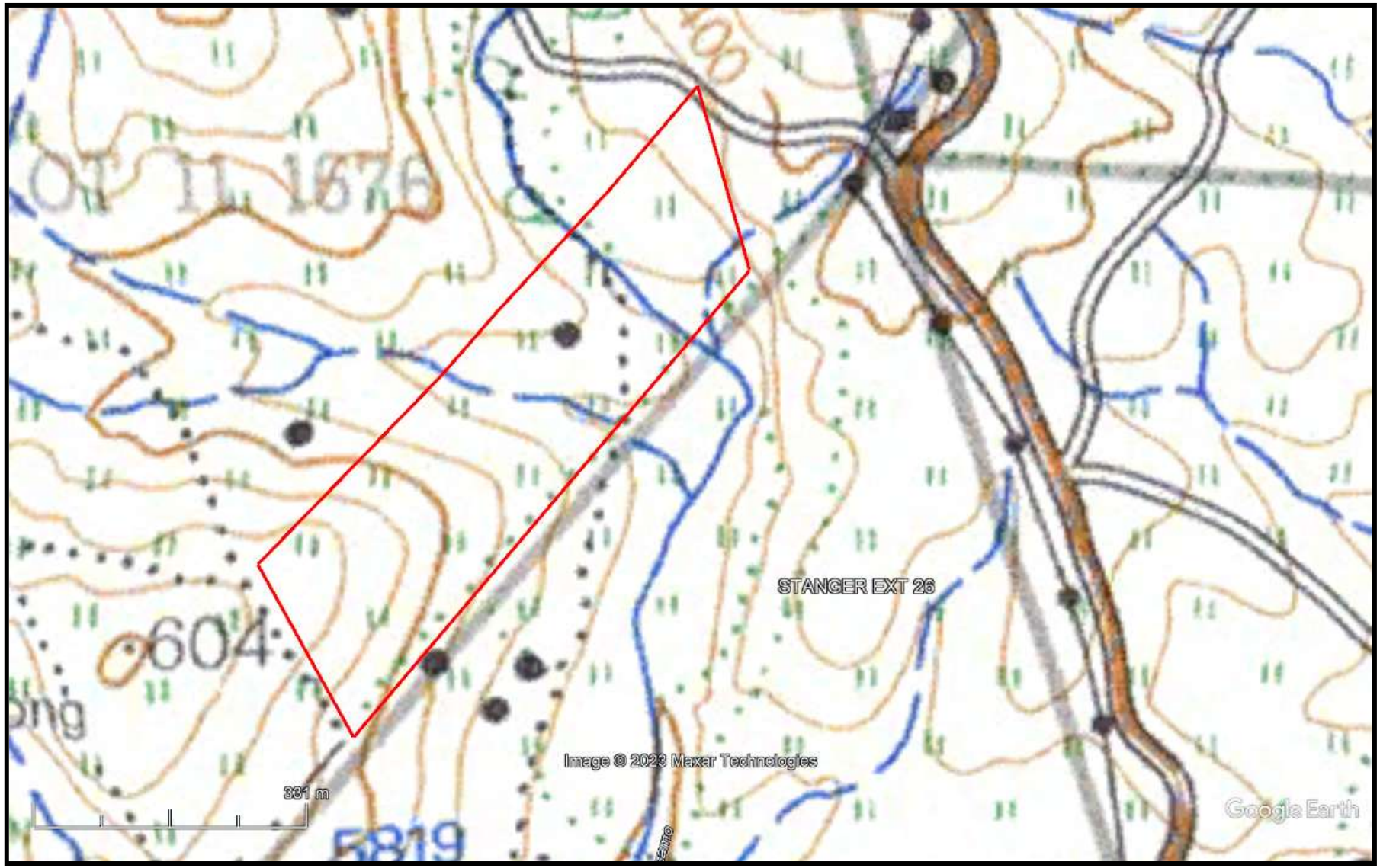


FIG. 6: LOCATION OF THE STUDY AREA IN 1937[2]



[2] 117B_048_36626

FIG. 8: 1968 TOPOGRAPHICAL MAP OF THE STUDY AREA[3]

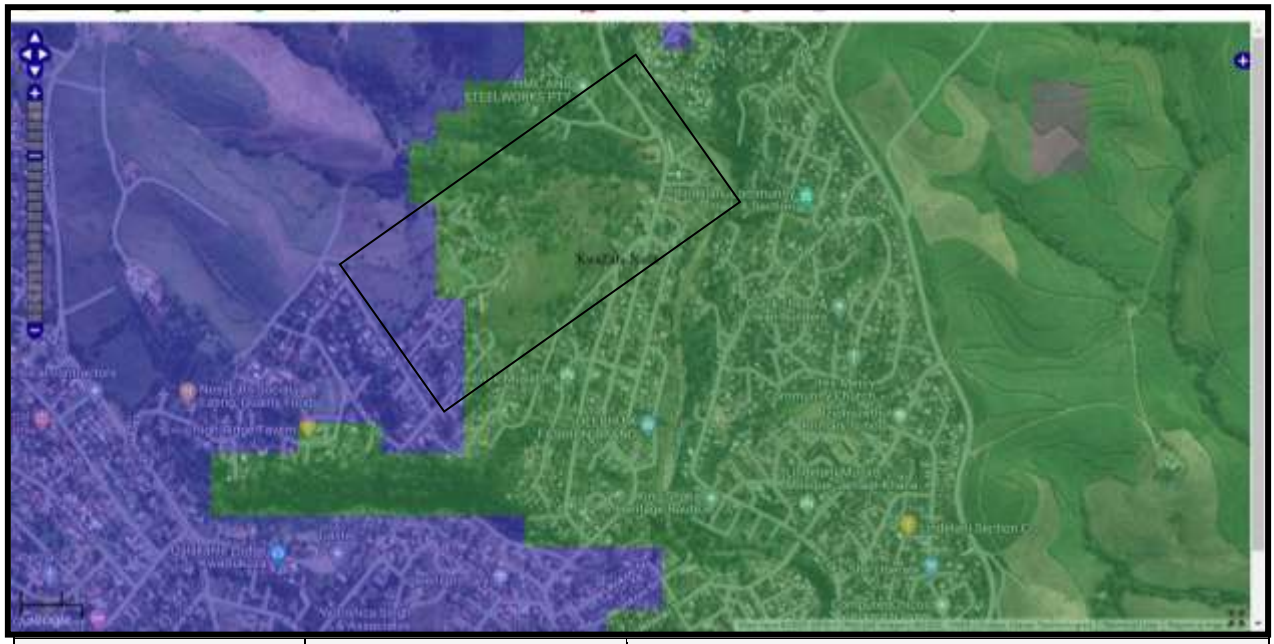


[3] 2931AD_1968 Stanger

PALAEONTOLOGICAL SENSITIVITY

The area is mostly in an area of moderate palaeontological sensitivity (fig. 9). Dr Alan Smith undertook a desktop study of the proposed housing area (Appendix A). He states: Although paleontological material is very unlikely (but not zero) to be encountered in the soil during the Shakaspring Subsidised Housing Project, a "Chance Find Protocol" has been included. No further **palaeontological work** is required unless the "Chance Find Protocol" is triggered.

FIG. 9: PALAEONTOLOGICAL SENSITIVITY MAP



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

FIELD SURVEY

A field survey was undertaken on the 17 May 2023. The southwestern part of the study area is on top of the hill. Most of this upper area has been changed with the addition of low cost housing – more than what is indicated on the Google Earth imagery.

The study area is mostly on a steep gradient that would not have archaeological sites.

No heritage sites were observed within the study area.

MITIGATION

No further mitigation is required in terms of the heritage aspect. However, if any artefacts or human remains are noted, then KZNARI needs to be informed.

A Chance Find Protocol is required for the palaeontology.

CONCLUSION

A heritage survey was undertaken for the proposed Shakaspring Subsidised Housing Development, KwaDukuza. The desktop study noted the area has been under cultivation for over 100 years and that no known heritage sites occur within the study area. Te field survey noted that the sensitive area for potential heritage sites has been affected by new low cost housing. The rest of the land is on a steep slope that is not conducive for historical human occupation.

The chances of finding significant fossiliferous material is low. However, a Chance Find Protocol was initiated and needs to form part of the EMPr.

REFERENCES

Maps:

2931AD Stanger 1968, 2000

117B_048_36226

Database

KZN Museum

SAHRA

Umlando

EXPERIENCE OF THE HERITAGE CONSULTANT

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

DECLARATION OF INDEPENDENCE

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

Gavin Anderson
Archaeologist/Heritage Impact Assessor

APPENDIX A

DESKTOP PIA REPORT

SHAKASPRING SUBSIDISED HOUSING PROJECT: DESKTOP PALEONTOLOGICAL ASSESSMENT, STANGER, ILLEMBE REGIONAL 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

18 May, 2023

Declaration of Independence

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

Specialist: Dr Alan Smith

Signature: 

EXECUTIVE SUMMARY

Alan Smith Consulting was appointed by **UMLANDO: Archaeological Surveys & Heritage Management** to conduct a Desk-Top field assessment of the potential impacts to **Palaeontology Resources** that might occur through the activities of the proposed Shakaspring Subsidised Housing Project, Stanger, Ilembe District Municipality, KwaZulu-Natal

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

The chances of encountering fossils are **Low,** but N**ot Zero**; consequently a ***"Chance Find Protocol"*** has been included (see section 6).

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 Shakaspring Subsidised Housing project (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 Shakaspring Subsidised Housing 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 9) were used in this research.

4. GEOLOGY

This project is located on rocks of the Dwyka Group ***(C-Pd:Greenish).*** It may also intersect rocks of the Natal Group ***(Light Blue)*** and Karoo Dolerite ***(Jd: red)***) (Figure 2).

Figure 2: Approximate area (boxed) of the Shakaspring Subsidised Housing project. Extract from the 125 000 Geological Map: Durban 2930. According to this map, this project will intersect Dwyka Group (C-Pd:Greenish), possibly the Natal Group (Light Blue) and Karoo Dolerite (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. In this region 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.

Natal Group

The Natal Group formed early in the history of the Gondwana Supercontinent. The Natal Group comprises reddish coloured sandstones, when seen in the field. Deposition of the Natal Group began in the Early Ordovician and lasted possibly to the Late Ordovician, 485-443 (Ma) millions of years (Vorster et al., 2016). Deposition took place in a terrestrial-dominated setting on the Gondwana Supercontinent. It was probably deposited in a small, half-graben, continental basin (Vorster et al., 2016). This unit is very poorly understood.

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 was a sequence of lavas up to 4.5 km thick which was deposited about 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 took place by fissure eruption. This event triggered the break-up of the Gondwana supercontinent (Hastie et al., 2014).

5. PALAEONTOLOGY

The area of the proposed Shakaspring Subsidised Housing development is green coded (Table 1; Figure 3).

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

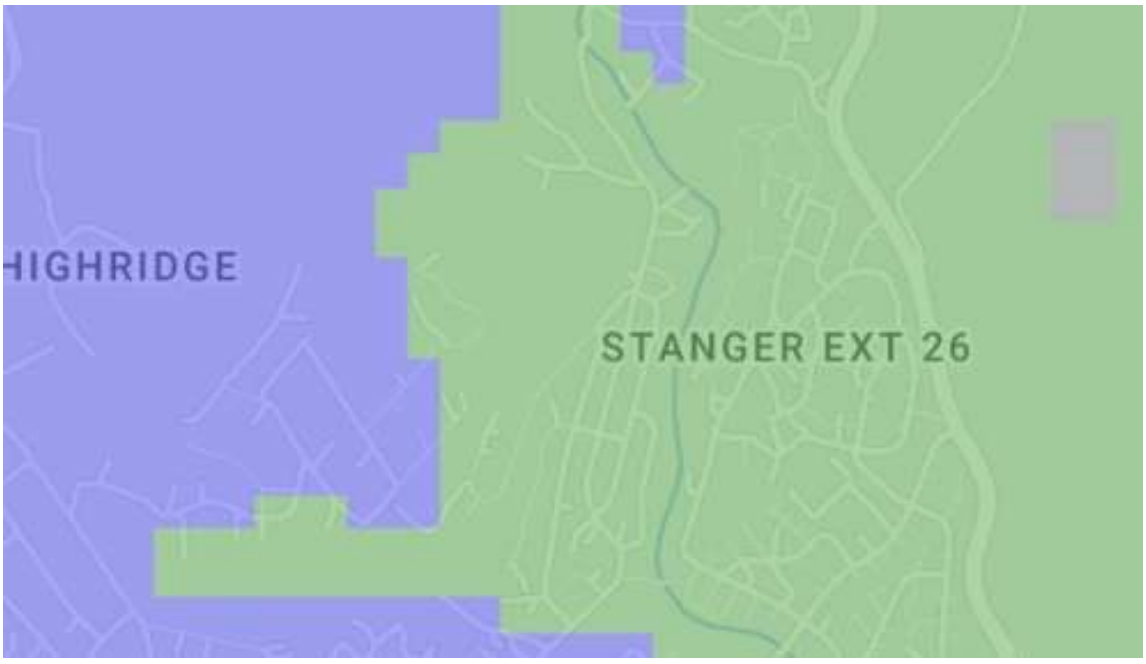


Figure 3: Palaeosensitivity of the Shakaspring Subsidised Housing Development (approximate area). Extract from Sahris Palaeosensitivity Map). Project is dominantly on green coded area.

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 or shells have been recorded from this lithology. In the latter case this may be due to the strong silt flux given off by melting glaciers inhibiting carbonate precipitation.

Natal Group

The Natal Group is believed to have been laid down in a terrestrial setting. At this time (Ordovician) there was little terrestrial life on Earth. No fossils are known from the Natal Group. However this does not mean none ever will. No distinction is made between the Natal Group and the Mzimkaba Formation (which can contain fossils) on the Durban 125, 000 Geological Map, however at this locality it very unlikely to be Mzimkaba.

Karoo Dolerite

This is an intrusive igneous rock and by definition is not fossiliferous.

6. 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.

7. CONCLUSIONS

Although paleontological material is very unlikely (but not zero) to be encountered in the soil during the Shakaspring Subsidised Housing Project, a "Chance Find Protocol" has been included. No further **palaeontological work** is required unless the "Chance Find Protocol" is triggered.

8. REFERENCES

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

Visser, J.N.J., 1990. The age of the late Palaeozoic glacigene deposits in southern Africa. South African Journal of Geology, 93, 366–375.

Vorster, C; Krammers, J; Beukes, N; Vanniekerk H (2016). Detrital zircon U–Pb ages of the Palaeozoic Natal Group and Msikaba Formation, Kwazulu-Natal, South Africa: provenance areas in context of Gondwana Geol. Mag. 153 (3), 2016, pp. 460–486. Cambridge University Press 2015 460 doi:10.1017/S0016756815000370

9. DETAILS OF SPECIALIST

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

&

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

Role: Specialist Palaeontological Report production

Expertise of the specialist:

Dr Alan Smith: CV (short)

Dr Alan Smith Pr. Sc. Nat., I.A.H.S.

Private Consultant: ***Alan Smith Consulting, 29 Brown's Grove, Sherwood, Durban***
&
Honorary Research Fellow: ***Discipline of Geology, School of Agriculture, Earth and Environmental Sciences, University of KwaZulu-Natal, Pietermaritzburg***.

Role: Specialist Palaeontological Report production
Expertise of the specialist:

- MSc in palaeontology. The Stromatolites of Etosha Pan. (University of KwaZulu-Natal).
- Alan has published 9 refereed journal articles on "Stomatolites".
- He is part of the Epstrom international collaboration on extant stromatolites. This is sponsored by the Natural Environment Research Council, UK (NERC) and includes Essex (UK) Nelson Mandela, Ulster (UK) and KwaZulu-Natal Universities.
- PhD in Geology (University of KwaZulu-Natal), Expert in Vryheid Formation (Ecca Group) in northern KZN, this having been the subject of PhD.
- Scientific Research experience includes: Fluvial geomorphology, palaeoflood hydrology, Cretaceous deposits.
- Experience includes understanding Earth Surface Processes in both fluvial and coastal environments (modern & ancient).

- Alan has published in both national and international, peer-reviewed journals. He has published more than 50 journal articles with +620 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.
- Alan has been writing Palaeontological Reports since 2014.